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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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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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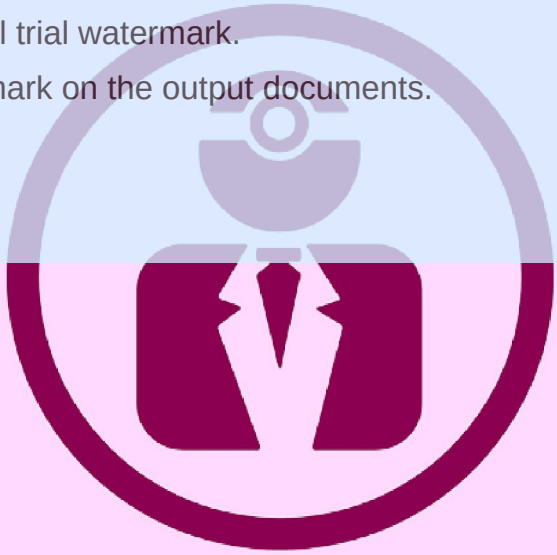
PART - 1

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) :

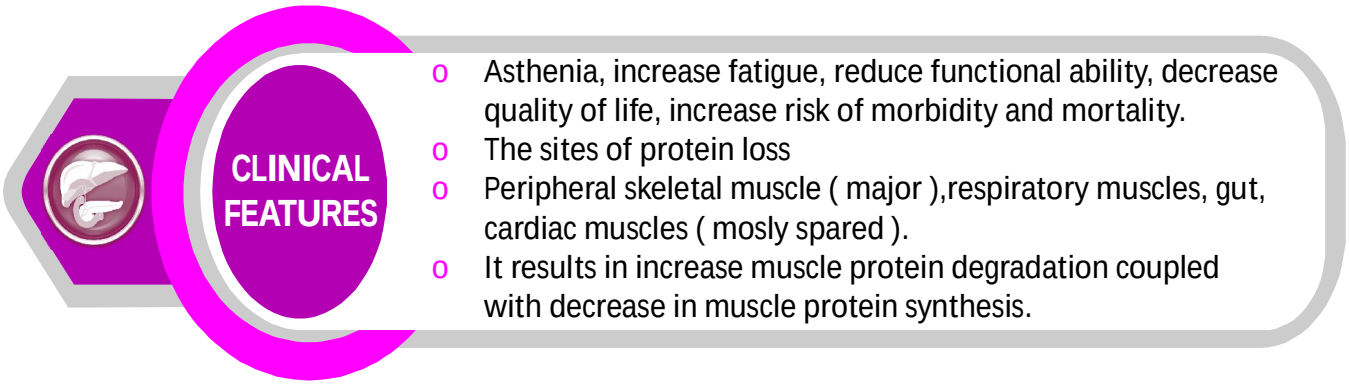
- The liver and skeletal muscle together accounts for > 50 % f daily body protein turnover.
- Skeletal muscle has a large mass but low turnover, liver has relatively small mass but high protein turnover.
- The appr represents a double edge sword as it provides protein important for recovery and repair 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

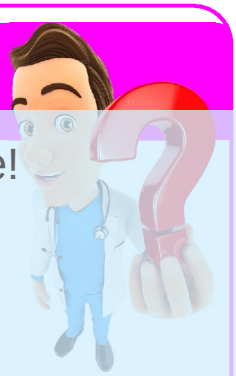
CORRECTION OF COAGULOPATHY :

- 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 :

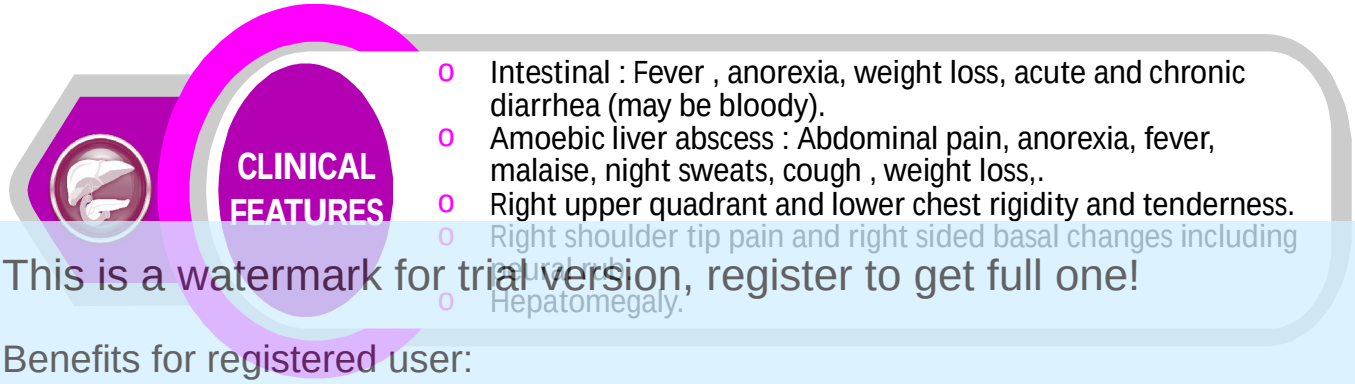
- Pulmonary disease is self limiting only symptomatic treatment.
- Anthelminthic drugs for intestinal disease
- Complications like intestinal obstruction require surgery

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 :

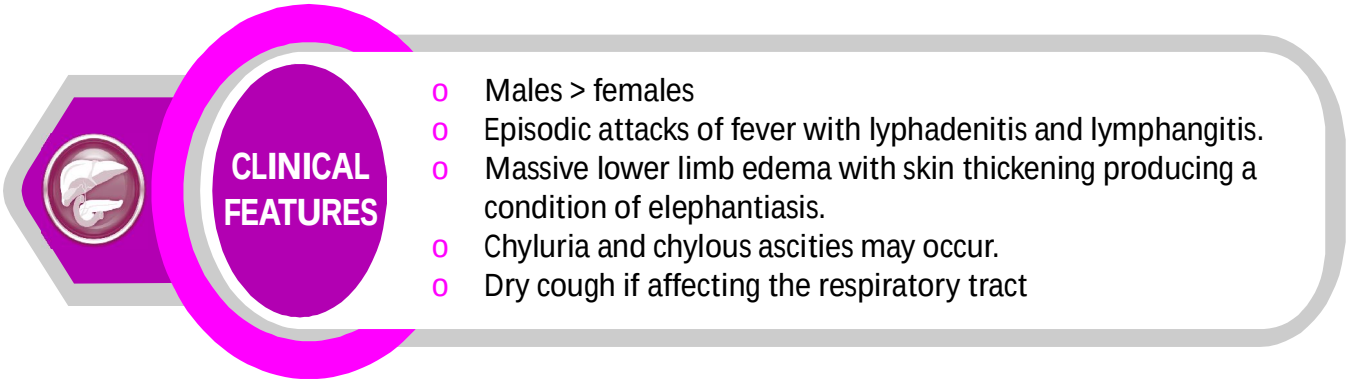
1. Non-endemic regions : Indirect hemagglutinin iha and elisa .
2. Endemic regions : Counter-immunoelectrophorosis

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 :

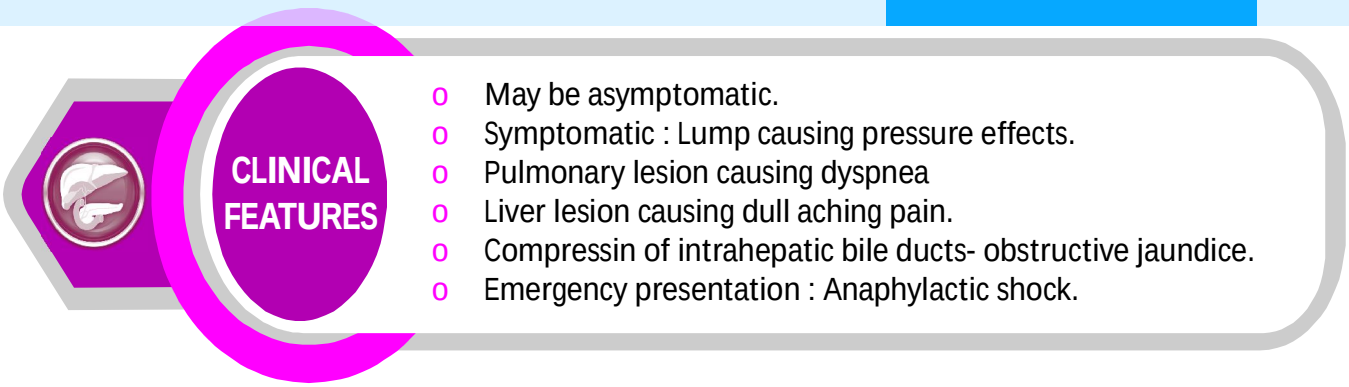
- Cbc esinophilia
- Nocturnal peripheral blood smear - immature form of microfilariae.
- Parasite may also seen in chylous urine, ascities and hydrocele fluid.

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.

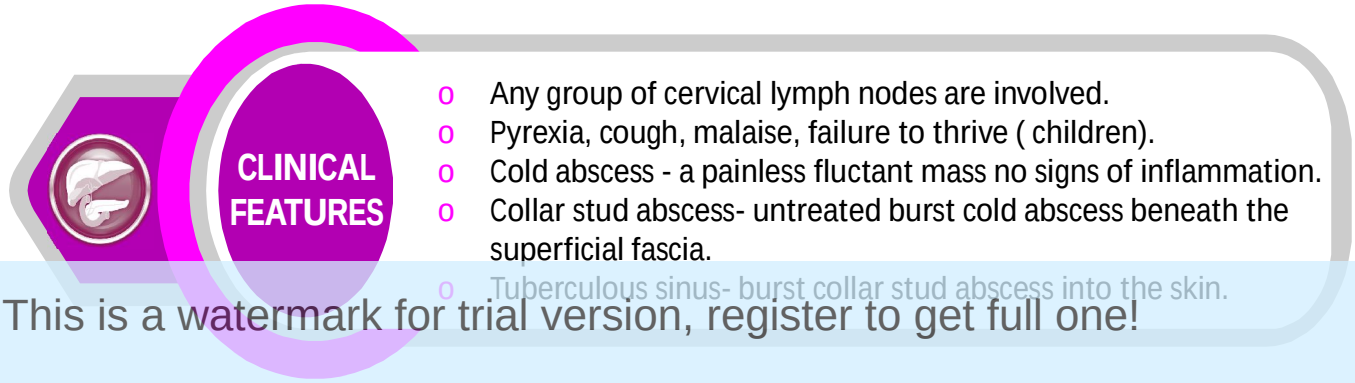
MANAGEMENT :

- 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.

CLINICAL FEATURES

- 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.
- High dose antibiotics (penicillin G , clindamycin with 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 common organism is beta haemolytic streptococci
- It is a rapidly spreading infection of fascial planes leading to necrosis of subcutaneous tissue and overlying skin.

CLINICAL FEATURES

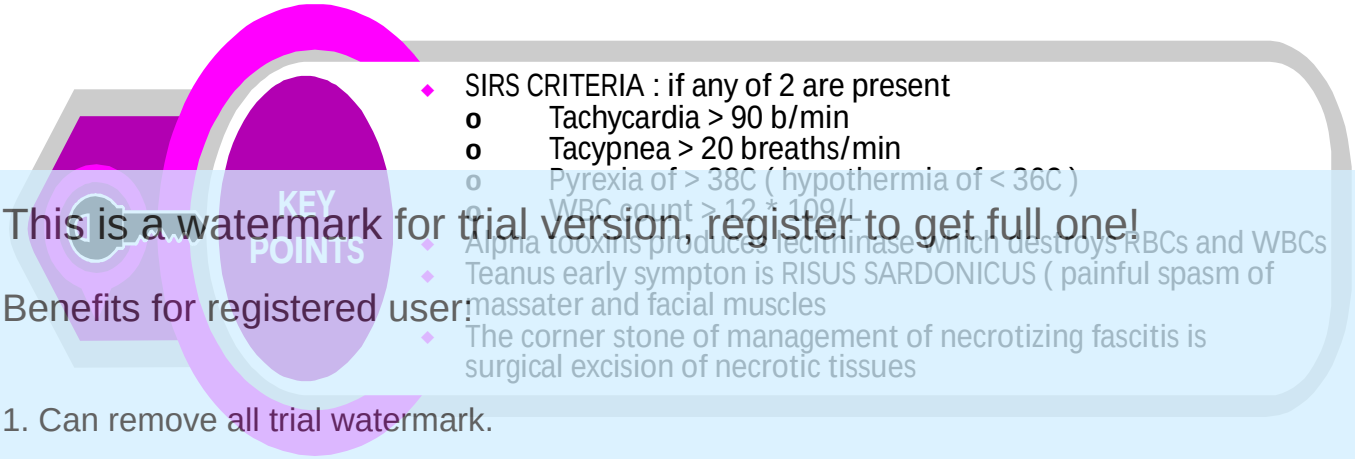
- Severe wound pain, signs of spreading inflammation with crepitus and smell.
- Progressive underlying necrosis and thrombosis turns skin
- dusky blue and black.
- Renal failure as a result of hypovolemia and cardiovascular collapse
- Fournier gangrene when it affects the perineal area.
- Meleney's synergistic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

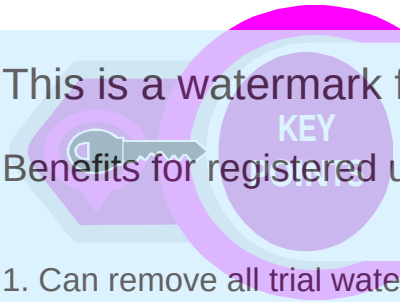
3. KELOID :

- 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 :

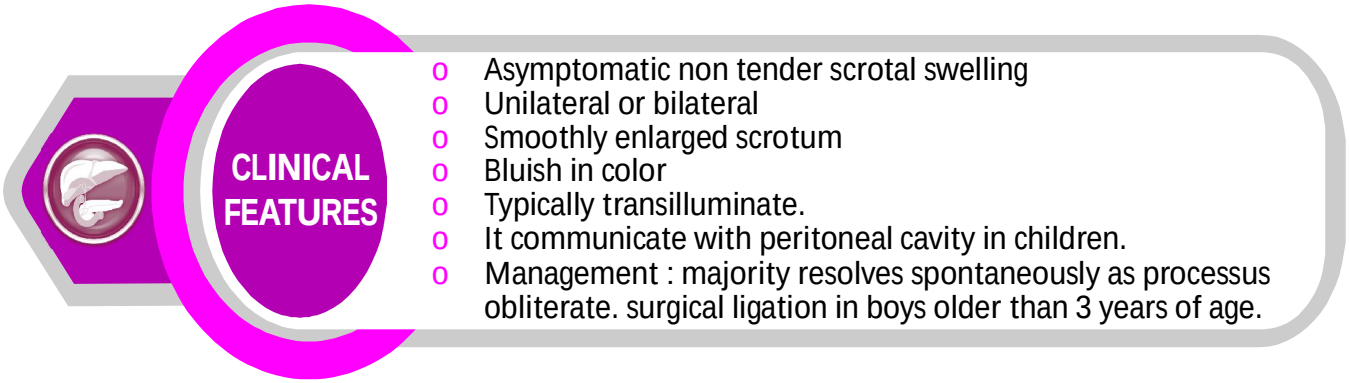
- Inguinal hernia in children are always INDIRECT due to patent processus vaginalis.
- More common in premature boys.
- 15 % bilateral.
- Right sided> left sided.
- It typically causes an intermittent swelling in the groin or scrotum on crying or staining.
- Higher incidence of complications (incarceration)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

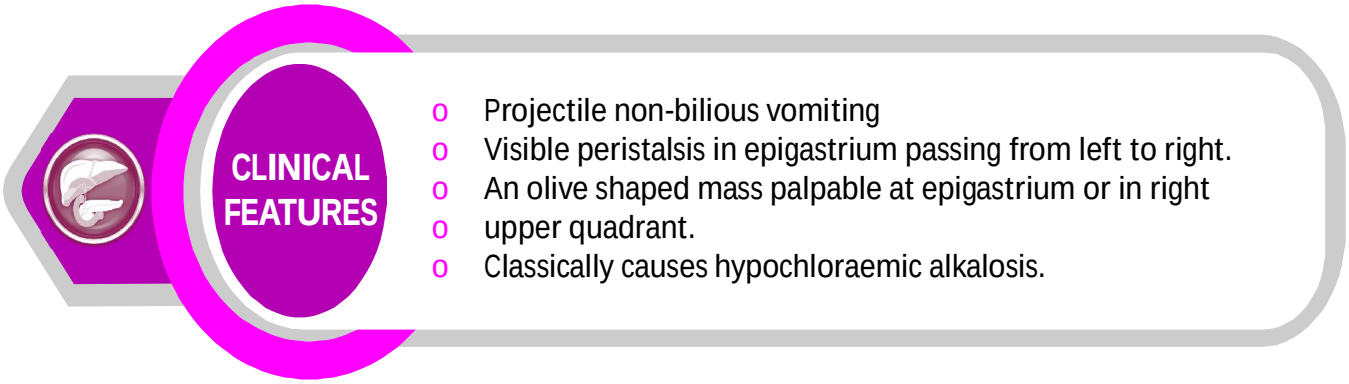
- Colicky pain and vomiting , recurrent jelly stool, palpable sausage shaped mass in right upper quadrant, signs of shock.
- Diagnosis :
  - U/S (diagnosis of choice)
  - Plain Xray abdomen
  - Air contrast enema.

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 :

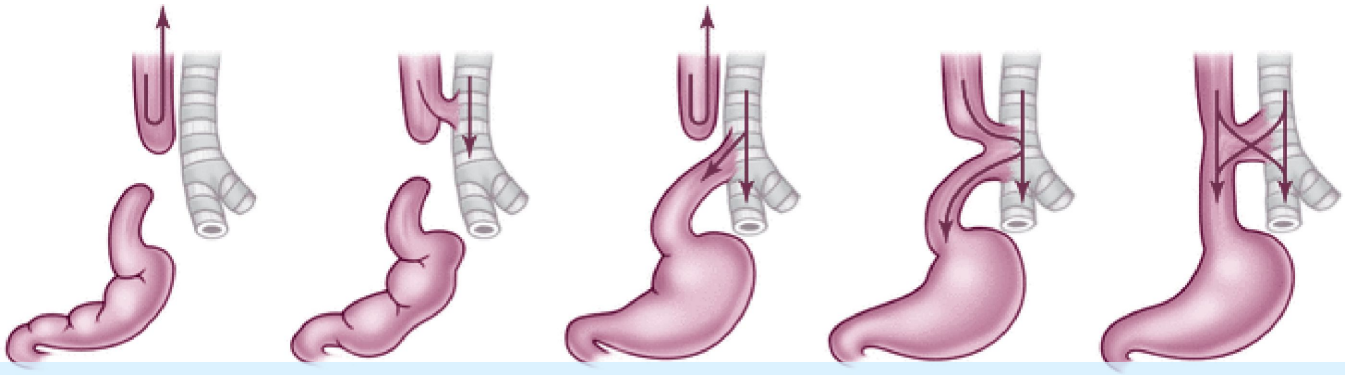
- It results from failure of development of duodenal canal.
- Bile stained vomiting since birth , epigastric fullness.
- Associated with maternal polyhydramnios, down syndrome, annular pancreas.
- DOUBLE BUBBLE sign on abdominal x-ray.
- Surgical bypass (duodenoduedenostomy) after resuscitation.

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.

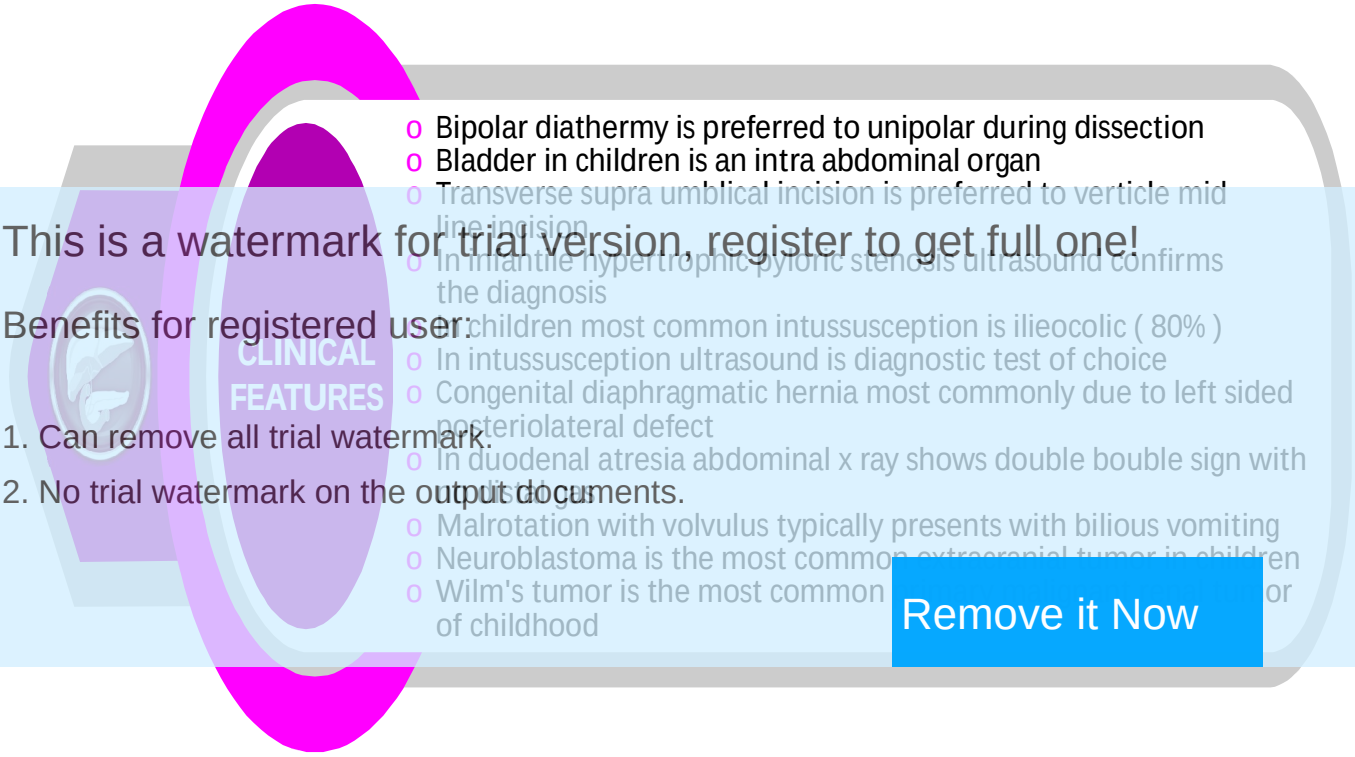
PAEDIATRIC ONCOLOGY :

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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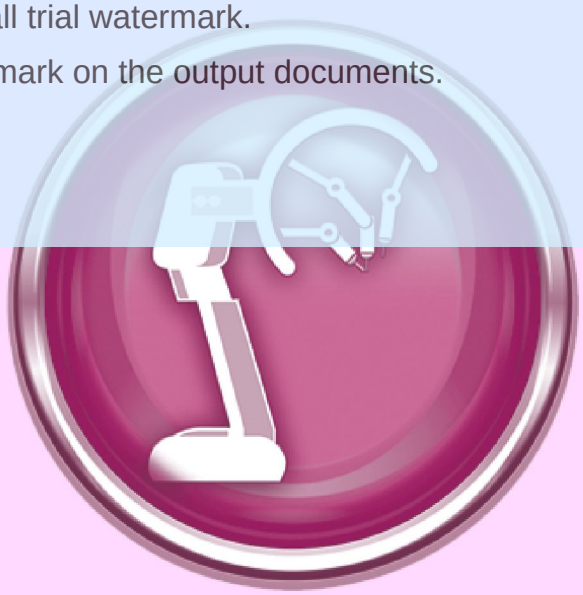
PART - 2

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[illegible]

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 /

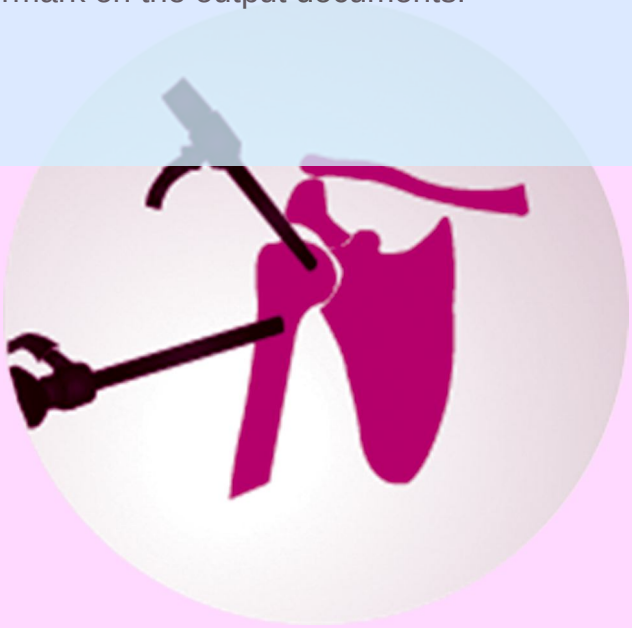
Q : What are the parameters to assess malnutrition ?

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 :**

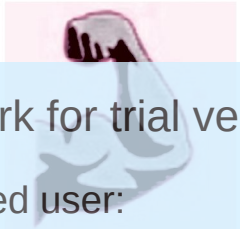
- Spontaneously 04
- To verbal command 03
- To painful stimuli 02
- Does not open 01

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

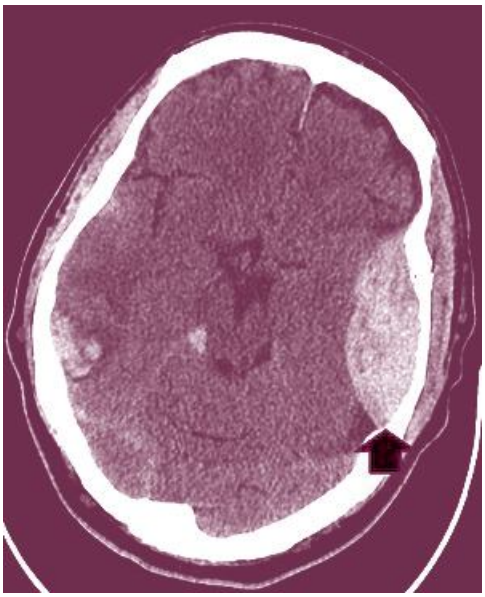
EXAMINATION :

- 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) :



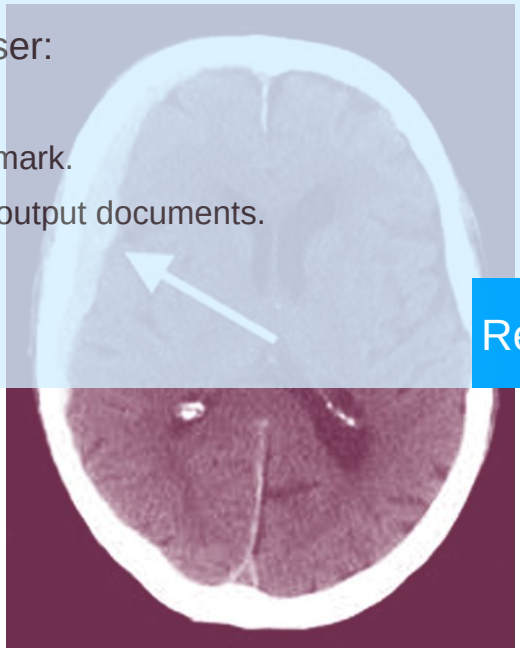
- It is a neurosurgical emergency
- It refers to accumulation of blood between bone and dura
- It results from rupture of an artery , vein, venous sinus
- Almost associated with skull fracture
- Typically it is damage to the middle meningeal artery under the thin temporal bone
- Presentation : lucid 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

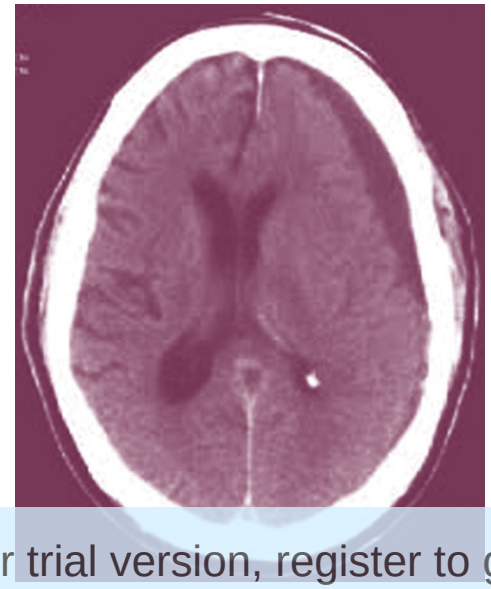
INVESTIGATION :

- 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

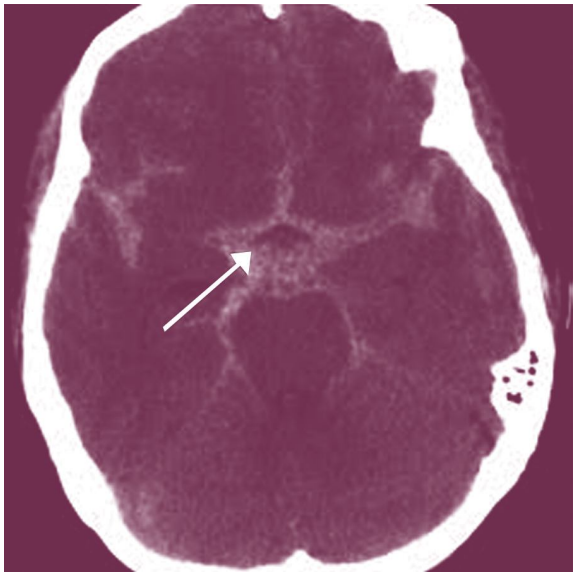
TREATMENT :

- 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

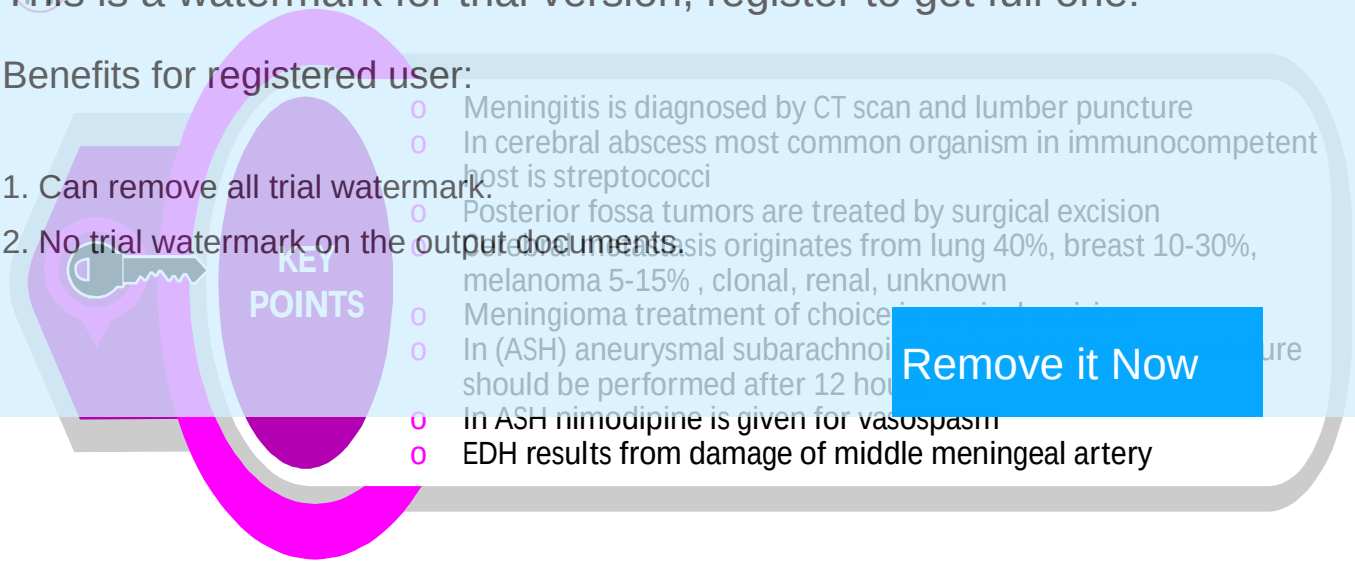
1. Identification of the cause of irreversible coma
2. Exclusion of reversible causes of coma
3. Clinical demonstration of absence of brainstem reflexes

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 :

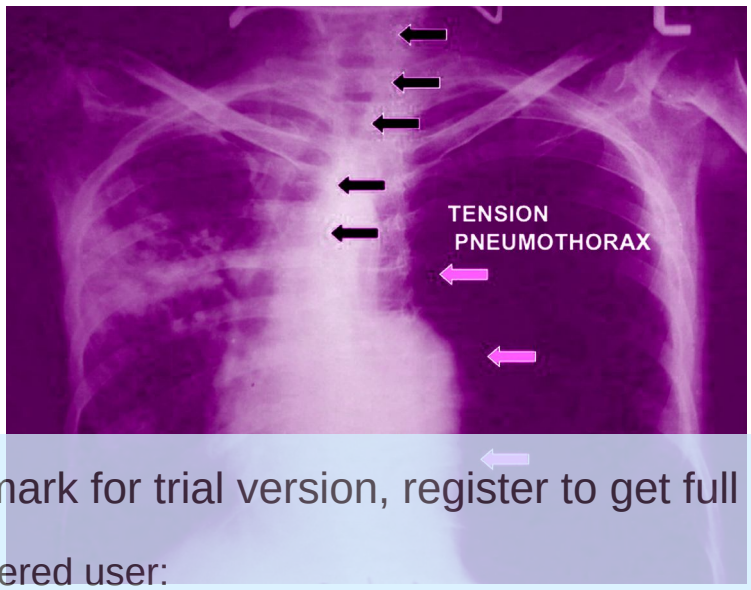
- Chest radiograph investigation of choice
- Ultrasound can be used to differentiate between contusion and actual presence of blood
- Spiral CT scan provided rapid diagnosis in the chest and abdomen
- **Chest drain :** diagnostic as well as therapeutic

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

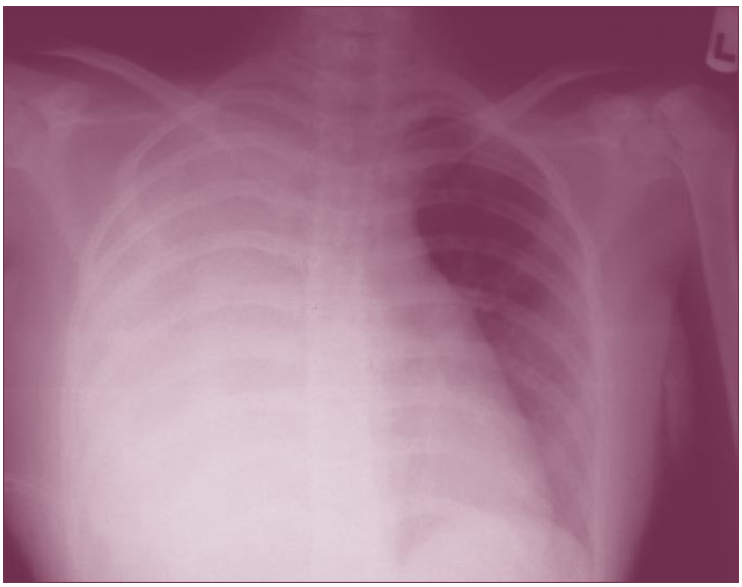
TREATMENT :

- 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 :

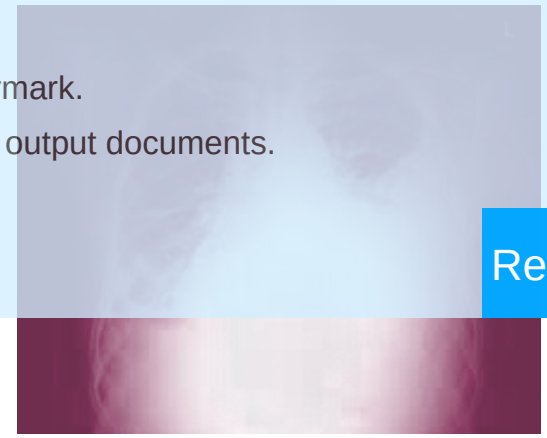
- Every effort should be made to conserve the spleen
- Small tears managed with pressure and hemostatic agents
- Emmental wrapping or enclosing the spleen within a mesh bag
- Occasionally total splenectomy is required.

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 :

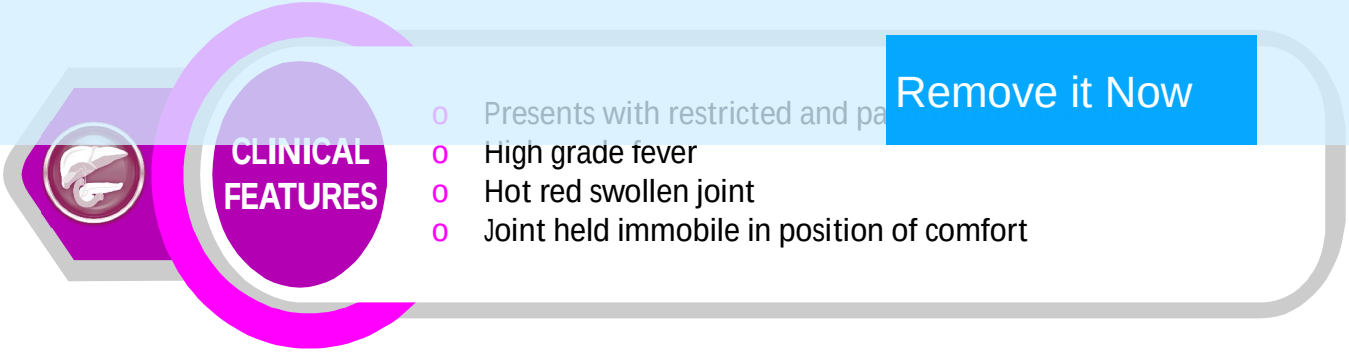
Chapter 16

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

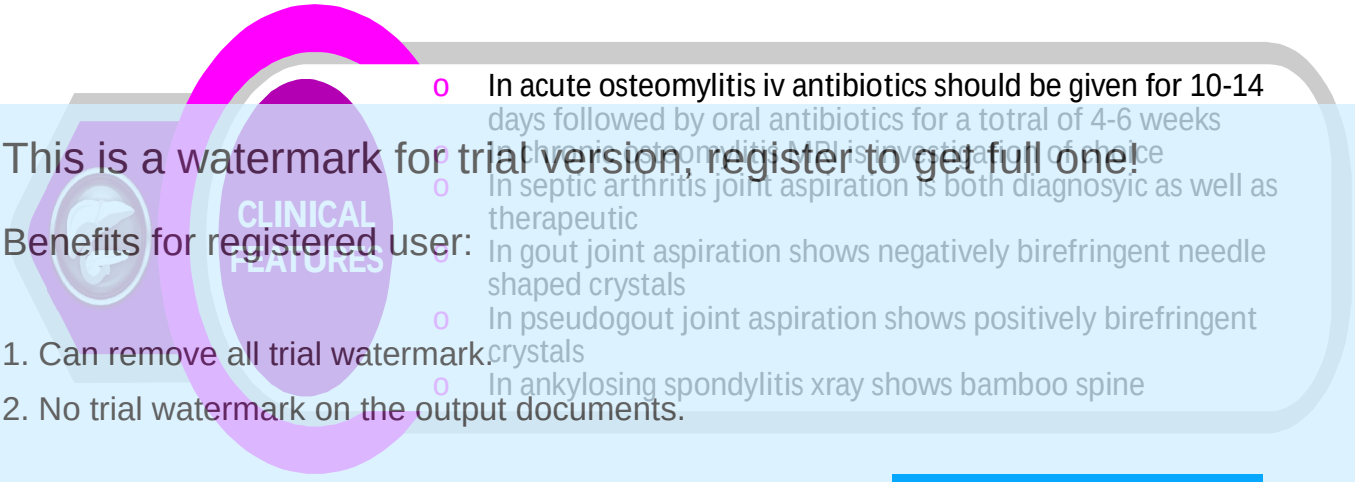
TREATMENT :

- 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 :

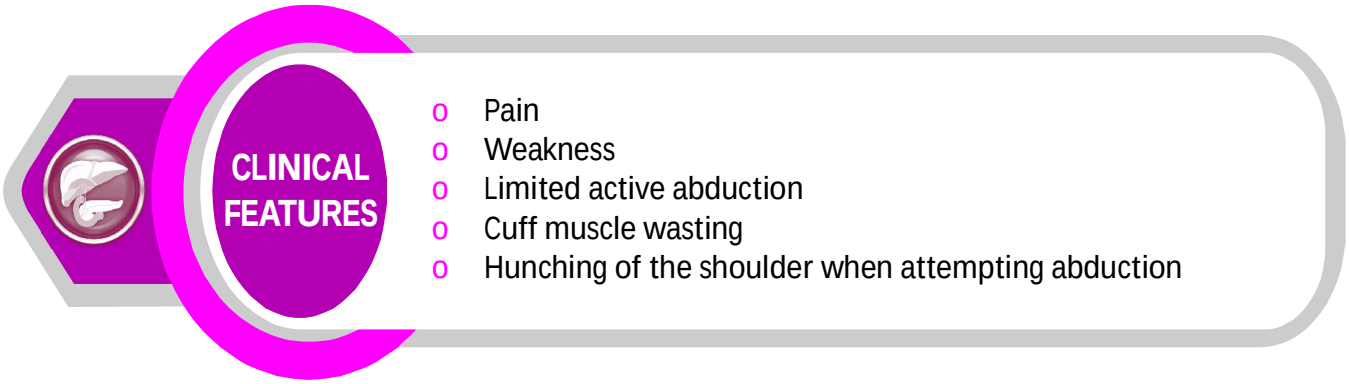
- Middle age.
- It is usually activity related,
- No local tenderness
- Active movement produces pain 60-120degrees of forward flexion.
- Passive movement is less painful than active
- **Hawkin's sign :** Pain is reproduced when shoulder is internally rotated with 90 degree forward full flexion.
- Neer's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

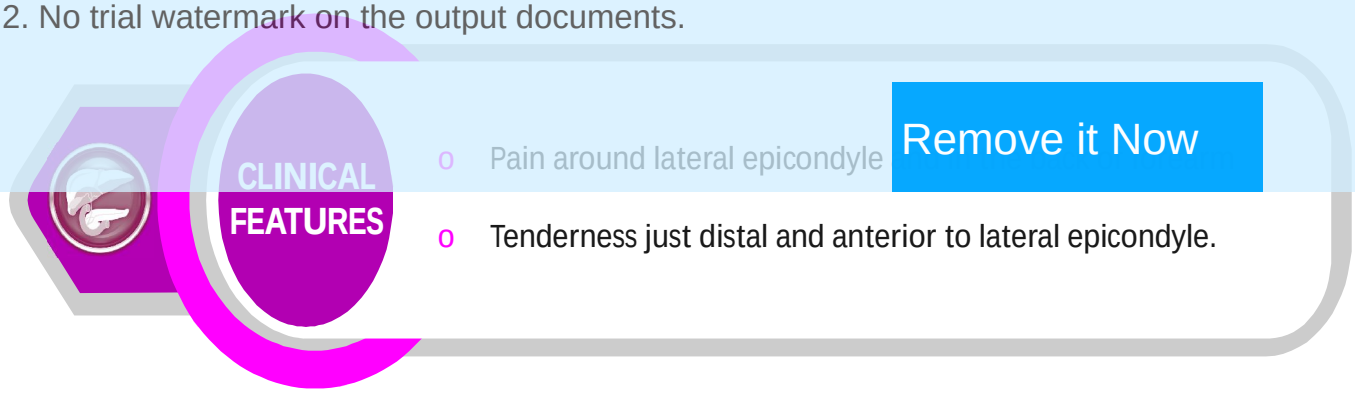
Depends upon patients age, lifestyle, severity of symptoms.

- 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) :

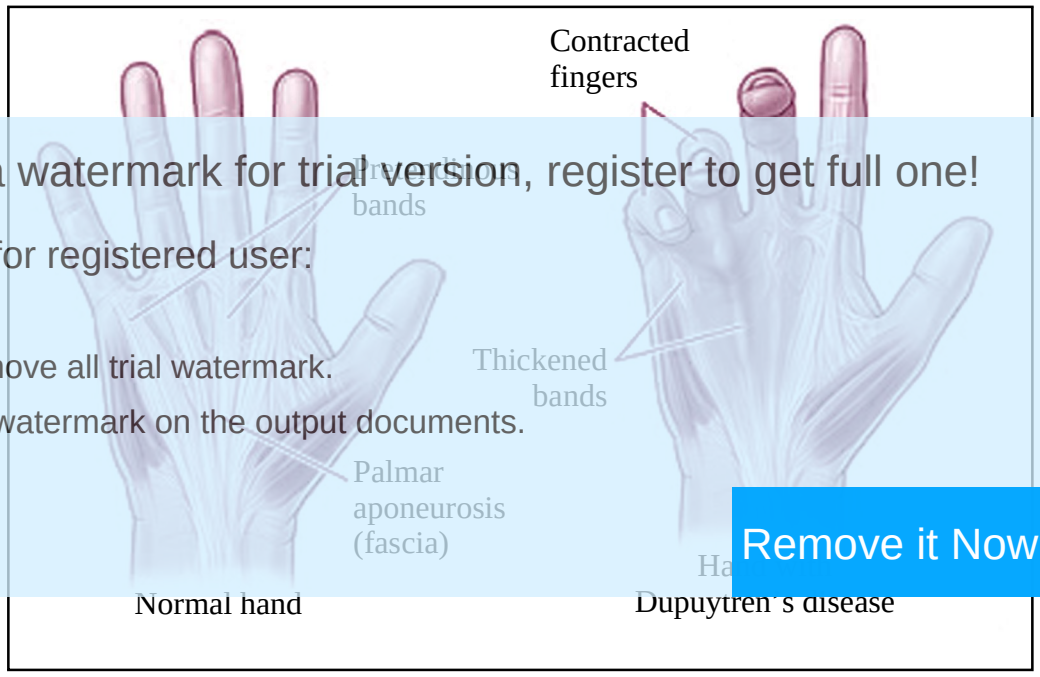
- It involves flexor pronator origin at medial epicondyle
- Pain in medial epicondyle at common flexor origin.
- Differential diagnosis is ulner nerve entrapment.

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.

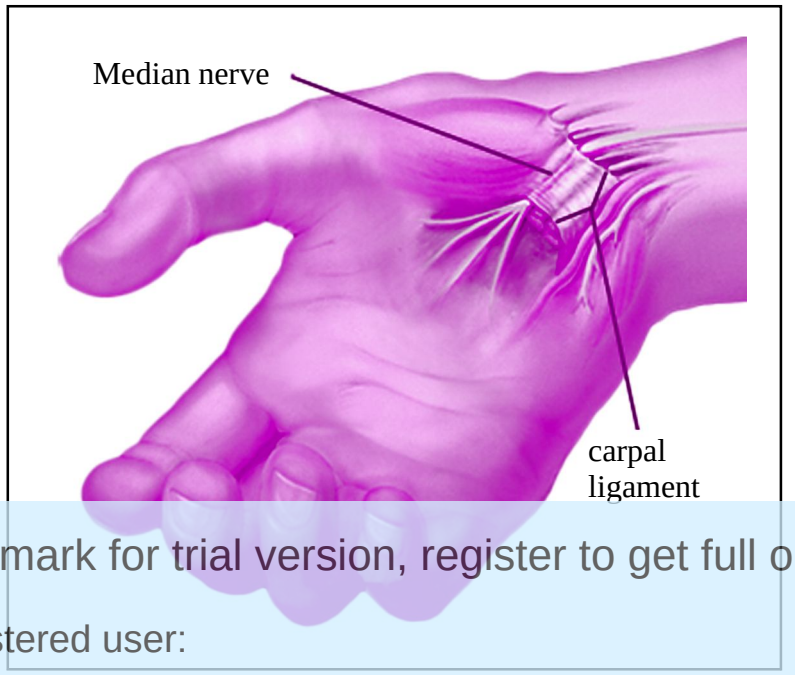
HAND DISORDERS :

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 :

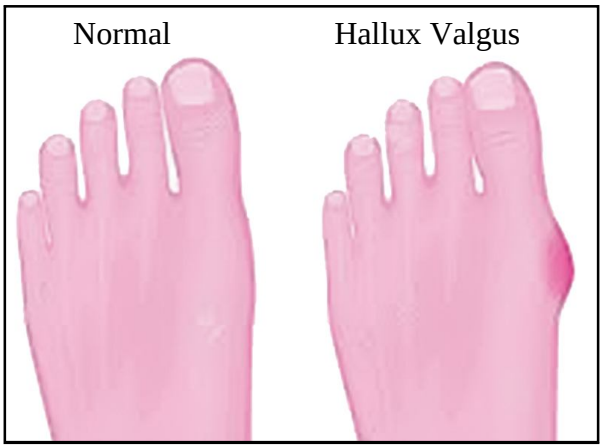
- Radiograph - Joint Space Narrowing, Subchondral sclerosis, Osteophytes
- Subchondral Cysts

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 :

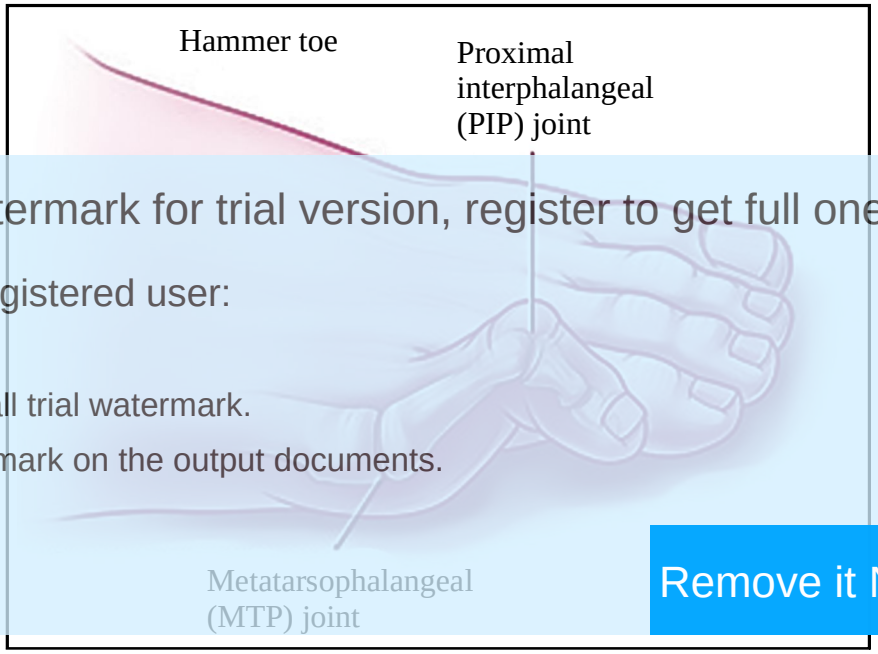
- Mild (Distal Osteotomy), Moderate (Shaft Or Basal Osteotomy), Severe (Shaft And Basal Osteotomy And Fusion Of 1st Metatarsophylyngeal Joint).

COMPLICATIONS :

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

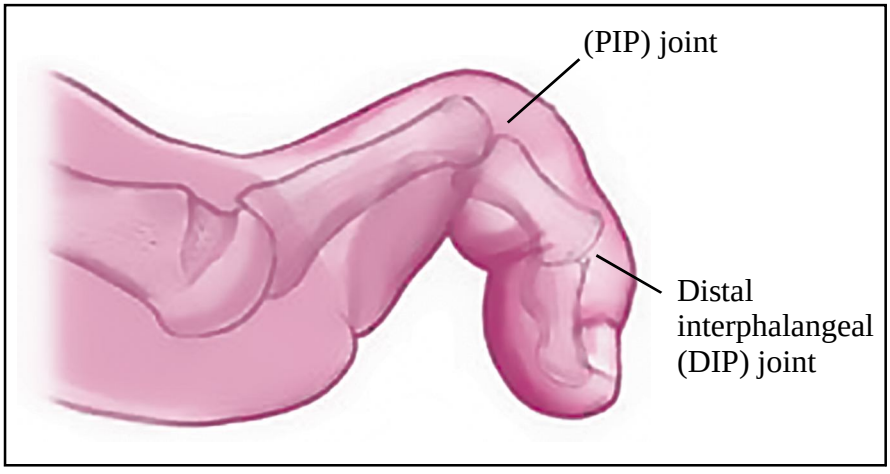
LESSOR TOE DEFORMITIES

HAMMER TOE :



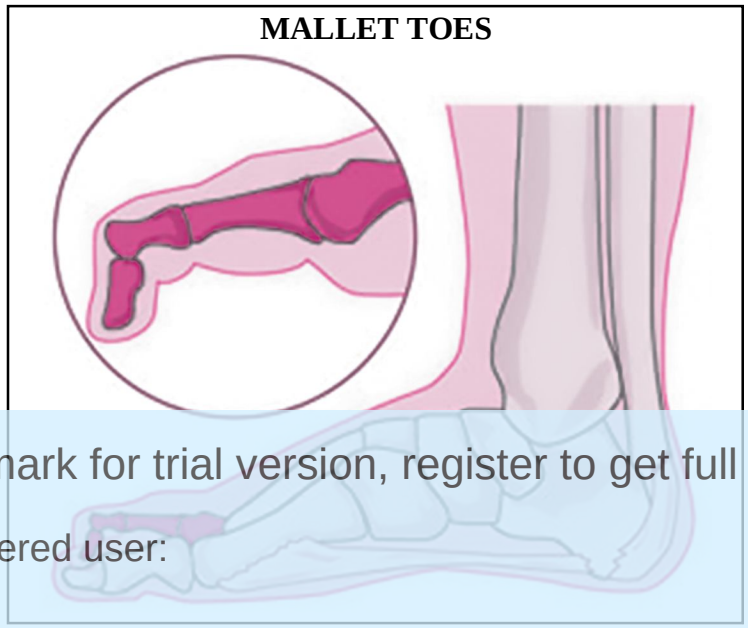
- It is mostly associated with hallux valgus
- Most commonly affects second toe
- Extended MTP joint and DIP joint while flexed PIP joint.

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.

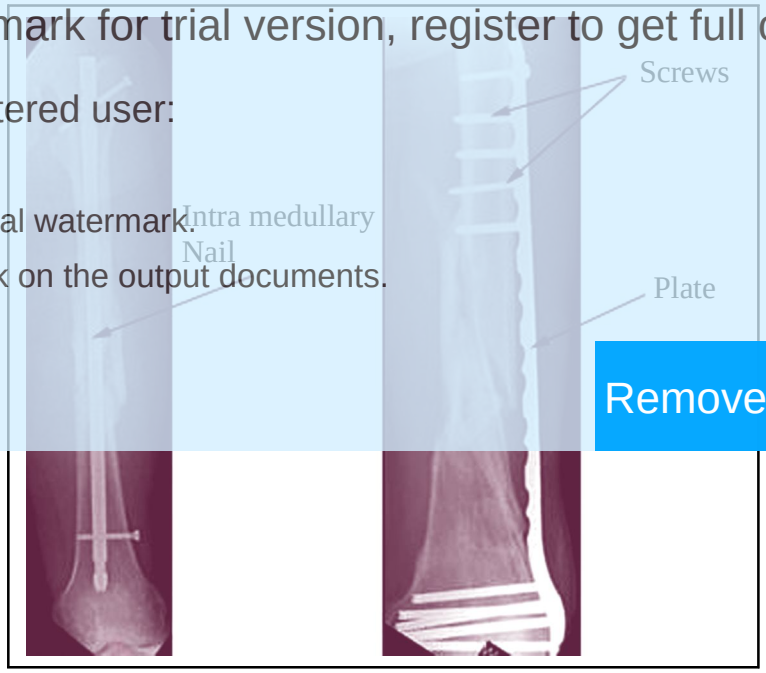
DISADVANTAGE :

- 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.

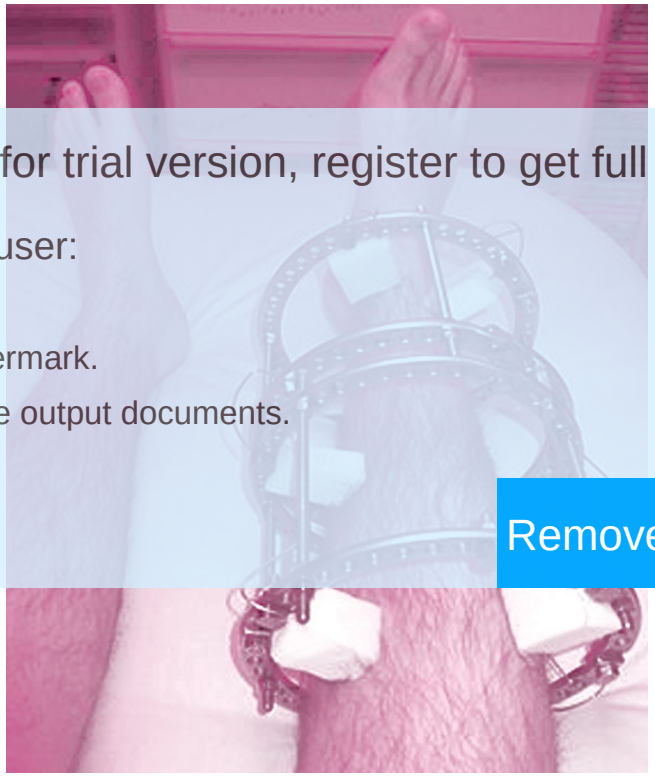
ADVANTAGE :

- 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

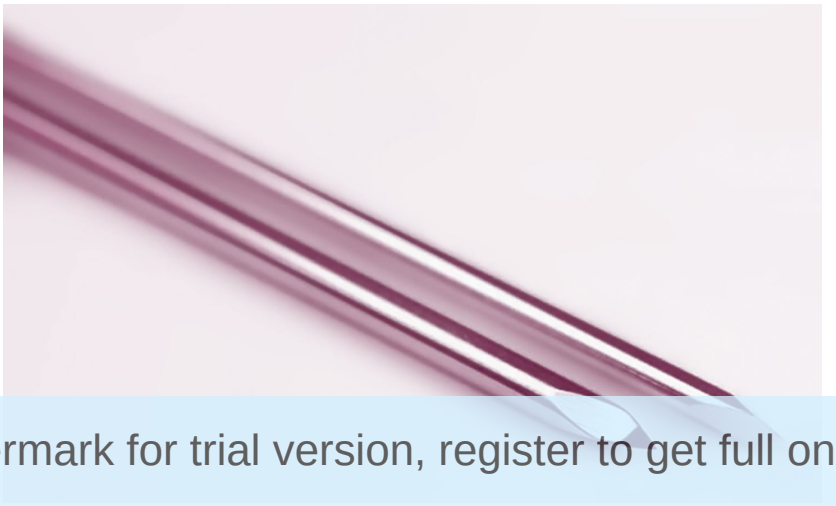
ADVANTAGE :

- 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 :

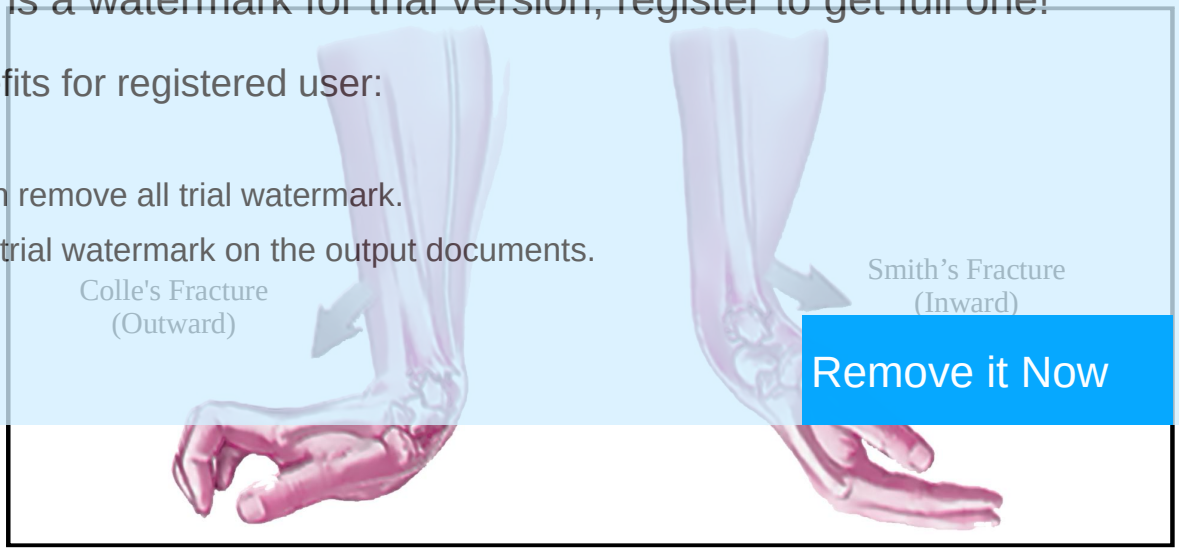
- By open reduction and plate fixation.

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 :

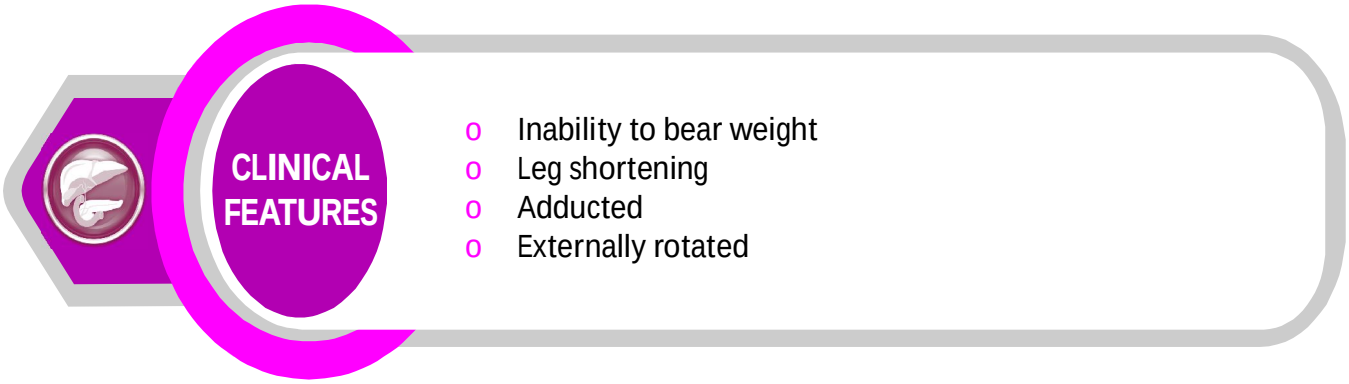
- Talus consist of head neck and body
- Talus neck fracture is the commonest one
- If fracture is undisplaced apply strict non weight bearing in below knee plaster for 6 weeks
- If fracture is displaced ORIF with lef screw
- Complication : AVN

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

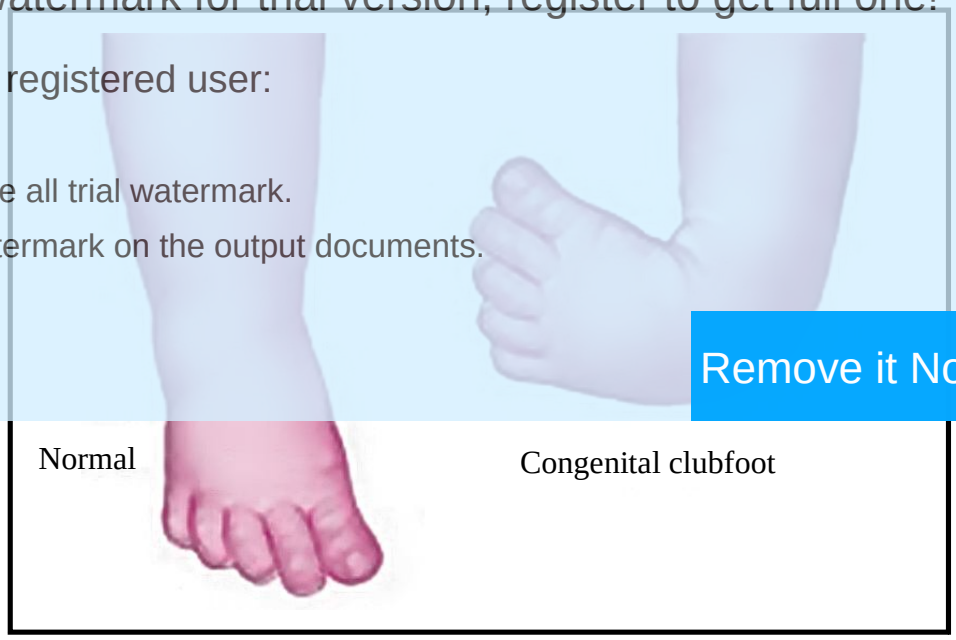
CONGENITAL TALIPES EQUINOVARUS CTEV (CLUB FOOT) :

- 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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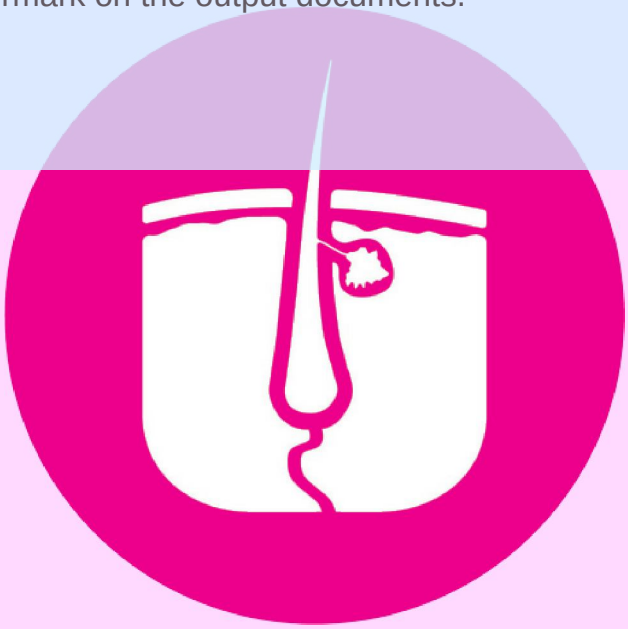
PART - 5

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 :

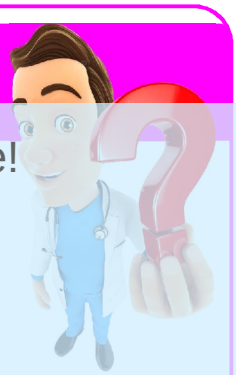
- These affects boys and girls equally
- These are associated with numerous syndrome
- They are invariably present at Berith
- These arises secondary to errors in development of vascular elements during 8th week in utero
- Low flow malformation may cause skeletal hypoplasia
- High flow malformation may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

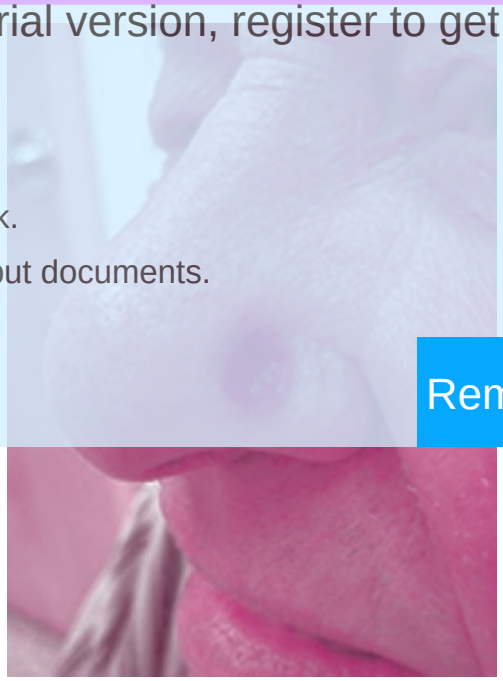
KEY POINTS

- 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