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3rd Edition

Review of Bailey & Love

COMPACT SURGERY

By:
Dr. Maryam Masood (D.U.H.S.)
Dr. Sheheryar Munir (D.U.H.S.)

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Published By : AZAM SONS
Opp. Dow University,
Baba-e-Urdu Road, Karachi.
Phone: (+92) 3272 8282
Email: azamsons@live.com

Distributor : **ZUBAIR BOOK DEPOT**
Neela Gumbad,
Lahore.
Phone: (+92)

3rd Edition : 2020

Printed at : Afrisia Printing Press, Karachi

Retail Price : Rs. 595/-

PREFACE

“RECITE WITH THE NAME OF YOUR LORD WHO CREATED”
Sorah : Al-Alaq

I am thankful to Almighty ALLAH who gave the opportunity and courage to write this comprehensive book for undergraduate medical student.

This is a concise book of general surgery help students in review and concept building as it contains relevant and current information of general surgery.

This book is based on Bailey and love short practice of surgery.

This book offers students a comprehensive knowledge on subject of interest as it focuses on current syllabus and viva pattern.

Your healthy comments, suggestions and constructive criticism are highly appreciated.

You can also follow us on us on face book

Wish you all the best.

Dr. Maryam Masood
Dow Medical College

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THIS BOOK IS DEDICATED TO
MY BELOVED PARENTS

M. MASOOD ALI KHAN
&
RUKHSANA MASOOD

REVIEW OF BAILEY & LOVE

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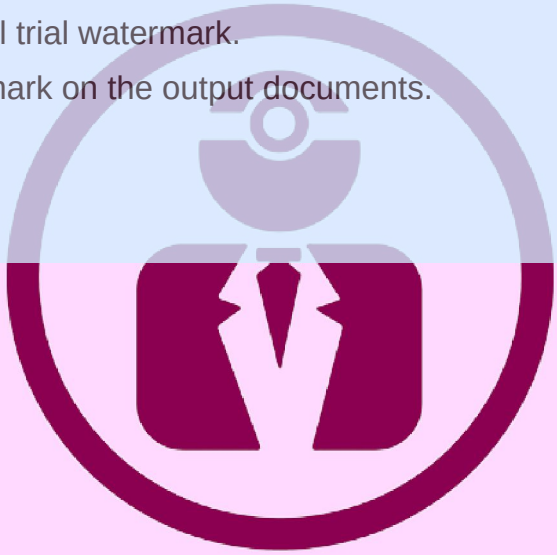
PART - 1

THE PRINCIPLES



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METABOLIC RESPONSE TO INJURY

Chapter 01

BASIC CONCEPT :

- Haemostasis is the foundation of normal physiology.
  "Stress free" preoperative care helps to preserve haemostasis following elective surgery.
- In a severely injured patient hemostasis can be possible by means of resuscitation, surgical
- intervention and critical care.

SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) :

- SIRS Is Characterized By Release Of Pro Inflammatory Cytokines (I.E Interleukin-1 IL 1, IL6, IL8, Tumor Necroting Factor Alpha) These Are Responsible For :
- Act On Hypothalamus And Cause Pyrexia.
- Act On Skeletal Muscles And Cause Proteolysis.
- Inducing Acute Phase Protein Production In Liver.
- Development Of Peripheral Insulin Resistance.
- Augment The Hypothalamic Response.
- To Control The Pro Inflammatory Response , Within Hours Of Upregulation Of Cytokines There Is Rapid Increase In Plasma Levels Of Cytokineantagonists (I.E Interleukin 1 Receptor Antagonist (IL 1Ra) And TNF Soluble Receptors (TNF -Sr).
- If This Process Is Prolong Or Excessive It May Evolve Into Counter inflammatory Response Syndrome (CARS).
- CARS Result In Immunosuppression And Increased Susceptibi
  (Nosocomial) Infection.

NEUROENDOCRINE RESPONSE TO INJURY :

- The Pathway Of Stress Response Consist Of :
- Afferent Nociceptive Neurons
- Spinal Cord
- Thalamus
- Hypothalamus
- Pituitary
- The Neuroendocrine Response Is Biphasic

ACUTE PHASE :

- It is characterized by an actively secreting pituitary and elevated counter regulatory hormones (i.e cortisol, glycogen, adrenaline)
- The phase is thought to be beneficial for short term survival.

CHRONIC PHASE :

- This phase is characterized by hypothalamic suppression and low serum levels of the respective target organs.
- The changings in this phase contribute to chronic wasting.

EBB AND FLOW MODEL :

- It is the metabolic stress response to surgery and trauma

EBB PHASE :

- Begins at the time of injury and last for approximately 24-48 hours.
- It may be attenuated by proper resuscitation, but not completely abolished.
- It is characterized by hypovolemia, decrease basal metabolic rate, reduce cardiac utput, hypothermia and lactic acidosis.
- The ebb phase is regulated by catecholamines, cortisol and aldosterone.
- The main physiologic role of ebb phase is to conserve both circulating volume and energy stores.

FLOW PHASE :

- It begins after ebb phase, it correspond to SIRS.
- It is characterized by tissue edema, increased metabolic rate, increase cardiac output, raised body temperature, leukocytoses, increased oxygen consumption and increased gluconeogenesis.
- It is subdivide into :
- Catabolic phase : lasting for about 3-10 days
- Anabolic phase : lasting for weeks. It is characterized by increased regulatory hormones and inflammatory cytokines results in sustained urinary nitrogen excretion, insulin resistance and increase risk of infection and cardiovascular diseases.

PHYSIOLOGICAL RESPONSE TO INJURY :

- The natural response to injury includes :
- Immobility/ rest
- Anorexia
- Catabolism
- The changes are designed to aid survival of moderate injury in the absence of medical intervention.

KEY CATABOLIC ELEMENT OF FLOW PHASE :

1. Hyper metabolism
2. Acute phase protein response APPR in liver
3. Insulin resistance
4. Skeletal muscle wasting
5. Change in body composition

1. HYPERMETABOLISM :

- It is mainly caused by an acceleration of energy dependent metabolic cycle.
- It results in energy expenditure from :central thermodysregulation, increase sympathetic activity, abnormalities in wound circulation (ischemic areas produce lactate), increase protein turnover and nutritional support.

2. ACUTE PHASE PROTEIN RESPONSE (APPR) :

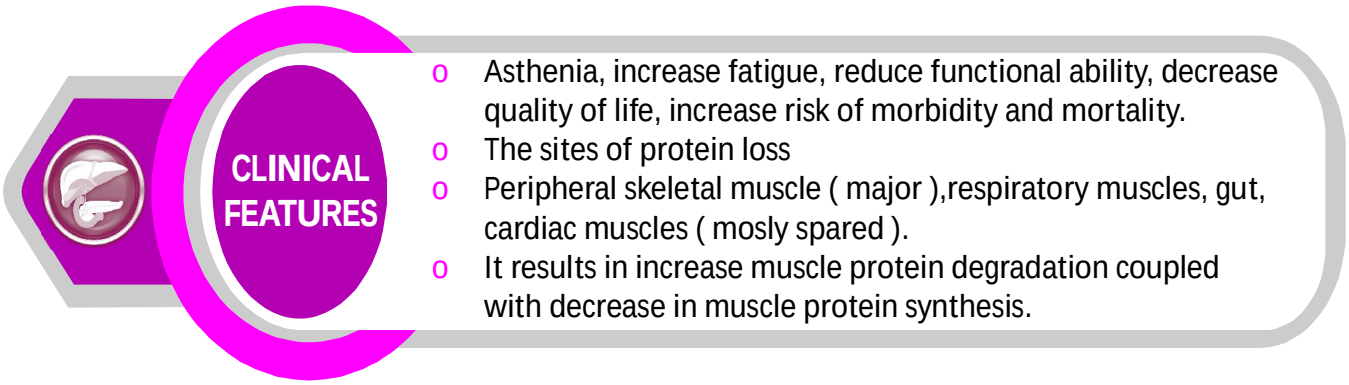
- The liver and skeletal muscle together accounts for > 50 % f daily body protein turnover.
- Skeletal muscle has a large mass but low turnover, liver has relatively small mass but high protein turnover.
- The appr represents a double edge sword as it provides protein important for recovery and repair but only at the expense of valuable lean tissue and energy reserve.
- The hepatic acute phase response characterized by
- Positive reactants : increase in plasma concentration, eg crp, fibrinogen.
- Negative reactants : decrease in plasma concentration, eg albumin.

3. INSULIN RESISTANCE

- Following surgery or trauma post operative hyperglycemia develops.
- Hyperglycemia develops due to increase glucose production combined with decrease glucose uptake in peripheral tissues as results of insulin resistance.
- The degree of insulin resistance is proportional to magnitude of injurious process.
- Following routine upper abdominal surgery insulin resistance may persist for approximately 2 weeks.
- Postoperative patients with insulin resistance behave in similar manner to individuals with type 2 diabetes mellitus.
- The mainstay of management of insulin resistance is in
- Insulin infusion may be used in either intravenous app ach.

4. SKELETAL MUSCLE WASTING :

- It provdes amino acids for the metabolic support of central organ/tissue.
- it is mediated at molecular level mainly by activation of ubiquitin-proteasome pathway.



- Asthenia, increase fatigue, reduce functional ability, decrease quality of life, increase risk of morbidity and mortality.
- The sites of protein loss
- Peripheral skeletal muscle (major),respiratory muscles, gut, cardiac muscles (mosly spared).
- It results in increase muscle protein degradation coupled with decrease in muscle protein synthesis.

5. CHANGES IN BODY COMPOSITION FOLLOWING INJURY :

- Catabolism leads to decrease in fat mass and skeletal muscle mass.
- Body weight may paradoxically increase because of expansion of extracellular fluid space.
- The body weight increase immediately on resuscitation with an expansion of extracellular volume by 6-10 lit within 24 hours
- Thereafter, the total body protein will diminish by 15 % in the next 10 days and body weight will reach negative balance as the expansion of extracellular space resolves.
- This change can be avoided by blocking the neuroendocrine stress response with
  1- Epidural Analgesia
  2- Early Enteral Feeding

AVOIDABLE FACTORS THAT COMPOUND THE RESPONSE TO INJURY :

- continuing hemorrhage
- hypothermia
- tissue edema
- starvation (glycogen is depleted by 24 hrs ; by gluconeogenesis and 40 hrs by gluconeogenesis)
- inadequate perfusion
- immobility

A PROACTIVE APPROACH TO PREVENT UNNECESSARY ASPECTS OF SURGICAL STRESS :

- minimal access techniques
- blockade of afferent painful stimuli (eg epidural analgesia)
- minimal periods of starvation
- early mobilizations

KEY POINTS

- Ebbs phase main role is to conserve both circulating volume and energy stores for recover and repair.
- Hyper metabolism in flow phase is caused by acceleration of futile metabolic cycle.
- Peripheral skeletal muscles are major site of protein loss.

SHOCK AND BLOOD TRANSFUSION

Chapter 02

SHOCK :

DEFINITION :

- Shock is a state of cellular or tissue hypoxia due to reduced oxygen delivery or increased oxygen consumption or inadequate oxygen utilization.
- With insufficient delivery of oxygen and glucose, cells switch from aerobic to anaerobic metabolism.
- If perfusion is not restored in a timely fashion, cell death ensues.

PATHOPHYSIOLOGY :

- Reduced tissue perfusion deprives the cells of oxygen result in change from aerobic to anaerobic metabolism
- Anaerobic respiration produces lactic acid which causes metabolic acidosis.
- As glucose within the cells is exhausted anaerobic respiration ceases resulting in failure of sodium potassium pump.
- Intracellular lysosomes release autodigestive enzymes and cell lysis ensues
- Hypoxia and acidosis activate compliment and neutrophils resulting in generation of oxygen free radicals and cytokines causing capillary en

SYSTEMIC FEATURES :

CVS :

- Tachycardia and systemic vasoconstriction from :
- Increase in sympathetic activity
- Release of catecholamines in circulation
- Decrease in preload and afterload.

RESPIRATORY :

- Metabolic acidosis and increased sympathetic response result in an increased respiratory rate and minute ventilation :
- To increase excretion of co2
- Compensatory respiratory alkalosis.

RENAL :

- Decrease perfusion pressure in kidney leads to :
- Reduce gfr and urine output
- Increase in sodium and water reabsorption by activation of renin-angiotensin system.
- Further vasoconstriction

ENDOCRINE :

- Activation of adrenal and renine angiotensin system
- Increase production of antidiuretic hormone in response to decrease pre load causing vasoconstriction and water resorption in renal collecting system
- Cortisol is also released leads to sodium and water resorption and sensitizing the cells to catecholamines.

CLASSIFICATION OF SHOCK :

Shock can be classified on the basis of initiating mechanism as

1. Hypovolaemic shock
2. Cardiogenic shock
3. Obstructive shock
4. Distributive shock
5. Endocrine shock

CLASSIFICATION :

Shock	Important features	Causes	Pathophysiology
Hypovolaemic	Most common	Caused by reduced circulating volume Hemorrhage Non-hemorrhagic: vomiting, diarrhea, urinary loss (dm), pancreatitis	Dec cardiac output due to dec volume of blood Dec left ventricular end diastolic volume Inc peripheral vascular resistance (vasoconstriction of arterioles) Dec mixed venous o2 content (mvo2) i.e dec blood flow through microcirculation leads to increase excretion of oxygen from blood ar
Cardiogenic	Due to primary failure of heart to pump blood to tissues.	Mi (most common) Cardiac dysrhythmias Valvular heart disease Blunt myocardial injury	Dec card of contraction in left ventricle Inc lv end diastolic pressure blood accumulation in lv Inc peripheral vascular resistance due to vasoconstriction of arterioles. Dec mvo2 content
Obstructive	Reduced preload because of mechanical obstruction of cardiac filling	Cardiac temponade Tension pneumothorax Massive pulmonary embolism Air embolism	Reduce filling of left or right side lead to reduce preload and dec cardiac output.
Distributive	Hypotension and generalized tissue hypoxia resulting from vascular dilation	Anaphylaxis (vasodialation caused by histamine release) Spinal cord injury (vasodialation caused by failure of sympathetic outflow)	Septic shock : Initial inc in cardiac output -> decrease left ventricular end diastolic pressure ->dec peripheral vascular resistance -> increase mvo2 -> tissue are unable to extract o2

		Sepsis (vasodialation due to release of bacterial endotoxinsand activation of cellular and hormonal immune system)	because of increase blood flow.
Endocrine	A combination of hypovolemic, cardiogenic and distributive shock	Hypothyroidism (myxedema coma) Hyperthyroidism Adrenal insufficiency	Hypothyroidism : dec cardiac output due to low inotropy and bardycardia Thyrotoxicosis : high output cardiac failure Adrenal insufficiency : hypovlemia and poor responmnse to circulating and endogenous catecholamines or due to addisons disease.

Cardiovascular and metabolic characteristics of shock :

Characteristics	Hypovolemic	Cardiogenic	Obstructive	Distributive
Cardiac output	Low	Low	Low	High* (septic)
Vascular resistance	High	High	High	Low
Venous pressure	Low	High	High	Low
Mixed venous saturation	Low	Low	Low	High
Base deficit	High	High	High	High

* table after : bailey and love short practice of surgery

CLINICAL FEATURES

- **Septic shock :** it is characterized by following features
  - Warm skin : vasodialation of skin vessels
  - Increase cardiac output :bounding pulse
  - Acute respiratory distress syndrome
  - Disseminated intra vascular coagulation dic
- Patient with shock exhibit low bp, high heart rate with rapid and weak pulses
- O/e : aitated or confused state and cold clammy peripheries

Clinical features	Compensated	Mild	Moderate	Severe
Lactic acidosis	+	++	++	+++
Urine output	Normal	Normal	Reduced	Anuric
Conscious level	Normal	Mild anxiety	Drowsy	Comatose
Respiratory rate	Normal	Increase	Increase	Labored
Pulse rate	Mild increase	Increase	Increase	Increase
Blood pressure	Normal	Normal	Mild hypotension	Severe hypotension

* table after : bailey and love short practice of surgery

MANAGEMENT OF SHOCK :

RESUSCITATION :

- Maintain iv line
- First line therapy is intravenous fluid administration
- Short wide bore catheter or long narrow needles (central venous catheter)

CHOICE OF FLUID :

- There is no overt difference in response or outcome of crystalloids (normal salaine, hartman solution, ringer lactate) or colloids (albumin , dextran, gelofusin)
- If blood is being lost , the ideal replacement is blood.
- Hypotonic solutions (dextrose) are poor volume expanders and should not be used in treatment of shock unless the deficit is free water loss (diabetes insipidus) or patient are sodium overload (cirrhosis)

DYNAMIC FLUID RESPONSE :

- The need for fluid can be determined dynamically by the cardiovascular response to the rapid administration of fluid bolus.
- In total 250-500 ml of fluid is rapidly given over 5-10 minutes
- Cardiovascular response is observed in `terms of heart rate, blood pressure and central venous pressure.
- Patients can be divided into responders, transient responders and non-responders.
- **Responders :** have an improvement in their cardiovascular status which is sustained, they are not actively losing fluid but require filling to a
- **Transient responders :** have an improvement but reve
- 10 -1 20 minutes.

Non responders : have no response and are severely volume depleted.

VASOPRESSOR AND INOTROPIC SUPPORT :

- **Vasopressors :** eg phenyl epinephrine and noradrenaline
- **Indications :** distributive shock (sepsis , neurogenic shock) in which there is peripheral vasodialation and a low systemic vascular resistance.

- Inotrops : eg dobutamine

- Indications : in cardiogenic shock or when myocardial depression complicates a shock state i.e severe septic shock with low cardiac output.
- These are not indicated as first line therapy in hypovolemia.
- If given before fluid therapy they will cause decrease coronary perfusion and depletion of myocardial oxygen reserves.

MONITORING :

MINIMUM :

- Ecg
- Pulse oximetry
- Blood pressure
- Urine output (best measure of organ perfusion, best monitor of adequacy of shock therapy)

ADDITIONAL MODALITIES :

- Invasive blood pressure
- Cardiac output
- Mixed venous oxygen saturation :
- Central venous pressure

Levels	Findings
50-70%	Normal levels
< 50%	Inadequate oxygen delivery ,increase oxygen extraction by the cells in hypovolemia and cardioenic shock
>70%	Sepsis

- **Base deficit and serum lactate :** it is sensitive for both diagnosis of shock and monitoring of response to therapy.
- A base deficit of > 6 mmol/l have higher mortality and morbidity than those with no metabolic acidosis.

HEMORRHAGE :

TYPES :

- Revealed
- Concealed
- Primary
- Reactionary
- Secondary
- Surgical
- Non surgical

PRIMARY :

- Bleeding occurs immediately after surgery or intra operative bleeding

REACTIONARY :

- Bleeding within 24 hours of surgery

CAUSES :

- Dislodgement of clots
- Normalization of blood pressure

- Vasodialation
- Slippage of ligature

SECONDARY :

- It usually occurs 7-14 days after injury due to sloughing of wall of vessels.

PRECIPITATING FACTORS :

- Infection
- Pressure necrosis
- Malignancy

REVEALED HEMORRHAGE :

- Obvious external hemorrhage.
- Eg : open arterial wound
- Massive hemetemesis from duodenal ulcer

CONCEALED HEMORRHAGE :

- Hemorrhage within the body cavity
- Eg : trauma (within chest, abdomen, pelvis, reteroperitoneum, limbs

SURGICAL :

- It is due to direct injury and is amenable to surgical control
- Eg angioembolization.

NON-SURGICAL :

- Hemorrhage by general ooze from all raw surfaces can
- means (except packing)
- Eg : coaugulopathy

CLASSIFICATION OF HEMORRHAGIC SHOCK :

	1	2	3	4
Blood volume lost	<15 %	15-30 %	30-40 %	>40 %

* table after : bailey and love short practice of surgery

MANAGEMENT :

Identify the hemorrhage : external/ concealed
Immediate resuscitative measures :

- Direct pressure over external hemorrhage site
- Airway and breathing assessment
- Pass large bore iv access
- Blood drawn for cross matching

IDENTIFY THE SITE OF HEMORRHAGE :

- To define the next step in hemorrhage control operation, angioembolization, endoscopic control.
- **Hemorrhage control :** if bleeding is severe the only way to establish a diagnosis may be at re-operation.
- If the patient is stable and re-operation is undesirable consider imaging.
- CT scan may reveal intra-abdominal or intra thoracic hemorrhage.
- Angiography may reveal active bleeding site and may be therapeutic
- Once hemorrhage is controlled patient should be aggressively resuscitated, warmed and coaugulopathy corrected.

DAMAGE CONTROL SURGERY :

- Arrest hemorrhage
- Control sepsis
- Protect from further injury
- Nothing else

BLOOD TRANSFUSION :

Blood & blood products :

Whole blood :

- Now rarely available
- Coagulation factor rich
  - If fresh more metabolically active than stored blood.

PACKED RED CELLS :

- These are red blood cells which are separated from wh n and concentrated.
  - **Shelf life :**
    - 5 weeks at 2-6 degree c : in sag-m solution (salaine adenine glucose mannitol)
    - 2-3 weeks : in cpd solution (citrate phosphate dextrose)
  - **Each unit** = 330 ml with a hematocrit of 50-70n %

PLATELETS :

- Platelets are supplied as a pooled platelet concentrate and contain about 250*10 9/l
- Platelets are stored on special agitator at 20-24 degree c with a shelf life of 5 days.
- **Indications :** thrombocytopenia, platelet dysfunction, bleeding or undergoing surgery.
- Platelets do not need to be cross matched but should be abo compatible.

Prothrombin complex concentrate (pcc) :

- Pcc are highly purified concentrates prepared from pooled plasma.
- They contain factor 2, 9, 10 and 8.
- **Indication :** for emergency reversal of anticoagulant (warfarin) therapy in uncontrolled hemorrhage.

FRESH FROZEN PLASMA (FFP) :

- Is removed from fresh blood and stored at -40 to -50 degree c with a 2 year shelf life.
- Rich in coagulation factor
- FFP is first line therapy in treatment of coagulopathic hemorrhage..
- FFP does not need to be crossed matched but should be abo compatible.
- Rhesus d positive FFP may be given to rhesus d negative woman.

- 1 unit of ffp = 150-250 ml

CRYOPRECIPITATE:

Cryoprecipitate is a supernatant of ffp.

- It is rich in factor 8 and fibrinogen.
- It is stored at -30 degree c with a 2 year shelf life.
- It is given in low fibrinogen state or factor 8 deficiency.
- Abo and rhesus compatibility are not relevant.
- 1 bag of cryoprecipitate = 150-250 mg of fibrinogen and factor 8.

INDICATIONS FOR BLOOD TRANSFUSION :

- Acute blood loss
- Preoperative anemia
- Symptomatic chronic anemia

Perioperative red blood cell transfusion criteria :

Hb level (g/dl)	
< 6	Transfusion will benefit the patient.
6-8	Transfusion unlikely to be benefit in absence of bleeding or surgery.
>8	No indication for transfusion in the absence of other risk factors.

BLOOD GROUP AND CROSS MATCHING :

Abo & rhesus group :

- The system consist of three allelic genes a, b and o.
- The system allows for 6 possible genotypes although there are only 4 phenotypes.
- These are strongly antigenic and are associated with naturally occurring antibodies in serum.
- Blood group o is universal donor and contains no antigen to provoke a reaction.
- Blood group ab is universal recipient and can receive any abo blood type they have no circulating antibodies.
- 85 % of population have rhesus d (rhd).
- Rhd is strongly antienic
- 15 % of individual do not have antibodies to d but the formation may be stimulated by the transfusion of rh positive red cells or they may acquire during delivery of a rh(d) positive baby.

Phenotype	Genotype	Antigen	Antibodies	Frequency (%)
O	Oo	O	Anti-a , anti-b	46
A	Aa or ao	A	Anti-b	42
B	Bb or bo	B	Anti-a	9
AB	Ab	AB	None	3

*** table after : bailey and love short practice of surgery**

TRANSFUSION REACTION :

- If antibodies are present in the recipient serum are incompatible with the donors cell, a transfusion reaction will result.
- Cross matching is required to prevent transfusion reaction.
- Full cross matching may take upto 45 minutes.
- When blood must be given in emergency group 0 is given.
- O-negative : to females
- O-positive : to males

COMPLICATIONS OF BLOOD TRANSFUSION :

- Single transfusion complications :
  - Febrile transfusion reaction
  - Air embolism
  - Incompatibility hemolytic transfusion reaction
  - Infection (bacterial, hepatitis, hiv , malaria
  - Thrombophlebitis
  - Transfusion related acute lung injury

MASSIVE TRANSFUSION COMPLICATIONS :

- Coagulopathy
- Hypocalcemia
- Hypothermia
- Hypokalaemia
- Hyperkalemia

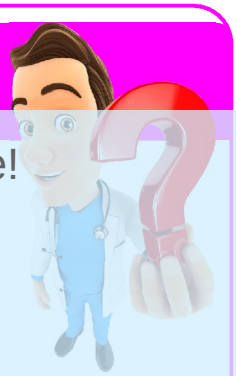
CORRECTION OF COAGULOPATHY :

- Ffp if prothrombin time (pt) or partial thromboplastin time (ptt) > 1.5 times normal
- Cryoprecipitate if fibrinogen <0.8 g/l
- Platelets if platelets count < 50 *10 9 / ml

KEY POINTS

- Repeated transfusion will result in hemosidrosis.
- Multiple transfusion cause hypocalcemia.
- Massive transfusion causes hyperkalaemia.
- Anaerobic respiration will causes systemic metabolic acidosis

A young male of 29 yrs old admitted in hospital for blood transfusion, during transfusion he is complaining of flushing of skin , severe itching



Q : what is the possible cause of his symptoms ?

A : blood transfusion reaction.

Q :what will be the immediate measures to his condition ?

A : stop the blood

Q : what are the complications if single ?

A : complications of single transfusion reaction are : febrile transfusion reaction, allergy, infection, air embolism, thrombophlebitis.

Q :massive blood transfusions ?

A : complications of massive transfusion are : coagulopathy, hypocalcemia, hypokalemia, hypothermia, hyperkalaemia.

SURGERY IN TROPICS

Chapter 03

ASCARIS LUMBRICOIDES (ROUND WORM) :

- Most common intestinal nematodes.
- It produces symptoms both as larva and adult worm.

PATHOGENESIS :

- Typically found in humid atmosphere and poor sanitary contusions.
  Larva cause pulmonary symptoms :
  - cough ,chest pain dyspnea , fever (loeffler's syndrome)
- Adult worm cause gastrointestinal :
  - distal ileal obstruction,
- BILIARY
  - ascending cholangitis and obstructive jaundice from infestation of common bile duct.
- PANCREATIC SYMPTOMS :
  - acute pancreatitis when worm is lodged in pancreatic duct.
  - Malnutrition
  - Failure to thrive.

INVESTIGATION :

- CBC - esinophilia
- Stool examination - ova
- Sputum examination - charcot-leyden crystals.
- Chest Xray- fluffy exudates in loffler's syndrome.
- Barium meal and follow through - bolus of worms in ileum or lying freely in small intestine.
- U/S - worm in pancreatic duct or common bile duct.

MANAGEMENT :

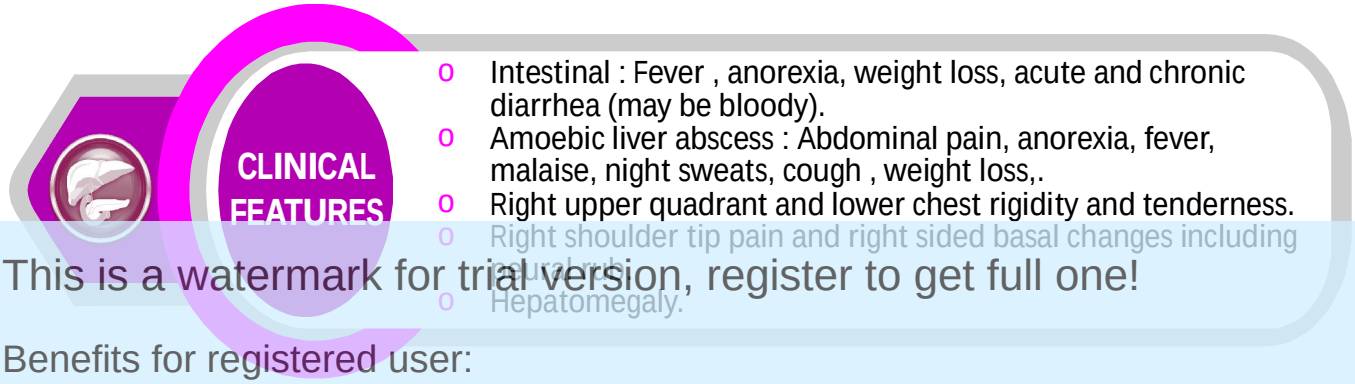
- Pulmonary disease is self limiting only symptomatic treatment.
- Anthelminthic drugs for intestinal disease
- Complications like intestinal obstruction require surgery

AMOEBIASIS :

PATHOGENESIS :

- **Organism :** Entamebia histolytica.
- Transmitted by Fecal-oral route.

- The vast majority of carriers are asymptomatic.
- Insanitary conditions and poor personal hygiene encourage transmission of infection.
- In small intestine parasite hatches into trophozoites, which invade the submucosa producing flask shaped ulcer.
- In portal circulation , parasite causes liquifactive necrosis in the liver producing an abscess (most common extra intestinal manifestation)
- The majority of abscess in right lobe of liver.
- A mass in the course of large bowel may indicate an amoeboma.



INVESTIGATIONS :

- CBC (anemia, leukocytosis)
- Elevated ESR, CRP
- LFT (elevated alkalaine phosphatases ALP).
- U/S
- CT Scan.
- Sigmoidoscopy (flask shaped ulcer , most comm
- Serological investigations :

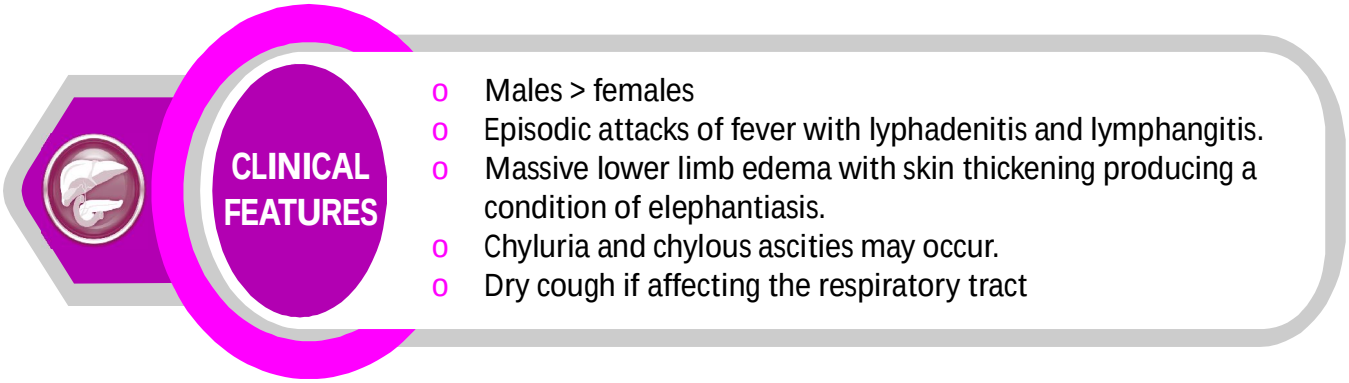
1. Non-endemic regions : Indirect hemagglutinin iha and elisa .
2. Endemic regions : Counter-immunoelectrophorosis

MANAGEMENT :

- Medical :
- Treatment of choice in elective cases.
- Metronidazole and tinidazole are effective drugs.
- Diloxanide furoate : Used for 10 days to destroy intestinal ameoba but not effective against hepatic infestation.
- Surgical :
- Open drainage if an abscess fails top respond.
- Reserved for complications like rupture into pleural, peritoneal, pericardial space.

FILARIASIS :

- Caused by parasite wuchereria bancrofti carried by mosquito.
- Adult worm mainly colonise the lymphatic system.



- Males > females
- Episodic attacks of fever with lyphadenitis and lymphangitis.
- Massive lower limb edema with skin thickening producing a condition of elephantiasis.
- Chyluria and chylous ascities may occur.
- Dry cough if affecting the respiratory tract

DIAGNOSIS :

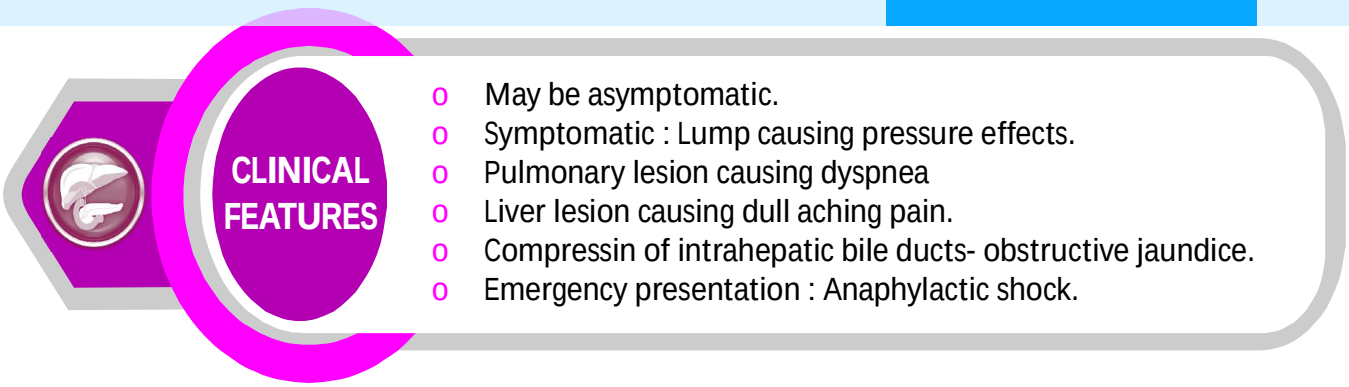
- Cbc esinophilia
- Nocturnal peripheral blood smear - immature form of microfilariae.
- Parasite may also seen in chylous urine, ascities and hydrocele fluid.

MANAGEMENT

- Medical treatment with diethylcarbamazine
- Intermittent pneumatic compressions (in early disease).
- Surgery in hydrocele.

HYDATID DISEASE (Tape Worm) :

- Caused by echinococcus granulosus.
- It can affect any organ but LIVER is most common follo



- May be asymptomatic.
- Symptomatic : Lump causing pressure effects.
- Pulmonary lesion causing dyspnea
- Liver lesion causing dull aching pain.
- Compressin of intrahepatic bile ducts- obstructive jaundice.
- Emergency presentation : Anaphylactic shock.

DIAGNOSIS :

- CBC - esinophilia
- U/S and CT Scan ARE INVESTIGATION OF CHOICE.
- CT scan - space occupying lesion with a smooth outline with septa, pulmonary disease-water lily sign.
- ERCP
- Serology - casoni test (positive in 80%), IHA test is most accurate.
- CXR (pulmonary disease) meniscus or cresent sign.

MANAGEMENT :

- Medical : albendazole 400mg tds for 30 days.
- Surgical :
- If connection between cyst and bile duct : removal of intact cyst.
- If no connection : PAIR

1. Puncture of cyst
2. Aspiration.
3. Injection of 100 % ethanol or hypertonic saline.
4. Re-aspiration after 25 minutes.

- Pulmonary disease : surgery like vcystotomy, capittonage, pericystectomy, segmentectomy occasionally pneumonectomy.

LEPROSY (HANSEN'S DISEASE):

It is a chronic curable infectious disease caused by acid fast bacilli mycobacterium leprae.

TUBERCULOID :

- Damage to tissue early.
- Localized.
- Neura lesion : tender thickened nerves
- Dermal changes : assymetrical, hypopigmented macules with elevated edges and dry rough surfaces.
- Host resistance is stronger than virulence of organism.

LEPROMATOUS :

- Damage to tissue occurs late
- Symmetrical and extensive.
- Neural lesion : widespread neuritis, nerve thickness , neuropathic tissue injury.
- Dermal changes : hypopigmented areas affecting the face , limbs and trunk.
- Host resistance is weaker than virulence of organism.
- Nodular lesions on face “leonine facies”, loss of eyebrows, nasl deformity, facial nerve paralysis, blindness, epiphora, conjunctivitis.
- Ulner and median nerve involvement leading to CLAW HANDS
- Posterior tibial nerve involvement leading to CLAW TOES
- Lateral popliteal nerve involvement leading to FOOT DROP
- Gynaecomastia due to bilateral testicular atrophy.

DIAGNOSIS :

- Clinical examination.
- Skin smear or skin biopsy.

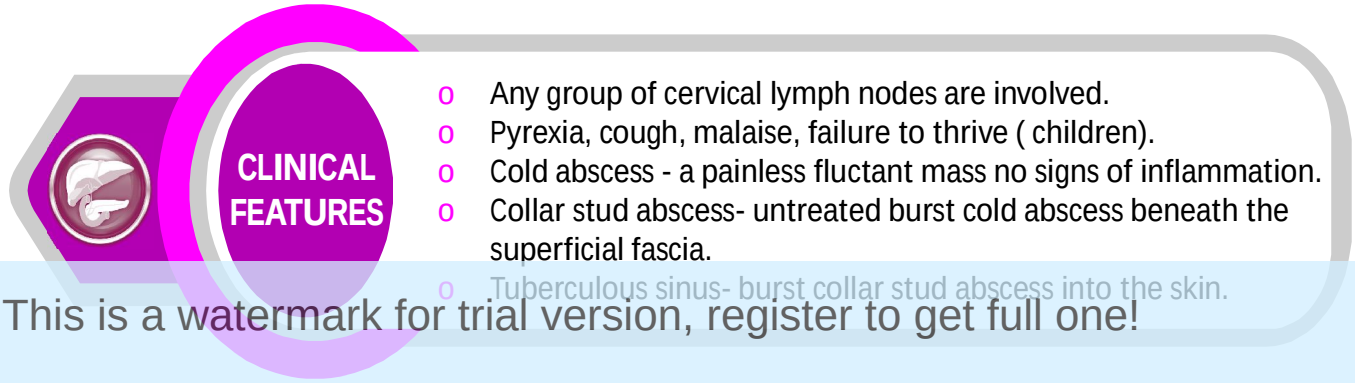
MANAGEMENT :

- Multiple drug therapy for 12 months is the key to treatment.
- Team approach.

- Dapsone is the principle drug , rifampicin and clofazimine are also use.
- Surgical treatment is required for correction of deformities like thickening of skin, paralysis of eyelids hands and feets, severely damaged limbs may require amputation.

TUBERCULOUS CERVICAL LYMPHADENITIS :

- Common in Indian subcontinent.
- Presenting with cervical lymphadenopathy.



- Any group of cervical lymph nodes are involved.
- Pyrexia, cough, malaise, failure to thrive (children).
- Cold abscess - a painless fluctant mass no signs of inflammation.
- Collar stud abscess- untreated burst cold abscess beneath the superficial fascia.
- Tuberculous sinus- burst collar stud abscess into the skin.

DIAGNOSIS :

- Cbc - low hb.
- Raised esr and crp.
- Culture and sensitivity of pus and biopsy of lymph nodes.
- Staining with ziehl neelsen for acid fast bacili.

MANAGEMENT :

- Medical treatment is the mainstay.

TUBERCULOSIS OF SMALL INTESTINE :

- It is caused by mycobacterium tuberculosis.
- Most common site - terminal ileum.
- **TYPES :**
-
  1. **Ulcerative** : serosa is studded with tubercles, virulence of organism is greater, it occurs when patient awallowed infected sputum and organism colonises the lymphatics of terminal ileum.
  2. **Hyperplastic** : host defence is greater than virulence of organism, hyperplasia and thickening of terminal ileum, caused by drinking of infected milk.

CLINICAL FEATURES

- Weight loss, malaise, chronic cough, evening rise in temperature with sweating, abdominal pain and distension, alternating constipation and diarrhea.
- Examination : Doughy feel a mass may be found in rif.
- Emergency : Distal small bowel obstruction , peritonitis (perforated tuberculous ulcer in small bowel).

DIAGNOSIS :

- CBC - lymphocytosis raised WBC
- Raised ESR , CRP
- Positive Mantoux test
- CXR - pulmonary infiltrates
- U/S abdomen localized areas of ascities.
- Barium meal and follow through- multiple small bowel strictures in ileum subhepatic caecum (hyperplastic)

MANAGEMENT :

- Medical : anti tuberculous therapy
- Surgery : Intestinal obstruction from distal ileal strictures
- Side to side ileotransverse bypass
- Right hemicolectomy.

TYPHOID :

- Caused by salmonella typhi
- Contaminated food or water
- Organism colonise the peyer's patches in terminal ileum causing hyperplasia of
- lymphoid follicles followed by necrosis and ulceration.

DIAGNOSIS :

- Fever, abdominal distension (paralytic ileus), melaena
- Blood and stool cultures for salmonella typhi.
- After second weak generalize severe abdominal pain- perforated typhoid ulcer.

MANAGEMENT :

- Vigorous resuscitation with I/v fluids and antibiotics.
- Metronidazole , cephalosporin , gentamycin are used in combination.
- Laparotomy.

KEY POINTS

- In amoebiasis diloxanide furoate is used for 10 days to destroy intestinal amoeba
- In hydatid disease CT scan is imaging modality of choice

A patient came in out patient department with complain of mild persistent right hypochondrial pain and yellow coloraation of sclera CT scan show space occupying lesion with smooth outlines and septa

Q : What is the diagnosis ?
A : Hydatid cyst

Q : What is the investigation of choice ?
A :CT scan

Q : What is the medical treatment ?
A :Albendazole 400mg TDS for 30 days

Q : What is the interventional treatment ?
A : PAIR : puncture, aspiration, injection, reaspiration

Q : What are the contraindication of intervention ?
A : Communication with the biliary tree

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SURGICAL INFECTIONS

Chapter 04

INTRODUCTION :

Micro organism are normally prevented from causing infection in tissues by intact epithelial surfaces, most notably skin. Other protective mechanisms are

- **Chemical :** Low gastric pH.
- **Humoral :** Antibodies, complements, opsonins.
- **Cellular :** Phagocytic cells , macrophages, polymorphonuclear cells and killer lymphocytes.

CAUSES OF REDUCED HOST RESISTANCE TO INFECTION :

- **Metabolic:** Malnutrition , diabetes, uraemia, jaundice.
- Disseminated disease : cancer, AIDS.
- **Iatrogenic :** radiotherapy, chemotherapy, steroids.

RISK FACTORS FOR INCREASE RISK OF WOUND INFECTION :

- Malnutrition (obesity , weight loss).
- Metabolic disease (diabetes, uraemia, jaundice).
- Immunosuppression (cancer, AIDS, steroids, chemotherapy, radiotherapy).
- Colonisation and translocation in gastrointestinal tract.
- Poor perfusion (systemic shock or local ischaemia).
- Foreign body material.
- Poor surgical technique (dead space , hematoma).

MAJOR WOUND INFECTION :

- A major SSI is defined as a wound that either discharge significant quantity of pus spontaneously or needs a secondary procedure to drain it.
- Patients are systemically ill.
- Delayed return to home.

MINOR WOUND INFECTION :

- They may discharge pus or infected serous fluid but should not be associated with excessive discomfort, systemic signs or delay return to home.

SIRS :

- It stands for systemic inflammatory response syndrome
- It is present if any 2 or greater than 2 of the following :
- **1.** Tachycardia >90 beats /min
  2. Tachypnea >20 breaths / min
  3. Pyrexia > 38 C (or hypothermia < 36 C)
  4. White blood count >12 *109/L

SEPSIS : SIRS + a documented infection.

SEPSIS SYNDROME :

Sepsis + evidence of 2 or greater than 2 organ failure.

- Respiratory, Cardiovascular, Renal, Liver, Coagulation system, Central nervous system

LOCALISED INFECTIONS :

CELLULITIS AND LYMPHANGITIS :

CELLULITIS :

- It is a non-suppurative invasive infection of tissues.
- Actively dividing infectious bacteria within tissues of skin.
- It is poorly localised.
- Systemic signs are common with chills , fever , rigors
- Blood culture are often negative.
- Common organisms :
  1. Group A beta streptococci
  2. Staphylococcus
  3. C.perfringes
- **Treatment :** I/V antibiotics (benzyl penicillin, flucloxacillin)

LYMPHANGITIS :

- It is defined as presence of actively dividing infectious in lymphatic vessels of an area of the body.
- It presents as painful red streaks in affected lymphatics.
- It is often accompanied by painful lymph nodes groups in the related drainage area.

ABSCESS :

- It is defined as localized collection of pus.
- Acute (if pus is lined by granulation tissue)
- Chronic (if pus is lined by granulation tissue and fibrosis)
- Signs of inflammation are present I.e calor (heat), rubor (redness), dolour (pain), tumor (swelling) and function laesa (loss of function).
- It contain hyperosmolar material that draws in fluid, which increase pressure cause pain.
- If they spread they may lead to rupture or discharge into another organ (fistula) or opening into epithelial surface (sinus).
- ANTI-BIOMA is sterile abscess which formed by complete elimination of a chronic abscess without drainage.

MANAGEMENT :

- Abscess need drainage and curettage.
- Modern imaging techniques may allow guided aspiration.
- Antibiotics are indicated if the abscess is not localised (eg evidence of cellulitis) or the cavity is not left open to drain freely.
- Healing by secondary intention is encouraged.

SPECIFIC WOUND INFECTION :

TETNUS :

- It is caused by C.tetani
- These are anaerobic, spore forming , gram positive bacillus.
- They are present soil and manure
- Iit enters the body through a wound and replicate.
- It produces tetanospasmin, a potent exotoxins that binda to neuromuscular junction of CNS neurons, rendering incapable of neurotransmitter release.
- Incubation period is 7 days.

CLINICAL FEATURES

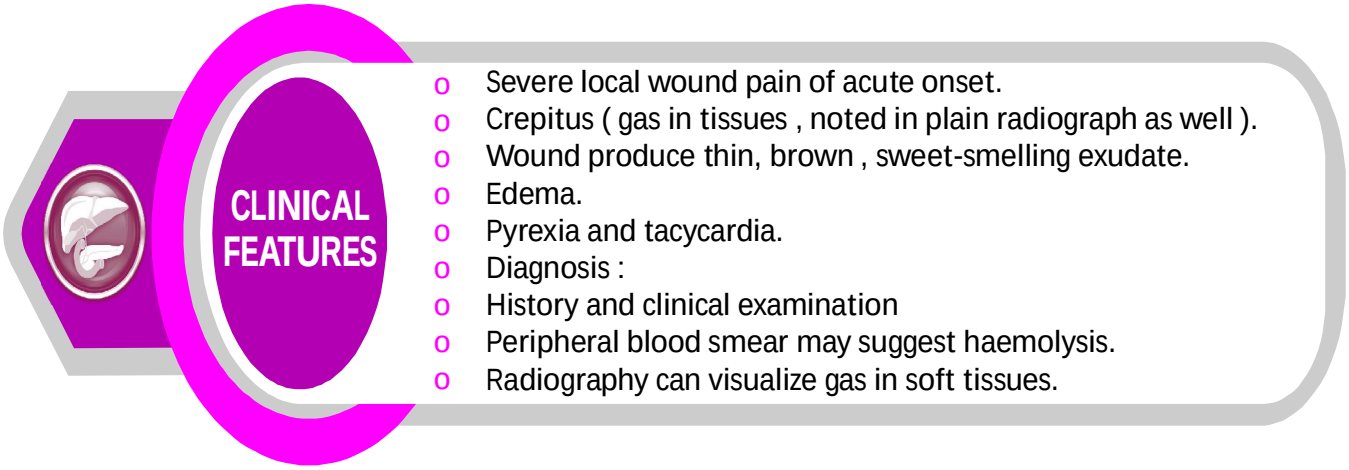
- Early symptom is RISUS SARDONICUS (painful spasm of messeter and facial muscles).
- OPISTHOTONUS arching of whole body due to spasm of paravertebral and extensor limb musculature.
- Laryngeal muscle spasm leads to apnea and if prolonged, to asphyxia and respiratory arrest.

TREATMENT :

- I/M 0.5 ml tetanus toxoid (active immunization)if wound is contaminated in soil.
- I/M Human ATG (anti-tetanus globulin) 250-500 U in gross contamination of deep cavitating wound.
- Wound debridement.
- I/V antibiotics (penicillin G).

GAS GANGRENE :

- It is caused by C.perfringes.
- These gram positive anaerobic spore-forming bacilli are widely found in nature, in soil and feces.
- it produces exotoxins of which alpha toxins are most important.
- Alpha-toxins produce lecithinase which destroys red and white blood cells.
- It is a dreaded consequence of inadequately treated missile wounds, crushing injuries, high voltage electrical injuries, traumatic surgery and colorectal operation.
- It produces gas composed of nitrogen, hydrogen sulphide and carbon dioxide that spread along the muscle plane.
- Incubation period is <24 hours.
- Immunocompromised patients are most at risk.



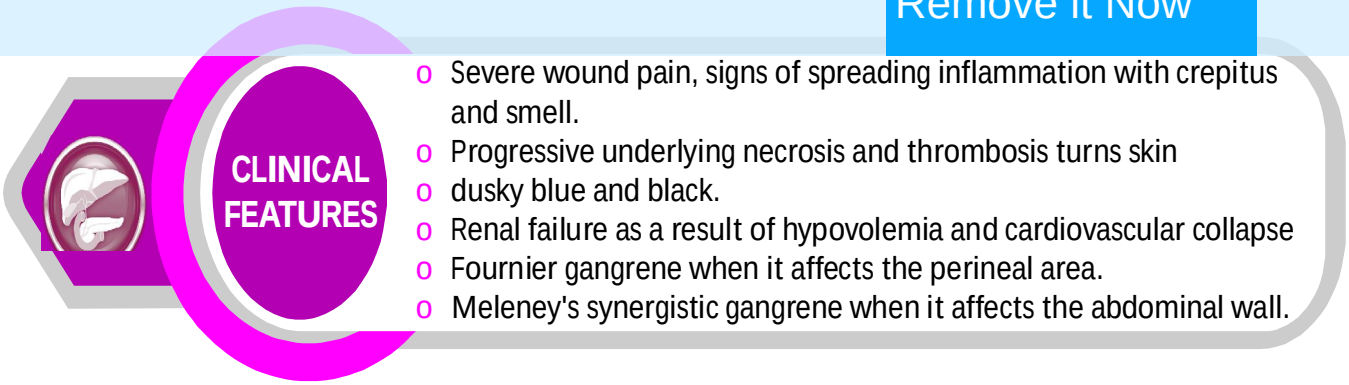
- Severe local wound pain of acute onset.
- Crepitus (gas in tissues , noted in plain radiograph as well).
- Wound produce thin, brown , sweet-smelling exudate.
- Edema.
- Pyrexia and tacycardia.
- Diagnosis :
- History and clinical examination
- Peripheral blood smear may suggest haemolysis.
- Radiography can visualize gas in soft tissues.

TREATMENT :

- Admit the patient preferably in icu.
- Maintain proper input and output fluid balance.
- High dose i/v antibiotics (penicillin g , 3rd generation cephalosporin).
- Surgical excision of necrotic tissue.
- Amputation of the affected limb if systemic toxicity.
- Antibiotic prophylaxis is essential when performing amputation to remove dead tissues.

NECROTIZING FASCIITIS :

- Most commonly caused by beta-hemolytic streptococci
- It is a rapidly spreading infection of fascial planes leading to necrosis of subcutaneous tissue and overlying skin.



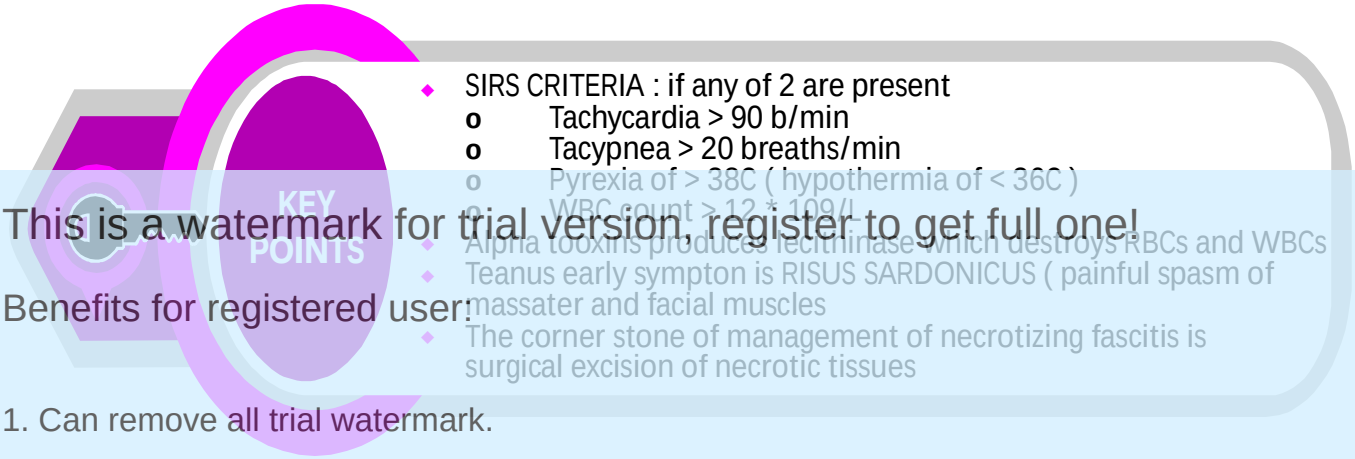
- Severe wound pain, signs of spreading inflammation with crepitus and smell.
- Progressive underlying necrosis and thrombosis turns skin
- dusky blue and black.
- Renal failure as a result of hypovolemia and cardiovascular collapse
- Fournier gangrene when it affects the perineal area.
- Meleney's synergistic gangrene when it affects the abdominal wall.

MANAGEMENT :

- Diagnosis is based on clinical ground.
- Increase ck levels
- Biopsy of fascial layer can confirm the diagnosis.
- High dose i/v antibiotics (penicillin g , 3rd generation cephalosporin and metronidazole).
- Surgical excision of necrotic tissue.
- Hyper baric oxygen is bactericidal, improves neutrophil function and promote wound healing.

CHOICE OF ANTIBIOTIC FOR PROPHYLAXIS :

- Empirical cover against expected pathgens with local hospital guidelines.
- Single shot I/V administration at induction of anesthesia.
- Repeat only during long operations or if there is excessive blood loss.
- Continue as therapy if unexpected contamination or prosthetic implant with a septic source.
- Benzyl penicillin is used if clostridium gas gangrene is a possibility.
- Patient with heart wall disease and prosthesis should be protected from bacteraemia caused by dental work, urethral instrumentation or visceral surgery.



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WOUNDS, TISSUE REPAIR AND SCARS

Chapter 05

NORMAL WOUND HEALING :

- Wound healing is a mechanism whereby the body attempts to restore the integrity
- of the injured part.
- There are three phases of normal wound healing
  - The inflammatory phase
  - The proliferative phase
  - The remodeling (maturing) phase

INFLAMMATORY PHASE :

- It lasts 2-3 days
- It involves vasodilation and increased vascular permeability
- Influx of pmn lymphocytes and fibroblast
- Platelet activation and initiation of the coagulation and complement cascade leading to clot formation and homeostasis.

PROLIFERATIVE PHASE :

- It lasts from 3rd day to 3rd week.
- It involves fibroblast activity with production of collage
  (glycosaminoglycan and proteoglycan).
- Angiogenesis (formation of new blood vessels as capillary loops) take place.
- Re-epithilization of the wound surface takes place.
- Granulation tissue , which is a network of capillary loops and myofibroblast forms in this phase.
- Granulation tissue is then replace by type 3 collagen , given tensile strength to the wound.

REMODELING PHASE :

- It lasts for months after wound healing.
- It is characterized by maturation of collagen (type 3 is replaced by type 1).
- Decrease wound vascularity (change in color) and wound contraction due to fibroblast and myofibroblast activity.

CLASSIFICATION OF WOUND HEALING :

PRIMARY INTENTION:

- It is also known as healing by first intention.
- opposition of wound edges.

- Minimal surrounding tissue trauma.
- Least inflammation.
- Minimal scar.

SECONDARY INTENTION :

- In this type of healing the wound is left open.
- Allow to heal by granulation, contraction and epithelialisation.
- Increase inflammation and proliferation.
- This process takes longer time.
- Poor scar.

TERTIARY INTENTION :

- It is also known as delayed primary intention.
- In this type of healing wound edges are not opposed immediately.
- Edges later opposed when healing conditions favourable.
- The scar is less satisfactory.

Types of wound :

TIDY	UNTIDY
incised	Crushed or avulsed
Clean	contaminated
Healthy tissue	Devitalized tissue
Seldom tissue loss	Often tissue loss

*table after : bailey and love short practice of surgery

CLASSIFICATION OF WOUND :

- **Clean :** They have no septic focus and are non traumatic there is no viscus open. Eg: hernia
- **Clean-contaminated :** Non traumatic with contaminated entry into viscus but with minimal spillage eg : Elective cholecystectomy.
- **Contaminated :** Significant spillage from viscus or acute inflammation or traumatic clean wound. Eg: Emergency appendicectomy.
- **Dirty :** Significant bacterial contamination , traumatic wound from a dirty focus Eg : Laprotomy for peritonitis.

MANAGEMENT OF ACUTE WOUND :

- Cleaning
- Exploration and diagnosis
- Debridement
- Repair of structures
- Replacement of lost tissues where indicated
- Skin cover if required
- Skin closure without tension
- All of the above with careful tissue handling and meticulous technique

COMPARTMENT SYNDROME :

- **Definition :** It is a condition in which increased pressure within one of the body's compartment results in insufficient blood supply to tissues within that space.
- Signs and symptoms : 5P's
- Pain out of proportion and on passive movement of affected compartment muscles (most reliable sign)
- Paresthesia
- Paralysis
- Pallor
- Pulselessness

MANAGEMENT :

- Removal of any bandage immediately
- Plaster immobilization
- Measurement of compartment pressure
- Compartment pressure can be measured by a pressure monitor and a catheter is placed in muscle compartment.
- If pressure are constantly > 30 mmHg and clinical signs present , fasciotomy should be performed.
- Fasciotomy :
- Incision of deep fascia
- Surgical division of the fascia.
- Must be avoided in chronic compartment syndrome (which present several days after injury) as dead muscle produces myoglobin which ... blood stream cause myoglobinuria and renal failure.

CHRONIC WOUNDS :

Leg ulcers : An ulcer is a break in epithilial continuity.

AETIOLOGY :

- Venous disease leading to local venous hyprtension eg varicose vein
- Arterial disease either large arteries (atherosclerosis) or small vessels (diabetes).
- Arteritis associated with autoimmune disease (RA , lupus)
- Trauma
- Chronic infection
- Neoplastic (SCC, BCC).

MANAGEMENT :

- Treat the underlying cause
- **SURGERY :** if medical treatment has failed or if the patient suffered non tractable pain.

PRESSURE SORES :

These can be define as tissue necrosis with ulceration due to prolong pressure.

COMMON SITES (IN DESCENDING ORDER) :

- Ischium
- Greater trochanter
- sacrum
- Heel
- Malleolus (lateral than medial)
- Occiput

STAGES :

Stage	Description
Stage I	Non blanch able erythema without a breach in the epidermis
Stage II	Partial thickness skin loss involving the epidermis and dermis
Stage III	Full thickness skin loss extending into the subcutaneous tissue but not through underlying fascia.
Stage IV	Full thickness skin loss through fascia with extensive tissue destruction, may be involving muscle , bone,

* table after : bailey and love short practice of surgery

MANAGEMENT :

PREVENTION:

- Good skin care
- Special pressure dispersion cushions or foams.
- Bed bound patient should be turned at least every 2 hours.
- Wheelchair bound patient being taught to lift them selves off their seat for 10 seconds every 10 minutes.

SURGERY :

- Clean the wound
- Exploration and diagnosis
- Debridement
- Repair of structures
- Replacement of loss tissues where Indicated
- Skin cover if required
- Skin closure without tension
- Vaccum-assisted closure (negative pressure wound closure)

NECROTIZING SOFT TISSUE INFECTIONS :

- Rare but often fatal.
- They are most commonly Polymicrobial infections
- Usually a history of trauma or surgery with wound contamination.
- There are two main types of necrotizing infections
- 1. clostridal (gas gangrene)
- 2. Non clostridal (streptococcal gangrene and necrotizing fascitis).

SIGN AND SYMPTOMS :

- Unusual pain
- Edeme beyond the area of erythma
- Crepitus
- Skin blistering
- Fever (often absent)
- Greyish drainage (dishwash pus)
- Pink / orange skin staining
- Focal skin gengrene (late sign)
- Sepsis, coagulopathy and multiorgan failure.

TREATMENT :

- Surgical excision with tissue biopsies being sent for culture and diagnosis
- Delayed primary closure or skin grafting often performed due to wide raw areas.

SCAR :

A scar is an area of fibrous tissue that replaces normal skin af

TYPES :

1. ATROPHIC :

It is pale, flat and stretched in appearance .
It is easily traumatized as the epidermis and dermis are thinned.
Excision and resuturing may only rarely improve such a scar.

2. HYPERTROPHIC :

- It is an excessive scar tissue that does not extend beyond the boundary of original incision and wound.
- It results from prolong inflammatory phase of wound healing and from unfavorable scar siting (I.e across the lines of skin tension)
- In face these are known as lines of tension.
- Excessive collagen and hypervascularity

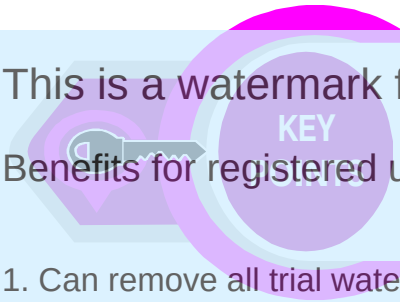
3. KELOID :

- It is an excessive scar tissue that extends beyond the boundaries of original incision or wound.

- Atielogy is unknown.
- Associated with elevated levels of growth factor, deeply pigmented skin, an inherited tendency.
- Marked Excessive collagen and hypervascularity

TREATMENT OF HYPERTROPHIC AND KELOID SCAR :

- Pressure - local moulds or elasticated garments
- Silicon gel sheeting
- Interlesional steroid injections
- Excision and post operative radiations (external beam or bracytherapy)
- Intralesional excision (keloids only)
- Laser - to reduce redness
- Vitamin E or palm oil massage (unproven)



- Inflammatory phase last from 2-3 days
- Proliferative phase lasts from 3rd day to 3rd week.
- In remodeling phase type 3 collagen is replaced by type 1.

Case example :
A patient came in opd with having an open wound on his leg de

Q : Different types of wound healing ?
A : Primary healing by first intention, secondary healing , tertiary healing or delayed primary healing

Q : Phases of wound healing ?
A : Inflammatory phase, proliferative phase, remodeling phase

Q : What are the factors that impaired wound healing ?
A : Wound infection , alcohol, DM, anemia, malnutrition,immunosuppressive therapy are the factors that impaired wound healing

BASIC SURGICAL SKILLS

Chapter 06

*** AN INCISION IS THE ONLY PART OF THE OPERATION THE PATIENT SEES ***

INCISION :

1. While planning incision 4 factors should be considered.
2. Skin tension lines (langer's liners) incision placed parallel to these lines results in a better scar.
3. Anatomical structures : should avoid bony prominences.
4. Cosmetic factors: especially in exposed parts.
5. Adequate access for the [procedure

SUTURE MATERIAL: DESIRED CHARACTERISTICS :

- Easy to handle
- Predictable behavior in tissues
- Predictable tensile strength
- Sterile
- Glides through tissue easily
- Secure knotting abilities
- In`expensive
- Minimal tissue reaction
- Non-cappillary
- Non-allergenic
- Non-carcinogenic
- Non-electrolytic
- Non-shrinkage

SUTURE MATERIAL:

1. Non-absorbable : Silk and prolene
2. Absorbable : catgut (plain, chromic), vicryl

NON-ABSORBABLE :

1. **Prolene :**

   - Monofilament, synthetic sutureand polymer of propylene.
   - Tensile strength : infinite (> 1 year).
   - Tissue reaction : low.
   - Indications : cardiovascular, plastic, opthalmic, general surgery, subcuticular skin closure.
   - Contraindication : none

2. SILK :

- Braided or twisted multifilament
- It is natural protein derived from silk worm
- Tensile strength : loses 20 % when wet, 80-100 % lost by 6 month.
- Tissue reaction : mod to high
- Indications : ligation and suturing when long term tissue support is necessary, for securing drains externally, tendon repair, sternal wiring, hernia mesh repair.
- Contraindications : not for use with vescular prosthesis or in tissue requiring prolong approximation under stress, not suitable for skin closure.

ABSORBABLE SUTURES :

1. CATGUT :

- Plain : Collagen derived from healthy sheep or cattle.
- Tensile strength : Lost within 7- 10 days
- Tissue reaction : High
- Indications : Ligate superficial vessels, suture subcutaneous tissue, stomas and other tissues that heal rapidly.
- Contraindications : Not for tissues which heal slowly
- Chromic : Derived from healthy sheep tanned with chromium salt
- Tensile strength : Lost within 21 -28 days
- Tissue reaction : Moderate
- Indications : As for plain catgut
- Contraindications : As for plain catgut.

2. VICRYL :

- Synthetic, polyfilament
- Tensile strength : 20-30 days
- Tissue reaction : mild
- Indications : gut biliary and vascular anastomosis, subcuticular wound closure, opthalmic surgery.

ANASTOMOSIS :

A process by which a tubular viscus (bowel or vessel) is joined after resection or bypass without exteriorization with a stoma.

BOWEL ANASTOMOSIS :

- Ensure good blood supply to both bowel ends.
- Ensure anastomosis is under no tension
- Avoid risk to mesenteric vessels by clamps or sutures.
- Use atraumatic bowel clamps to minimize contamination.
- Interrupted or single layered suture techniques are adequate and safe.
- Bowel preparation
- Antibiotic prophylaxis
- Adequate nutritional support.

DUCTS ANASTOMOSIS :

- Good blood supply
- Good size approximation
- No tension
- No holes and leaks

VESSEL ANASTOMOSIS :

- Prolene sutures give the best result
- Intimal suture line must be smooth
- Knots must be secured.
- Needle must pass from within outwords on the downflow aspect of anastomosis

COMPLICATION OF ANASTOMOSIS :

- Bowel peritonitis
- **Vessel :** hematoma, hemorrhagic shok (early), pseudo-aneurysm (late).
- Stenosis, ileus, portal obstruction, primary thrombosis, occulusion, gengrene

DRAINS :

- Drains are use to allow fluid or air that might collect at an operation site or in a wound to drain freely to surface.

TYPES :

1. Open passive
2. Closed passive
3. Closed active

OPEN PASSIVE :

- They provide a conduit around which secretions may flow.
- Eg : yates corrugated drain, penrose tube drain, drainage seton placed in anal fistulas

CLOSED PASSIVE :

- They drain fluid by gravity (siphon effect) or by capillary flow.
- Eg : NGtube, chest drain , ventriculo-peritoneal shunt, Robinson tube drain.

CLOSED ACTIVE :

- They generate active suction
- Eg : redivac, miniver, Jackson Pratt drain.

STOMAS :

- It refers to an external opening
- Can be temporary or permanent in a lamented organ.
- It may be ileostomy or colostomy

COLOSTOMY :

LOOP COLOSTOMY :

- It is an artificial opening made in large bowel for feces and flatus to deverted to exterior, collected in an external pouch.
- Indications: colonic perforation with contaminated peritoneal cavity, anterior resection (diversion colostomy for distal anastomosis)

END COLOSTOMY :

- Formed after an abdomino peritoneal excision of rectumor as part of hartmann's procedure.
- Loop is brought outside at left ilaic fossa through tha lateral edge of rectus sheath above and medial to bony prominence (best site).
- Indications : lower rectal carcinoma, anal carcinoma

COMPLICATIONS OF COLOSTOMY :

- Stenosis
- Prolapse
- Retraction
- Necrosis of distal end
- Fistula formation
- Colostomy hernia

ILIEOSTOMY :

LOOP ILIEOSTOMY :

- For defunctioning lower rectal anastomosis or an ileal pouch.
- A knuckle of ileum is pulled out in right iliac fossa
- It is spouted

END ILEOSTOMY :

- It is formed after a subtotal colectomy without anastomosis when it may later be reversed or may be permanent after a panproctocolectomy
- Indications : ulcerative colitis , carcinoma colon

COMPLICATIONS OF ILEOSTOMY :

- Hemorrhage
- Necrosis
- Stenosis
- Retraction
- Fluid imbalance *
- Gallstone formation

PRINCIPLES OF PEDIATRIC SURGERY

Chapter 07

INTRODUCTION :

- Children have wider abdomen.
- Shallow pelvis
- Liver is easily palpable below costal margins.
- Bladder is an intra-abdominal organ.
- Respiration- diaphragmatic
- Broad costal margins
- Umbilicus-lowline.
- Transverse supra umbilical incision is preferred

- Preterm : < 37 completed week of gestation
- Full term : Between 37 and 42 completed week of gestation
- Neonate : Newborn baby upto 28 days of age.
- Infant : Upto 1 year of age.
- Child : All ages up to 16 years of age.
- Pre-school : <5 years of age.

***table after : bailey and love short practice of surgery**

BASIC PEDIATRIC DATA :

WEIGHT :

AGE	WEIGHT (Kg)
Term neonate	3.5
1 year	10
5 years	20
10 years	30

***table after : bailey and love short practice of surgery**

VITAL SIGNS :

AGE (years)	HEART RATE (bpm)	SYSTOLIC BP (mmHg)	R/R (b/min)
< 1 year	110-160	70-90	30-40
2-5	90-140	80-100	25-30
5-12	80-120	90-110	20-25

***table after : bailey and love short practice of surgery**

MAINTENANCE FLUID REQUIREMENT :

WEIGHT	DAILY FLUID REQUIREMENT (ml/kg/day)
Neonate	120-150
First 10 kg	100
Second 10 kg	50
Each subsequent kg	20

***table after : bailey and love short practice of surgery**

MAINTENANCE ELECTROLYTE REQUIREMENT :

WEIGHT (kg)	Na(mmol/kg/day)	K (mmol/kg/day)	ENERGY (kcal/kg/day)
< 10 kg	2-4	1.5 - 2.5	110
< 10 kg	1-2	0.5 - 1.0	40 - 75

*table after : bailey and love short practice of surgery

PRINCIPLES OF PEDIATRIC SURGERY :

- Gentle tissue handling.
- Bipolar diathermy is preferred to unipolar during dissection.
- Abdominal incision can be closed with absorbable sutures
- Bowel can be anastomosed with interrupted single layer extramucosal sutures.
- Skin can be closed with absorbable subcuticular suture.
- Stomas are necessary in some children
- A gestrostomy may be required for nutritional support
- Temporary intestinal stomas are used in management of necrotizing enterocolitis and hirchsprung's disease.
- Infant with proximal stomas required salt and bicarbonate supplements to avoid deficits.

THERMOREGULATION:

- Babies are prone to hypothermia due to HIGH body surface area to weight ratio. (the body surface area to weight ratio decrease with age)
- Infant have less subcutaneous fat, immature vasomotor control, greater heat loss from pulmonary evaporation.
- Infant should be kept warm in operation theater.

PEDIATRIC TRAUMA :

- Traume remains the leading cause of death in children and adolescents
- Some important differences for children in ATLS are :
  1. Avoid over extension of neck which can obstruct the airway
  2. Use a broslow tape if weight is not known
  3. BP is often normal until > 25 % of circulating volume is lost
  4. Cardiorespiratory arrest is due to hypoxia and not vascular disease
  5. Diagnostic peritoneal lavage is obsolete in children.

PRIMARY SURVEY :

- Airway
- Breathing (respiratory rate, signs of respiratory distress, chest expansion)
- Circulation (vital sign, capillary refill time, skin color, temperature, mental status,
- bleeding, gcs, eyes- pupil size reactivity, overview , avoiding neck over extension)

RESUSCITATION :

- High flow oxygen if there is cardiorespiratory compromise.
- ETT if flail chest, severe head injury, oxygenation is required.
- Chest tube drainage if pneumothorax or hemothorax.
- Pass 2 large bore I/V cannula.
- In small children intra osseous infusion.
- Base line blood tests and x-ray c-spine (lateral), chest and pelvis.
- After major trauma c-spine injury should be assumed until excluded by full neurological assessment.

SECONDARY SURVEY :

- Chest trauma : rib fracture is rare due to elastic ribs, tension pneumothorax (needle thoracocentesis 2nd IC space mid clavicular line) followed by chest tube drainage in 5th ICS , mid axillary line). Cardiac contusions are common, cardiac temponade requires emergency needle pericardiocentesis, massive hemothorax (chest tube drainage in 5th ICS , mid axillary line).

- Abdomen : blunt trauma > penetrating trauma, liver and spleen injury are common and usually be managed non-operatively ,laprotomy if hemodynamically unstable. In penetrating trauma, GOLD standard investigation in hemodynamically stable patients is CONTRAST CT SCAN.

- **Imaging :** FAST (focused assessment sonography for trauma) looks for fluid in perihepatic ,hepatorenal pace , peri splenic area, pelvis and pericardium.

COMMON PEDIATRIC SURGICAL CONDITIONS :

- Inguinoscrotal or penile disorders
- Gastrointestinal conditions
- Congenital malformations
- Pediatric oncology

INGUAINOSCROTAL OR PENILE DISORDERS :

UNDESCENDED TESTES :

- Palpable Undescended testes : a testes can not be palpated in ingunal canal , but can be milked from there into the superficial pouch.
- Impalpable undescended testes : are either abscent or located in abdomen or inguinal canal best manage with laparoscopy.
- Retractile testes : reaches the base of the scrotum without tension but retracts.
- Ectopic testes : outside the normal line of descent, often in perineum.
- Undescended testes occurs when the testes is arrested along its normal pathway of descent.

CAUSES :

- Agenesis, incomplete descent, ectopic descent, intra abdominal arrest
- **Clinical features :** In full term boys after 1 year of age < 1%, more common on right side, mostly in premature infants.

INVESTIGATION :

- Diagnostic laparoscopy is definitive to visualizing the anatomy, u/s may help to locate the impalpable testes.

MANAGEMENT :

1. Orchidopexy : should be performed before 2 years of age, it involves mobilizing the testes and placing it in a subdartos pouch.
2. Orchidectomy : removal of testes, indicated in un… es which can not be corrected by orchidopexy.

INGUINAL HERNIA :

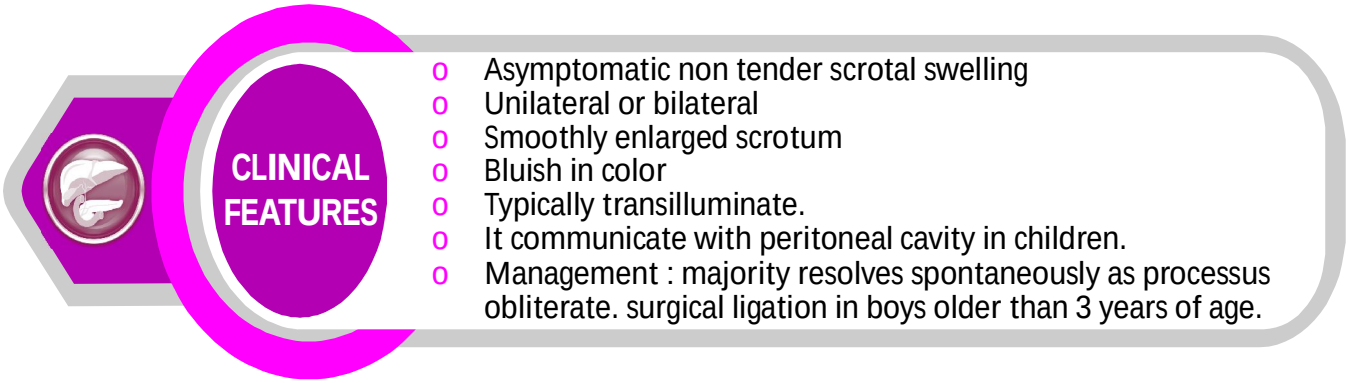
- Inguinal hernia in children are always INDIRECT due to patent processus vaginalis.
- More common in premature boys.
- 15 % bilateral.
- Right sided> left sided.
- It typically causes an intermittent swelling in the groin or scrotum on crying or staining.
- Higher incidence of complications (incarceration) than adult.

MANAGEMENT :

- Herniotomy via an inguinal skin crease incision dissection, division and proximal ligation of hernial sac.

HYDROCELE :

- It refers to congenital fluid filled processus vaginalis or tunica vaginalis.



ACUTE SCROTUM :

TESTICULAR TORSION :

- Most common in adolescents.
- Must be assumed in child presenting with acute scrotum util proven otherwise.
- Must be corrected within 6-8 hours of onset of symptoms.

TREATMENT :

- orchidopexy
- At operation viability of testes is assess after derotation.
- If salvageable, three point fixation of both testes with non-absorbable suture.
- Testicular blood flow assessed by color Doppler ultrasound.

TORSION OF A TESTICULAR APPENDAGES :

- Because of enlargement of hydatid in response to gon
- Occur just before puberty
- A hydatid of morgagni is an embryological remnant found on upper pole of testes or epididymis.

TREATMENT :

- excision of appendage.

CIRCUMSCION :

- It refers to surgical removal of some or all of the foreskin (prepuce) from penis.
- Indications : recurrent balanoposthitis, recurrent UTI, phimosis (balanitis xerotica obliterance).
- Complications : bleeding , poor cosmoses, trauma to glans or urethra.

HYPOSPADIAS :

- Seen in 1:300
- Uretheral opening on ventral surface of penis.
- Results from failure of complete uretheral tubularization in male fetus.
- Types : Glandular (most common), coronal, penile or penscrotal, perineal (most severe)

TREATMENT :

- Glandular doesn't need treatment unless meatus is stenosed, in which case meatomy is performed surgery before 2 years of age.
- Avoid circumcision as prepuce may be used in correction procedure.

GASTRO-INTESTINAL CONDITIONS

INTUSSUSCEPTION :

- From 2 months to 2 years of age.
- It refers to invagination of one portion of intestine into an adjacent segment.
- It typically causes strangulated bowel obstruction, which cacn progress to gangrene and perforation.
- 80 % are ILEOCOLIC in children.
- Most commonly caused by hyperplasia of gut lymphoid tissue.

CLINICAL FEATURES

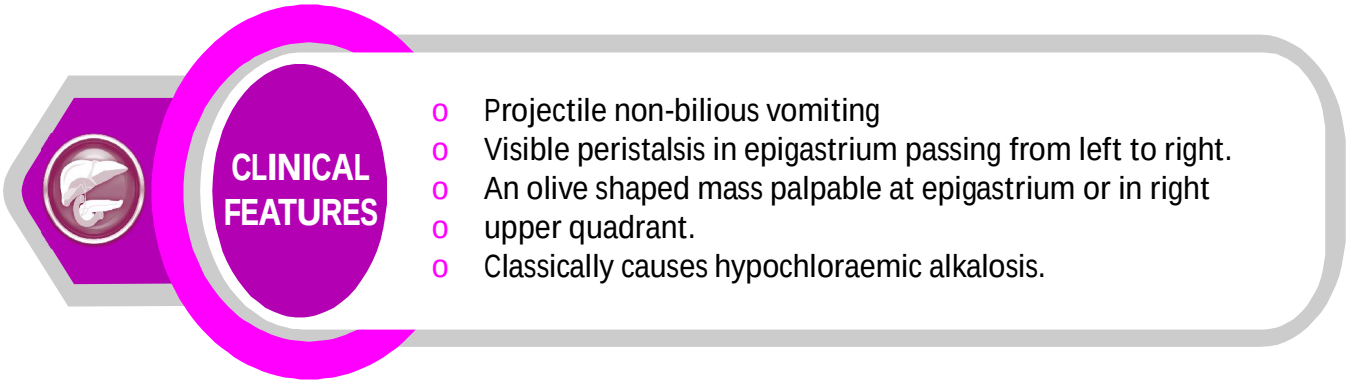
- Colicky pain and vomiting , recurrent jelly stool, palpable sausage shaped mass in right upper quadrant, signs of shock.
- Diagnosis :
  - U/S (diagnosis of choice)
  - Plain Xray abdomen
  - Air contrast enema.

TREATMENT :

- Maintain IV line
- Give I/V fluids
- NG drainage
- Broad spectrum antibiotics
- Non- operative reduction
- Surgical reduction (indications) : if signs of peritonitis or perforation, reduced manually by retrograde squeezing and gentle proximal traction, resection and anastomosis if bowel viability is in doubt.

INFANTILE HYPERTROPHIC PYLORIC STENOSIS (IHPS):

- Hypertrophy of circular muscle layer increasing the length and diameter of pylorus.
- 2-8 weeks of age.
- Male to female ratio is 4:1
- More common in first born males
- Strong genetic predisposition.



- Projectile non-bilious vomiting
- Visible peristalsis in epigastrium passing from left to right.
- An olive shaped mass palpable at epigastrium or in right upper quadrant.
- Classically causes hypochloraemic alkalosis.

INVESTIGATIONS :

- Clinically
- Test feed
- U/S confirms the diagnosis

TREATMENT :

- Ramstedt pyloromyotomy is surgical treatment of choice.

ACUTE APPENDICITIS :

- Patient presents with anorexia, vomiting, low grade fever,.
- Tenderness and guarding in right iliac fossa.
- Exclude referred pain from right lower lobe pneumonia

TREATMENT :

- Maintain IV line
- Give I/V fluids
- Start broad spectrum antibiotics
- Give proper analgesia
- Appendicectomy

CONGENITAL MALFORMATION :

DUODENAL ATRESIA :

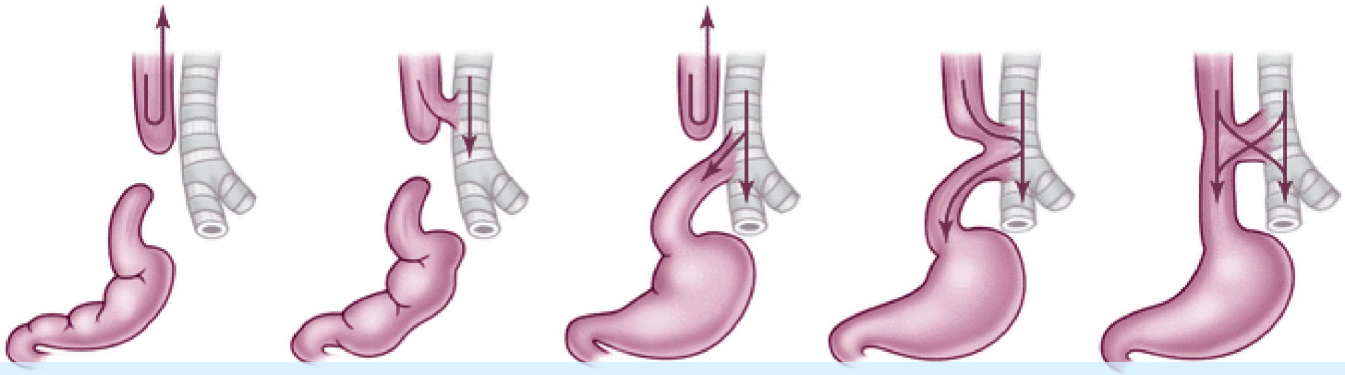
- It results from failure of development of duodenal canal.
- Bile stained vomiting since birth , epigastric fullness.
- Associated with maternal polyhydramnios, down syndrome, annular pancreas.
- DOUBLE BUBBLE sign on abdominal x-ray.
- Surgical bypass (duodenoduedenostomy) after resuscitation.

ESOPHAGEAL ATRESIA :

- It refers to partial or complete interruption of esophageal lumen.
- It is associated with maternal polyhydramnios.

TYPES :

- **TYPE A :** esophageal atresia without tracheo-esophageal fistula
- **TYPE C :** esophageal atresia with tracheo-esophageal fistula (most common)
- **TYPE E :** H-typr tracheoesophageal fistula.



- Regurgitation of all feed
- Frothy saliva
- Cynotic episodes with feeding.
- Associated congenital abnormalities (VACTERL) vertebral abnormalities, anal atresia, CVD, tracheo-esophageal fistula, esophageal atresia, renal anom

TREATMENT :

- confirmed by failure to pass orogastric tube in stomach
- Plain xray abdomen and thorax :
- Orogastric tube coiled in esophagus + abdominal gas + esophageal atresia with TEF.
  Rx : ligation of fistula and primary closure of esophageal defect (within a day or two of birth).
- Orogastric tube coiled in esophagus + no gas + esophageal atresia only
  Rx : gastrostomy for feeding and delayed primary repair.

INTESTINAL MALROTATION :

- It results when midgut fails to rotate counter- clock wise around superior mesenteric artery by 12 week of gestation.
- The duodenojejunal flexure lies to right of midlineand the cecum is central.
- Predisposition to mid gut volvolus.
- Malrotation with volvolus typically present with bilious vomiting and is life threatening.
- Bile stained vomiting in infants is a sign of intestinal obstruction until proven otherwise.

- Upper GI contrast study confirms the malrotation.
- Surgical correction by LADD'S PROCEDURE :
- Untwisting the volvolus
- Widening the base of small bowel mesentery
- Straightening the duodenum
- Positioning the bowel in a non rotated position.

MECONIUM ILEUS :

- It results from impaction of abnormally thick meconium in terminal ileum.
- It is opathognomic of cystic fibrosis.
- Present in neonates with distal obstruction (vomiting, distension, failure to pass meconium, mass in RIF).

INVESTIGATIONS :

- Plain xray abdomen
- contrast enema

TREATMENT :

- Admit the patient
- Maintain iv line
- Resuscitation with IV fluids
- Pass NG tube
- Removal of meconium via surgery

ABDOMINAL WALL DEFECTS :

GASTROSCHISIS :

- This condition is defined as herniation of abdominal viscera through a defect in abdominal wall to the right of umblicus.
- Small size of defect, bowel usually inflammed.
- Rx : reduction of bowel, closure of defect.

EXOMPHALOS (OMPHALOCELE) :

- It is defined as herniation of abdominal viscera through a defect in UMBLICUS but is covered with membrane.
- Size of defect is large, bowel usually non-inflammed.
- If defect is minor (< 5 cm) reduction and closure
- If defect is larger (> 5 cm) application of silver sulphadiazine pste and delayed closure.

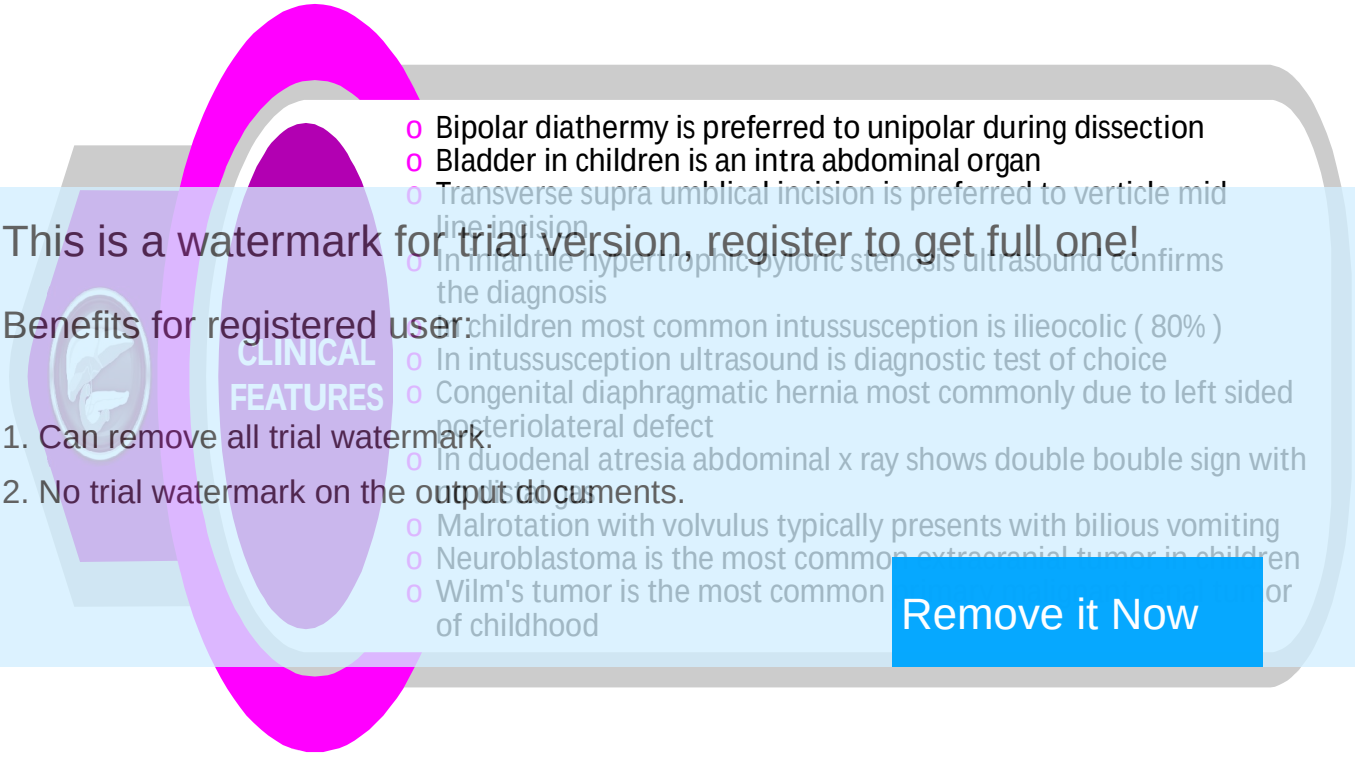
PAEDIATRIC ONCOLOGY :

WILM'S TUMOR : (nephroblastoma)

- It is a malignant renal tumor
  It is derived from embryonic cells.
- A mutation in wilms tumor suppressor gene (WT1) is responsible for some cases.
- Discovered during first 5 years of life, usually unilateral.
- Present with rapidly growing abdominal mass.
  Hematuria denotes extension to renal pelvis.
  Metastasis to lungs occur early.
  Rx : Unilateral tumor : chemotherapy followed by nephrectomy, Bilateral tumor : partial nephrectomy

NEUROBLASTOMA :

- It is a malignancy in the adrenal medulla or sympathetic ganglion.
- It arises from primordial neural crest cells.
- It is the most common extra cranial solid tumor in childhood.
- Present with abdominal or para-vertebral mass.
- Metastasize to lymph nodes , bones, liver.
- It causes elevated urinary catecholamines
- **Rx :** surgery if disease is localized, chemotherapy added with surgeryif diseae is advance.



Case example :
A 4 week old male child brings by parents in OPD with c/o projectile vomiting which is not bile stained o/e baby is dehydrated and emaciated

Q : What is your diagnosis ?
A : infantile hypertrophic pyloric obstruction

Q : What is the investigation of choice ?
A : u/s abdomen

Q : What is the treatment of choice ?
A : ramstedt operation

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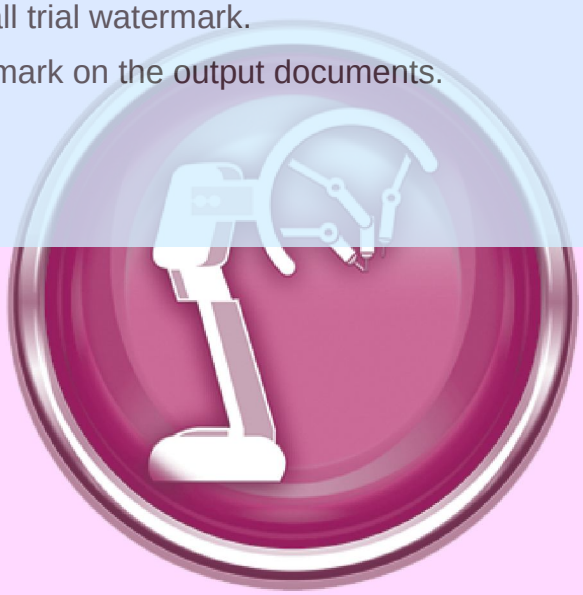
PART - 2

PRE OPERATIVE CARE



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PRE OPERATIVE CARE

Chapter 08

PREOPERATIVE PLAN FOR THE BEST PATIENT OUTCOMES :

- Record all the relevant information.
- Optimize patient conditions
- Choose surgery that offers minimal risk and maximum benefit.
- Anticipate and plan for adverse events.
- Inform everyone concerned.

PATIENT ASSESSMENT :

HISTORY TAKING :

- Bio data
- Presenting complaints.
- History of presenting complaint : symptoms, onset, aggravating relieving factors, nature and radiation of pain.
- Past medical and surgical history
- Drug history
- Family history
- Social history
- Transfusion history

EXAMINATION :

- General Physical Examination
- CNS
- CVS
- Respiratory System
- GIT

INVESTIGATION :

- CBC
- UCE
- LFT
- Clotting screening
- Viral markers
- Urinalysis
- Beta HCG (to confirm pregnancy)
- ABGs
- ECG
- CXR

PREOPERATIVE MEDICAL CONDITION :

1. HYPERTENSION , IHD :

- Prior to surgery blood pressure should be controlled to 160/90
- The most important routine screening test is ECG
- Recent myocardial infarction is a strong contraindication to elective anesthesia.
- Elective surgery should be postponed for 3 to 6 months after a proven myocardial infarction.

2. ANEMIA AND BLOOD TRANSFUSION :

- If Hb level is below 8 g/dl preoperative transfusion may be considered
- Indication of transfusion :
- Patient is symptomatic
- Actively losing blood.
- Transfusion should perform on day time , a day before surgery.
- Consider co-administration of a loop diuretics.

- Preoperative CXR or scans are useful to asses the status.
- Admit the patient few days before surgery for chest physiotherapy.
- If dyspnea is predominant, get lung function tests and ABGs.
- GA causes detonation in lung function test regional anesthesia may need to be considered.
- The patients should be on their usual inhalers and neb
- Stop smoking atleast 4 WEEKS prior to surgery.

4. JAUNDICE :

- Patient with jaundice are at risk of doveloping clotting disorders due to vitamin K deficiency.
- Patient with obstructive jaundice are at risk of developing hepatorenal syndrome post operatively.
- Ensure adequate hydration, hourly fluid balance chart , measure UCE and LFTs daily, prophylactic antibiotics should be considered.

5. MALNUTRITION AND OBESITY :

- Nutritional support should start before 2 weeks of surgery.
- BMI < 18.5 indicates nutritional impairment and < 15 is associated with significant hospital mortality.
- Obesity is defined as BMI > 30 and is associated with intraop and post op complications like difficult intubation, aspiration, MI, stroke, DVT, PE , poor wound healing , pressure sores.

6. DIABETES :

- It is associated with many postoperative complications.
- Complete updates regarding oral or injectable hypoglycemia medications weather insulin dependant or non insulin dependent
- HbA1C level should be checked.
- Should be first on operating list.
- Patient blood sugar levels should be checked every 2 hours
- Patient on metformin should be discontinued 24 hours before contrast angiography and restarted 24-48 hours after words as there is a risk of life threatening lactic acidosis.

MINOR SURGERY (< 30 MIN) :

- Insulin dependant : omit preoperative insulin on day of surgery, monitor blood glucose every 4 hour, restart normal insulin once oral diet is established.
- Non-insulin dependant : omit morning dose, listing for early surgery, restart drug when they start eating after operation.

MAJOR SURGERY (> 30 MIN) :

- Insulin dependant : commence IV insulin sliding scale preop once NPO and continue until they have recovered from surgery.
- Non-insulin dependant : omit drug preop, monitor blood glucose 4 hourly, if exceeds 15 mmol/l start IV insulin regimen.

7. OTHER DISORDERS :

- Patient with family history and previous history of thro… prophylaxis in preopperiod.
- Progesterone only pill can be continued.
- Hormone replacement therapy (HRT) should be stopped 6 weeks prior to surgery.
- Warfarin should be stopped 3-4 days before surgery and replaced by low molecular weight heparin and restart after surgery.
- Antiplatelet agents aspirin should be stopped 7 days and clopidogral 10 days before surgery.

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ANESTHESIA AND PAIN RELIEF

Chapter 09

AIRWAY ASSESSMENT (MALLAMPATI TEST)

- **Grade 1 :** fauces, pillars, soft palate and uvula seen
- **Grade 2 :** fauces, pillars, soft palate and some part of uvula seen
- **Grade 3 :** soft palate seen.
- **Grade 4 :** only hard palate seen.

GENERAL ANESTHESIA :

- It is a TRIADE of amnesia, analgesia and muscle relaxant.

ASA GRADING SYSTEM (estimation of risk of anesthesia and surgery) :

- **Class I :** Normal Healthy Individual.
- **Class II :** Patient with mild systemic disease.
- **Class III :** Patient with severe systematic disease.
- **Class IV :** Patient with incapacitating disease that is a constant threat to life.
- **Class V :** Moribound patient not expect to survive with or without operation.
- **Class VI :** A declared brain dead patient whose organ are being removed for donor purpose

* this system is used to estimation of risk of anesthesia and s

INDUCTION :

- May be IV or inhalational.
- Inhalational is method of choice in children or needle phobic individual.

COMMONLY USED DRUGS FOR INDUCTION OF GA :

- Propofol (most common iv agent) , thiopentone sodium, etomidate.
- Muscle relaxation is achieved by depolarizing or non depolarizing agents.
- Depolarizing : suxomethonium , most rapid acting, may cause diffuse muscle pain hyperkalemia, and malignant hyperpyrexia. Contraindicated in patient prone to hyperkalemia especially burn victums.
- Non-depolarizing : atracurium, vecurnium, slower onset but longer duration.

TIVA (TOTAL INTRAVENOUS ANESTHESIA) :

- It comprises of propofol, short acting opoid analgesic, neuromuscular blockade and pulmonary ventalation with a mixture of air and oxygen.

MAINTENANCE OF GA :

- Mainly by inhalational agents like halothane, enflurane, isoflurane, sevoflurane, nitrous oxide
- Nitrous oxide is a potent analgesicbut weak anesthetic.

TECHNIQUES FOR MAINTAINING AIRWAY DURING GA :

- Chin lift and jaw thrust : suitable for short term.
- Guedal airway : holds tongue forward but doesn't prevent aspiration.
- Laryngeal mask : easy insertion, reliable airway, allows ventilation.
- Endotracheal tube : secure and protected airway.
- Tracheotomy tube : when airway needs protecting for longer period of time.

MONITORING DURING GA :

- Monitor Temperature And Avoid Hypothermia
- Monitoring Of Ecg
- Pulse Oximetry
- Inspiratory Oxygen Concentration
- Expiratory Co 2 Tension.

RECOVERY FROM GA : CLOSELY SUPERVISED.

LOCAL ANESTHESIA :

- They agents work by altering the membrane permeability to prevent passage of nerve impulse.
- Stored as acidic salt solution, therefore ineffective in acidic condition like infected wounds.
- Ideal agents have low toxicity, high potency, rapid onset, long duration.
- Some agents are lignocaine (early onset good for sensory blocks), bupivacaine (more cardiotoxic) , ropivacaine , prilocaine (metham
(must not be given near end arteries as causing ischer

SPINAL ANESTHESIA :

- Spinal anesthesia alone or with GA use in lower limb , obstetric and pelvic surgeries.
- Injection of hyperbaric solutions of bupivacaine as single shot intrathecally.
- It causes autonomic sympathetic block, resulting hypotension.
- Dural puncture cause headache.

REGIONAL ANESTHESIA :

- It involves central neuroaxial or peripheral nerve or plexus blocks.
- It is an excellent pain relief, safer procedure in emergency
- It causes more hypotension and arrhythmia as compared with GA.

EPIDURAL ANESTHESIA :

- Slower in onset than spinal.
- Urinary retention is common so catheterization of bladder is necessary.
- It is ideal for post op pain.
- Epidural containing opoids need careful monitoring for 24 h due to risk of respiratory arrest.

BIER'S BLOCK (IN RAVENOUS REGIONAL ANESTHESIA) :

- Only safe in upper limb
- Upto 50 ml of prilocaine is recommended as the safest agent to use.

PRI OPERATIVE PAIN RELIEF :

- Acute post operative pain relief :
- Requires team approach
- Measure pain level daily
- Analgesia given before pain breaks through
- Opoids should not be withheld.

ANALGESIC LADDER :

- Step 1 : non opoid analgesics (paracetamol, NSAIDS)
- Step 2 : intermediate strength opoids (codeine , tramadol)
- Step 3 : strong opoids (ORAL MORPHINE drug of choice)

TECHNIQUES FOR POST OPERATIVE PAIN RELIEF :

- Regular IM injections
- Local anesthetic blocks
- Indwelling epidural (good pain control)
- Patient controlled analgesia (PCA)

CHRONIC PAIN :

- Inadequate control of acute pain may lead to chronic p
  nociceptors appears too produce sensitization.
- Types :
  - **Nociceptive pain :** arises from inflammation and ischemia.
  - **Neuropathic pain :** arises from dysfunction in central nervous system.
  - **Psychogenic pain :** is modified by the mental state of patient.

PAIN CONTROL IN BENIGN DISEASE :

- Local anesthesia and steroid injections
- Transcutaneous nerve simulator modify pain by increasing endorphin production.
- Trigeminal neuralgia respond to decompression of nerve
- Amputation, encourage activity, anti depressants.

PAIN CONTROL IN MALIGNANT DISEASE :

- Oral morphine using slow-release, enteric coated tablets.
- Slow infusion of opiates S/C , by epidural or intrathecally.
- Nerolysis for patients with limited life expectancy.
- Palliative hormones, radiotherapy or steroid control pain from swelling.

CLINICAL FEATURES

- During general anesthesia avoid HYPOTHERMIA
- Regional anesthesia causes more hypotension and tachyarrythmias as compared with GA
- Oral morphine (strong opoid) remain the drug of choice in pre operative pain relief

POST OPERATIVE CARE

Chapter 10

GENERAL MANAGEMENT :

- All vital parameters should be monitored and documented.
- Treat pain, nausea, vomiting.
- Watch for complications.

COMPLICATIONS :

RESPIRATORY COMPLICATIONS :

- Most common are hypoxaemia, hypercapnia, aspiration
- Hypoxia : arterial saturation < 90%
- **Causes of hypoxia :** upper airway obstruction, laryngeal edema, hypoventilation, atelectasis, pulmonary edema, pulmonary embolism

CARDIOVASCULAR COMPLICATIONS :

- Hypotension : Inadequate fluid replacement, vasodialation, surgical bleeding, arrythmias, MI, cardiac failure, tension pneumothorax, pulmonary embolism, pericardial temponade, anaphylaxis
- Signs and symptoms : cold clammy extremities, tachycardia, low urine output (< 0.5ml/kg/hr), low CVP
- Treatment : I/V crystalloid or colloid infusions accoring

RENAL AND URINARY COMPLICATIONS :

- Acute renal failure :

CAUSE :

Prerenal	Hypotension
	Hypovolaemia
Renal	Nephrotic Drugs (Gentamycin, Diuretics, NSAIDS)
	Surgery Involving Renal Vessels
	Myoglobinuria
	Sepsis
Post Renal	Ureteric Injury
	Blocked Uretheral Catheter

* **table after : bailey and love short practice of surgery**

- Urine output of < 0.5 ml/kh/hr for 6 hours
- Urinary retension and infections are common problems postoperatively

ABDOMINAL SURGERY :

- The main complications after an abdominal surgery are : paralytic ileus, bleeding or abscess and anastomotic leakage.

NAUSEA AND VOMITING :

- Predisposing factors are poorly controlled pain, use of opoids, surgery on GIT, orthopaedic surgery, young and females.
- **Rx :** adequate pain control, avoid opoids, keep stomach empty by aspiration, maintain hydration and BP,.
- Start drugs (metclopramide , dopamine receptor antagonist (prochlorperazine), H1 receptor antagonist (cyclizine), 5HT receptor antagonist (ondensetron)

FEVER :

- **Causes :**
  - **Day 2-5 :** Atelectasis of lungs
  - **Days 3- 5:** Superficial and deep wound infections
  - **Day 5 :** Chest infection, uti, thrombophelbitis
  - **Day > 5 :** Wound infection, anastomotic leakage, intracavitatory collections, abscesses.

WOUND DEHISCENCE :

- It refers to disruption of any or all of the layers in a wo
- Most commonly occurs from the 5th to 8th postoperativ
- Present with serosanguinous discharge

RISK FACTORS :

- Malnutrition
- DM,
- Obesity
- Renal failure
- Jaundice
- Sepsis
- Cancer
- Steroids
- Inadequate or poor closure
- Hematoma ,
- Seroma

TREATMENT :

- Give I/V antibiotics
- Regular wound lavage and dressing
- Vacume assisted closure for large wounds

- Re suturing in theater if appropriate
- Closure by secondary intention.

DEEP VEIN THROMBOSIS :

RISKS :

Low	Medium	High
Maxillofacial surgery	Inguainal hernia repair	Pelvic elective and trauma surgery
neurosurgery	Abdominal surgery	Total knee and hip replacement
Cardiothoracic surgery	Gynaecological surgery	
	Urological surgery	

* **table after : bailey and love short practice of surgery**

DIAGNOSIS :

- Age > 60 yrs
- Immobilization
- Obesity
- Heart failure
- OCPs.

SIGN AND SYMPTOMS :

- calf pain
- Swelling
- Warmth
- Engorged veins
- Tender muscles on palpation
- Homan's sign : calf pain on dorsiflexion of foot.

MANAGEMET :

- Early mobilization
- Maintain good hydration
- Compression stalkings
- LMW heparin prophylaxis

KEY POINTS

- It is recommended that cannula are marked with the date of insertion and changed at 72 hours
- The return of function of bowel occur in following order : small bowel, large bowel, stomach

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NUTRITION AND FLUID THERAPY

Chapter 11

NUTRITION :

- Malnutrition is common.
- It occurs in 30 % of surgical patient with gastrointestinal disease.
- It occurs in 60 % of those in whom hospital stay has been prolonged because of post operative complications.
- Aim of nutritional support is to identify those patient at risk of malnutrition and to ensure that their nutritional requirements are met.

PATHOPHYSIOLOGY :

- 12 hour fasting : coricycle (glycogenolysis).
- > 24 hour fasting : gluconeogenesis.
- After 48 - 72 hours fasting : CNS may adapt to using ketone bodies as their primary fuel source.
- Physiologic response consist of :
  - High plasma glycogen
  - Low plasma insulin
  - Protein catabolism
  - Hepatic glycogenolysis
  - Hepatic gluconeogenesis
  - Mobilization of fat stores by lipolysis
  - Adaptive ketogenesis
  - Reduction in resting energy expenditure

METABOLIC RESPONSE TO TRAUMA AND SEPSIS :

- Increase counter-regulatory hotmones : adrenaline, noradrenaline, cortisole, glycogen and growth hormone.
- Increase energy requirements
- Increase nitrogen requirements
- Insulin resistance and glucose intolerance
- Preferential oxidation of lipids
- Increased gluconeogenesis and protein catabolism
- Loss of adaptive ketogenesis
- Fluid retention with adaptive hypoalbuminaemia

NUTRITIONAL ASSESSMENT :

- Bmi (body mass index):
- It is calculated as weight/height2 in kg/m2
- BMI of less than 18.5 indicates nutritional impairment
- BMI of less than 15 associated with significant hospital mortality

- <15 severely malnourished
- <19 malnourished
- 20-27 = normal
- 27-30 =over weight
- 30-35 = obese
- 35-40 =morbidely obese

MUST TOOL :

- It refers to malnutrition universal screening tool
- BMI (kg/m2):
  - I. 0 = > 20.0
  - II. 1 = 18.5 - 20.0
  - III. 2 = < 18.5
- Weight loss in 3-6 months :
  - I. 0 = <5 %
  - II. 1 = 5 - 10 %
  - III. 2 = > 10 %
- Acute disease effect :

Add a score 2 if there has been or is likely to be no or very little nutritional intake for > 5 days.

RESULT (OVERALL RISK OF UNDERNUTRITION) :

SCORE 0 : LOW

- Routine clinical care
- Repeat screening
- Hospital : every week
- Care homes : every month
- Community : every year for special group eg those > 75 years

SCORE 1 : MEDIUM

- Observe
- Hospital : document dietary and fluid intake for 3 days
- Care homes : as for hospital
- Community : repeat screening , eg from < 1 month to >6 months (with dietary advice if necessary)

SCORE 2 OR > 2 : HIGH

- Treat
- **Hospital :** refer dietician por implement local policies
- **Care homes :** as for hospital
- **Community :** as for hospital

FLUID AND ELECTROLYTES :

- **Lungs :** 400ml of water loss in expired air each 24 hours
- **Skin :** sweat losses 600-1000 ml/day
- **Feaces :** 60 - 150 ml/ day
- **Urine :** 1500ml /day

DAILY REQUIREMENTS OF ELECTROLYTES :

- **Sodium :** 50 - 90 mM/day
- **Potassium :** 50 mM/day
- **Calcium :** 5 mM/day
- **Magnesium :** 1 mM/day

DAILY CALORIES REQUIREMENT :

- Total energy requirement is 20-30 kcal/kg/day
- Carbohydrate requirement 2g/kg/day
- Nitrogen requirement 0.10 - 0.15 g/kg/day

ARTIFICIAL NUTRITIONAL SUPPORT :

1. TOTAL PARENTERAL NUTRITION TPN:

- Provision of all nutritional requirements by means of i
- It may be central or peripheral

PERIPHERAL :

- For short term feeding upto 2 weeks.
- Medium caliber cannula in a peripheral vein
- Access by 2 methods , PICC (7 days) or a conventional short cannula in wrist (12 hours)
- Complication : thrombophelbitis

CENTRAL :

- Into a central vein eg subclavia, internal or external juglar vein
- The infra-clavicular subclavian approach is more suitable
- Access by PICC (peripherally inserted central venous catheter) or Hickman line (tunneled line)
- Post insertion chest radiograph is necessary.

COMPLICATIONS :

- Fluid overload
- Hyperosmolar dehydration
- Increased sympathetic activity
- Excess fat eg hypercholesterolemia excess amino acids eg hyperchloremic metabolic acidosis

- Catheter related sepsis
- Systemic sepsis
- Refeeding syndrome : severe fluid and electrolytes shift in severly malnourished it results in hypophosphataemia, hypomagnesemia, hypocalcaemia. These causes altered myocardial function, arrythmias, detoriating respiratory functions, liver dysfunction, seizures, tetany, coma death.

ENTERAL NUTRITION :

- Enteral nutrition refers to delivery of nutrients into gastrointestinal tract.
- Methods : sip feeding/oral supplements or via tube feeding (nasogastric tube,
- nasojejunal tube, per cutaneous endoscopic gastrostomy PEG, per cutaneous endoscopic jejunostomy PEJ)
- Feeds : polymerics (carbohydrates, fat , whole proteins), small molecules, specific feed (low sodium diet in liver disease)

COMPLICATIONS :

- Mechanical (malpositioning) : Displaced feeding tube, clogging, skin erosions,
- Gastrointestinal : Diarrhea, vomiting, bloating, aspiration.
- Metabolic : Electrolyte imbalance, hyperglycemia, micro nutrient deficiency, drug interaction.

KEY POINTS

- In total parenteral nutrition the most common complication is refeeding syndrome
- Tonicity = 2 (Na) + (K) (BUN /

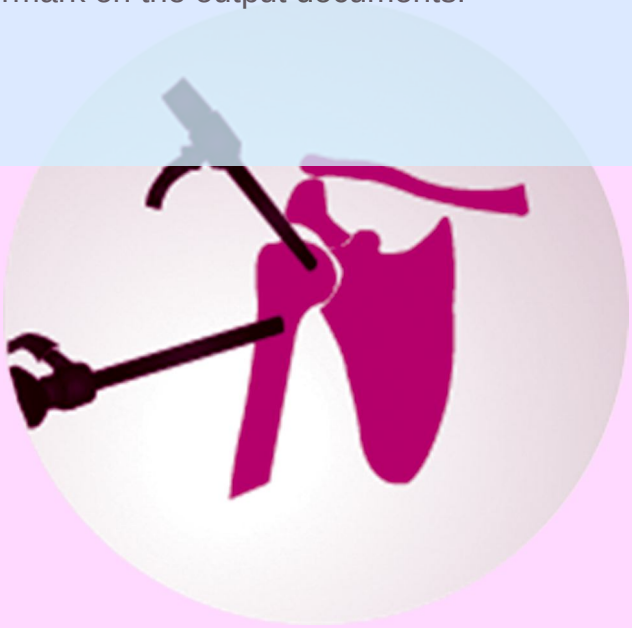
Q : What are the parameters to assess malnutrition ?

A: parameters to assess malnutrition are

1. Physical assessment
2. BMI
3. Hand grip
4. Mid arm circumference
5. Tricep skin fold thickness
6. Albumin level
7. Transferring
8. Lymphocyte count

PART - 3

TRAUMA



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NEUROSURGERY AND HEAD INJURY

Chapter 12

CEREBRAL BLOOD FLOW :

- Normal CBF is 55ml/min for every 100 gm of brain tissue
- Ischemia results when rate drops below 20ml/min
- Cerebral perfusion pressure CPP is the difference between mean arterial pressure MAP and intracranial pressure ICP
- CPP (75- 105 mmHg) = MAP (90-110) - ICP (5-15)
- Neurosurgical emergencies lead to brain swelling, bleeding and hydrocephalus
- Common pathophysiological pathway is elevated ICP and reduces CPP and CBF.

GLASGOW COMA SCORE GCS :

- 3/15 is lowest possible score
- It has 3 components eyes, verbal, motor

o **EYES OPEN :**

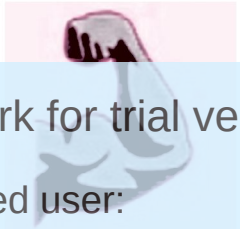
- Spontaneously 04
- To verbal command 03
- To painful stimuli 02
- Does not open 01

o **VERBAL :**

- Normal oriented conversation 5
- Confused 4
- Inappropriate /words only 3
- Sounds only 2
- No sound 1
- Incubated patient T

o **MOTOR :**

- Obeys command 6
- Localises to pain 5
- Withdrawal to pain 4
- Abnormal flexion 3
- Extension 2
- No motor response 1

Behaviour	Response
 **Eye Opening**	4. Spontaneously 3. To speech 2. To pain 1. No response
 **Verbal Response**	5. Oriented to time. Person ^ place 4. Confused 3. Inappropriate words 2. Incomprehensible 1. No response
 **Motor Response**	6. Obeys command 5. Moves to localised pain 4. Flex to withdraw from pain 3. Abnormal flexion 2. Abnormal extension 1. No respnnse

- **IT CAUSES COMPRESSION OF :**
  - 3rd nerve : dialation and fixation of ipsilateral pupil
  - Posterior cerebral artery : hemorrhagic infarction of occipital lobe
  - Ipsilateral cerebral peduncle : contralaeteral hemiperesis
  - Contralateral cerebral peduncle : ipsilateral heiperesis.

- **TONSILLAR HERNIATION :**
  - it refers to downward shift to cerebral tonsil and medulla through foramen magnum
  - It can compress medullary vasomotor and respiratory centers classically producing cushing's triade (hyperyension, bradycardia, irregular respiration).

- **SUBFALCINE HERNIATION :**
  - It refers to herniation of cingulate gyri under falx cerebri, it cause compression of anterior cerebral artery.

RAISED ICP :

- **Causes :** mass lesion, hydrocephalus, cerebral edema

- **Clinical features :** headache, nausea, vomiting, blurring and double vision, drowsiness, unsteadiness of gait urinary retention (frontal lobe) , cognitive and personality change (frontal lobe) , right sided weakness and garbled speech (dominant temporal lobe)
- **Signs :** papilledema, 6th nerve palsy, impaired upgaze, focal neurological deficits, impaired conscious level.
- **Signs in infants :** macrocephaly, bulging anterior fontanelle, dilated scalp vein, sun setting eyes
- **Management :** elevate head end 30 degrees, sedation, use of barbiturates, active cooling, anticonvulsants, steroids for vasogenic edema, craniotomy (mass lesion, EDH, SDH, intra cerebral contusion), craniectomy (traumatic brain injury, extensive middle cerebral artery infarction)

HYDROCEPHALUS :

- It refers to increased CSF volume and ventricular enlargement due to disturbance of production, flow or reabsorption of CSF.
- Total CSF volume in normal adult is 150 ml
- 80 % production by choroid plexus of ventricles with rate of 20ml/ hr
- Absorbed by arachnoid villi by passive process
- Direction of flow : from lateral ventricle through foramen of Monro into 3rd ventricle then into cerebral aqueduct and 4th ventricle then exit into subarachnoid space via middle foramen of Magendie and lateral foramen of lushka.

ETIOLOGY :

- **Obstructive h :** Lesion within the ventricle, lesion in the ventricular wall, lesion distant from ventricle but with a mass effect. LP is contraindic
- **Communicating h :** Post hemorrhagic, SCF infections,
- **Excessive CSF production :** Choroid plexus papiloma/ carcinoma.
- **Normal pressure h :** it is a type of communicating hydrocephalus, dialation of ventricular system by intermittent raise in CSF pressure, affects elderly with triade of ataxia cognitive decline urinary incontinence.

INVESTIGATIONS :

- CT (first line)
- MRI
- LP

MANAGEMENT :

- Acute hydrocephalus is an emergency
- Surgical removal of mass lesion
- Ventriculoperitoneal (VP) shunt
- Ventriculoatrial shunt
- Ventriculopleural shunt
- Endoscopic third ventriculostomy (ETV)

VP SHUNT :

- It involves insertion of catheter into lateral ventricle, while distal catheter is tunneled subcutaneously to the abdomen, a shunt valve is inserted at the junction of these catheter
- Complications : blockage , infections, seizures, leak, stroke, intracerebral hemorrhage.

ETV :

- This procedure is useful in obstructive hydrocephalus due to aqueduct stenosis
- A neuroendoscope is inserted into the frontal horn of lateral ventricle and then into the third ventricle via foramen of monro, a stoma is created into the floor of 3rd ventricle
- CSF can then communicate freely between the 3rd ventricle and interpeduncular subarachnoid space.
- It is associated with lower rates of infections

Complications : damage to basilar artery, damage to fornix result in permanent memory loss.

INTRA-CRANIAL INFECTIONS :

CEREBRAL ABSCESS :

- Abscess arise when brain is exposed :
- Directly (air sinus infection)
- After surgery
- Hematogenous spread (respiratory infections, endocarditis, dental infection)
- Streptococcus is most common in immunocompetent
- Present with high grade fever, headache, seizures, foca

INVESTIGATIONS :

- LP is contraindicated
- CT scan shows RING ENHANCING lesion
- MRI

TREATMENT :

- Surgical drainage following iv antibiotics for 6 weeks
- Steroids if edema and mass effects.

MENINGITIS :

- It refers to acute life threatening infection of meninges
- Presents with fever, neck stiffness, rigidity, photo phobia, altered LOC,

INVESTIGATIONS :

- CT scan
- lumber puncture

TREATMENT :

- I/V antibiotics
- Acyclovir for HSV
- Shunt placement if post meningitis communicating hydrocephalus.

INTRA-CRANIAL TUMORS :

- Mostly present with seizures, raise ICP, focal neurological deficits or endocrine disturbance.

METASTASIS :

- They are most by far most common intra cranial tumors

TUMORS OF ORIGIN FOR BRAIN METASTASIS :

ORIGIN	PERCENTAGE
Lungs	40
breast	15
melanoma	10
Renal/ GU	10
unknown	25

MANAGEMENT :

- If solitary cerebral metastasis -surgery and radiotherapy. If multiple lesions -only palliative treatment.

GLIOMAS :

- These are tumors of glial cell origin.
- WHO classification :
  - **Grade 1** : pilocytic astrocytoma : most common in children and young adult, most common site is cerebellum, peak incident 10 yrs, posterior fossa tumors are treated by surgical excision.
  - **Grade 2** : diffuse astrocytoma : most common in 4th decade
  - **Grade 3** :anaplastic astrocytoma : common in 5th and 6th decade, treatment is surgery followed by chemo-radiotherapy.
  - **Grade 4** : glioblastoma multiform is : most common in 5th and 6th decade, butterfly gliomabecause it has a tendency to cross the midline, treatment is surgery followd by chemo-radiotherapy.

MENINGIOMAS :

- They are usually benign tumors
- They arise from meninges

- Around 80% are supra tentorial
- Treatment : surgical excision, radiotherapy for more aggressive tumors

PITUITARY TUMORS :

- Most tumors are benign
- Types : prolactinoma (30%), non functioning adenoma (20%), growth hormone secreting adenoma (15%), ACTH secreting adenoma (10%)
- Present with mass effects bitemporal hemianopia due to pressure on optic chiasm, dysfunction of cranial nerve 3 , 4 and 6.galactorrhea, amenorrhea, impotence, acromegaly, gigantism, cushings disease

TREATMENT :

- Medical : bromocriptine, cabergolin for prolactinoma. Octeriotide and dopamine agonist for growth hormone adenoma
- Surgical : trans-sphenoidal surgery

INTRA-CRANIAL TUMOR IN CHILDREN :

- In neonates tumors are mostly supratentorial
- They are teratomas, premitive neuroectodermal tumor, high grade astrocytoma, choroid plexus papiloma/carcinoma
- In older children tumors are mostly infra tentorial they are medulloblastoma, ependymoma, pilocytic astrocytoma

HEAD INJURY :

- Head injury accounts for 3-4 % of emergency departm
- Peak age 15-30 years
- Risk factors are males, recreational drugs, youth
- Road traffic accidents RTA are leading cause of head injury.
  primary brain injury :
  - o It occurs at the time of impact
  - o It includes injuries like brain stem contusions, hemispheric contusions, diffuse axonal injury, cortical laceration.

  SECONDARY BRAIN INJURY :
  - o It occurs after some time of mment of impact
  - o It is causd by hypoxia, hypotension, reduced cerebral perfusion pressure, raised ICP, pyrexia.

CLASSIFICATION OF HEAD INJURY ACCORDING TO GCS:

- **Severe head injury :** GCS 3-8
- **Moderate injury :** GCS 9-13
  Mild head injury : GCS 14 or 15 with loss of consciousness
- **Minor head injury :** GCS 15 with no loss of consciousness

NICE GUIDELINES FOR CT SCAN IN HEAD INJURY :

- GCS < 13 at any patient
- GCS 13 or 14 at 2 hrs
- Focal neurological deficits
- Suspected open, depressed or basal skull fracture
- > 1 episode of vomiting
- Any patient with head injury > 65 yrs or with coagulopathy, for instance warfarin use should be scan urgently
- Dangerous mechanism or injury or antegrade amnesia > 30 minutes warrants CTC scan within 8 hrs

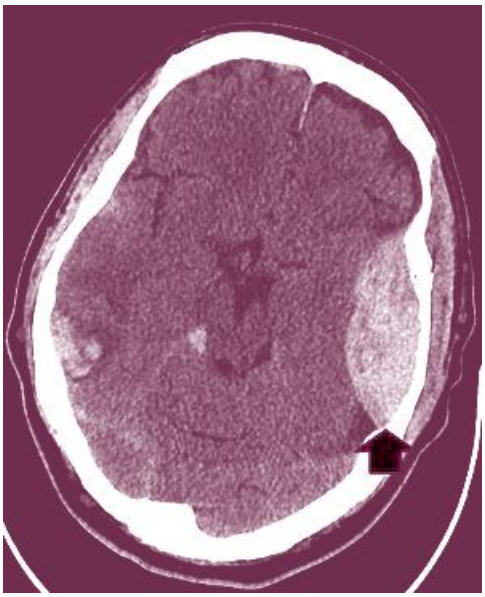
EXAMINATION :

- GCS
- Pupil size and response
- Lateralizing signs
- Meningeal irritation (neck stiffness, photophobia, reflexes)
- Base of skull fracture signs
  - **Raccon eyes :** bilateral priorbital edema
  - **Battle sign :** bruising over mastoid
  - CSF rhinorrhea or otorrhoea
  - Hemotympanium : bleeding from ear

IMPORTANT ASPECTS OF INJURY :

- Head injury can be divided into three categories
  1. **Diffuse :** the brain has been shaken.
  2. **Blunt :** a direct non-penetrating blow
  3. **Penetrating :** the cranium has been breached
- Rapid deceleration often produces sharing axons (diffuse axonal injury) and coup-countercoup contusions.

EXTRA DURAL HEMATOMA (EDH) :



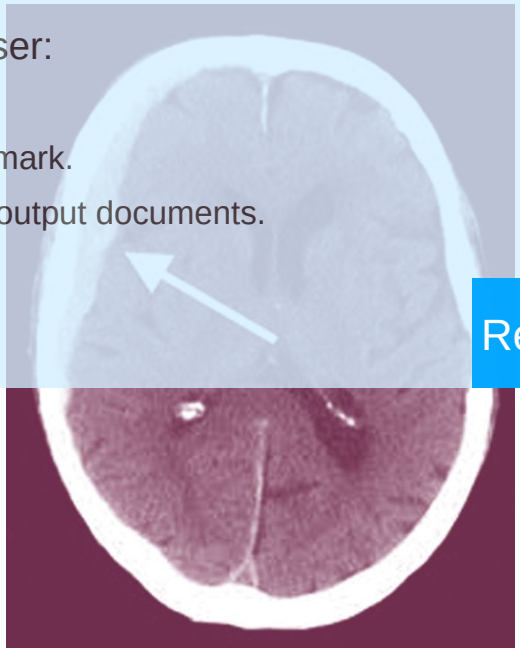
- It is a neurosurgical emergency
- It refers to accumulation of blood between bone and dura
- It results from rupture of an artery , vein, venous sinus
- Almost associated with skull fracture
- Typically it is damage to the middle meningeal artery under the thin temporal bone
- Presentation : lucid interval with headache but with no neurological deficit
- After minutes or hours rapid detoriation occurs with cintralateral hemiperesis, reduced conscious level, ipsilateral pupil dialation

INVESTIGATION :

- CT SCAN shows lentiform (biconvex) hyperdense lesion

TREATMENT :

- Immediate surgical evacuation via craniotomy
- Close observation with serial imaging



- It arises from rupture of cortical vessels
- It is associated with high energy mechanism and primary brain injury
- Presents with impaired conscious level

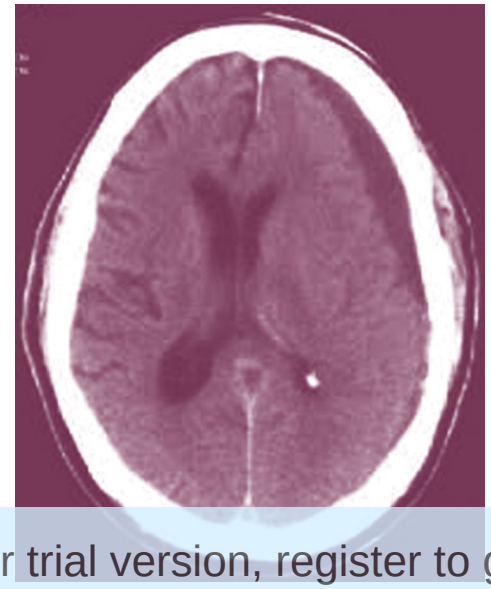
INVESTIGATION :

- CT scan shows diffuse concave hyperdense appearance

TREATMENT :

- Midline shift require evacuation via criotomy

CHRONIC SUBDURAL HEMATOMA :



- Patients are generally elderly , may be taking antiplatelet or anticoagulant medicines
- Usually a history of fall
- It is usually due to rupture of small bridging veins and remain clinically silent but gradually increase in volume causing mass effects
- Presents with headache, neurological deficits, seizures, cognitive decline

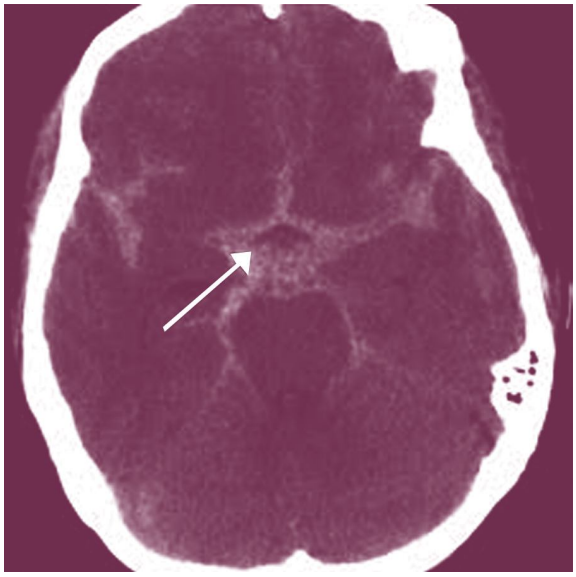
TREATMENT :

- CT SCAN : acute (0-10 days) hyperdense, subacute (10 days to 2 weeks) isodense relative to brain, chronic (> 2 weeks) hypodense lesion

TREATMENT :.

- Surgical evacuation via burr holes

ANEURYSMAL SUBARACHNOID HEMORRHAGE :



- Most common cause of SAH is trauma
- In non-traumatic causes most common cause is rupture of an aneurysm in 80% cases other causes are AVM, idiopathic , tumors
- Most common in 6th decade of life
- Risk factors are age, female, hypertension, smoking, cocaine abuse, family historyadult polycystic kidney disease, fibromuscular dysplasia.
- Presentation : thunderclap headache which is sudden and severe, nausea, vomiting, photophobia, seizures.
- Cushings response : hypertension and bradycardia with altered consciousness secondary to raised ICP.

INVESTIGATION :

- CT scan best initial test performed within 12 hours , LP performed after 12 hours in patients with suspicion of SAH with negative CT scan

TREATMENT :

- Bed rest
- Hourly neurological observation
- Strict input/output monitoring
- IV fluid replacement
- Analgesia, laxatives, antiemetics
- Nimodipine for vasospasm
- Endovascular coiling
- Surgical clipping via craniotomy

COMPLICATIONS :

- Electrolyte imbalance , cardiac arrythmias, neurogenic pulmonary edema
- Neurological detoriation may indicate a communicating hydrocephalus
- Delayed ischemic neurological deficit (DIND) is attributed to vasospasm
- Rebleeding

BRAIN STEM DEATH :

- It is irreversible LOC , loss of brainstem reflexes and apnea

BRAINSTEM REFLEXES :

- Pupillary reaction to light
- Corneal reflex
- Vestibulo-ocular reflex
- Cough reflex
- Gag reflex
- Motor response to central pain
- Apnea test : apnea despite a CO2 increase to > 6.65kpa
- All reflexes must be absent and are tested for twice by 2 doctors

- It is diagnosed in three stages

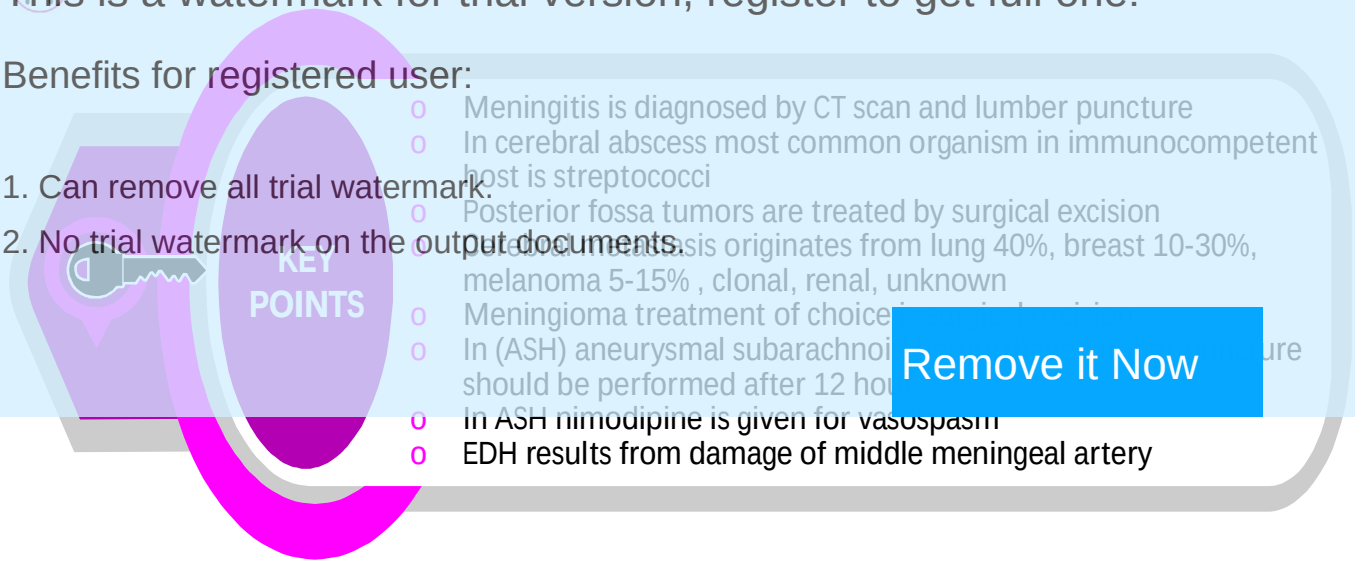
1. Identification of the cause of irreversible coma
2. Exclusion of reversible causes of coma
3. Clinical demonstration of absence of brainstem reflexes

CHIARI MALFORMATION :

- It refers to herniation of posterior fossa contents via foramen magnum
  It is of two types
- **Type 1 :** associated with > 5mm of tonsillar decent, present in youngs, headache exacerbated by coughing and straining
- **Type 2 :** decent of tonsils and cerebellar vermis, present in infancy with signs of brainstem compression such as poor feeding strider and apneic spells

TREATMENT :

- First treat hydrocephalus followed by foramen magnum decompression



- Meningitis is diagnosed by CT scan and lumber puncture
- In cerebral abscess most common organism in immunocompetent host is streptococci
- Posterior fossa tumors are treated by surgical excision
- Parenchymal metastasis originates from lung 40%, breast 10-30%, melanoma 5-15% , clonal, renal, unknown
- Meningioma treatment of choice
- In (ASH) aneurysmal subarachnoi ure should be performed after 12 hou
- In ASH nimodipine is given for vasospasm
- EDH results from damage of middle meningeal artery

Case example :
A young male came to ER with RTA complaining of head injury history of 3 episodes of vomiting after RTA and severe headache CT scan brain shows biconvex hyperdense lesion

Q : What is your diagnosis ?
A : extra dural hematoma (EDH).

Q : What is the CT scan finding ?
A : biconvex (lentiform) hyperdense lesion between skull and brain.

Q : What is the treatment option ?
A : evacuation of hematoma via craniotomy.

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TORSO TRAUMA

Chapter 13

INTRODUCTION:

- Torso is generally regarded as the area between neck and groin, made up of thorax and abdomen
- 42 % of all deaths are result of brain injury
- 39 % of all trauma deaths are caused by major hemorrhage
- ATLS is the cornerstone of advanced resuscitation

FUNCTIONAL ZONES :

- Neck
- Mediastinum
- Diaphragm
- Groin
- Retroperitoneum :
  - **Zone 1 (central) :** hematomas in this zone should always be explored
  - **Zone 2 (lateral) :** lateral hematomas are usually renal in origin and can be managed non operatively
  - **Zone 3 (pelvic) :** should not be opened when possible, should be controlled with packing and angioembolism.

THORACIC INJURY :

- Chest injuries are often life threatening, 80% cases can
- It accounts for 25 % of all severe injuries

INVESTIGATIONS :

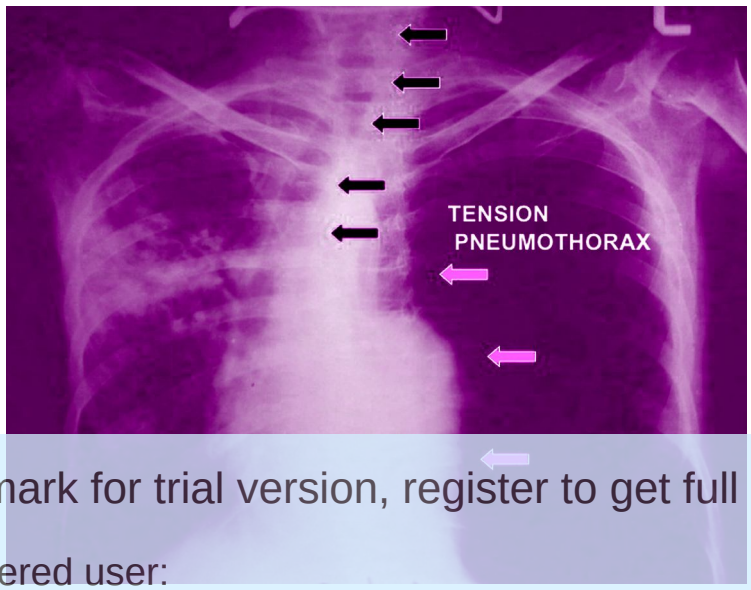
- Chest radiograph investigation of choice
- Ultrasound can be used to differentiate between contusion and actual presence of blood
- Spiral CT scan provided rapid diagnosis in the chest and abdomen
- **Chest drain :** diagnostic as well as therapeutic

CLOSED MANAGEMENT OF CHEST INJURIES :

- About 80 % of chest injuries can be managed closed
- If there is an open wound insert a chest drain
- Do not close a sucking chest wound until a drain is place
- If bleeding persists, the chest will need to be opened

IMMEDIATE LIFE THREATENING INJURIES :

1. TENSION PNEUMOTHORAX :



- It develops when a one way valve air leak occurs either from the lung or through the chest wall
- Air is sucked into the thoracic cavity without any means of escape, completely collapsing then compressing the affected lung

CAUSES :

- Penetrating chest trauma (most common)
- Iatrogenic lung puncture
- Blunt chest trauma with parenchyma lung injury
- Mechanical positive pressure ventilation

CLINICAL PRESENTATION:

- Patient is panicky with dyspnea, tachypnea and distended neck veins
- Tracheal deviation AWAY from the affected side
- Hyper-resonance or absent breath sounds over the affected hemithorax
- Raised JVP

It is a clinical diagnosis and treatment should never be delayed by waiting for radio graphical confirmation.

TREATMENT :

- Immediate decompression
- Needle thoracostomy in 2nd intercostal space in mid clavicular line of affected hemithorax
- followed by insertion of chest tube through 5th intercostal space in midaxillary line.

PERICARDIAL TAMPONED :

- It is most commonly result of penetrating trauma
- It is due to accumulation of blood or fluid in pericardial sac , resulting in compression of heart.

CLINICAL PRESENTATION :

- Beck's triad : Raised JVP, low BP, muffled heart sound
- Tachycardia, dyspnea, collapse
- Kussmaul's sign : JVP raised on inspiration

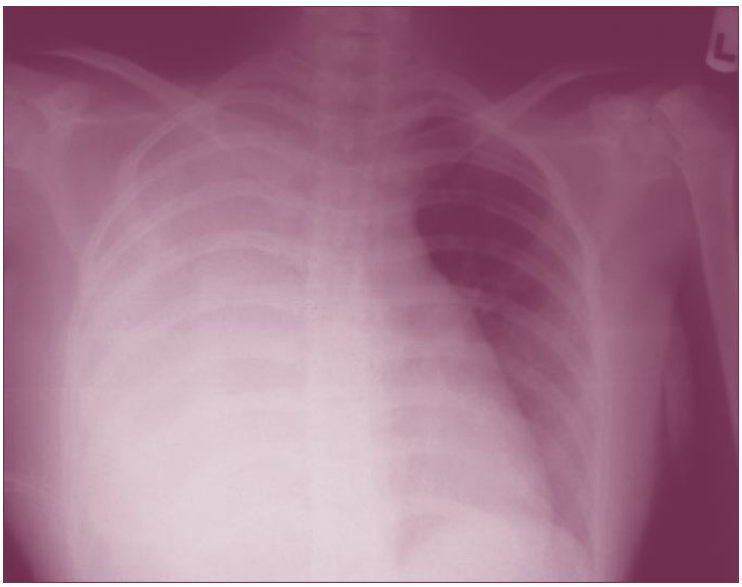
TREATMENT :

- Pericardiocentesis
- Volume resuscitation
- Sternotomy or left thoracotomy

OPEN PNEUMOTHORAX (SUCKING CHEST WOUND) :

- This is due to large open defect in the chest (> 3cm), equalizing pressure between airway and pleural space.
- Clinical features :
- Respiratory distress
- Decrease air entry
- Hypoventilation on affected side, increased percussion note
- Treatment :
- Close defect with occlusive plastic dressing taped on three sides to act as a flutter-type valve
- Insertion of chest tube in a remote site from the injury
- Definitive treatment is surgical closure

MASSIVE HEMOTHORAX :



- Accumulation of blood in a hemithorax
- Most common cause in blunt injury is continuing bleeding from a torn intercostal vessel or occassionally from internal mammary artery

CLINICAL PRESENTATION :

- Hemorrhagic shock
- Flat neck veins
- Unilateral absence of breath sounds
- Dull percussion note

TREATMENT :

- Correction of hypovolumic shock
- Insertion of an intercostal drain
- Initial drainage of >1500ml of blood or on going hemorrhage of > 200ml/hr every 3-4 hour is generally considered as indication of urgent thoracotomy.

FLAIL CHEST :

- Usually results from a blunt trauma
- Associated with multiple rib fracture
- It is defined as three or more rib fracture in two or more places
- Blunt force may result in underlying contusion as well.

CLINICAL PRESENTATION :

- Respiratory distress
- Paradoxical respiratory movement
- Rib crepitus
- Hypoxia
- Hypovolemia

TREATMENT :

- Oxygen administration
- Adequate analgesia
- Physiotherapy
- Drainage if hemopneumothorax
- Surgery for severe chest injury or pulmonary contusion rarely indicated

POTENTIALLY LIFE THREATENING INJURIES :

DIAPHRAGMATIC INJURIES :

- A penetrating injury below 5th intercostal space should raise suspicion of diaphragmatic injury
- Blunt trauma can cause karge defect in diaphragm

CLINICAL PRESENTATION :

- Most are silent
- Mostly left sided

INVESTIGATIONS :

- CXR
- CT scan
- Video assissted thoracoscopy
- Laproscopy

TREATMENT :

- Operative repair is indicated in all cases
- All penetrating diaphragmatic injuries must be repair via abdomen and not the chest

THORACIC AORTIC DISRUPTION :

- It is a common cause of sudden death
- Site of rupture is usually the ligamentum arteriosum as the vessel is relatively fixed here

CLINICAL PRESENTATION :

- Asymmetry of upper and lower extremity blood pressure
- Chest wall contusion
- Widening pulse pressure
- Hypotension

INVESTIGATION :

- Extensive widening mediastinum
- CT scan confirm the diagnosis
- Aortogram GOLD STANDARD

TREATMENT :

- Control of systolic BP (<100 mmHg)
- Treat abdominal injury first
- Definitive treatment is stent

ABDOMINAL INJURIES :

CLASSIFICATION OF PATIENTS :

- Patients who have suffered abdominal trauma can generally be classified into following categories
- Hemodynamically normal : investigation can be completed before treatment is planned
- Hemodynamically stable : investigation is more limited , treatment can be non operative angioembolization or operative
- Hemodynamically unstable : no time for investigation, need immediate surgical correction of bleeding

INVESTIGATIONS :

FOCUSED ABDOMINAL SONAR FOR TRAUMA (FAST) :

- FAST is a technique whereby U/S imaging is used to assess for the presence of free blood, either in abdominal cavity or in pericardium.

- This is used for focused in 6 areas : the pericardium, area around liver and spleen, left and right periodic gutters, peritoneal space in pelvis
- It is a rapid, reproducible, portable and non invasive test
- It will reliably detect < 100 ml of free blood
- It does not identify injury to hollow viscera
- It can not reliably exclude injury in penetrating trauma
- It may need repeating and supplementing with other investigation

DIAGNOSTIC PERITONEAL LAVAGE (DPL) :

- DPL is used to asses presence of blood in abdomen
- A cannula is inserted below the umbilicus , directed caudally and posteriorly
- The cannula is aspirated for blood and following this 1000 ml of warmed R/L solutions allowed to run in abdomen and is then drained out.
- The presence of > 100000 RBCs/micro lit or >500 WBCs/microlit is positive
- Drainage of lavage via chest drain indicates penetration of diaphragm

COMPUTED TOMOGRAPHY :

- It is investigation of choice in stable patient
- The scan usually performed using IV contrast and often oral contrast
- It is sensitive for blood and for reteroperitoneal injury
- A normally performed scan is usually sufficient to exclude injury

TRAUMA TO LIVER :

- Liver is positioned under diaphragm so injuries to liver
- Liver injury are of two types blunt or penetrating.

BLUNT LIVER TRAUMA :

- It occurs as a result of direct injury
- Most injuries are minor and can be managed conservatively

PENETRATING LIVER TRAUMA :

- It is relatively common
- Mostly by stab or gunshot wound
- Penetrating trauma should be explored

INVESTIGATION :

- Ct scan is investigation of choice in stable patients
- DPL
- Laparoscopy

MANAGEMENT :

- ABCDE protocol (airway, breathing, circulation, disability, exposure and environment)

CONSERVATIVE MANAGEMENT :

- Indications for conservative management are : stable patient, no peritoneal sign, low grade hepatic surgery with < 125 ml free intra peritoneal blood, no other intra abdominal injuries
- Principles of conservative management are : continual re-assessment, correct clotting abnormalities, blood transfusion and immediate surgery if needed.

OPERATIVE MANAGEMENT :

- Laparotomy via roof top incision
- 4 Ps : push , pringle, plug, pack
- The hepatic artery can be tied off, but not the portal vein (stent)
- Closed suction should always be used
- Immediate laparotomy indications :
- A gunshot wound to the abdomen
- A stab wound in abdomen in hemodynamically unstable patient
- Clinical evidence of intra abdominal bleed in hemodynamically unstable patient

TRAUMA TO SPLEEN :

- It is usually due to blunt trauma
- It can be injury involving capsule , extra capsular rupture, intra capsular rupture leading to hematoma formation.

INVESTIGATIONS :

- U/S
- CT scan
- DPL
- laparotomy (unstable patient)

TREATMENT :

- Conservative management :
- Can be cautiously undertaken if there is absence of progressive hemorrhage and no other intra abdominal injuries
- Recommended in children
- Patient should be closely observed for 6-10 days due to risk of secondary rupture

OPERATIVE MANAGEMENT :

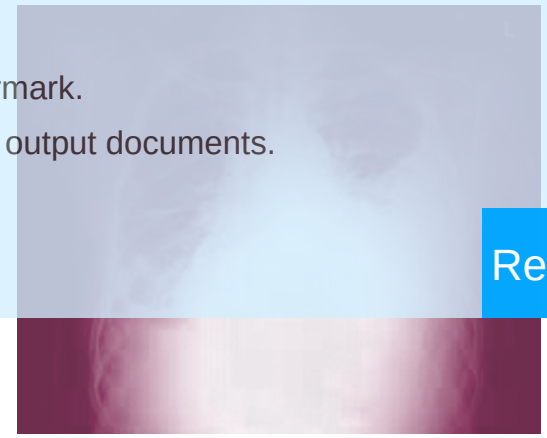
- Every effort should be made to conserve the spleen
- Small tears managed with pressure and hemostatic agents
- Emmental wrapping or enclosing the spleen within a mesh bag
- Occasionally total splenectomy is required.

KEY POINTS

- Tension pneumothorax presents with dyspnea, tacypnea, distended neck veins , respiratory distress
- (TP) Tension pneumothorax is clinical diagnosis and treatment shouldn't be delayed by waiting for radiological coonfirmation
- TP treatment is immediate decompression
- In abdominal injury ct is the investigation of choice
- In spleenic trauma it is recommended in children bleeding will usually stop within 12 hours

Case example:

A middle aged male came to ER after fall from bike he is complaining of chest pain with respiration his R/R is 28 , pulse is 120/ min Xray shows :



Q : What is your diagnosis ?

A : left sided hemothorax.

Q : What are the indications of thoracotomy ?

A : > 1500ml of blood on insertion of chest drain or 200ml/hr for 3-4 hrs

PLASTIC AND RECONSTRUCTIVE SURGERY

Chapter 14

GRAFTS :

- Grafts are tissues that are transferred without their blood supply, which therefore have to revascularise once they are in a new site.
- Only tissue that produce GRANULATION will support a graft.
- Grafts are contraindicated to cover exposed tendons, cartilage or cortical bone.

TYPES :

- **Autograft :** transfer from part of a persons body to another part
- **Isograft :** transfer between genetically identical individual
- **allograft :** transfer between individual of same species
- **xenograft :** transfer between individual of different species

1. SPLIT THICKNESS SKIN GRAFT :

- They consist of epidermis plus variable thickness of dermis
- These are sometimes called thiersch graft.
- They use to cover all sizes of wound.
- They are of limited durability and will contract
- They may be used to provide valuable temporary wou
- The most commonly used site is thigh.

2. FULL THICKNESS SKIN GRAFT :

- Consist of epidermis plus entire thickness of dermis.
- They also known as Wolfe grafts
- They used for smaller areas of skin replacement where good elastic skin is required

3. TENDON GRAFT :

- Usually taken from palmers longus or plantaris tendon
- Used for injury loss or nerve damage correction.

4. NERVE GRAFT :

- Usually taken from sural nerve.
- Sometimes smaller cutaneous nerve may be taken.

5. COMPOSITE SKIN GRAFT :

- Consist of skin and fat or skin and cartilage
- Often taken from ear margin and useful for rebuilding missing elements of nose, eyelids and fingertips.

FLAPS :

- These are tissues that are transferred with a blood supply.
- They have advantage of bringing vascularity to the new area.

TYPES :

1. **Random flaps :** The lenghth and breath ratio is no more than 1.5:1
   Three parts of a rectangle bearing no specific relationship to where the blood supply enters
2. **Axial flaps** : Much longer flap, based on known blood vessel supply to skin.
   Length to breath ratio ca n be greatly increased.
3. **Pedical/islended flap :** The axial blood supply of these flaps means that they can be swung round on a stalk or even fully islended so that he business end of the skin being transferred can have the pedicle burried
4. **Free flaps :** The blood supply has been isolated, disconnected and then reconnected using microsurgery at the new site
5. **Composite flap** : various tissues are transferred together, often skin with bone or muscle

SOME FLAPS :

- A local flap is raised next to a tissue defect in order to reconstruct it
- Local flaps have following basic patterns :
- **Transposition Flap :** the most basic design , leaving a graftable donor site
  - Z plasty : for lengthening scars and tissues
  - Rhomboid flap : for cheek, temple, back and flat surfaces
  - Rotation flap : for convex surfaces
  - Advancement flap : for flexor surfaces
  - V to Y advancement : commonly used for
  - Bilobed flap : for convex surfaces especially nose
  - Bipedicle flap : for eyelids , rarely elsewhere
- All flaps must be raised in subcutaneous plane

ADVANTAGES :

- Best local cosmetic tissue match
- Often a simple procedure
- Local or regional anesthesia option

DISADVANTAGES :

- Possible local tissue shortage
- Scaring may exacerbate the condition
- Surgeon may compromise local resection

COMBINED LOCAL FLAPS :

- Sometimes a local flap may be combined to import a surplus tissue from a wide area adjacent to a scar or defect that needs removal
- Examples are W-plasty and multiple Y to V plasty

DISTANT FLAP :

- It involves moving tissue from one part of the body, where it is dispensable to another part where it is needed
- They may be myocutaneous (a long muscular pedicla that contains a dominant blood supply) or fasciocutaneous (where a long fascial layer contains a septal blood supply)
- Examples : breast reconstruction, oral cancer reconstruction

FREE FLAP (FREE TISSUE TRANSFER) :

- It consist of disconnecting the blood supply from donor site and reconstruct it in distant place using the operative microscope
- It is the best means of reconstructing major composite loss of tissues in face jaws lower limb
- A good arterial flow in and venous return out without external tissue pressure is of paramount importance in achievement a successful transfer

ADVANTAGES :

- Being able to select exactly the best tissue move
- Only takes what is necessary
- Minimize donor site morbidity

DISADVANTAGES :

- More complex surgical technique
- Failure involves total loss of all transferred tissue
- Usually takes more time unless the surgeon is experienced

CAUSES OF FLAP FAILURE :

- Poor anatomical knowledge i.e deficient blood supply
- Flap inset with too much tension
- Local sepsis
- Septicemic patient
- Too tight dressing around the pedicel
- Micro surgical failure in free flap surgery

TISSUE EXPANSION :

- It is valuable for local tissue for reconstruction
- It involves by placing a device (expandable balloon) beneath the tissue to be expanded and progressively enlagarged the volume with fluid (sterile saline)

ADVANTAGES :

- Well vascularized tissue
- Tissue next to defect is likely to be of similar consistency
- Good color match
- It is invaluable for sharing remaining areas of scalp hair after severe burn, removing major congenital naevi.

DISADVANTAGES :

- Multiple expansion episodes
- Cost of device
- High incidence of infection

VACUUM ASSISTED CLOSURE :

- It is also known as negative pressure wound therapy
- It involves placing an open cell foam dressing into the wound cavity and applying a controlled sub atmospheric pressure
- Apply intermittent negative pressure of -125mmHg

- Graft are tissues that are transferred without their blood supply
- Split thickness skin graft are hairless and do not sweat
- Presence of group A hemolytic streptococci is a contraindication to grafting
- Z plasty for lengthening scars or tissue

BURNS

Chapter 15

- Majority of burns in children are scaled
- Majority of burns in adults are flame
- Most common organ affected is the skin
- Burn refers to coagulative necrosis of variable death
- **Types :** thermal (most common) , electrical, radiation, chemical
- Alkali burns are more severe than acidic burns

PATHOPHYSIOLOGY :

METABOLIC POISONING :

- Most common poisoning is from carbon mono oxide : concentration above 10% requires treatment with pure oxygen for more than 24hours, death occurs with concentration around 60%
- Hydrogen cyanide cause metabolic acidosis.

INJURY ABOVE LARYNX :

- Caused by inhaled hot gases
- Cause laryngeal edema which may completely block the airway

INJURY BELOW LARYNX :

- Rare but caused by steam inhalation
- In this injury respiratory epithelium swells and detached from bronchial tree , create casts which can block main upper airway.

INHALATIONAL INJURY :

- Caused by minute particles within thick smoke
- They stick to moist lining causing intense reaction in alveoli
- It causes chemical pneumonitis and respiratory failure.

INTESTINAL CHANGES :

- Inflammatory stimulus and shock causes micro vascular damage and ischemic to gut mucosa
- This reduces gut motility and decrease food absorption
- This will also lead to translocation of gut bacteria which become the source of infection
- Gut mucosa swelling, gastric stasis and peritoneal edema can also cause abdominal compartment syndrome
- This will splint the diaphragm and increases the airway pressure needed for respiration.

CIRCULATORY CHANGES :

- It causes increased vascular permeability
- As a result of which water, solutes and proteins escape from intra vascular to extra vascular space.
- This flow occurs over the first 36 hours after injury, but does not include RBCs
- Above > 15 % of burn area causes shock.

DANGER TO PERIPHERAL CIRCULATION :

- In full thickness burn, collagen fibers are coagulated
- Normal elasticity of skin is lost
- A circumferential full thickness burn of a limb act as a tourniquet, this will progress to limb threatening ischemic.

CLASSIFICATION OF BURN : ACCORDING TO DEPTH :

BURN	EXTENT	DERMIS	CAPILLARY RETURN	PINPRICK SENSATION
Superficial partial thickness burn	Papillary dermis	Pink and moist	Clearly visible when blenched	Normal
Deep partial thickness burn	Reticular dermis	Not as moist	Doesn't blench with pressure	Reduced
Full thickness burn	Whole dermis	Hard with leathery feel	Absent	Anaesthetized completely

ASSESSING AREA OF BURN :

- area of burn can be calculated by wallace's rule or mo
  browder chart

LUND AND BROWDER CHART :

Age in years	0	1	5	10	15	Adult
A head	9	8	6	5	4	3
B thigh	2	3	4	4	4	4
C leg	2	2	3	3	3	3

*** table after bailey and love short practice of surgery**

WALLACE'S RULE :

- Head 9%
- Arms each 9%
- Leg 18% each
- Trunk 36%
- Perineum 1%
- Palm and hand 1%

CAUSES OF BURNS AND THEIR LIKELY DEPTH :

- **Scald :** superficial but with deep dermal patches
- **Fat burn :** deep dermal
- **Flame burn :** mixed deep dermal and full thickness
- **Alkali burn :** often deep dermal or full thickness
- **Acid burn :** weak concentration superficial, strong concentration deep dermal
- **Electrical contact burn :** full thickness

BURN MANAGEMENT :

PRE HOSPITAL CARE :

- Stop the burn process
- Cool the burn wound
- Give oxygen
- Elevate the patient
- Check for other injuries

HOSPITAL CARE :

- A : airway
  - B : breathing and ventilation
  - C: circulation
  - D: disability- neurological status
  - E: exposure
  - F: fluid resuscitation
- In suspected airway burn : early incubation with an ET
- Laryngeal edema can develop in 4-24 hours of burn, it
so an emergency cricothyroidectomy should be performed.

CRITERIA FOR ACUTE ADMISSION TO A BURN UNIT :

- Suspected airway or an inhalational injury
- Any burn likely to require fluid resuscitation
- Any burn likely to require surgery
- Burn of hand face feet or perineum
- Any suspicion of non accidental injury
- Any burn in a patient with extreme of age
- Significant electrical or chemical burn
- Any burn associated with major trauma

FLUID RESUSCITATION :

- In children burn over 10% TBSA and adults with burn over 15% TBSA consider need of I/V fluid resuscitation
- If oral fluids are to be used, salt must be added to prevent hyponatremia and water intoxication.
- Fluid resuscitation is important in first 8 hours when fluid loss is maximum.

TYPES OF FLUID :

- There are three types of fluid
  1. Ringer's lactate or hartmann's solution
  2. Albumin solution or fresh frozen plasma FFP
  3. Hypertonic saline
- Widely used formula for fluid resuscitation is parkland formula
- It calculate fluid resuscitation in first 24 hours
- Formula = total % of body surface area * weight (kg) *4 = colume (ml)
- Half of this volume is given in first 8 hours and half is given in next 16 hours

FLUIDS :

- **Crystalloids :** most common is ringer's lactate
- **Hypertonic saline :** it produces hyperosmolarity and hypernatremia and prevent tissue edema
- Colloids : human albumin solution is most commonly used, should be given after 12 hours because before this time massive fluid shift cause protein to leak out of the cells
- Most common colloid formula is Muir and Barclay =0.5 * % body surface area burnt * weight = one portion
- Periods of 4/4/4, 6/6 and 12 hours respectively
- One portion to be given in each period

MONITORING OF RESUSCITATION :

- The key is urine output.
- Should be between 0.5-1.0 ml/kg/hr
- If urine output is below this infusion rate should be inc
- Urine output in excess of 2ml/kg/hr should signal a de

TREATING THE BURN WOUND :

ESCHAROTOMY :

- Circumferential full thickness burns to the limb require emergency surgery
- It refers to incising the whole length of a full thickness burn in mid axial lime, avoiding major nerves.
- It can cause significant blood loss so blood should be arranged prior to procedure if required.

FULL THICKNESS BURN AND OBVIOUS DEEP DERMAL WOUNDS :

1. Silver sulphadiazine cream 1 % : broad spectrum prophylaxis, effective against pseudomonas aeruginosa and MRSA.
2. Silver nitrate solution 0.5% : prophylaxsis against pseudomonas aeruginosa, but it needs to be changed and the wound resoaked in every 2-4 hours.It also produce black staining of all the furniture surrounding the patient.
3. Mefenide acetate cream : used as a5% topical solution, painful to apply, associated with metabolic acidosis.
4. Silver sulphadiazine and cerium nitrate : cerium nitrate forms a sterile eschar , it also boost cell mediated immunity in patients.

SUPERFICIAL PARTIAL THICKNESS AND MIXED DEPTH WOUNDS :

- The key lies with dressings are easy to apply, non painful , simple to manage and locally available.
- If wound is acute heavily contaminated then clean the wound under GA.
- If wound is chronic heavily contaminated then use silver sulfadiazine dressing for 2-3 days
- Hydro colloid dressing : for mixed depth burn, need to be changed every 3-5 days
- Biological dressing : useful for superficial burn eg amniotic membrane, do not need to be changed.

ADDITIONAL ASPECTS OF TREATING THE BURNED PATIENT :

- Analgesia : oral or iv (IM injections are contraindicated in acute burn over 10% TBSA)
- Energy balance and nutrition : >15-20% burn require NG feeding, should start within 6 hours of injury.
- Control of infection
- Physiotherapy
- Psychological care

DELAYED RECONSTRUCTION :

- Delayed reconstruction of burn injuries is common for large full thickness burns
- Eyelids must be treated before exposure keratitis arises
- Transposition bands and Z-plasty with or without tissue expansion are useful
- Full thickness graft and free flaps may be needed for large or difficult areas
- Hypertrophy is treated with pressure garments
- Pharmacological treatment of itch is important adjunc

SURGERY FOR ACUTE BURN WOUND :

- Any deep , partial thickness burn except < 4 cm2 need surgery.
- Deep burns:
  - Needs tangential shaving and split skin grafting
  - Topical adrenaline reduces bleeding
- **Full thickness burn :**
  - Require full thickness excision of skin.
  - Wherever possible skin graft should be applied immediately
- **Post operative management :**
  - Elevation of the appropriate limb
  - Careful evaluation of fluid balance and hb
  - Physiotherapy and splints

NON THERMAL BURN INJURY

ELECTRICAL INJURIES :

1. LOW TENSION INJURY (<1000V) :

- Domestic appliance injury

- Small, localized deep burn
- May cause underlying tendon or nerve damage
- Alternating current may create a tetany in muscles
- Interfering with normal cardiac pacing, thisn can cause cardiac arrest

2. HIGH TENSION INJURY (>1000V) :

- It can cause cutaneous and deep tissue damage with entry and exit wound
- Can cause significant myocardial damage without pacing interruption.
- Damage to underlying muscle of the affected limb can cause rapid onset of compartment syndrome

CHEMICAL INJURIES :

- Acid injuries cause coagulative necrosis
- Acid penetrate the skin rapidly but easily removed
- Alkali cause liquifective necrosis
- Florid ions in hydrofluoric acid burn the skin causing liquefective necrosis and de calcification
- Small burn require calcium gluconate gel tropically large burns need bier block containing 10% ca gluconate gel
- Elemental Na K Mg Lido not require irrigation initially, they ignite in water.

KEY POINTS

- Alkali burns are more severe than acidic burns
- Burn Above 15% of surface area ... lock
- Criteria for admission in burn > 1...
- Ringer lactate is most commonly used crystallites
- Laryngeal edema makes incubation difficult so emergency cricothyroidectomy should be performed
- Hydro colloid dressings are used for mixed depth burns

Case example :
A 34 years old female brought in emergency department with history of scaled burn via hot boiling water on arrival her abdomen and lower limb is affected On examination her bp is 100/60 pulse is 90/min

Q : how will you estimate the total burn area
A : by rule of nine (wallace's rule)

Q : what are the management in ER ?
A : ABCDEF approach , maintain IV line, IV fluid resuscitation, monitor resuscitation by urine output, plan for surgical management if needed

PART - 4

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ORTHOPEDIC INFECTION AND INFLAMMATION :

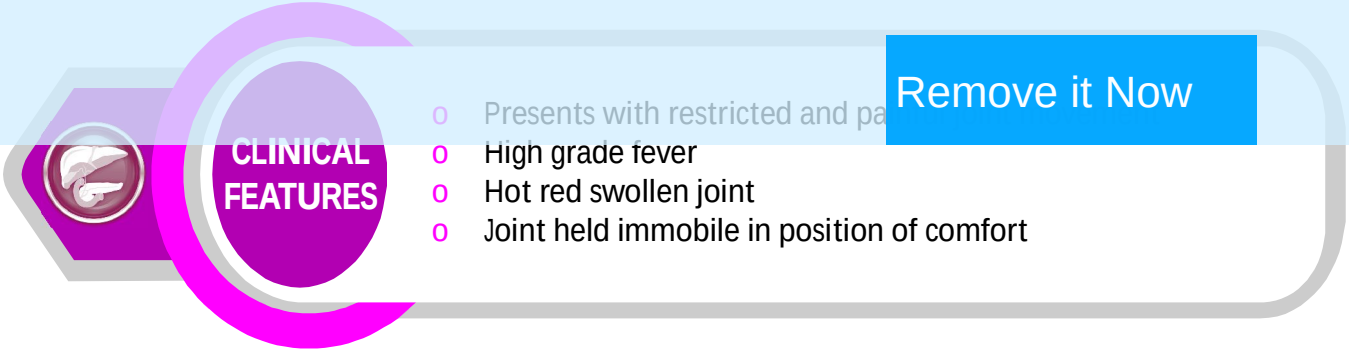
Chapter 16

SEPTIC ARTHRITIS :

- It is invasion of any joint by bacteria
- S.aureus is MOST COMMON agent.
- H.influenza and hemolytic streptococci are common in neonates
- N. Gonorrhea in young adults
- Most common sites : hip in neonates and knee in children and adults.
- It must be treated as surgical emergency
- Any hot swollen joint must be treated as septic arthritis until proven otherwise.

RISK FACTORS :

- Extremes of ages
- Underlying joint abnormality especially RA
- Immunocompromise (DM, HIV)
- Joint instrumentation (steroid injections, arthroscopy)
- Intravenous drug abusers
- Indwelling central venous catheter
- Bacteremia (Staph aureus)



INVESTIGATIONS :

- CBC
- ESR
- CRP
- UCE
- Uric aid levels
- X ray
- U/S
- C X R
- MRI
- Blood cultures
- Joint aspiration (for microscopy, gram stain and culture, uric acid and calcium pyrophosphate crystals)

TREATMENT :

- IV antibiotics
- Joint aspiration
- Surgical washout.

OSTEOMYLITIS :

ACUTE OSTEOMYLITIS :

- It refers to bacterial inflammation of bone
- It can be hematogenous, post-traumatic or contiguous
- MOST COMMON agent is streptococcus aureus
- H.Influenza and hemolytic streptococci are common in neonates
- Salmonella is common in patients with sickle cell disease
- E.Coli is common in intravenous drug users

CLINICAL FEATURES

- Present with pain
- Limb swelling
- Loss of function
- Systemic upset
- Pyrexia.

EVENTS :

- Infection starts at metaphysic
- Membrane elevation in first 24-48 hours when inflammatory exudates forms deep to periosteum causing pain.
- Progression of inflammatory process leads to cortical infarction, formed a necrotic cortical bone called SEQUESTRUM.
- This is followed by formation of new bone surrounding the sequestrum called INVOLCRUM
- Involcrum can develop defect called cloacae
- Investigations :Technetium bone scan : positive in first 24-48 hours
- CT scan defines extent of bone sequestration and cavitation.

TREATMENT :

- Resuscitation
- Blood cultures
- Start iv antibiotics for 10-14 days converted to oral for atleast 4-6 weeks
- Splintage of affected limb
- Radiographically guided aspiration or surgical evacuation
- plain xrays : normal in first 10 days
- MRI : will show bone edema and periosteal elevation

CHRONIC OSTEOMYLITIS :

CAUSES :

- Following acute osteomylitis
- Following contaminated trauma and open fractures
- After joint replacement therapy

RISK FACTORS :

- Smoking
- Malnutrition
- Immunosuppression
- DM
- Steroids
- Vascular disease

- Present with pain
- Chronic inflammation
- Sinus formation or ulceration.

INVESTIGATIONS :

- Xray : soft tissue swelling, subperiosteal reaction, bone
- CT scan : for cortical bone imaging, for planning surgic
- MRI :imaging TEST OF CHOICE
- Blood cultures
- ESR, CRP
- Bone biopsy
- Swabs from sinus tract.

CIERNEY AND MADER CLASSIFICATION.

- **Stage 1 :** (medullary) confined to medullary cavity
- **Stage 2 :** (superficial) periosteum and cortex is involved
- **Stage 3 :** (localized) medullaa and periosteum with formation of sinus tract
- **Stage 4 :** (diffuse) involves entire circumference of bone and soft tissue.

TREATMENT :

- IV antibiotics for 2 weeks followed by oral antibiotics for 4 weeks

RHEUMATOID ARTHRITIS (RA) :

- Most common type of inflammatory arthritis
- Mostly involves small joint in a symmetrical manner
- RF is positive in 80%

CLINICAL FEATURES

- Morning stiffness
- Symmetrical arthritis
- Hand deformities and rheumatoid nodules

DIAGNOSTIC CRITERIA : RA IF 4 OR > 4 ARE POSITIVE

- Seropositive rheumatoid factor and radiographic changes
- Morning stiffness lasting > 1 hour
- Active arthritis of > 3 joints simultaneously
- Active arthritis of at least one hand joint.
- Symmetrical arthritis
- Duration >6 weeks
- Subcutaneous rheumatoid nodules.

MANIFESTATION :

- Fingers : swan neck, boutonniere
- Extensor tendon rupture
- Flexor tendon rupture
- Flexor synovitis
- Metacarpophalangeal joint : flexion, ulner deviation, subjugation, dislocation
- Wrist : radial deviation, carpal supination, prominent ulnar head
- Extensor tenosynovitis
- Sclerotia, iritis
- Inferential lung disease, pleural effusion,
- Myocarditis
- Nephritis
- Amyloid of lung , kidney, heart bowel.

INVESTIGATION :

- CBC,
- ESR,
- CRP,
- RF,
- Anti-ccp antibodies,
- X-ray of the affected joint

TREATMENT :

- Analgesia
- Cortocosteroids
- NSAIDS
- Anti-TNF drugs,

- Disease modifying anti-rheumatic drugs (DMARDS) :sulfasalazine, leflunomide, penicillamine, cyclosporin, gold
- Synovectomy, tenosynovectomy, arthrodesis, joint replacement.

ANKYLOSING SPONDYLITIS :

- Present following trauma, a high index of suspicion for occult fracture
- It is seronegetive spondyloarthritis (negative RF)

INVESTIGATION :

- CBC
- ESR
- CRP
- HLA-B27
- Xray of spine BAMBOO SPINE

TREATMENT :

- Physical activity
- NSAIDS
- Analgesia
- Methotrexate
- Sulfasalazine
- ANTI- TNF antibody
- Local corticosteroid injections

GOUT :

- Strong male predominance
- Usually affects a single joint
- It is defined as a pathological reaction of joint to the p… …e monohydrate crystals
- 1st metacarpophalangeal joint is affected in 50 % (podagra)
- White crystal deposition in ear lobes and around joints (tophi)

CAUSE :

- Increased uric acid production (idiopathic, inborn errors of metabolism , myeloproliferative disorders)
- Impaired excretion of uric acid (chronic renal failure, drugs, hyperparathyroidism)

INVESTIGATION :

- CBC
- ESR
- CRP
- X ray of affected joint
- Serum urate levels
- Joint fluid aspiration- NEGATIVE BIREFRINGENT NEEDLE shaped crystals

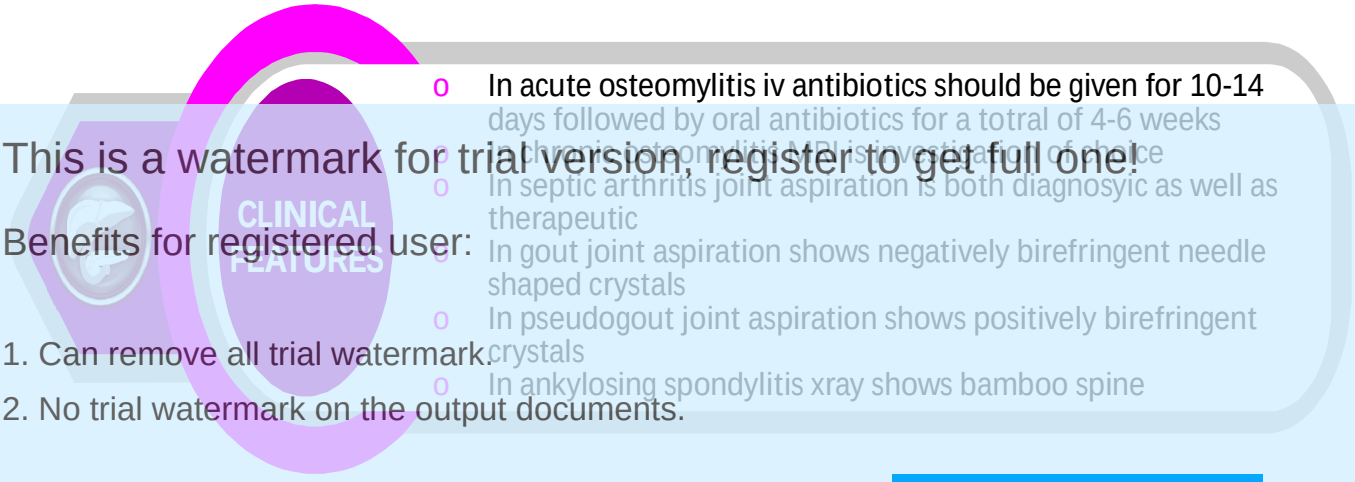
TREATMENT :

- NSAIDS + PPI
- local ice packs,

- Clochicine
- Joint aspiration
- Allopurinol
- Febuxostat

PSEUDOGOUT :

- Accumulation of calcium pyrophosphate crystals.
- In elderly age
- MOST COMMON SITE KNEES, followed by wrist and pelvis
- Joint fluid aspiration POSITIVE BIREFRINGENT CRYSTALS
- RHOMBOID SHAPED



Case example :
A 45 years old male came in OPD with complains of small joint pains and morning stiffness for last 3 months on examination swan neck and wrist deviation is found

Q : what is your diagnosis ?
A : rheumatoid arthritis

Q : what is the diagnostic criteria for RA ?
A : Diagnostic criteria : RA if 4 or > 4 are positive

- Seropositive rheumatoid factor and radiographic changes
- Morning stiffness lasting > 1 hour
- Active arthritis of > 3 joints simultaneously
- Active arthritis of at least one hand joint.
- Symmetrical arthritis
- Deviation of wrists
- Subcutaneous rheumatoid nodules

Q : how eill you investigate the case ?
A : blood test (CBC, ESR, CRP, RF, anti-CCP antibodies) and x ray of the affected joint

Q : what is the treatment of this condition ?
A : Treatment :

- Analgesia
- Cortocosteroids
- NSAIDS
- Anti-TNF drugs,

Disease modifying anti-rheumatic drugs (DMARDS) :sulfasalazine, leflunomide, penicillamine, cyclosporin, gold
Synovectomy, tenosynovectomy, arthrodesis, joint replacement

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UPPER LIMB PATHOLOGIES

Chapter 17

CONGENITAL ABNORMALITIES :

SPRENGEL'S SHOULDER :

- Most common congenital abnormality due to abnormal scapular decent from its embryonic midcervical position
- **Presentation :** high , small, rotated scapula

KLIPPEL-FEIL SYNDEROME :

- Congenital fusion of cervical vertebra.

ACQUIRED ABNORMALITIES

FROZEN SHOULDER :

- Also known as adhesive capsulitis, contracted shoulder.
- This is a idiopathic painful and stiff condition.
- Usually affecting females in their fifties
- It is associated with diabetes, heart, thyroid disease
- Presents with the onset of severe pain, may follow a minor trauma.
- Loss of active and passive movements
- Pathognomic sign : loss of external rotation
- Xrays : normal

CLINICAL COURSE :

Painful , stiffness and thawing phase

- **Phase 1 (painful phase) :** lasts 2-9 months, shoulder becomes increasingly painful especially at nights
- **Phase 2 (stiffening phase) :** lasts 4-12 months , gradual reduction in range of movement of shoulder.
- **Phase 3 (thawing phase) :** lasts for further 4-12 months , gradual improvement in range of motion.

TREATMENT :

- Often no treatment is required
- Acute phase is treated with corticosteroid
- Physiotherapy
- Manipulation under anesthesia
- Surgery for prolonged stiffness affecting function.

INSTABILITY OF GLENOHUMERAL JOINT :

TRAUMATIC :

- Commonest of all
- Unidirectional

- Commonly anterio-inferior
- Bankart defect with detachment of anterio-inferior gleniod labium and damage to the humeral head

TREATMENT :

- surgical repair and tightening of anterior capsule and posterior capsule.

TRAUMATIC :

- Less traumatic event
- multidirectional
- Shoulder subluxes rather than dislocation, painful,
- Generalize ligament laxity

TREATMENT :

- Physiotherapy
- Muscle strengthening
- Rotator cuff strengthening
- Surgical tightening of capsule (50 %)

INERTIAL :

- Voluntary with ligament laxity.
- Not painful
- Surgery is contraindicated.

ROTATOR CUFF PATHOLOGIES

ROTATOR CUFF IMPINGEMENT :

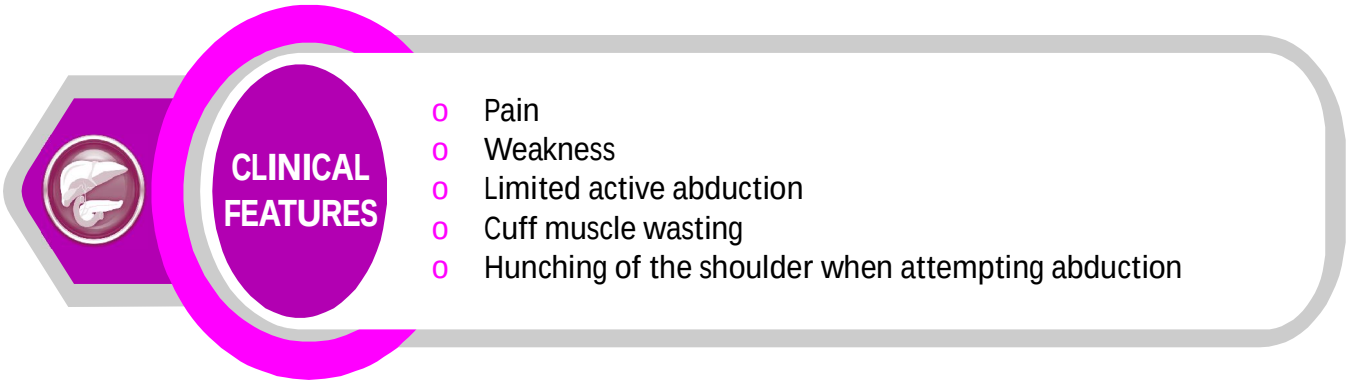
- Middle age.
- It is usually activity related,
- No local tenderness
- Active movement produces pain 60-120degrees of forward flexion.
- Passive movement is less painful than active
- **Hawkin's sign :** Pain is reproduced when shoulder is internally rotated with 90 degree forward full flexion.
- Neer's impingement test : pain is reproduced with full forward flexion of shoulder joint.

TREATMENT :

- Subacromial steroid
- Surgery involves decompression of rotator cuff by excising the coracoacromial ligament and part of acromion
- Surgery for those who do not respond to steroids or if symptoms persist for a minimum period of 6 months.

ROTATOR CUFF TEAR :

- It is classified as small (less than 1 cm), intermediate (2-4 cm), large (>5 cm).
- More common in elderly
- Begins at the anteriolateral edge of supraspinatous and progress posteriorly to involve the infraspinatusand teres minor tendon.



TREATMENT :

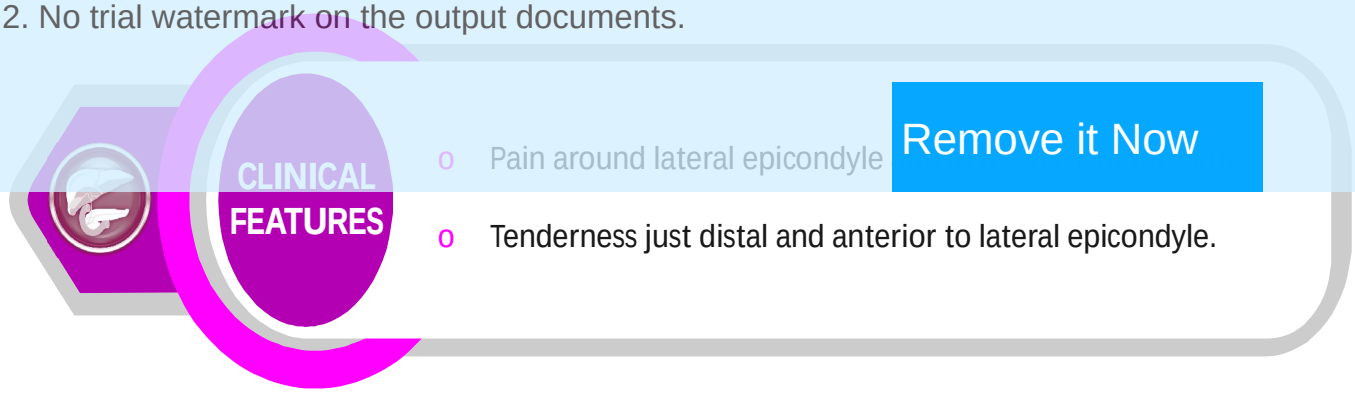
Depends upon patients age, lifestyle, severity of symptoms.

- Arthrosporic or open repair with subacromial decompression can be considered for all tears

ELBOW DISORDERS :

LATERAL EPICONDYLITIS (TENNIS ELBOW) :

- Strain or small tear in the common extensor origin followed by an inflammatory reaction.
- It is the most common cause of traumatic elbow pain.
- Most commonly involved tendon is extensor carpai radialis brevis.



DIAGNOSIS :

- Pain is produced with wrist flexion and forearm pronation against resistance.
- Pain is reproduced with resisted wrist extension.

TREATMENT :

- Analgesia
- Local injections of hydrocortisone
- Stretching exercises
- Open or arthrosporic surgery.

GOLFER'S ELBOW (MEDIAL EPICONDYLITIS) :

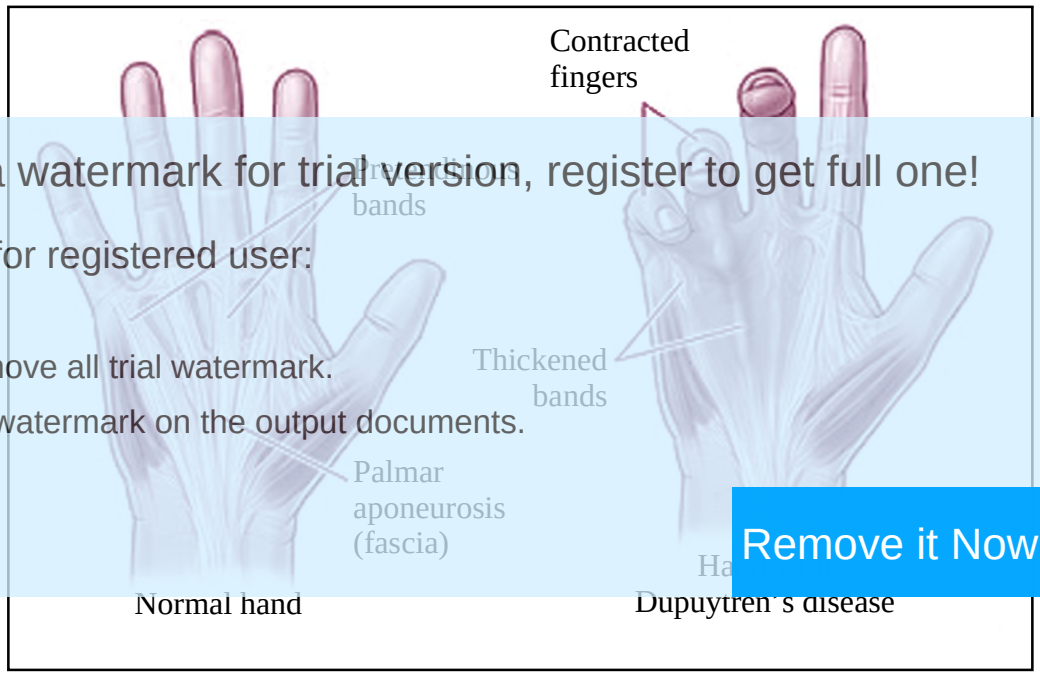
- It involves flexor pronator origin at medial epicondyle
- Pain in medial epicondyle at common flexor origin.
- Differential diagnosis is ulner nerve entrapment.

ULNER NERVE COMPRESSION :

- Compression of nerve around the elbow
- Most common after carpel tunnel
- Present with weakness with paraesthesia
- TINNEL'S sign positive : tapping over the nerve produces pain.
- Treatment involves nerve decompression with or without partial medial epicondylectomy and anterior transposition.

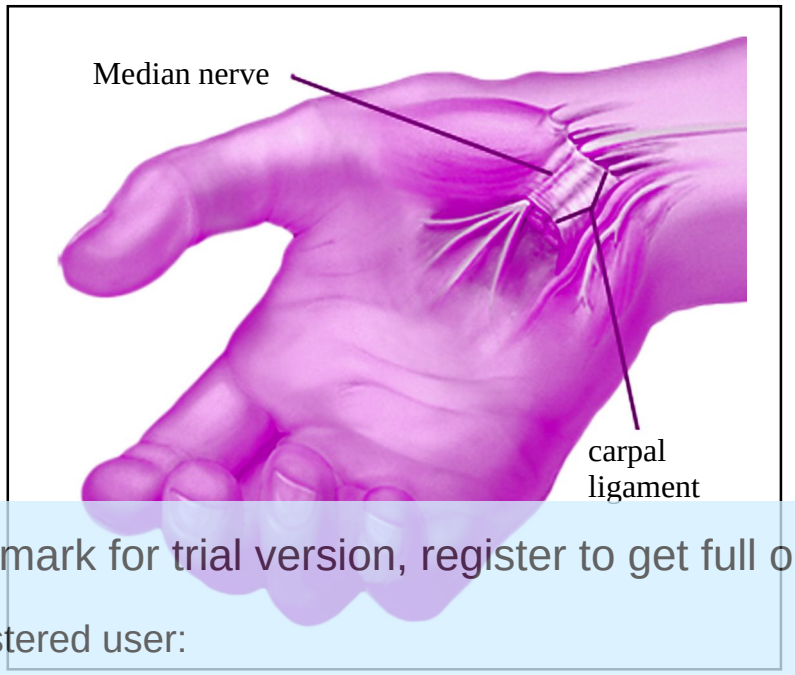
HAND DISORDERS :

DUPUYTREN'S CONTRACTURE :



- Autosomal dominant condition
- 5^{th} to 7^{th} decade in men
- Associated with smoking, epilepsy, AIDS, hypothyroidism, alcoholic cirrhosis.
- It is a proliferative fibroplasia of the palmer and digital fascia.
- Commonly affect ring finger
- **Presentation :** Palmer nodules, skin puckering , cord of palm and digits, flexion contracture of digits.
- **Fibromatosis of planter fascia :** ledderhose's disease and penile fibromatosis (peyronie's disease) are associated with aggressive and severe form called dupuytren's diathesis.
- Surgery is the treatment if hand can not be placed flat.
- Fasciotomy, fasciectomy, dermofasciectomy are surgical treatments.

CARPAL TUNNEL SYNDROME :



- It is a median nerve compression in the carpal tunnel deep to wrist flexor retinaculum.
- Commonly affect woman.

CAUSES :

- Idiopathic
- Pregnancy
- Obesity
- Occupation
- Trauma
- Alcoholism.

CLINICAL FEATURES

- Radial wrist pain
- Swelling
- Tenderness

TREATMENT :

- NSAIDS
- Splintage
- Steroid injections
- Surgical release of extensor retinaculumof first dorsal compartment.

CLINICAL FEATURES

- AVN of femoral head the most common cause is trauma
- The most common non traumatic cause of AVN excess alcohol, use of steroids, SICKLE CELL DISEASE
- Supra spinatous is the most common rotator cuff muscle involved in disease due to relatively poor blood supply

Case example :

A 26 years old cricketer came in ER with complain of rt shoulder pain and inability to move his right shoulder

Q : how will you investigate the case ?

A : x ray right shoulder joint

Q : what is the diagnosis ?

A : right shoulder dislocation

Q : what are the treatment options ?

A : analgesia for pain relief,
Arthrosporic and open repair of the defect with tightening of capsule

Q : what is the absolute indication of surgery ?

A : dislocation when patient is asleep

Q : what are the complications ?

A :recurrence, capsular tear, nerve injury, humerus head injury

LOWER LIMB PATHOLOGIES

Chapter 18

HIP AND KNEES :

VASCULAR NECROSIS OF FEMORAL HEAD :

- It occurs because of the interruption of blood supply to femoral head.
- Can be primary (idiopathic) or secondary (other causes)

CAUSES :

- Sickle cell disease
- Hemoglobinpathies
- Caisson disease
- Hyperlipidemia
- Gaucher disease
- Chronic liver disease
- Antiphospholipid antibodies
- Radiotherapy, chemotherapy
- HIV
- Steroids, alcohol excess

CLINICAL FEATURES

- Common in man
- Age 35-45 years
- Bilateral in over 50%
- Asymptomatic in early stages
- In late stages : pain in groin, walk with a limp with limitation of movement

INVESTIGATION :

- A weight bearing AP radiograph along with lateral radiograph of affected limb show :
- Increased sclerosis = early stage
- Subchondral bone resorption= crescent sign
- Flattening indicates segmental bone collapse = late stages
- MRI most sensitive

TREATMENT :

- Pre-collapsed state : the aim is to preserve and revascularized the femoral head, surgical treatment is core decompression
- Post-collapsed : aim to replace the femoral head by femoral osteotomy or joint replacement

STEINBERG'S CLASSIFICATION OF AVN OF FEMORAL HEAD :

Stage 0 : Normal, Non Diagnostic Radiograph , MRI , Bone Scan
Stage 1 : Normal Radiograph, Abnormal MRI Or Bone Scan
Stage 2 : Sclerosis Or Cyst
Stage 3 : Subchondral Collapse , Crescent Sign
Stage 4 : flattening of head, normal acetabulum
Stage 5 : Acetabular Involvement
Stage 6 : Obliteration Of Joint Space

OSTEOARTHRITIS (OA) OF HIP :

- OA is a non-inflammatory condition
- It can be primary (idiopathic) or secondary (trauma, AVN, perthes disease, DDH, slipped capital femoral epiphysis , septic arthritis)

EXAMINATION :

- Gluteal muscle wasting
- Limp with a positive trendelenber's sign
- Leg length discrepancy
- Limitation of movement

INVESTIGATION :

- X rays of hip :
- Reduction of joint space
- Sclerosis
- Subchondral cyst
- Osteophytes formation
- Collapsed femoral head (advance stage)

TREATMENT :

- Conservative : NSAIDS , walking aids, glucoamine, physiotherapy
- Indications for surgery : relentless pain, limitation of daily activity, failure to conservative treatment
- Surgical options : osteotomy (age 55-65 yrs), arthrodesis (<55 yrs), total hip replacement (>65 yrs)

TOTAL HIP REPLACEMENT (THR) :

- Complications : intra operative like nerve injury, vascular injury, femoral fracture.
- Post operative complications : DVT, infection, dislocation, leg length inequality, implant loosening.

OSTEOARTHRITIS OF KNEE JOINT :

- It affects woman more than man

CLINICAL FEATURES

- Pain is the chief symptom (activity related)
- Restricted movement
- Effusion present
- Crepetus present
- OA : varus deformity, medial compartment involved
- RA : valgus deformity, lateral compartment involved

INVESTIGATION :

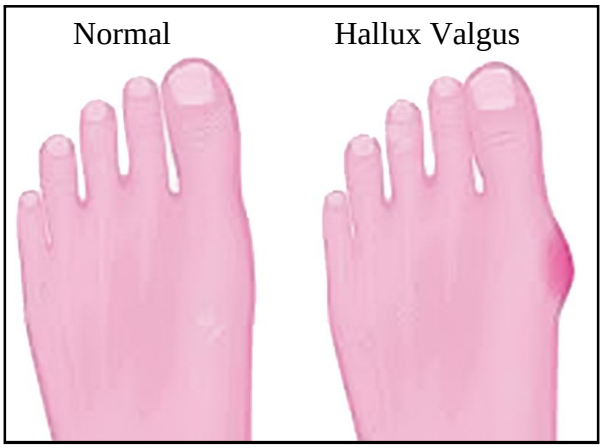
- Radiograph - Joint Space Narrowing, Subchondral sclerosis, Osteophytes
- Subchondral Cysts

TREATMENT :

- **Conservative :**
  - Nsaids,
  - Walking Aids,
  - Glucosamine,
  - Physiotherapy
- **Surgical options :**
  - arthroscopy,
  - arthrodesis,
  - osteotomy,
  - total knee replacement

HALLUX VALGUS :

- It refers to deviation of big toe away from mdline
- Associated with bunion
- Woman > man
- Often bilateral
- Mild (angle < 20), moderate (angle 20-40), severe angle (> 40)



TREATMENT :

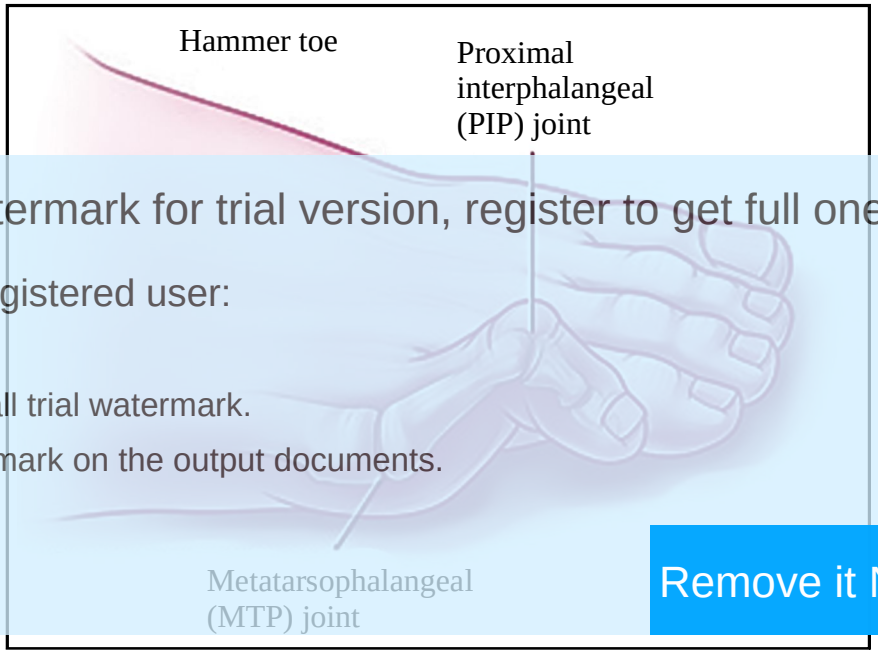
- Mild (Distal Osteotomy), Moderate (Shaft Or Basal Osteotomy), Severe (Shaft And Basal Osteotomy And Fusion Of 1st Metatarsophylyngeal Joint).

COMPLICATIONS :

- Infection, cutaneous nerve damage, recurrence, stiffness and overload of 2nd metatarsophylyngeal joint.

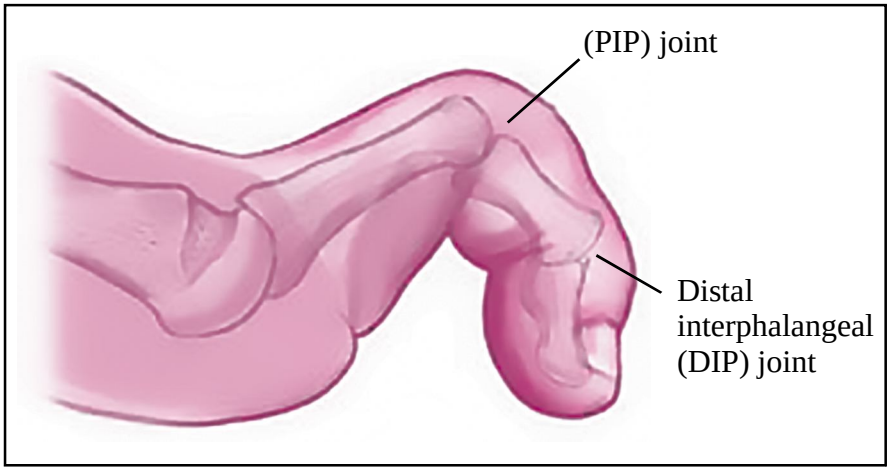
LESSOR TOE DEFORMITIES

HAMMER TOE :



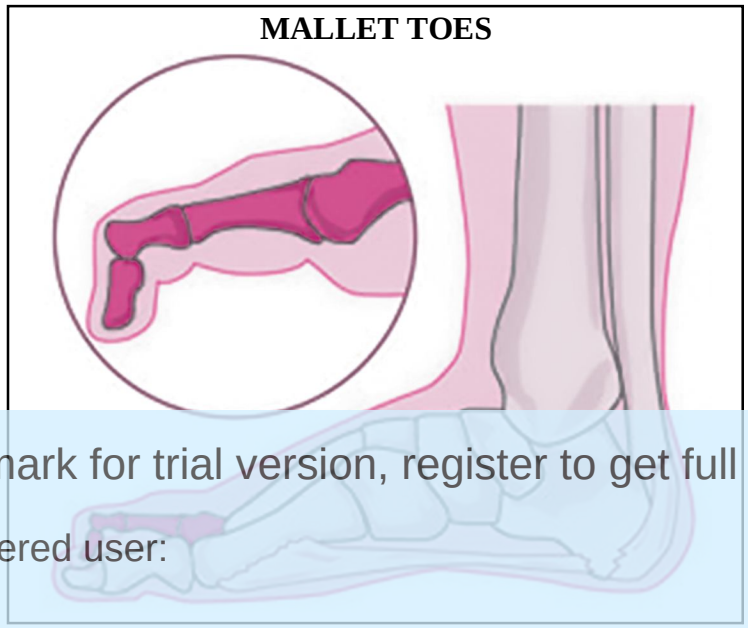
- It is mostly associated with hallux valgus
- Most commonly affects second toe
- Extended MTP joint and DIP joint while flexed PIP joint.

CLAW TOE :



- It may be associated with pes cavus , hallux valgus, RA
- Mostly idiopathic
- Extended MTP joint and flexed PIP DIP joints.

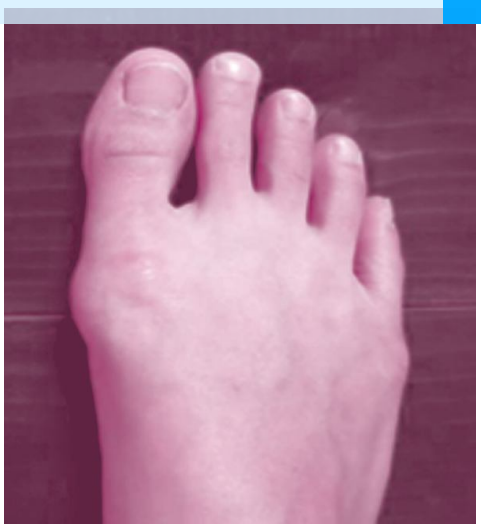
MALLET TOE :



In this disease only DIP joint is flexed all other are normal.

Case example :

An middle aged male came to opd with complain of bony out g... the medial aspect of right foot



Q : what is your diagnosis ?
A : bunion

Q : what is the treatment of this condition ?
A : excision and modify foot wear

Q : what are the complications ?
A : recurrence , infection, stiffness, nerve damage

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EXTREMITY TRAUMA

Chapter 19

PRINCIPLE OF FRACTURE MANAGEMENT :

- Fracture is a soft tissue injury with a broken bone at the bottom of it.
- Management of a racture include reduction, stabilization, preservation of blood supply, early and safe mobilization of the part and patient

FRACTURE HEALING :

- **Priamary :** Direct bone healing, without callus formation.it tends to occur when fracture ends are closely opposed and there is no relative movement between them, reduced inflammatory response, new lamellaer bone is laid down without callus formation.
- **Secondary :** indirect bone healing, with callus formation, it occurs when bone ends are not aligned. It has three phases inflammatory phase, repair with callus formation, remodeling of immature woven bone to mature lamellar bone.

REDUCTION AND STABILIZATION :

- **Reduction has 2 components :** Reducing the fragments and assessing adequacy of reduction
- The principle is to reverse the movement which created the fracture
- Over angulation allows the intact periosteum to guide the fragments into position.
- **Stabilization is of 2 types :** Absolute and relative
- **Absolute :** It produces a situation that allow no move
- **Relative** : It produces situation that allows some move ends, callus formation and secondary bone healing.

METHODS OF STABILIZATION :

TRACTION :

- It is a process of putting a stretching force on a limb to pull a fracture straight
- It relies on the integrity of surrounding tissues
- Static traction means that force and counter force are contained within two fixed points eg Thomas splint
- Dynamic traction means the force is applied by a system of weights and counter force is patients own weight. Eg hamilton russell traction.

ADVANTAGE :

- No Wound In Zone Of Injury, No Interference With Fracture Site, Cheap, Adjustable

DISADVANTAGE :

- Restricts mobility of patient, expensive, skin pressure complications, pin site infection, thromboembolic complications.

CASTING AND SPLINTING :

- It refers to application POP plaster of paris or fibreglass.

ADVANTAGE :

- No wound, no interference with fracture site, cheap, adjustable, no implant to remove.

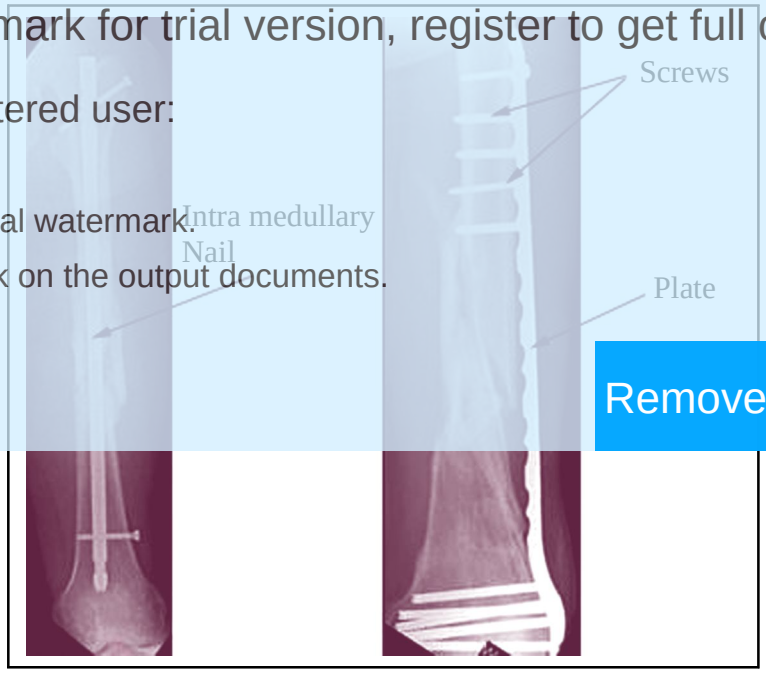
DISADVANTAGE :

- Limited assess to soft tissue, cumbersome, interfer with function, poor mechanical stability, plaster disease

OPEN REDUCTION AND INTERNAL FIXATION :

- ORIF is the term used to describe the operation of reducing a fracture under direct vision and then applying plates, screw , wires or intra medullary nails to hold the reduction.

PLATES AND SCREW :



- A large screw is used to compress two things together.
- Ideal for fractures such as those of fractures of radial and ulner shaft

ADVANTAGE :

- Can be used when anatomical reduction is required, allows early mobilization, can provide absolute and relative stability.

DISADVANTAGE :

- May interfer with fracture site, periosteal , soft tissue damage, does not normally allow for immediate load bearing, potential for infection, metalwork complication, need for plate removal.

INTRA MEDULLARY NAILING :

- It can be inserted down the medulla to hold a fracture reduced.

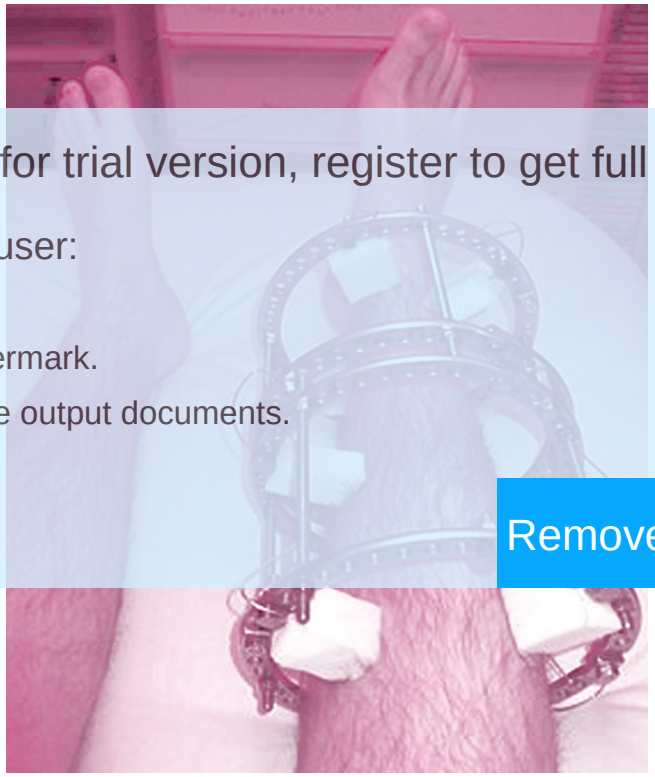
ADVANTAGE :

- Minimally Invasive*, early weight bearing, less periosteal damage than ORIF, seldom need removal.

DISADVANTAGE :

- Increased Risk Of Fat Emboli/Chest Complications, Infection difficult to treat, difficult to remove if broken.

EXTERNAL FIXATION :



* external fixator : ilizarov frame

- Each side of the fracture is connected to the main fixator which lies outside the patient.
- The connection is via half pin or tensioned wires

INDICATIONS :

- Emergency stabilization for a long bone fracture in pilytrauma patient
- Stabilization of a dislocated jpointafter reduction
- Complex periarticular fracture
- Fracture associated with infections
- Treating fracture with bone loss

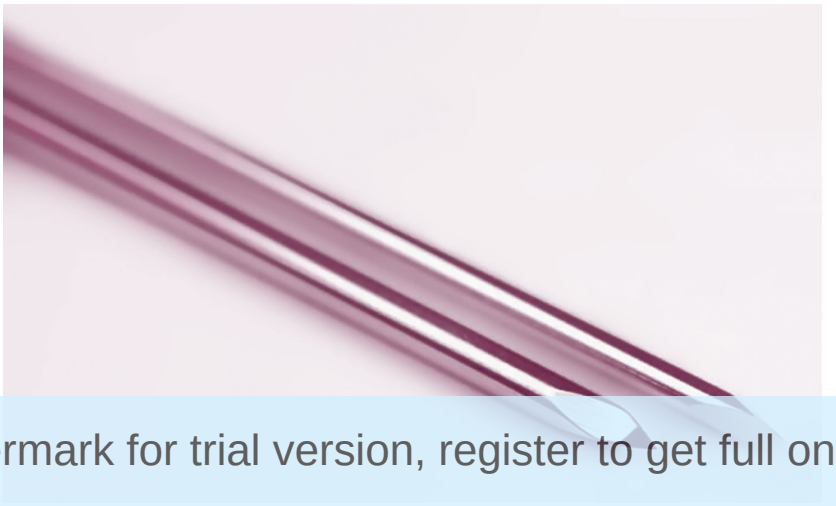
ADVANTAGE :

- No interference with fracture site, adjustable after application, soft tissue accessible for plastic surgery, rapid stabilization of fracture, hardware easy to remove.

DISADVANTAGE :

- Pin site infection, interfers with plastic surgical procedures, soft tissue ththering, cumbersome for patients.

K-WIRES :



- **K-WIRES :** are thin flexible wires of stainless steel.
- **Indications :** Temporary fixation, definitive fixation - with small fracture fragments, tension band wiring, temporary immobilization of a small joint.

MANAGEMENT BY TYPE AND REGION :

DIAPHYSEAL FRACTURE :

- Fracture treatment is aimed by restoring function by a correction of length , alignment and rotation.
- Consider whether primary or secondary bone healingis the objective.
- Radius and ulna need precise reduction to function.

FEMORAL SHAFT FRACTURE :

- A statically locked intra medullary nail is suitable
- Traction is only used as a first aid measure to provide pain relief and maintain length while transferring the patient to definitive care.

TIBIAL SHAFT FRACTURE:

- When stable A type fracture - casting is safe and cheapest choice.
- In or C type fractures surgery is required - IMN is the most frequent choice of treatment. External fixation is a good option for a wide range of tibial shaft fracture

HUMERAL SHAFT FRACTURE :

- Majority treated non operatively with simple protective functional brace and a collar and cuff.
- Safest and cheapest option.
- Indications for operative management : open fracture, presence of other injuries, multiple injuries, ipsilateral arm fracture, failed non operative treatment
- Method of choice : PLATING , IMN

RADIUS AND ULNA :

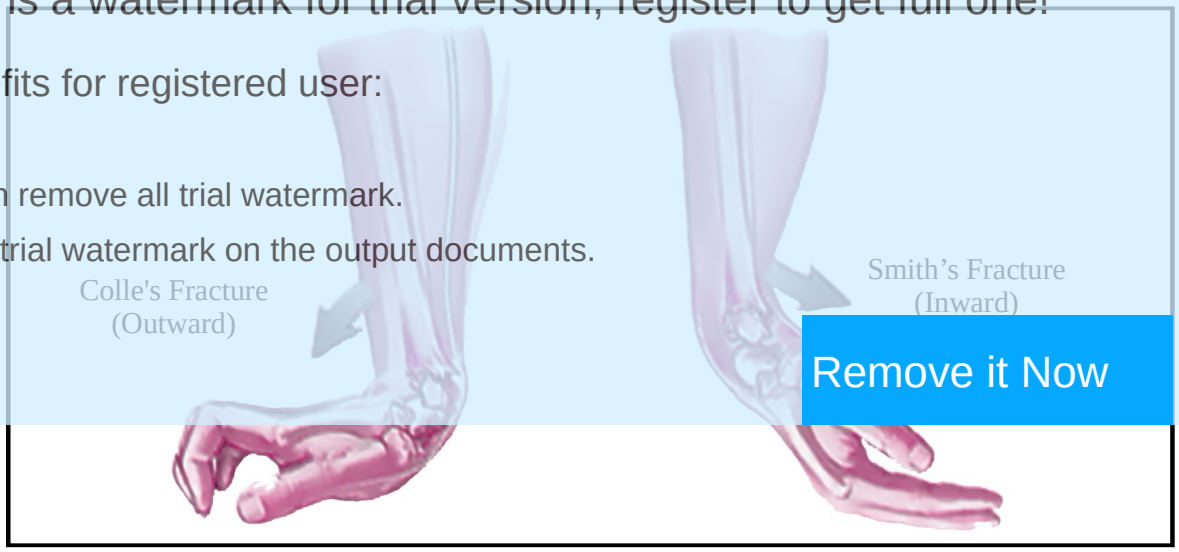
- By open reduction and plate fixation.

COLLES FRACTURE :

- It refers to fracture of distal radius
- Commonly accompanied by a fracture of ulnar styloid process
- It is usually caused by a fall on outstretched hand with the wrist extended
- Present with classic dinner fork deformity and radial shortening
- If fracture is undisplaced but stable : below elbow plaster immobilization for 6 weeks
- If fracture is displaced but stable : close reduction and plaster immobilization for 6 weeks
- If fracture is displaced and unstable : close reduction and either K-wire insertion or external fixation.

SMITH FRACTURE :

- The displaced fracture in opposite direction (I.e volar)
- Stability is difficult to achieve by casting so plating is preferred



SCAPHOID FRACTURE :

- It is the most commonly injured carpal bone
- Mostly due to fall on outstretched hand with wrist in radial deviation and dorsi flexed.
- Proximal pole or scaphoid is intra-articular and receive all blood supply, most at risk of non-union or vascular necrosis

CLINICAL FEATURES

- Tenderness in anatomical snuff box
- Pronation and ulnar deviation is painful
- Pain on compressing the thumb longitudinally

TREATMENT :

- Displacement < 1 mm - below castr in neutral position
- Displacement > 1 mm - ORIF with compression screw

FEATURES OF TARSUS AND FOOT :

TALUS FRACTURE :

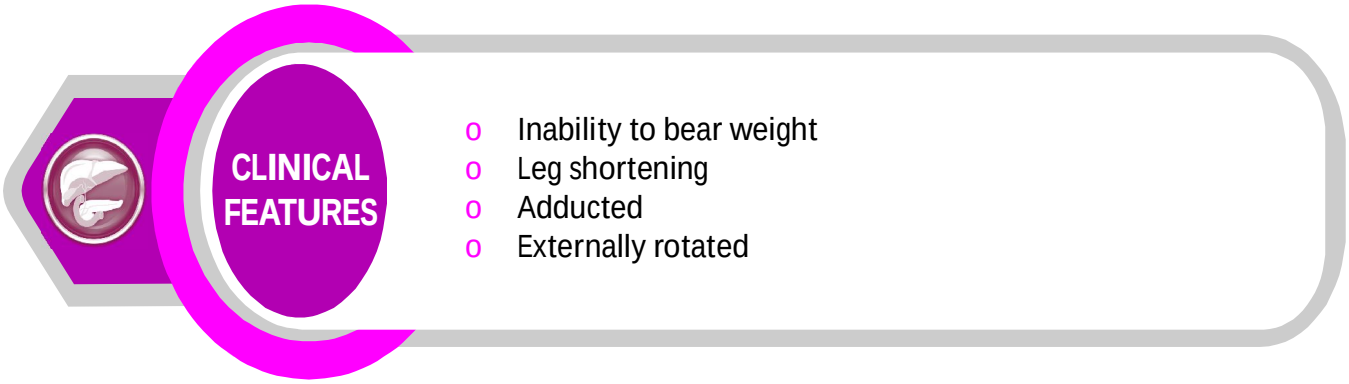
- Talus consist of head neck and body
- Talus neck fracture is the commonest one
- If fracture is undisplaced apply strict non weight bearing in below knee plaster for 6 weeks
- If fracture is displaced ORIF with lef screw
- Complication : AVN

CALCANEAL FRACTURE :

- Most frequently fractured hindfoot bone
- Cause by a fall from height
- If fracture id extra-articular and undisplaced intra-articular : elevation , ice, bed rest, mobilized non-weight bearing with a removable splint to stop equines at the ankle.
- If fracture is displaced intra-articular : ORIF with a specialized calcaneal plate

PROXIMAL FEMUR FRACTURE :

- It falls into two groups extra-capsular and intra-capsular
- Common fracture in elderly
- In young individual it is due to major trauma



- Inability to bear weight
- Leg shortening
- Adducted
- Externally rotated

INVESTIGATIONS :

- X rays
- MRI (GOLD STANDARD)
- Isotope bone scan.

1. INTRA CAPSULAR :

- (Sub capital - below the head, trans cervical- in the neck, basal) : they can cause AVN of head as retrograde blood supply to head and neck travels through hip capsule.

MANAGEMENT :

- Undisplaced : in adult = 2 or 3 parallel screws
- Displaced : in patients > 65 years = hemiarthroplasty
- In patients < 65 years = urgent reduction and IF or THR

2. EXTRA CAPSULAR FRACTURE

- (intratrochentric, basal, subtrochanteric) : chances of

MANAGEMENT :

- Reduction and fixation via dynamic hip screw (DHS) or intra-medullary fixation device.

Case example :
A young male driver by profession came in ER with complain of hip pain and inability to stand after a road traffic accident O/e he is vitally stable but can't move his right leg and have severe tenderness over right hip joint
X ray shows :

Q : what is your diagnosis ?
A : hip dislocation.
Q : what is the management ?
A : admit the patient, give potent analgesia, plan relocation under general anesthesia.
Q : what is the most common type of dislocation ?
A : posterior dislocation is the commonest among all.
Q : what are the complications ?
A : recurrence , capsular tear, head of femur injury, sciatic nerve injury, acetabular fracture.

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SPINAL PATHOLOGIES AND MUSCULO SKELETAL TUMORS

Chapter 20

SPINAL PATHOLOGIES :

TUMORS OF SPINE : can be metastatic or primary

PRIMARY TUMORS :

- **Accounts for 2 %**
- **The are :**
  1. Cartilage forming (chondroma, osteochondroma, chondrosarcoma)
  2. Bone forming (myeloma osteoma osteoblastoma)
  3. Spinal cord tumors (glioma, ependymoma, astrocytoma)
  4. Intra dural (extra medullary : meningioma & neurofibroma and intra medullary : ependymoma & astrocytoma)
- **others (giant cell, Ewing sarcoma, hemangioma)**
- They can present with fracture and deformity, cord root or nerve compression
- Benign tumors tend to occur in posterior element
- Malignant tumor tend to involve the vertebral body

METASTATIC :

- 98 % of all spinal lesion
- Common routes are : batson's plexus, embolization th... extension, lymphatic spread.
- Presents with : pain, compressing spinal cord.

MUSCULO SKELETAL TUMORS :

- Most common tumors affecting the spine
- Malignant tumors metastasize to bone via hematogenous spread.
- Tumor cells metastasize to spine via batson's venous plexus.
- They can be lytic (arise from tumors that are vascular) ,sclerotic (from prostate) or mixed
- **Bone metastasize from:** (in decreasing order) breast* , lung , renal, prostate, GIT, thyroid.
- **Most common sites of bone metastasis:** spine, proximal femur, proximal humerus.

OSTEOGENIC TUMORS :

CHONDROGENIC TUMORS :

1. **Osteochondroma :**
   - It is a benign cartilage capped bony projection
   - Can be pedunculated or sessile, usually solitary.
   - Increase in size may indicate malignant transformation.

CHONDROMA :

- Enchondroma (benign tumor within the intra medullary cavity of bone) or ecchondroma (in cortex)
- Enchondroma is most common tumor in hand
- It is associated with ollier's disease and muffucci syndrome with malignant transformation of 20 and 100 % respectively.

CHONDROBLASTOMA :

- Benign cartilage producing tumor
- In epiphysis of children.
- It is most common around the KNEE.

CHONDROSARCOMA :

- Malignant, with cartilage differentiation
- Presents with pain or swelling
- It is a slow progressing tumor

OSTEOID OSTEOMA :

- Benign bone forming tumor, small but very painful.
- Noturnal pain relieved by aspirin.
- Common in PROXIMAL FEMUR.

OSTEOSARCOMA :

- Most common in DISTAL FEMUR.
- Malignant and most common primary bone tumor
- Xray : sub peristyle elevation with new bone formation and SUNRAY appearance I.e bone destruction, soft tissue [illegible] of bone.

OSTEOBLASTOMA :

- Larger and more aggressive tumor.
- Dull pain not relieved by aspirin.
- Commonly affects SPINE.

OTHERS :

- **SIMPLE BONE CYST :** membrane lined cavity filled with serous fluid
- **ANEURYSMAL BONE CYST :** benign , blood filled spaces separated by fibrous septa, present with pain and swelling, aggressive lesion.
- **GIANT CELL TUMOR :** benign, aggressive, large osteoblast like giant cells, between age 20 and 45 , especially around KNEES, PROXIMAL HUMERUS, DISTAL RADIUS .
- **EOSINOPHILIC GRANULOSA :** rare neoplasm of langerhan cells ,there is a predilection of skull and diaphysis of long bones, x-rays shows punched out lesions and peristyle reaction.
- **EWING SARCOMA :** round cell sarcoma, painful mass with general symptoms (fever , anemia, increase ESR), x-ray : moth eaten appearance and onion skin peristyle reaction.

WARNING SIGNS - BONE TUMOR :

- Non-mechanical bone pain
- Especially around the knees in young adolescents
- Concerning x-rays

TUMOR ASSESSMENT :

Staging in three phases

PHASE 1 : WITHIN 24 HOURS :

- Hx and examination
- CBC , ESR, calcium and myeloma screening
- Radiograph of whole abdomen and chest

PHASE 2 : WITHIN 1ST WEEK

- Bone scan
- MRI of chest
- Ct scan of chest

PHASE 3 : AT ONCOLOGY UNIT

- CT scan of lesion
- MRI scan of lesion

BIOPSY :

- Only biopsy once staging is complete
- Biopsy should be performed at centre undertaking definitive surgery
- Image guided biopsy is more reliable
- The biopsy track must be excised at definitive surgery
- jamshidi needles for bone biopsy, trucut needles for soft tissue biopsy*

MANAGEMENT OF TUMOR :

BENIGN TUMORS :

- Can be simply curetted
- CT guided thermo coagulation for osteoid osteoma
- Large benign tumors may require reconstruction

MALIGNANT TUMORS :

- Osteosarcoma and ewing's sarcoma require neoadjuvant chemotherapy
- Chondrosarcomas are insensitive to radiotherapy or chemotherapy
- Most malignant tumors can be treated with limb salvage
- There is no difference in survival between amputation and limb salvage.

CAUDA EQUINA SYNDROME:

- It is a surgical emergency.
- Narrowing of spinal cord below level of L 2, resulting in compression of cauda equina.

SIGN AND SYMPTOMS :

- Lower back pain
- Uni or bilateral sciatica
- Saddle anesthesia
- Motor weakness in lower extremities
- Variable rectal and urinary symptoms

CAUSES :

- Pathologies at level of L2 & S2 (tumor, trauma, infection, ankylosing spondylosis) , central rupture of disc at L4-5.
- **Most common cause :** Lumber Disc Protrusion At L4/5.
- **Diagnosis :** X-Rays, MRI, CT Scan, Bony Scintigraphy, Bone Densitometry, Discography, Spinal Biopsy.

TREATMENT :

- Surgical decompression of spine (within 24 hours for better results)
- Microdisectomy, laminectomy.

CLINICAL FEATURES

- Cauda equina syndrome is characterized by lower back pain, saddle anesthesia, rectal /urinary symptoms
- Surgical decompression in CES within 24 hours will result in better prognosis
- Osteosarcoma is malignant and tumor ,affect distal femur, trea
- Enchondroma is most common
- Ewing sarcoma / round cell sarcoma : x-ray shows mouth eaten appearance, onion skin peri osteal reaction

PEDIATRIC ORTHOPAEDICS

Chapter 21

DEVELOPMENTAL DISPLASIA OF HIP (DDH) :

- DDH describes the spectrum of instability ranging from shallow acetabulum (dysplastic), pushed out (barlow positive) to the dislocated hip that is irreducible (ortolans negative)
- Incident of instability : 1-2:1000 live births
- Incident of dislocation 2:1000 live births

RISK FACTORS :

- More common in girls
- Breech presentation
- More common in first born
- More common of left hip
- Oligohydramnios
- Family history
- Liow among Africans
- More common in winters

DIAGNOSIS :

- Clinical assessment (barlow and ortolani test)
- U/S (CONFIRMS THE DIAGNOSIS)
- X Ray from 12 weeks onwards.

MANAGEMENT :

- **Age 4-6 months** : a harness (pavlik harness) is usually effective
- In older babies , close reduction is sometimes possible
- **Late DDH :** The older the child the more likely it is they will need the surgery, femoral osteotomy , pelvic osteotomy, acetabular remodeling are treatment options.

COMPLICATION :

- AVN of hip

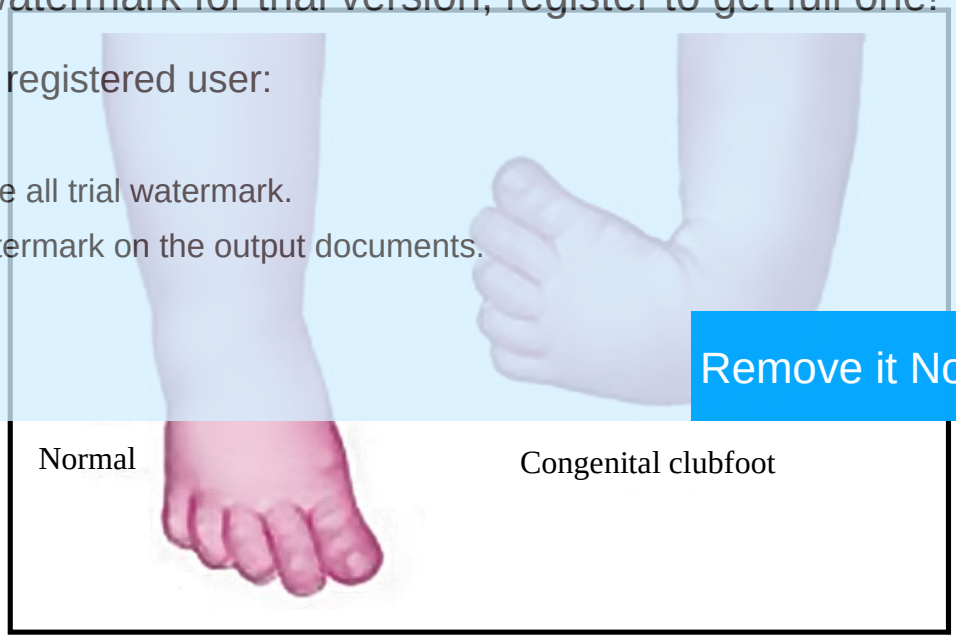
CONGENITAL TALIPES EQUINOVARUS CTEV (CLUB FOOT) :

- It is congenital deformity of the foot and ankle.
- More common in boys and bilateral in 50%
- Family history
- Multifactorial
- Incident : 1-6:1000 live births
- **TYPES :**
  - postural,
  - idiopathic,
  - neuromuscular ,
  - syndromic

- It is a multi planer deformity : Hindfoot (Eqinus And Varus), Midfoot (Cavus), Forefoot (Adducted And Supinated)

MANAGEMENT :

1. **Ponseti method :**
   - Treatment commence within a few days of birth
   - Series of maneuvers followed by series of above knee plaster casts. It involves elevation of 1st ray gradual abduction to 60 degrees and dorsi flexion usually following Achilles tenotomy.
2. **Surgical management :**
   - When conservative management fails
   - Best undertaking before 1 year of age
   - Done by turco or cicinnati incision
   - Surgery involves sequential release of tendons, ligaments and joint capsule allowing reduction of deformity.



LEG CALF PERTHES DISEASE :

- Characterized by development of AVN of proximal femoral epiphysis
- Boys > girls
- Age 4-8 years
- 10 % bilaterally

FACTORS IMPLICATED IN PATHOGENESIS :

- low birth weight
- High birth rate
- Delayed bone age
- Low socioeconomic status.

CAUSES OF AVN OF FEMORAL HEAD :

- Steroids
- Infections
- Perthes disease
- Sickle cell disease
- Hypothyroidism
- Skeletal dysplasia

DIAGNOSIS :

- AP and frog lateral xrays of pelvis

MANAGEMENT :

- To maintain femoral head sphericity, non surgical treatment to maximize range of movement
- surgical treatment for containment or salvage.

- Ultrasound confirm the diagnosis in DDH
- If a child is 4-6 yrs of age pavlik harness is effective in DDH
- (CTE) Congenital telepes equinovorus is a triplaner deformity
- In CTE ponseti method should commence within few days of birth

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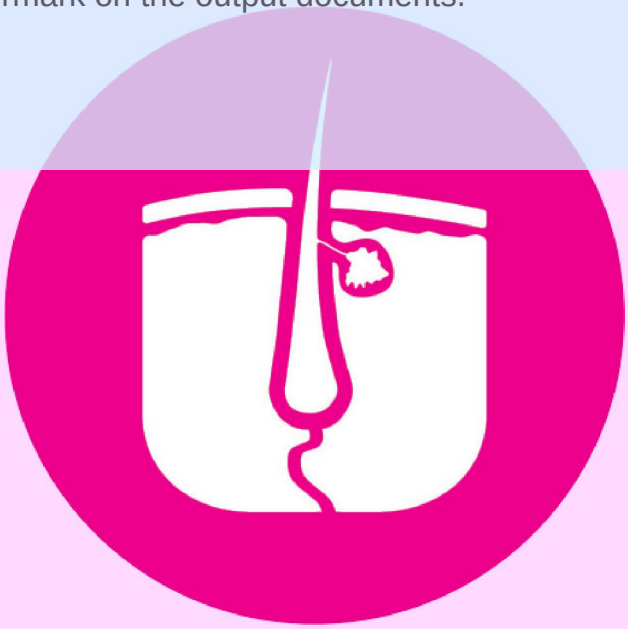
PART - 5

SKIN AND SUBCUTANEOUS TISSUE & OTHER



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SKIN AND SUBCUTANEOUS TISSUE

Chapter 22

FUNCTIONAL ANATOMY AND PHYSIOLOGY OF SKIN :

- Skin can be divided into an outer layer the epidermis and an inner layer the dermis
- Deep to dermis is hypodermis which is composed of subcutaneous fat

EPIDERMIS :

- Composed of keratinized stratified squamous Epithelium
- It accounts for total 5% of the skin
- It is subdivided into 5 layers stratum Basale, Stratum Spinosus, Stratum Granulosum, Stratum Lucidum And Stratum Corneum.
- Majority of epidermal cells are keratinocytes.
- Melanocytes and dendritic cells of neural crest origin usually in basal epidermis
- Melanocytes synthesis melanin
- Langerhans cells are dendritic bone marrow derived
- Markel cells found in basal layer, play role in signal transduction of fine touch

DERMIS :

- It comprises 95% of the skin
- It is divided into superficial papillary and deep reticular layer
- Papillary layer composed of delicate collagen and elastic fibers
- Reticular layer is composed of curse branching collage rface

HAIR FOLLICLE :

- Human has two types of hai vellus hair and terminal hair
- Vellus hair are fine, Downey, non pigmented, cover the body for 3 months inuteroand shed before birth apart from eyebrows and lashes
- Terminal hair are thicker, pigmented , long,
- Each hair follicle has growth cycle of three phases
- Anlagen phase during which hair grows
- Catagen phase during which the hair is shed
- Telogen phase during which the follicle remains quiescent for several months

FUNCTIONS OF SKIN :

- Barrier to environment : trauma , radiation , pathogens
- Temperature and water hemostatic
- Excretion eg urea, sodium, chloride, potassium, water
- Endocrine and metabolic functions
- Sensory organ for pain, pressure, movement

BLOOD SUPPLY OF THE SKIN :

- Blood supply is arranged in superficial and deep plexuses
- It is made up of arterioles, arterial, venous capillaries and venules
- The blood supply to skin is anastomosed in subfascial, fascia, subdermal, dermal and subepidermal plexi.
- The epidermis contain no blood vessels so cells there derived nourishment by diffusion
- The venous drainage is via valved and un valved veins
- The unvalved veins allow an oscillating flow between cutaneous territories within subdermal plexus equlibirating flow and pressure
- The valved cutaneous veins drain via plexi to deep veins

ABNORMAL SCARS :

KELOID AND HYPERTROPHIC SCAR :

- Hypertrophic scar is an elevated scar, confined within the boundary of initial injury
- Hypertrophic scar affects young, females, has fine collagen and increased level of alpha actins.
- Keloid is an elevated scar , extend BEYOND the boundary of initial injury
- Keloid affects elderly, strong family hx, thick collagen and increased level of epidermal hyaluronic acid
- They both involve abnormal collagen metabolism
- Both have higher than usual proportion of type III collagen
- Both are associated with tissue hypoxia.

TREATMENT :

- **Conservative :** pressure garments, silicon dressing or c… py and intra lesional steroids, radiotherapy.
- **Surgery :** usually combined with intra lesional steroids, intra lesional excision

SINUS :

- A sinus is a blind ending tract that connects a cavity lined with granulation tissue.
- Sinus may be congenital or acquired.
- Acquired causes are : presence of retained foreign body (suture),specific chronic infection (TB), malignancy, inadequate drainage of the cavity.

TREATMENT :

- Treat the underlying cause
- Biopsy should always be taken from the wall of the sinus to exclude malignancy or specific infection.

ULCERS :

- Ulcer is a discontinuity of an epithelial surface
- Ulcers can be classified as specific, non specific and malignant
- Ulcers may have characteristic shape of edges eg
- Tuberculosis : undermined edges
- Non specific ulcers : shelving edges

- Basal cell carcinoma : rolled edges
- Squamous cell carcinoma : heaped up, everted edges with irregular thickened edges
- Syphilis : punched out ulcers

FISTULA :

- It is an abnormal communication between two epithelial surfaces
- This tract may be lined by granulation tissue
- It may be congenital (tracheo-esophageal and branchial fistula) or acquired (fistula in ano, enterocutaneous fistula, atriovenous fistula).

TREATMENT :

- Treat the underlying etiology
- Treat sepsis, fluid imbalance, proper nutrition.
- Ensure good drainage
- Removal of chronic fistula tract and surrounding inflamed tissue

PRE-MALIGNANT SKIN CONDITIONS :

BOWEN'S DISEASE :

- It is SCC in situ
- 3-8% of bowens disease progresses to SCC
- It presents in elderly and middle aged
- 90 % are found on face

RISK FACTORS :

- Chronic solar damage
- Arsenic
- HPV 16
- Immunosuppression

TREATMENT :

- **Conservative :** topical 5 flurouracil and topical imiquimod
- **Surgical :** excision with 4 mm margin, moh's micro graphic surgery

KETATOCANTHOMA :

- It is a symmetrical cutaneous growth with a central crater filled with a keratin plug
- Twice common in man.

ETIOLOGY :

- Unknown, papilloma, smoking, chemical carcinogen exposure

TREATMENT :

- Excision

MALIGNANT LESIONS :

SQUAMOUS CELL CARCINOMA :

- It is the second most common skin cancer
- Twice common in man and in white skin people
- It is the malignant tumor of keratinizing cells of epidermis
- Associated with chronic inflammation
- Invariably ulcerated lesion
- Metastasis in 2% of cases
- SSC arising from scar is known as marjolin's ulcer.

RISK FACTORS :

- UVR
- Actinic kurtosis
- Pre-existing scar burns
- Immunosuppression
- Infection with HPV5 and 16.

TREATMENT :

- Surgical excision
- If SSC < 2cm = clearance margin should be 4mm
- If SSC >2cm = clearance margin should be 1cm\

TNM classification and staging :

SIZE	NODES	METS	
T1 = <2 cm	NO= no regional nodes	M0 = no mets	
T2= 2-5 cm	N1= regional nodes	M1 = distant mets	G2 = mod differentiated
T3 = >5 cm			G3 = high grade
T4 muscle or bony invasion			

BASAL CELL CARCINOMA :

- It is also known as rodent ulcer
- It is the most common skin malignancy
- It is slow growing but locally invasive malignant tumor
- Most important risk factor is ULTRAVIOLET radiation others are coaltar, arsenical compounds, aromatic hydrocarbons genetic skin cancer syndrome
- Most common in man
- 90% lesions found on the face above a line from lower lobe of ear to corner of mouth
- The characteristic finding is of ovoid cells in nests with a single outer palisading layer
- Only the outer layer of the cells actively divide

TREATMENT :

- Surgical excision
- Moh's micrographics surgery
- Chemotherapy
- Radiotherapy
- Photo dynamic therapy PDT

CUTANEOUS MALIGNANT MELANOMA (MM) :

- It is a cancer of melanocytes
- Main cause is exposure to UVR
- MM accounts for 3% of all malignancies world wide
- It is the most common cancer in young adults (20-39 yrs)
- Risk factors : UVR , xeroderma pigmentiosa, family hx, dysplastic navi, red hair, immunosuppression, h/o sunburn
- It has ABCDE features I.e asymmetry, border irregularity, color change, diameter, elevated
- Most common type is superficial spreading melanoma (70%)
- Nodular melanoma accounts for 15 % of all MM
- Lentigo maligna melanoma also known as hutchison's Melanotis freckles
- Acral lentiginosus melanoma

TREATMENT

- MM with positive nodes = wide surgical excision
- MM with positive nodes = excision and block dissection of regional lymph nodes
- MM with distant metastasis = excision with chemothe
- The presence of lymphnode metastasis is the single m ex in MM

VASCULAR LESIONS :

HAEMANGIOMA :

- These are benign endothelial tumors
- More common in girls (3:1)
- They rapidly grow in 1st year of life then slowly involute over several years with 70% having resolved by 7 years of age
- Treatment : systemic corticosteroids

VASCULAR MALFORMATION :

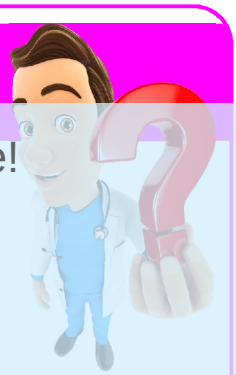
- These affects boys and girls equally
- These are associated with numerous syndrome
- They are invariably present at Berith
- These arises secondary to errors in development of vascular elements during 8th week in utero
- Low flow malformation may cause skeletal hypoplasia
- High flow malformation may cause skeletal hypertrophy

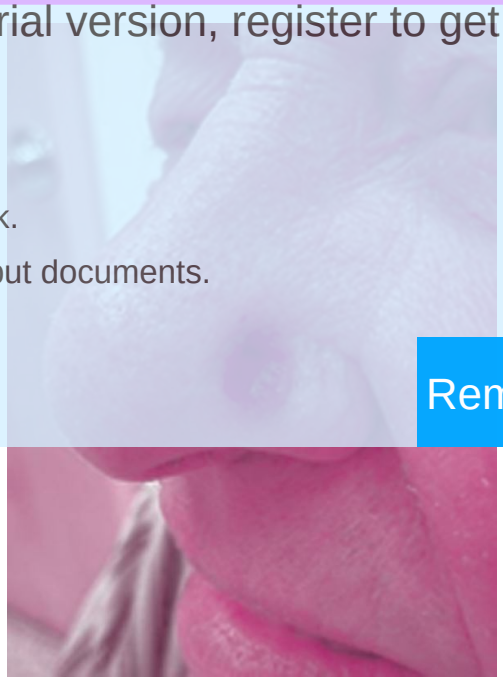
KEY POINTS

- Ulcer refers to discontinuity of an epithelial surface
- Hypertrophic scars refer to an elevated scar confined within the boundary of the initial injury or incision treatment is intra lesional steroids
- Malignant melanoma is the commonest cancer in young adults (20-39 yrs)

Case Example :

An old lady came in ER with complain of lesion on her nose





Q : what is your diagnosis ?
A : basal cell carcinoma (BCC)

Q : what are the types ?
A : it can be cystic, nodular or ulcerated

Q : what is the commonest site ?
A : commonest site around the inner canthus, 90% lesions are found on upper half of face

Q : **what is the treatment ?**
A : excision and radiotherapy

SALIVARY GLANDS AND NECK PATHOLOGIES

Chapter 23

NECK PATHOLOGIES:

LUMP IN THE NECK :

- Full history and examination
- Physical signs : size, site, shape, surface, consistency, fixation, plurality, compressibility, trans illumination, bruit

BRANCHIAL CYST :

- Thought to be developed from vestigial remenant of second branchial cleft
- Lined by squamous epithelium
- It contains thick, turbid fluid filled of cholesterol
- Usually present in upper neck
- It is a soft fluctuate swelling that may be trans illuminate
- Diagnosis : U/S, FNAC, MRI (confirmatory)
- Treatment : complete excision

BRANCHIAL FISTULA :

- May be unilateral or bilateral
- Thought to represent a persistent second branchial cle
- The external orifice is in lower third of neck while the i
  aspect of posteriorfaucial pillar just behind the tonsil
- Lined by columnar epithelium
- Treatment : complete excision by more than one transverse incision in neck

CYSTIC HYGROMA :

- Usually present in neonates and in infancy
- Cyst are usually filled with clear lymph and lined by single layer of epithelium
- Usually in neck or may involve parotid, submandibular, tongue, floor of mouth
- May be bilateral and soft and partially compressible
- Brilliantly translucent
- Treatment : complete excision in early age

THROGLOSSAL DUCT CYST :

- It results from incomplete closure of thyroglossal duct
- It is a fluid filled sac
- May be found anywhere or adjacent to the mid line from the tongue base to the thyroid isthmus
- It is mobile and MOVES UP WITH WALLOWING
- May become infected and rupture onto the skin of the neck presenting as discharging sinus

TREATMENT :

- Excision of whole thyroglossal tract by SISTRUNK'S OPERATION
- This operation includes removal of body of hyoid bone, supra hyoid tract through the tongue base to the vallecula at the site of primitive foramen cecum together with core of tissue of the other site

SALIVARY GLAND PATHOLOGIES :

MINOR SALIVARY GLANDS :

- The mucosa of oral cavity contain approximately 450 minor salivary glands
- They are distributed in the mucosa of the lip, cheeks, palate, floor of mouth, and reteromolar area
- They contribute to 10% of total salivary volume

TUMORS :

- Tumors of minor salivary glands are histologically similar to major salivary glands
- Common sites are upper lip, palate , reteromolar region.

TREATMENT :

- Benign tumor >1 cm = excisional biopsy
- Benign tumor <1 cm = incisional biopsy
- Tumor of upper lip = excision
- Malignant tumor of palate = wide excision

THE SUBLINGUAL GLAND :

- These are paired of set of minor salivary gland
- Lie on amnterior part of floor of mouth between the m… …hoid muscle and body of the mandible
- Each glands has numerous excretory ducts that open either directly into the oral cavity or indirectly via ducts that drain into submandibular ducts
- Nearly all tumors are malignant

CYST :

- Minor tumor retention cyst develop in the floor of the mouth from an obstructed sublingual gland
- RANULA refers to mucus extravasation cyst that arise from sublingual gland
- Ranula produces a characteristic translucent swelling that takes an appearance of a frog belly
- Ranula can resolve spontaneously

TREATMENT :

- surgical excision

TUMORS :

- Rare and 85 % malignant
- Hard , firm painless swelling in the floor of mouth

TREATMENT :

- Wide surgical excision with neck dissection

THE SUBMANDIBULAR GLAND :

- These are paired and below the mandibles on either side
- Consist of large superficial and small deep lobe
- The gland is drained by a single submandibular duct (warton's duct)
- There are several lymph nodes immediately adjacent and sometimes within the superficial part of the gland
- Important anatomical relationship of submandibular gland are
  - Lingual nerve
  - Hypoglossal nerve
  - Anterior facial nerve
  - Facial artery
  - Marginal mandibular branch of facial nerve

SIALADINITIS :

- It refers to inflammation of submandibular gland

CAUSES :

- Viral (Mumps)
- Baterial (S.Aureus) ,
- Sialolithiasis,
- Decrease Salivary Flow Or Dehydration

TREATMENT :

- hydration , warm compress and massage, antibiotics , I&D, excision in recurrent cases

SIALOLITHIASIS :

- It is the most common cause of obstruction within the submandibular gland
- Submandibular gland is most common site of stone formation in salivary glands
- 80% stones are radio-opaque
- Presents with acute painful swelling
- Pain is precipitate by eating
- The swelling occur rapidly and resolve over 1-2 hrs afterv the meal is completed
- Clinical examination reveals an enlarge , firm glander tender on bimanual examination

TREATMENT :

- If stone is distal to lingual duct stone removal by incision longitudinal over the duct and wall of duct should be left open to promote free drainage of saliva
- If stone is proximal to the lingual duct submandibular gland excision and ligation of submandibular duct

TUMORS OF SUBMANDIBULAR GLAND :

- These are uncommon
- Present as slow growing, painless swelling within submandibular triangle, facial nerve weakness, induration and ulceration of overlying skin, cervical node enlargement
- 50% are benign
- Diagnosis : CT, MRI, FNAC (safe)
- Open surgical biopsy is contraindicated

TREATMENT :

- Small - gland excision
  Large - supra hyoid neck dissection

THE PAROTID GLAND :

- It lies in the recess bounded by the ramus of mandibles, base of skull and mastoid process
- It lies on the carotid sheath and XI and XII cranial nerves and extend forward over the masseter muscle
- It divided into deep (20%) and superficial (80%) lobes separated by facial nerve
- Several important structures run through the gland :
  - Branches of facial nerve
  - Terminal branch of external carotid artery
  - Retromandibular vein
  - Intraparotid lymph nodes

MUMPS :

- It is the most common cause of acute painful swelling [illegible] children
- It is spread via airborne droplets of infected saliva
- Present with fever , nausea, headache followed by swelling of one or both parotid gland
- Pain can be severe and aggravated by eating and drinking
- Symptoms resolve within 5-10 days
- Treatment : symptomatic with regular paracetamol and adequate fluid intake
- Complications : orchidist, oophoritis, pancreatitis, sensorineural deafness, meningioencephalaitis

BACTERIAL SALADENITIS :

- The infecting organism is usually s.aureus
- Present with tender, painfull parotid swelling , malaise , pyrexia, cervical lymphadenopathy
- Treatment : I/V antibiotics
- Later stages with abscess formation required aspiration with large bore needle or drainage under GA

HIV ASSOCIATED SALADENITIS :

- Chronic parotitis in children is pathognomic of HIV infection
- It is associated with negative antibodies screen.
- Ct and MRI shows “ swiss cheese ” appearance of multiple large cystic lesion
- Parotidectomy is indicated

STONE FORMATION :

- Sailolithiasis is less common in parotid gland
- They are usually radiolucent and rarely visible on x-ray
- Parotid gland sailography is usually required for stone identification

TREATMENT :

- Surgical excision of stone via parotidectomy

TUMORS OF PAROTID GLAND :

- Parotid gland is the most common site for salivary gland tumor
- Most tumors arising in superficial lobe
- Present as slow growing, painless swelling
- Difficulty in swallowing and snoring
- Firm swelling in soft palate and tonsil
- 80-90 % are benign
- Tumor arise from superficial lobe present as slow growing painless swelling below the ear
- Tumor arise from accessory lobe present as persistent swelling within the cheek
- In benign tumors Most common type is pleomorphic adenoma
- Malignant tumors are divided into :
  - Low grade malignant tumors : acinic cell carcinoma
  - High grade malignant tumor : adenocarcinoma, SCC
- Diagnosis : CT, MRI, FNAC, open surgical biopsy is contraindicated unless malignancy is suspected

TREATMENT :

- Tumors in superficial gland - superficial parotidectomy
- High grade tumor - radiacl parotidectomy
- Radiacl parotidectomy involves :
  - Removal of all parotid gland
  - Elective sectioning of facial nerve
  - Removal of ipsillator messeter muscle
  - Neck dissection if cervical lymphadenopathy

COMPLICATIONS OF PAROTIDECTOMY :

- Hematoma
- Infection
- Temporary/permenant facial nerve weakness
- Sialocele
- Frey's syndrome

FREY'S SYNDROME :

- Also known as gustatory sweating
- It results from damage to the autonomic innervation of salivary gland with inappropriate regeneration of parasympathetic nerve fibers that stimulate the sweat glands of the overlying skin

- Sweating and erythma over the region of surgical excision of parotid gland by smell or taste of food.

PREVENTION :

It includes

- Sterno mastoid muscle flap
- Temporalis fascial flap
- Insertion of artificial membrane between the skin and parotid bed

TREATMENT :

- Antiprespirantsusually containing aluminum chloride
- Denervation of tympanic neurectomy,
- Injection of boyulinium toxin into the affected skin.

KEY POINTS

- Tumors of sublingual glands are malignant in 85% cases
- Sialadenitis commonly occurs in adults
- Sailolithiasis is the most common cause of obstruction within submandibular gland
- Submandibular gland is the most common site for salivary stones (80 %), treatment is left open the wall of the duct to promote free drainage of saliva
- The parotid gland is divided into deep (20%) and superficial (80%) lobes separated by facial nerve
- Branchial fistula is thought to represent a persistent 2nd branchial cleft
- Thyroglossal duct cyst is mobile and moves up with swallowing

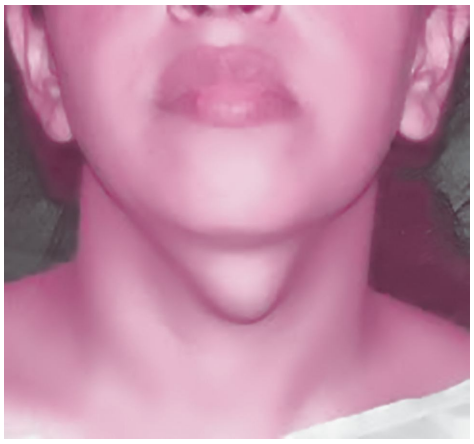
Case example :
A young female came in OPD with a swelling in her neck
O/e swelling is moving with protrusion of tongue and swallowing

Q : what is your diagnosis ?
A : thyroglossal cyst

Q : what is the commonest site ?
A : the commonest site is below the thyroid bone

Q : what is the etiology of the disease ?
A : it is the remnant of thyroglossal duct

Q : what is the treatment of the condition ?
A : excision (sistrunk's operation)



CLEFT LIP AND PALATE

Chapter 24

INTRODUCTION:

- Cleft of the lip, alveolus, hard and soft palate are most common congenital abnormalities the orificial structures

INCIDENCE:

- The incidence of cleft lip and palate is 1:600 live births
- Isolated cleft palate is 1:1000 live births
- Cleft lip alone 15%
- Cleft lip and palate 45%
- Isolated cleft palate 40%
- Predominates in males
- Mostly left sided

CLEFT LIP AND PALATE :

- More common in males
- Significant genetic influence
- Can be diagnosed antenatally by us after 18 weeks gestation
- Associated with pier robin syndrome

CLEFT PALATE :

- More common in females
- Significant environmental influence
- Can not be diagnosed antrnatally
- Mostly associated with syndromes like stickler , shprintzen , down, apert syndrome

ANATOMY OF CLEFT LIP AND PALATE :

CLEFT LIP :

- The facial muscle can be divided into three muscular rings of delaire
- The nasolabial muscle ring : Surrounds the nasal aperture
- The bilabial muscle ring :Surrounds the oral aperture
- Labiomental muscle ring : Envelop the lower lip and chin regions.

UNILATERAL CLEFT LIP :

- The nasolabial and bilabial muscle distrupts on one side resulting in an asymmetrical deformity involving external nasal cartilage, nasal septum, anterior maxilla.

BILATERAL CLEFT LIP :

- Deformity is more profound but symmetrical
- Distruption of nasolabial and bilabial muscle ring bilaterally
- It produces flaring of nose, a protrusive premaxilla and an area of skin in front of
- premaxilla devoid of muscles known as prolabium

CLEFT PALATE :

EMBRYO LOGICALLY :

- Primary palate consist of all anatomical structures anterior to the invasive foramen
- Primary palate consist of alveolus and upper lip
- Secondary palate is reminder of the palate behind the invasive foramen
- Secondary palate consist of hard palate and soft palate
- Cleft palate is result of failure of fusion of two palatine shelves
- **Incomplete :** when the cleft of hard palate remains attached to the nasal septum and vomer
- **Complete :** when the nasal septum and vomer are completely separated from palatine processes

CLASSIFICATION :

- LAHSHAL classification describe size, site, extent and type of cleft
- Complete clefts of lip, alveolus, hard and soft palate are designed as capital L,A,H,S
- LAHSHAL refers to complete bilateral cleft lip and palate
- lahSh refers to incomplete right unilateral cleft lip and alveolus with a complete cleft of soft palate extending partly onto the hard palate

EARLY PROBLEMS AFTER BIRTH :

FEEDING PROBLEMS :

- Some babies are able to feed normally while some will need assistance
- Good feeding patterns can be established with soft bo
- Simple measure such as enlarging the hole in teat, ofte

AIRWAY :

- Major respiratory obstruction is uncommon and occur exclusively in babies with pierre robin syndrome
- Hypoxic episodes during sleep and feeding can be life threatening
- Intermittent airway obstruction is ore common and is managed by nursing the baby prone
- Persistant airway compromise can be managed by retained nasopharyngeal intubation

PRINCIPLES OF CLEFT SURGERY :

CLEFT LIP SURGERY :

- Mostly performed between 3-6 months of age
- Skin incision to restore displaced tissue including skin and cartilage to their normal position
- Nasolabial muscles are anchored to the premaxilla
- Oblique muscles of orbicularis oris are sutured to the base of anterior nasal spine
- Closure is completed by suturing the horizontal fibers of orbicular is oris

CLEFT PALATE SURGERY :

- Most commonly performed between 6-18 months
- Repair can be done by one or two stage palatoplasty
- The surgical principle is mobilisation and reconstruction of the abberent soft palate musculature
- Two stage procedure attempts to minimize dissection.

SECONDARY MANAGEMENT :

- Many aspects of cleft care require long term review
  - Hearing
  - Speech
  - Dental development
  - Facial growth

HEARING :

- Eustachian tube dysfunction plays a central role in the pathogenesis of otitis media with effusion in children with cleft palate.
- Children with cleft lip and palate are at increased risk of sensory neural hearing loss so they should undergo assessment before 12 months of age.
- Sensory neural deafness is managed with hearing aids.
- Middle ear effusion is treated with prophylactic myringotomy and grommet insertion

SPEECH :

- Initial speech assessment should be performed early (18 months)
- Common problems are velopharyngeal incompetence,

DENTAL :

- Dental anomalies are common findings in children with cleft lip and palate
- Too many or too few teeth with eruption
- Anomalies most commonly occur in the region of cleft alveolus involving the maxillary lateral incisor tooth

ORTHODONTIC TREATMENT :

- It is carried out in two phases
- 1. Mixed dentition (8-10 yrs) to expend the maxillary arches as prelude to alveolar bone graft
- 2. Permanent dentition (14-18 yrs) to align the dentition and provide a normal functioning occlusion

SECONDARY SURGERY FOR CLEFT LIP AND PALATE : PROCEDURES INCLUDED ARE :

- Cleft lip revision
- Alveolar bone graft
- Veleoplasty and pharyngoplasty
- Dentoalveolar procedure
- Orthoganthic surgery
- Rhinoplasty

ALVEOLAR BONE GRAFTING :

ADVANTAGES :

- Stabilization of maxillary segments
- To promote eruption of canine tooth into cleft site
- To enhance bony support of teeth adjacent to cleft alveolus
- To promote closure of oronasal fistula
- To close residual fistula of the anterior plate
- To provide adequate bone stock to receive an osseointegrated dental implant where a
- tooth is congenitally absent
- Surgery best performed before the canine tooth eruption (8-11 years)

CLEFT LIP REVISION :

- Should be delayed for 2 years after primary lip closure

INDICATIONS :

- Lip deformity : Malaligned vermilion, asymmetrical cupid bone, muscle discontinuity
- Nasal deformity : Lateral drift of alar base, poor nasal tip projection, dns into the non cleft nostrils

- cleft lip and palate can be diagnosed antenatally by US after 18 weeks of gestation
- peirre robin sequence remain the most common syndrome associated with this condition
- Cleft lip repair is most common [illegible] months of age
- Cleft palate repair is most commonly performed between 6-18 months of age
- Eustachian tube dysfunction plays a central role in the pathogenesis of otitis media with effusion

PART - 6

TRANSPLANTATION

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TRANSPLANTATION

Chapter 25

IMPORTANT DEFINITIONS :

- **Allograft :** An organ or tissue transplanted from one individual to another
- **Alloantigen :** Transplant antigen
- **Alloantibody :** Transplant antibodies
- **HLA** : Human leukocyte antigen , the main trigger to graft rejection
- **Xenograft :** A graft performed between different species
- **Orthotopic graft** : A graft placed in its normal anatomic site
- **Heteropic graft :** A graft placed in a site different from that where the organ is normally located

BASIS OF REJECTION :

- Allograft provokes a powerful immune response that results in rapid graft rejection unless immunosuppressive therapy is given
- Allograft trigger a graft rejection response because of allelic differences at polymorphic genes that give rise to histocompatibility antigen of which ABO and HLA are most important

ABO BLOOD GROUP ANTIGENS :

- The ABO blood group antigens are expressed not only by red blood cells but by most other types of cells as well
- It is vitally important to all type of organ allograft
- Permissible transplants are :
  - Group O donor to group O,A,B or AB recipient
  - Group A donor to group A or AB recipient
  - Group B donor to group B or AB recipient
  - Group AB donor to group AB recipient

HLA ANTIGENS :

- Allograft rejection is directed predominantly against HLA
- HLA are strong transplant antigen
- HLA are the most common cause of graft rejection
- Their physiological function is to act as antigen recognition units
- They are highly polymorphic
- HLA-A, B (class I) and DR (class II) are most important in organ transplant
- HLA antibodies may cause hyper acute rejection.

	Class I	Class II
HLA loci	HLA-A, B, C	HLA-DR, DP, DQ
Structure	Heavy chain and beta 2 micro globulin	Alpha and beta chain
Distribution	All nucleated cells	B cells, dendritic cells, macrophages

* **table after : bailey and love short practice of surgery**

INTRODUCTION:

- Torso is generally regarded as the area between neck and groin, made up of thorax and abdomen
- 42 % of all deaths are result of brain injury
- 39 % of all trauma deaths are caused by major hemorrhage
- ATLS is the cornerstone of advanced resuscitation

TYPE OF ALLOGRAFT REJECTION :

HYPER ACUTE :

- Occurs immediately
- Due to ABO or preformed anti HLA antibodies
- Characterized by intra vascular thrombosis and interstitial hemorrhage ad graft destruction within minutes to hours
- Heart and liver transplant are relatively resistant
- kidney transplant are particularly vulnerable to hyper

ACUTE :

- occurs in first 6 months of transplantation but may occur later
- T cell dependent
- May be cell mediated, antibody mediated or both
- Usually reversible
- It is characterized by mononuclear cell infiltration of the graft
- Most episodes of acute rejection can be reversed by additional immunosuppressive therapy

CHRONIC :

- Occurs months and years after transplantation usually occur after 6 months
- Major cause of allograft failure
- The liver is most resistant to destructive effects of chronic graft rejection
- Antibodies play an important role
- Non immune factors contribute to pathogenesis
- **Histology :** Characterized by myointimal proliferation in graft arteries leading to ischemic and fibrosis

RISK FACTORS FOR CHRONIC REJECTION ARE :

- Previous episodes of acute rejection
- Poor HLA match
- Long cold ischemic time
- CMV infection
- Raised blood lipids
- Inadequate immunosuppression

ORGAN SPECIFIC FEATURES OF CHRONIC GRAFT REJECTION :

- **Kidney :** Glomerular Sclerosis and Tubular Atrophy
- **Pancreas :** Acinar Loss and Islet Destruction
- **Heart :** Accelerated Coronary Artery Disease
- **Liver :** Vanishing Bile Duct Syndrome
- **Lungs :** Obliterative Bronchiolitis

GRAFT-VERSUS-HOST DISEASE GVHD :

- When lymphocytes from donor organ react against HLA antigen experienced by recipient tissue it will lead to GVHD
- It frequently involve skin causing a characteristic rash on palm and soles
- GVHD is a serious and sometimes fetal complication

IMMUNOSUPPRESSION :

- Principle of immunosuppression in organ transplantation
- The aim of immunosuppression is to maximize the graft protection and minimize the side effect
- Most regimens are based on calcineurin blockade and an antiproliferative agent
- Need for immunosuppression is highest in the first 3 months but indefinite treatment is needed
- Immunosuppression increases the risk of infection and malignancy

IMMUNOSUPPRESSIVE AGENTS :

- **Calcineurin inhibitors :** ciclosporin and tacrolimus
- **Antiproliferative agents :** azathioprine and mycophenolate
  Steroids
- **Antibody therapy :** anti CD 25 and OKT3 monoclonal antibody

SIDE EFFECTS OF IMMUNOSUPPRESSIVE AGENTS :

Agents	Side Effects
Steroids	HTN, DM ,dyslipidemis, osteoporosis, AVN, cushingoid appearance
Azathioprine	Leukopenia, thrombocytopenia, hepatotoxicity, GIT symptoms
mycophenolate	Leukopenia, thrombocytopenia, GIT symptoms
ciclosporin	Nephrotoxicity, HTN, dyslipidemia, hirsutism, gingival hyperplasia
tacrolimus	Nephrotoxicity, HTN, dyslipidemia, neurotoxicity, DM

mTOR inhibitors	Thrombocytopenia, dyslipidemia, pneumonia, impaired wound healing
AIG	Infusion reaction, leukopenia, thrombocytopenia
Anti CD25	uncommon
Anti CD52	Infusion reaction and autoimmune disease
Anti CD20	Infusion reaction and pulmonary toxicity

* **table after : bailey and love short practice of surgery**

Side effects of immunosuppression :

- **Infections :**
  - Transplant recipients are at high risk of opportunistic infection especially viral
  - Bacterial and fungal are also common
  - Risk of infection is greatest during first 6 months
  - Chemoprophylaxis is important for high risk patients
  - Viral infection may result from re activation of latent virus or from primary infection
  - Viral prophylaxis
  - Pre transplant vaccination against community acquired infection should be considered

- **Malignancy :**
  - Cancer incidence after transplantation
  - Children are at risk of post transplant lymphoproliferative disease PTLD
  - High risk of squamous cancer of skin and recipient should have regular skin review

ORGAN DONATION :

DONATION AFTER BRAIN DEATH DONORS :

- Brain death occurs when brain injury causes irreversible loss of the capacity for consciousness combined with the irreversible loss of capacity for breathing

CLINICAL TESTING FOR BRAINSTEM DEATH :

- Performed on 2 separate occasions by 2 clinicians experienced in this area.

1. Absence of cranial nerve reflex : pupillary reflex, corneal reflex, pharyngeal (gag) and tracheal cough reflux

2. Absence of motor response : the absence of motor response to painful stimuli applied to head/face and absence of cranial nerve distribution to adequate stimulation of any somatic area is an indicator of brainstem death . the presence of spinal refluxes does not preclude brainstem death

3. Absence of spontaneous respiration : after preventilation with 100 & oxygen for at least 5 minutes , the patient is disconnected from the ventilator for 10 min to confirm absence of repiratory efforts during which time the arterial pressure pCO2 level should be > 8kPa to ensure adequate respiratory stimulation. To prevent hypoxia during apnoeic period O2 (6 ml/min) is delivered via endotracheal tube

EVALUATION AND MANAGEMENT OF A DECEASED DONOR :

- Full medical history
- ECG
- Urine output > 100ml /hr
- CVP line
- Arterial line
- Temperature
- Cardiovascular support in the form of dopamine, dobutamine, epinephrine
- Respiratory support
- Tri iodothyronine administration
- Treatment of coagulopathy with blood products

MAXIMUM OPTIMAL COLD STORAGE TIMES :

Organ	Optimum (Hrs)	Safe Maximum (Hrs)
Kidney	<18	36
Liver	<12	18
Pancreas	<10	18
Small Intestine	<4	6
Heart	<3	6
Lung	<3	8

* **table after bailey and love short practice of surgery**

- Donor age ranges for a commonly transplanted organ are :
  - Liver = no limit
  - Kidney= 2 years
  - Pancreas = 10-60 yrs
  - Heart =1-65 yrs
  - Lung =5-65 yrs

ORGAN PRESERVATION :

- Organs are stored / preserved in different storage solution
- The storage solution temperature ranges 4-10 C
- Extracellular solution contain moderate potassium and high sodium
- Intracellular solution contain high potassium and low sodium

LIVING DONORS :

- Living donors should be 1st degree relatives
- They may be genetically unrelated individual (spouse)

LIVER TRANSPLANTATION :

INDICATIONS AND PATIENT SELECTION :

- Chronic liver failure (most common)
- Cirrhosis
- Acute fulminate liver failure

- Metabolic liver disease
- Primary hepatic malignancy

TECHNIQUE OF LIVER TRANSPLANTATION :

- A transverse abdominal incision with a midline extension
- The CBD is divided as is the hepatic artery
- IVC is clamped and divided above and below the liver
- The portal vein is clamped and divided
- The arterial vasculature is per fussed with marshall's hypertonic solution liver preservation in cold storage (sterile bag)
- Liver should be transplanted within 12 hours of retrieval.

COMPLICATIONS :

- Hemorrhage
- Vascular complications : Hepatic artery thrombosis
- Biliary complications : leak
- Infection
- Rejection

RENAL TRANSPLANTATION :

- It account for total 30 % of total transplant activity in western world
- Renal transplantation is preferred treatment for many patients with end stage renal disease.

INDICATIONS :

- Diabetic nephropathy
- Renal vascular disease
- Polycystic kidney disease
- Pyelonephritis
- Hypertensive nephrosclerosis
- Glomerulonephritis
- Metabolic disease
- Obstructive uropathy
- SLE
- Analgesic nephropathy

TECHNIQUE OF RENAL TRANSPLANTATION :

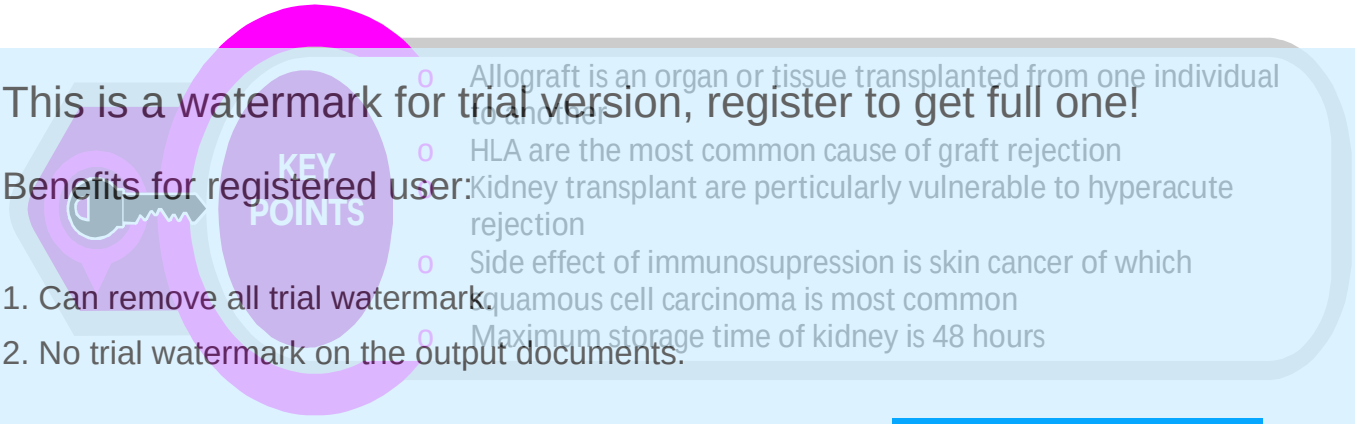
- Under GA
- Maintain CVline and urinary catheter.
- A curved incision is made in lower abdomen
- The donor renal vein is anastomosed end to side to the external iliac vein
- The donor renal artery is anastomosed end to side with the internal iliac artery
- Kidney is kept cold by application of topical ice
- Ureter is then anastomosed with the bladder, occasionally stented.

COMPLICATIONS :

- Vascular complications : renal artery thrombosis
- Lymphocele
- Ureteric stenosis
- Infection
- Graft rejection.

OUTCOME AFTER TRANSPLANTATION :

- Deceased donor graft 13 yrs
- Living un-releated graft 15 yrs
- Living haploidentical graft 16 yrs
- Living identical sibling graft 27 yrs



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PART - 7

ENDOCRI-NOLOGY

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THYROID AND PARATHYROID GLAND

Chapter 26

THYROID AND PARATHYROID GLAND :

EMBRYOLOGCAL DEVELOPMENT :

- The thyroid gland develops as diverticulum from floor of embryonic pharynx, then migrate caudally
- During migration it remains connected to the tongue by thyroglossal duct
- Thyroglossal duct later obliterated
- The throglossal duct develops from median bud of pharynx
- The foramen cecum at the base of the tongue is the vestigeal remnant of the duct
- The parathyroid gland develop from 3rd (inferior parathyroid gland) and 4th (superior parathyroid gland) pharyngeal pouch
- Thymus also develop from 3rd pouch

SURGICAL ANATOMY :

- The normal thyroid gland weights 20-25g.
- The follicle contains colloid in which thyroglobulin is stored
- The functioning unit is the lobule supplied by a single arteriole and consist of 20-40 follicles lined with cuboidal epithelium.

ARTERIAL SUPPLY :

- Thyroidea ima - from aortic arch
- Superior thyroid artery - arises from external carotid artery
- Inferior thyroid artery - arises from thyrocervical trunk of 1st part of subclavian

VENOUS DRAINAGE :

- Superior thyroid vein- drain to internal juglar vein
- Middle thyroid vein - drain to internal jugla vein
- Inferior thyroid vein - drain to brachiocephalic vein

PARATHYROID GLAND :

- The normal parathyroid gland weight upto 50 mg , they are 4 in number
- The superior parathyroid is more consistent in position than inferior
- Superior is most commonly found in fat above the inferior thyroid artery
- Inferior mostly found under the capsule of upper horn of thymus or on the inferior pole of thyroid lobe
- Parathyroid gland is supplied by posterior branch of superior and inferior thyroid arteries

PHYSIOLOGY :

THYROXINE :

- The hormone T3 (tri-iodothyronine) and T4 (L-thyroxine) are bound to thyroglobulin within the colloid

- Synthesis of thyroglobulin complex is controlled by several enzymes , in distinct steps :
  - Trapping of inorganic iodide from the blood
  - Oxidation of iodide to iodine
  - Binding of iodine with tyrosine to form iodotyrosines
  - Coupling of mono-iodotyrosines and di-iodotyrosines to form T3 and T4
- T3 is more important physiological hormone

PARATHORMONE (PTH) :

- The parathyroid gland secrete parathyroid hormone pth
- Pth controls serum calcium in extracellular fluid
- Pth is released in response to low serum calcium and high serum magnesium levels
- Pth activates osteoclast to resorb bone
- It increase calcium resorption from urine
- It causes renal activation of vitamin d and increased gut absorption of calcium
- It increase renal excretion of phosphate

CALCITONIN :

- The parafollicular C cells of thyroid are of neuroendocrine origin
- They produce calcitonin
- Calcitonin is a serum marker of recurrence of medullary thyroid cancer

THE PITUITARY-THYROID AXIS :

- The synthesis and liberation of thyroid hormone from thyroid gland is controlled by thyroid stimulating hormone TSH from anterior pituitary
- Secretion of TSH is via classic negative feedback mann
- When thyroid hormones are high in blood TSH produc ersa
- Regulation of TSH secretion also results from activation of thyrotrophic releasing
- hormone TRH produced in hypothalamus

THYROID FUNCTION TEST :

SERUM TSH :

- Normal serum value 0.5-5 uU/ml
- Negative feedback with T3 and T4
- In euthyroid : T3, T4, TSH all are normal
- Florid thyroid failure :depressed t3 and t4 levels with gross elevation of TSH
- Incident or developing thyroid failure : low normal t3 t4 and elevated TSH
- In toxic state : TSH level is suppressed and undetectable

T4 AND T3 :

- T4 is five fold less active than T3
- T3 is mainly (85%) formed by convertion of t4
- T3 is less useful for diagnosis of hypothyroidism as compared to T4

THYROID AUTOANTIBODIES :

- Thyroid autoantibodies are against thyroid peroxides TPO and thyroglobulin
- Thyroid autoantibodies are useful in determining the cause of thyroid dysfunction and swelling
- Levels above 25U/ml for TPO and titre of > 1:100 for antithyroglobulin are considered as significant
- TSH receptor antibodies are often present in graves disease

THYROID IMAGING :

- Chest and thoracic inlet x-ray confirm the presence of significant reterosternal goiter, tracheal deviation and compression , pulmonary metastasis may also be detected
- Ultrasound
- CT scan and MRI is not indicated and is reserved for known malignancy

ISOTOPE SCANNING :

- 80 % of cold swelling (decrease uptake) are benign
- 5 % of functioning or warm swelling (increased uptake) are malignant

[illegible] BY FNAC :

- FNAC is investigation of choice in discrete thyroid swelling
- It has an excellent patient compliance, quick and simple
- Results should be reported in standard terminology :

Thy1	Non diagnostic
Thy1c	Non diagnosti[illegible]
Thy2	Non neoplasti[illegible]
Thy3	follicular
Thy4	Suspicious of malignancy
Thy5	malignant

* **table after bailey and love short practice of surgery**

HYPOTHYROIDISM :

CLASSIFICATION :

- FNAC is investigation of choice in discrete thyroid swelling
- It has an excellent patient compliance, quick and simple
- Results should be reported in standard terminology :

Autoimmune thyroiditis (chronic lymphocytic thyroiditis)	non goitrous: primary myxedema
	Goitrous : Hashimotos disease
Iatrogenic	After thyroidectomy
	After radio iodine therapy
	Drug induced

Dyshormonogenesis	
Goitrogen	
Secondary to pituitary or hypothalamic disease	
thyroid agenesis	
Endemic cretinism	Often goitrous or due to iodine deficiency

*** table after bailey and love short practice of surgery**

ADULT HYPOTHYROIDISM :

- Term myxedema reserved for severe thyroid deficiency
- Signs : bardycardia, cold extremity, dry skin and hair, periorbital puffiness, hoarse voice, bradykinesia, delayed relaxation phase of ankle jerks
- Symptoms : tiredness, mental lethargy, cold intolerance, weight gain, constipation, menstrual disturbance, carpal tunnel syndrome
- Investigations : low T4 , T3 and high TSH, high TPO antibodies are characteristics of autoimmune disease.

TREATMENT :

- Oral thyroxine (o.1-0.2 mg) as single daily dose is curative
- In elderly and cardiac patients the replacement dose is commenced at 0.05mg daily and increased cautiously

CRETINISM (FETAL OR INFANTILE) :

- It is characterised by inadequate thyroid hormone pro natal development
- **Endemic :** due to dietary iodine deficiency
- **Sporadic :** due to either inborn error of thyroid metabolism or complete / partial agenesis of gland
- **Clinical features**: horse cry, macroglossia, umbilical hernia with features of thyroid failure
- Immediate diagnosis and treatment with thyroxine within few days of birth are essential
- Woman on antithyroid drugs may give birth to hypothyroid child

MY XOEDEMA :

- It refers to hypothyroidism with accentuated sign and symptoms

CLINICAL FEATURES

- Supra clavicular puffiness
- Malar flush
- Yellow tinge to skin
- Altered mental state
- Hypothermia

TREATMENT :

- Intravenous or oral thyroid replacement either a bolus of 0.5mg og T4 or 10 microgm of
- T3 every 4-6 hourly
- Broad spectrum antibiotics
- Hydrocortisone
- Slow re-warm the body

THYROID ENLARGEMENT :

- Normal thyroid gland is impalpable
- The term goiter is used to described generalized enlargement of thyroid gland
- Isolated (solitary) swelling : a discrete swelling in one lobe with no palpable abnormality elsewhere
- Dominant : a discrete swelling with evidence of abnormality elsewhere in gland

CLASSIFICATION OF THYROID SWELLING :

- **Simple goiter :**
  1. Diffuse hyperplasia : physiology, puberty, pregnancy
  2. Multi nodular goiter
- **Toxic**
  1. Diffuse (graves disease)
  2. Multi nodular goiter
  3. Toxic adenoma
- **Neoplasia**
  1. Benign
  2. Malignant
- **Inflammatory**
  1. **Autoimmune :** chronic lymphocytic thyroiditis, ha
  2. **Granulomatous :** de Quervain's thyroiditis
  3. **Fibrosing :** riedel's thyroiditis
  4. **Infective :** acute (bacterial, viral, subacute thyroiditis) , chronic (TB, syphilitic)
  5. **Others :** amyloid

SIMPLE GOITER :

- Simple goiter may develop as a result of stimulation of thyroid gland by TSH either :
- As a result of inappropriate secretion from micro adenoma in anterior pituitary or
- In response to chronically low levels of circulating thyroid hormone

SIMPLE GOITER :

- Simple goiter may develop as a result of stimulation of thyroid gland by TSH either :
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CAUSES :

- Physiological : puberty, pregnancy
- Dietary iodine deficiency
- Dyshormonogenesis

- Goitrogens : Brassica family (cabbage) , PAS containing drugs, calcium and floride in drinking water, iodide in large quantities

NATURAL HISTORY OF SIMPLE GOITER :

DIFFUSE HYPERPLASTIC GOITER :

- It correspond to first stage of natural history
- It usually occur at puberty when metabolic demands are high

COLLOID GOITER :

- A colloid goiter is a late stage of diffuse hyperplasia
- when TSH stimulation has fallen off and when many follicles are inactive and full of colloid

NODULAR GOITER :

- Nodules are usually multiple , forming multi nodular goiter
- Nodules may be solitary or solitary
- Cystic degeneration or hemorrhage are common
- Nodules appear early in endemic goiter and later in sporadic goiter
- Simple nodules are common in females

DIAGNOSIS :

- Patient is euthyroid
- Visible palpable nodules
- Painless goiter move freely on swallowing
- Hardness or irregularity due to calcification may stimu
- Painful nodule, sudden appearance, rapid enlargemen

INVESTIGATION :

- TFT , Autoantibodies, X-Ray Chest And Thoracic Inlet, U/S, CT , FNAC

TREATMENT :

- Prevention by introduction of iodized salt
- Hyper plastic goiter thyroxine 0.15-0.2 mg daily
- Indications of Surgery : multi nodular goiter, cosmetic reasons, pressure symptoms, patient anxiety, reterosternal extension

DISCRETE THYROID SWELLING :

- These are common
- These are 3-4 times common in females
- These are of two types isolated or solitary and dominant
- A discrete swelling in otherwise impalpable gland is termed as isolated or solitary , 70% are solitary
- A similar swelling with clinical evidence of generalized abnormality in the form of a palpable contra lateral lobe or generalized mild modularity are termed as dominant swelling , 30 % swellings are dominant

INVESTIGATION :

- TSH, autoantibody titre, U/S chest and thoracic inlet x-ray, CT, MRI, FNAC, isotope scanning, laryngoscope (for medico legal rather than clinical reasons), core biopsy
- FNAC: investigation of choice, but can not distinguish between a benign follicular adenoma and follicular carcinoma

TREATMENT :

- The main indication for operation iare : the risk of neoplasia, Toxic adenoma, Pressure symptoms, Cosmesis, Patients wish
- Risk of neoplasia is increased by : > 50 yrs, male, hard irregular fixed swelling, recurrent laryngeal nerve palsy, deep cervical lymphadenopathy along with internal juglar vein

RETEROSTERNAL GOITER :

- Arise from ectopic thyroid tissue
- Most arise from lower pole of a nodular goiter
- Symptoms : dyspnea, cough, stridor, dysphagia, engorgment of facial neck and superficial chest veins , recurrent nerve paralysis
- Chest and thoracic inlet x-rays and CT scan
- Surgical resection is required if obstructive symptoms are present wirth thyrotoxicosis

THYROID OPERATIONS :

1. **Subtotal :** total lobectomy + isthmuscectomy
2. **Total thyroidectomy :** 2 * total lobectomy + isthmuscectomy
3. **Subtotal thyroidectomy :** 2 subtotal lobectomy+ isthmuscectomy
4. **Near total thyroidectomy :** total lobectomy + isthmuscectomy + sub total lobectomy (dunhill procedure)

THYROIDECTOMY :

PRE OPERATIVE PREPARATION :

- It is essential to make a patient biochemically euthyroid at operation
- Carbimazole 30-40 mg / day is the drug of choice before operation
- After 8-12 weeks reduce to 5mg 8hr , last dose on evening before surgery
- Propranolo 40 mg three times a day
- Nadolol 160 mg once daily
- Iodine may be given with carbimazole and beta blockers 10 days before operation

PRE OPERATIVE INVESTIGATION :

- TFT
- Laryngoscope
- Thyroid antibodies
- Serum calcium
- Isotope scan

TECHNIQUE :

- GA
- Gel pad or sandbag under neck and shoulder to extend

- Curved skin crease incision midway between notch of thyroid cartilage and supra sternal notch
- Flaps of skin, subcutaneous fascia and fat are raised
- Deep cervical fascia is divided in midline
- Strap muscles are not divided
- Pre tracheal fascia around thyroid is incised
- Thyroid lobe is mobilized
- Recurrent laryngeal nerve is identifies
- Superior thyroid artery is tied off closed to the thyroid gland to protect external laryngeal nerve
- Inferior thyroid artery is tied off away from gland to protect recurrent laryngeal nerve
- Parathyroid gland are identified
- Thyroid is excised
- In subtotal resection leaving a remnant of 4-5 gm on each side
- Hemostatic secured
- Close in layer

COMPLICATIONS :

- Hemorrhage
- Nerve damage
- Thyroid crises
- Hypothyroidism
- Pain
- Dysphagia
- Strider
- Hypocalcemia

POST OPERATIVE CARE :

- 25 % of patient develop transient hypocalcemia and oral calcium may be necessary (1 gm 3-4 times per day)
- Iv calcium gluconate if serum ca levels below 1.9 mmol/ml

HYPERTHYROIDISM :

THYROTOXICOSIS :

- Symptoms due to raise levels of circulating thyroid hormones
- **Types are :**
  - Diffuse toxic goiter (graves's disease)
  - Toxic nodular goiter
  - Toxic nodule
  - Hyperthyroidism due to rare causes

DIFFUSE TOXIC GOITER :

- It is primary thyrotoxicosis
- Usually occur in younger woman
- Frequently associated with eye signs

- 50 % patient have family history of autoimmune endocrine disorder
- Hypertrophy and hyperplasia are due to abnormal thyroid stimulating antibodies (TSH-RAb) that bind to TSH receptor site

TOXIC NODULAR GOITER :

- It is secondary thyrotoxicosis
- Usually I middle or elderly age
- Hyperthyroidism is less severe
- Cardiac failure is common
- Eye signs are rare

TOXIC NODULE :

- It is a solitary overactive nodule
- It may be a part of generalize nodularity or a true toxic adenoma
- It is autonomous and hypertrophy or hyperplasia are not due to TSH RAb
- The normal thyroid is consist of acini and lined with flattened cuboidal Epithelium
- In hyperthyroidism there is hyperplasia of acini lined by high columnar epithelium characteristic scalloped pattern

- **Symptoms are :** tiredness, emotional liability, heat intolerance, weight loss, excessive appetite, palpitations
- **Signs :** tachycardia, hot moist palm, exophthalmos, eyelid lag/retraction, agitation, thyroid goiter and bruit
- **Cardiac rhythm :**
  - o A fast heart rate which persist during sleep is characteristic
  - o Stages of development of thyrotocisx arrhythmia are :
    1. Multiple extra systoles
    2. Paroxymal atrial tachycardia
    3. Paroxymal atrial fibrillation
    4. Persistant atrial fibrillation , not responsive to digoxin
- Myopathy : proximal muscle weakness, recovery proceed as hyperthyroidism is controlled.
- Thyroid dermopathy / peritibial myxedema : thickening of skin due to deposition of hyaluronic acid in dermis and subcutis
- **Eye signs :**
  - o Some degree of exopthalmos is common
  - o May be unilateral
  - o True exopthalmos is proptosis of eye, caused by infiltration of reterobulvbar tissue with fluid and round cells with a varrying degree of retraction and or spasm of upper eyelid
  - o Result in widening of palpaberal fissure so that the sclera may be seen clearly above the upper margin of the iris and cornea
  - o Weakness of extraocular muscles particularly the elevators (inferior oblique) will result in diplopia
  - o In severe cases paploedema and corneal ulceration occur
  - o Sleeping prop up and tarsorraphy will help to protect the eye
  - o Massive dose of prednisone

- Intra orbital injection of steroid is dangerous because of venous congestion
- Orbital compression when the eye is in danger

- **Diagnosis :** mostly clinical, TFT, thyroid scan

MANAGEMENT :

MEDICAL :

- Carbimazole and propylthiouracil are common
- Beta adrenergic blockers are used to block cardiovascular effects

ADVANTAGE :

- No surgery and no use of radioactive material

DISADVANTAGE :

- Prolong treatment with 50% failure rate
- Milder cases can be treated for 6 months and severe for 2 years before stopping therapy

SURGERY :

- Treatment of choice in patients with large diffuse goiter , multi nodular goiter , solitary nodule, diffuse toxic goiter

ADVANTAGE :

- Rapid cure
- Goiter is removed and cure rate is high

DISADVANTAGE :

- Recurrence in 5%
- Risk of permanent hypoparathyroidism
- Nerve injury

RADIO-IODINE :

- It destroys thyroid cells

ADVANTAGE :

- No surgery or prolong drug therapy

ADVANTAGE :

- Isotope facilities must be available, avoid pregnancy and close contact particularly
- with children , eye signs may be aggravated

NEOPLASM OF THYROID GLAND

BENIGN TUMORS :

- Follicular adenoma and colloid nodule
- In benign tumor there is no invasion of capsule or of peri capsular blood vessels

TREATMENT :

- wide excision i.e lobectomy

MALIGNANT TUMORS :

- Papillary carcinoma 60%
- Follicular carcinoma 20%
- Anaplastic carcinoma 10%
- Medullary carcinoma 5%
- Malignant lymphoma 5%

PAPILLARY CARCINOMA :

- Most tumors contain a mixture of colloid filled and papillary follicles
- Orphan annie eyed nuclei I.e pale empty nuclei
- No capsule
- Lymphatic spread is common
- Mortality rate is 11 %

FOLLICULAR CARCINOMA :

- Encapsulated
- Common in iodine deficient areas
- Hematogenous spread via lungs and bones
- Mortality rate is 24 %

MANAGEMENT OF PAPILLARY AND FOLLICULAR CARCINOMA :

SURGICAL :

- Thyroid lobectomy : for minimal papillary Ca (<1cm) c… …cular carcinoma
- Total thyroidectomy : for cytologically proven tumors, for >1cm papillary and widely
- invasive follicular caif lymphadenopathy then combine with neck dissection

MEDICAL :

- Thyroxine : in all patients after operation
- Radio iodine : after surgery, also indicated in unresectable disease, metastasis local recurrence, high risk patients, elevated serum thyroglobulin

ANAPLASTIC (UNDIFFERENTIATED) :

- In elderly woman
- Spread by both lymphatic and blood stream
- Extremely lethal tumors
- Complete resection is justified
- Treatment : debunking surgery, Radiotherapy in all patients

MEDULLARY CARCINOMA :

- These are tumors of parafollicular cells (c cells) derived from neural crest cells
- High levels of serum calcitonin and carcinoembryonic antigen are produced by many medullary tumors.

- 10-20% are familial
- Mostly appear with MEN type 2A with adrenal pheochromocytoma and hyperparathyroidism
- Familial occurs in children and younf=g adult while sporadic occur at any age
- Lymph node involvement 50-60%
- Blood metastasis is common
- Prognosis is variable abd depend on the disease stage

TREATMENT :

- Total thyroidectomy plus central and bilateral cervical lymphadenectomy

HYPERPARATHYROIDISM :

PRIMARY HYPERPARATHYROIDISM :

- It commonly a sporadic rather than familial
- Associated with hypercalcemia, raised PTH
- It is associated with MEN 1 (wamer syndrome) and MEN 2 (sipple syndrome)
- **Causes :** single adenoma (85%), parathyroid hyperplasia (13 %) , parathyroid carcinoma (1 %), multiple adenoma
- **Clinical features :** classic quarter of stones , bones, abdominal groans, psychic moans

INVESTIGATIONS :

- high serum Ca
- high PTH
- increase urinary calcium excretion
- low phosphate
- low chlorine
- normal vitamin D levels
- Neck ultrasound
- CT/MRI
- Radio isotope (sastamibi) scanning : for localized adenoma, it allows a focal approach

TREATMENT :

- Parathyroidectomy is the only curative management

INDICATIONS OF SURGERY :

- Urinary tract calculi
- Reduced bone density
- Severe hypercalcemia (serum ca > 3.5 mmol/l) / symptomatic hypercalcemia
- Detoriating renal functions
- Younger age group < 50 yrs
- If imaging identified the position of adenoma : focus neck exploration via lateral cervical scar
- If imaging studies donot identify the podsition of adenoma : bilateral neck exploration , visualization of all 04 glands and excision of enlarged one

THYROIDITIS :

GRANULOMATOUS THYROIDITIS :

- Also known as subacute thyroiditis or de-Quervain thyroiditis
- It may follow a viral infection
- Presents as pain, fever,malaise and a firm irregular enllargement of one or both thyroid lobe

INVESTIGATION :

- Raised ESR, absent thyroid antibodies, variable serum T4, radio iodine uptake is low, if doubt FNAC.

TREATMENT :

- prednisone 10-20 mg daily for 7 days
- If thyroid failure- thyroxine

CHRONIC LYMPHOCYTIC THYROIDITIS :

- Also known as autoimmune thyroiditis
- Usually associated with raise titre of thyroid antibodies
- Commonly present as goiter which may be diffuse or nodular with characteristic bosselated feel.

CLINICAL FEATURES

- sudden onset
- Sometimes painful
- Mild hyperthyroidism initially the … owly
- Goiter may be lobulated or diffus…
- It may be large or small and soft , rubbery in consistency
- Most common in woman at menopause
- Papillary carcinoma and malignant lymphoma are occasionally associated with autoimmune thyroiditis

INVESTIGATION :

- Thyroid antibodies - positive in 85% of cases
- FNAC - most appropriate investigation
- TFT

TREATMENT :

- Thyroxine
- Surgery if pressure symptoms or indeterminate nodule

RIEDEL'S THYROIDITIS :

- Rare, accounts for 0.5 % of goiters
- It is characterized by replacement of thyroid tissue by cellular fibrous tissue
- The goiter may be unilateral or bilateral and is very hard and fixed
- It eventually causes hypothyroidism

TREATMENT :

- High dose steroid, tamoxifen, thyroxine replacement

FAMILIAL HYPOCALCIURIC HYPERCALCEMIA :

- It is an autosomal dominant condition
- The defect is missence mutation in the cell membrane calcium receptor
- High serum C and PTH but low urinary Ca excretion (differentiate from primary parathyroidism)
- Only neonates required parathyroidectomy

HYPERCALCEMIC CRISES :

- It is an emergency condition
- Characterized by : drowsiness, LOC, dehydration, weakness, vomiting, renal failure
- Treatment : iv fluids for dehydration, bisphosphonates, calcitonin

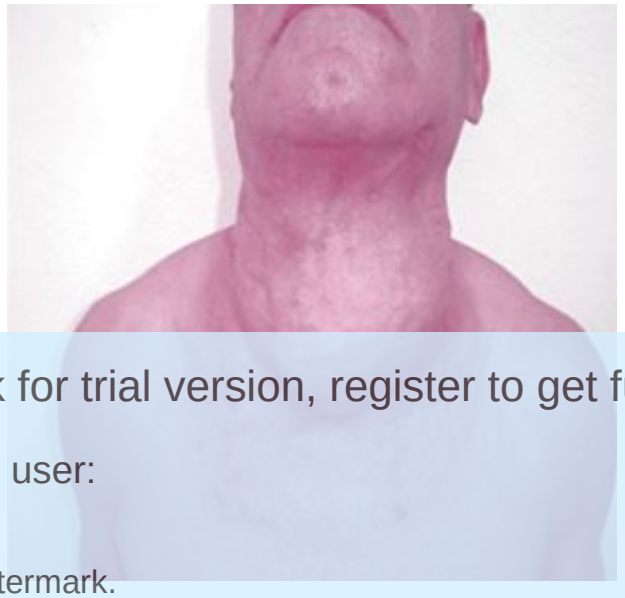
STEPS OF PARATHYROIDECTOMY :

- The patient is in reverse trendelenberg position with sliligh gel pad under shoulders to extend the neck
- Or
- A transverse collar incision 2 cm below sternal notch
- Lift the skin and platysma flap to the level of thyroid notch superiorly and supra sternal notch inferiorly
- Divide the strap muscles and pre tracheal facial in mid line
- Expose thyroid lobe by retracting strap muscles
- Identify recurrent laryngeal nerve and inferior thyroid
- Localized parathyroid gland in symmetrical manner
- All abnormal glands are excised
- Label each gland with position and send them separately for histopathology
- Secure homeostasis
- Closure in layers

KEY POINTS

- In adult hypothyroidism delayed relaxation phase of ankle jerks-most useful clinical sign
- Serum calcitonium is a tumor marker in patients with medullary carcinoma
- In primary hyperparathyroidism sestambi scanning is used to localize adenomas
- In familial hypocalciuric hypercalcemia focused neck exploration through a lateral cervical scar is performed
- Gastric ph of < 2.5 and serum gastrin > 1000pg/ml is confirmatory of ZES
- In pheochromocytoma most common clinical feature is hypertension

Case example :
A 49 years old male came in OPD with complain of swelling in neck , dysphagia and dyspnea
O/e swelling is moving with deglutition



Q : what is your diagnosis ?
A : reterosternal goiter

Q : what is the investigation of choice ?
A : x ray neck thoracic inlet oblique view

Q : what is the treatment ?
A : surgery

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THE BREAST

Chapter 27

COMPARATIVE AND SURGICAL ANATOMY :

ANATOMICAL EXTENSION :

- From 2nd to 6th rib
- From lateral border of sternum to anterior axillary line.

SURGICAL EXTENSION :

- From the clavicle above to the 7th or 8th rib
- From midline to the edge of latisimus dorsi posteriorly

ANATOMICAL PARTS :

1. AXILLARY TAIL :

- The axillary tail of the breast is of surgical importance
- It sometimes mistaken for a mass of enlarged lymph nodes or a lipoma

2. LOBULE :

- It is the basic structure unit of mammary gland
- Lobules empty via ductules into a lactifarous duct.

3. LIGAMENTS OF COOPER :

- These are hollow conical projections of fibrous tissue f
- They are firmly attached to the superficial fascia and t the breast
- These ligaments account for dimpling of the skin overlying a carcinoma

4. AREOLA :

- Areola contain involuntary muscles arranged in concentric rings as well as radially in
- subcutaneous tissue
  It contains numerous sweat and sebaceous glands, later which enlarge during pregnancy
- and serve to lubricate the nipple during lactation (Montgomery's tubercle).

5. LYMPHATICS :

- Lymphatic of the breast drain predominantly into the axillary and internal mammary lymph nodes
- The axillary nodes receive 85% of the drainage and are arranged as follows :
  - **Lateral :** Along the axillary vein
  - **Anterior :** Along the lateral thoracic vessels
  - **Posterior :** Along the subscapular vessels
  - **Central** : Embedded in the fat in the centre of axilla
  - **Interpectoral :** Between the pectoralis major and minor
  - **Apical :** Lie above the level of pectoralis minor tendon in continuity with the supra clavicular nodes and drain into the subclavian lymph trunk

- **Senital node :** It is defined as the first node draining the tumor bearing area of the breast.

INVESTIGATIONS :

MAMMOGRAPHY :

- It consist of low voltage , high amperage x-rays
- The dose of radiation is 0.1 cGy therefore it is the very safe investigation
- Sensitivity increases with age as breast become less dense
- A normal mammogram does not exclude the presence of carcinoma

ULTRASOUND :

- Useful in young woman with dense breast
- Useful in distinguishing cyst from solid lesion
- Use to localize impalpable areas of breast pathology
- Increasingly, U/S of axilla is performed when a cancer is diagnosed with guided per cutaneous biopsy of any suspicious gland

MRI :

- It is the best imaging modality for breasts of woman with implants
- It is used to distinguishing scar from recurrence in woman who have had previous breast conservation therapy for cancer
- It has proven to be useful as screening tool n high risk woman
- It is less useful than CT's in management of axilla in both primary breast cancer and recurrent disease

NEEDLE BIOPSY/ CYTOLOGY :

- Can be obtained under local anesthesia using a spring
- Needle should be 21G or 23G
- FNAC is least invasive, rapid and very accurate investigation
- False negatives do occur
- Invasive cancer can not be distinguished from in situ disease
- Core biopsy provides a definitive pre operative diagnosis, differentiate between duct carcinoma in situ and invasive disease
- It allows the tumor to be stained for receptor status

TRIPLE ASSESSMENT :

- It consist of
- Clinical assessment
- Radiological imaging
- Tissue sampling taken for either cytological or histological analysis
- Positive predictive value exceeding 99.9%

THE NIPPLE :

NIPPLE RETRACTION :

- This may occur at puberty or later in life
- Retraction occur at puberty also known as simple nipple inversion
- Retention of secretion cause infection and problems during breast feeding

- Recent retraction of nipple may be of considerable pathological significance
- **Slit like retraction :** Duct Ectasia, Chronic Peri Ductal Mastitis
- **Circumferential retraction :** Underlying Carcinoma
- May spontaneously resolve during pregnancy or lactation
- Simple cosmetic surgery

CRACKED NIPPLE :

- Occur during lactation or in infective mastitis
- If occur during lactation , should be rested for 24-48 hrs and breast should be emptied with a breast pump
- Feeding should be assumed as soon as possible

PAPILLOMA OF NIPPLE :

- Should be excised with a tiny disc of skin
- Or may be tied its base with a ligature and papilloma will spontaneously fall off

ECZEMA :

- Rare condition
- Often bilateral
- Usually associated with eczema elsewhere on the body
- Direction : Start from areola to nipple
- Treat with 0.5% hydrocortisone

PAGET'S DISEASE :

- Must be distinguished from eczema
- Caused by malignant cells in subdermal layer
- Associated with carcinoma within the breast
- Direction : start from nipple to areola

DISCHARGE FROM NIPPLE :

CAUSES :

1. DISCHARGE FROM SURFACE :

- Paget's disease
- Skin disease (eczema , psoriasis)
- Rare cause (chancre)

2. DISCHARGE FROM A SINGLE DUCT :

- Blood stained : Intraductal papilloma, intraductal carcinoma, duct ectasia
- Serous (any color) : Fibrocystic disease, duct ectasia, carcinoma

3. DISCHARGE FROM MORE THAN ONE DUCT :

- **Blood stained :** Carcinoma, ectasia, fibrocystic disease
- **Black or green :** Duct ectasia
- **Purulent :** Infection
- **Serous :** Fibrocystic disease, duct ectasia, carcinoma
- **Milk :** Lactation, rare cause (hypothyroidism, pituitary tumor)

TREATMENT :

- First exclude carcinoma by occult blood test and cytology
- Simple reassurance
- Microdochectomy : remove the affected duct

BENIGN BREAST DISEASE :

- This is the most common cause of breast problem
- Most common symptoms are pain , lumpiness or a lump
- Upto 30 % women will suffer from benign breast problem requiring treatment

CLASSIFICATION :

- **Congenital :** Amazia, polymazia, mastitis of infants , diffuse hypertrophy, inverted nipples, tietze's disease (costochondritis)
- **Injuries :** Hematoma, traumatic fat necrosis
- **Inflammation/infection :** Bacterial mastitis, abscess, tb, Mondor's disease, duct ectasia periductal mastitis
- **Aberration of normal development and involution (andi) :** Cyclical nodularity and mastitis, cyst, fibroadenoma, galactocele, phylloids tumor

DIFFUSE HYPERTROPHY :

- Occur in otherwise healthy girls in puberty and during first pregnancy
- It may be due to enhance sensitivity of breast to oestr

TREATMENT :

- Anti-estrogenic drugs , reduction mammoplasty

TRAUMATIC FAT NECROSIS :

- May be acute or chronic
- Usually occur in stout middle aged women, following a blow or even indirect violence
- Often a painless lump appears
- Biopsy is required for diagnosis

TREATMENT :

- Reassurance

BACTERIAL MASTITIS :

- Most common variety of mastitis and associated with lactation
- Most cases are caused by S.aureus
- Clinical signs of acute inflammation in affected breast are present.

TREATMENT :

- Feeding from affected site may continue if patient cam managed
- Support to breast , local heat, analgesia
- Broad spectrum antibiotics (flucloxacilin) in early cases

- Repeated aspiration under antibiotic cover if abscess formed
- **Surgical drainage :** radial or circumferential incision
- **ANTIBIOMA :** It results when an antibiotic is used in the presence of undrained pus, It is a large , sterile, brawny edematous swelling that takes many weeks to resolve
- Breast should be incised and drained if the infection not resolved within 48 hrs

MONDOR'S DISEASE :

- It is thrombophlebitis of superficial veins of breast and anterior chest wall
- The pathognomic feature is a thrombosed subcutaneous cord , usually attached to the skin.
- It may occur spontaneously or following breast surgery
- May be associated with later development of breast cancer

TREATMENT :

- Self-resolving, restricted arm movements

DUCT ECTASIA / PERI DUCTAL MASTITIS :

- This is a dilation of breast duct often associated with peri ductal inflammation
- More common in smokers
- **Clinical features are :** nipple discharge of any color, subareolar mass, mammary duct fistula, slit like nipple retraction.

TREATMENT :

- Antibiotics (co amoxiclav or flucloxacilin + metronidazole)
- Surgical excision of all the major ducts (hadfielf operation)
- Any suspicious mass should be excised

ABERRATIONS OF NORMAL DEVELOPMENT AND INVOLUTION (ANDI) :

- ANDI extending from a perturbation of normality to well defined disease process
- ANDI consist of 4 features
  1. Cyst formation
  2. Fibrosis
  3. Hyperplasia
  4. papillomatosis
- It is a benign discrete lump
- May be bilateral
- Mostly in upper outer quadrant
- Cyclical mastalgia present

TREATMENT :

- Reassurance after exclusion of breast cancer
- Adequate support
- Exclude caffeine
- Evening primrose oil
- Danazole 100mg TDS
- Tamoxifen

PHYLLODES TUMOR :

- Also known as serocystic disease of brodie or cystosarcoma phyllodes
  Usually occur in woman over the age of 40
- They are large, massive tumor with an unevenly bosselated surface
- Ulceration of overlying skin occurs because of pressure necrosis
- Despite their large size they remain mobile on chest wall
- They may metastasize via blood stream

TREATMENT :

- Benign : nucleation or wide local excision
- Massive or recurrent tumors require mastectomy

BREAST CYST :

- These occur most commonly in last decade of reproductive cycle
- As a result of non integrated involution of stroma and epithelium
- Often multiple, may be bilateral, can mimic malignancy

TREATMENT :

- Solitary cyst or small collection of cysts may be aspirated
- If resolve completely : no further treatment required
- If blood stained or residual present : core biopsy or local excision for histological examine action is required

FIBROADENOMA :

- Between 15-25 years
- Arise from hyperplasia of a single lobule and usually gr
- Surrounded by a well marked capsule and can thus be
- They don't require excision unless suspicion of malignancy, cosmetic reason or increasing size
- Giant fibroadenoma are over 5 cm and are rapidly growing

CARCINOMA OF BREAST :

- It is the most common cause of death in middle aged woman in western countries

RISK FACTORS :

- Geographical (west 3-5 %, developing countries 1-3%)
- Age (> 20 yrs)
- Family history
- Diet (high alcohol consumptions)
- Nulliparity
- Obesity
- Oral contraceptive pills
- Hormones replacement therapy
- Lack of breast feeding
- Previous irradiation

RELATIVE RISK OF INVASIVE CARCINOMA IN BEIGN BREAST DISEASE :

NO INCREASED RISK :

- Adenosis
- Apocrine metaplasia
- Cyst
- Duct ectasia
- Fibroadenoma
- Fibrosis
- Hyperplasia
- Mastitis, periductal mastitis
- Squamous metaplasia

SLIGHTLY INCREASED RISK (1.5-2 TIMES)

- Hyperplasia , moderate or florid, solid or papillary
- Papilloma with atypical ductal cells

MODERATELY INCREASED RISK (5 TIMES):

- Atypical hyperplasia (ductal or lobular)

PATHOLOGY :

- Breast cancer may arise from the epithelium of ductal system

DUCTAL CARCINOMA :

- It is the most common variant 80%
- Lobular carcinoma accounts for 15 % , they are classica
- Histological variant : colloid , medullary, tubular

INFLAMMATORY CARCINOMA :

- Rare, highly aggressive
- Present as painful swollen breast warm with cutaneous edema
- Inflammatory cancers usually involve one third of breast and may mimic a breast abscess
- A biopsy will confirm the diagnosis and show undifferentiated carcinoma cells
- It is used to be rapidly fatal but with aggressive chemotherapy and radiotherapy and with salvage surgery the prognosis has improves considerably

IN SITU CARCINOMA :

- It is pre invasive cancer, not breached the epithelial membrane
- Usually asymptomatic
- May be ductal DCIS or lobular LCIS
- Mastectomy iis curative
- In situ carcinoma with high van Nuys system score = complete excision + radiotherapy
- In situ carcinoma with low van Nuys system score = complete excision

PAGET'S DISEASE OF NIPPLE :

- It is a superficial manifestation of underlying breast carcinoma
- It presents as eczema like condition of nipple and areola which persist despite local treatment
- Nipple eroded slowly and disappeared
- Nipple eczema should be biopsies
- Microscopic appearance : large , ovoid cells with abundant clear pale staining cytoplasm in Malpighian layer of epidermis

THE SPREAD OF BREAST CANCER :

LOCAL SPREAD :

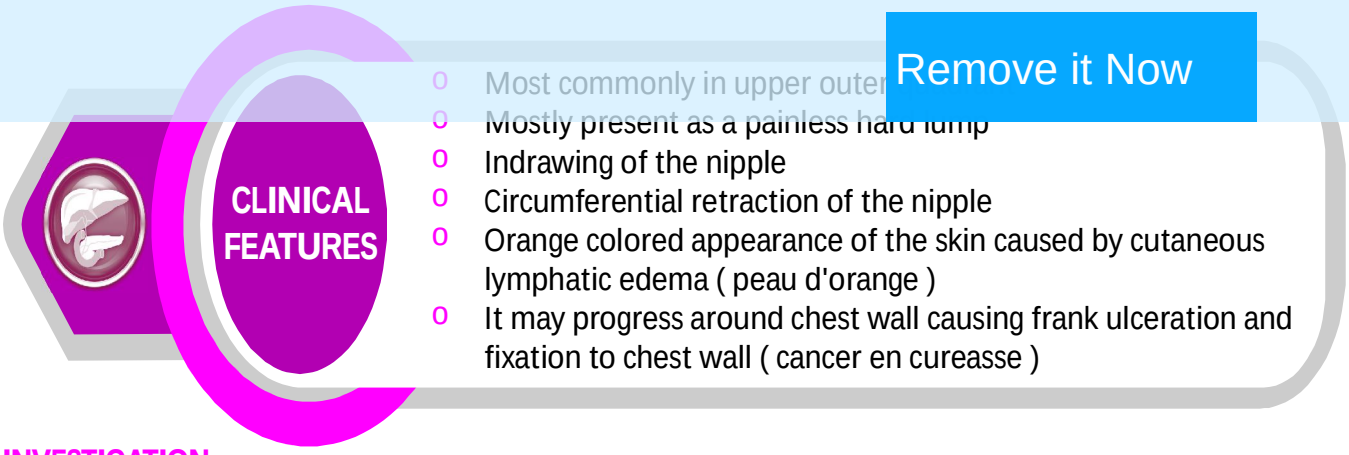
- It tends to involve the skin and penetrate the pectoral muscle and even chest wall

LYMPHATIC SPREAD :

- Primarily to the axillary and internal mammary lymph nodes
- Tumor in the posterior one third of breast drain into internal mammary lymph nodes
- Involvement of supra clavicular lymph node or any contra lateral node represent advanced disease

HEMATOGENOUS SPREAD :

- Widely disseminated skeletal metastasis occur
- Most commonly involve lumber vertebra then femur , thoracic vertebra , ribs and skull
- It also involves liver, lungs, brain, adrenal glands , ovaries



INVESTIGATION :

- Staging evaluation
- Clinical examination
- Chest radiograph
- CT scan of chest and abdomen
- Isotope bone scan

TREATMENT OF BREAST CANCER :

- Two basic principle of treatment are to reduce the chance of local recurrence and risk of metastatic spread

- Treatment of early breast cancer will usually involve surgery with or without radiotherapy
- Systemic therapy such as chemotherapy or hormone therapy is added if adverse prognostic factors

1. SURGICAL OPTIONS :

- Radical (Halstead) mastectomy :
- It involves excision of breast , axillary lymph nodes, pectoralis major, pectoralis minor

2. MODIFIED RADICAL MASTECTOMY (PATEY MASTECTOMY) :

- It involves removal of breast, large portion of skin , all fat fascia lymph nodes of axilla
- Pectoralis major and minor left intact
- Wound is drained via wide bore suction drain
- Early mobilization of the arm is encourage
- Physiotherapy is advised

3. WIDE LOCAL EXCISION / CONSERVATIVE BREAST SURGERY :

- Removing the tumor plus a rim of at least 1 cm of normal breast tissue
- It is usually followed by radiotherapy
- Higher rate of local recurrence following conservative surgery

4. AXILLARY SURGERY :

- The role of axillary surgery is to stage the patient and to treat the axilla
- The presence of metastatic disease within the axillary lymph nodes remain the best single marker for prognosis
- However, treatment the axilla does not affect long term survival
- It should not be combined with radiotherapy because
- Removal of internal mammary lymph nodes is unnece

5. SENITAL NODE BIOPSY :

- This technique ha s become the standard of care in the management of axilla in patient with clinically node negative disease
- The senital node is localized pre operatively by the injection of patent blue dye , a radioisotope labeled albumin in breast
- The recommended sit=te for injection is subdermal plexus around nipple
- Pre operative diagnosis allows complete axillary clearance if nodal disease is detected

6. RADIOTHERAPY :

- Radiotherapy to chest wall after mastectomy is indicated in patients with :
  - Large size tumor
  - Large number positive nodes
  - Extensive lymph vascular invasion
  - To relieve pain of bony metastasis

7. CHEMOTHERAPY :

- It achieved 25% reduction in risk of relapse over 10-15 years period

- It involves using a first generation regimen such as a six monthly cycle of cyclophosphamide, methotrexate and 5 flurouracil
- Modern regimen include an anthracyclinand a newer agent such as taxanes
- It can be used in pre and post menopausal woman with poor prognosis
- Combine hormone and chemotherapy is additive although hormone therapy is started after completion of chemotherapy to reduce side effects
- Pre operative chemotherapy is used to shrink the large sized tumors
- Newer biological agents are trastuzumab (herceptin), bevacizumab, lapitinab

8. HORMONE THERAPY :

TAMOXIFEN :

- Tamoxifen has been the most widely used hormonal treatment in breast cancer
- Its an antagonist of estrogen receptors in breast tissues
- It is used for receptor positive breast cancer in pre menopausal woman
- It reduces the risk of contra lateral breast tumor
- Disadvantage : it has a partial agonist effect on endometrial tissue and thus may cause endometrial cancer

AROMATASE INHIBITOR (AI) :

- It is mainly for receptor positive post menopausal woman
- Most common agent is anastrozole
- Disadvantage : expensive than tamoxifen.

LHRH AGONISTS :

- Luteinizing hormone releasing hormone causes revers
- decreasing estrogen levels
- Common side effects are hot flushes, headache, osteoporosis

FOLLOW UP FOR BREAST CANCER :

- It is current practice to arranged yearly or two yearly mammography of the treated and contra lateral breast.

FAMILIAL BREAST CANCER :

- The BRCA 1 gene located on long arm of chromosome 17 has been associated with an increased incidence of breast, ovarian cancer and colorectal cancer
- BRCA 2 located on chromosome 13 associated with male breast cancer

BREAST CANCER AND PREGNANCY :

- Breast cancer presenting during pregnancy or lactation tends to be at later stage , because the symptoms are masked by pregnancy
- Radiotherapy is contraindicated
- Chemotherapy should be avoided in first trimester
- Mastectomy is treatment of choice
- Hormone therapy is not required as most tumors are hormone receptor negative

HORMONE REPLACEMENT THERAPY (HRT):

- HRT does increase the risk of developing breast cancer if taken for prolong period
- HRT may also prolong the symptoms of benign breast disorder
- Patients who develop breast cancer while on HRT appear to have a more favourable prognosis

ADVANCE BREAST CANCER :

- Management should be aimed at palliation of the symptoms and treatment of breast cancer
- Can be done by endocrine manipulation
- Radiotherapy may or may not be used.

LOCALLY ADVANCED INOPERABLE BREAST CANCER :

- Systemic therapy (chemo or hormone therapy)
- Toilet mastectomy or radiotherapy to control a fungating tumor

METASTATIC CARCINOMA OF BREAST :

- Post menopausal woman = aromatase inhibitor
- Pre menopausal woman = tamoxifen
- Cytotoxic therapy in younger woman or those with visceral metastasis and rapidly growing tumor

THE MALE BREAST :

GYNAECOMASTIA :

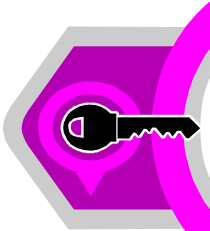
- Hypertrophy of male breast may be unilateral or bilateral
- Common causes are : idiopathic, associated with lepro
- syndrome or some drugs like steroids, stilbestrol thera cimetidine , spironolactone , digitalis

TREATMENT :

- Reassurance , Mastectomy

CARCINOMA MALE BREAST :

- It is an infiltrating ductal carcinoma
- Presenting as lump
- Account for 0.5% of breast cancer
- Treatment options are : radical mastectomy, chemotherapy, radiotherapy, hormonal therapy.



KEY POINTS

- Broad spectrum antibiotics should be given in bacterial mastitis in early cases
- Duct ectasia require hadfield operation I.e surgical excision of all the ducts
- Ductal carcinoma is the most common variant of breast cancer 80% Inflammatory carcinoma is rare but highly aggressive

Case example :
A 28 years old lactating woman came in OPD with complain of painful swelling of breast
O/E rt breast is hot and tender

Q : what is your diagnosis ?
A : breast abscess

Q : what is the investigation ?
A : ultrasound

Q : what is the treatment ?
A : incision and drainage , daily dressing, antibiotics

Q : what is the causative agent ?
A : staphylococcus aureus

OTHER ENDOCRINE DISORDER :

Chapter 28

PANCREATIC ENDOCRINE TUMORS :

- Accounts for 5% of pancreatic tumors
- 10-20 % associated with MEN1
- The endocrine cells in pancreas are grouped in the islet of langerhans
- There are four main types of cells in islet of langerhans :
  - **Beta cells** (65-80 %) producing insulin
  - **Alpha cels** (15-20 %)producing glycogen
  - **Delta cells** (3-10%) producing somatostatin
  - **Pancreatic polypeptide cells** (1 %) containing polypeptides

INSULINOMA :

- It is an insulin producing tumor of pancreas
- It results in Whipple's triade :
  - Symptoms of hypoglycemia after fasting and exercise
  - Fasting glucose level < 2.8 mmol/l
  - Relieve of symptoms on intravenous administration of glucose
- It is the most common functioning pancreatic tumor
- Highest incident in 4th to 6th decade, common in emale
- 10 % are malignant
- Tumor of < 2cm without signs of vascular invasion or metastasis are considered as benign

CLINICAL FEATURES

- Hypoglycemia, Diplopia,
- Blurred Vision, Confusion ,
- Loc, Coma,
- Trmors, Nausea,
- Anxiety, Palpitations

INVESTIGATION :

- Screening Test - Hypoglycemia And Increased Plasma Insulin after 72 hrs fasting (most sensitive)

SUPPRESSIVE TEST :

- High C- peptides after iv insulin (normally c peptides suppresses after insulin but does not occur in insulinoma)

IMAGING :

- Endoscopic U/S ,
- CT, MRI,
- Intra-Operative Exploration

TREATMENT :

- Tumor Enucleation,
- Laproscopic,
- Distal Pancreatectomy if in the body pr tail

GASTRINOMA (ZOLLINGER - ELLISON SYNDROME) :

- It includes :
  - Fulminating ulcer diathesis in stomach, duodenum or atypical sites
  - Recurrent ulceration despite adequate therapy
  - Non beta islet cell tumors of pancreas (gastinoma)
- It accounts for 20% of PET
- More common in males
- 60 % are malignant
- Most common site is gastrinoma triangle I.e head of pancreas , superior and descending portion of duodenum and relevant lymph nodes

INVESTIGATIONS

- low gastric ph < 2.5 and serum gastrin concentration above 1000 pg/ml

TREATMENT :

- medical proton pump inhibitor, octerotide, systemic ch
- Enucleation with pre pancreatic lymph nodes in pancr
- Duodenal gastrinoma < 5 mm enucleation with overlying mucosa, > 5mm excision with
- full thickness removal of pancreatic wall

MULTIPLE ENDOCRINE NEOPLASIA (MEN) :

- These are group of autosomal dominant sydrome
- Characterized by benign and malignant tumors in different endocrine glands
- These are of two types MEN 1 & MEN2

MEN 1 :

- Also known as warner syndrome
- Germ line mutation in menin gene located on chromosome 11
- Characterized by 3Ps :
  - Primary hyperparathyroidism
  - Pancreatic and duodenal endocrine tumors (gastrinoma, insulinoma, VIPoma)
  - Pituitary (Anterior) tumors : prolactinoma, non functioning adenoma, ACTH secreting tumor

SCREENING :

- Should be biochemical
- Start at age of 15 yrs , repeated every 3 years
- Tests are albumin corrected total serum Ca, intact serum PTH, serum prolactin, FBS, serum pancreatic polypeptide and gastrin, plasma chroagranin A

MEN2 :

- Germline mutation in RET- proto-oncogene gene on chromosome 10
- It is of two types MEN 2A, MEN 2B

MEN 2A :

- Also called sipple syndrome
- Characterized by : primary hyperparathyroidism, pheochromocytoma, medullary thyroid carcinoma

MEN 2B :

- It is characterized by pheochromocytoma, medullary thyroid carcinoma, marfinoid habitus, mucosal and ganglioneuromas
- Screening is genetic
- Familial members should be screen soon after birth
- Any patient having RET mutation should undergo thyroidectomy

PHEOCHROMOCYTOMA :

- Also known as adrenal paraganglioma
- It is a tumor of adrenal medulla
- It is derive from chromaffin cells which produce catecholamines
- It is known as 10 % tumor as :
  - 10 % are familial
  - 10 % are extra adrenal
  - 10 % are bilateral
  - 10 % occur in children
- It may be a part of several tumor syndromes
- MEN 2A
- Familial paraganglioma syndrome
- Von hipple lindau syndrome
- Neutofibromatosis type I

SYMPTOMS :

Hypertension	80-90%
Headache	60-90%
sweating	50-70%
palpitations	50-70%
pallor	40-45%

Weight loss	20-40%
hyperglycemia	40%
nausea	20-40%
Psychological effects	20-40%

INVESTIGATIONS :

- 24 hrs urine collection (MOST ACCURATE) : increased level of vanillylmandelic acid (VMA), metadrenaline, normetadrenaline
- CT / MRI : for localization of adrenal tumors, sympathetic chain tumors
- MIBG (meta-iodo-benzyl-guanidine) : for localization of extra adrenal tumors , tumors not detected by CT/MRI

TREATMENT :

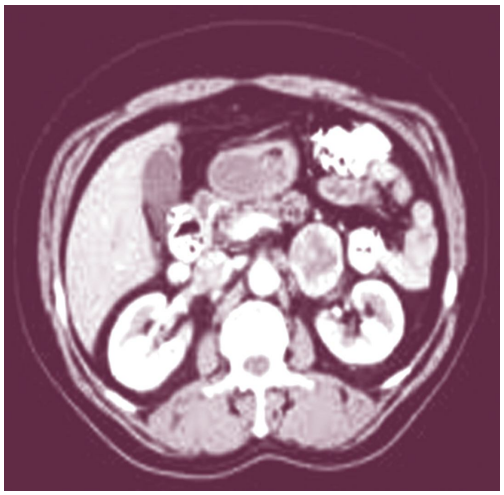
- Preoperative treatment
- Alpha blockade with phenxybenzamine until HTN is controlled
- Beta blockade with propranolol to control tachycardia or arrhythmia

SURGERY :

- Tumor < 8 mm = laproscopic adrenalectomy
- Tumor > 8 mm = open adrenalectomy

Case example

A young patient came in ER with complain of abdominal pain sweating and palpitation
O/E : BP 180/100
Ct scan shows :



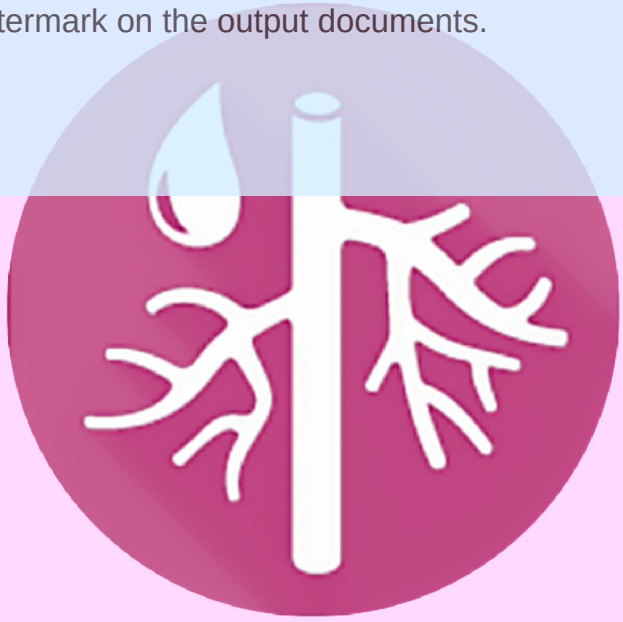
Q : what is your diagnosis ?
A : pheochromocytoma

Q : what are the investigations ?
A : 24 hrs urine collection (MOST ACCURATE) : increased level of vanillylmandelic acid (VMA), metadrenaline, normetadrenaline

Q : what is the treatment ?
A : laproscopic or open surgical resection depends upon the size

PART - 8

VASCULAR DISORDERS



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ARTERIAL DISORDERS

Chapter 29

INTRODUCTION:

- Arterial disorders mostly due to effect of atheroma on arterial supply of heart muscles and brain
- Arterial disorder represent the most common cause of morbidity and death in western societies

ARTERIAL STENOSIS OR OCCLUSSION :

CAUSES :

- Commonly caused by atheroma
- Emboli
- Trauma

SIGN AND SYMPTOMS :

- Symptoms and signs are related to organ supplied by that artery
- The severity of symptom is related to size of the vessel occluded and onset of occlusion (sudden or gradual)
- **Lower limb :** Claudication, Rest Pain, Gangrene
- **Brain :** Transient Ischemic Attacks, Stroke
- **Myocardium :** angina, myocardial infarction
- **Kidney :** Hypertension, Renal Failure
- **Intestine :** Abdominal Pain,Infarction

ARTERIAL OCCLUSION OR STENOSIS IN LEG :

INTERMITTENT CLAUDICATION :

- It is a cramp like pain felt in the muscles that is brought on by walking
- Relived by standing still
- Not present on taking the first step (unlike osteoarthritis)
- Pain is usually felt in the calf muscles because superficial femoral artery is most commonly affected (70 %)
- Thigh or buttock claudication by aotoiliac disease (30 %)
- LIERCHE'S SYNDROME : buttock claudication associated with sexual impotence due to arterial insufficiency

ULCERATION AND GANGRENE :

- ulceration occur with severe arterial insufficiency
- Present as painful erosions between the toes
- or as shallow non healing ulcer on dorsum of foot, on the shins, around melleoli
- Superadded infection often makes the gangrene wet

REST PAIN :

- Felt in the foot at rest
- Exacerbated by lying down or elevation of foot
- Pain is worst at night

COLOR, SENSATION, TEMPERATURE AND MOVEMENT :

- Cold , white, paralysed and insensate foot is acutely ischemic
- Warm with intact sensation foot is chronically ischemic
- Pallor coloration of limb while elevation
- Red/purple coloration of limb while hang down
- Normal capillary refill time is 2- 3 seconds
- Capillary refill time may be prolonged to 10 seconds in severe ischemic

ARTERIAL PULSES :

- Popliteal pulses are difficult to feel and if prominent may suggest popliteal aneurysm
- Pulsation distal to occlusion is usually absent
- Can arterial bruit indicates turbulent flow suggests a stenosis
- A continuous machinery murmur over an artery usually indicates an arteriovenous fistula

* severe ischemia is usually caused by multilevel disease I.e iliac and femoropopliteal disease

RISK FACTORS :

- Smoking
- Hypertension
- Diabetes
- Hyperlipidemia

INVESTIGATION:

- Cbc
- Blood sugars
- Lipid profile
- S. Urea
- S. Electrolytes
- ECG
- ABGs
- PFT
- Doppler ultrasound
- Ankle brachial pressure index ABPI = ratio of systolic pressure at the ankle to that in the arm
  - Normal value = 1.0
  - Rest pain <0.5
  - Imminent necrosis <0.3
- Duplex scanning
- Angiography
- MRA magnetic resonaance angiography
- CT angiography

MANAGEMENT :

NON SURGICAL :

GENERAL :

- Stop smoking
- Regular exercise (walk)
- Dietary advice
- Weight loss

MEDICINES :

- Medicines required for disease associated with arterial disorder like hypertension and diabetes
- Statin
- Antiplatelate (aspirin) 75 mg/day

TRANSLUMINAL ANGIOPLASTY AND STENTING :

- This technique is suitable for patients with claudications, rest pain or tissue necrosis
- In this technique a balloon catheter is inserted into an artery and inflating it within a narrowed or blocked area for approximately 1 minute and deflated
- Complications occur in about 5 % of cases include failure, hematoma, bleeding, thrombosis, distal embolization
- If vessel fail to stay adequately dialated a metal stent may be used to open the lumen.

SURGICAL TREATMENT :

- This is reserved in patients with severe symptoms when angioplasty has failed or not possible
- Aortoiliac occlussion = Aortrofemoral bypass , axillo fe
- femorofemoral bypass if only one iliac system affected
- Superficial femoral artery disease = femoropopliteal bypass
- Obstruction below popliteal artery = femorotibial bypass

CAROTID STENOSIS :

- Stenosis at the carotid bifurcation in neck
- It may cause transient ischemic attack TIA
- Presents with unilateral motor or sensory loss in the arm, leg or face , transient blindness or speech impairment
- Duplex scan should be done
- Tight stenosis (>70 %) = carotid endarterectomy should be offered

SUBCLAVIAN ARTERY STENOSIS :

- It will cause claudication in the arm or digital ischemia from distal embolization
- Sometimes associated with neck pathology such as cervical rib
- Treatment : angioplasty, surgical bypass
- Subclavian steal syndrome : if the first part of subclavian artery is occluded, it presents with syncope and visual disturbance with arm exercise, treated with angioplasty or surgery

MESENTERIC ARTERY OCCLUSSION :

- It will cause pain after eating and weight loss
- Symptoms appear when 2 of the 3 vessels occluded I.e coeliac axis, superior mesenteric artery, inferior mesenteric artery

TREATMENT :

- PTA, enartrectomy, bypass

ANEURYSM :

INTRODUCTION :

- It is defined as dilatation of localised segment of arterial system

CLASSIFICATION ACCORDING TO WALL :

- **True Aneurysm :** containing the three layers of arterial wall (intima, media, advantitia)
- **False Aneurysm**: a single layer of fibrous tissue as a wall of aneurysm

CLASSIFICATION ACCORDING TO MORPHOLOGY/ SHAPE :

- Fusiform
- Saccular

CLASSIFICATION ACCORDING TO ETIOLOGY :

- Atheromatous
- Mycotic (bacterial rather than fungal)
- Collagen disease
- Traumatic

ABDOMINAL AORTIC ANEURYSM (AAA) :

- It is the most common type of large vessel aneurysm
- Founded in 2 % of population
- 95 % have associated atheromatous degeneration
- Site = 95 % occur below the renal arteries
- They are mostly remain asymptomatic until rupture
- Sex predilection = males

CLINICAL FEATURES

- Back and abdominal discomfort, sudden severe backache if ruptured

INVESTIGATIONS :

- CBC
- LFT
- Serum electrolytes, urea
- Coagulation profile
- Lipid profile
- Ultrasound abdomen
- CT/ MRI
- CXR to identify associated thoracic aortic aneurysm

MANAGEMENT :

- If aneurysm is ruptured immediate resuscitation with oxygen , iv fluids, central line
- Pass urinary catheter
- Maintain blood pressure
- Arrange and cross match 6 units of blood
- Transfer to room

INDICATIONS FOR SURGERY :

- Asymptomatic aneurysm of > 55mm in anterioposterior diameter on US
- Symptomatic (painful, tender) aneurysm of any size
- Aneurysm of any size that is causing distal embolization

SURGICAL OPTIONS :

- **Open surgical repair :**
  - Under GA
  - Full length midline or supra umbilical transvers
  - It involves synthetic graft replacement with ab
- **Endovascular aneurysm repair (EVAR) :**
  - Under LA or GA
  - Access to aorta via both femoral arteries
  - Placement of a stent graft under radiological control

POST OPERATIVE COMPLICATIONS :

- Atelectasis
- Lower lobe consolidation of lung
- Myocardial ischemia/ infarction
- Colonic ischemia
- Sexual dysfuntion
- Spinal cord ischemia

GANGRENE :

- It refers to death of macroscopic portion of tissues
- The tissue turns black because of breakdown of hemoglobin and formation of iron sulphide

- Usually affect the most distal part of the limb
- It has two types dry and wet gangrene
- **Dry gangrene :** When tissue are desicated by gradual slowing of blood stream, results from atheromatous occlusion of arteries
- **Wet gangrene :** Occurs when superadded infection and putrification present

TREATMENT :

- It depends upon blood supply proximal to gangrene
- The affected part must be kept dry as much as possible
- The affected part must not be heated
- Protection of local pressure areas like heel etc
- Proper analgesia and antibiotics
- Intravenous antibiotics and surgical debridement if gangrene is wet
- Amputation of affected part if blood supply is poor

DIABETIC GANGRENE :

- Ischemia secondary to atheroma
- Peripheral neuropathy
- immunosuppression

- Treatment depends upon degree of arterial involvement
- Gangrene must be treated by drainage of pus, debridement of dead tissues, local amputation of necrotic digits and antibiotic

BEDSORES :

- It is generally caused by local pressure
- Risk factors are : pressure, injury, ischemia, malnutrition, moisture

TREATMENT :

- Avoidance of pressure over bony prominence by regular turning, water bed, foam blocks
- Skilled nursing
- Appropriate dressing of wound
- Debridement if necessary
- Vacuum dressing and rotation flaps with the help of plastic surgeon

FROSTBITE :

- It is caused by exposure to cold
- Cold injuries damages the wall of blood vessel which causes swelling and leakage of fluid together with severe pain
- Pain is followed by blisters and then gangrene

TREATMENT :

- Gradual re warming
- Analgesics
- Delayed conservative amputation after demarcation of devitalised tissue

ARTERIOVENOUS FISTULA (AVF) :

- Communication between an artery and a vein

CAUSES :

- Congenital or trauma or for treatment i.e hemodialysis
- It has both structural and physiological effect
- **Structural effect :**
  - Veins become dialated, torturous and thick walled
- **Physiological effect :**
  - it can cause high cardiac output
- If the lesion is superficial it give pulsatile swelling
- On palpation a thrill is detected
- On auscultation a machinery murmur is detected

DIAGNOSIS :

- Duplex U/S, Angiography

TREATMENT :

- Endovascular or surgical surgery

THROMBOANGITIS BLITERANS (BURGER'S DISEASE) :

- Vasculitis of small or medium sized arteries
- Thrombophelbitis of superficial and deep veins
- Raynaud syndrom
- Male dominance
- Assopciation with smoking
- Usually under age 30 yrs

TREATMENT :

- Smokinhg sesation
- Aspirin
- Prostacyclin infusion
- Amputations

RAUNAUD'S DISEASE :

- Idiopathic
- Young woman
- Hands are affected more than feet
- It is a medium sized vessel disease affecting digital vessels in fingers and toes
- Characteristic change in fingers from white- blue- red

TREATMENT :

- Avoid cold exposure
- Nefidipine (ca channel blockers)
- Sympathectomy

RAYNAUD'S SYNDROME :

- It is a peripheral arterial manifestation of a collagen disease
- Associated with systemic lupus erythmatous, rheumatoid arthritis
- Clinical features are similar to that of raynauds disease but are more aggressive and severe

TREATMENT :

- Treat the underlying cause
- Calcium channel blockers

- In ilial artery obstruction : unilateral claudication in thigh and calf and sometimes in buttocks, bruit over ilial region, unilateral absence of femoral and distal pulses
- Most common source of emboli in arterial occlusion is left atrium in cardiac arrythmias
- Urine output should be measured at least every 2 hours
- Indication of operation in aneurysm is asymptomatic > 55mm in anterioposterior diameter measured by ultrasound

Case example :

A 35 years old male came in ER with complain of severe abdominal pain radiating to back

Q : what is the diagnosis ?
A : abdominal aortic aneurysm

Q : what are the possible causes ?
A : traumatic, atherosclerotic*, mycotic

Q : what is the treatment ?
A :

- If aneurysm is ruptured immediate resuscitation with oxygen , iv fluids, central line
- Pass urinary catheter
- Maintain blood pressure
- Arrange and cross match 6 units of blood

Surgical options :

- Open surgical repair :
- Endovascular aneurysm repair (EVAR)

Q : what are the indications for surgery ?
A :

- Asymptomatic aneurysm of > 55mm in anterioposterior diameter on US
- Symptomatic (painful, tender) aneurysm of any size
- Aneurysm of any size that is causing distal embolization

VENOUS DISORDERS

Chapter 30

ANATOMY :

SUPERFICIAL VEINS OF LOWER LIMB :

- Superficial trunk in the lower limb are greater (long) and lesser (short) saphenous vein

GRATER SAPHENOUS VEIN (GSV) :

- GSV = dorsal vein of BIG toe + dorsal venous arch of foot
- It pases anterior to medial malleolus and posterior to medial condyle of femur
- It courses along the medial aspect of the thigh and finally empty into the femoral vein at fixed point in the groin 2.5 cm below and lateral to pubic tubercle.

LESSER SAPHENOUS VEIN (LSV) :

- LSV = dorsal vein of LITTLE toe + dorsal venous arch of foot
- It passes posterior to lateral malleolus
- It course along lateral border of calcaneal tendon, ascend between the head of gastrocnemius muscle
- It empties into the popliteal vein into the popliteal fossa

DEEP VEINS OF LOWER LIMB :

- The deep veins of the lower limb include three pair of [illegible] accompany three crural veins
- These six veins intercommunicate and join in the popli[illegible]ein
- The popliteal vein passes up through the adductor hiatus to enter the subsartorial canal as the superficial femoral vein
- The femoral vein receive deep (profunda) femoral vein in femoral triangle
- To become the common femoral vein
- This femoral vein passes behind the inguinal ligament and changes its name to external iliac vein
- The internal iliac vein joins the external iliac vein in pelvis and form the common iliac vein
- The left and right common iliac vein join and form inferior vena cava

PERFORATING VEINS :

- These are the veins that join the superficial to the deep vein
- These allow blood flow from superficial to deep venous system
- It allow muscle contraction to propel the blood towards heart against gravity
- Lower limb perforators are :
  1. **Hntarian perforator =** proximal thigh perforator
  2. **Dodd perforator =** mid thigh perforator
  3. **Boyd perforator =** gastrocenemius perforator
  4. **Cockett perforator =** lower leg perforator
  5. **May or kuster perforator =** ankle perforator

VARICOSE VEINS :

- These are dilated , tortuous, subcutaneous vein > 3mm in diameter

RISK FACTORS :

- Gender (woman > man)
- Ageing
- Increase BMI
- Family history
- Occupation prolong standing
- Smoking

CLASSIFICATION :

- CEAP (clinical- etiology - anatomy - pathophysiology)

CLINICAL :

- **C0 =** no signs of venous disease
- **C1 =** telangiectasis or reticular veins
- **C2 =** varicose vein
- **C3 =** edema
- **C4 a =** pigmentation or eczema
- **C4 b =** lipodermatoscelerosis or atrophic blanche
- **C5 =** healed venous ulcer
- **C6 =** active venous ulcer

*each class is further characterised whether the patient is symptomatic (S) or asymptomatic (A)

ETIOLOGICAL CLASSIFICATION :

- **Ec =** congenital
- **Ep =** primary
- **Es =** secondary (post- thrombotic)
- **En =** no venous cause identified

ANATOMICAL CLASSIFICATION :

- As = superficial veins
- Ap = perforator veins
- Ad = deep veins
- An = no venous location identified

PATHOPHYSIOLOGICAL CLASSIFICATION :

- pr = reflux
- Po = obstruction
- Pr, o = reflux and obstruction
- Pn = no venous pathophysiology identified

CAUSES :

- Primary / idiopathic
- Secondary :
  - Pelvic mass
  - Pregnancy
  - DVT
  - After major surgery (pelvic surgery)
  - Multiple atriovenous fistula

SYMPTOMS :

- Aching or heaviness usually at the end of the day, prolong standing
- Ankle swelling, Itching, bleeding
- Superficial thrombophelbitis
- Lipodermatosclerosis
- Varicose ulceration

SIGNS :

- Tortuous dilated subcutaneous veins
- Medial thigh and calf varicosities suggest long saphenous incompetence
- Posteriolateral calf varicosities suggest short saphenous incompetence
- Anteriolateral thigh and calf varicosities suggest isolated incompetence of proximal perforator entering the superficial vein

INVESTIGATION :

TOURNIQUET TEST :

- These are now largely been abandoned
- It is used to assess the competence of saphenofemoral , saphenopopliteal and mid thigh perforators

COUGH IMPULSE TEST :

- First limb is elevated to empty the varicose veins
- Then limb is put up on the bed and patient is asked to cough forcibly
- An expansile impulse / thrill is felt in long saphenous vein
- Saphena varix is a large varicosity in groin usually as a painless lump

DUPLEX ULTRASOUND :

- This is the investigation of choice
- Confirm the number, location, and diameter of incompetent vein
- Determine the extent of reflux in saphenous vein
- Useful when mismatch between examination and hand held Doppler

HAND HELD DOPPLER :

- A unihasic signal show flow in one direction i.e competent valves
- A biphasic signal indicate forward and reverse flow i.e incompetent valves

INTRODUCTION:

- Torso is generally regarded as the area between neck and groin, made up of thorax and abdomen
- 42 % of all deaths are result of brain injury
- 39 % of all trauma deaths are caused by major hemorrhage
- ATLS is the cornerstone of advanced resuscitation

VARICOGRAPHY :

- It involves injection of a contrast directly into the superficial varices
- It is useful in patients with recurrent varicose veins and difficult anatomy

VENOGRAPHY :

- A contrast is injected in deep veins
- Useful when lower limb varicosities appear to arise from pelvic vein incompetence

TREATMENT :

- Asymptomatic patients may be observed
- If C2 disease with bleeding or C3-C6 disease referral to vascular surgeon is indicated

COMPRESSION THERAPY :

- Class I stocking = pressure 14- 17 mmHg
- Class II stocking = pressure 18- 24 mmHg
- Class III stocking = pressure 25- 35 mmHg
- Class IV stocking are mostly used

INJECTION SCLEROTHERAPY :

- It involves injecting a detergent directly into the super
- Sodium tetradecyl sulphate is most commonly used ag
- The detergent destroys the lipid membrane of endothelial cells leading to thrombosis, fibrosis and obliteration
- It is useful in dealing with minor varicosities and recurrences

SURGERY :

Principle of surgery is to ligate the point of junctional incompetence and to remove the reflexing trunk and dilated tributaries

LIGATION OF SAPHENOFEMORAL JUNCTION AND STRIPPING OF LONG SAPHENOUS VEIN :

- First incision is an oblique groin incision made at the level of and lateral to pubic tubercle
- Identification of long saphenous vein and dissection at SFJ
- Clamp and cut the LSV and stitch both ends this is known as ligation
- Stripping done by passing the wire through the vein, the wire along the vein is pulled out through the incision
  Small varicosities are removed via second small incision along langer's line

LIGATION OF SAPHENOPOPLITEAL JUNCTION AND LESSER SAPHENOUS STRIPPING :

- Pre operative doppler is highly recommended to marked the SPJ
- Two incisions are made a transverse incision over pre marked SPJ, second at the ankle

- Identification and tracing of vein to the SPJ before it is divided
- A wire is placed upward from the ankle to remove the lesser saphenous vein
- Small vaicosities are removed via tiny stab incision

COMPLICATIONS OF SURGERY :

- Recurrence (most common)
- Wound infection
- Nerve injury
- Numbness and tingling
- DVT
- Hemorrhage

LEG ULCERATION :

CAUSES :

- Venous disease (most common)
- Arterial ischemic ulceration
- Traumatic ulcer
- Neoplastic ulcer (SSC , BCC)
- Rheumatoid ulcer
- Infections
- Neuropathic ulcer (DM)

PATHOPHYSIOLOGY :

- Ambulatory venous hypertension
- High venous pressure
- Static blood within the superficial vein led to hypoxia a
- Reactive oxygen species in ulcers generate free radical
- Increase proteolytic enzymes and decrease growth factors

CLINICAL FEATURES

- Appearance of ulcer : Sloping edge floor contains granulation tissue
- Most common site medial side of calf
- Lesser saphenous incompetence develop ulcers on the lateral side of calf
- Lipodermatosclerosis is there (thickening, pigmentation, inflammation and induration)

INVESTIGATION :

- CBC
- CRP
- ESR
- BSR
- Sickle cell test
- Antibody screening for rheumatoid arthritis
- Dupplex scan

TREATMENT :

- Compression bandage
- Antibiotics
- Biopsy if suspecting malignancy (marjolin type ulcers)
- Biological dressings : fetal keratinocytes and collagen mash, pinch graft and ulcer
- excision with mash grafting

SUPERFICIAL THROMBOPHLEBITIS :

- It is superficial thrombosis of veins

CAUSES :

- Venepuncture
- External trauma
- Hyperosmolar solutions and drugs infusions
- Coagulation disorders like thrombocytosis, polycythemia, sickle cell disease
- Thromboplebitis migrans

MANAGEMENT :

- Elevation of leg
- Rest
- NSAIDS
- Anticoagulation if associated with DVT

DEEP VENOUS THROMBOSIS (DVT) :

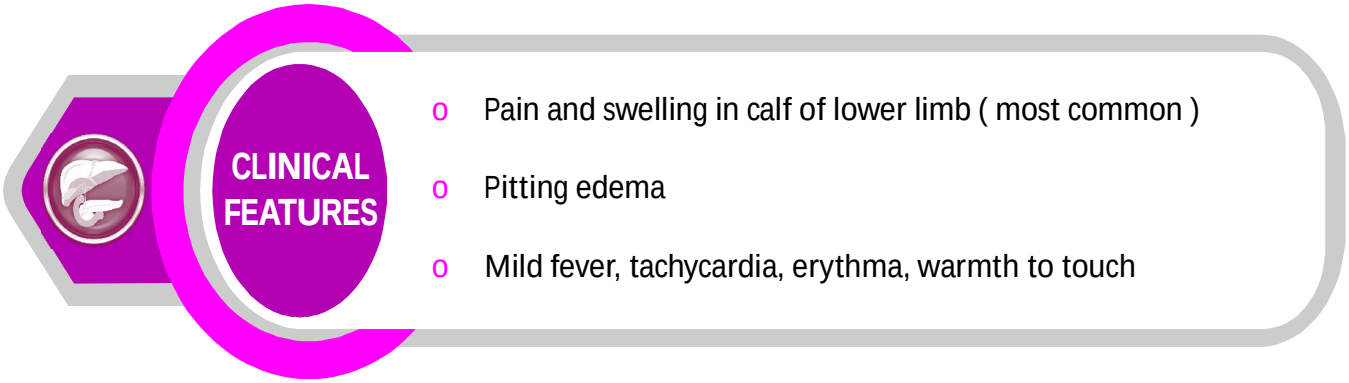
- It is the formation of semi solid coagulum within the venous system

ATIEOLOGY :

- Virchow triade
- Endothelial damage (change in the vessel wall)
- Stasis i.e diminish blood flow through the veins
- Thrombophilia (coagulability of blood)

RISK FACTORS :

- Obesity
- Age
- Immobility
- Varicose vein
- Pregnancy
- Purpureum
- High dose estrogen therapy
- Previous dvp or pulmonary embolism
- Trauma or surgery
- Malignancy
- Antiphospholipid antibody or lupus anticoagulant
- Deficiency of antithrombin iii, protein c, s, factor v



- Pain and swelling in calf of lower limb (most common)
- Pitting edema
- Mild fever, tachycardia, erythma, warmth to touch

INVESTIGATION :

- Duplex ultrasound
- Serum D dimers (raised levels are suggestive of DVT)
- For pulmonary embolism CT pulmonary angiography (dold standard) or ventilation perfusion acnning

DIFFERENTIAL DIAGNOSIS :

- Ruptured bekar cyst
- Calf muscle hemmatoma
- Ruptured plantaris muscle
- Thrombosed popliteal aneurysm
- Arterial ischemia

MANAGEMENT :

- Elastic compression stocking
- External pneumatic compression
- Vena cava filter
- Low molecular weight heparin (subcutaneous)
- Warfarin (10 mg Day1, 10 mg D2 , 5 mg D3 prothrombin time taken on day 2 and day 3)
- TPA (tissue plasminogen activator) for thrombolysis in patients with an iliac vein thrombosis
- Venous thrombectomy for severe thrombosis with venous gangrene

COMPLICATIONS :

- Pulmonary embolism
- Phlegmasia cerulia dolens (blue discoloration of leg , arterial insufficiency, neurologic deficit)
- Phlegmasia alba dolens (pallor swelled leg , no arterial insufficiency, no neurologic deficit)

KEY POINTS

- Duplex ultrasound is investigation of choice in varicose veins
- In DVT pain and swelling is most common in calf of one lower limb
- CT pulmonary angiography is gold standard in DVT

Case example :
An old aged obese female came in OPD with c/o lower limb pain mostly at the end of the day
O/E : bulging veins of rt lower limb

Q : what is your diagnosis ?
A : varicose veins

Q : what are the investigations ?
A : doppler u/s, duplex u/s, varicography, venography

Q : what is the treatment ?
A : life style modifications, compression stockings, injection sclero
(ligation and stripping)

LYMPHATIC DISORDERS

Chapter 31

LYMPHOEDEMA :

INTRODUCTION:

- It is defined as abnormal limb swelling caused by accumulation of increased amount of high protein interstitial fluid secondary to defective lymphatic drainage in the presence of normal net capillary pressure

TYPES :

- Primary lymphoedeme : unknown cause
- Secondary lymphoedema : in which there is an underlying cause

RISK FACTORS :

UPPER LIMB / TRUNK :

- Surgery with axillary lymph node dissection
- Axillary radiotherapy
- Drain, seroma formation
- Cording (axillary web syndrome)
- Advance cancer
- Obesity
- Hypertension
- Congenital predisposition
- Air travel
- Atriovenus fistula

LOWER LIMB :

- Surgery with inguinal lymph node dissection
- Pelvic radiotherapy
- Recurrent soft tissue infection at the same site
- Advance cancer
- Varicose vein stripping and vein harvesting
- Poor nutrition
- Thromboplebitis
- Orthopaedic surgery
- Prolong limb depenency and immobilization
- Air travel
- Chronic disorders

SYMPTOMS :

- Swelling
- Constant dull ache, cramps
- Burning and bursting sensation

- Sensitivity to heat
- General tiredness
- Pin and needle sensation
- Skin problems eg flakiness, weeping, excoriation, breakdown
- Backache and joint pain
- Athlete's foot
- Acute infective episodes

CLASSIFICATION (BRUNNER) :

- Subclinical : no clinical appearance but histological abnormalities present
- Class I : pitting edema, completely disappear on elevation and bed rest
- Class II : non pitting edema, doesn't reduce on elevation , positive stemmr's sign
- Class III : edema associated with irreversible skin changes I.e fibrosis, papillae

ASSOCIATED MALIGNANCIES :

- Lymphangiosarcoma (stewart treves syndrome)
- Kaposis sarcoma
- SCC
- Liposarcoma
- Malignant melanoma
- Malignant fibrous hitocytoma
- BCC
- Lymphoma

PRIMARY LYMPHOEDEMA :

- In this type of lymphoedema the cause is unknown
- It has been proposed that all cases of primary lymphoe
  abnormality of lymphatic system termed as congenital lymphatic dysplasia

CLASSIFICATION :

Classify on the basis of

- Familial / hereditary
- Age of onset
- Lymphangiographic findings

FAMILIAL TYPE :

TYPE 1 :

- It is known as nonne-milroy
- Present in 1;6000 live birth
- Autosomal dominant pattern
- Abnormality in gene incoding for vascular endothelial growth factor VEGF on chromosome 5
- It is characterized by brawny lymphodema of both legs sometimes genitalia and feet which develop from birth or before puberty

TYPE 2 :

- It is known as letessier-meige
- Autosomal dominant in some but not in all cases
- Lymphedema generally develops between puberty and middle age (50 yrs)
- It usually affect one or both legs but may involves the arms

AGE OF ONSET :

LYMPHOEDEMA CONGENITA :

- Onset at or within 2 years of birth
- More common in males
- Mostly bilateral and involve the whole leg

LYMPHOEDEMA PREACOX :

- Onset from 2- 35 years
- 3 times common in females
- 3 times likely to be unilateral
- Only extend to knee

LYMPHOEDEMA TARDA :

- Onset after the age of 35 years
- Associated with obesity
- Unknown etiology
- Lymphoedema developing for the first time after 50 years should prompt a through search for underlying malignancy
- In patients with malignancy lymphoedema usually present in thigh rather than distally

LYMPHANGIOGRAPHIC CLASSIFICATION :

CONGENITAL HYPERPLASI (10%) :

Age of onset	: congenital
Sex	: male > female
Extent	: whole leg
Laterality	: unilateral = bilateral
Family history	: often positive
Progression	: progressive
Response to compression therapy	: variable
Increase no of lymph nodes , functionally defective	

DISTAL OBLITERATION (80 %) :

Age of onset	: puberty (preacox)
Sex	: female > male
Extent	: ankle , calf
Laterality	: often bilateral
Family history	: often positive
Progression	: slow
Response to compression therapy	: good
Absent or reduce distal superficial lymphatics, also termed as aplasia or hypoplasia	

PROXIMAL OBLITERATION (10 %) :

- Age of onset : any age
- Sex : male > female
- Extent : whole leg, thigh only
- Laterality : unilateral usually
- Family history : no
- Progression : rapid
- Response to compression therapy : poor
- There is obstructrion at the level of aortoiliac or inguinal nodes

SECONDARY LYMPHOEDEMA :

- In this type there is clear underlying cause
- It is the most common type

CAUSES :

- Filariasis (most common cause)
- Podoconiasis
- Surgery (breast surgeryy, varicose vein surgery)
- Infections (cellulitis, lymphadenitis, TB, filariasis)
- Inflammation (RA, dermatitis, psoriasis, sarcoidosis, dermatosis)
- Endocrinal disorders (myxoedema)
- Immobility and dependency
- Factious self harm

INVESTIGATIONS :

- CBC
- LFT
- UCE
- FBS
- Throid profile
- Urine dipstick
- CXR
- Lymphangiography (gold standard)
- Isotope lymphoscintigraphy
- CT SCAN
- MRI
- Ultrasound

MANAGEMENT :

RELIEF OF PAIN :

- Analgesics (opoid or non opioid)
- Anti depressants
- Corticosteroids
- Muscle relaxants
- Physiotherapy

- Nerve block
- Adjuvant anticancer therapy (chemotherapy , radiotherapy)

CONTROL OF SWELLING :

- Bed rest
- Elevation
- Bandaging
- Compression stockings
- Massage and exercise
- Mannual lymphatic drainage MLD
- Multilayer lymphoedema bandaging MLB

SKIN CARE :

- Wash the limb daily
- Use bath oil (balneum)
- Dry the limb with a hair drier rather than towel
- Never walk barefoot
- Use insect repellant

SURGICAL TREATMENT :

SISTRUNK OPERATION :

- In this procedure a wedge of skin and subcutaneous tissue is excised
- Wound closed primarily
- Commonly carried out to reduce the girth of thigh

HOMANS OPERATION :

- This is the most satisfactory operation for the calf
- It involves skin flap elevation, excision of subcutaneous tissue then primary closure
- Main complication is skin flap necrosis
- There must be at least 6 months gap between operation of medial and lateral sides of limb

THOMPSON OPERATION :

- It is modified homansprocedure
- Aim of this operation is to create a new lymphatic between superficial and deep system
- In this procedure skin flap is denuded, sutured to deep fascia and burried between second skin flap
- It is less popular due to pilonidal sinus formation

CHARLES OPERATION :

- It involves excision of all the skin and subcutaneous tissue down to the deep fascia with coverage using split skin graft
- Poor cosmetic outcomes

KEY POINTS

- Lymphadema associated with malignancy commence proximally in the thigh rather than distally
- If lymphadema develop for the first time after 50 yrs should prompt a through search for malignancy

Case example :
An old aged obese hypertensive male came in OPD with c/o lower limb swelling and dull aching pain
O/E lt lower limb swelling with skin changing

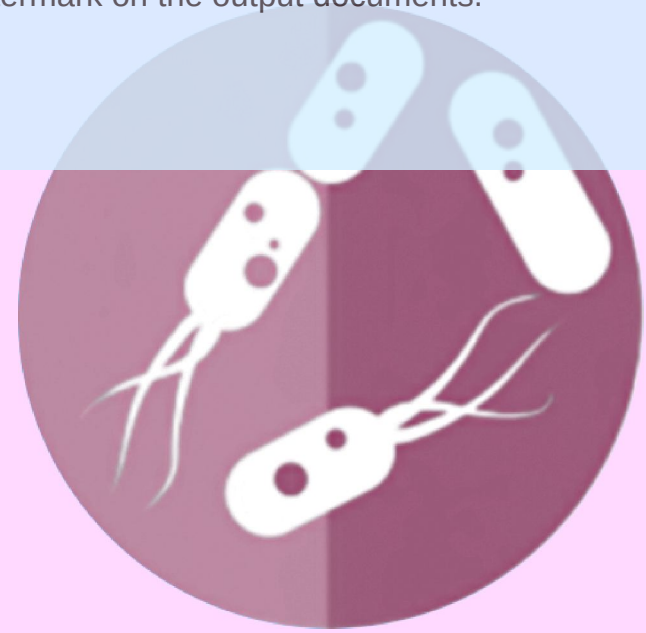
Q : what is your diagnosis ?
A : lymphadema

Q : what are the investigation ?
A : lymphangiography, lymphoscintigraphy, ct , MRI

Q : what is the treatment ?
A : exercise, banding, skin care, massage, compression garments, sistrunk operation

PART - 9

ADOMEN



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ABDOMINAL WALL AND HERNIA

Chapter 32

INTRODUCTION:

- Hernia refers to protrusion of a viscus or part of a viscus through an abnormal opening in the walls of its containing cavity

COMPONENTS OF A HERNIA :

- THE SAC consist of mouth, neck, body and fundus, it is a diverticulum of peritoneum
- COVERING is derived from layers of abdominal wall through which sac passes
- CONTENTS can be omentum (omentocoele), intestine (enterocele), a portion of intestine (ritcher's hernia), a meckle's diverticulum (littre's hernia)

CAUSES OF HERNIA :

- Basic design weakness
- Weakness due to structure entering and leaving the abdomen
- Developmental failures
- Genetic weakness of collagen
- Sharp and blunt trauma
- Weakness due to aging and pregnancy
- Primary neurological and muscle weakness
- Excessive intra abdominal pressure

TYPES OF HERNIA :

- **Occult :** may cause severe pain but not detectable clin
- **Reducible :** swelling appears and disappears, positive cough impulse
- **Irreducible :** can not be replaced in abdomen, high risk of complications
- **Strangulated :** sudden onset of colicky abdominal pain and tenderness over hernia site, vascular compromise, require urgent surgery
- **Obstructed :** gradual onset of colicky pain and tenderness over hernia site, with good blood supply
- **Infracted :** When content have become gangrenous, high mortality
- **Incarcerated :** Irreducible hernia but bowel is not obstructed or strangulated, contents are fixed in sac because of their size

EXAMINATION :

- Reducibility
- Cough impulse
- Overlying skin color changes
- Multiple defects , contra lateral side
- Previous repair signs
- Scrotal content of groin hernia
- Any other associated pathology
- A swelling with cough impulse is not necessarily a hernia
- A swelliny with no cough impulse may still be a hernia

INVESTIGATION :

- Plain xray
- Ultrasound
- Ct scan for incisional hrnia mostly
- Mri scan
- Contrast radiology
- Laproscopy to identify occult contra lateral hernia

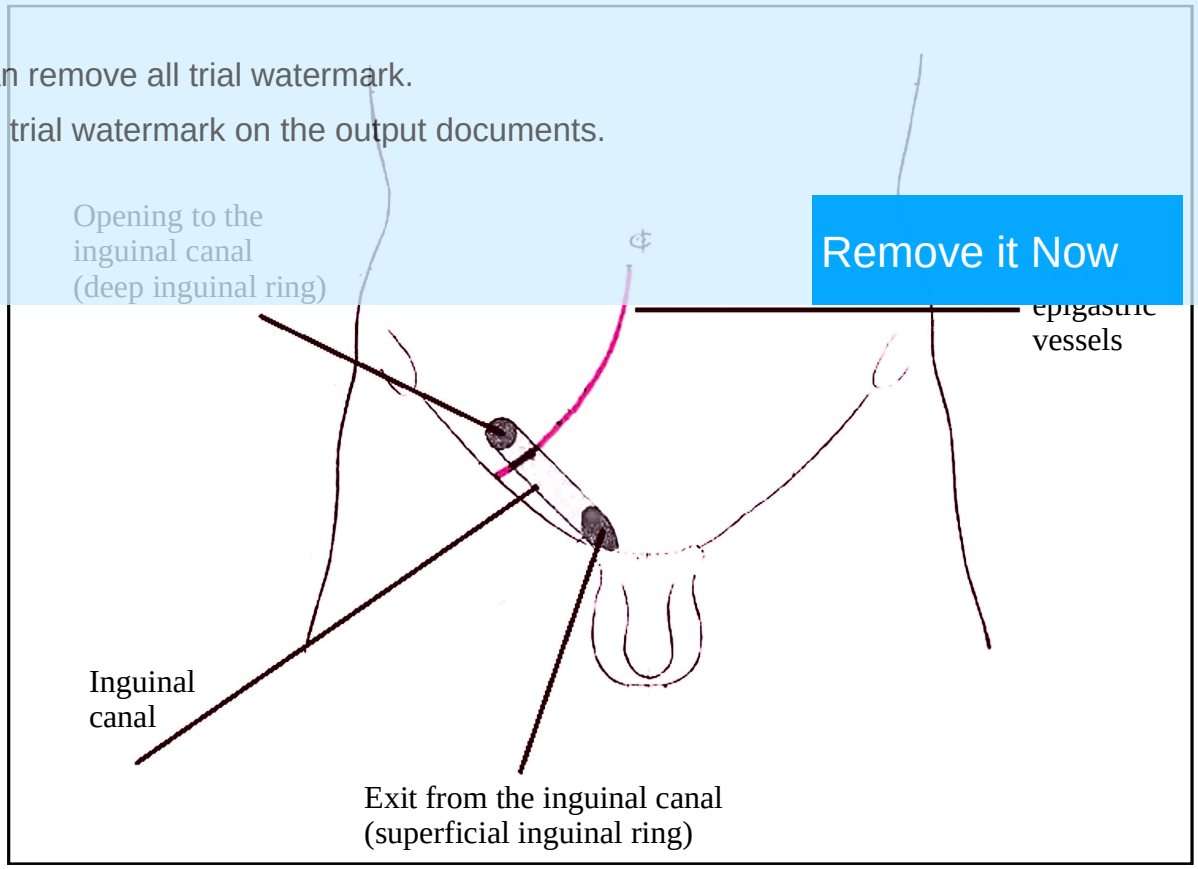
MANAGEMENT :

- Not all hernia require surgical repair
- Any patient who presents with acute pain in a hernia perticularly irreducible should be offered surgery
- Increasing size is also an indication for surgery
- Femoral hernia should always be repaired

INGUINAL HERNIA :

ANATOMY OF INGUINAL REGION :

INGUINAL RINGS :



SUPERFICIAL INGUINAL RING :

- It is a v shaped defect in the aponeurosis of external oblique muscles
- It lies 1.25 cm above the pubic tubercle

DEEP INGUINAL RING :

- it is a u shaped defect in transversalis fascia
- It lies mid way between the anterior superior iliac spine and pubic tubercle approximately 2-3 cm above the femoral artery pulse in the groin I.e at mid point of inguinal ligament

INGUINAL CANAL :

BOUNDRIES :

- **Roof / superior :** conjoint tendon
- **Posterior wall :** transversalis fascia
- **Anterior wall :** external oblique aponeurosis
- **Floor / inferior :** inguinal ligament
- It is directed downward and medially from deep to superficial inguinal ring
- It is about 3.75 cm in length
- Inferior epigastric vessel lie posteriorly and medially to deep inguinal ring
- It transmit spermatic cord in males and round ligament of uterus in females
- Iliohypogastric, ilioinguinal and genital branch of genito femoral nerves passes through the canal

CONTENT OF SPERMATIC CORD :

- **3 nerves :** ilioinguinal and genital branch of genito femoral and autonomic supply to testis
- **3 vessels :** testicular artery, cremestric artery, artery to vas
- **3 structures :** vas , papmiform plexus , testicular lymph
- **3 coverings :** external spermatic fascia, cremestric fasc

INDIRECT INGUINAL HERNIA :

- It is lateral to inferior epigastric vessels
- It is oblique as hernia passes obliquely from lateral to medial through abdominal muscle layers
- Most common hernia
- In children it is always indirect
- Males > females
- More common in right side
- Bilateral in 12 % cases
- It has 3 different types :
  - **Bubonocele :** Hernia limited to inguinal canal, does not come out of superficial inguinal ring
  - **Funicular :** Comes out to superficial inguinal ring but fails to reasch the bottom of scrotum
  - **Complete :** Hernia reaches the bottom of scrotum, testis lie within the lower part of hernia

DIFFERENTIAL DIAGNOSIS :

MALES :

- Vaginal hydrocele
- Encysted hydrocele of cord
- Spermatocele
- Femoral hernia

FEMALES :

- Femoral hernia
- Hydrocele of canal of nuck

TREATMENT :

- Surgery is the treatment of choice
- Herniotomy : involves dissection the sac, reduce the contents, remove excess sac and close it, commonly done in children
- Herniorraphy involves repair of posterior wall of inguinal canal
- Herniotomy + herniorraphy is treatment of choice in adults
- Herniorraphy is reinforcement of inguinal canal, repair of transversalis fascia and internal ring

LAPROSCOPIC HERNIORRHAPY :

- Indications are primary bilateral inguinal hernia, recurrent inguinal hernia, femoral hernia
- There are two types :
  - Trans abdominal pre peritoneal repair TAPP: It involves attachement of mash to floor of inguinal canal from pre-peritoneal space
  - Totally extra peritoneal repair TEP : it entails inflation of balloon in pre peritoneal plane to expose inguinal floor
- Cover the defect by a prosthetic mesh laproscopically

HERNIORRHAPHY :

- There are two common methods shouldice and lichtenstein tension free method
- Lichtnstein hernioplasty :
- It involves placement of mash to posterior wall and overlapping it in all directions
- Inferior margins of mash sutured to inguinal ligament
- Medial and superior margins sutured to internal oblique muscle
- Medial end should reach the pubic tubercle
- Suture lateral tail end to one another around the cord ensuring the gap left in mesh for cord is enough to admit the little finger tip

SHOULDICE :

- Deep ring ansd fascia are incised
- Lower fascia transversalis flap is sutured to under surfaace of conjoint tendon
- Double breasting is done I.e Upper fascia transversalis flap is overlapped and sutured to anterior surface of lower flap of fascia transversalis
- Make a new deep ring by suturing laterally
- Reinforcement of repair by medial suturing of conjoint tendon to aponeurosis of external oblique

- It arises medial to inferior epigastric vessels
- It protrudes through the posterior wall of inguinal canal
- It is always acquired
- Common in older men
- Straight course
- Strangulation is less common
- It has two different types
  - **Funicular :** Narrow necked hernia with prevasicle fat and portion of bladder, defect is in the medial part of conjoint tendon
  - **Dual / saddle bag / pantaloon :** When direct and indirect sac straddle the inferioe epigastric artery one is medial other is lateral
- Principle of repair is same as indirect hernia

STRANGULATED INGUINAL HERNIA :

- Constricting agents are neck of sac (most common), external inguinal ring, adhesions within sac
- More common with indirect inguinal hernia
- Contents are small intestine (mostly) , momentum or both

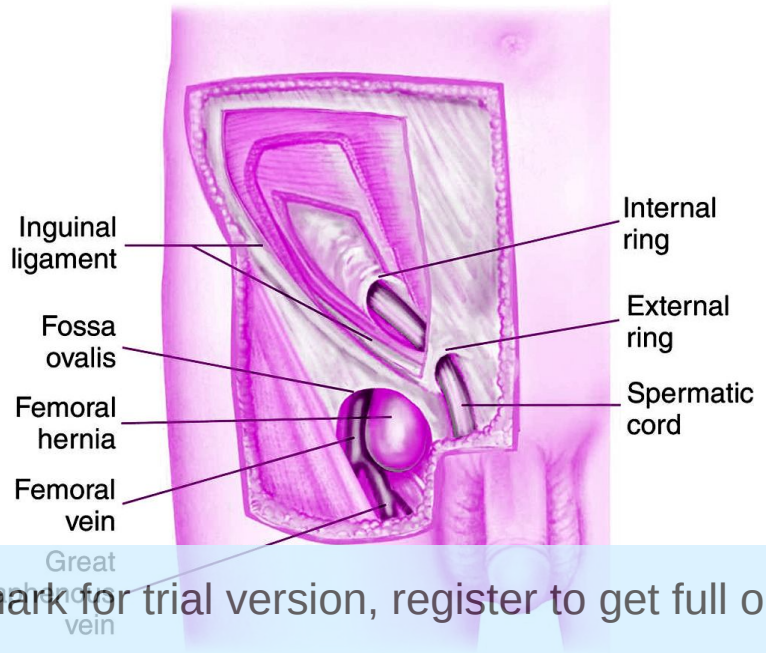
TREATMENT :

- Resuscitation
- IV fluids
- NG tube and stomach emptying
- Urine catheterization
- IV antibiotics
- Emergency herniotomy

SLIDING HERNIA / HERNIA-EN-GLISSADE :

- In this hernia the posterior wall of sac is formed by viscera
- On LEFT side it is formed by peritoneum, sigmoid colon , mesentery
- On RIGHT side it is formed by peritoneum and cecum
- Exclusively occur in men
- Common on LEFT side
- After age of 40 yrs
- Surgery is the treatment of choice as impossible to control with truss

FEMORAL HERNIA :



- It refers to protrusion of peritoneal tissue, peritoneum and other contents through femoral canal
- Femoral canal is 1.25 cm long and 1.25 cm wide
- Femoral canal is medial most compartment of femoral sheath
- Femoral ring is upper opening of femoral canal
- Contents of femoral canal : fatty connective tissue, efferent lymph vessels from deep inguinal nodes, deep inguinal node of cloquet
- Boundaries of femoral ring

Anterior : Inguinal Ligament
Posterior : Pubic Bone, Coopers Ligament, Fascia over pectineus muscle
Medially : Lacunar Ligament
Laterally : Thin Septum

- Mostly after puberty, 20% are bilateral
- Affect RIGHT side twice common then left
- Female > male
- Cannot be controlled by truss
- Higher incidence of strangulation due to narrow neck
- Should be operated as soon as possible

DIFFERENTIAL DIAGNOSIS :

- Inguinal hernia
- Saphena varix
- Enlarge femoral lymph nodes
- Lipoma
- Femoral aneurysm
- Psoas abscess

DIAGNOSIS :

- Hernia appears below and lateral to pubic tubercle
- Lies in upper leg
- 1-2 cm and may be mistaken for lymph nodes
- A direct inguinal hernia leaves abdominal cavity just above inguinal ligament and femoral
- hernia just below inguinal ligament

TREATMENT :

- Surgery is the treatment of choice
- Surgical options are low approach , inguinal approach and high approach

LOW (LOCKWOOD) APPROACH :

- It is the simplest operation
- Only perform when there is no risk of bowel resection
- A transverse incision is made over the hernia
- Open the sac, reduced the contents
- The sac is also reduced and non absorbable suture placed between inguinal ligament above and fascia overlying the bone below
- A mesh can be placed for further reinforcement

INGUINAL (LOTHEISSEN) APPROACH :

- Oblique incision 2.5 cm above medial 2/3 of inguinal ligament
- dissection is same as for the inguinal hernia repair
- Transversalis fascia opened , spermatic cord or round ligament is mobilized
- Reduced the hernia
- Neck of hernia is closed with sutures or mesh
- Reconstitute the transversalis fascia

HIGH (McEVEDY) APPROACH :

- It is ideal for emergency situations
- Most useful approach for strangulated hernia
- A vertical incision is made in lower abdomen
- Expose the femoral canal and sac
- Open the sac inspect the bowel carefully
- Resect the non viable bowel, end to end anastomosis
- In doubtful cases wrap the bowel in warm pack for 10 minutes and re inspect
- Femoral defect is closed with sutures or mesh

VENTRAL HERNIA :

- Hernia of the anterior abdominal wall is termed as ventral hernia
- Umblical - para umblical hernia
- Epigastric hernia
- Incisional hernia
- Parastomal hernia
- Spigelian hernia
- Lumber (dorsolateral but included in ventral hernia)
- Traumatic hernia

UMBILICAL - PARAUMBILICAL HERNIA :

- It refers to protrusion of peritoneal sac and content through Linea alba
- Predisposing factors : obesity, pregnancy , liver disease with cirrhosis
- Five times Common in woman
- Presents with cresent shaped appearance of umbilicus and gastrointestinal symptoms
- Surgery advised in all cases
- Small defects < 1 cm closed with simple figure of eight suture
- Defect < 2cm umbilical herniorrhaphy
- Defect > 2 cm required mesh repair

MAYO'S REPAIR :

- A transverse incision is made and hernia sac is identified
- Open the sac near neck
- Inspect and return the protruding bowel
- Excise the omentum
- Remove sac and overlying skin
- Double breasting done
- Close the skin in layers

MESH REPAIR :

- For defects larger than 2 cm
- A transverse incision is made and hernia sac is identified
- Open the sac near neck
- Inspect and return the protruding bowel
- Excise the omentum
- Close the defect with interrupted non absorbable sutu
- Suture the mesh on to the anterior rectus sheath over ble interrupted sutures
- Close the skin in layers

EPIGASTRIC HERNIA :

- It occurs through linea alba anywhere between xiphoid process and the umblicus
- The defect is eliptical and usually less than 1 cm in maximum diameter
- Common in males between 25 and 40 years
- Present with epigastric pain and swelling
- Surgery is indicated if hernia is painful
- If defect < 4 cm anatomical repair
- If defect > 4 cm mesh repair

INCISIONAL HERNIA :

- Incidence : 10-15 % after laparotomy

CAUSES :

patient , wound and surgeon factors

Patient :

- Obesity
- Poor health
- Immunosuppression

- Steroid therapy
- Chronic cough
- Cancer

WOUND :

- Wound infection
- Poor quality tissue

SURGICAL :

- Inappropriate suture material
- Incorrect suture placement

- Present as diffuse bulging of whole length of scar
- Kin overlying hernia is thin , atrophic, peristalysis may be seen
- Partial intestinal obstruction is common
- Obstruction is common but strangulation is rare
- Surgery is treatment of choice
- Defect < 4 cm = anatomical repair
- Defect > 4 cm = mesh repair

SPIGELIAN HERNIA :

- Arise through defect in spigelian fascia
- Affect men and women equay
- Most occur below the level of umbilicus
- Present with intermittent pain
- Surgery indicated in all cases
- Surgery : excision of peritoneal sac , closure of defect

BURST ABDOMEN / ABDOMINAL DEHISCENCE :

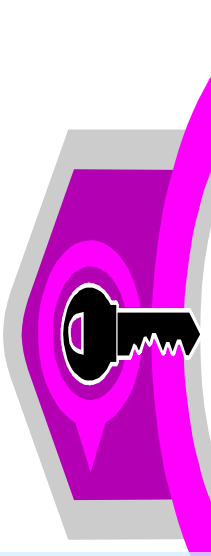
- Present as serosanguinous discharge from wound and
- Intra peritoneal contents lying extra peritoneally

SURGERY :

- Wash the intestine gently with saline and returned to abdomen
- All layers are approximated via through and through sutures
- Antibiotics started

OBTURATOR HERNIA :

- Hernia passes through the obturator canal
- More common in women
- Mostly after 60 years
- Swelling appears if the limb is flexed, abducted and rotated outward
- In > 50% of cases of strangulated obturator hernia pain is referred along the obturator nerve by its geniculate branch to the knee
- Surgery is indicated
- Lower laparotomy is performed
- Obturator fascia is stretched to allow reduction of contents
- The defect is closed by a mesh plug



KEY POINTS

- Strangulated hernia is associated with onset of sudden colicky abdominal pain and tenderness over hernia site with nausea and vomiting
- Inguinal hernia in children is always indirect
- Laproscopic herniorrhaphy is indicated in primary bilateral inguinal hernia
- Sliding hernia occurs exclusively in men, left sided, over the age of 40 yrs, treatment is truss
- The femoral canal is the medial most compartment of femoral sheath
- Inguinal hernia emerge above and medial to pubic tubercle
- Femoral hernia emerge below and lateral to pubic tubercle
- In paraumblical/ epigastric hernia if the defect is < 4cm umblical herniorrhaphy and if the defect > 4 cm mesh repair

Case example :

A middle aged woman [illegible] no swelling on his previous operation site, the swelling is increasing in size and bulging on coughing or weight lifting

Q : what is your diagnosis ?

A : Incisional hernia

Q : what is the treatment ?

A : Anatomical repair or mesh repair depending upon the size of defect

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THE PERITONEUM

Chapter 33

- The peritoneal cavity is the largest cavity in the body
- It is composed of a membrane called mesothilium
- The membrane is divided into two parts
  - Visceral peritoneum : surrounding the viscera, innervated by visceral nerves , insensitive to pain
  - Perital peritoneum : lining the outer surface of cavity, innervated by somatic nerves, sensitive to pain

FUNCTIONS OF PERITONEUM :

- Inflammation and immune response
- Pain perception (parital)
- Fibrinolytic cavity
- Visceral lubrication
- Fluid and particulate absorption

ACUTE PERITONITIS

It refers to acute inflammation of peritoneal cavity

- Mostly caused by bacterial invasion of peritoneal cavity (bacterial peritonitis)

CAUSES :

- Bacterial , gastrointestinal (E. coli, streptococci, clostri ds) ,
- nongastrointestinal (clamydia, gonococcus, streptococ
  - **Chemical** eg bile, barium
  - **Allergic** eg starch peritonitis
  - **Traumatic** eg operative handling
  - **Ischemia** eg strangulated bowel , vascular obstruction

ROUTES OF INFECTION :

- Transmural translocation eg pancreatitis, ischemic bowel
- Gastrointestinal perforation eg perforated ulcer, appendix, diverticulum
- Female genital tract eg pelvic inflammatory disease
- Exogenous contamination eg drains, open surgery
- Hematogenous spread eg sepicemia

LOCALIZED PERITONITIS :

- Factors which favors the development of localized peritonitis :
- Adhesions
- Decrease peristalsis
- Greater omentum adhering to inflammed structures and acting as a barrier
- Surgical drains

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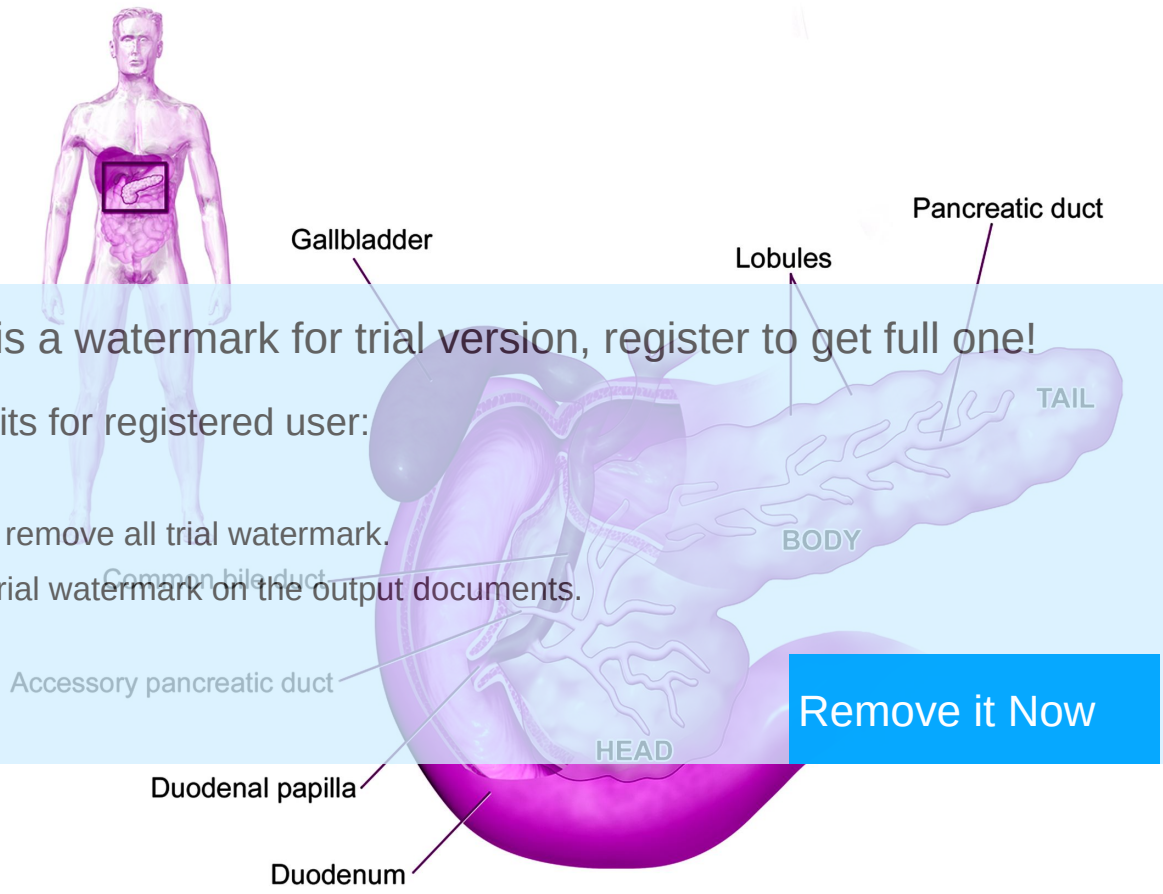
THE PANCREAS

Chapter 39

ANATOMY OF PANCREAS :



- The pancreas is situated in reteroperitonium
- It is divided into head , neck, body and tail
- Head occupies 30 % of the gland mass
- Head lies within within the curve of duodenum , overlying the body off 2nd lumber vertebra and vana cava
- The uncinate process lies on the side of head passing to the left and behind the superior mesenteric vein
- Aorta and superior mesenteric veins lies behind the neck of pancreas
- Behind the neck, neat its upper border the superior mesenteric vein joins the splenic vein to form the portal vein
- Body and tail together constitute 70% of the gland
- The tip of the pancreatic tail extends up to the splenic hilum
- Pancreas weights approximately 80 gms
- The pancreas is both an exocrine and endocrine gland

EXOCRINE GLAND :

- Constitue around 80-90%
- Composed of exocrine acinar tissues, organized into lobules
- It produces digestive enzymes at an alkaline ph

ENDOCRINE GLAND :

- The functional unit is islet of langerhans
- Islet consist of different types of cells
- B cells : 75% , procucing insulin
- A cells : 20%, producing glucagon
- D cells : 4%, producing somatostatin
- P cells : 1 % , producing polypeptides

PANCREATIC DUCTS :

MAIN PANCREATIC DUCT / DUCT OF WIRSUNG :

- Embryo logically it is formed by ventral duct and distal portion of dorsal duct
- Before entering in 2nd part of duodenum it joins the bile duct to form ampulla of vater

ACCESSORY PANCREATIC DUCT / DUCT OF SANTORINI :

- Embryologically formed by proximal portion of dorsal duct
- It opens into duodenum superior to opening of main pancreatic duct

PHYSIOLOGY OF PANCREAS :

- Pancreas secretes digestive enzymes in an alkaline ph
- Secretin which releases from duodenal mucosa evokes
- CCK released from duodenal mucosa in response to fo
- Vagal stimulation increases the volume of secretion
- Protein is synthesized at a greater rate in the pancreas than in any other tissue
- Approximately 6-20 g of digestive enzymes enter the duodenum each day

INVESTIGATIONS OF PANCREAS :

SERUM ENZYME LEVELS :

- Serum amylase is the most widely used test for pancreatic damage
- Serum lipase is most sensitive but not widely available
- Serum aylase rise within a few hours of pancreatic damage and declines over the next 4-8 days

CAUSES OF RAISED SERUM AMYLASE LEVELS OTHER THAN ACUTE PANCREATITIS :

- Upper GI perforation
- Mesenteric infarction
- Torsion of an intra abdominal viscus
- Reteroperitoneal hematoma
- Ectopic pregnancy
- Renal failure
- Salivary gland inflammation

PANCREATIC FUNCTION TESTS PFT :

- Secretin stimulation test
- Lundh test
- NBT-PABA test
- Fecal elastase test

ULTRASONOGRAPHY :

- It is the initial investigation of choice in patients with jaundice
- It can determine whether the bile duct is dilated
- Gall stones
- Gross disease within the liver eg metastasis
- Presence or absence of mass in pancreas

CT SCAN :

- Unenhanced CT scan to determine the presence of calcification within the pancreas and GB
- Multiphasic scan with intravenous
- Pancreatic carcinoma size and site
- Endocrine tumours
- Necrotic areas in patients with pancreatitis
- Inflammatory collections and pseudocyst

MRCP & ERCP :

- MRCP is non invasive but only diagnostic , it determines the presence of obstruction
- ERCP is invasive , it is diagnostic and therapeutic as well, is used for biliary and pancreatic stent placement
- Malignant stricture of CBD and main pancreatic duct v GN

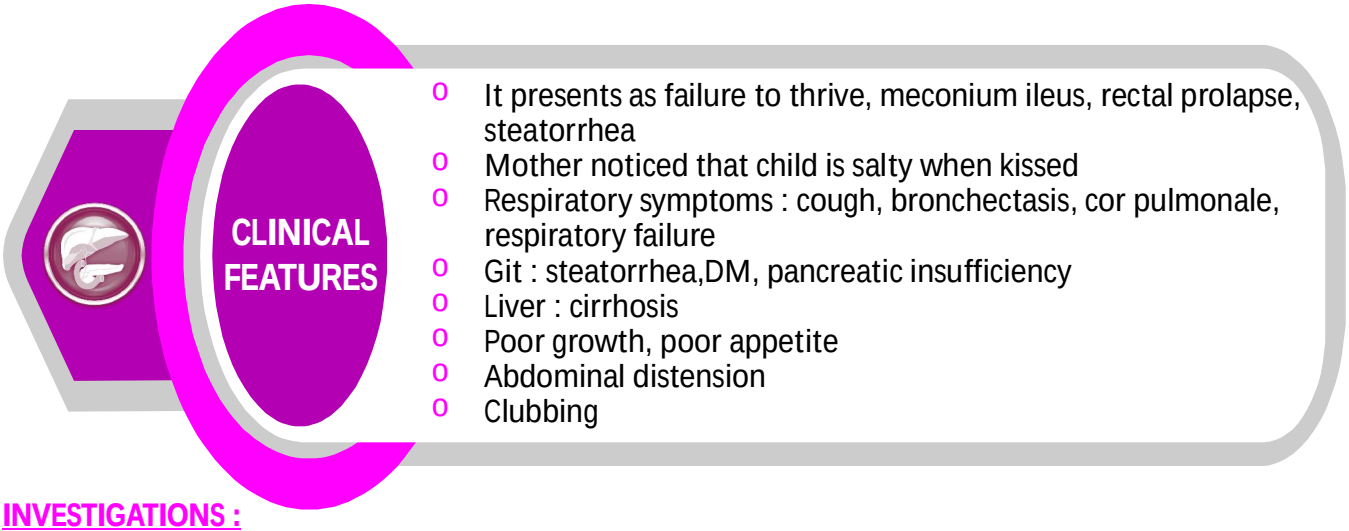
ENDOSCOPIC ULTRASOUND :

- It is used for small tumors that don't show up on CT and MRI
- Relationship of a pancreatic tumor to the major vessel
- Relationship of neuroendocrine tumor to the main pancreatic duct
- Distinguish cystic tumors from pseudocyst

CONGENITAL ANOMALIES :

CYSTIC FIBROSIS :

- Autosomal recessive condition
- Mutation in CFTR gene on chromosome 7
- It is a multisystem disorder of exocrine gland which affects the lung , intestine, pancreas and liver
- In developed countries it is the most common cause of chronic lung disease in children.



- It presents as failure to thrive, meconium ileus, rectal prolapse, steatorrhea
- Mother noticed that child is salty when kissed
- Respiratory symptoms : cough, bronchectasis, cor pulmonale, respiratory failure
- Git : steatorrhea,DM, pancreatic insufficiency
- Liver : cirrhosis
- Poor growth, poor appetite
- Abdominal distension
- Clubbing

INVESTIGATIONS :

- Sweat test : level of NaCl ions in sweat >90 mmol/l confirm the diagnosis
- Genetic testing

TREATMENT :

- Aim of treatment is to treat the secondary consequences of the disease
- Respiratory : antibiotics , physiotherapy
- Malabsorption : oral pancreatic enzymes preparation
- Pulmonary failure : lung transplantation

PANCREATIC INJURY :

- Blunt trauma does not frequently cause pancreatic injury rather injury to other organs are common
- Penetrating trauma to upper abdomen and back carries a high risk of pancreatic injury

INVESTIGATIONS :

- Raise serum amylase
- CT scan
- ERCP if suspected duct injury

TREATMENT :

- NPO
- Iv fluids
- If the patient is hemodynamically stable , preferable to manage conservatively first
- Surgery is indicated in almost all cases if disruption of main pancreatic duct
- If gland is transected in body or tail distal pancreatectomy with or without splenectomy
- If damage is in the head of pancreas : hemostasis and externa drainage is effective.

PROGNOSIS :

- BLEEDING is the most common cause of death in immediate period
- Duct stricture leading to recurrent pancreatitis
- Pancreatic pseudocyst may develop
- If the main duct is intact : cyst may be aspirated percutaneously
- If duct is disrupted : distal resection

PANCREATIC FISTULA :

- It usually follow operative trauma to the gland or occur as a complication of acute or chronic pancreatitis
- External pancreatic fistula : communication between pancreas and skin
- Internal pancreatic fistula : communication between pancreas and other organs

INVESTIGATIONS :

- Serum amylase
- CT scan
- ERCP

TREATMENT :

- Iv fluid and electrolyte management
- Correct the underlying cause
- Octeriotide to suppress secretions
- Skin care of fistula
- Drainage of fluid collection
- If obstruct : ERCP and stent placement
- Parenteral NO feeding

PANCREATITIS :

- It is the inflammation of the gland parenchyma of pancreas
- It can be divided into acute and chronic pancreatitis

ACUTE PANCREATITIS :

- 3% of all abdominal pains
- May occur at any age
- Peak incidence in young men and older women

TYPES :

MILD ACUTE PANCREATITIS :

- Characterized by interstitial edema of gland with minimal organ dysfunction
- 80% of patients have mild attack of pancreatitis
- Mortality rate is 1 %

SEVERE ACUTE PANCREATITIS :

- Characterized by pancreatic necrosis, severe inflammatory response, multi organ failure
- Mortality 20-50%
- 1/3 deaths occur in early phase of attack due to multi organ failure
- Death occur after 1st week due to septic complications.

CAUSES OF ACUTE PANCREATITIS GET SMASHED :

- Gall stones 50-70%
- Ethanol
- Trauma
- Steroids
- Mumps
- Autoimmune

- Scorpion venom
- Hyperlipidemia
- Endoscopic post ERCP 3%
- Drugs : azathioprine, thiazides, estrogens, valproic acids

CLINICAL FEATURES

- Constant abdominal pain
- Severe in intensity
- Fr hours or days
- Refractory to analgesics
- Radiate to back in 50%
- May me relief by sitting and leaning forward
- Nausea, vomiting, retching, hiccoughs are marked
- Tachypnea, tachycardia
- Ill looking patient with toxicity and confusion
- Jaundice
- Swinging pyrexia
- Grey turner sign : bleeding into the facial plane produce discoloration of flanks
- Cullen sign : periumblical discoloration
- Abdominal distension
- Ascites
- A mass can be palpable in epigastrium
- Muscle guarding in upper abdomen

INVESTIGATIONS :

- Elevated serum amylase levels (3 to 4 times above normal)
- Elevated serum lipase
- CXR
- Abdominal x-rays : senital loop design , colon cutt off sign, renal halo sign
- ultrasound
  Contrast enhanced CT scan

ASSESSMENT OF SEVERITY :

- It is essential due to difference in outcome between patients with mild and severe disease

RANSON SCORE	GLASGOW SCORE
On admission :	On admission :
Age >55 yrs WBCs > 16 * 10 9/l Blood glucose > 10 mmol/l LDH > 700 units /l AST > 250sigma frankel unit per cent	Age > 55 yrs WBCs > 15 * 10 9/l Blood glucose > 10 mmol/l PaO2 < 8 kPa (60mmHg) S urea >16 mmol/l

Within 48 hours :	Within 48 hours :
BUN rise > 5 mg % PaO2 < 8 kPa (60mmHg) S.calcium < 2.0 mmol/l Base deficit > 4mmol/l Fluid sequestration > 6 lit	S. Calcium < 2.0 mmol/l s albumin < 32 g/l LDH > 600 units /l AST/ALT > 600 units /l

* 3 or more positive factors within 48 hour of onset suggest severe acute pancreatitis
***table after bailey and love short practice of surgery**

TREATMENT :

- Mild pancreatitis : NPO, iv fluid, analgesia, antiemetics
- Severe pancreatitis :
- NPO
- Fluid rehydration
- Analgesia
- Oxygenation
- Abgs, urine out put , vital sign monitoring
- Serum lipase and investigations
- Iv antibiotics for 2 weeks
- Perform ct scan if sign of detoriation
- ERCP urgently perform in gall stone pancreatitis (within 72 hours)
- No feeding, nutritional support

COMPLICATIONS :

SYSTEMIC

- shock
- Arrhythmias
- ARDS
- Renal failure
- DIC
- Hypocalcemia, hyperglycemia, hyperlipidemia
- Ilius
- Visual disturbance, confusion, irritability, encephalopathy
- Subcutaneous fat necrosis
- Arthralgia

LOCAL :

- Acute fluid collection
- Sterile pancreatic necrosis
- Infected pancreatic necrosis
- Pancreatic abscess
- Pseudocyst
- Pancreatic ascites
- Pleural effusion
- Portal/splenic vein thrombosis
- Pseudaneurysm

CHRONIC PANCREATITIS :

- Progressive inflammatory disease
- Irreversible distruction of pancreatic tissue
- Mean age of onset 40 yrs
- Frequently affect men

CAUSES :

- ALCOHOL most common cause 60-70 %
- Pancreatic duct obstruction
- Heriditary pancreatitis
- Autoimmune pancreatitis
- Consequences of acute pancreatitis
- Neoplasm
- Primary biliary cirrhosis

CLINICAL FEATURES

- Abdominal pain often dull, severe flare up also occurs
- Pain radiate to left shoulder
- Nausea
- Anorexia, weight loss
- Steatorrhea
- Dm
- Infections

INVESTIGATIONS

- Abdominal x-ray : pancreatic calcifications
- CT scan : enlarged gland , calcifications, atrophy, masses , pseudocyst
- ERCP : most accurate for anatomy of duct, may show dilated chains of lakes : sacculations
- with short strictures

TREATMENT :

- Control dm
- Stop alcohol and tobacco
- Analgesia
- Adequate carbohydrate and protein intake
- Decrease fat intake
- Adequate diet rich in antioxidants
- Pancreatic exocrine enzymes supplements.

SURGICAL MANAGEMENT :

- Endoscopic pancreatic sphincterotomy in patients with papillary stenosis and a high sphincter pressure and pancreatic duct pressure
- Stent placement : in patients with dominant pancreatic duct stricture and upstream dilation, stent should be left in for no more than 4-6 weeks

- Beger procedure or pancreatodudenectomy : in patients with a mass in head of pancreas
- Frey procedure or longitudional panncreatojejunostomy : if duct is markedly dilated
- Distal pancreatectomy : when disease is in tail
- Total pancreatectomy : when intractable pain and diffuse disease

PANCREATIC PSEUDOCYST :

- It is a collection of amylase rich pancreatic fluid
- It is called as pseudo because the wall of the cysst is formed by granulation tissue and not by epithelial lining
- Its formation required 4 weeks from the onset of acute pancreatitis
- When the pancreatic duct communicate with pseudocyst it is called as communicating pseudocyst
- Non communicating if no communication between pancreatic duct and pseudocyst

DIAGNOSIS :

- U/s CT Scan
- It is differentiated from cystic neoplasm by EUS and aspiration of cystic fluid
- The fluid should be sent for CEA levels, amylase levels and cytology
- Pseudocyst have typically low CEA levels
- Pseudocyst fluid have high amylase level but it is not diagnostic
- Cytology reveals inflammatory cells in pseudocyst fluid
- **ERCP, MRCP :** may demonstrate communication between pseudocyst and pancreatic duct.

TREATMENT :

- Will resolve spontaneously in most cases

INDICATIONS FOR SURGERY :

- Thick walled or large (> 6cm in dia)
- Have lasted for long time (> 12 weeks)
- Pseudocyst causing symptoms
- To differentiate between pseudocyst and tumor
- Development of complications.

PERCUTANEOUS APPROACH :

- A percutaneous transgastric cystgastrostomy can be done under imaging guidance
- Double pigtail drain is placed with one end in cyst cavity and other end in gastric lumen.

ENDOSCOPIC APPROACH :

- It involves puncture of cyst through stomach or duodenal wall under EUS guidance
- Placement of tube drain with one end in cyst cavity and other end in gastric lumen

SURGICAL DRAINAGE :

- Cystogastrostomy
- Cystodudenostomy
- Roux-en-Y cystojejunostomy in non adherent pseudocyst
- If pseudocyst in tail of pancreas : resection of pancreatic tail and pseudocyst

PANCREATIC TUMORS :

INSULINOMA	GASTRINOMA
Also known as beta cell tumor	Also known as G cell tumor
Most common islet cell tumor	Malignant, sometimes in extrapancreatic sites
It produces insulin	It produces gastrin
Elevated insulin Decrease glucose No ketoacidosis Elevated C peptides	Elevated gastrin Gastric hyper acidity Recurrent peptic ulcer disease
Whipple's triade : episodic hyperinsulinemmia and hypoglycemia + CNS dysfunction + dramtic reversal of symptoms by glucose intake	

PANCREATIC CARCINOMA :

- It causes 2-3 % of all cancers
- Peak incidence 65-75 yrs

RISK FACTORS :

- Male predominance
- Smoking
- Family history
- Chronic pancreatitis
- High fat consumption
- DM
- FAP (familial adenomatous polyposis)
- HNCC (heriditary non polyposis colorectal cancer)

PATHOLOGY :

DUCTAL ADENOCARCINOMA :

- It consist of 85% of pancreatic cancer
- Most commonly in head of pancreas
- They are solid, infiltrating tumors
- Liver and peritoneal metastasis are common

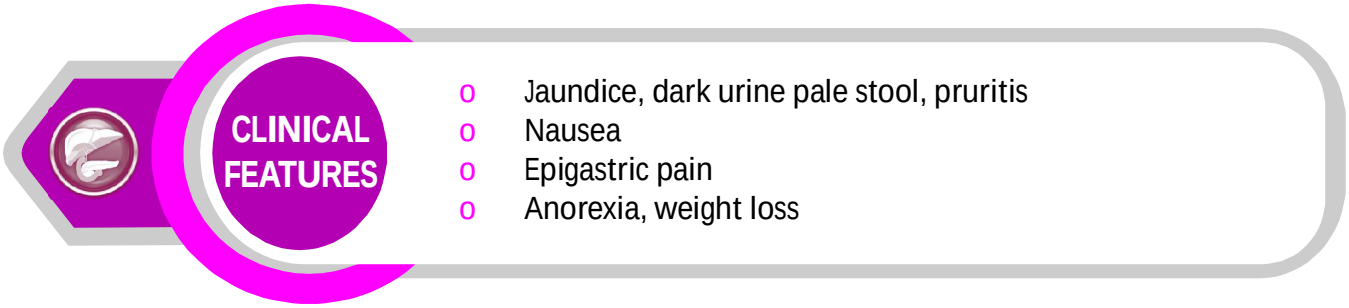
SEROUS CYSTADENOMAS :

- Typically in older woman
- They are large aggregation of multiple small cyst like a bubble wrap.

MUCINOUS TUMORS :

- Potential for malignant transformation
- Mucinous cystic neoplasn (MCN)Common in pre menopausal woman

- IPMN intraductal papillary mucinous neoplasm common in pancreatic head and seen in older men



INVESTIGATIONS :

- Blood test
- Ultrasound
- Contrast enhanced ct scan
- ERCP if any suggestion of cholangitis
- EUS
- Elevated CA 19-9
- Laparoscopy for peritoneal and liver metastasis.

CONTRAINDICATIONS TO SURGERY :

- Presence of peritoneal , liver, lymph nodes metastasis
- Complete encasement of portal vein or superior mesenteric vein
- Encasement of superior mesenteric, hepatic or celiac artery by tumor

PPPD PROCEDURE

- Pylorus preserving pancreatodudenectomy
- Procedure of choice if the tumor is in pancreatic head or ampulla

WHIPPKE PROCEDURE :

- When tumor enroching 1st part of duodenum or antrum of stomach
- It involves removal of antrum of stomach, duodenum, head of pancreas, CBD, GB

DISTAL PANCREATECTOMY :

- When the tumor is in body or tail
- It involves removal of body and tail along with spleen

PALLIATIVE MANAGEMENT :

- Pain relief via celiac axis block, escalation of analgesia
- Jaundice treatment via stent placement or surgical biliary bypass
- Improve gastric emptying by gastroenterostomy or duodenal stent
- Symptomatic treatment

KEY POINTS

- Serum amylase is most widely used test for pancreatic damage
- Serum lipase is most specific for acute pancreatitis
- Protein in synthesized in greater rate in pancreas than in any other tissue
- Cystic fibrosis is an autosomal recessive condition
- Cystic fibrosis is most common cause of chronic lung disease in children of developed world
- Annular pancreas is associated with down syndrome
- Bleeding due to pancreatic injury is most common cause of death in immediate period
- Most common cause of acute pancreatitis is gall stones
- Alcohol is the most common cause of chronic pancreatitis
- Ductal adenocarcinoma is most common pancreatic cancer
- PPPD is standard procedure for removal of tumor of pancreatic head or ampulla

Case example :
A 61 years old male came in OPD with c/o yellow discoloration [illegible] anorexia, weight loss, nausea and deranged LFT with increase bilirubin.
U/S shows dilated bile ducts and CT scan show mass in pancreatic head

Q : what is your diagnosis ?
A : carcinoma head of pancreas

Q : what are the treatment options ?
A : if carcinoma is resectable : whipple's procedure
If carcinoma is non resectable : stent placement by ERCP

THE SMALL AND LARGE INTESTINE

Chapter 40

ANATOMY OF SMALL INTESTINE :

- Length of small intestine between 300-850 cmfrom duodenojejunal flexure (DJF) to iliocecal valvae.
- About 40% intestine is referred as jejunum
- Remainder is ilium
- Jejunum has wider diameter, thick walls, more prominent mucosal folds (valvulae conniventes)
- Ilium contains large aggregates of lymph nodes (peyer's patches)
- Blood supply of small intestine is via superior mesenteric artery
- Venous drainage is via portal venous system
- Nerve supply : rich autonomic innervation using splanchnic nerve
- Referred pain from small intestine usually felt in periumblical region (T10)

ANATOMY OF LARGE INTESTINE :

- Large intestine begins at ileocecal valve (ICV) and extends to the anus
- The large intestine is approximately 1.5m long
- The large intestine is less mobile and ascending and descending colon are fixed to the reteroperitoneum
- Colon has fat filled peritoneal tags called appendices e
- Blood suPply from branches of superior (SMA) and in A)
- Marginal artery (of drummond) runs round the lengt
- Venous drainage into portal system
- Nerve supply : derived from splanchnic nerve via dense sympathetic plexus
- Visceral pain from part of the colon supplied by SMA is felt in periumblical region (T 10) and pain from colon distal to that is felt suprapubically (T12-L1)

PHYSIOLOGY OF SMALL AND LARGE INTESTINE :

- Jejunum is the principle site for digestion and absorption of fluid , electrolytes, iron, folate, fat,protein and carbohydrate
- Absorption of bile and vitamin B 12 occurs in the terminal ileum
- Principle function of colon is absorption of water
- Fecal residue reaches the cacum 4 hours after a meal and the rectum after 24 hours

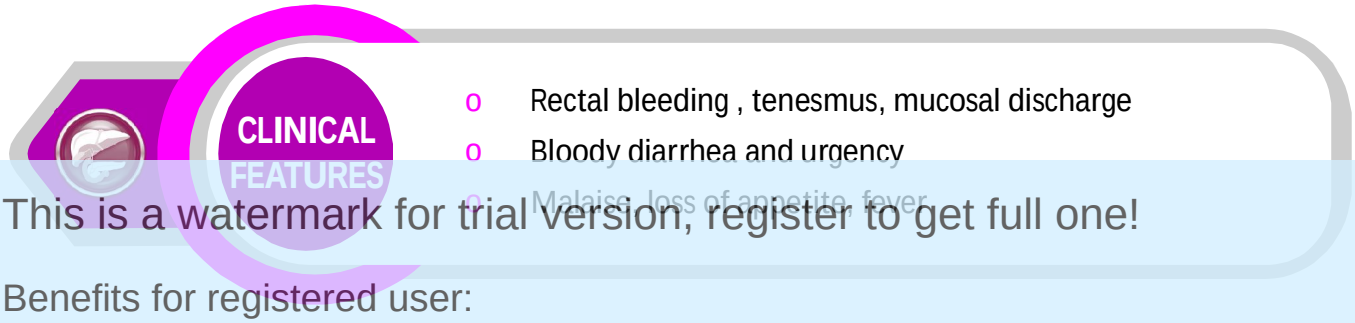
ULCERATIVE COLITIS :

- Diffuse Chronic inflammation which is confluent and superficial affecting mucosa and superficial submucosa, may extend full thickness trough the wall of colon
- It is a disease of rectum and colon with extra intestinal manifestation
- More common in males in later life
- Peak incidence 20and 40 years of age
- Smoking and appendicectomy have a protective effect

- 10-20 % have affected first degree relatives
- More common in caucasians
- Ulceration associated with granulation tissue and regeneration formation
- Polyp like appearance , pseudopolyposis
- Dysplasia commonly found

HISTOLOGY :

- Increased in inflammatory cells in lamina propria
- Crypts abscess
- Dysplasia



CLASSIFICATION OF SEVERITY :

MILD DISEASE :

- < 4 stools/day
- With or without bleeding
- Clinically well
- Normal ESR

MODERATE DISEASE :

- 4-6 stools/day
- Moderate rectal bleeding
- Few systemic signs (fever)
- Anemia , abdominal pain present
- Raise ESR, CRP

SEVERE DISEASE :

- > 6 stools / day
- Large rectal bleeding
- Fever, tachycardia present
- Anemia , hypoalbumenimia present
- Raise ESR CRP

FULMINANT DISEASE :

- > 10 stools/day
- Continuous rectal bleeding
- Fever, tachycardia, abdominal distension and tenderness
- Anemia, huypoalbuminemia
- Blood transfusion requirement

EXTRA INTESTINAL MANIFESTATIONS :

- Large joint polyarthropathy 15 %
- Sacroilitis
- Ankylosing spondylitis
- Scelerosing cholangitis* can progress to cirrhosis and hepatocellular failure
- Erythema nodusum
- Pyoderma gangrenosum
- Uveitis, episcelritis
- Cholangiocarcinoma

COMPLICATIONS OF UC :

- Toxic dilation
- Perforation
- Hemorrhage
- Cancer
- Extra intestinal manifestations

INVESTIGATIONS :

- Barium meal follow through : edematous colonic mucosa (thumb printing) , loss of haustration, small bowel loop in RIF show severity of disease
- Barium enema :loss of haustrations, pseudopolyps, narrow contracted colon
- Stool culture to exclude infections by compylobactor, c difficile, salmonella and shigella
- Sigmoidoscopy :detect parotitis hyperemic mucosa bleed on touch with prulent exudates, tiny ulcers
- Colonoscopy and biopsy :extent of inflammation , distinguish between UC and CD , to monitor response of disease, to assess long standing c

TREATMENT :

- Multidisciplinary approach

MEDICAL TREATMENT :

- Anti inflammatory agents
- 5 amino sallicylic agents tropically (per rectum) or systemically
- Corticosteroids are mainstay of treatment for any flare up
- Azathioprine and cyclosporin can be used t maintain remission and as steroid sparing agents
- Mild attack : oral prednisolon for 3 to 4 week period + 5ASA
- Moderate attack : oral prednisolon + twice daily steroid enema + 5ASA
- Severe attack : admit , NPO, iv fluid and electrolytes hydrocortisone 100-200 mg four times/day + reectal steroid enemas , vital monitoring, surgery if no improvement after 3-4 days

SURGICAL INDICATIONS :

- Severe or fulminating disease, failure to response to medical therapy
- Chronic disease with anemia, frequent stools , urgency, tenesmus
- Steroid depending disease
- Inability of patient to tolerate required medical treatment

- Neoplastic change
- Extra intestinal manifestation
- Rarely, severe hemorrhage or stenosis causing obstruction

SURGERY :

PROCTOCOLECTOMY AND ILIEOSTOMY

- Remove all colon and rectum leaves a permanent stoma (ileostomy)
- Proctocolectomy with an ileoanal pouch (parks) :
- Removal of colon and rectum
- A pouch is made out of ileum as a substitute for rectum and sewn or stapled to anus
- This avoids a permanent stoma
- Pouch may be J , S or W shaped
- Operation of choice in younger patients as no permanent ileostomy
- Complication rates are higher

COLECTOMY AND ILEORECTAL ANSTOMOSIS :

- Removal of colon with preservation of rectum and ileum
- It is preferred in UC with minimal rectal inflammation
- The annual rectal inspection is advocated

CROHN'S DISEASE (REGIONAL ENTERITIS) :

- It is a chronic full thickness inflammatory process that can affect any part of GIT from lip to anal margin
- Slightly more common in women
- Peak incidence 25-40 yrs
- Smoking is a risk factor
- 10% have affected the 1st degree relatives
- DNA of mycobacterium paratuberculosis is found in ap... with CD
- HLA DR1 mutation is common
- Most commonly involve TERMINAL ILEUM
- The transluminal inflammation is the KEY FEATURE OF CD
- Focal areas of chronic inflammation involving all layers
- Non caseating granulomas are found in 60% of cases
- Surpentine linear ulcer, deep fissures, skip lesions are features of CD

CLINICAL FEATURES

- Mild diarrhea
- RIF pain with palpable mass
- Intermittent fever, anemia, weight loss
- Fistulation may occur into adjacent bowel loops
- Entero enteric fistula or entero vasicle fistula or entero cutaneous fistula
- Perianal menifestation : perianal skin appears bluish in active disease
- Superficial ulcers with undermined edges are relatively painless
- Deep cavitating ulcers are often found in upper anal canal

EXTRA INTESTINAL MANIFESTATIONS :

- Gall stones
- Renal calculi
- PSC
- Chronic active hepatitis
- Sacroilitis
- Amyloidosis
- Erythma nodosum
- Pyoderma granulosum
- Arthropathy
- Eye complications (uvitis, iritis)
- Apathous ulceration

INVESTIGATIONS :

- CBC (anemia)
- LFT
- CRP
- Serum albumin
- Barium studies : stricture , pre stenotic dilation, string sign of kantor (narrowed terminal ileum)
- SMALL BOWEL ENEMA IS INVESTIGATION OF CHOICE
- CT scan : Fistulas, intrabdominal abscess, bowel thickening and dilation
- MRI : Useful in assessing complex perianal disease
- Endoscopy : patchy inflammation, apathous ulcers the terminal ileum may be ulcerated or structured

TREATMENT :

MEDICAL :

- Steroids are mainstay of treatment
- 5ASA
- Metronidazole and ciproxcin may be used for perianal disease
- Azathioprin and cyclosporin
- Nutritional support

INDICATIONS FOR SURGERY :

- Recurrent intestinal obstruction
- Bleeding
- Perforation
- Failure to medical therapy
- Intestinal fistula
- Fulminate colitis
- Malignant change
- Perianal fistula

SURGERY :

- Ileocecal resection
- Segmenteal resection : inpresence of stricture

- Colectomy and ileorectal anastomosis : for colonic CD with rectal sparing and normal anus
- Subtotal colectomy and ileostomy
- Temprary loop ileostomy
- Proctocolectomy with permanent ileostomy
- Strictureplasty

INFECTIONS OF SMALL AND LARGE INTESTINE :

INTESTINAL AMOEBIASIS :

- Ameobiasis is an infestation with entaemeobia histolytica
- Transmission is via contaminated drinking water
- Can cause chronic ulcers aka bottle necked ulcers
- Mainly confined to distal sigmoid colon and rectum

- Bloody diarrhea
- Hemorrhage ,stricture formation or perforation in severe cases
- Live abscess
- Intestinal obstruction.

INVESTIGATIONS :

- Fresh hot stool examination for ameoba
- Endoscopy and biopsy

TREATMENT :

- Metronidazole 3 times daily for 7-10 days
- Diloxanide furoate is effective against chronic infection associated with passage of cyst in stool

TYPHOID :

- Thphoid fever is caused by S, typhi
- Incubation period 10-20 days
- Present with fever abdominal pain in 1st week
- Next week distension and diarrhea, splenomegaly , rose spot on abdomen, vasculitis
- 3rd week : perforation of ulcers
- Common site : lower ileum
- Diagnosis is confirmed by culture of blood and stool
- Treatment : antibiotic (chloramphanicol)

COMPLICATIONS OF TYPHOID :

- Paralytic ileus
- Intestinal hemorrhage
- Perforation
- Cholecystitis

TB OF INTESTINE :

- It can affect any part of GIT
- Most common site are ileum, proximal colon and peritoneum
- There are two presentations

1. ULCERATIVE TB :

- Secondary to pulmonary TB
- Arises as a result of swallowing tb bacilli
- Transverally lying multiple ulcers in terminal ileum
- Overlying mucosa is thicened, reddened and covered with tubercles
- Diarrhea and weight loss are common features
- CT scan or barium follow through show absent filling of lower ileum, cecum and ascending colon

TREATMENT :

- Chemotherapy (anti TB drugs)
- Surgery if complete obstruction or perforation

2. HYPERPLASTIC TB :

- Most commonly in ileocecal region
- Commonly associated with small bowel strictures
- Granulomas of organisms less than the host defence
- Presents with abdominal pain , intermittent diarrhea
- Barium follow through or small bowel enema show a l
  terminal ileum

TREATMENT :

- Chemotherapy (anti TB drugs)
- Surgery if complete obstruction or perforation

INTESTINAL DIVERTICULAE :

- Diverticula is a hollow out pouching is a common structural abnormality
- Can occur anywhere from esophagus to recto sigmoid junction
- They can be classified as congenital or acquired

CONGENITAL :

- Contain all three coats of bowel in wall of diverticulum
- Eg meckel's diverticulum

ACQUIRED :

- No muscularis layer in wall of diverticulum
- Eg sigmoid diverticulum

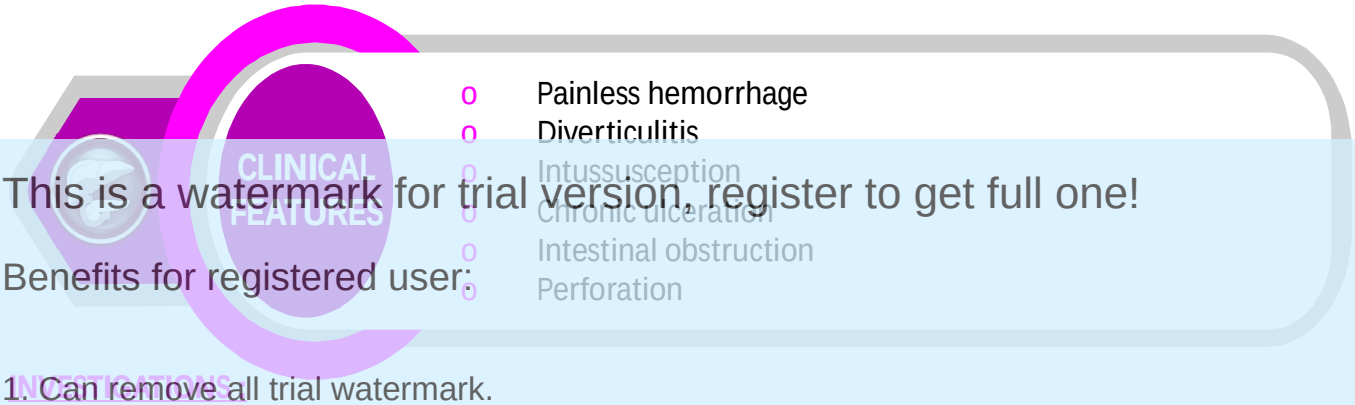
JEJUNAL DIVERTICULAE :

- They arise from mesenteric side of bowel as a result of mucosal herniation at the point of entry of blood vessel

- They are often multiple
- Often asymptomatic
- Sometimes present as abdominal pain, malabsorption, or acute abdomen

MECKEL'S DIVERTICULAE :

- It is a persistent reminant of vitellointestinal duct
- Present in 2 % of population
- 2 feet (60 cm) from ICV
- 2 inches (5 cm) long
- 2 % symptomatic
- 2 types of common ectopic tissue (gastric and pancreas)



INVESTIGATIONS

Technicium 99 scan is INVESTIGATION OF CHOICE

TREATMENT :

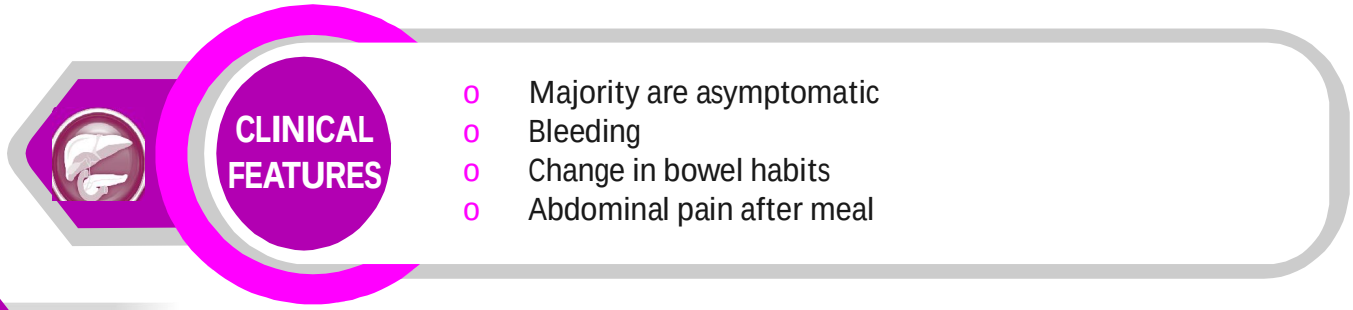
- If diverticulum is wide mouthed and not thickened it c
- Surgical procedure of choice is diverticulectomy

DIVERTICULAR DISEASE OF COLON / DIVERTICULOSIS :

- It is a false diverticula as all three layers are not present in diverticula wall
- Common sites are sigmoid colon (90 %) , cecum , entire large bowel
- 60% are present over the age of 60 yrs
- Associated with co existing carcinoma in 12 % of cases

RISK FACTORS :

- Chronic constipation
- Aging
- Family history
- Low fiber diet



COMPLICATIONS :

- Diverticulitis
- Abscess
- Peritonitis
- Intestinal obstruction
- Hemorrhage
- Fistula

DIVERTICULITIS :

- It refers to inflammation of diverticula
- Present as persistant lower abdominal pain LIF
- Loose stool or constipation
- Fever , malaise, Ileukocytosis
- Tenderness in LIF
- Palpable tender sigmoid colon
- If perforation : generalize peritonitis, shock

HINCHEY CLASSIFICATION OF COMPLICATED DIVERTICULITIS :

Grade I	Mesenteric or pericolic abscess
Grade II	Pelvic abscess
Grade III	Purulent peritonitis
Grade IV	Fecal peritonitis

INVESTIGATIONS :

- Abdominal and chest xray
- CT scan
- Double contrast barium enema
- Sigmoidoscopy and colonoscopy

TREATMENT OF DIVERTICULOSIS :

- High fibre diet
- Antispasmodic medications

TREATMENT OF DIVERTICULITIS :

- Iv antibiotics
- Analgesics
- NPO

INDICATIONS FOR SURGERY :

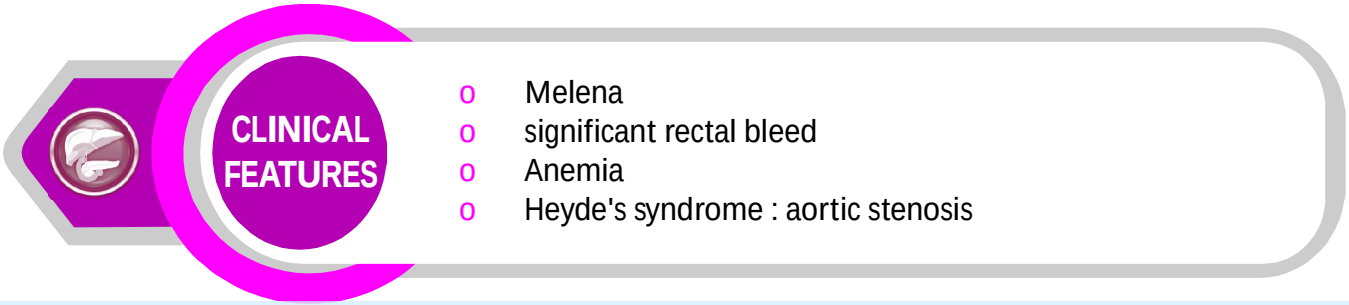
- Failure to response to medical treatment
- Generalize peritonitis

SURGERY :

- Laprotomy and thorough wash out
- Hartmann's procedure : sigmoid resection with LIF colostomy and closure of rectal stump

ANGIODYSPLASIA :

- It is a vascular malformation
- After 60 yrs of age
- Occur particularly in ascending colon and cecum of elderly patients
- It consist of dilated tortuous submucosal vein
- It is a cause of hemorrhage from the colon.



INVESTIGATIONS :

- Colonoscopy
- Capsule endoscopy
- SMA/IMA angiography
- Technium 99m scan

TREATMENT :

- Stabilize the patient
- Localized the bleed
- Curetization of bleeding vessel

SURGERY :

- Total abdominal colectomy + ileorectal anastomosis

MESENTERIC ISCHAEMIA :

- It is acute in onset
- Results from embolisation or thrombosis f mesenteric vessel
- Superior mesenteric vessels SMV sre most commonly affected vessels

SOURCES OF EMBOLISM OF SMA ARE :

- Left atrium associated with fibrillation
- A mural myocardial infarction
- Atheromatous plaque from an aortic aneurysm
- Mitral valve vegetation associated with endocarditis

THROMBOSIS :

- Thrombosis is associated with atherosclerosis and thromboangitis obliterans
- Thrombosis of SMVein is associated with :
  - Factor V leiden
  - Portal hypertension
  - Portal pyaemia
  - Sickle cell disease
  - Contraceptive pills

CLINICAL FEATURES

- Sudden onset of severe abdominal pain in patients with atrial fibrillation or atherosclerosis
- The pain is central
- Pain is out of propotion to physical findings
- Persistent vomiting abd defecation
- Passage of altered blood
- Hypovolaemic shock
- Abdominal tenderness and rigidity are late features

INVESTIGATIONS :

- CBC : neutophils leukocytosis
- X ray abdomen : absence of gas in thickened small intestine, presence of gas bubbles in mesenteric veins
- Mesenteric angiogram

TREATMENT :

- Resuscitation
- Embolectomy via ileocolic artery
- Revascularization of SMA
- If young patient and good collateral circulation bowel should be resected with end to end anastomosis
- Anti coagulation in early post operative period

HIRCHSPRUNG'S DISEASE :

- Congenital absence of intra mural ganglion cells
- Hypertrophic nerves present in distal large bowel
- Affected portion tonically contracted causing functional obstruction
- Proximal portion become distended due to build up of fecal matter.

CLINICAL FEATURES

- Delayed passage of meconium (neonates)
- Abdominal distension
- Bilious vomiting
- Associated with down syndrome
- Enterocolitis

INVESTIGATIONS :

- X-ray abdomen
- Enema
- Rectal biopsy confirm the diagnosis
- Anorectal manometry

TREATMENT :

- Resuscitation
- Analgesia
- Decompression of colon
- D functioning of stoma
- Resection of ganglionic segment

MEGACOLON AND MEGA RECTUM :

- It refers to abnormally distended colon and rectum
- The cause is unknown

CLINICAL FEATURES

- Severe constipation before age 20
- Fecal incontinence
- Abdominal distension
- Vomiting
- P/R shows large fecal mass in lumen
- Anus is patulous
- Perianal soiling

INVESTIGATIONS :

- Anorectal physiology : delayed sensation and raised maximum tolerated volume
- Abdominal xray
- Double contrast enema
- Anorectal biopsy

TREATMENT :

- Emptying the rectum
- Keeping empty with enemas
- Washouts, manual evacuation under anesthesia
- Osmotic laxatives
- Resection of dilated rectum and colon with coloanal anastomosis
- Colectomy with formation of ileorectal anastomosis
- Restorative proctocolectomy
- Vertical reduction rectoplasty
- Stoma formation

NON MEGACOLON CONSTIPATION :

- It has normal gut transit time or slow transit time
- Constipation not associated with distension of colon and rectum

FACTORS INFLUENCING BOWEL TRANSIT TIME ARE :

- Drugs : opiates, ferrous sulphate , anticholinergics
- Parkinson disease

- Multiple sclerosis
- Diabetic nephropathy
- Hypothyroidism
- Hypercalcemia

INVESTIGATIONS :

- Whole gut transit time measurement : ask the patient to syop all laxatives and take capsule containing radio oopaque marker, retension of >80% of shape 120 hours after ingestion is abnormal
- Defecating proctography

TREATMENT :

- Dietary fibre
- Laxatives
- Surgery : total colectomy and ileorectal anstomosis

TUMORS OF SMALL INTESTINE :

- Rare
- Less than 10 % of total GIT neoplasm

PEUTZ JEGHER SYNDROME :

- Autosomal dominant disease
- Characterized by melanosis of mouth and lips, multiple hemartomatouss polyp in small intestine & colon
- Diagnosis requires two of the following
  1. Mucocutaneous pigmentation
  2. Small bowel polyposis
  3. Family histoery suggestiive of autosomal dominent inheritence
- Associated with other cancers : bowel, colorectal, cervical, breast, ovarian, testicular
- Resection if serous bleeding and intussussception

CARCINOID TUMOR :

- These are neuroendocrine tumors
- Occurs throughout GIT
  Most commonly in appendix, ileum, rectum
  It can produce a number of vasoactive peptides, most commonly serotonin

CLINICAL FEATURES OF CARCINOID SYNDROME :

- Reddish blue cynosis
- Flushing attacks
- Diarrhea
- Borborygmi
- Asthmatic attacks
- Pulmonary and tricuspid stenosis

TREATMENT :

- Surgical resection
- Octeriotide
- In patients with hepatic metastasis : hepatic resection

GASTROINTESTINAL STROMAL TUMORS GIST :

- These are mesenchymal tumors
- Most commonly found in stomach
- They are radio resistant
- Treatment : surgery

LYMPHOMA :

- They may be primary or secondary to systemic lymphoma
- Western type lymphoma are non Hodgkin B cell lymphoma
- T cell lymphoma are present in patients with coeliac disease
- Mediterranean lymphoma are associated with alpha chain disease

BENIGN TUMORS OF LARGE INTESTINE :

- Polyp is a clinical description of ay protrusion of mucosa
- Polyp can be pedunculated (attached with a stalk) or sessile (flat)

ADENOMATOUS POLYPS :

- They are formed due to excessive growth of colorectal epithelium
- Risk of malignancy depends upon : size, sessile form and villous adenomas

TYPES :

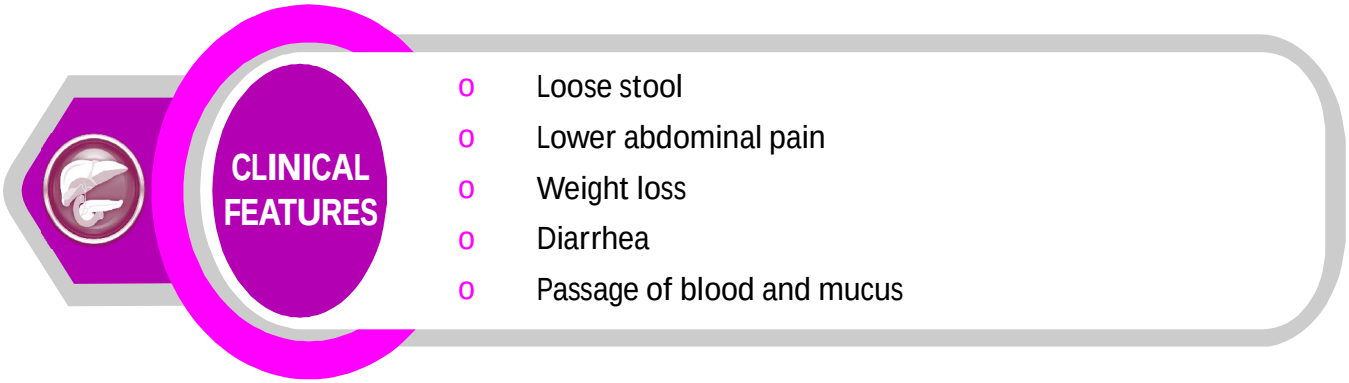
1. Tubular adenomas : most common
2. Villous adenoma : cause hypoalbuminemia and hy
3. Tubulovillous adenoma.

TREATMENT :

- Adenomas larger than 5mm are usually excised due to their malignant potential
- Colonoscopic polypectomy
- Endoscopic mucosal resection EMR
- Transendoscopic microsurgery TEMS
- Proctectomy for massive and extensive villous lesions of rectum

FAMILIAL ADENOMATOUS POLYPOSIS :

- Presence of > 100 colorectal adenomas
- Positive family history in 80% of cases
- Mutation in adenomatous polyposis coli (APC) gene on short arm of chromosome 5
- It is autosomal dominant condition
- It accounts for < 1 % of all colon cancer
- No sex predilection
- Most commonly affect large bowel followed by small intestine and stomach



SCREENING POLICY :

- At risk family members are offered genetic testing in their early teens
- At risk members should be examine at the age 10-12 yrs , repeated every year
- Those who are going to get polyp will have them at 20 yrs and those require operation
- If there are no polyp at the age of 20 , continue the 5 yr examination until the age of 30yrs

TREATMENT :

- Aim of surgery is to prevent the development of colorectal cancer
- Colectomy with ileorectal anastomosis
- Restorative proctocolectomywith an ileal pouch anal anastomosis
- Total proctocolectomy and end ileostomy

HERIDITARY NON POLYPOSIS COLORECTAL CANCER (HNPCC) / LYNCH SYNDROME :

- It is characterized by increased risk of colorectal cance trium, ovary, stomach and small intestine
- Autosomal dominant
- Mutation in MLH1 and MSH2 gene
- Risk of developing colorectal cancer is 80 %
- Risk of developing endometrial cancer is 30-50 %
- Mean age of diagnosis is 45 yrs
- Most common site is proximal colon.

DIAGNOSIS :

Amsterdam criteria II

- 3 or more family members with HNPCC related cancer, one of whome is 1st degree
- relative of other two
- 2 successive affected generations
- At least one colorectal cancer diagnosed before the age of 50 yrs
- FAP excluded
- Tumor verified by pathological examination

COLONIC CANCER :

- It is the 2nd most common cause of cancer death in developed countries
- The adenoma carcinoma sequence consist of following steps
- APC gene mutation

- K-ras mutation
- SMAD gene mutation
- P53 gene mutation

RISK FACTORS

- Intake of red meat
- Smoking
- Alcohol
- Colorectal adenoma
- Long standing IBD
- Type 2 DM
- Cholecystectomy
- Acromegaly
- Pelvic radiographs

PATHOLOGY :

- Annular : presents with obstructive symptoms
- Tubular : bleeding
- Ulcerative : bleeding + local invasion
- Cauliflower : bleeding

DISTRIBUTION :

Site	% age
Rectum	38
Sigmoid Colon	21
Cecum	12
T Colon	5.5
A Colon	5
D Colon	4

SPREAD OF CARCINOMA :

- Direct spread
- Lymphatic spread
- Hematogenous spread
- Transcoelomic spread

STAGING OF COLON CANCER / DUKE'S CLASSIFICATION :

- **Stage A** : Invasion of but not breaching the muscularis propria
- **Stage B :** breaching the muscularis propria but not involving lymph nodes
- **Stage C :** Lymph nodes involved
- **Stage D :** Metastatic disease

TNM CLASSIFICATION :

T1 **T2** **T3** **T4**	Into submucosa Into muscularis propria Into pericolic fat but not breaching serosa Breaches serosa
N0 **N1** **N2**	No nodes involved 1-3 nodes involved 4 or more nodes involved
MO **M1**	No metastasis metastasis

CLINICAL FEATURES

Left side tumors :

- More common
- Change in bowel habbits
- Rectal bleed
- Blood coats the stool
- Tenesmus

RIGHT SIDE TUMORS :

- Tend to bleed
- Blood mixed in with stool
- RIF mass
- Iron deficiency anemia

METASTASIS :

- Metastasis mostly to liver
- Present with jaundice, ascites, hepatomegaly, weight loss

INVESTIGATIONS :

- Colonoscopy is INVESTIGATION OF CHOICE if colon cancer is suspected
- Sigmoidoscopy

Spiral ct scan

Double contrast barium enema : apple core appearance

TREATMENT :

- Surgical resection with chemotherapy is the treatment of choice
- Right hemicolectomy : if tumor is in cecum or a.colon
- Extended right hemicolectomy : if tumor is in t.colon
- Left hemicolectomy : if tumor is in d.colon
- Anterior resection : if involving upper 2/3 of rectum
- Abdomino perineal resection : if in lower third of rectum

KEY POINTS

- Bowel frequency of < 3 days should be considered abnormal
- Hirschsprung disease present with delayed passage of meconium and abdominal distension, rectal biopsy confirms the diagnosis heyde's syndrome = aortic stenosis + GI bleeding from colonic angiodysplasia
- An inguinal or femoral hernia associated with meckel's diverticulum is called littre's hernia
- Meckel's diverticulum presents with painless severe hemorrhage
- Commonest complication of diverticular disease is diverticulitis
- Hall mark feature of UC is bloody diarrhea
- Toxic megacolon refers to acutely and massively distended colon
- Most common extra intestinal menefestation of UC is PSC
- In severe UC hydrocortisone 100-200mg 4 times daily is given
- In CD transmural inflammation is present
- Barium enema show string sign of kantor in CD
- Primary lymphoma associated with celiac disease is a T cell lymphoma
- New mutation in APC on short arm of chromosome 5 in 20%
- Colonic cancer (annular type) present with obstructive symptoms
- Colonoscopy is investigation of choice in colonic carcinoma

Case example

A surgeon found 2 inches long structure 2 feet proximal to ileocecal junction during laprotomy.

Q : what is your diagnosis ?

A : meckel's diverticulum

Q : what is the treatment ?

A : resection of segment of intestine which has meckel's diverticulum and restore the anatomy

INTESTINAL OBSTRUCTION

Chapter 41

INTESTINAL OBSTRUCTION :

CLASSIFICATION :

1. DYNAMIC :

- In this obstruction paristalsis is working against a mechanical obstruction
- It may occur in acute or chronic form

CAUSES :

- Intra lumina : foreign body, fecal impaction, bezoar, gall stones
- Intramural : stricture, malignancy, intussusception, volvulus
- Extramural : bands/ adhesions, hernia

2. ADYNAMIC :

- No mechanical obstruction, paristalsis is absent or inadequate

CAUSES :

- Paralytic ileus
- Pseudo obstruction
- Mesenteric vascular obstruction

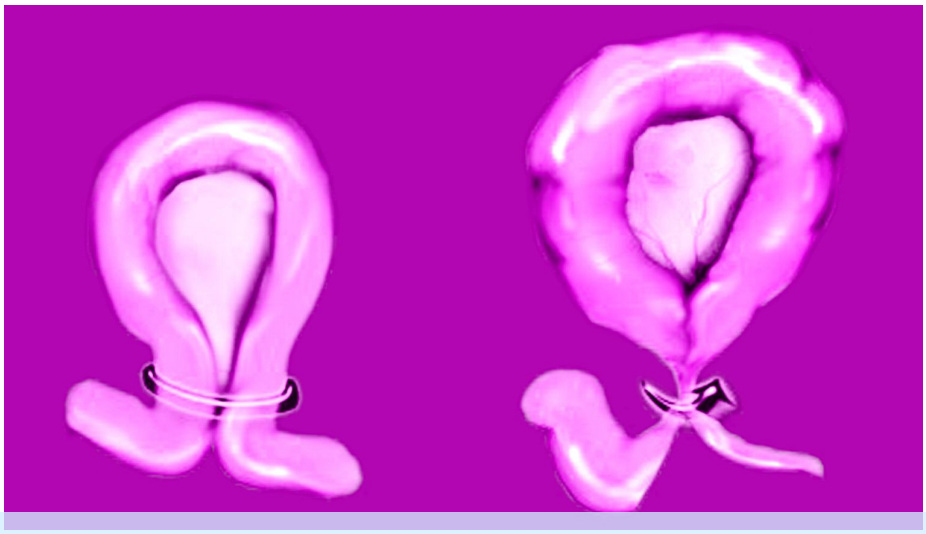
PATHOPHYSIOLOGY :

- Bowel proximal to obstruction dilated
- Distension is by 2 ways

1. **Gas :** Produces by aerobic and anaerobic bacteria, mainly nitrogen (90 %)
2. **Fluid :** Made up of digestive juices

- Dehydration and electrolytes loss are dur to :
  - Reduce oral intake
  - Defective intestinal absorption
  - Losses as a result of vomiting
  - Sequestration in bowel lumen
  - Transudation of fluid in peritoneal cavity
- Bowel distal to obstruction show normal peristalsis and absorption until it becomes empty
- After that it become contracted , immobile and collapse

CLOSED LOOP OBSTRUCTION :



- Distension at both sides of strangulated segment
- Adhesions, hernia, malignant stricture of colon with a competent ileocecal valve
- The inability of distended colon to decompress it self into the small bowel result in increase in lumenal pressure which is greatest at cecum, subsequent impairment in blood flow to the wall, resulting necrosis and perforation

TREATMENT :

- Resection of ischemic segment with end to end anastomosis
- Second look laparotomy (re exploration after 24 hrs) bowel is not sure

DYNAMIC OBSTRUCTION :

- In this obstruction peristalsis is working against a mechanical obstruction
- It may occur in acute or chronic form

CAUSES :

- **Intralumina :** Foreign body, fecal impaction, bezoar, gall stones
- **Intramural :** Stricture, malignancy, intussusception, volvulus
- **Extramural :** Bands/ adhesions, hernia.

CLINICAL FEATURES

- First symptom is abdominal pain
- Distension
- Vomiting (the more distal the obstruction the longer interval b/w appearnce of symptoms and vomiting)
- Absolute constipation (it is a cardinal feature of complete intestinal obstruction)
- Dehydration is seen most commonly in small bowel bstruction
- Hypothermia indicates infarction or perforation
- Pyrexia in presence of obstruction may indicate onset of ischemia, perforation, inflammation

HIGH SMALL BOWEL OBSTRUCTION :

- Vomiting occurs first
- Distension is minimal

LOW SMALL BOWEL OBSTRUCTION:

- Pain (central abdomen) with central distension first
- Vomiting is delayed
- Multiple fluid levels (central) on x-ray abdomen.

LARGE BOWEL OBSTRUCTION :

- Distension is early and pronounced
- Mild pain (lower abdomen)
- Vomiting and dehydration are late features

RADIOLOGICAL FEATURES :

- Supine x-ray abdomen
- Contrast enema for distinguishing between small and large bowel
- Normal fluid levels are 2 in number one at duodenal cap and other in terminal ileum
- **Small Bowel Obstruction :**
  - more distal the lesion the number of fluid level increases accordingly
  - Straight segment , generally central, lie transversally
  - No gas is seen in colon
  - Jejunum : mucosal folds completely pass across the width of bowel , regularly spaced, ladder pattern called as valvulae conniventes
  - The distal ileum is featureless
- **Large Bowel Obstruction :**
  - Cecum : distended, round gas shadow in RIF
  - Except for cecum large bowel shows haustral folds, irregularly spaced, incomplete

TREATMENT OF ACUTE INTESTINAL OBSTRUCTION :

- IV fluid rehydration
- NG decompression
- Broad spectrum antibiotics
- Correction of electrolyte imbalance
- Laparotomy via midline incision
- Cecum identification and assessment : if collapsed then small bowel obstruction, if dilated then large bowel obstruction
- Identify the cause of obstruction and remove accordingly like adhesiolysis if adhesions or untwisting if volvulus
- Check the viability of bowel resection if non viable with end to end anastomosis
- Second look laparotomy in doubt ful cases.

BOWEL DIAMETER :

- Small bowel = 30mm
- Large bowel = 60mm
- Cecum = 90 mm

STRANGULATION :

- Type of obstruction in which blood supply is compromised and bowel become ischemic
- Venous return is compromised before the arterial supply
- Once arterial supply is impaired hemorrhagic infarction occur
- As the viability of bowel is compromised, translocation and systemic exposure to anaerobic organism and endotoxins occur
- It is a surgical emergency

CAUSES :

- Mesenteric infarction
- Closed loop obstruction
- Internal hernia
- Adhesions
- Intussusception
- Volvulus

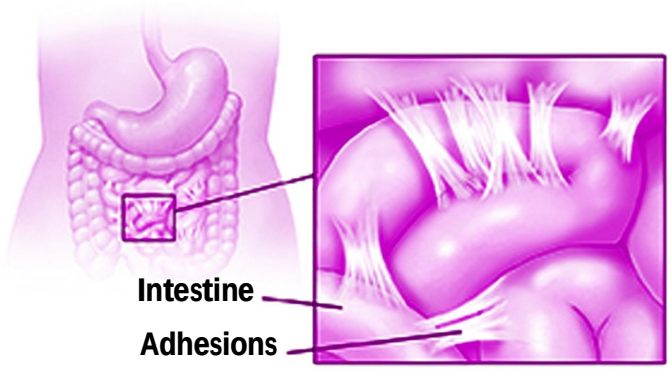
CLINICAL FEATURES

- Abdominal pain (constant)
- On examination : tenderness and rigidity
- Sudden onset of symptoms
- Signs of shock

TREATMENT :

- IV fluid
- NG decompression
- Broad spectrum antibiotics
- Laprotomy
- Resect the non viable bowel segment and perform end to end anastomosis
- Abdominal lavage if peritoneal contamination

ADHESIONS :



- These are the fibrous bands forms between the tissue and organs
- Adhesions are most common cause of intestinal obstruction
- Adhesions starts to form within hours of abdominal surgery

CAUSES :

- Acute inflammation eg sites of anastomosis, trauma , ischemia
- Foreign material eg gauze, silk, starch
- Infections eg TB , peritonitis
- Chronic inflammatory conditions eg CD
- Radiation enteritis

PREVENTION OF ADHESIONS :

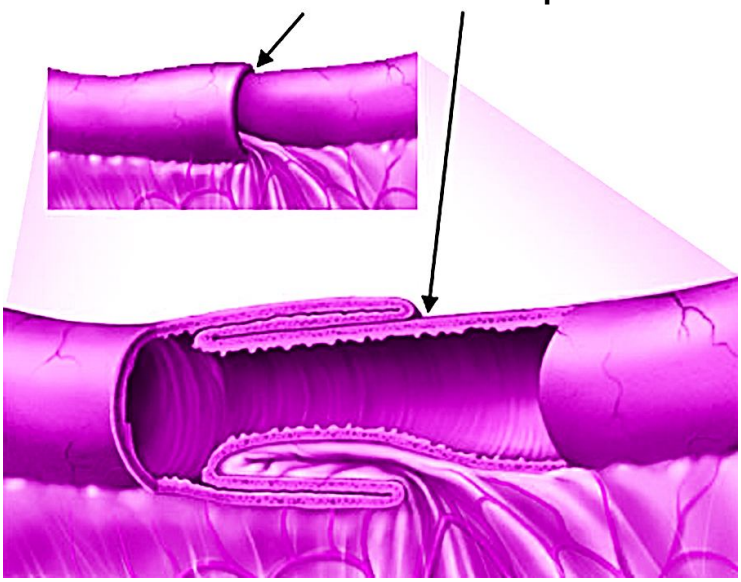
- Good surgical techniques
- Washing of peritoneal cavity with saline to remove clots
- Minimizing contact with gauze
- Covering anastomosis and raw peritoneal surfaces

TREATMENT :

- IV fluid
- NG decompression
- Broad spectrum antibiotics
- Conservative management should not be prolonged for > 72 hours
- At operation , divide only the causative adhesions and limit dissection
- Laparoscopic adhesiolysis
- Recurrent intestinal obstruction due to adhesions can be treated with
  - Repeat adhesiolysis (enterolysis) alone
  - Noble's plication operation
  - Charle's phillips transmesenteric plication
  - Intestinal intubation

INTUSSUSCEPTION :

Small Intestine With Intussusception



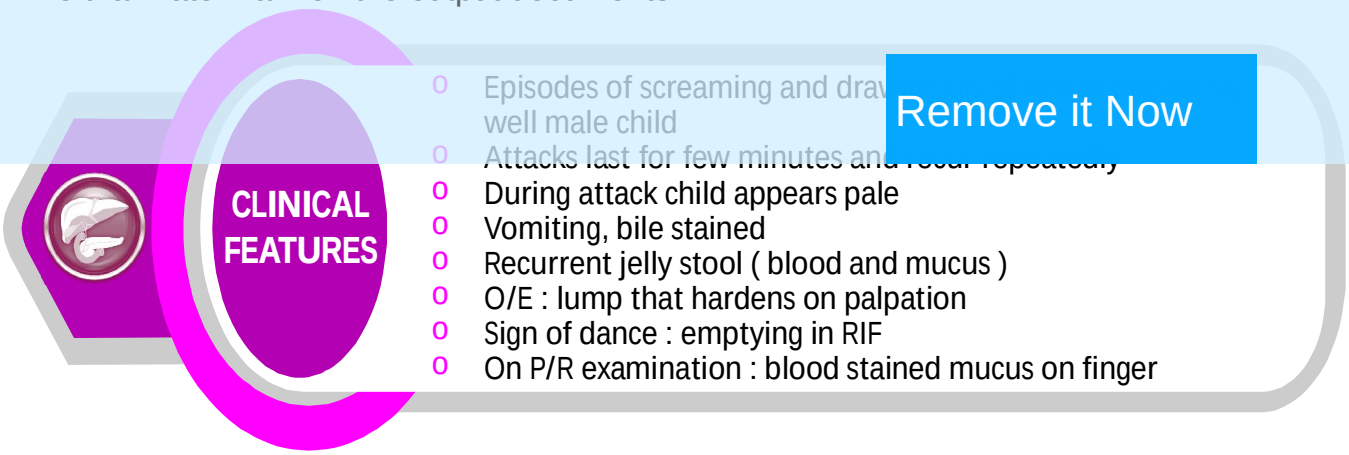
- This occur when one portion of gut invaginates into an immediately adjacent segment
- More common in children
- Peak incident 5-10 months of age
- Most common type in children is ILEOCOLIC
- Most common type in adult is colocolic

CAUSES :

- 90% are idiopathic
- Associated with RTI
- Gastroenteritis
- Hyperplasia of peyer's pathers in ileum
- Meckel's diverticulum (LEAD POINT IN CHILDREN)
- Peutz jeghers syndrome (LEAD POINT IN ADULTS)
- Polyp
- Duplication
- Henoch schonlen purpura

PATHOLOGY :

- **Intussusceptum :** Returning or Middle part
- **Intussuscipiens :** Sheath or outer tube
- **Intussusception :** Entering or iNner tube
- **Apex :** Leading edge
- **Neck :** Junction of entering layer with the mass



INVESTIGATIONS :

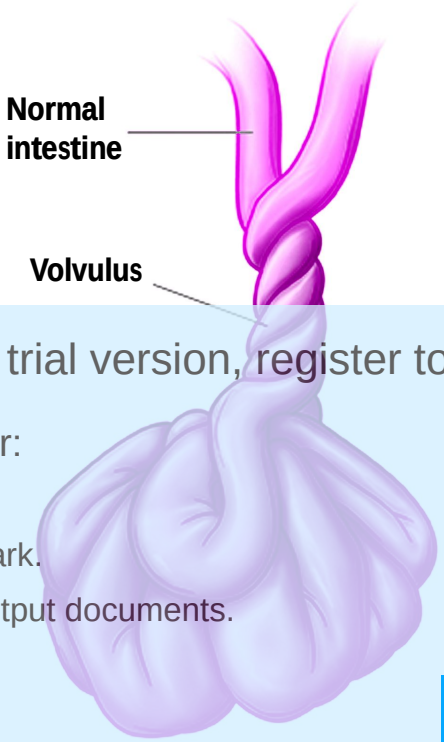
- Plain abdominal x ray : Absent cecal gas shadow in an ileocolic case, Evidence of small or large bowel obstruction
- Barium enema : Claw sign in ileocolic intussusception
- Ultrasound abdomen : Doughnut appearance concentric rings in t.colon
- CT scan : Target or sausage shaped soft tissue mass , typical mesenteric vessels within bowel lumen

TREATMENT :

- IV fluids
- Broad spectrum antibiotics

- Non operative reduction via Air or barium enema
- Non operative reduction is contraindicated if there are signs of peritonitis or perforation
- More than 70 % intussusception reduce non operatively *
- Surgical reduction via transverse right sided abdominal incision
- Gentle compression of most distal part of intussusception towards its origin
- Check bowel viability , resect if non vialble with end to end anastomosis

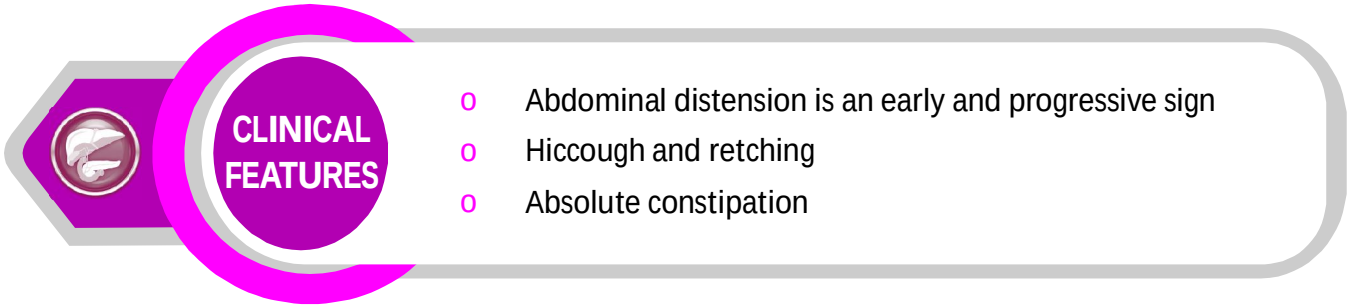
VOLVULUS :



- It is a twisting or axial rotation of a portion of bowel about its mesentery
- If torsion is > 180 degree volvulus cause obstruction to the lumen
- If torsion is > 360 degree it casuse vascular occlusion in the mesentery
- Volvoulus may be primary or secondary
- Primary : it occur secondary to congenital mal rotation of gut, abnormal mesenteric attachments, congenital bands eg v. neonatorum, cecal v , sigmoid v
- Secondary : more common, rotation of segment of bowel around an acquired adhesion or stoma

SIGMOID VOLVULUS :

- Twist is anticlock wise
- Most common type in adults
- Predisposing factors are :
  - Constipation
  - High residue diet
  - Band of adhesions
  - Overloaded pelvic colon
  - Long pelvic mesocolon
  - Narrow attachment of pelvic mesocolon



- Abdominal distension is an early and progressive sign
- Hiccough and retching
- Absolute constipation

INVESTIGATIONS :

- X-ray abdomen : massive colonic distension, 2 limb running diagonally across abdomen from right to left with 2 fluid levels one within each loop

TREATMENT :

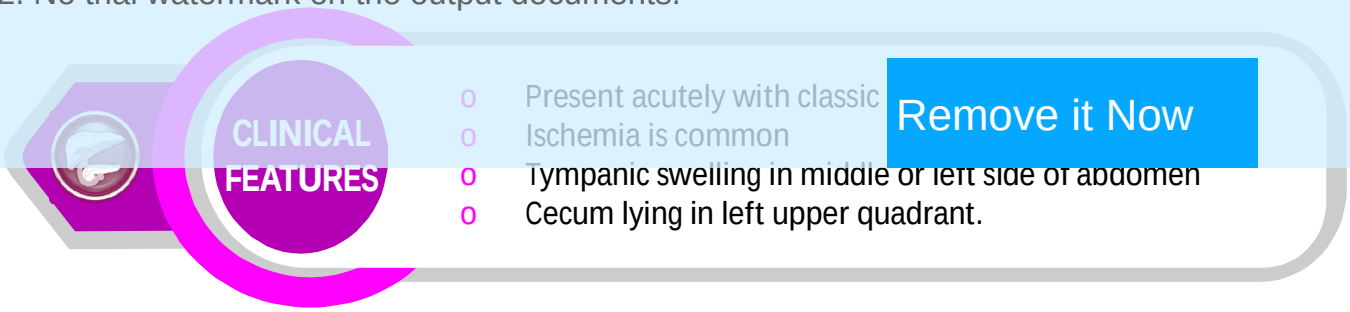
- Flexible or rigid sigmoidoscopy and insertion of flatus tube to allow deflation of gut tube secured in place with tape for 24 hrs and repeat the x-ray

SURGERY :

- If bowel is viable fixation pf sigmoid colon to posterior abdominal wall
- If bowel is non viable sigmoid colectomy or peutz milkulicz procedure is carried out

CECAL VOLVULUS :

- This is more common in females in 4th or 5th decade
- The twist is clock wise.



- Present acutely with classic
- Ischemia is common
- Tympanic swelling in middle or left side of abdomen
- Cecum lying in left upper quadrant.

INVESTIGATIONS :

- Xray abdomen : cecal dilation, single air fluid level, small bowel dilation, absence of gas in distal colon
- Barium enema : absence of barium in cecum and a BIRD BEAK deformity

TREATMENT :

- If bowel is viable : cecostomy or fixation of cecum to the RIF
- If bowel is non viable/ ischemic : right hemicolectomy

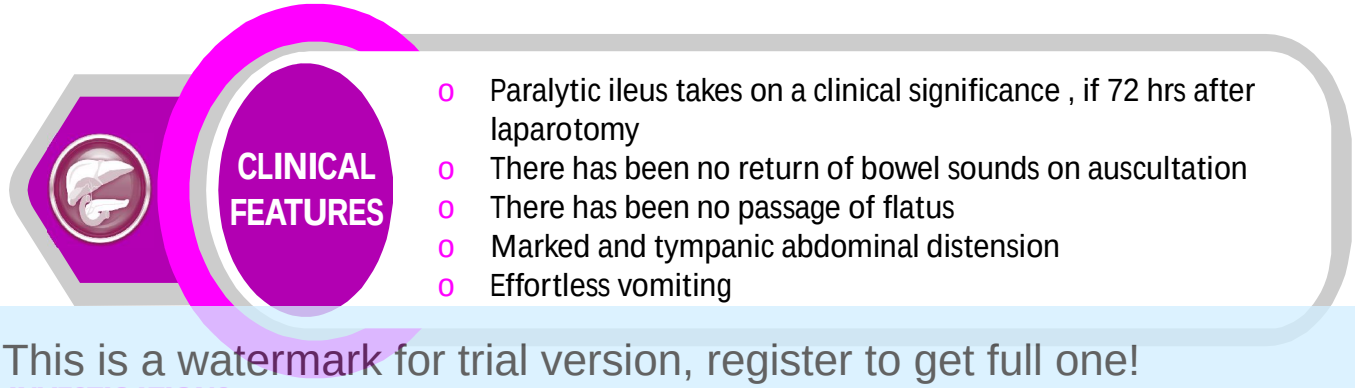
ADYNAMIC OBSTRUCTION :

PARALYTIC ILEUS :

- A state in which failure of transmission of peristaltic waves secondary to neuromuscular failure
- The resultant stasis leads to accumulation of fluid and gas within the bowel

TYPES :

- Post operative : self limiting, duration of 24-72 hours
- Infection : intra abdominal sepsis
- Reflex ileus : following fracture of spine or ribs , reteroperitoneal hemorrhage, application of a plaster jacket
- Metabolic : uremia, hypokalemia



- Paralytic ileus takes on a clinical significance , if 72 hrs after laparotomy
- There has been no return of bowel sounds on auscultation
- There has been no passage of flatus
- Marked and tympanic abdominal distension
- Effortless vomiting

INVESTIGATIONS :

- X-ray abdomen : distilled loop of intestine with multiple fluid levels

TREATMENT :

- IV fluids
- NG decompression
- Correct electrolyte imbalance
- Treat the primary cause
- Adrenergic blocking agents
- Cholinergic stimulation

PSEUDO OBSTRUCTION :

- An obstruction that occur in the absence of a mechanical cause or acute intra abdominal disease
- Most common site of obstruction is COLON *

RISK FACTOR :

- Metabolic : DM, hypokalemia, uremia, myxodema, intermittent porphyria
- Severe trauma
- Shock : burns, MI, stroke, septicemia, post operative
- Reteroperitoneal irritation : blood , urine, enzymes, tumors
- Drugs : tricyclic antidepressants, phenothiazines, laxatives
- Scleroderma
- Chagas disease

TREATMENT :

- Correct the underlying cause
- Antibiotics
- Antiemetics if needed
- Colonoscopic decompression
- Tube cecostomy

KEY POINTS

- Cause of dynamic obstruction is gall stones , bezoars
- Proximal site of obstructed bowel dilated and show altered motility
- Closed loop obstruction eg is malignant stricture of right colon with a competent ileocecal valve
- Abdominal pain is first symptom of dynamic intestinal obstruction
- There are 2 fluids levels in adults
- Pyrexia in presence of obstruction may indicate ischaemia
- Strangulation present with constant pain , tenderness with rigidity, shock
- Most commonly associated leading point in adults is polyp
- > 70% intussusception is reduced non operatively
- Sigmoid volvulus is most common spontaneous type of volvulus in adults
- Most common site of pseudo obstruction is colon
- Most common site of ischemic colitis is spleenic flexure
- Bilious vomiting is abdominal feature of jejunal atresia
- Abdominal distension is most common feature of ilieal atresia
- Duodenal atresia is most common

Case example :
A 1 year old child is brought to ER by parents with c/o bile stain
excessive crying , recurrent jelly stool
O/E a hard mass is palpable in abdomen and emptying of RIF

Q : What is the diagnosis ?
A : Intusseption

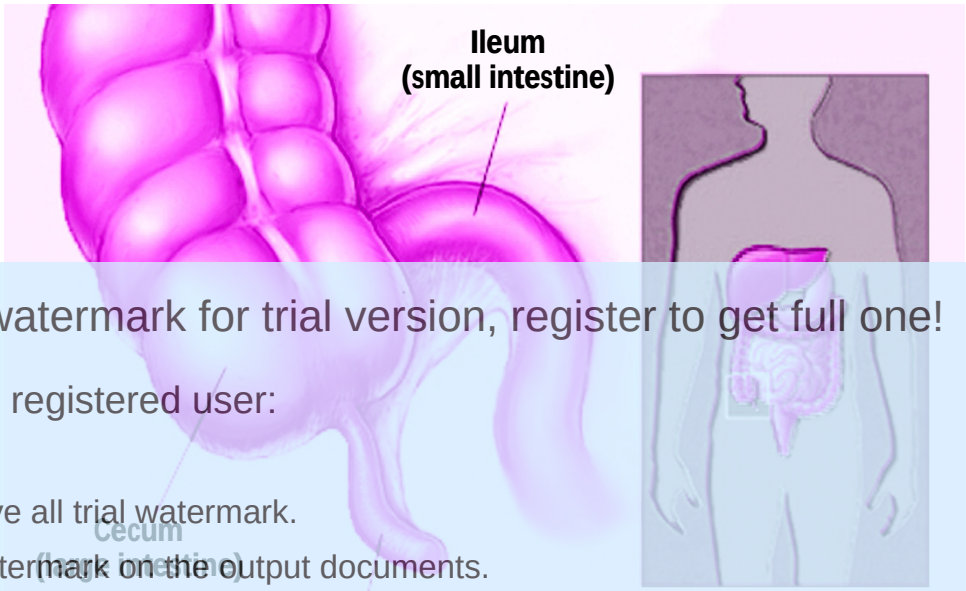
Q : What are the investigations ?
A : X-ray abdomen, ba enema, ultrasound, CT scan

Q : What are the treatment options ?
A : Spontaneous sloughing, air enema, surgery

THE VERMIFORM APPENDIX

Chapter 42

ANATOMY :



- It is a blind muscular tube
- It has 4 layers I.e mucosa, submucosa, muscularis, serosa
- At birth the appendix is short and broad at its junction with cecum
- At the age of 2 yrs the differential growth of the cecum produces a typical tubular structure
- During childhood appendix rotates into reterocecal but intra peritoneal position
- If this rotation fails to occur, it will result in pelvic, subcecal or paracecal position of appendix
- Appendix can be felt in LIF in case of intestinal malrotation
- Appendix can be felt near GB if cecum does not migrate in development to its normal position in right lower quadrant
- The position of base of appendix is constant,being found at the confluence of 3 taenia coli of cecum which fuse to form outer longitudional muscle coat of appendix
- The mesentery of appendix arises from lower surface of mesentery or terminal ileum
- The appendicular artery is a branch of lower division of ileocolic artery
- The appendicular artery passes behind the terminal ileum to enter the mesoappendix
- The appendicular artery is an end artery , thrombosis of which result in necrosis of appendix
- Lymphatics empty into the ileocecal lymph nodes

MICROSCOPIC ANATOMY :

- Average length is between 7.5 - 10 cm
- Lined by columnar cells
- Crypts are present
- In the base of crypts argentine (kulchitsky) cells which may give rise to carcinoid tumor
- The appendix is the most common site of carcinoid tumor

ACUTE APPENDICITIS :

- It refers to acute inflammation of appendix
- It is the most common surgical emergency
- Rare in infants
- Peak incident in childhood and early adult life

RISK FACTORS :

- Decrease dietary fibresbacterial proliferation within appendix
- Fecolith obstruction
- Stricture
- Obstruction by tumor of cecum
- Barium enema

PATHOLOGY :

- Obstruction of appendiceal lumen by inflammation and lymphoid hyperplasia
- Inflammatory exudates and mucus secretion increases the intra luminam pressure, obstructing lymphatic drainage
- Edema and mucosalulceration develop with bacterial translocation to submucosa
- Further distension of appendix may cause venous obst endix wall producing gangrenous appendix with bacterial inv oria and submucosa.

RISK FACTORS FOR PERFORATION OF APPENDIX :

- Extremes of ages
- Immunosuppression
- DM
- Fecolith obstruction
- Pelvic appendix
- Previous abdominal surgery

TYPES :

- Obstructive appendix :
- More acute onset
- Generalize abdominal pain from start
- Vomiting
- Urgent surgical intervention is required

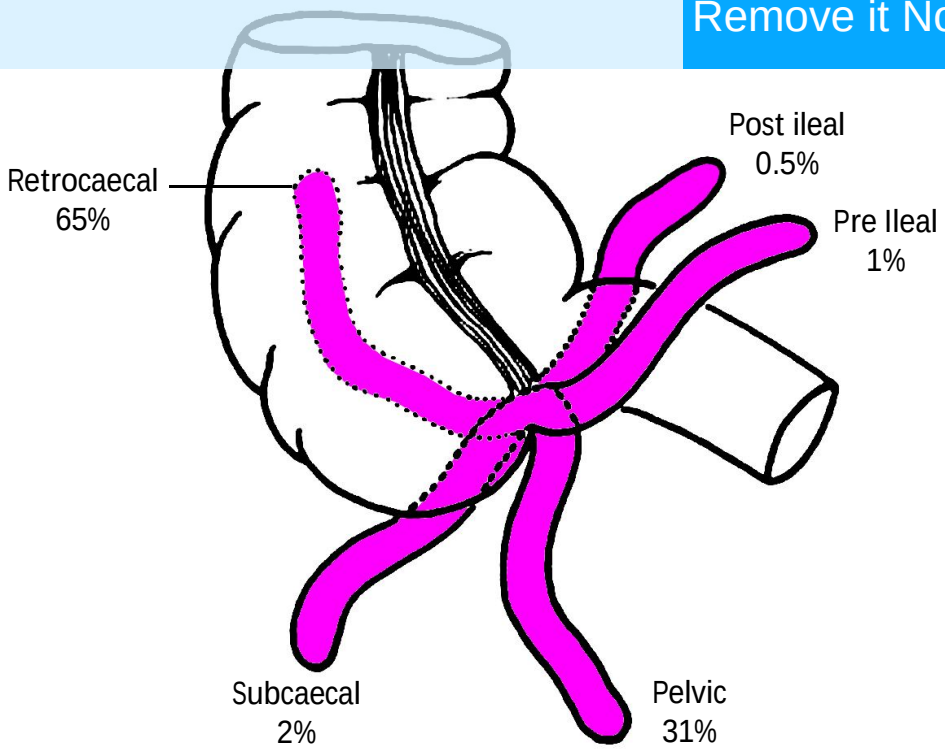
NON OBSTRUCTIVE APPENDIX :

- It is also called acute catarrhal appendicitis

CLINICAL FEATURES

- Poorly localized colicky abdominal pain
- Pain shifting to RIF
- Anorexia
- Nausea vomiting
- Slight pyrexia
- Tachycardia
- O/E : localized tenderness
- Muscle guarding classically at mc burney's point
- Rebound tenderness
- Pointing sign : patient points where the pain begins and where it moved
- Positive Rovsing sign : deep palpation in LIF may cause pain in RIF
- Psoas sign : patient lie with right hip flexed for pain relief as appendix lie on psoas muscle
- Obturator sign :pain in hypogastrium while hip is flexed and internally rotated, seen in pelvic appendix

SPECIAL FEATURES ACCORDING TO POSITION OF APPENDIX :



RETEROCECAL APPENDIX :

- Rigidity is often absent
- Also called silent appendix because cecum is distended with gas prevent the pressure exerted by the hand from reaching the inflammed structure
- Psoas spasm can occur as inflamed appendix is in contact with the muscle : flexion of hip
- joint, hyperextension of hip joint may induce abdominal pain.

PELVIC APPENDIX :

- Diarrhea
- Abdominal rigidity and tenderness is often absent
- P/R examination : tenderness at rectovesicla pouch or pouch of douglas
- Psoas sign positive
- Obturator sign positive

POSTILEAL APPENDIX :

- Inflammed appendix lie behind the terminal ileum
- Pain in right flank
- Diarrhea
- Marked retching
- Ill defined tenderness may to the right of the umbilicus

SPECIAL FEATURES ACCORDING TO AGE :

- Rare in infants < 30 months of age
- Child with appendicitis have a complete aversion to food
- Genrene and perforation occur much more frequently in elderly patient
- Appendicitis is the most common extra uterine abdominal condition in pregnancy
- Diagnosis is complicated by delay in presentation
- Pain in right lower quadrant of abdomen remain is cardinal symptom in pregnancy
- Fetal loss occur in 3-5 % cases
- Increased to 20 % if perforation is found at operation.

DIFFERENTIAL DIAGNOSIS :

CHILDREN :

- Gastroenteritis : vomiting is beore pain *
- Mesenteric adenitis
- Meckle's diverticulum
- Intussusception
- Henoch schonlen purpura

ADULTS :

- Terminal ilitis
- Uretric colic
- Right sided acute pyelonephritis
- Perforated peptic ulcer
- Testicular torsion
- Rectus sheath hematoma

ADULT FEMALE :

- Pelvic inflammatory disease MOST COMMON *
- Mittelschmerz
- Ectopic pregnancy
- Torsion / hemorrhage of ovarian cyst.

INVESTIGATIONS :

- Diagnosis of acute appendicitis is essentially clinical
- Alvarado (MANTRELS) score : Score 7 or more out of 10 = strongly suggestive of acute appendicitis

Symptoms	Migratory RIF pain Anorexia Nausea & vomiting	1 1 1
Sign	Tenderness RIF Rebound tenderness Elevated temperature	2 1 1
Labs	Leukocytosis Shift to left	2 1
Total		10

- CBC
- UCE
- Urinalysis
- Pregnancy test
- U/S
- X ray abdomen supine
- Contrast enhanced ct scan.

TREATMENT :

- Treatment of acute appendicitis is appendicectomy
- Common incision are :

GRID IRON INCISION :

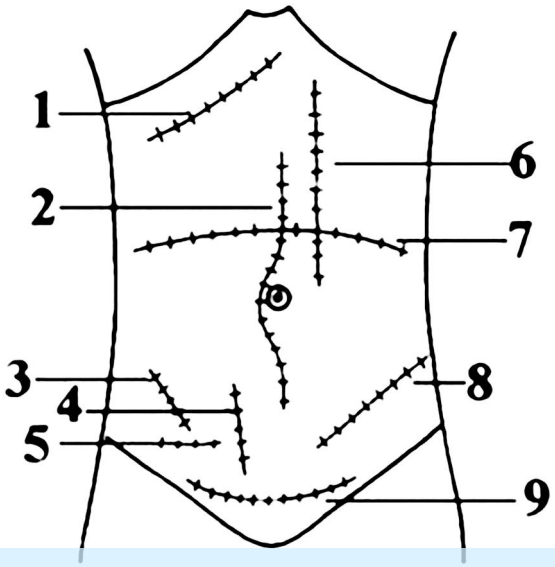
- Made at right angle to line joining the anterior superior iliac spine to the umbilicus
- Center being along th line at Mcburney's point

RUTHERFORD MORRISON INCISION :

- It involves cutting of internal oblique and transverse muscle with lower end of incision over McBurney's point and extending upward and laterally as necessary.

LENZ INCISION :

- Also called transverse skin crease incision
- Better exposure and extension
- 2 cm below umbilicus, centered at mid clavicular - mid inguinal point



1- Kocher incision
2- Midline incision
3- Mc Burney incision
4- Battle incision
5- Lanz incision
6- Para median incision
7- Transverse incision
8- Rutherford Morrison incision
9- Pfannenstiel incision

APPENDICECTOMY :

- Identify the cecum by presence of tenia coli
- Appendix is felt at the base of cecum
- Base of mesoappendix is clamped , divided and ligated
- Appendix is clamped and tied at the base then excised
- The stump of appendix is inverted using purse string suture
- Wound close in layers

PROBLEMS ENCOUNTERED DURING APPENDICECTOMY :

NORMAL APPENDIX :

- Always look for meckle's diverticulum and feel pelvic c

APPENDICEAL TUMOR :

- Small tumors < 2 cm = appendicectomy
- Large tumors > 2cm = right hemicolectomy

APPENDIX ABSCESS :

- Drainage of abscess
- IV antibiotics
- Sometimes cecotomy or right hemicolectomy is required

PELVIC ABSCESS :

- Most commonly present with spiking pyrexia several days after appendicitis *
- Treated by transrectal drainage under GA

CROHN'S DISEASE :

- If cecal wall are healthy at the base of appendix = appendicectomy
- If crohn's disease affecting pelvis = iv steroids and antibiotics

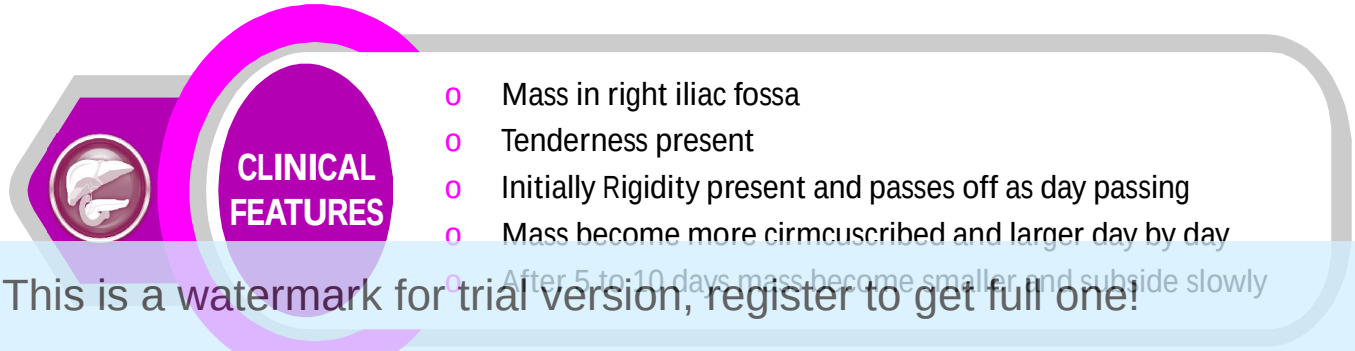
POST OPERATIVE COMPLICATIONS :

- Wound infection
- Intra abdominal abscess

- Ileus
- Respiratory complications
- Portal pyema
- Fecal fistula
- Adhesive intestinal obstruction

APPENDIX MASS :

- It is an inflammed appendix with an adherent covering of omentum and small bowel



TREATMENT :

OCHSNER-SHERREN-REGIMEN :

- NPO
- Monitoring of vital sign
- Analgesia
- Antibiotics (metronidazole + cefurexime)
- IV fluids
- CT guided drainage if abscess
- Anti thrombotic therapy
- Glycerine suppository if needed.

SURGICAL INDICATIONS (PPM)* :

- Pulse is rising
- Pain (increase abdominal pain)
- Mass (increasing size of mass)
- Small bowel obstruction due to adhesions

KEY POINTS

- The appendix is the most common site for carcinoid tumor
- In obstructive and non obstructive appendicitis there is a generalize pain from start
- Appendicitis is the most common extra uterine abdominal condition
- in pregnancy
- Gastroenteritis is most common differential diagnosis of appendicitis
- but in this condition vomiting occur before pain
- In adult female PID is most common differential diagnosis of appendicitis
- Avarado score 7 or > 7 require operation
- Grid iron incision : right angle to a line joining the anterior superior iliac spine to umblicus center of incision being along the line at Mc.burney's point
- Lenz incision : a transverse skin crease incision 2cm below the umbilicus, centered on mid clavicular mid inguinal point
- Pelvic abscess most commonly present with spiking pyrexia

Case example :
A 17 years old male came in ER with c/o RIF pain for 1 hour with vomiting
O/e : rebound tenderness in RIF and raised TLC count

Q : what is your diagnosis ?
A : acute appendicitis

Q : how will you diagnose the condition
A : diagnosis is mainly clinical (MANTRELS)

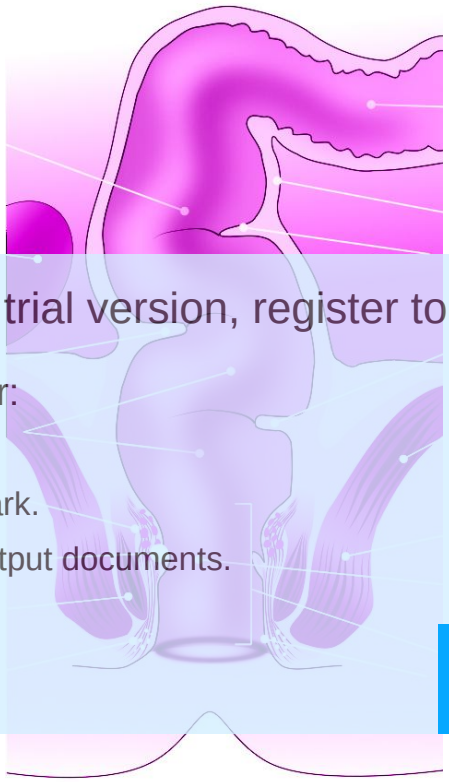
Q : what is the treatment ?
A : appendicectomy

Q : what are the different incision for appendicectomy ?
A : lanz incision
Grid iron incision
Rutherford morrison incision
Right transverse incision
Lower midline incision

THE RECTUM

Chapter 43

ANATOMY :



- The rectum is 12-18 cm long
- It extend between sigmoid coolon and anal canal
- It follows the curve of the sacrum and ends at anorectal junction
- The puborectalis muscle creates a anorectal junction normally 120 degree
- The rectum has 3 lateral curvatures, the upper and lower are convex to the right and the middle is convex to left
- The 3 curves are marked by semicircular folds (houston's valve)
- The rectum is divided into 3 parts
  - **Upper third :** mobile, covered with peritoneum
  - **Middle third :** covered with peritoneum anteriorly and part of lateral surface
  - **Lower third :** lies deep in pelvis, seperated from adjacent structures by fascial layers
- Denonvilliers fascia seperates the rectum from prostate / vagina in front
- Waldeyer's fascia seperate the rectum from coccyx and lower 2 sacral vertebrae from behind

BLOOD SUPPLY :

- Superior rectal artery : main supply of rectum , it is a direct continuation of inferior mesenteric artery
- Middle rectal artery : arise on each side from internal iliac artery
- Inferior rectal artery :arises on each side from the internal pudendal artery.

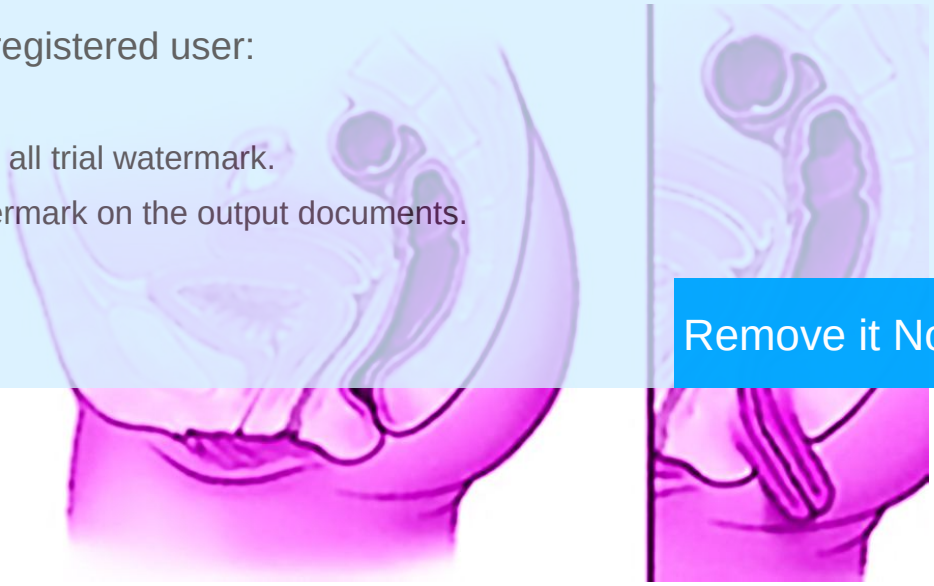
VENOUS DRAINAGE :

- Superior hemorrhoidal vein draining the upper half of anal canal above the dentate line drain into inferior mesenteric vein , which drain into hepatic portal system
- Middle rectal vein drain into IVC
- Inferior rectal vein drain into IVC

LYMPHATIC DRAINAGE :

- The usual drainage flow is UPWARD
- Upper half of rectum drain into inferior mesenteric lymph nodes
- Lower half of rectum into internal iliac lymph nodes

RECTAL PROLAPSE :



- Prolapse usually either mucosal or full thickness rectal wall decent

FULL THICKNESS PROLAPSE :

- Also called as procidentia
- It is less common
- Protrusion consist of all layers of rectal wall
- Usually associated with weak pelvic floor
- It starts with the anterior wall of rectum where supporting tissues are weakest
- It is > 4 cm and commonly as much as 10-15 cm in length
- Any prolapse over 5 cm in length contains anteriorly between its layers a pouch of peritoneum
- 6 times more common in females
- Commonly associated with prolapse of yterus in females
- In 50% of adults fecal incontinence is a feature

DIFFERENTIAL DIAGNOSIS :

- Ileocecal intussusception (children)
- Rectosigmoid intussusception (adults)

TREATMENT :

- surgery is the treatment of choice
- Operation can be performed via abdominal or perineal approach

PERINEAL APPROACH :

- **Thiersch approach :**
  - Place a steel wire or a silastic or nylon suture around the anal canal
  - It has become obsolete now because the suture often break or cause chronic perineal abscess
- **Delorme's operation :**
  - The rectal mucosa is removed circumferentially from the prolapsed rectum
  - The underlying muscle is then plicated with a series of sutures, so that when these are tied, the rectal mucosa is concertinaed towards the anal canal
- **Altemier's procedure :**
  - Excision of prolapsed rectum and associated sigmoid colon from below and construction of a coloanal anastomosis

ANDOMINAL APPROACH :

- Principle is to fix the rectum in its normal position
- Inserting a sheath of polypropyelene mesh between re
- Hitching up the recto sigmoid junction with a teflon sli
- **Sutured rectopexy :** suturing the mobilized rectum to the sacrum via 4 to 6 interrupted non absorbable sutures
- Laproscopic rectopexy
- **Resection rectopexy :** abdominal rectopexy + resection of sigmoid colon
- Anterior mesh rectopexy

DIFFERENCE BETWEEN ABDOMINAL AND PERINEAL APPROACH :

- Perineal approach is preferred in elderly and young males
- Abdominal approach has a lower recurrence rate
- Abdominal approach has a disadvantage of severe constipation and sexual dysfunction

MUCOSAL PROLAPSE :

- The mucus membrane or submucosa of rectum protrude outside the anus approximately 1-4 cm
- In infants the direct downward course of the rectum due to undeveloped sacral nerves
- In children it is followed by repeadted attacks of diarrhea, weight loss, maldevelopment of pelvis
- In adults it is associated with 3rd degree hemorrhoids , torn perinium in female. Straining from uretheral obstruction in male. Weakness of sphincter muscle in old age

TREATMENT :

- **In infants and young children :**
  - Digital repositioning
  - Submucosal injections of 5% phenol in almond oil
  - Surgery : suturing of rectum to sacrum
- **In adults :**
  - Submucosal injections of phenol in almond oil
  - Rubber band applicatio
  - Excision of prolapsed mucosa

RECTAL CARCINOMA :

- It is the second most common malignancy in developed world
- Colorectal carcinoma arises from adenomas in a step wise progression

TYPES OF CARCINOMA SPREAD :

LOCAL SPREAD :

- Local spread occurs circumferentially
- If penetration occurs anteriorly the prostrate , seminal vesicles or bladder in males , vagina and uterus in females
- If penetration is lateral ureter may become involved
- If penetration posteriorly it involves sacrum and sacral plexus

LYMPHATIC SPREAD :

- Above the peritoneal reflection is almost always in upward
- Below the level is still upward

VENOUS SPREAD :

- The principal sites of blood born metastasis are liver then lungs and adrenals

PERITONEAL DIMENSIONS :

- This may follow penetration of the peritoneal coat by a high lying rectal carcinoma

DUKE'S STAGING :

- **Stage A :** Growth is limited to rectal wall 15 % cases , excellent prognosis
- **Stage B :** Extended to extrarectal tissue, no metastasis to regional lymph nodes, reasonable prognosis
- **Stage C 1:** Only local pararectal lymph nodes involvement
- **Stage C2 :** Nodes accompanying the supplied blood vessels are involved
- **Stage D :** Distant metastasis

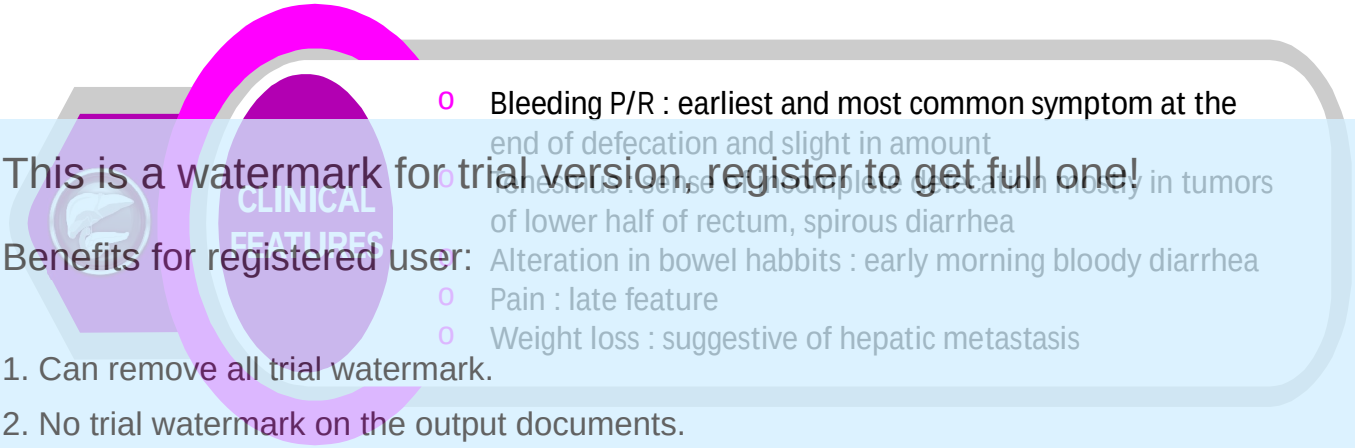
TNM STAGING :

T1	Invasion into muscularis mucosa
T2	Invasion into but not through muscularis propria
T3	Invasion through muscularis propria
T4	Invasion through serosa

N0 **N1** **N2**	No lymph nodes involvement 1-3 lymph node involvement 4 or more lymph nodes involvement
MO **M1**	No distant metastasis Distant metastasis

HISTOLOGICAL GRADING :

- Low grade : We differentiated, prognosis is good
- Average grade : Prognosis is fair
- High grade : Undifferentiated tumor, poor prognosis



- Bleeding P/R : earliest and most common symptom at the end of defecation and slight in amount
- Tenesmus : sense of incomplete defecation mostly in tumors of lower half of rectum, spirous diarrhea
- Alteration in bowel habbits : early morning bloody diarrhea
- Pain : late feature
- Weight loss : suggestive of hepatic metastasis

INVESTIGATIONS :

- DRE
- Sigmoidodcopy and biopsy
- Barium enema
- Colonoscopy
- Ct cholangiography
- Ct liver and chest
- MRI pelvis

TREATMENT :

- Surgery is the mainstay of treatment
- Pre operative chemo radiotherapy to reduce the tumor size and reduce the incidence of local recurrence.

ANTERIOR RESECTION :

- It is used when tumor is confined to iddle third of rectum
- It is a sphincter preserving operation
- It consist of removal of rectum, mesorectum, associated lymph nodes, end to end anastomosis.

ABDOMINOPERINEAL RESECTION ABPR :

- For tumors of lower third of rectum
- Less commonly used as it does not preserve the sphincter
- Trendelenberg lithotomy position

- Abdominal procedure is carried out via laproscopy or midline laprotomy
- Perineal procedure via elliptiical incision between tip of coccyx and centreal perineal point around the anus
- It involves removal of anus, rectum, mesocolon, part of sigmoid colon and associated lymph nodes
- Permanent colostomy is made in the LIF

HARTMANN'S PROCEDURE :

- In old and frail patients
- An abdominal incision is made
- Excised the rectum , anorectal stump is transected with a stapler end colostomy is formed

BRUNCHWIG'S OPERATION :

- Also known as pelvic exenteration
- Aim is to remove all the pelvic organs together with internal iliac and obturator lymph nodes
- A rectus abdominus flap may be used to fill the empty pelvis

CHEMOTHERAPY AND RADIOTHERAPY :

- Chemotherapy is used as an adjuvant therapy for treatment of disseminated disease
- Most commonly used is 5 florouracil or its oral equvivalent (caecitabine)
- The neoadjuvant radiotherapy reduces the risk of local recurrence
- Combine radio and chemotherapy can be given pre operatively to shrink the size of tumor

KEY POINTS

- The rectum is the most comm… …na
- In rectal cancers surgery is the…
- Anterior resection involves : removal of rectum, mesorectum, lymphnodes, end to end anastomosis

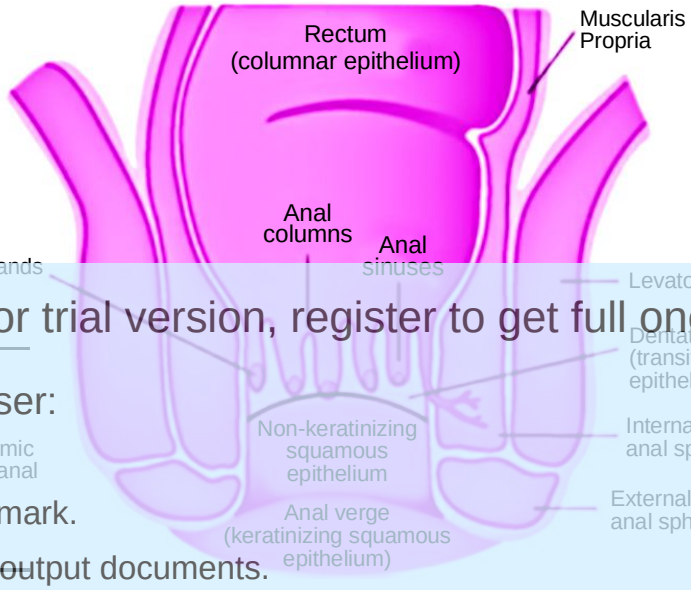
Case example :
A 60 years old male came to OPD with c/o bleeding P/R at the end of defecation, tenesmus, weight loss, abdominal pain and altered bowel habbits

Q : what is the diagnosis ?
A : rectal carcinoma
Q : what are the investigation ?
A : DRE, Sigmoidodcopy and biopsy, Barium enema , Colonoscopy, Ct cholangiography, Ct liver and chest, MRI pelvis
Q : what is the treatment :
A : surgery is the mainstay of treatment
Anterior resection, ABPR, hartmann's procedure , brunchwig's procedure, chemo radiotherapy

ANUS AND ANAL CANAL

Chapter 44

SURGICAL ANATOMY :



- The anal canal lies below the pelvic diaphragm and en
- The anal canal is divided into upper 2/3 and lower 1/3
- Dentate line is a hindgut proctoderm junction

	Upper anal canal (2/3)	Lower anal canal (1/3)
Characteristics	Visceral portion	Somatic portion
Formation	anal column of morgagni, anal valves, anal sphincter	It extend from pectinate line to the anal verge
Epithelium	simple columner cuboidal epithilium	Stratified squamous
Venous Drainage	portal venous system via superior rectal vein	Caval system via middle and inferior rectal vein
Lymphatic Drainage	internal iliac nodes	Superficial inguinal nodes
Sensory Supply	from pelvic plexus	Pudendal nerve

ANORECTAL RING :

- The anorectal bundle or ring is a muscular junction between the rectum and anal canal
- Anorectal ring can be clearly felt digitally
- Anorectal ring is formed by : puborectalis muscle + deep external sphincter + conjoint longitudinal muscle + highest part of internal sphincter

THE PUBORECTALIS MUSCLE

- Maintains the angle between anal canal and rectum
- Important component in continence mechanism
- The muscle derives its nerve supply from sacral somatic nerves nd its functionally indistinct from external anal sphincter.

THE EXTERNAL SPHINCTER :

- It forms the bulk of anal sphincter complex
- It is divided into deep , superficial and subcutaneous portion
- It is a somatic voluntary muscle, red in color and innervated by pudendal nerve.

THE INTERSPHINCTERIC PLANE / HILTON'S WHITE LINE :

- It lies between the external sphincter muscle laterally and longitudional muscle medially
- It contains intersphinteric glands
- It is a potential route to spread of pus

THE LONGITUDINAL MUSCLE :

- It is the direct continuation of smooth muscle of outer muscle coat of rectum
- During defecation its contraction widens the anal lumen, flattens the anal cushions, shortens the anal canal, everts the anal margins.

THE INTERNAL SPHINCTER :

- It is a thickened 2-5mm distal continuation of circular muscle coat of rectum
- It is innervated by autonomic nervous system
- It receives intrinsic non adrenergic non cholinergic (NANC) fibres
- Stimulation of NANC cause release of neurotransmitte[illegible]ternal sphincter relaxation

IMPERFORATE ANUS :

- It is a congenital defect
- In this defect the opening of anus is blocked or missing
- It is divided into two main groups high and low imperforate anus
- **High :** Rectum is patent to level above puborectalis sling, prone to fecal incontinence and difficult to correct
- **Low :** Rectum patient to level below puborectalis sling, prone to constipation, easy to correct
- In boys it is mostly associated with rectouretheral fistula (most common) and perianal fistula
- In girls it is associated with recto vestibular fistula (most common) , anterior anus
- The finding of single perineal orifice indicates a persistent cloaca.

INVESTIGATIONS :

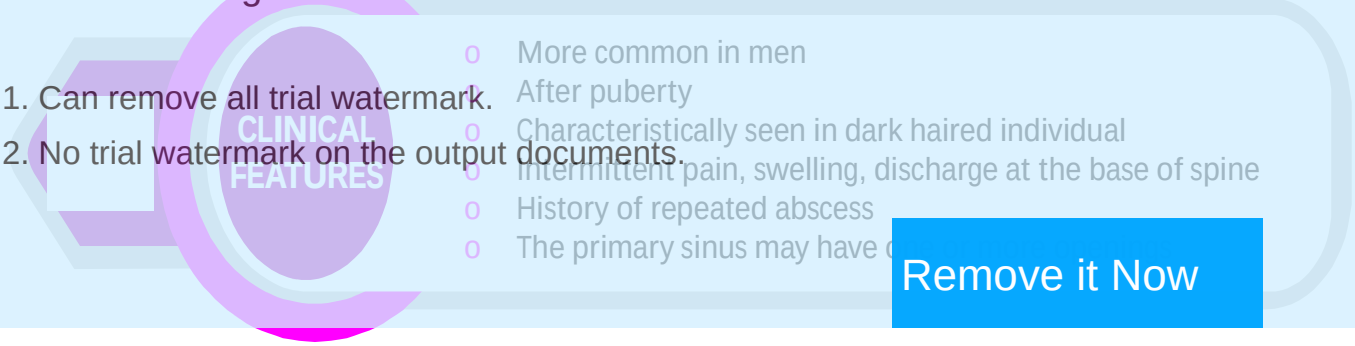
- DRE
- The presence of meconium on perinium indicates a low defect
- The presence of meconium in urine indicates urinary tract fistula
- Lateral prone radiograph show distance between rectal gas bubble and anal skin

TREATMENT :

- Anoplasty for low defects
- Temporary colostomy and later reconstructive surgery for high defects

PILONIDAL SINUS / JEEP DISEASE :

- It is a sinus found in natal cleft overlying the coccyx
- It communicates with a fibrous tract lined by granulation tissue and containing hair within the lumen
- It is thought to be a combination of buttock friction and sharing forces allow broken hair to drill through the mid line skin
- The condition is precipitated by excessive sitting
- Interdigital pilonodal sinus is an occupational disease of hairdressers
- Common between age 20-29 yrs
- No hair follicle found in the wall of sinus
- The hair projecting from the sinus are dead hair with their pointing ends directed towards the blind end of the sinus
- Recurrence is common.



CONSERVATIVE TREATMENT :

- Simple cleaning out of tract
- Removal of all hair
- Regular shaving of the area
- Strict hygiene

TREATMENT OF AN ACUTE ABSCESS :

- Rest
- Baths
- Local antiseptic dressings
- Broad spectrum antibiotics
- Surgical drainage of the pus via small longitudinal incision over the abscess and off the mid line

TREATMENT OF CHRONIC PILONIDAL SINUS :

- Karydaki's procedure / primary closure : excision of all tract by a semilateral incision and flap is mobilized to allow tension free closure of wound off the mid line

- Bascom's procedure / secondary closure : incision lateral to midline to gain access to sinus cavity, excision and closure of mid line pits, lateral wound is left open to heal by secondary intention
- Advantages over primary closure : shorter hospital stay, broad hairless scar which reduces recurrence
- Disadvantage over primary closure : slower healing, active wound care, delayed return to work due to open wound

ANAL FISSURES :

- It is a longitudinal split in the anoderm of distal anal canal
- It extends from the anal verge proximally towards, but not beyond, the dentate line
- Posterior mid line is the MOST COMMON SITE
- Anterior wall fissure is much more common in women

CAUSES :

- Strained evacuation of a hard stool
- Following vaginal delivery
- Vascular insufficiency

CLINICAL FEATURES

- Pain associated with defecationpassageof fresh blodd
- Constipation
- Chronic fissures exhibits sen
  hypertrophied anal papillae

ASSOCIATED CONDITIONS :

- TB
- CD
- STD HIV related ulcers
- Squamous cell carcinoma

TREATMENT :

- Stool softner
- Advice high fibre diet
- Adequate water intake

Sitz bath/ warm baths
Topical anesthetic agents
GTN 0.2% four times per day
Diltiazem 2% twice daily

MANUAL DILATION :

- Forced manual sphincter dilation (4-8 digits) under regional or GA
- Procedure of choice in young men with high sphincter tone
- High risk of incontinence.

LATERAL ANAL SPHINCTEROTOMY :

- The internal sphincter is divided away from the fissure
- Early complication includes hemorrhage, hematoma, bruising, perianal abscess and fistula
- 30 % patients may exhibit incontinence

ANAL ADVANCEMENT FLAP :

- Edges of fissure are excised
- Fissure is covered by an inverted flap of perineal skin using interrupted absorbable sutures
- Useful in those with low resting or normal anal pressure

HEMORRHOIDS :

- These are symptomatic anal cushions

TYPES :

INTERNAL HEMORRHOIDS :

- Lie in 3, 7 and 11 o,clock position
- They occur above the pectinate line

EXTERNAL HEMORRHOIDS :

- They are painful
- Occur below the pectinate line
- Related to venous channel of internal hemorrhoidal plexus deep in the skin

INTERNOEXTERNAL HEMORRHOIDS :

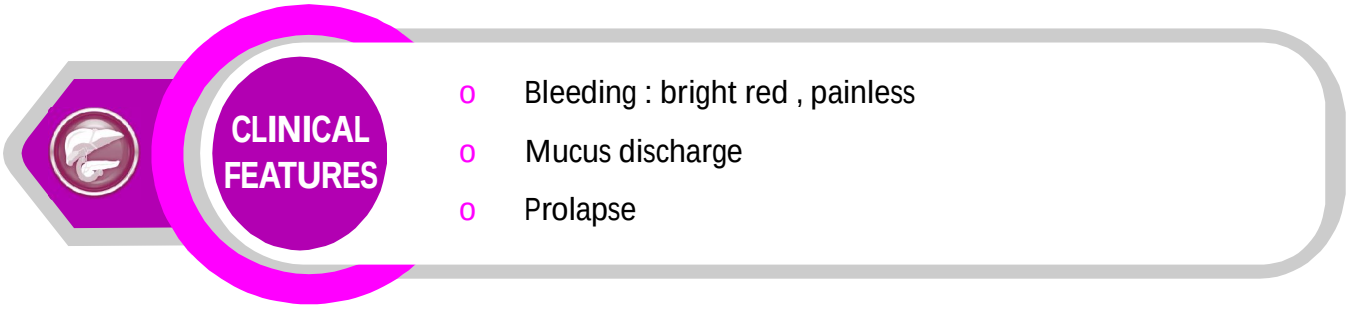
- External extensions of internal hemorrhoids
- They result from progression of internal hemorrhoids
  plexus

SECONDARY HEMORRHOIDS :

- They arise as a result of specific conditions :
- Local : anorectal deformity , hypotonic anal sphincter
- Abdominal : ascites
- Pelvic : gravid uterus, uterine, ovarian, bladder neoplasm
- Neurological : multiple sclerosis, paraplegia.

RISK FACTORS :

- Aging
- Constipation
- Sharing forces acting on anus
- Chronic straining
- Obesity
- Anal hypertonicity
- Multigravida



DEGREE OF HEMORRHOIDS :

- First degree : bleeding P/R
- Second degree : prolapse but reduce spontaneously
- Third degree : prolapsed and have to reduce manually
- Fourth degree : lie permanently out side

COMPLICATIONS OF HEMORRHOIDS :

- Secondary infection
- Ulcer
- Gangrene
- Portal pyema
- Fibrosis

TREATMENT OF COMPLICATIONS :

- Secondary infection : Thrombosed pile mass : rest , analgesia, hot baths, warm/ cold saline compressions, surgery at later stage if necessary
- **Strangulation, Thrombosis, Gangrene :**
  - Antibiotic cover
  - Immediate surgery
- **Severe hemorrhoids :**
  - It usually results from bleeding diathesis or use of anticoagulants
  - After exclusion of these cases give :
  - Local compress containing adrenaline solution
  - Injection of morphine
  - Blood transfusions if needed
  - Ligation and excision of piles
- General management :
- Stool softnner
- High fibre diet
- Suppositories
- Use of proprietary creams
- Injection sclerotherapy
- Banding
- Hemorrhoidectomy

INJECTION SCLEROTHERAPY :

- It is useful when bleeding is the main complaint
- Indicated for 1st and 2nd degree hemorrhoids

- Performed in left lateral position
- Involves submucosal injection of 5 % phenol in almond oil into apex of each pile pedicle
- Patient is reassess after 8 weeks

BANDIG :

- It is useful when prolapse is the main complaint
- For 1st and 2nd degree piles
- It involves application of elastic bands onto the base of each pile pedicle
- It causes ischemic necrosis of the pilewhich slough off within 10 days
- Bleeding is the main complication , patient must be warned before the procedure

HEMORRHOIDECTOMY :

INDICATIONS FOR SURGERY :

- 3rd and 4th degree hemorrhoids
- 2nd degree hemorrhoids that have not been cured non operatively
- Fibrosed hemorrhoids
- Interoexternal hemorrhoids when external hemorrhoid is well defined

TECHNIQUES :

- Open Hemorrhoidectomy
- Closed Hemorrhoidectomy
- Stapled Hemorrhoidectomy

COMPLICATIONS OF HEMORRHOIDECTOMY :

- Early : pain , acute urinary retention, reactionary hemorrhage
- Late : sec hemorrhage, anal stricture and fissure, incor

THROMBOSED EXTERNAL HEMORRHOIDS :

- Commonly termed as perianal haematoma
- Sudden in onset
- Painful, olive shaped, blue spontaneous swelling at anal margin
- Thrombosis is usually situated in a lateral region of anal margin
- If present within 48 hours clot may be evacuated under LA
- After 48 hours , left untreated, as majority resolve or fibrose, indeed this condition has been called as " a 5 day , painful , self curing lesion "

ANORECTAL ABSCESS :

- Collection of pus in area of anus and rectum

SUBDIVIDED ACCORDING TO ANATOMICAL SITES :

- Perianal 60%
- Ischiorectal 30 %
- Submucosal 5%
- Pelvirectal 5%

CLINICAL FEATURES

- Severe , well localized pain
- Palpable tender lump at anal margin
- Indurated hot tender perianal swelling
- Swinging pyrexia

ASSOCIATED CONDITIONS :

- Fistula in ano (MOST COMMON)
- CD
- DM
- Immunosupression
- Rectal malignancy
- HIV

DIFFERENTIAL DIAGNOSIS :

- Abscess connected with a pilonidal sinus
- Abscess connected with bartholin's gland or cowper's gland

TREATMENT :

- Treatment is primarily surgical
- Crutiate incision over a fluctuant point
- Excision of skin edges to de roof the abscess
- Biopsy the wall and send pus for culture
- Antibiotics if there is surrounding cellulitis

FISTULA IN ANO :

- Fistula is a tract connecting 2 epithelial surfaces and lined by epithelium or granulation tissue
- Fistula in ano is a chronic abnormal communication between anorectal lume and vaginal or perianal skin
- Most commonly caused by sepsis / infection arising in ANAL GLAND
- It may be high level (internal opening is above the ano rectal ring) or low level (internal opening is below the ano rectal ring)

HIGH FISTULA :

- Suprasphinteric fistula
- Extrasphinteric fistula
- High trans- sphincteric fistula

LOW FISTULA :

- Intersphinteric (MOST COMMON)
- Low trans sphincteric
- Submucosal fistula

ASSOCIATED CONDITIONS :

- CD
- TB
- Lymphogranuloma venerum
- Actinomycosis
- Rectal duplication
- Foreign body
- Malignancy

CLINICAL FEATURES

- More common in men
- Intermittent prulent discharge may be bloody
- Pain
- Past history of anorectal sepsis

INTERSPHINCTERIC FISTULA :

- 5 %
- Does not cross the external sphincter
- Primary tract courses via internal sphincter to intersphinteric space and then to perineum

TRANS-SPHINCTERIC FISTULA :

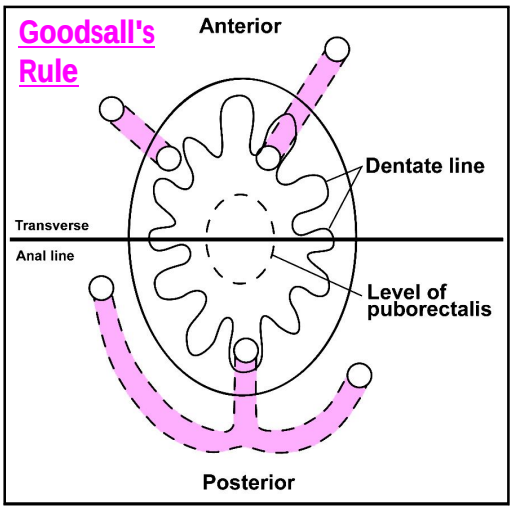
- 40 %
- Primary tranct courses to both internal and external a… …ectal fossa and then to perineum

SUPRASPHINCTERIC FISTULA :

- Vary rare
- Primary tract courses via intersphinteric space superiorly to above puborectalis muscle into ischiorectal fossa and then to perineum.

EXTRASPHINCTERIC FISTULA :

- Primary tract courses frmperineal skin through levetor ani muscle to rectal wall
- Completely outside sphincter mechanism Goodsall's rule :
- Fistula containing anterior to transverse line through the anus will have STRAIGHT tract
- Fistula containing posterior to transverse line through the anus will have CURVE tract



INVESTIGATIONS :

- Full medical history
- Key points to determine is site of internal and external opening , presence of secondary extension, presence of other complications
- Examination
- EUA to identify the course of tract
- Dilute hydrogen peroxide injection in external opening and looking for blue dye coming out of internal opening
- Endoanal ultrasound
- MRI is GOLD standard in fistula imaging
- Fistulography for extrasphincteric fistula

TREATMENT :

FISTULOTOMY :

- For low level fistula
- Lying open and division of all structures lying between external and internal openings
- It is applied mainly to intersphincteric and trans sphincteric fistula
- A probe is passed from external to internal opening
- Tract over the probe is aid open
- Remove granulation tissue and send for histopathology
- Secondary tract should be laid open or drained
- Marsupialization of wound

FISTULECTOMY :

- It refers to removing fistula tract and close the internal
- Using diathermy *
- It is applied for high level fistula

SETON :

- It is applied for high level fistula
- It is a placement of thick suture through fistula tract to allow slow transection of sphincter muscle
- No risk of incontinence
- Seton can be loose or cutting depends on the intention of cutting through the enclosed muscles

ANAL CARCINOMA :

- It accounts for < 2 % of all large bowel cancers
- Most common is squamous cell carcinoma SCC
  SSC arises below the dentate line
- Tumor above the dentate line are : adenocarcinoma, melanoma, lymphoma, epidermoid
- carcinoma

RISK FACTORS :

- HPV
- HIV
- STDs

- Immunosuppression
- Anal intra epithilial neoplasm

CLINICAL PRESENTATION :

- Pain and bleeding are the most common symptoms
- Mass
- Pruritis

TREATMENT :

- Primary treatment for SSC is NIGRO protocol I.e chemo+ radiotherapy
- Treatment for adenocarcinoma is abdominoperineal resection ABPR
- Small malignant tumors are best treated by local excision
- Radical excision is indicated in those with persistent or recurrent disease following NIGRO

CLINICAL FEATURES

- In girls imperforate anus with rectovestibular fistula is most common
- Pilonidal sinus may be precipitated by excessive sitting
- Internal hemorrhoids occur above the pectinate line
- Strangulation and thrombosis are main complication of hemorrhoids
- Banding is indicated for 1st and 2nd degree hemorrhoids when prolapse is main complain
- Early complication of hemorrhoidectomy is pain
- Thrombosed external hemorrhoids also known as perianal hematoma
- In anorectal abscess crutiate incision is given over the most fluctuant point
- Anal fistula may be associated with
- Anal fistula commonly caused by se nal gland
- MRI is gold standard for fistula imaging
- Squamous cell carcinoma is the most common type of anal cancer
- Most common risk factor for anal carcinoma is HPV 16, 18, 31, 33

Case example :
A 60 years old male came in OPD with c/o painful defecation and constipation

Q : what is your diagnosis ?
A : fissure in ano

Q : what is the treatment ?
A : high fiber diet , ispaghol husk, laxatives, analgesics, xylocane gel for LA,
sitz bath, 0.2 % GTN for sphincter relaxation
Laterla sphincterotomy , four finger anal dilation

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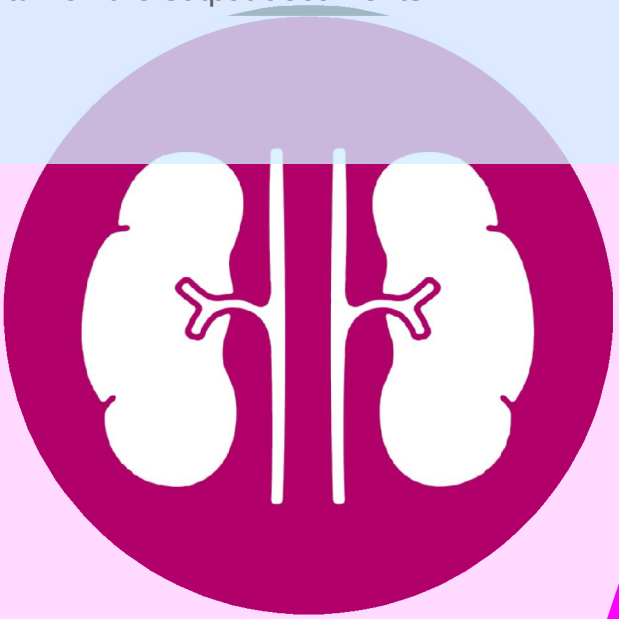
PART - 8



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KIDNEY AND URETER

Chapter 45

ANATOMY OF KIDNEY :

- The parencyma of each kidney usually drain into 7 calyces
- 3 upper , 2 middle and 2 lower calyces
- The 3 of each segment contain its own blood supply
- Renal artery is typically hidden behind the renal vein

CONGENITAL ABNORMALITIES OF KIDNEY :

ADULT POLYCYSTIC KIDNEY DISEASE :

- It is an autosomal dominant condition
- Slightly more common in women
- It is an important cause of end stage renal failure
- Mutation in PKD1 gene in 85 %

CLINICAL FEATURES

- An irregular upper quadrant abdominal mass
- Loin pain
- Hematuria
- Infection (pyelonephritis)
- Hypertension
- Uraemia

INVESTIGATIONS :

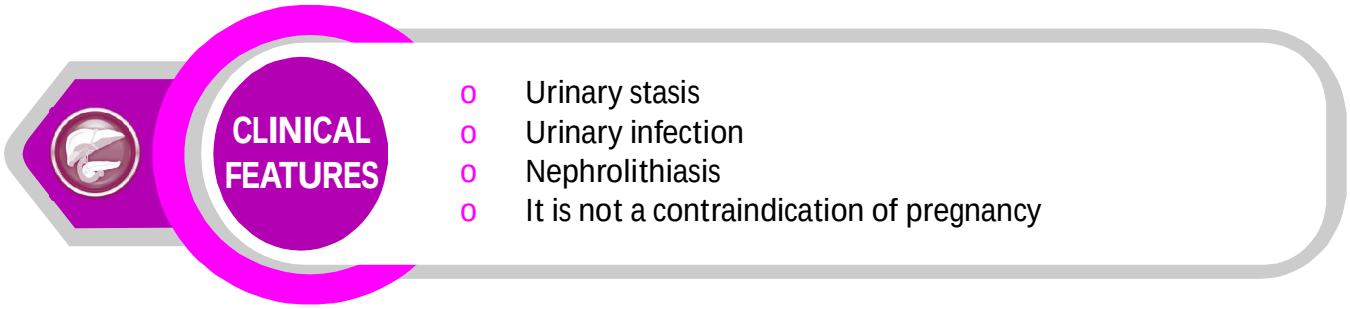
- Urogram shows :
  1. Enlarged renal shadows in all directions
  2. Compressed and elongated renal pelvis
  3. Calyces are stretched over the cyst

TREATMENT :

- Low protein diet
- Antibiotics
- Antihypertensive medications
- Renal replacement therapy (dialysis, transplantation)
- Surgery to uncap the cyst (rovsing's operation)

HORSESHOE KIDNEY :

- It refers to a pair of fused ectopic kidney found at lower pole and lying in front of 4th lumber vertebra
- More common in men



- Urinary stasis
- Urinary infection
- Nephrolithiasis
- It is not a contraindication of pregnancy

INVESTIGATIONS :

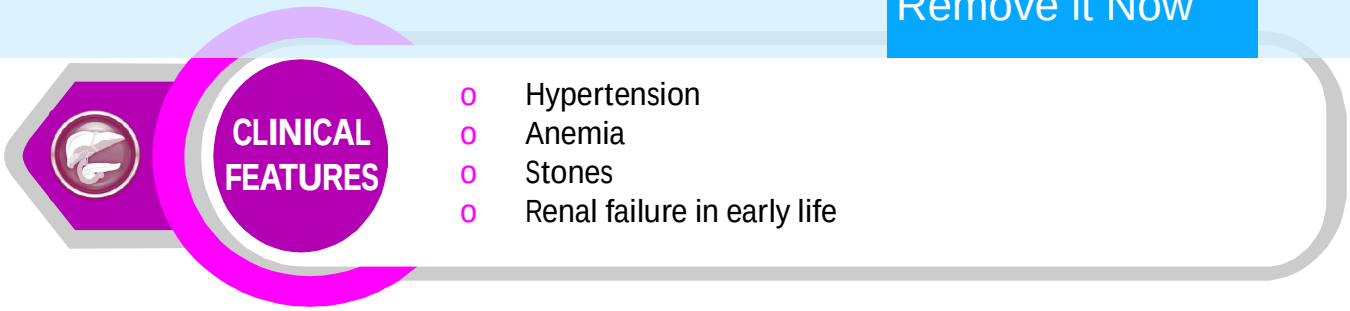
- The diagnosis is usually radiological
- Urogram shows lower pole calyces bilaterally point towards mid line

TREATMENT :

- Division of isthmus is only indicated in the course of surgery for abdominal aortic aneurysm
- If it causes pelviureteric obstruction the treatment is pyeloureteroplasty
- If it causes stone treatment is open surgery or extracorporeal shock wave lithotripsy ESWL

INFANTILE POLYCYSTIC KIDNEY DISEASE :

- It is an autosomal recessive condition
- Kidneys are large and may obstruct birth
- Early presentation is with renal failure in early life
- Mutation in PKHD1 gene
- It has an association with congenital hepatic fibrosis, s… …nsion



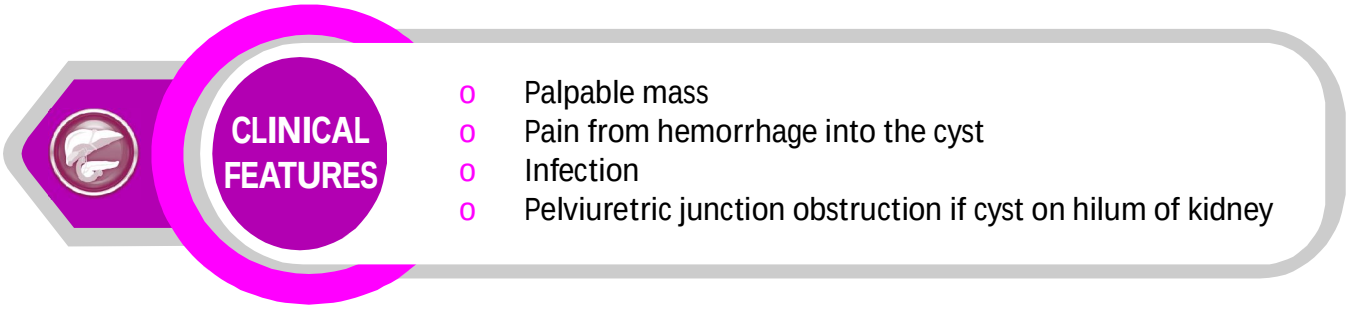
- Hypertension
- Anemia
- Stones
- Renal failure in early life

TREATMENT :

- Symptomatic treatment
- Dialysis
- Renal transplantation

SIMPLE RENAL CYST :

- The condition is common and benign
- Often multiple
- Often discovered incidentally



- Palpable mass
- Pain from hemorrhage into the cyst
- Infection
- Pelviuretric junction obstruction if cyst on hilum of kidney

INVESTIGATIONS :

- It is diagnosed on ultrasound or ct scan
- Smooth thin walls, homogenous contents, avscularity, fluid rather than solid signals

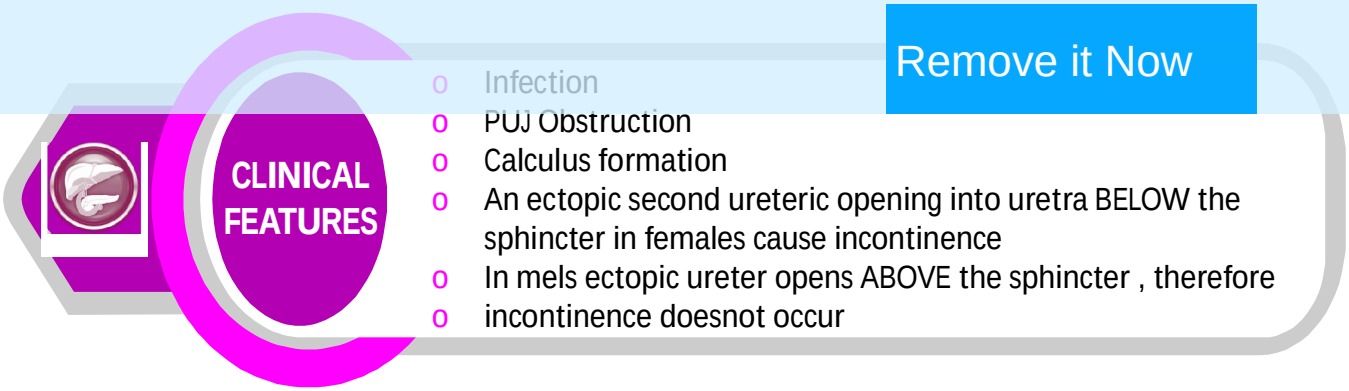
TREATMENT:

- Only if causing obstruction
- Percutaneous cyst puncture for cytology is rarely necessary

CONGENITAL ABNORMALITIES OF RENAL PELVIS AND URETER :

DUPLICATION OF URETER :

- Duplication of renal pelvis is usually unilateral and left sided
- Found in 4 % of patients
- Duplication of ureter is found in 3 % of patients
- Duplication of ureter joining the lower third and of their course with a common ureteric orifice



- Infection
- PUJ Obstruction
- Calculus formation
- An ectopic second ureteric opening into uretra BELOW the sphincter in females cause incontinence
- In mels ectopic ureter opens ABOVE the sphincter , therefore
- incontinence doesnot occur

TREATMENT:

- Asymptomatic duplication is harmless and does not require surgery
- If severly diseased = partial nephrectomy
- A reflexing ureter may need re implantation
- If causing incontinence = implantation of ectopic ureter into the bladder

URETEROCELE :

- It is a cystic enlargement of intramural ureter
- It results from congenital atresia of uretric orifice
- More common in women

INVESTIGATIONS :

- Urogram shows : adder head appearance
- Cystoscopy : a translucent cyst enlarging and collapsing as urine flows in it

TREATMENT :

- No treatment if asymptomatic
- Endoscopic diathermic incision in symptomatic cases

RENAL CALCULI :

- More common in men
- Usually unilateral
- Peak incidence 20-30 yrs

RISK FACTORS :

- Dehydration
- Vitamin A deficiency
- Decrease urinary citrates
- Renal infections
- Inadequate urinary drainage and stasis
- Prolonged immobilization
- Hyperparathyroidism

TYPES OF CALCULI

- Oxalate calculus
- Phosphate calculus
- Uric acid and urate calculi
- Cystine calculus

CLINICAL FEATURES

- Fixed renal pain occur in renal angle
- Pain is aggrevated on movement
- No pyrexia
- High pulse rate
- Calcium oxalate stones are most common and radio opaque and cause bleeding *
- Magnesium ammonium phosphate stones also called struvite or staghorn grow in alkaline medium may be clinically silent
- Uric acid and urate calculi are hard , smooth and oftem multiple they are radio lucent and confirmed by CT scan
- Cystine calculi are radio opaque, hexagonal , formed in acidic urine

URETERIC COLIC :

- Severe excrutiating pain on background of continuing pain
- Pain radiates to groin, penis, scrotum or labium

- Hematuria
- O/E abdominal tenderness and rigidity
- Pyuria

INVESTIGATIONS :

- CBC
- X ray KUB
- Non contrast spiral CT
- Excretion urography
- Ultrasound abdomen

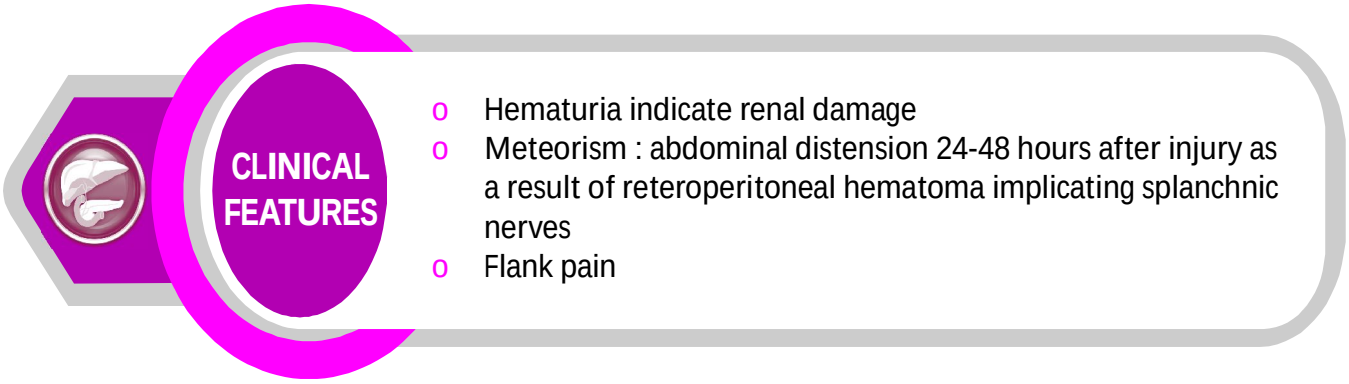
TREATMENT :

- Calculi < 0.5 cm pass spontaneously
- Percutaneous nephrolitotomy :
  - It involve placement of hollow needle into renal collecting system using floroscopic guidance
  - Tract dilated
  - Small stones are extracted
  - Large stones are fragmented by ultrasound or laser or electrohydrolic probe and removed
  - Complications : hemorrhage, perforation of collecting system or colon or pleural injury
- Extracorporeal shock wave lithotripsy ESWL
  - It involve focused ultrasonic shock waves
  - It can be used without general anesthesia
  - Ureteric colic are common after ESWL
  - Main complication is infection
- Open surgery
  - Pyelolithotomy : renal pelvis stone
  - Extended pyelolithotomy : this avoids renal vessels and allow incision into the calyces
  - Nephrolithiasis : for complex calculus branching into the most peripheral calyces
  - Partial nephrectomy : stone in lower most calyces

INJURY :

CLOSED RENAL INJURY :

- Mechanism of injury : blows , fall on loin or crushing injury (RTA)
- Range of injury extend from small sub scapular hematoma to complete tear through the kidney
- Closed renal injury is usually extra peritoneal



- Hematuria indicate renal damage
- Meteorism : abdominal distension 24-48 hours after injury as a result of reteroperitoneal hematoma implicating splanchnic nerves
- Flank pain

TREATMENT :

Conservative management :

- Secure IV access
- Cross match blood if transfusion is needed
- Bed rest
- Analgesia
- Hourly vital observation
- Antibiotics
- Check for hematuria
- Urgent intravenous urography IVU or contrast CT to clarify the extent of renal damage.

SURGICAL EXPLORATION :

- It is indicated if progressive blood loss or expanding loin mass
- If there is hematoma = temponade effect (may result in massive hemorrhage)
- Small tear= suturing of tear over a hemostatic sponge
- Avulsion of one pole = partial nephrectomy
- Avulsion of renal pedicle = nephrectomy

COMPLICATIONS :

- Heavy hematoma may lead to clot retension
- Pararenal pseudohydronephrosis
- Hypertension
- Post traumatic aneurysm of renal artery

URETERIC INJURY :

- Mechanism of injury : hyperextension injury of spine, surgical trauma during hysterectomy or pelvic surgery
- It is less common

TREATMENT :

- Pre op catheterization of ureter prevents surgical trauma
- If there is no loss of length = spatulation and end to end anastomosis without tension
- If there is little loss of length = mobilize the kidney and hitch up the bladder or BOARI operation
- if there is marked loss of length = transureteroureterostomy, interposition of isolated bowel loop or mobilized appendix, nephrectomy

BOARI OPERATION :

- A strip of bladder wall is fashioned into a tube to bridge the gap between the cut ureter and the bladder

URETERIC CALCULUS :

- Ureteric stones are come from kidney
  Most pass spontaneously from ureter
  There are 5 sites of narrowing where stone can arrest

1. Pelviureteric junction PUJ
2. Crossing the iliac artery
3. Juxta position of vas deference or broad ligament
4. Entering the bladder wall
5. Ureteric orifice

CLINICAL FEATURES

- Ureteric colic
- Hematuria
- Tenderness and rigidity over some part of course of ureter
- Must be differentiated from appendicitis as patient is in greater pain and less systemically ill than appendicitis

INVESTIGATIONS :

- X ray abdomen kub
- IVU confirm the diagnosis
- Spiral CT
- Reterograde ureterography
- Cystoscopy

TREATMENT :

- NSAIDs for pain relief

INDICATION FOR SURGERY :

- Repeated attack of pain and stone is not moving
- Stone is enlarging
- Complete obstruction of kidney
- Infected urine
- Stone is too large to pass
- Bilateral obstruction
- Stone is obstructing solitary kidney

SURGICAL OPTIONS :

- Endoscopic stone removal using dormia basket
- Ureteric meatomy : endoscopic incision via diathermy knife
- Ureteroscopic stone removal : endoscope pass transurethrally across the bladder into the ureter

- Push bang : stone is pushed back into the kidney , a J stent secure the calculus into the kidney for subsequent treatment with ESWL
- Lithotripsy in situ
- Ureterolithotomy :
  1. **Calculi in upper third =** loin or upper quadrant transverse incision
  2. **Calculi in middle third =** through a muscle cutting iliac fossa incision
  3. **Calculi in lower third =** pfannenstiel incision

RENAL INFECTIONS :

- Renal infections arise either hematogenously or ascending infection (most common)
- Commonly caused by E.coli and streptococci in acidic urine
- Proteus and staphylococci split the urea , makes the urine alkaline and promotes formation of calculi.

ACUTE PYELONEPHRITIS :

- It is an acute inflammation of interestitium and tubules
- More common in females
- More common during childhood or puberty after mesopause, during pregnancy and during menopause
- It occur more on right side
- Mostly bilateral.

CLINICAL FEATURES

- Headache, lassitude, nausea
- Sudden onset pain in flank
- Pyrexia
- Cystitis (urgency, frequency
- Tenderness in hypochondrium and loin
- Risk of life thretening septicemia

CHILDHOOD :

- Cloudy and offensive urine
- Pain or screaming on micturation
- Loin pain
- Urinary frequency
- Secondary enuresis

INVESTIGATIONS :

- CBC
- UCE
- Urine culture and sensitivity
- Blood cultures
- Ultrasound
- IVU

TREATMENT :

- Adequate hydration
- Analgesics
- Antibiotics
- Alkalinization of urine by potassium citrate

CHRONIC PYELONEPHRITIS :

- It is also known as reflux nephropathy
- Associated with vesicoureteric reflux
- There is interestitial inflammation and scaring of renal parenchyma with a patchy distribution
- 3 times more common in females
- 2/3 of females are under 40 yrs
- 60% of male patients are over 40 yrs

CLINICAL FEATURES

- Lumber pain : dull non specific
- Dysuria
- Increase frequency
- Hypertension
- Malaise, anorexia, nausea, headache
- Anemia

INVESTIGATIONS :

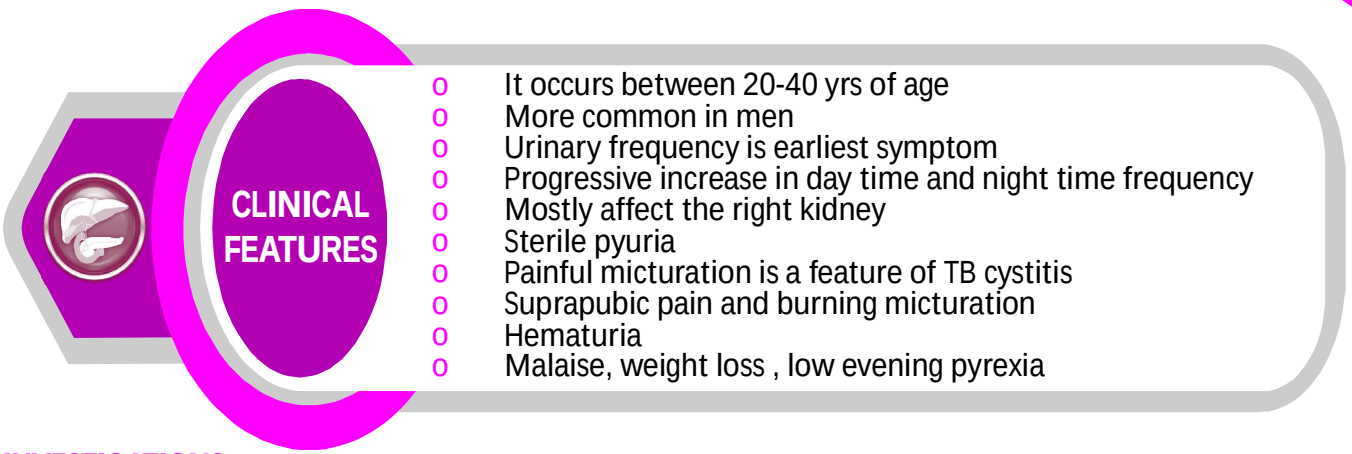
- UCE
- Urine RE
- Ultrasound
- IVU
- Voiding cystourethrogram

TREATMENT :

- Antibiotics
- Surgery is indicated only when disease is confined to one kidney
- Nephrectomy or partial nephrectomy may stop the infection and help to control hypertension
- Patients with end stage renal failure may require renal replacement therapy

RENAL TUBERCULOSIS :

- It arises from hematogenous infection from distant focus
- Lesions are usually unilateral
- It is often associated with TB of bladder



INVESTIGATIONS :

- 3 complete specimen of early morning urine sent for microscopy and culture
- Ziehl-neelsen staining of urine
- Culture on lowenstein - jensen medium of urine
- X ray abdomen : calcified lesion
- IVU
- Cystoscopy

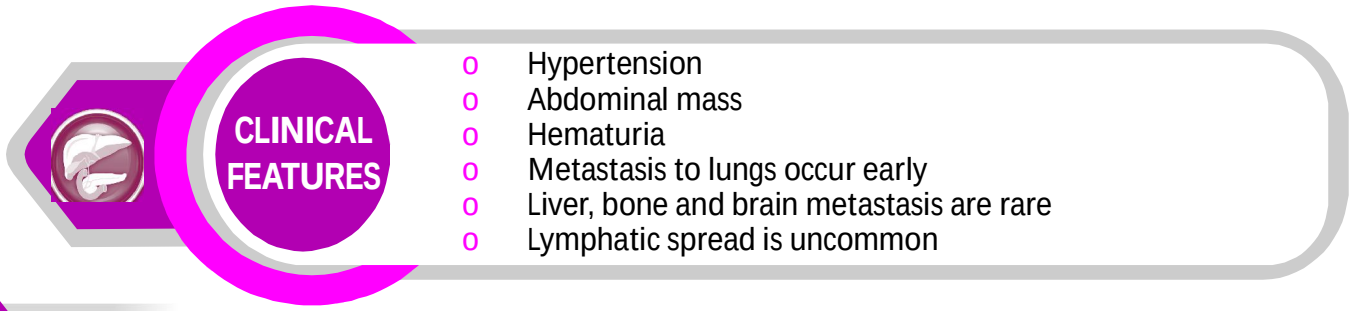
TREATMENT :

- Anti tuberculous therapy ATT
- Aim of surgery is to remove the large foci of infection and correct the obstruction caused by fibrosis
- The optimum time for surgery is between 6-12 weeks after start of ATT
- The obstructed lower pole calyx may be drained into upper ureter
- A strictured renal pelvis may need a pyeloplasty
- Ureteric stenosis and shortening may require a boari o ion
- Non functional kidney require nephroureterectomy

NEOPLASM OF KIDNEY :

WILM'S TUMOR :

- It is also known as nephroblastoma
- It is a mixed tumor as it contains elements from embryonic nephrogenic tissues
- Discovered in first 5 yrs of life
- It is the most common primary malignant tumor of childhood
- Usually unilateral
- Rapidly growing tumor
- Thought to be due to loss of tumor suppressor gene on chromosome 11 WT1 gene



INVESTIGATIONS :

- CT abdomen
- Ct chest (for metastasis)
- U/S

INVESTIGATIONS :

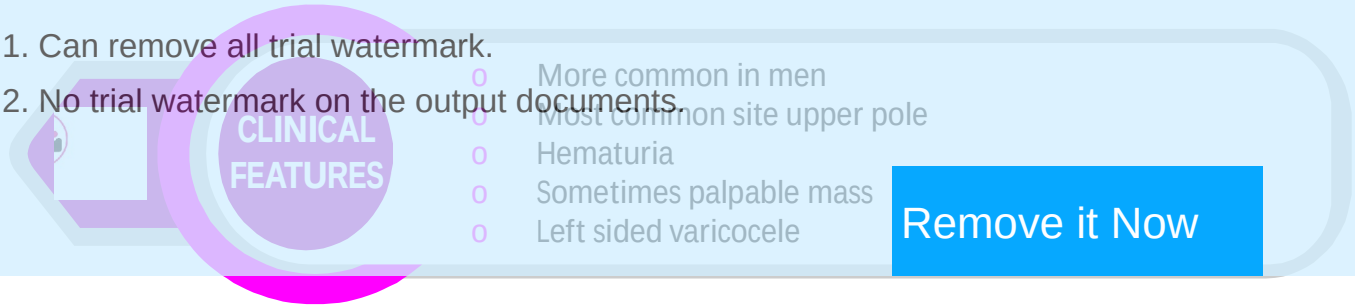
- Unilateral tumor = chemotherapy followed by nephrectomy
- Bilateral tumor = partial nephrectomy

GRAWITZ'S TUMOR :

- Renal cell carcinoma is also called hypernephroma
- It is an adenocarcinoma
- It is the most common cancer of kidney 75 %
- It arises from renal tubular cells.

SPREAD :

- Tumor cells form intravenous clot
- Cells enter the circulation and reach the lungs , grow and form cannon ball secondary deposits
- Metastasis to bone also occur and secondary deposits to long bone



ATYPICAL PRESENTATION :

- In 25% cases no local symptoms
- Symptomatic secondary deposits in bone or lungs (persistant cough or hemoptysis)
- Persistant pyrexiawith no evidence of infection
- Pyrexia after nephrectomy suggests metastasis
- Anemia
- Polycythemiain 4 %
- Nephrotic syndrome is rare presentation

INVESTIGATIONS :

- CBC
- UCE
- C XRAY
- IVU
- CT scan
- X ray KUB
- Isotope bone scan

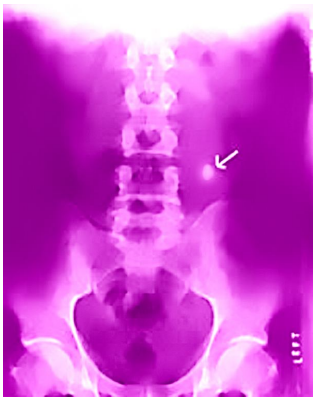
TREATMENT :

- Nephrectomy is the treatment of choice if tumor confined to kidney
- It is performed through a loin / transverse /oblique upper abdominal incision
- The vascular pedicle should be ligated before the kidney is mobilized
- The first step is to ligate the renal artery in continuity
- Gentle palpation of renal vein to exclude the tumor in its lumen
- Renal vein and artery ligated and divided
- Kidney is then mobilized within its covering
- Renal cell carcinoma respond poorly to radiotherapy or conventional chemotherapy
- Radical nephrectomy is recommended for large tumors
- Tumors < 4 cm may be treated with partial nephrectomy

KEY POINTS

- Horse shoe kidney is not a contraindication of pregnancy
- Horseshoe kidney is usually a radiological diagnosis
- Adult polycystic kidney disease APKD is more common in women
- Calcium oxalate calculus are radio opaque and cause bleeding
- Magnesium ammonium phosphate / struvite/ staghorn stones grow in alkaline medium and are clinically silent
- Uric acid and urate calculi are radio lucent and confirmed on ct scan
- Cystine calculi are radio opaque , hexagonal , trans lucent white crystal
- Most common complication of ESWL is infection
- In ureteric calculi IVU during pain d

Case example :
A young male came in OPD with c/o left lumber pain
X-ray shows



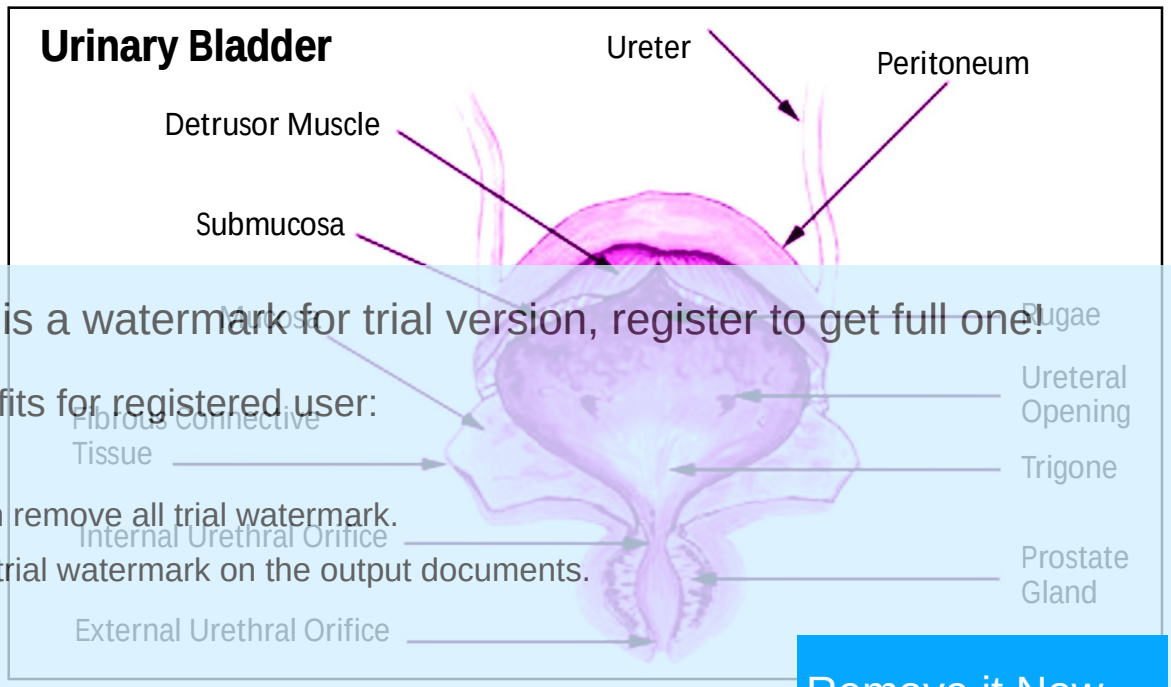
Q : what is your diagnosis ?
A : left renal stone

Q : what are the treatment options ?
A : ESWL, pecutaneous nephrolithotomy, pyelolithotomy, extended pyelolithotomy, pariatl nephrectomy, nephrectomy

THE URINARY BLADDER

Chapter 46

ANATOMY OF BLADDER :



- Bladder is lined by transitional epithilium
- Bladder is supplied by superior and inferior vescicle arteries from the anterior trunk of internal iliac artery
- Prostatic (male) and vaginal (femalee) plexus drain into internal iliac vein
- Lymphatic drainage into internal iliac chain to obturator and external iliac chains
- The parasympathetic supply : from S 2,3,4 fibers passes via pelvic splanchnic nerve to inferior hypogastric plexus
- The sympathetic input arises through T11 to L2 fibers passes via parasacral hypogastric nerve to inferior hypogastric plexus
- Somatic innervation passes to the distal sphincter mechanism via pudendal nerve and also via fibres that pass through inferior hypogastric plexus

BLADDER TRAUMA :

- This can be intra peritoneal (20 %) or extra peritoneal (80 %)

INTRAPERITONEAL RUPTURE :

- Secondary to a blow or fall on distended bladder more rarely to surgical damage
- Associated with severe pain in hypogastrium, syncope , abdominal distension, peritonitis
- **Treatment :** Laprotomy , Repair And Bladder Drainage

EXTRAPERITONEAL RUPTURE :

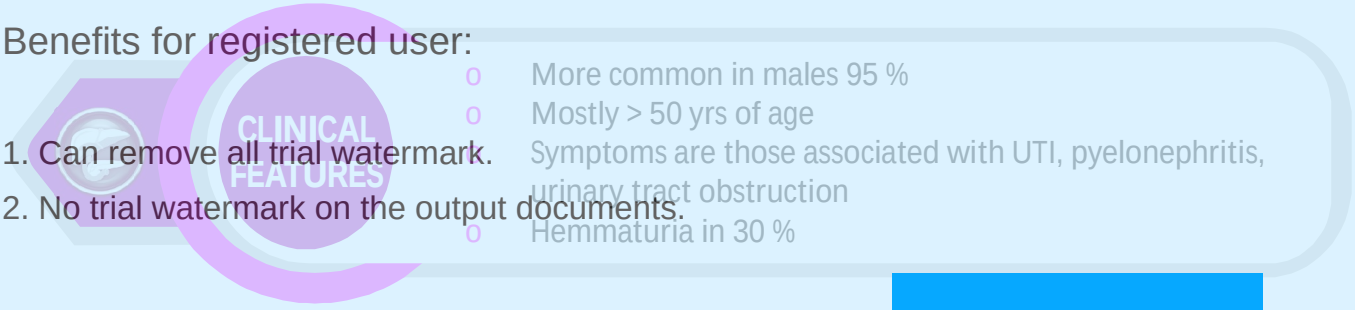
- Caused by blunt trauma or surgical drainage
- It may be difficult to distinguish extraperitoneal rupture from rupture of membranous urethra
- **Treatment :** catheter drainage for 10 days

DIVERTICULAE OF BLADDER :

- Diverticulae are bulging pouches in bladder wall
- Diverticulae are lined by bladder mucosa and wall is composed of fibrous tissue only
- Diverticulae can be congenital or acquired
- The size may be varry from 2-5 cm or may be larger

COMPLICATIONS :

- Recurrent UTI
- Bladder stones
- Hydronephrosis and hydroureter
- Neoplasm



INVESTIGATIONS :

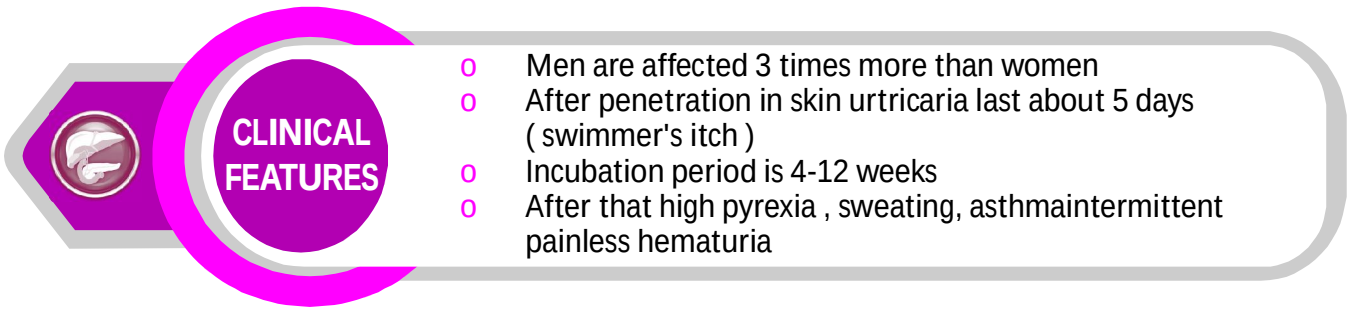
- Ultrasound
- Cystoscopy

TREATMENT :

- Surgery is necessary only for treatment of complicatioon
- Surgery : combined intravesicle and extravesicle diverticulectomy

SCHISTOSOMIASIS OF BLADDER :

- The disease is caused by scistosomia hematobium
- It is acquired via exposure of skin to infected water



INVESTIGATIONS :

- CBC : leukocytosis, esinophilia
- Early morning urine samples

CYSTOSCOPIC APPEARANCE :

- Bilharzial pseudotubercle
- Bilharzial nodules
- Sandy patches
- Ulceration
- Fibrosis
- Granuloma
- Papilloma
- Carcinoma

TREATMENT :

- Praziquental in 3 doses of 20mg/kg 4 hours apart

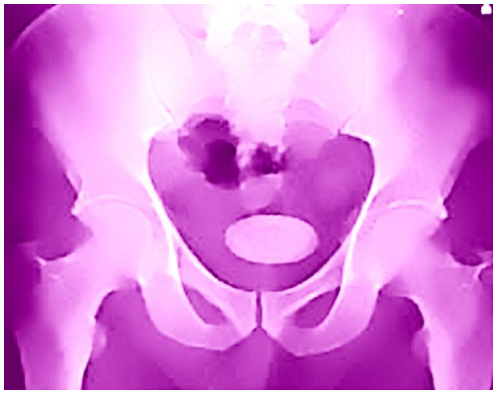
BLADDER STONES :

- A primary bladder stone is the one that develops in sterile urine, it often originate in kidney
- A secondary stone develops in presence of infection, outflow obstruction, impaired bladder emptying, foreign body
- Primary vesicle calculus is rare
- Most vesicle calculi are mixed
- Oxalate calculus is a primary calculus that grows slowly
- Uric acid stones are round,smooth , in patients with go
- Cystine calculus occur in presence of cystinuria and is radio opaque
- Tripple phhosphate calculus is composed of ammonium, magnesium and calciumphosphate and occur in in urine infected with urea splitting organism

CLINICAL FEATURES

- 8 times more common in men
- Frequency is earliest symptom
- Pain (strangury) in patients with spiculated oxalate calculus
- Pain occur at the end of micturation and referred to tip of penis or labia majora
- Pain in worsened by movement
- In young boys screaming and pulling of penis at the end of micturation is suggestive of bladder stone
- Hematuria
- UTI
- Rectal /vaginal examination is unremarkable
- Occassionally a large calculus is palpable in female

INVESTIGATIONS :



- Urine RE reveals microscopic hematuria, pus or crystals
- Plain x ray
- Ultrasound

TREATMENT :

- Preurethral litholapaxy
- Ultrasound lithotripsy is extremely safe but appropriate only for small stones
- For large stones = laser lithotripsy with holmium laser
- Percutaneous suprapubic litholapaxy

NEOPLASM OF BLADDER :

- 95% of bladder cancer originate in transitional epithelium
- Secondary tumors of bladder are common and arises from sigmoid colon, rectum, prostate, ovaries or uterus
- Histological types of bladder include urothelial, squamous, adenocarcinoma

RISK FACTORS :

- Cigarette smoking
- Genetic factors
- 2 napthylamine and benzidine
- Textile workers
- Dye workers
- Tyre rubber and cable workers
- Petrol workers
- Leather workers
- Shoe manufacturer and cleaners
- Painters
- Hairdressers

STAGING :

- Non muscle invasive tumors : 70%
  - pTa : not invading the lamina propria
  - pT1 : invading the lamina propria
- Muscle invasive disease : 25 %
  - Local invasion and distant metastasis are common
  - Poor prognosis
- Flat non invasive CIS : 5 %
  - It refers to in situ carcinoma
  - It can only be diagnose via biopsy undermicroscope

CLINICAL FEATURES

- Painless gross hematuria
- Constant pain in pelvis
- Pain referred to suprapubic region, groin, anus, perinium and into the thighs

INVESTIGATIONS :

- Urine culture and sensitivity
- Blood culture
- CBC
- UCE
- Ultrasound
- IVU
- Cystourethroscopy
- Biopsy under GA

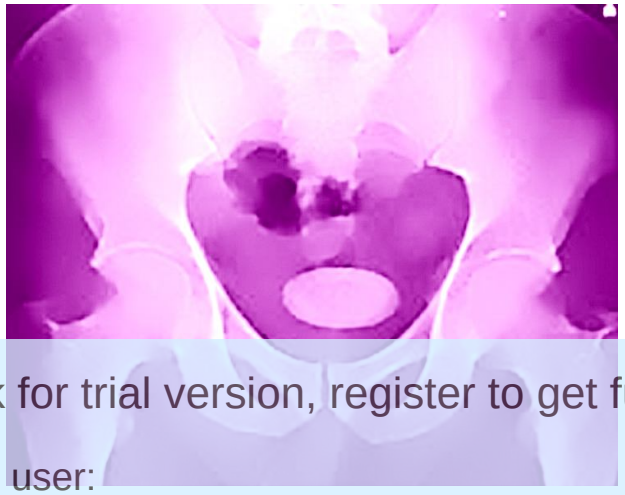
TREATMENT :

- Transurethral endoscopic resection of tumor
- Intravesical chemotherapy
- BCG immunotherapy
- Cystectomy : for high grade pT1 with multiple CIS
- Radical cystectomy and pelvic lymphadenectomy : for
- External beam radiotherapy : for those who are unfit f

KEY POINTS

- In young boys screaming and pulling at the penis with hand at the end of micturation is indicative of bladder stone
- In bladder diverticulae surgery is the only for treatment of complications
- Most common risk factor for bladder carcinoma is cigarette smoking

Case example :
A middle aged male came in OPD with c/o urgency, frequency , painful micturation usually at the end of micturation
X- ray shows :



Q : what is your diagnosis ?

A : urinary bladder stone

Q : what are the treatment options ?

A :

1. Preurethral litholapaxy
2. Ultrasound lithotripsy is extremely safe but appropriate
3. For large stones = laser lithotripsy with holmium laser

Percutaneous suprapubic litholapaxy

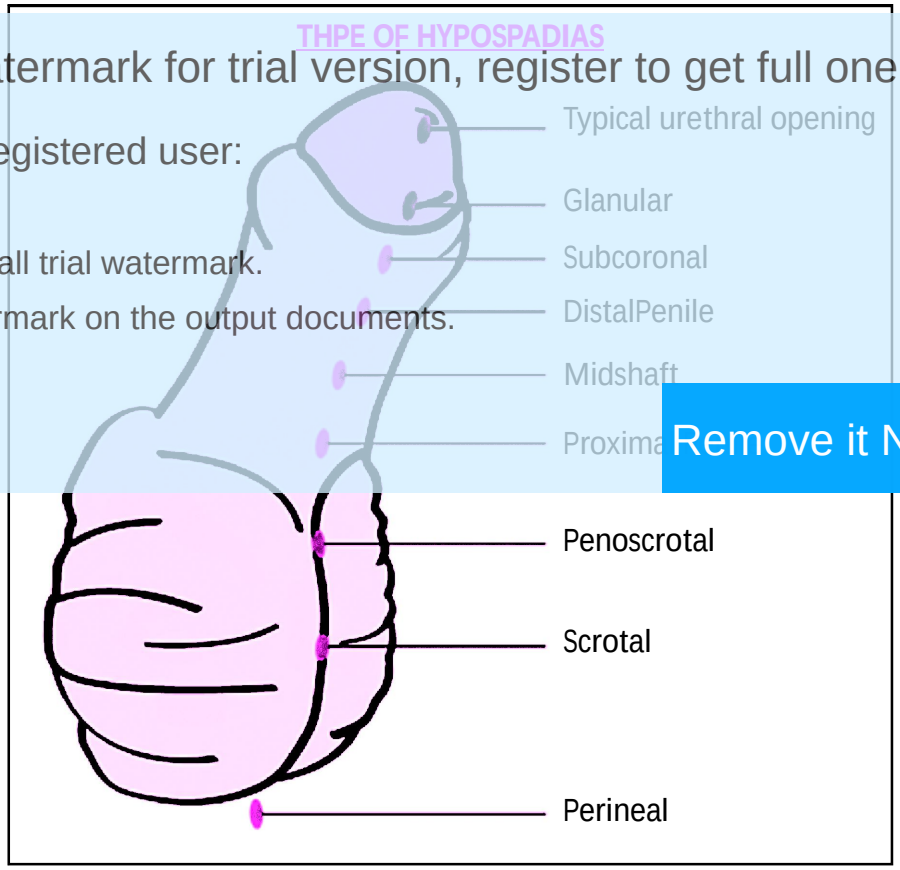
URETHRA AND PENIS

Chapter 47

CONGENITAL ABNORMALITIES :

HYPOSPADIAS :

- Occur in 1 in 200-300 male live birth
- It is the most common congenital abnormality of urethra
- It is characterized by the combination of ventrally (underside) placed urethral meatus, a hooded foreskin and chordee
- Avoid circumcision as prepuce may be used in procedures to correct the abnormality



Types : classified according to the position of meatus

- **Glanular :** Most common, meatus is at glans penis , not required treatment
- **Coronal :** Meatus is at junction of underside of glans and body of penis
- **Penile & penoscrotal :** Meatus is at underside of penile shaft
- **Perineal :** Rarest, most severe, bifid scrotum and urethra opens between its 2 halves

TREATMENT :

- Surgery is performed between the age of 9 and 18 months

POSTERIOR URETHRAL VALVES :

- These cause obstruction to the urethra of boys
- It can lead to renal failure so the diagnosis must be detected an treated as early as possible
- The diagnosis is commonly made antenatally on ultrasound which demonstarate bilateral hydronephrosis above a distended bladder
- Voiding cystogram shows : dilation of urethra above the valves, hypertrophied bladder, diverticulae, vesicoureteric reflux into dilated upper tract

TREATMENT :

- Catheterisation : to relieve the back pressure and to allow the effect of renal failure to improve
- Definitive treatment is endoscopic destruction of valves

INJURY TO MALE URETHRA :

RUPTURE OF MEMBRANOUS URETHRA :

- It may be caused by pelvic fracture or extraperitoneal rupture of bladder
- Intra pelvic rupture of membranous urethra occur near the apex of prostate

CLINICAL FEATURES

- The most common cause of pelvic fractures are road traffic accidents RTA, severe crush injuries and fall
  - Urinary retention
  - Blood at meatus
  - High riding prostate on rectal e
  - A water soluble urethrogram c

TREATMENT :

- Supra pubic catheterisation
- Surgical exploration is needed if there is co existent rupture of bladder
- Delayed anastomotic urethroplastyis the preferred definitive management

COMPLICATIONS :

- Urethral stricture
- Urinary incontinence
- Erectile dysfunction
- Extravasation of urine

RUPTURE OF BULBAR URETHRA :

- Caused by a blow to perineum, usually due to fall astride injury

CLINICAL FEATURES

- Suspected urethral injury after blunt perineal trauma when the man can not void, when there is perineal bruising and when there is blood at the urethral meatus

TREATMENT :

- Analgesia
- Antibiotics
- Discourage from passing urine
- A full bladder should be drained with suprapubic puncture, this reduce urinary extravasation
- Delayed anastomotic urethroplasty after swelling and bruising have settled down (after 8-12 weeks)
- Excision of traumatized section
- Spatulated end to end anastomosis of urethra

URETHRAL STRICTURE :

CAUSES :

Inflammatory	Secondary to urethritis Secondary to balanitis xerotica ob
Traumatic	Bulbar urethral injury Pelvic fracture urethral distruption injury
Iatrogenic	Sec to urethral instrumentation Sec to urethral catheterisation Sec to transurethral prostatectomy Sec to radical prostatectomy
Idiopathic	Inflammatory

CLINICAL FEATURES

- Hesitency
- Straining to void
- Poor stream
- Frequency

INVESTIGATION :

- History of poor urinary stream in young patients
- Urethroscopy

- Urithrography
- Urinary infection should be excluded

COMPLICATIONS :

- UTI most common
- Urinary retention
- Urethral diverticulum
- Paraurethral abscess
- Urethral fistula

TREATMENT :

- Urethral dilation
- Endoscopic urethrotomy
- Urethroplasty

DISEASES OF FORESKIN :

DEFINITION :

INDICATIONS :

- Congenital abnormalities
- Phimosis
- Paraphimosis
- BXO
- Penile tumors

PROCEDURE :

- **Infants :**
  - The plastable device (hollister) used in inf
  - Fore skin is ligated over the groove of bell t away
  - The ring separates between 5-8 days post operatively
- **In adolescents and adults :**
  - The prepuce is held in artery forecep and put a gentle stretch
  - A circumferential incision in the penile skin is made at level of corona using a knife
  - The prepuce is then slit dorsally in the mid line to within 1 cm of corona
  - This converts the foreskin into 2 flapsconnected at mid line anteriorly
  - When the undersurface of the prepuce is separated from glans, the inner layer of each flap is incised with a second circumferential incision leaving about 0.5 cm of inner layer of preputial skincutting the remaining connectve tissue complete the excision
  - Use bipolar diathermy
  - Never use monopolar diathermy as it causes coagulation at the base of penis
  - Hemostatsis is secured
  - Use absorbable suture for closure

PHIMOSIS :

- When foreskin can not be fully retracted over the glans penis
- Can cause urinary difficulty, meatal stenosis

- Most common cause is balanitis xerotica obliterence BXO
- Circumcision is indicated as curative

PARAPHIMOSIS :

- A tight foreskin once retracted can not be returned back will result in paraphimosis
- It cause constriction of glans
- Icebags
- Gentle manual compressions
- Injection of hylauronidase solutionsin normal saline
- A dorsal split of prepuce under LA
- Circumcision is indicated in all patients

PRIAPISM :

- It is asurgical emergency
- It refers to prolong (> 4 hours) painful erection
- It can be ischemic or non ischemic

ISCHAEMIC :

- More common
- It is due to venous congestion with consequent thrombosis and ischemia

CAUSES :

- Genitourinary infections
- Intracavernosal injections
- Sickle cell disease
- Leukemia

CLINICAL FEATURES

- Painful erection not involving the glans penis
- Blood from penis shows : hypoxia, hypercapnia, acidosis
- Doppler shows : absence of blood flow within penis

TREATMENT :

- It is a surgical emergency
- Aspiration of a sludge blood in corpora cavernosa
- Intracavernosal injections of phenylephrine

NON-ISCHAEMIC PRIAPISM :

- Rare form
- Caused by traumatic damage to central penile artery due to blunt perineal trauma
- Painless erection
- Dopplar ultrasound shows fistula

PEYRONIE'S DISEASE :

- It refers to penile deformity, palpable penile plaqueswithin the penis, erectile dysfunction and pain on erection

- May be due to minor injury on erect penis with secondary microhemorrhages beneath tunical albuginea and secondary fibrosis
- The most common direction of deformity is dorsally (towards abdomen)
- Associated with dupuytren's contracture
- Surgery is indicated to correct the deformity that interfers with sexual function
- Nesbitt procedure : plicating the convex side of deformity , straightening the penis, with some loss of length

CARCINOMA OF PENIS :

Risk factors :

- Smoking
- BXO
- Chronic balanoposthitiis
- Genital watrs
- Leukoplakia of the glans

CLINICAL FEATURES

- Foul smelling bloody discharge
- 50 % have inguinal lymph node enlargement
- Biopsy should be performed to make the diagnosis
- If untreated the whole glans is replaced by fungating mass
- Inguainal nodes can erode the skin
- Death of the patient can result from erosion of external iliac and femoral vessels

TREATMENT :

- Surgical excision is the mainstay of treatment
- Radiotherapy is effective for small tumors

SEXUALLY TRANSMITTED INFECTIONS :

GENITAL HERPES :

- Caused by sexual transmission of HSV 2
- Pain along the distribution of sensory nerve , usually genitofemoral nerve
- Shallow painful ulceration formation
- Fever , mayalgia
- Retention of urine

TREATMENT :

- Acyclovir and valacyclovir is effective

LYMPHOGRANULOMA VENERUM :

- Caused by chlamydia trachomatous type L1-L3
- It is primarily an infection of lymphatics and lymph nodes
- The primary lesion is fleeting, painless genital papules or ulcers
- The inguainal glands become enlarge and painful between 2 weeks and 4 months of infection

- The masses of nodes met together above and below the inguinal ligament to give the
- sign of groove
- Reddened overlying skin
- Fluctuation present
- In women there may be parotitis
- In men there may be urethritis and urethral stricture

TREATMENT :

- Combination of antibiotics (sulphonamides, oxytetracycline, erythromycin)
- The multilocular lymphatic mass should not be excised, aspiration is permissible to reduce discomfort

GRANULOMA INGUINALE :

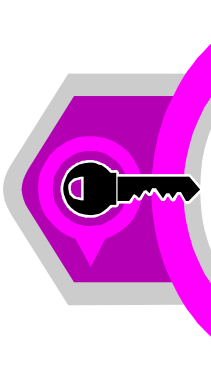
- Chronic and slowly progressing ulcerive tropical disease affecting genitals and surrounding tissues
- Caused by klebsiella granulomatis
- Present with painless vesicle or indurated papule on external genitalia
- Diagnosis by biopsy of material from edge of ulcer
- Treatment : erythromycin, oxytetracyclin, streptomycin

CONDYLOMATA ACUMINATA / GENITAL WARTS :

- Caused by HPV 6 and 11
- Lesion most commonly occur under prepucein the coronal sulcus
- In women lesion most commonly on vulva
- Genital warts may complicate HIV infection

TREATMENT :

- Topical application of podophyllincan be excised
- Can be ablated with cryosurgery, electrosurgery or laser



KEY POINTS

- Hypospadias is the most common congenital malformation of the urethra
- Bulbar urethra injury present with urinary retention, perineal hematoma, bleeding from external urinary meatus
- Never use monopolar diathermy when performing circumcision as it cause coagulation at base of penis

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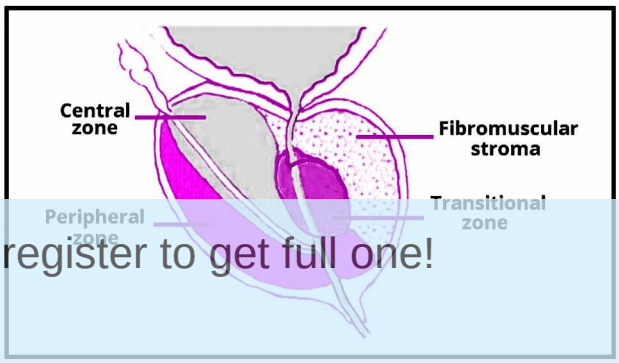
THE PROSTATE

Chapter 48

ANATOMY :



- Prostate is located between the base of urinary bladder and urogenital diaphragm
- Skene's tubules , which are open on either side of female urethra , are the homologous of prostate
- It is divided into three zones

1. **Peripheral zone :** lie posteriorly, site of Prostatic Carcinoma
2. **Central zone :** lie posterior to urethra and above Ejaculatory Duct
3. **Periurethral transitional zone :** site for benign Prostatic Hyperplasia

- **Prostate consist of five lobes**

1. Anterior lobe : lies in front of urethra
2. Posterior lobe : lies behind the urethra
3. Median lobe : lies between urethra and ejaculatory ducts
4. Right lateral lobe
5. Left lateral lobe

- Prostate is supplied by internal iliac artery via inferior vesicle artery
- Venous drainage to internal iliac vein and IVC via prostatic plexus and vertebral venous plexus to cranial dural sinus

PHYSIOLOGY / HORMONAL CONTROL :

- The main hormone acting on prostate is testosterone
- Testosterone is secreted by leydig cells of testes under control of leutinizing hormone LH
- LH secreted from pituitary under control of hypothalmic luteinizinh hormone releasing hormone LHRH

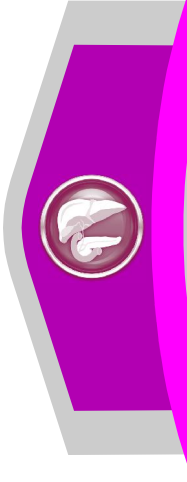
- LHRH has a short half life and release in pulsatile manner
- The pulsatile release is important as receptors of LHRH will become desensitized if permanently occupied
- Testosterone is converted into 1,5 dihydrotestosterone (DHT) by enzyme 5 alpha reductase present in prostate and perigenital skin
- DHT has 5 times the potancy of testosterone

PROSTATIC SPECIFIC ANTIGEN PSA :

- PSA is a glycoprotein that is a serine protease
- It is a marker of prostatic disease
- The levels increase with age, prostatic cancer and BPH
- PSA is a reliable marker for the progression of advance disease
- PSA of 4-10 ng/ml = 25% will have prostatic cancer
- PSA of 1-4 ng/ml = 15-20 % will have prostatic cancer
- One would advise men aged 50-69 yrs to under go prostatic biopsy if PSA was > 3ng/ml

BENIGN PROSTATIC HYPERPLASIA (BPH) :

- It refers to benign enlargement of prostate
- It occurs in men over 50 yrs of age
- It is a common cause of significant lower urinary tract symptoms in men
- It is the most common cause of bladder outflow obsrtruction in men > 70 yrs of age
- BPH affects both glandular epithilium and connective tissue stroma
- It typically affects the submucous group of glands in transitional zone, forming a nodular enlargement
- Serum testosterone slowly decrease with age
- Serum esterogen levels not decrease equally
- Prostate enlarges because of increased estrogenic effe



CLINICAL FEATURES

- Lower urinary tract symptoms LUTS
  - **Voiding :** Hesitency, poor flow, intermittent stream, dribbling, sensation of poor bladder emptying, episodes of near retention
  - **Storage :** Frequency, nocturia, urgency, urge incontinence, enuresis (nocturnal incontinence)
- UTI
- Dysuria
- Chronic urinary retention
- Hematuria
- Acute urinary retention
- O/E :
- The posterior surface of prostate is smooth , convex, elastic
- Firm in consistency
- Residual urine may be felt as a fluctuating swelling above the prostate
- Rectal mucosa move freely over the prostate
  It is non tender
- Persistence of median sulcus is a definite sign of BPH , in cancer it is obliterated

INVESTIGATIONS :

- Serum PSA levels
- UCE
- Hb
- Rectal ultrasound
- Urodynamic studies
- cystoscopy
- Trans rectal ultrasound and biopsy

TREATMENT :

- Watchful waiting
- Alpha adrenergic blocking agent : inhibit the contraction of smooth muscle of prostate
- 5 alpha reductase inhibitors : inhibit the conversion of testosterone to DHT

Transurethra resection of prostate TURP :

- It is considered as the GOLD standard treatment of BPH
- Cutting is performed by a high frequency diathermy current
- The procedure is associated with hyponatremia (water intoxication) avoided by 1.5 % isotonic glycine for irrigation

- Reteropubic prostatectomy
- Transvesicle prostatectomy
- Perineal prostatectomy

COMPLICATIONS :

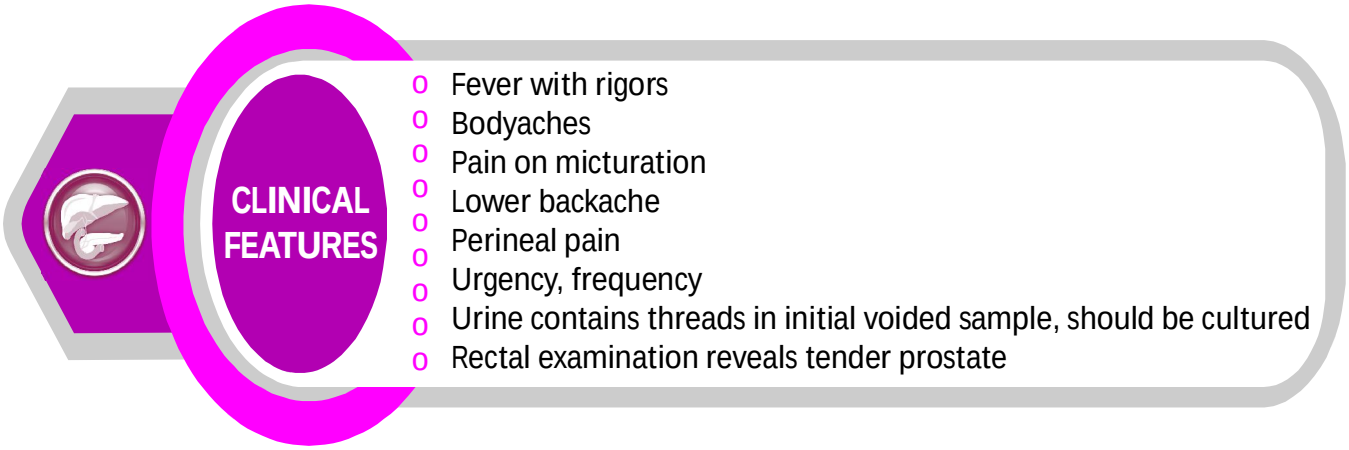
- Hemorrhage
- Perforation of bladder or prostatic capsule
- Sepsis
- Incontinence
- Reterograde ejaculation and impotence
- Urethral stricture
- Bladder neck contracture
- Water intoxication (TUR syndrome)
- Pulmonary atelectasis
- Pneumonia
- DVT

PROSTATITIS :

- It refers to inflammation of prostate
- It can be acute or chronic

ACUTE PROSTATITIS :

- Acute inflammation of prostate
- Commonly caused by ecoli, staph.aureus , staph.albus , strept.fecalis , n.gonorrhea
- Infection may be hematogenous from a distant focus
- May be secondary to acute urinary infection

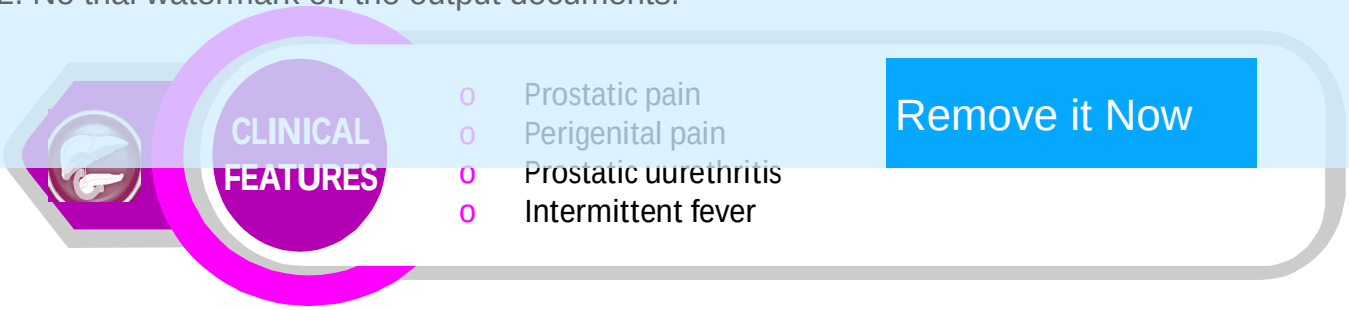


TREATMENT :

- Analgesia
- Antibiotics

CHRONIC PROSTATITIS :

- It refers to chronic inflammation of prostate
- Causes of inadequately treated acute prostatitis
- Diagnosis has to be done on :
  - i. Persistent threads in voiding urine
  - ii. Pus cells in urine showing pus cells with or without bacteria in absence of urinary infection



INVESTIGATIONS :

- 3 glass urine test : if the 1st glass with initial voided sample shows urine containing prostatic threads, prostitis is present
- Rectal examination: normal or soft boggy prostate
- Prostatic fluid shows bacteria and pus cells
- Urethroscopy : inflammation of prostatic urethra or pus exuding from prostatic duct

TREATMENT :

- Antibiotics

PROSTATIC ABSCESS :

- Can be develop after prostatitis
- Should be suspected if there is no response after using antibiotics for prostatitis
- Enlarge, hot, extremely tender, fluctuant prostate on rectal examination

TREATMENT :

- Drainage of the abscess by per urethral resection-unroofing of whole cavity
- Drainage can also be done by perineal route

TB OF PROSTATE AND SEMINAL VESICLE :

- It is a rare condition
- In 30 % of cases history of pulmonary TB within 5 yrs of onset of genital TB
- On rectal examination the affected vesicle is found to be nodular
- If prostate is involved , nodules are found in one or both lobes of prostate

CLINICAL FEATURES

- Urethral discharge
- Painful/ blood stained ejaculation
- Pain in perineum
- Infertility
- Dysuria
- Abscess formation

TREATMENT :

- Anti tuberculous therapy
- Transurethral drainage if abscess

CARCINOMA OF PROSTATE :

- It is the most common malignant tumor in men over t
- Usually originate in peripheral zone of prostate

RISK FACTORS :

- Age
- Family history
- Race

SPREAD :

- Local spread : to seminal vesicle , trigone, bladder neckureters,
- Hematogenous spread : to bone (pelvic, lumber vertebrae, femoral head, rib cage, skull)
- Lymphatic spread : internal and external iliac nodes, reteroperitoneal, mediastinal supraclavicular lymph nodes

STAGING :

- **T1a :** tumor involve < 5% of resected segment
- **T1b :** tumor involve > 5% of resected segment
- **T1c :** impalpable tumor found following investigation of raised PSA
- **T2a :** suspicious nodule involving one lobe
- **T2b :** involving both lobes
- **T3 :** tumor extend through the capsule
- **T4 :** fixed tumor invading adjacent structures

CLINICAL FEATURES

- Early prostatic cancer is asymptomatic
- LUTS
- Bladder outflow obstruction
- Hematuria
- Pelvic pain
- Bone pain, malaise, arthritis
- Anemia, pancytopenia
- Renal failure
- O/E :
  - Nodules within the prostate
  - Stony hard, irregular
  - Obliteration of median sulcus
  - Heterogenous consistency
  - Rectal mucosa is tethered to the gland

INVESTIGATIONS :

- PSA : >10 nmol/ml is suggestive of bladder cancer and > 35ng/ml is diagnostic of advance cancer
- CBC
- LFT
- UCE
- C x ray
- Abdominal x ray

TREATMENT :

RADICAL PROSTATECTOMY :

- Is only used for localized disease T1 and T2
- It should be carried out in men with life expectancy of > 10 yrs
- It involves the removal of prostate down to the distal sphincter mechanism in addition to seminal vesicle
- The bladder neck is reconstituted and anastomosed to the urethra

EXTERNAL BEAM RADIOTHERAPY EBR :

- It is used for localized disease T1 and T2
- It may be associated with complications like cystitis, proctitis, erectile dysfunction
- Radiation used in this procedure of dose 55-70Gy over 4 week period

MEDICAL CASTRATION/ HORMONAL THERAPY :

- For locally advance or metastatic disease
- LHRH agonist given b 3 monthly depot injections
- Anti androgen are given orally

STAGE I , II :

- Radical prostatectomy in yooung patients
- TURP with or without hormonal therapy in old patients

Stage III, IV :

- Androgen ablation with radiotherapy for young patients
- Androgen ablation in old patients

KEY POINTS

- TURP is gold standard for treatment of BPH
- Carcinoma of prostate is the most common malignant tumor in men over the age of 65 yrs
- T4 stage : tumor is fixed or invading adjacent structures other than seminal vesicles
- Reterograde ejaculation is most common complication of prostatectomy

Case example :

A 65 year old man presents to OPD with c/o poor urinary stream , hesitency, dribbling and nocturnal frequency
O/E : posterior surface of prostate is smooth

Q : what is your diagnosis ?
A : benign prostatic hyperplasia BPH

Q : what are the investigations required ?
A : Serum PSA levels, UCE, Hb, Rectal ultrasound, Urodynamic studies, cystoscopy, Trans rectal ultrasound and biopsy

Q : what is the treatment ?
A :

- Watchful waiting
- Alpha adrenergic blocking agent : inhibit the contraction of smooth muscle of prostate
- 5 alpha reductase inhibitors : inhibit the conversion of testosterone to DHT
- Transurethra resection of prostate TURP :
  - It is considered as the GOLD standard treatment of BPH
  - Cutting is performed by a high frequency diathermy current
  - The procedure is associated with hyponatremia (water intoxication) avoided by 1.5 % isotonic glycine for irrigation
- Reteropubic prostatectomy
- Transvesicle prostatectomy
- Perineal prostatectomy

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TESTIS AND SCROTUM

Chapter 49

ANATOMY OF TESTIS :

- Testis develop in reteroperitoneum below the kidney testis lies at the internal inguinal ring at 3 month of gestation
- And descend to the scrotum between 7 to 9 month gestation
- maternal chorionic gonadotropin stimulates growth of testis and may stimulate its migration
- It is supplied by testicular artery from abdominal aorta
- Testicular vein drain into renal vein on left and IVC on right

ECTOPIC TESTIS :

SITES :

- On the perineum
- At superficial inguinal ring *
- At the roof of penis
- In femoral triangle
- The main hazard is liability to injury

INCOMPLETELY DESCENDED TESTIS :

- It occurs when testis is arrested in some parts of its no
- Ectopic testis : a testis abnormally placed outside its pa
- 4% of boys are born with incompletely descended testis
- About 2/3 of these reaches the scrotum during 1st 3 months of life
- In 10 % of unilateral cases there is family history
- The condition is more common on right side
- It is bilateral in 20% of cases

COMPLICATIONS :

- Infertility
- Malignancy (seminoma most common cancer)
- Indirect inguinal hernia
- Testicular torsion

KEY POINTS

- It must be differentiated from retractile testis
- It may be found intra abdominally, intracanalicular, extra canalicular, superficial inguinal pouch

INVESTIGATIONS :

- Ultrasound
- Laparoscopy

TREATMENT :

ORCHIDOPEXY :

- Usually performed before the boy reaches 12 months of age
- The testis and spermatic cord is mobilized and testis is repositioned in scrotum
- Incision over deep inguinal ring

TORSION OF TESTIS :

- It is a condition in which testicle twists in a such a way that its blood supply becomes compromised

RISK FACTORS :

- Inversion pof testis
- High investment of tunica vaginalis
- Separartion of epididymis.

CLINICAL FEATURES

- Most common between 10-25 yrs of age
- Sudden agonising pain in groin and lower abdomen
- Nausea, vomiting
- O/E testis seems high and tender twisted cord can be palpated above it
- Lost cremasteric reflex

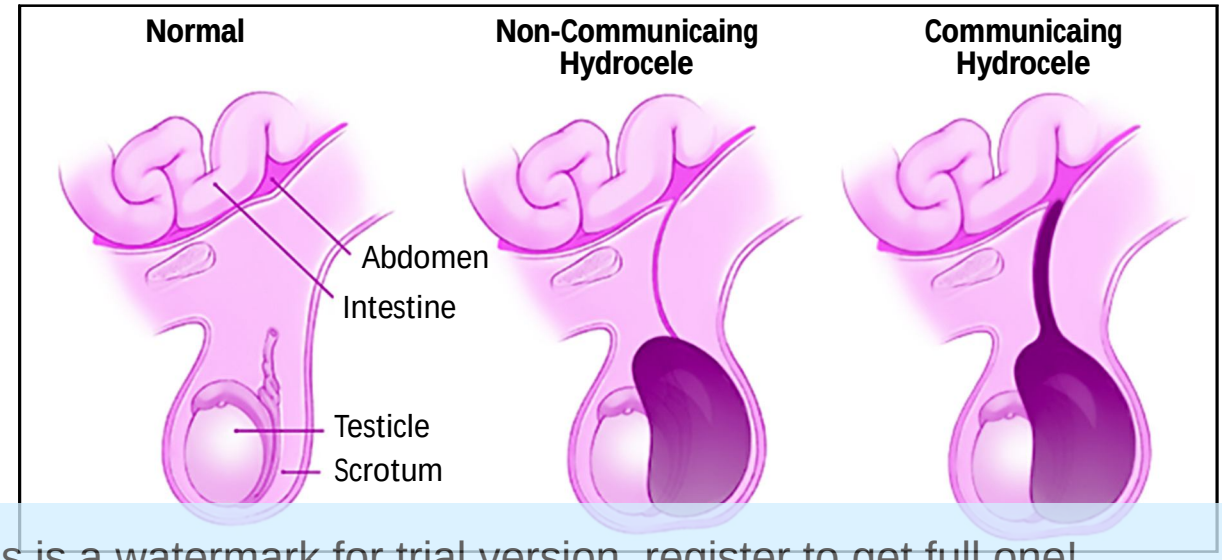
DIFFERENTIAL DIAGNOSIS :

- Epididymo orchitis : elevation of testis reduce the pain in epididymo orchitis
- Mumps orchitis : cord is not thickened and condition is bilateral
- Idiopathic scrotal edema

TREATMENT :

- Doppler U/S to confirm the absence of blood supply to affected testis
- Exploration through a scotal incision
- If testis is viable = orchidopexy of the affected and opposite testis to prevent torsion in future
- If testis is non viable = orchidectomy

HYDROCELE :



- Abnormal collection of serous fluid in a part of processus vaginalis , usually tunica vaginalis
- Fluid contains albumin and fibrinogen
- It can be produce :
  - By excessive production of fluid within the sac (secondary H)
  - By defective absorption of fluid (primary H)
  - By interference with lymphatic drainage
  - By connection with a peritoneal cavity via pate

CLINICAL FEATURES

- Hydroceles are typically translucent
- Possible to get above the swelling
- Painless swelling
- Encysted hydrocele of cord is a smooth oval swelling near the spermatic cord, less mobile and moves downward

TREATMENT :

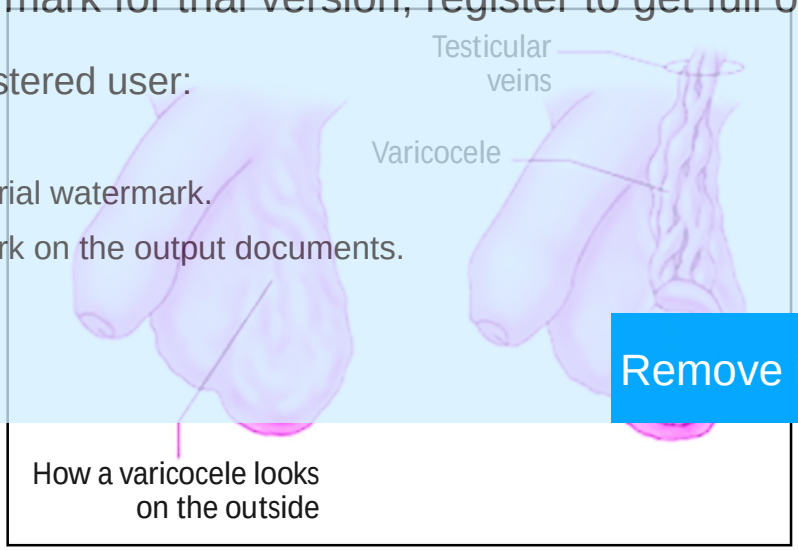
- Congenital hydrocele are treated by herniotomy
- Lord's operation :
  - Performed when the sac is thin walled
  - There is minimal dissection and reduce risk of hematoma
  - Incision through skin and dartos is continued through the tunica and hydrocele is emptied
  - Tunica is then plicated by series of interrupted sutures

- Jaboulay's peration :
  - ❖ Eversion of sac with placement of testis in a pouch prepared by dissection in fascial planes of scrotum

EPIDIDYMAL CYST :

- These are filled with crystal clear fluid
- They are very common
- Usually multiple
- Vary in size
- Often bilateral
- Occur in middle age
- Cluster of tens cyst feel like tiny brunches of grapes
- They are transilluminate brilliantly
- Diagnosis is confirmed by ultrasound
- Treatment : excision of cyst

VARICOCELE :



How a varicocele looks on the outside

- It is the varicose dilation of veins draining the testis
- Affects 15-20% of males
- 90% are left sided
- The usual cause is absence or incompetence of valves in proximal testicular veins
- May be due to renal tumor or nephrectomy

KEY POINTS

- o Most are asymptomatic
- o Annoying dragging discomfort, worst on standing at the end of the day
- o O/E varicose plexus feels like a bag of worms
- o Cough impulse may be present
- o The affected testis may be atrophied in long standing cases
- o Ultrasound is diagnostic

TREATMENT :

- Operation is not indicated for an asymptomatic varicocele
- Embolization of gonadal vein*
- Surgical ligation of testicular vein can also a treatment option

SPERMATOCELE :

- It is a unilocular retention cyst
- Typically lies in epididymal head above and behind the upper pole of testis
- Softer and laser
- It transilluminate
- Treatment : large one should be aspirated or excised through scrotal incision

EPIDIDYMO ORCHITIS :

- Inflammation confined to epididymis is epididymitis , infection spreading to testis is epididymo orchitis
- It can be acute or chronic

CAUSES :

- Chlamydia
- Gonorrhea
- E. Coli
- Proteus
- Urethral instrumentation

KEY POINTS

- Painful testis and epididymis
- Scrotal wall become red, edematous , shiny and become adherent to epididymis

INVESTIGATIONS :

- Urine analysis : leukocytes (UTI)
- Ultrasound : epididymitis, abscess formation
- Urethral swab for chlamydial testing in young patients

TREATMENT :

- Advice planty of fluids
- Antibiotics for at least 2 weeks
- Doxycycline 100-200 mg daily or quinolone in young patients
- If abscess = drainage is necessary

CHRONIC EPIDIDYMP ORCHITIS :

- It usually follow the failure of resolution of acute folrm
- Presents with intermittent episodes of discomfort
- Epididymis feels thick and tender

TREATMENT :

- Antibiotics and anti inflammatory agents for 4-6 weeks
- Epididymectomy
- Orchidectomy

TUBERCULOUS EPIDIDYMO ORCHITIS :

- Mostly affect the lower pole of epididymis
- The infection is retrograde from a tuberculous focus in seminal vesicle

CLINICAL FEATURES

- Firm, uncomfortable discrete swelling of lower pole of epididymis
- Normal feeling testis
- Subepithelial tubercle : beading of vas
- Indurated and swelled seminal vesicle
- Cold abscess formation in neglected cases

INVESTIGATIONS :

- Urine analysis
- Semen analysis
- C x-ray
- Ultrasound : thickened epididymis

TREATMENT :

- Secondary tuberculous epididymis may resolve when
- If no resolution within 2 months then epididymectomy

TUMORS OF TESTIS :

- Account for 1-1.5% of male neoplasm
- They are most common form of tumor in young men
- More common in patients with history of testicular maldescent, contralateral testicular tumor, klinefelter's syndrome

TYPES :

- Germ cell tumors 90-95% (seminoma, teratoma, choriocarcinoma)
- Interstitial tumors 1-2 % (leydig cell tumor)
- Lymphoma 3-7%
- Other tumors 1-2 %

SEMINOMA :

- Homogenous and pinkish cream in color
- Compress neighbouring testicular tissue
- It consist of oval cells with clear cytoplasm
- Large rounded nuclei with acidophilic nucleoliactive lymphocytic infiltration of tumor suggest good host response and better prognosis
- It metastasize mainly via lymphatics
- Lymphatic drainage of testis is to para aortic nodes

TERATOMA :

- These are non seminomatous germ cell tumors
- They contain more than one cell type
- Components derived from ectoderm, endoderm and mesoderm

INTERSTITIAL CELL TUMOR :

- Arise from leydig or sertoli cells
- Leydig cell tumor masculinises
- Sertoli cell tumor feminises
- Small well circumscribed tumors with a yellow cut surface
- 10% are malignant
- Microscopically cells are uniform and packed
- Most prepubertal tumors produce androgens which causes sexual precocity

CLINICAL FEATURES

- Painless testicular lump
- Sensation of heaviness
- In some cases severe pain with acute enlargement due to hemorrhage into the tumor
- O/E : intratesticular solid mass
- P/R : normal

INVESTIGATIONS :

- Diagnosis is confirmed by ultrasound scanning of testis
- AFP rise in 50-70 % cases
- HCG rise in40-60% cases
- **C X-RAY**: classical cannon ball metastasis
- Ct chest , abdomen for metastasis

STAGING :

- **Stage I :** Tumor is confined to testis
- **Stage II :** Nodal disease is present but confined to below the diaphragm
- **Stage III :** Nodal disease above the diaphragm
- **Stage IV :** Non lymphatic metastatic disease (most typically with lungs)

TREATMENT :

- Scrotal exploration and orchidectomy for suspected cases
- Management by staging and histological diagnosis after orchidectomy

STAGE I TUMORS :

- Seminomas are radiosensitive , Radiotherapy to para aortic nodes is mainstay of stage I tumors
- NSGCT are not radiosensitive but are highly sensitive to combine chemotherapy (bleomycin, etopside, cis-platinium) BEP chemotherapy

STAGE II-IV :

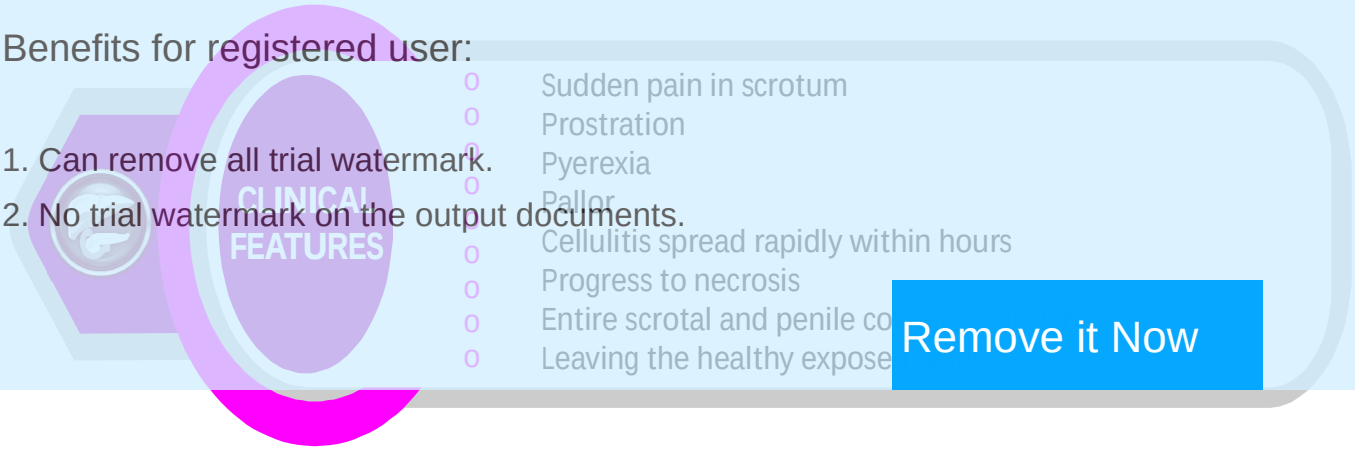
- BEP chemotherapy is mainstay of treatment for stage II-IV seminoma and NSGCT
- Reteroperitoneal lymph node dissection is needed in some cases of NSGCT when reteroperitoneal masses remain after chemotherapy

FOURNIER'S GANGRENE :

- It refers to sudden scrotal inflammation with rapid onset gangrene leading to exposure of scrotal content
- Can occur in conjunction with sepsis of testis, epididymis, perineal region

RISK FACTORS :

- Minor injury
- Procedures in perineum (bruise, scratch, urethral dilation, injection of hemorrhoids, opening of periurethral abscess)
- Mixed infection of aerobic and anaerobic bacteria



TREATMENT :

- It is a surgical emergency
- Urgent wide surgical excision of dead and necrotic tissue is essential
- Intravenous antibiotics with surgery

KEY POINTS

- Materna chorionic gonadotrophin (hCG) stimulates growth and migration of testis
- Lymphatic drainage follows the testicular vein into the para aortic nodes
- Undescended testis associated with indirect inguinal hernia
- Ectopic testis most commonly found at superficial inguinal ring
- Most common risk factor for torsion of testis is inversion of testis
- Embolization of testicular vein under radiological guidance is treatment of choice for varicocele
- Testicular tumors are mostly malignant
- Testicular tumors are more common in patients with history of undescended testis
- Lymphatic spread to para aortic lymph nodes
- Most common tumor is teratoma
- Least common tumors are interestitial tumors
- Lung metastasis suggest that tumor is teratoma

Case example :
A young 16 years old male came in ER with c/o sudden pain in s
O/E : right testis is tender and higher than normal, pain is increased on elevation of scrotum

Q : what is the diagnosis ?
A : Testicular torsion

Q : how will you confirm the diagnosis ?
A : Doppler ultrasound to check the vascularity

Q : what is the treatment ?
A : Exploration , untwisting, fixation of the affected as well as contralateral testis
If testis is non viable orchidectomy of the affected testis and fixation of contralateral testis