

3rd EDITION
2010/2018



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DEBOL

BEDSIDE ORIENTED SURGERY

LONG & SHORT CASES WITH VIDEO LINKS FOR MEDICAL & HEALTH SCIENCE STUDENTS



Don't depend on Debol. It is just an outline made on common cases!

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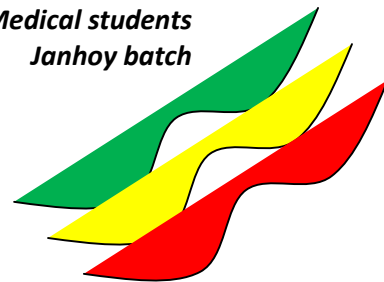
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Janhoy batch



PREFACE

Debol has three major parts; long cases, short cases & pictures of basic surgical instruments.

Long cases contain important information on how to approach patients. Like;

- Information that you will need for taking history (cause, risk factors, clinical presentation, complications, DDX...)
- Pertinent physical examination findings with youtube video links on how to examine a patient
- Sample histories
- Investigations to be done & informations expected from each investigation
- Principles of management

Short cases mainly contain the indication, contraindication & complication of a procedure with youtube video link on how the procedure is done. Some procedural notes are also included for ESS training.

The third part is composed of pictures of basic surgical instruments .For ESS training.

What is new in this edition?

- Some basic radiological images added
- Modification on 2nd edition components

When to read Debol?

- As a quick revision, after reading standard text books of surgery.

Hx of Debol

First edition of Debol was written during our 1st year clinical attachment with the major help of Biruk followed by Dan. 2nd edition was released during C II attachment with the help of lots of people listed on page 5. I want to thank all the participants for their invaluable contribution.

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- Head injury sample histor

ACRONYMS

- ✓ Ass't = Assessment
- ✓ ATLS = Advanced trauma life support
- ✓ Abd. = Abdominal
- ✓ ANDI = Aberration of normal development & involution
- ✓ Ca = Cancer
- ✓ CPs = Clinical presentations
- ✓ Cmn = Common
- ✓ Cpd = Compound
- ✓ Dx = Diagnosis
- ✓ Dxtic= Dignostic
- ✓ DRE = Digital rectal examination
- ✓ DOC = Drug of choice
- ✓ E(s)= subjective evidence
- ✓ E(o)=objective eidence
- ✓ ESS=essential surgical skill
- ✓ G/A = General appearance
- ✓ Hx = History
- ✓ Ix = Investigation
- ✓ Lt = Left
- ✓ LNs = Lymphnodes
- ✓ LAP = Lymphadenopathy
- ✓ LOC = Loss of consciousness
- ✓ MOI = Mechanism of injury
- ✓ MOA = Mechanism of action
- ✓ MVA = Motor vehicle accident
- ✓ Mov't = Movement
- ✓ Mgt = management
- ✓ N&V = Nausea & vomiting
- ✓ NR = Non-reactive
- ✓ No# = Number
- ✓ P/E = Physical examination
- ✓ Pts = Patients
- ✓ +ve = positive
- ✓ RFs = Risk factors
- ✓ R/o = rule out
- ✓ Rx = treatment
- ✓ Rt = Right
- ✓ U/S = ultrasound
- ✓ Ur = your
- ✓ # = fracture

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This book is dedicated to...



JANHOY BATCH /05

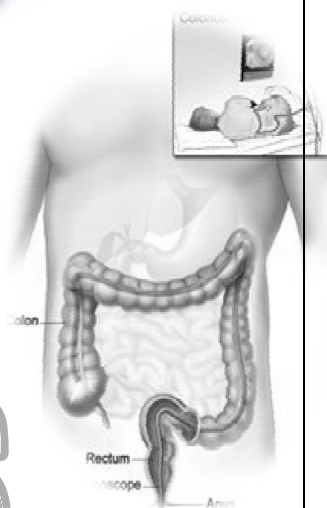
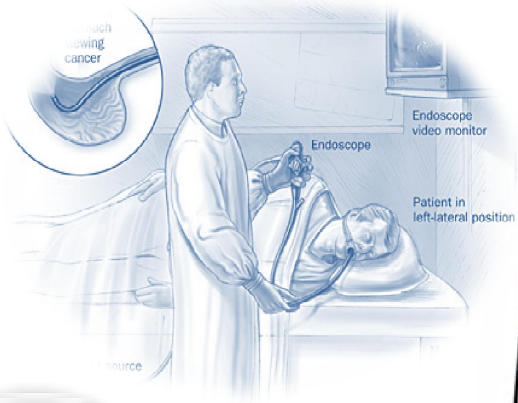


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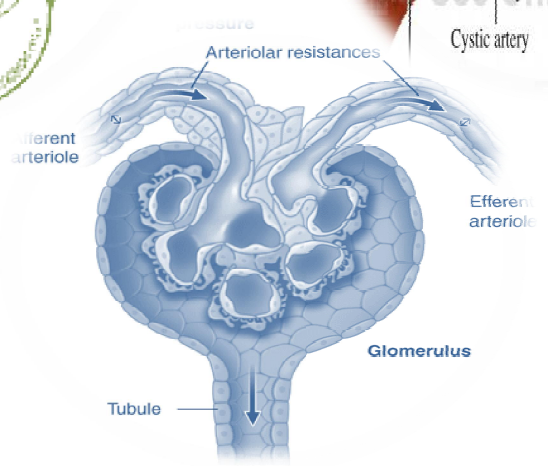
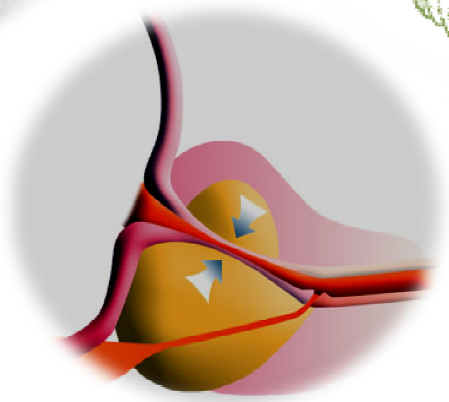
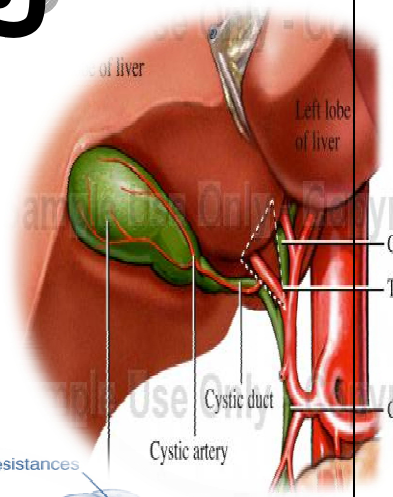
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LONG CASES



GOITER

DDx for anterior neck swelling

- Goiter---*May be*
 - ✓ *Diffuse, uni-nodular or multi-nodular*
 - ✓ *Non toxic(simple) or toxic goiter*
- Lipoma
- Thyroglossal cyst
- Brachial cleft anomalies
- Lymphadenopathy
- Cystic hygroma
- Subhyoid bursitis...

DDx for goiter (enlargement of thyroid gland)

1) Causes of non-toxic goiter

- Endemic goiter
 - ✓ Iodine deficiency
- Dietary goitrogens
 - ✓ Cabbage, Cassava...
- Drug induced goiter
 - ✓ Iodide, amiodarone, lithium
- Thyroiditis (inflammatory goiter)
 - ✓ Sub-acute, chronic thyroiditis
- Familial goiter
 - ✓ Dyshormogenesis--inborn errors of metabolism
- Neoplastic goiter

2) Causes of toxic goiter

- A. By increasing hormone synthesis→they have increased Radio-Active Iodine Uptake (RAIU)
- Graves' disease
 - TMNG
 - Toxic adenoma
 - Drug induced goiter
 - Thyroid ca.
 - Struma ovarii
 - GTD (gestational trophoblastic disease)→The α -subunit of HCG mimic TSH

- TSH-secreting pituitary adenoma
- B. By releasing pre-formed hormone → they have decreased RAIU
 - Thyroiditis
 - ✓ Acute phase of hashimoto's thyroiditis
 - ✓ Subacute thyroiditis

Clinical Presentation

History

In order to write a good hx on thyroid enlargement follow the orders listed below

- A. About the swelling
 - ✓ When it began?
 - ✓ How the pt noticed the swelling?
 - ✓ Painful /painless
 - ✓ Site & progression
- B. Pressure symptoms
 - ✓ Dyspnea /Stridor
 - ✓ Dysphagia
- C. Abnormal function manifestations
 - ✓ Hyperthyroidism: symptoms like...
 - Heat intolerance
 - Palpitation
 - Irritability, emotional lability
 - Sleep disturbance
 - Weight loss despite increased appetite
 - Diarrhea
 - Tremor (the pt may complain as symptom)
 - N & V (nausea & vomiting)
 - Oligomenorrhea or amenorrhea...
 - ✓ Hypothyroidism: symptoms like...
 - Cold intolerance
 - Weight gain
 - Anorexia
 - Constipation
 - Menorrhagia
 - Fatigue
 - Slowed intellectual & motor activity

- D. Mention any medication hx (attempted Rx)
- E. Compose ur +ve & -ve statements
- ✓ If you are trying to r/o or rule in simple goiter...
 - Is the pt from Iodine deficient area/not-----endemic goiter
 - =Ask similar illness in the vicinity
 - =Identifying the geographical location from where the pt came from
 - ✓ Is it mountainous /not? Because in highland areas→low iodine content of the water due to erosion
 - Goitrogen intake
 - =Drug hx
 - ✓ Iodide, amiodarone, lithium...
 - =Dietary hx
 - ✓ Cabbage, Cassava...
 - Because diets containing heavy metals compete with iodine to be taken by thyroid tissue
 - Family hx of thyroid disease (similar illness)
 - Dyshormogenesis
- ✓ If you are trying to r/o or rule in Grave's disease Vs TMNG...
 - Ask the pt about the timing between the goiter & thyrotoxic symptoms
 - a. The anterior neck swelling then thyrotoxic symptoms or
 - b. Did both appear simultaneously?
- ✓ If you are trying to r/o or rule in malignancy...
 - Rapidly/ slowly growing mass?
 - Constitutional symptoms of malignancy?
 - ✓ Anorexia, Easily fatigability , Wt. loss
 - Family hx of thyroid ca.
 - Previous head & neck radiation therapy
- ✓ If you suspect metastasis...Ask
 - Hx of hoarseness of voice (RLN involvement)
 - Hx of swelling in the neck (LAP--LN metastasis)
 - Hx of hemoptysis, bone pain...(Distal metastasis)
- ✓ If you want to r/o or rule in inflammatory causes ...Ask
 - Pain in the neck
 - Fever, chills

Physical Examination

- **General Appearance**
 - ❖ **Thyrotoxic pts**→hot intolerance→See carefully their dressing style
- **Vital Signs**
 - ❖ **BP**—in thyrotoxic pts→wide pulse pressure due to systolic hypertension
 - ❖ **PR**
 - ✓ **Tachycardia** (in thyrotoxic pt(>85bpm))
 - ✓ **Bradycardia** (in hypothyroidism)
 - ❖ **T⁰**—Thinking of inflammatory causes
- **LGS examination**
 - ❖ **Thyroid examination**
 - ✓ **Inspection**
 - **Size** (estimate)
 - **Shape**
 - **Site**
 - **Overlying skin color change**
 - **Visible Pulsation**
 - **Movement with deglutition & protrusion of tongue**
 - Because thyroid gland is enclosed by pretracheal fascia→it moves with deglutition
 - In case of solitary thyroid swelling→ look for upward movement of the swelling on protrusion of the tongue→ to differentiate a thyroid nodule from thyroglossal cyst.
 - **Pemberton's sign**
 - Ask the patient to raise both upper limbs above the head and keep it for @least 1 minute. If retrosternal extension is there, the patient will have congestion and puffiness in the face with respiratory distress.
 - Done...when? In pts with...
 - **Compliant of aero-digestive tract obstruction**
 - **Vascular congestion**
 - **If the lower border of the gland is not visible during deglutition**

✓ Palpation

- hotness
- Tenderness
- Size (measure)
- Surface (smooth Vs nodular)
- Border (regular Vs irregular)
- Consistency (soft Vs Firm Vs hard)
- Retrosternal extension= try to palpate the lowest tracheal ring above the sternal notch
- Fixity to overlying structure
- Thrill (on upper pole)
- Position of trachea (central Vs deviated)
- Kocher's test→test for tracheal compression
 - =The swelling is pressed slightly on either side of trachea. If trachea is already compressed patient will have stridor
- Berry's sign→carotid pulse palpation
 - Berry's sign positive mean→Carotid pulse is not palpable on the side of the swelling

Methods of palpation

- ✓ Standing in front of the pt &
- ✓ Standing behind the pt
- ✓ Percussion→if you suspect retrosternal extension =Resonant Vs dull
- ✓ Auscultation
 - Bruit over the swelling→upper poles

Reporting format

Inspection

-
- ✚ There is about 8X6cm butterfly shaped anterior neck swelling which moves with deglutition. The lower border is visible on swallowing. It's slightly deviated to the right side. There is no visible pulsation or overlying skin color change. Pemberton's sign is -ve.

Palpation

-
- ✚ There is 9X7cm non-tender, nodular, firm anterior neck mass with regular border & no fixity to the overlying skin. Its temperature is comparable to other parts of the body. The lower tracheal ring is palpable above sternal notch. There is no thrill. Kocher's test is -ve. Carotid arteries are palpable bilaterally (Berry sign is negative). The trachea is central.

Percussion-----

Auscultation→No bruit over the swelling

NB*****

Pertinent physical examination findings on other systems...

✓ Signs of thyrotoxicosis

❖ **Tachycardia (on V/S)**

❖ **Eye signs (on HEENT)**

• **Exophthalmos= abnormal protrusion of the eye ball**

❖ **Exophthalmos is said to be present when the eyeball is seen beyond the superior orbital margin--Top view. or**

❖ **Visibility of both the upper & lower sclera**

• **Lid lag (von graefe's sign)**

○ **Steady the patient's head with one hand**

○ **ask the patient to look at your finger**

○ **Ask the patient to look up and down following your finger**

○ **In case of thyrotoxicosis, the lid may lag while the eyeball move downward and the upper sclera become visible.**

• **Lid retraction (Dalrymple's sign)**

❖ **Visibility of upper sclera due to spasm of upper eyelid.(@rest)**

• **Absence of wrinkling (Jofroy's sign)**

○ **Steady the patient's head with one hand**

○ **Ask the patient to look up at the ceiling**

○ **In case of thyrotoxicosis, there may be loss of wrinkling of forehead.**

• **Failure of convergence**

○ **Ask the pt to look at your finger at distance then bring it suddenly in front of the pt eye**

○ **In thyrotoxicosis, there is failure of convergence**

❖ **Warm moist skin, Pretibial myxedema**

❖ **Tremor (on CNS)**

• **Finger--Ask the patient to stretch out both the upper limbs and spread out the fingers**

• **Tongue--Ask the pt to protrude the tongue resting on the lower lip**

Signs of hypothyroidism

- ✓ Bradycardia (on V/S)
- ✓ Edema of face & legs (HEENT + MSS)
- ✓ Delayed relaxation of deep reflexes (on CNS)
- ✓ Pendred's sign (on CNS)
 - ❖ Goiter + severe sensory neural hearing impairment

Signs of retrosternal extension

- ✓ Increased JVP (on CVS)
- ✓ Horner syndrome
 - ❖ ptosis
 - ❖ Anhidrosis
 - ❖ Miosis...

Signs of metastasis

- ✓ Hard cervical LNs (on LGS)
 - ❖ Never forget to check LNs
- ✓ Nodules on skull (on HEENT)
 - ❖ Rapidly growing, pulsatile & warm swelling
 - ❖ erosion of the skull may be present
- ✓ Long bone metastasis (on MSS)
- ✓ Chest effusion & consolidation (on RS)
- ✓ Nodular liver & ascites (abd. Examination)

Click below & watch video on how to examine thyroid enlargement

<https://www.youtube.com/watch?v=ta-s-ZWRk6g>

SAMPLE Hx

C/C

Anterior neck swelling of 2yrs duration

HPI

This pt was LRH 2 years back at which time she noticed a swelling on her left lower neck. The swelling was initially pea sized and later progress to grow upwards & medially to attain its current size & location.

06 months prior to admission she started to experience harsh noise when breathing which worsen during sleeping but no difficulty of swallowing or change in voice quality. Associated with this she started to experience palpitation, heat intolerance, profuse sweating & unquantified weight loss to the extent her skirts become loose. In addition she had irregular menstrual cycle for the past 07months which come every 2 to 3months.

03 months prior to admission she visited our hospital where blood sample & sample from the swelling was taken. Then she was given whitish scored oval tablet to be taken three times daily & reddish scored circular tablet to be taken twice daily. She is taking her medications adherently & currently she has no palpitation, heat intolerance or cold intolerance.

- **Many peoples in her vicinity have similar illness.** (endemic goiter)
- **Her regular dietary habit is 'injera' made of 'teff' & 'shirowot' made of 'atter.'** She occasionally eats cabbage.(Dietary goitrogens)
- **No hx of drug intake except the medication explained above.**(Drug induced goiter)
- **No hx of fever, chills or neck pain.**(inflammatory goiter)
- **No family hx of similar illness.**(familial goiter or thyroid ca.)
- **No hx of head & neck radiation therapy.** (RF--if ca)
- **No hx of swelling in the neck or axilla.** (LN metastasis-if malignant)
- **No hx of bone pain, hemoptysis or yellowish discoloration of the eyes.**
(distant metastasis-if ca)
- **No hx of dyspnea, orthopnea, PND or lower leg swelling.** (thyrocardiac disease)
- **No hx of chronic cough, contact with a chronic cougher or previous TB Rx**
- **No self/family hx of DM, HTN or asthma**
- **She was screened for RVI 7months back & found to be NR**

Finally she was admitted to our hospital.....

Investigations

Lab. studies

- TFT (thyroid function test)
 - ✓ TSH
 - ✓ T3 & T4

Pathology

- ✓ FNAC
 - ❖ Reliable in...
 - Papillary, medullary, anaplastic thyroid ca.
 - ❖ Not reliable in...
 - follicular adenoma vs follicular carcinoma
 - hurthle cell ca.
 - hashimoto's thyroiditis Vs thyroid lymphoma

Imaging

- Chest & thoracic inlet X-ray
 - ✓ What to look?
 - ❖ Retrosternal goiter
 - ❖ Tracheal deviation & compression
 - ❖ Pulmonary metastasis
- U/S
 - ✓ In evaluation of thyroid nodules
 - ❖ solid Vs cystic, size, multicentricity
 - ❖ risk of malignancy...by looking @ its echotexture, shape, border, calcifications, vascularity...
 - ✓ Targeted aspiration-(USG-FNAC)
 - ✓ For assessing cervical lymphadenopathy
- CT, MRI & PET

Thyroid (isotope) scanning

- Activity of the gland
 - ✓ Hot, Warm or Cold
- Size & shape of the gland

Anti-thyroid antibody assessment

- ❖ Do not indicate thyroid function rather indicate the underlying disorder
 - Usually an autoimmune thyroiditis

Discussion of the DDx (goiter)

1) Simple goiter

Ctrl + click → Causes of non-toxic goiter

Common in females → because of estrogen receptors in the thyroid tissue

Clinical Presentation

-Most → asymptomatic

-If symptomatic → often complain of

=Pressure sensation in the neck

=Compressive symptoms

>Dyspnea

>Dysphagia

>Catarrh--A need for frequent throat clearing

= Acute pain

In case of hemorrhage

=In substernal goiters--Positive Pemberton's sign

- Types
- If Diffuse type → on P/E--Soft, diffusely enlarged thyroid gland
-why diffuse? Due to persistent stimulation by TSH
 - If Multinodular type → on P/E--Nodules of various size & consistency
-why nodules? Due to fluctuation in stimulation by TSH

Complications

- Tracheal obstruction
- 2^o thyrotoxicosis-- In 30% of pts
- calcification
- Premalignancy--Cmn for follicular thyroid ca

Investigation

- euthyroid
- normal TSH
 - normal free T4 level

Mgt

- Large goiters
 - ✓ Give exogenous thyroid hormone
 - to reduce TSH stimulation of the gland growth (-ve feedback mechanism)

- Endemic goiters
 - ✓ Iodine supplementation
- Surgical resection
 - ✓ indications
 - toxic feature
 - goiters causing obstructive symptoms
 - goiters suspected for being malignant or proven by FNA
 - goiters cosmetically unacceptable
 - ✓ Preferred methods of resection → Near-total or total thyroidectomy with lifelong T4 therapy

2) Toxic goiter (thyrotoxicosis)

A. Diffuse toxic goiter (Graves' disease)

- ✓ An autoimmune disease with a strong familial predisposition
- ✓ Cmn in females (5:1)

CP

- ✓ Thyroidal manifestations
 - Thyrotoxicosis
 - Diffuse goiter
- ✓ Extra-thyroidal manifestations
 - Eye signs + CNS symptoms → cmn
- ✓ Specific to Graves' disease
 - Ophthalmopathy
 - Lid lag (von Graefe's sign)
 - Spasm of upper eye lid (Dalrymple's sign)
 - Prominent staring
 - Exophthalmos, conjunctival swelling & congestion, proptosis → ...in true infiltrating eye disease
 - Dermopathy--Pretibial myxedema
 - Due to deposition of glycosaminoglycans
- ✓ Thyroid gland on P/E
 - the thyroid is usually diffusely & symmetrically enlarged
 - there may be overlying bruit or thrill on thyroid gland
 - there may be loud venous hum in supraclavicular space

Ix

- ❖ TSH level → Suppressed
- ❖ Free T3 or T4 level -- May or may not be elevated
- ❖ RAIU & scan → increased uptake + diffusely enlarged gland

Mgt

1. Medical
2. Thyroid ablation
3. Surgical

1) Medical Rx

Anti-thyroid drugs

- Usually administered for preparing the pt for thyroid ablation with radioactive iodine or thyroidectomy. To render the pt euthyroid.
 - ✓ If not → thyroid storm during the procedures
- Dose = titrated as needed depending on TSH & T4 level
- Duration = Until the pt is euthyroid (Clinical & Lab. Evidences)
- Anti-thyroid drugs...
 - ✓ PTU (propylthiouracil) -- DOC
 - 100-300 mg PO TID
 - ✓ Methimazole

MOA:

- ❖ both reduce thyroid hormone production by inhibiting the organic binding of iodine & the coupling of iodotyrosines
- ❖ In addition PTU inhibits peripheral conversion of T4 to T3
 - ✓ Making it DOC for Rx of thyroid storm
- ❖ PTU → less risk of transplacental transfer compared to methimazole → Preferred in pregnant & breast feeding women

β-blocking agents

- To alleviate catecholamine response of thyrotoxicosis
- Should be considered in all symptomatic (thyrotoxic) pts & elderly with cardiac disease
- β-blockers...
 - Propranolol
 - Atenolol
 - Long acting

2) Thyroid ablation with Radio-Active Iodine (RAI)

- ✓ **indications**
 - elderly pts with small or moderate sized goiters
 - those who relapsed after medical or surgical therapy
 - when anti-thyroid drugs or surgery is contraindicated
- ✓ **Absolute contraindications for this Rx**
 - Pregnant or planning to conceive soon (< 6 month) after the Rx
 - Breast feeding mother
- ✓ **Relative contraindications**
 - Young pts
 - Those with thyroid nodules
 - Those with ophthalmopathy

3) Surgical Rx

- ✓ **Indications**
 - Confirmed ca. or suspicious thyroid nodules
 - Enlarged goiters (>80gm) causing compressive symptoms
 - Desire to conceive soon (<6 month) after the Rx
 - Pts with moderate to severe Grave's ophthalmopathy
- ✓ **Pre-op preparation**
 - Pt should be rendered euthyroid with anti-thyroid drugs
 - 7-10 days prior to surgery administer
 - Iugol's iodine solution or
 - Saturated potassium iodide**MOA: they reduce vascularity of the gland & decrease the risk of precipitating thyroid storm**
- ✓ **Procedure → thyroidectomy**
 - **Types**
 - Total thyroidectomy
 - Near total thyroidectomy
 - Subtotal thyroidectomy
 - Lobectomy
 - Hartley–Dunhill procedure
 - Subtotal thyroidectomy + Total lobectomy

Recommended for Graves' disease

NB*

In Graves' disease

- ✓ *enlargement of thyroid gland*
&
- ✓ *thyrotoxic signs & symptoms*

Appear
simultaneously
unlike TMNG

B. Toxic Multinodular Goiter (TMNG)

CP

- ❖ These pts will have prior hx of non-toxic multi-nodular goiter
 - ✓ They will tell you that "I had anterior neck swelling first" (non-toxic)
 - ✓ "Then...after some period of time I started to experience....." (the thyrotoxic symptoms)
- ❖ CVS symptoms → cmn
- ❖ Eye signs → infrequent unlike graves' disease

Ix

- ❖ TSH level → Suppressed TSH
- ❖ Free T3 & T4 → both elevated
- ❖ RAI scan → will show multiple nodules with increased uptake

Mgt

- 1) Control hyperthyroidism
 - a. Anti-thyroid drugs
 - b. B-blockers -- Rx should continue 1wk after surgery. Because half life of T4 reaches up to 7days.
- 2) RAI — thyroid ablation
 - ❖ Reserved for elderly pts
- 3) Surgical Rx
 - ❖ Near total or total thyroidectomy is recommended
 - To avoid recurrence & risk of repeating the surgery

C. Toxic adenoma (Plummer disease)

- Autonomous, solitary overactive nodule with inactive surrounding tissue
- Typically occur in young pts
 - ...recent growth of long standing nodule along with symptoms of hyperthyroidism

- **Thyroid gland on P/E**
 - usually reveals a solitary nodule without palpable thyroid tissue on the contra lateral side
- **RAI scan (Ix)**
 - Hot nodule with suppression of the rest of the gland
- **Mgt**
 - **Smaller nodules**
 - Anti-thyroid drugs
 - RAI-- thyroid ablation
 - **Larger nodules**
 - Higher dose
 - Anti-thyroid drugs
 - RAI
 - **Surgery**
 - Lobectomy & isthmusectomy

3) Inflammatory goiter

Inflammatory goiter may be toxic or non-toxic

NB***

Thyroid gland is inherently resistant to infection due to

- Its extensive blood & lymphatic supply
- High iodide content &
- Fibrous capsule

A) Acute (suppurative) thyroiditis

- More cmn in children
- Often preceded by URTI or otitis media

CP

- Severe neck pain radiating to the jaws/ear
- Fever, chills
- Odynophagia
- Dysphonia

Ix

- CBC=leukocytosis
- FNA for gram stain, culture & cytology

Complications

- Systemic sepsis
- Tracheal /esophageal rupture
- Jugular vein thrombosis
- Laryngeal chondritis & perichondritis
- Sympathetic trunk paralysis

Mgt

- Parenteral antibiotics
- Drainage of abscess
- Thyroidectomy
 - For persistent abscess
 - Failure of open drainage

B) Sub acute thyroiditis (granulomatous thyroiditis)

CP

May be painful or painless

Painful

- ✓ Thought to be viral in origin or post-viral inflammatory response
- ✓ Four stages--Hyperthyroidism→euthyroid→hypothyroidism→resolution & return to euthyroid state
- ✓ On Hx
 - sudden or gradual onset neck pain
 - which may radiate to the mandible or ear
 - Hx of preceding URTI (often)
- ✓ On P/E
 - Enlarged, tender, firm gland
- ✓ Ix
 - Early stage
 - TSH decreased, T4 &T3 elevated
 - ESR >100mm/h
 - RAI uptake=decreased
- ✓ Mgt→Self limiting disease. So Rx is primarily symptomatic relief
 - pain relief
 - NSAIDS
 - Steroids→in severe cases
 - Short-term thyroid replacement may be necessary
 - To shorten duration of symptoms

- **Painless**

- **Considered to be autoimmune**
- **On P/E --normal sized or minimally enlarged, firm, non-tender gland**
- **Ix--Similar to the painful one except normal ESR**
- **Mgt**
 - **Pts→with symptoms**
 - **B-blockers**
 - **Thyroid hormone replacement**

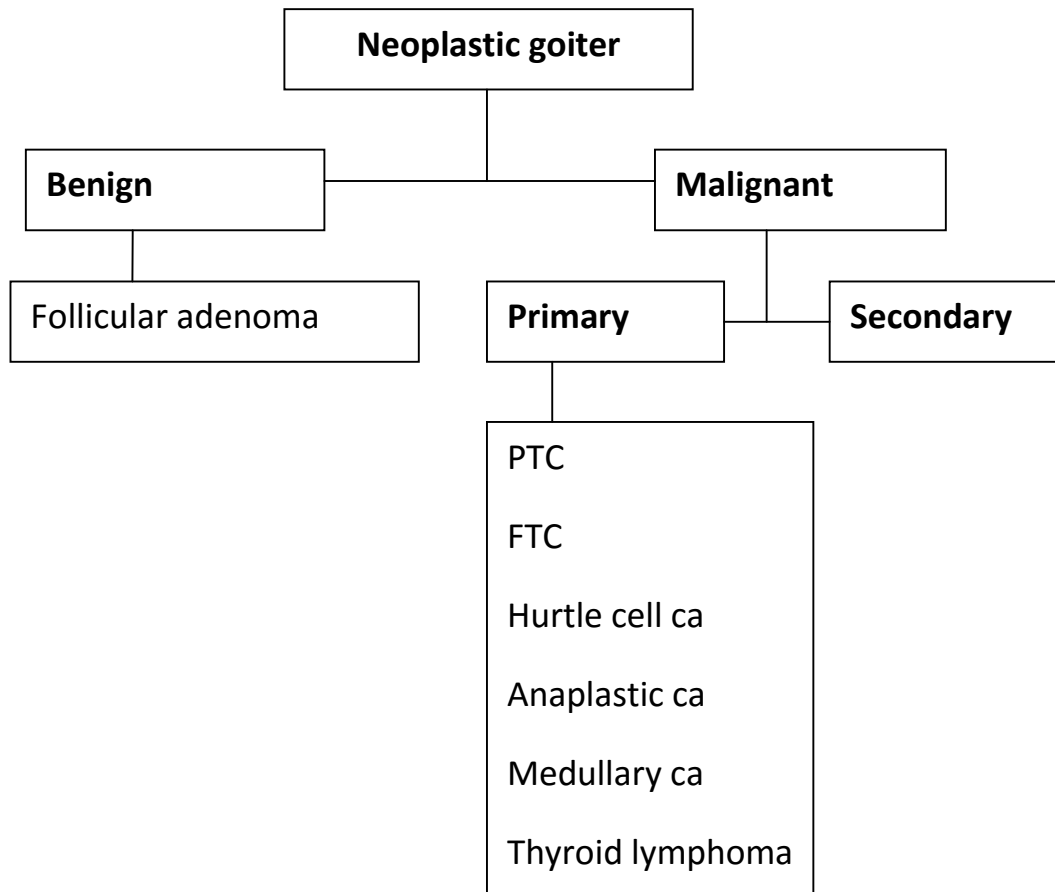
C) Chronic lymphocytic thyroiditis /Hashimoto's/

- **A transformation of thyroid tissue to lymphoid tissue**
- **Leading cause of hypothyroidism**
- **Cmn in females (10-20:1)**
- CP**
 - ✓ **Minimally or moderately enlarged firm & nodular gland**
 - ✓ **20% present with hypothyroidism while 5% present with hyperthyroidism**
- Ix**
 - ✓ **Elevated TSH**
 - ✓ **Thyroid auto-antibodies present**
- Mgt**
 - ✓ **Overtly hypothyroid pts**
 - **Thyroid hormone replacement therapy—Levothyroxine**

D) Reide's thyroiditis

- **Replacement of all or part of the thyroid parenchyma by fibrous tissue**
- CP**
 - ✓ **The pt may present with symptoms of hypothyroidism & hypoparathyroidism→since the gland is replaced by fibrous tissue**
 - ✓ **Typically presents as painless, hard (“woody”) anterior neck mass, with fixation to the surrounding tissue**
- Dx**
 - ✓ **Open thyroid biopsy**
- Mgt**
 - ✓ **Surgery**
 - ✓ **Hypothyroid pts→thyroid hormone replacement therapy**

4) Neoplastic goiter



Primary

From follicular epithelium → well differentiated -- slow growth

A. Papillary thyroid ca.(PTC)

- 80% of all thyroid malignancies
- Predominant in children & individuals exposed to radiation
- LN metastasis → cmn
- Distant metastasis
 - ✓ Lungs, bone, liver & brain
- Dx → FNAC
- Mgt
 - Surgical Rx
 - ✓ Total /near total thyroidectomy

- Post-op

- ✓ Radioiodine therapy
- ✓ Radiotherapy & chemotherapy
- ✓ Thyroid hormone

B. Follicular thyroid ca.(FTC)

- 10% of thyroid ca.
- Occur more commonly in iodine deficient areas
- Often present as solitary thyroid nodule
- Hematogenous metastasis → cmn
- Unlike PTC cervical LAP isn't cmn
- Dx
 - FNAC is unable to distinguish benign from malignant disease
 - Difficult to DX pre-op unless distal metastasis
- Mgt
 - Surgical Rx
 - ✓ Lobectomy
 - ✓ Total thyroidectomy
 - Post-op
 - ✓ Radioiodine therapy
 - ✓ Radiotherapy & chemotherapy
 - ✓ Thyroid hormone

C. Hurthle cell ca. (subtype of follicular ca)

- 3% of thyroid ca.
- Can't be DXed with FNA--Since it's characterized by vascular & capsular invasion

Follicular epithelium → de-differentiated

Anaplastic ca.

- early local infiltration → aggressive
- Typically pts present with long standing neck mass, which rapidly enlarged & may be painful + ...
 - Dysphagia, Dyspnea, Dysphonia
 - Pts also may experience bone pain, weakness, cough
- poor prognosis

Misc.

- **Medullary ca.**
 - arise from Para-follicular or C cells
 - Lump @ supero-lateral neck
 - may occur in combination with adrenal pheochromocytoma and hyperparathyroidism
 - Mgt
 - total thyroidectomy
 - External beam radiation
- **Thyroid Lymphoma**
 - Non Hodgkin's B-cell type

Secondary (Metastasis)

- Thyroid is rare site of metastasis
- Sites → kidney, breast, lung & melanoma

NB*

Prognosis → parameters;

- Age
- Metastasis
- Size
- Extrathyroidal extension
- Histologic type
- Resectability

Complications of thyroid surgery (specific)

- ✓ Hemorrhage
- ✓ Airway obstruction
 - causes
 - ✚ Laryngeal edema
 - Mgt
 - Intubate then
 - Give Steroids → to reduce the edema
 - ✚ RLN injury
 - Bilateral
 - CP—respiratory distress
 - Mgt
 - tracheostomy
 - chordotomy
 - unilateral
 - CP--hoarseness of voice
 - Mgt
 - re-innervation
 - medialization → injection therapy (edema)
 - ✚ Haematoma
 - CP—respiratory symptoms due to the compression
 - Mgt
 - remove all the stitches
 - Urgent decompression → release the blood collection
 - ✚ Hypocalcemic tetany
 - Laryngeal spasm → cause airway obstruction
 - Mgt
 - Intubate then Calcium supplementation
 - ✚ Tracheomalacia
- ✓ Wound infection
- ✓ Thyroid storm
 - Is a condition of hyperthyroidism accompanied by
 - ✚ fever, CNS agitation or depression
 - ✚ Cardio-vascular dysfunction &
 - ✚ GI dysfunction including hepatic failure
 - Due to Poor pre-op preparation

- Mgt of thyroid storm
 - B-blockers
 - Oxygen supplementation
 - Hemodynamic support
 - Pyrexia→give non-aspirin cpds
 - Lugol's iodine or sodium ipodate (IV route)
 - PTU
 - Corticosteroids
 - To prevent adrenal exhaustion & block hepatic thyroid hormone conversion
- ✓ Hypothyroidism
 - Mgt
 - ✚ levothyroxine
- ✓ Hypoparathyroidism
 - May be
 - ✚ Transient
 - Due to ischemia/manipulation
 - ✚ Permanent
 - Due to removal of the gland
 - May be
 - ✚ Subclinical--asymptomatic
 - Elicit signs of hypocalcemia
 - Chovestik sign
 - Trousseau sign
 - ✚ symptomatic
 - CP
 - perioral parasthesia, carpopedal spasm, laryngospasm, seizure, tetany...
 - Mgt
 - symptomatic--calcium supplementation
- ✓ Superior laryngeal nerve injury
 - Cp
 - ✚ can't produce high pitch sound
 - Mgt→speech therapy
- ✓ Other complications
 - Keloids
 - Stitch granuloma

BREAST

How to approach breast disorders

Benign Breast disorders

Malignant Breast disorders

Infiltrating ca

- Ductal ca. (cmn)
- Lobular ca.

Inflammatory ca.

→ Most aggressive

Congenital

Inverted nipple

Supernumerary breast/nipple

...

Injury

Hematoma

Fat necrosis

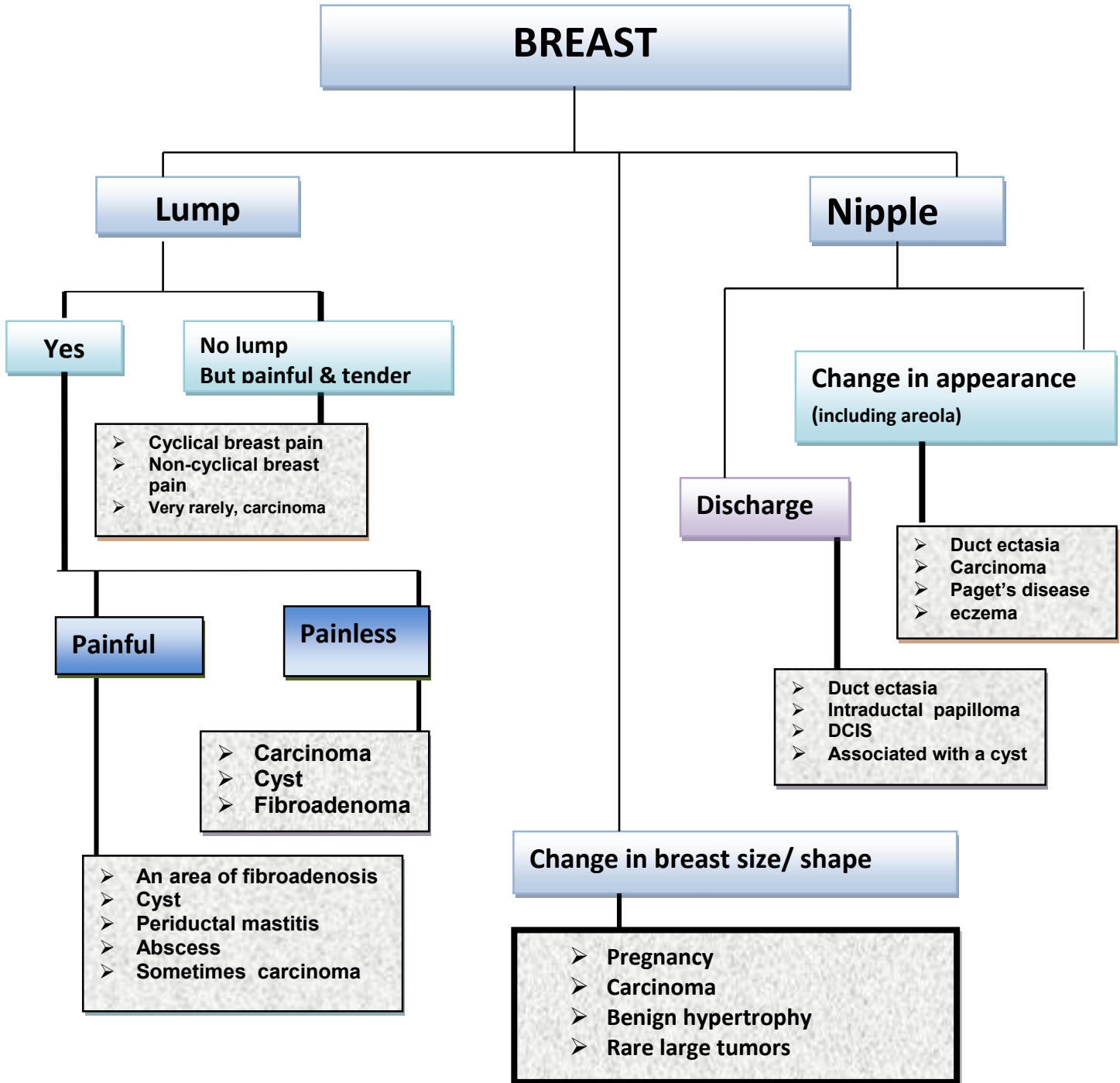
Inflammation/Infection

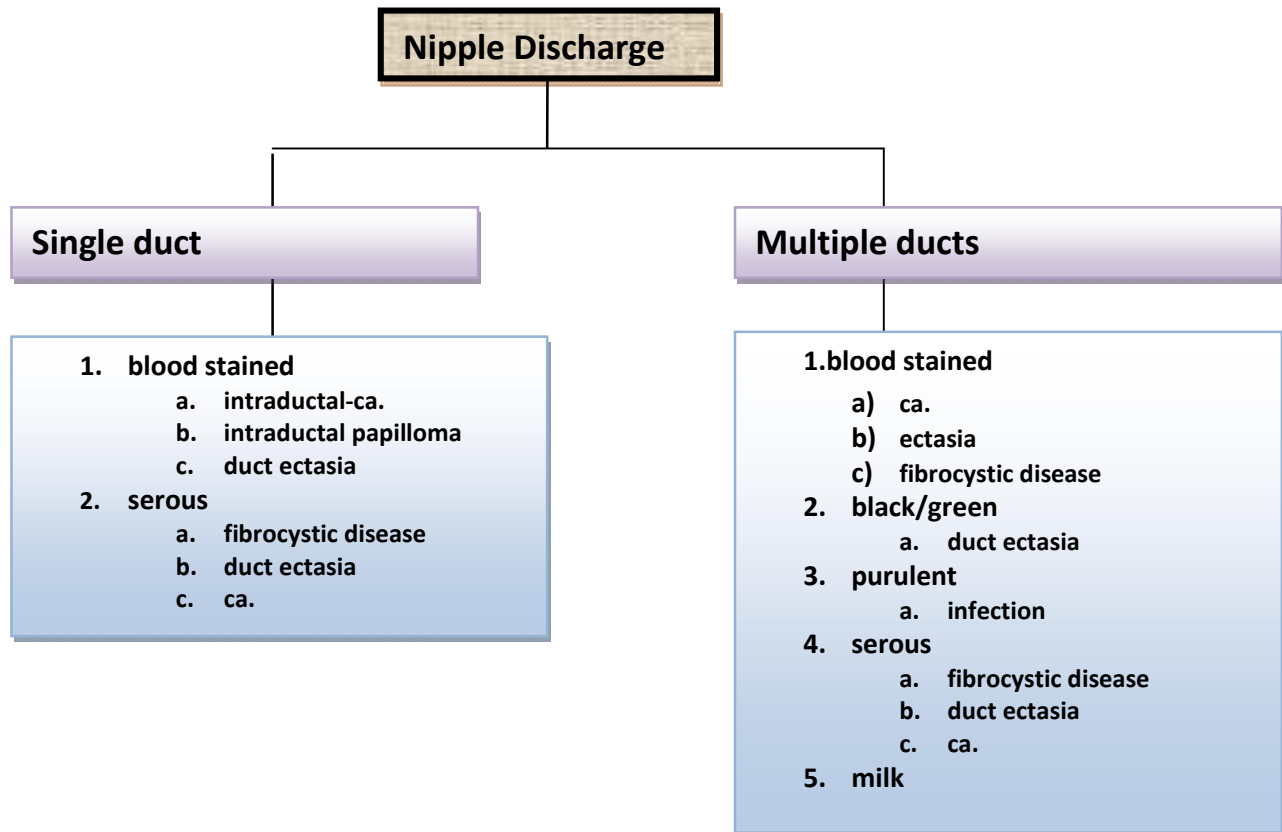
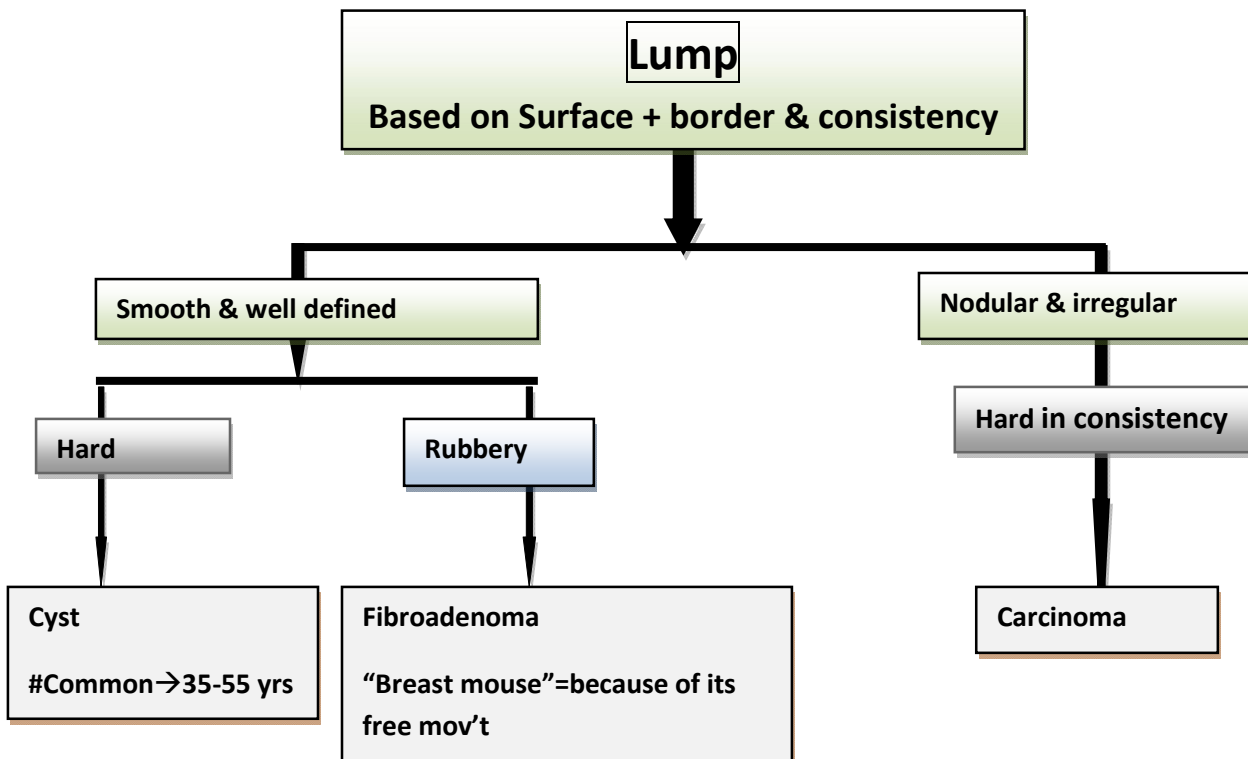
=Bacterial mastitis
=Chronic inflammatory abscess
=Duct ectasia/periductal mastitis
=TB of breast

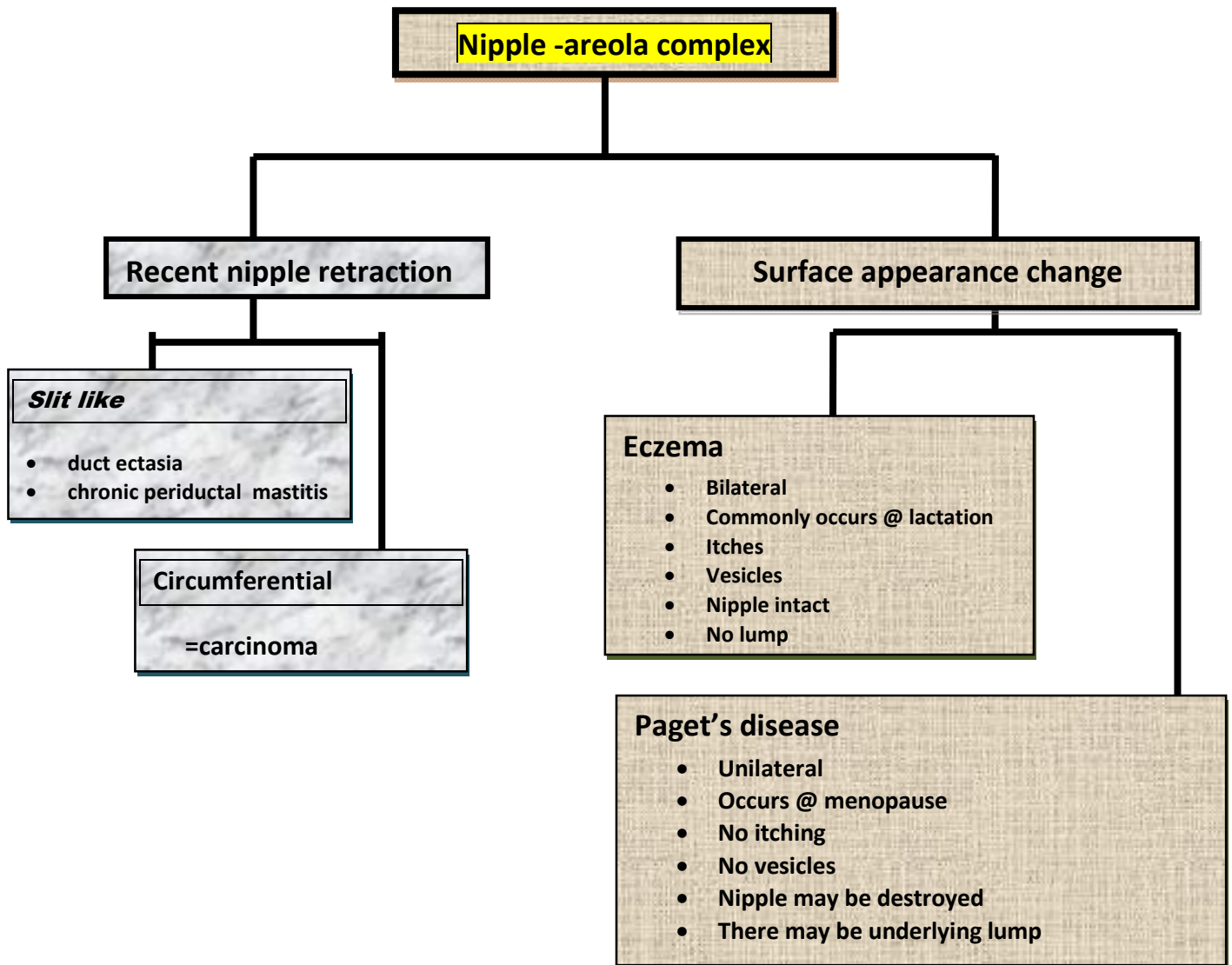
ANDI

=Cyst
=Fibroadenoma
= cyclical nodularity & mastalgia

BREAST







NB* Duct ectasia=dilatation of the breast ducts

BREAST CA

Risk Factors

✚ Female sex

✚ Increasing age (65+)

✚ Hormonal

- ✓ Increased (unopposed) estrogen exposure due to
 - Early menarche--age <12
 - Late menopause--age >55
 - Nulliparity
 - Never breastfed
 - Breast feeding → protective
 - First full term pregnancy >30yrs of age
 - First child @ early age → protective
 - Exogenous hormones
 - Hormone Replacement therapy (HRT) within the last 5yrs
 - Increased risk among those taking combined HRT than single estrogen formulation
 - ? OCP use within the last 10yrs
 - Up to 25% of pts → increased risk
 - >10 yrs of cessation → risk returns to that of average population
 - Obesity
 - In postmenopausal women → the adipose tissue acts as major source of estrogen

✚ Non hormonal

- ✓ Hx of radiation therapy/high dose/
 - E.g. mantle radiotherapy for Hodgkin's lymphoma
- ✓ Alcohol abuse--known to increase serum level of estradiol

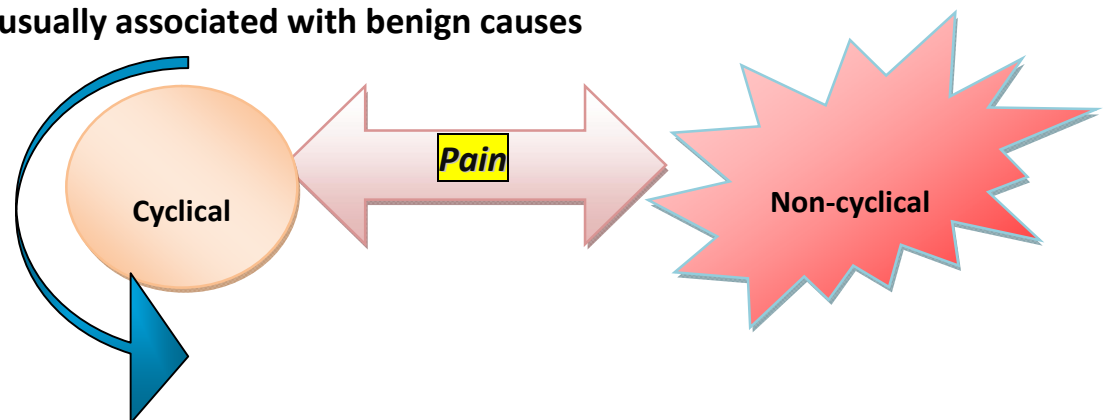
✚ Genetics

- ✓ Familial breast ca
 - Ask Hx of first degree relatives with breast ca.
- ✓ Hx of endometrial, ovarian or colonic ca

Clinical presentation

1) History

- Common presentations
 - Lump
 - When & how the pt noticed the swelling?
 - Site & progression?
 - Nipple discharge or retraction
 - Color of the discharge?
 - Ulceration or erythema of the skin
 - Axillary mass
 - Pain → usually associated with benign causes



- In advanced cases → when you suspect metastatic spread, u can ask...
 - Bone pain, fracture hx (pathological one)... → bone metastasis
 - Breathing difficulties ... → malignant pleural effusion
 - Yellowish discoloration of the eyes & the skin... → liver metastasis
 - Headache, nausea, vomiting (features of raised ICP)... → cerebral metastasis

Breast ca. Metastasis

1. Local spread
 - Skin, muscles, chest wall
2. Lymphatic metastasis
 - Axillary LNs, internal mammary LNs, supraclavicular LNs
3. Hematogenous metastasis
 - Skeletal metastasis (lumbar vertebrae, femur, thoracic vertebrae, rib & skull)
 - Liver, lungs & brain

2) Physical Examination

→ LGS Examination

➤ Breast examination

Inspection

- First position the pt
 1. Arms by side
 2. Arms straight up in the air
 3. Hands on hips
- Comment on....
 - Symmetry with other breast
 - Use nipple line for comparison
 - breast size & shape → compare both sides
 - Edema or peau d'orange appearance
 - due to cutaneous lymphatic obstruction
 - peau d'orange appearance → more prominent on elevation of the hands
 - Skin or nipple retraction
 - skin retraction → accentuated by positioning the pt with arms extended forward, sitting position & leaning forward
 - Nipple discharge
 - Ulceration

Palpation

Technique

- Examine all the 04 quadrants with palmar aspect of your fingers
- Avoid a grasping or pinching motion
- Comment on the swelling...
 - Site
 - Upper outer quadrant (UOQ) → cmn
 - Tender / non-tender
 - Consistency
 - Hard Vs firm Vs soft
 - Border
 - irregular Vs regular

- **Surface**
 - **Nodular Vs smooth**
- **Fixation**
 - **fixed to overlying or underlying structures v_s not fixed**

NB*important things to look for

- **Axillary + supraclavicular lymphadenopathy**
- **Upper extremity neurologic motor & sensory examination**
 - **In case of infiltration of brachial plexus**

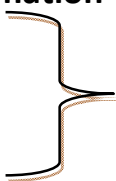
Watch video on how to examine breast swelling @
<https://www.youtube.com/watch?v=p8PobUp2Yo>

Bacterial mastitis

Can be

1. Lactational
 - Ask hx of crackled nipple or skin abrasion
2. Non-lactational
 - periareolar
 - periductal mastitis
 - peripheral-rare → ask Hx of DM , RA , steroid Rx, trauma

CP

- cardinal signs of inflammation
 - severe pain
 - swollen breast
 - Erythema
 - warm to touch

cellulitic stage
- When breast abscess develop there will be...
 - high grade fever &
 - Fluctuant swelling → you can feel it unless deep seated

Mgt

- Cellulitic stage
 - Proper antibiotics
 - Penicillins or Cephalosporins
 - Analgesics
 - Appropriately fitting supportive bra
 - Warm compress
 - Emptying the breast with breast suction pump
 - If not resolved within 48hrs or tense indurations after being emptied/underlying abscess → repeated aspiration
- Stage of abscess
 - Repeated aspiration with antibiotic coverage with or without u/s guidance
 - Incision & drainage (I&D)
 - For large abscesses with purulent discharge
 - Antibiotoma=large, sterile, brawny edematous swelling that form if antibiotic is used in the presence of undrained pus
 - antibiotic induced swelling=antibiotoma

SAMPLE Hx

C/C

Breast swelling of 6 months duration

HPI

This is a 38 years old nulligravida lady who was last relatively healthy 6months back at which time she noticed small swelling on her left breast while she was taking shower. Initially the swelling was pea sized but later it progressed to attain its current size & shape.01 month prior to admission she started to experience bright red bleeding from her left nipple but no hx of breast pain. Associated with this she started to experience change in nipple position & orange peel like skin appearance over the left breast.

- Her menses started @ the age of 12, It was regular, comes every 28 days, stays for 3-4 days, moderate in amount & associated with mild abdominal discomfort
- The pt doesn't notice any cyclical changes of the swelling with her menses.(ANDI)
- No family hx of similar illnesses. (RF)
- No hx of HRT or OCP use. (RF)
- No hx of radiation therapy. (RF)
- No hx chronic alcohol consumption. (RF)
- No hx of breast trauma
- No hx of breast or abdominal surgery. (Recurrence + surgery for ovarian/ endometrial ca resp.)
- No hx of swelling in the neck or axilla. (lymph node metastasis)
- No hx of bone pain, breathing difficulty or yellowish discoloration of the eyes.(metastasis)
- No hx of cough, contact with chronic cougher or previous TB Rx. (breast TB)
- No self or family hx of DM, HTN or asthma
- Has been screened for RVI 01 month back & found to be NR.

Finally she was admitted to our hospital walking by herself.

Investigations

Imaging studies

1. Mammography

- Mammography=imaging breast either in medio-lateral or cranio-caudal view by a selenium coated x-ray plate which will come in direct contact with the breast.
- sensitivity of this investigation increases with age as the breast become less dense

What to look for ca. in mammography?

- a solid mass with or without stellate features
- asymmetric thickening of breast tissue &
- clustered micro-calcifications

2. Breast U/S

- can be used in young women with dense breasts in whom mammograms are difficult to interpret
- can distinguish cysts from solid lesions
- Can localize impalpable areas of breast pathology
- It can guide
 - FNAC, core biopsy...
- Drawback=not ideal for lesions ≤ 1 cm in diameter

What to look for a cyst on u/s?

- Well circumscribed wall
- Smooth margins
- Echo-free center

What to look for breast ca. on u/s?

- Irregular walls
- But may have smooth margins
- Acoustic enhancement

What to look generally for benign breast mass?

- Well defined margins
- Round or oval shape
- Smooth contour
- Weak internal echoes

3. Ductography

- Ductography = Radio-opaque contrast media (injected) + mammography
- Primarily indicated for → blood stained nipple discharge

What to look on ductography?

- If intraductal papilloma--Small filling defects surrounded by contrast media
- If ca.--May appear as irregular masses or as multiple intra-luminal filling defects

4. MRI

Pathology

5. FNAC

- The least invasive technique for obtaining a cytological Dx.
- Drawback → can't distinguish invasive cancer from in-situ disease

6. Core biopsy

- Differentiates invasive ca from in-situ ca
- Pre-op ass't of hormone receptors can be done

Routine workups

- CBC
 - May show Anemia, leukocytosis...

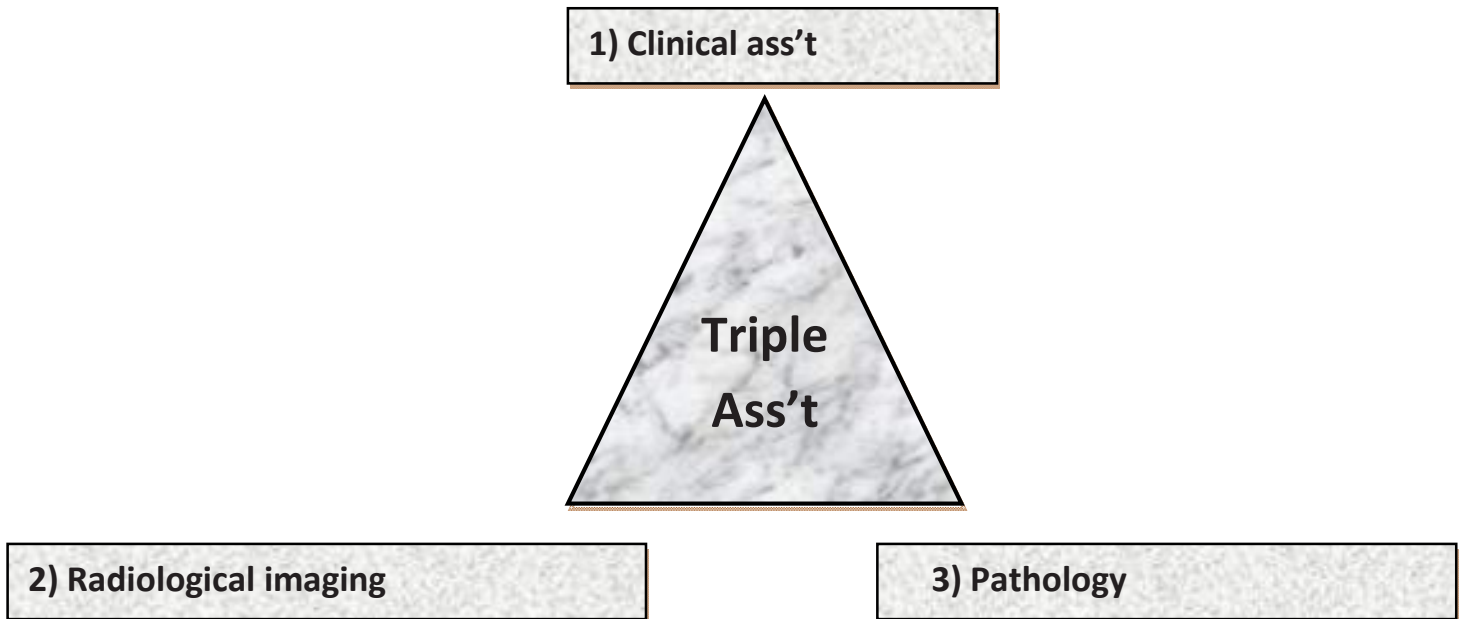
Metastatic workups

- Lab. studies
 - ALP Level--If increased → Bone or liver metastasis
- Radiological
 - CXR
 - Abdominal U/S-- If there is hepatomegally
 - Bone scan--If the pt is symptomatic or increased ALP level

NB***

Triple ass't --for pts suspicious of carcinoma

- **Positive predictive value (PPV)=99.9%**



Management

*Early breast ca (Stage I & IIA)

➤ Surgical mgt

❖ Mastectomy

- Indicated for
 - ✓ Large tumors
 - ✓ Central tumors beneath or involving the nipple
 - ✓ Multifocal
 - ✓ Local recurrence
 - ✓ Pt's preference
- May be
 - ✓ Simple mastectomy
 - Removal of the entire breast tissue
 - ✓ Modified radical mastectomy (patey)
 - Simple mastectomy + removal of pectoralis minor + axillary block dissection
 - ✓ Radical mastectomy
 - Obsolete nowadays

❖ Breast conservative surgery

- Lumpectomy+ axillary block dissection

❖ Lumpectomy

- Removal of the tumor with a rim of at least 1cm of normal breast tissue
- Indicated for <4cms tumors with well-differentiated histology

NB*

❖ Sentinel node biopsy

- Sentinel LN=The first LN to get enlarged in malignancies→has metastatic potential
- Considered as standard care for mgt of axilla in early breast ca with no clinically apparent LNs & non-multicentric disease
- Node localized preoperatively by injection of blue dye or using radio-isotope
- But, if node +ve disease detected→axillary block dissection

➤ Adjuvant treatment

❖ Radiotherapy

• Indications

- ✓ +ve tumor margin
- ✓ Breast conservative surgery
- ✓ Pectoralis major involved
- ✓ Inner quadrant tumor
- ✓ High grade tumors
- ✓ Axillary clearance not satisfactory

❖ Chemotherapy

❖ Hormonal Therapy

NB*

***In case of advanced breast ca, mgt should be aimed at palliation of the symptoms & Rx of breast ca by hormonal therapy (usually) with or without radiation therapy.**

GASTRIC OUTLET OBSTRUCTION

GOO 2^o to ???

DDx

Approach

Benign causes

- PUD
 - Decreasing in incidence due to triple therapy
- Infantile Hypertrophic Pyloric stenosis (IHPS)
 - In pediatric group
- Gastric polyp
- Caustic ingestion
- Gastric TB
- Pancreatic pseudocyst
- Bezoars
 - Child
 - Adults 2^o to bariatric surgery
 - From vagotomy induced hypomotility
- Post surgical complication

Malignant causes

- Gastric ca.
- Pancreatic ca.
- Less frequent
 - Gastric lymphoma
 - Duodenal ca.
 - Ampullary ca.
 - cholangiocarcinoma

Mechanism of obstruction & clinical presentation of GOO depend on the underlying cause. The following cases are selected for discussion here...

1. PUD
2. Gastric ca
3. IHPS

I) PUD

Risk Factors

- ✓ **H. pylori infection**
 - Predispose to ulcer by increasing acid secretion & compromising the mucosal defense mechanism
- ✓ **Drugs**
 - Chronic use of NSAIDS. Cause ulcer predominantly by compromising the mucosal defense mechanism
- ✓ **Lifestyle**
 - **Cigarette Smoking**
 - ✓ Twice increased risk than non-smokers
 - ✓ Smoking cause ulcer by increasing gastric acid secretion & duodeno-gastric reflex. It also interferes with the blood flow → impairing healing process
 - Chronic alcohol consumption
- ✓ **Severe stress like...**
 - Burn (curling's ulcer)
 - Head trauma (Cushing's ulcer)
- ✓ **Age**
 - Gastric ulcer—common in age >40 yrs
- ✓ **ZES (gastrinoma)**
- ✓ **Neurological causes**
- ✓ **Genetic factors**

Clinical Presentation

History

- ✓ **Abdominal pain**
 - Site = Epigastrium
 - Character = gnawing, burning
 - Pattern = may be episodic, seasonal or may become constant (deeper penetration)
 - Radiation = no radiation in typical presentation
 - ✓ referral of pain to the back is usually a sign of penetration into the pancreas

- ✓ **Timing of the pain**
 - **Immediately after meal**
 - ✓ **Gastric Ulcer (GU)**
 - **After 2-3hrs**
 - ✓ **Duodenal Ulcer (DU)**
 - ✓ **Food is usually emptied in 2-3 hrs. And food stimulated acid secretion persist 3-5hrs.**
 - **DU--often awakens the pt @night(nocturnal)**
 - ✓ **Why? Because...**
 - ✓ **Hunger aggravates it &**
 - ✓ **circadian stimulation of acid secretion is maximal from 5PM-2AM**
- ✓ **Aggravating & relieving factors**
 - **DU –aggravated by hunger & relieved by eating food**
 - **GU—aggravated during eating & relieved by vomiting**
- ✓ **Associated symptoms**
 - **Nausea, bloating, Vomiting**
 - **Wt. loss, anemia...**

NB*

If the symptoms are severe, sudden onset & with sharp abdominal pain (generalized/ epigastric) →suspect the complicated one→ i.e. perforated PUD

Physical Examination

NB*Clinical findings are few & non-specific for uncomplicated PUD

- **General Appearance**
 - **Acutely sick looking**
 - **Chronically sick looking or**
 - **Acutely sick looking on chronic base**
- **Vital signs**
 - **BP=Hypotensive (<90/60)**
 - **Think of complications like**
 - **Hypovolumic Shock 2⁰ to GI loss (vomiting) or Hemorrhagic shock 2⁰ to Upper GI bleeding...**
 - **PR= Tachycardic**
 - **Complications (like perforation...)**
 - **The pain per se**
 - **Feeble pulse--? shock**

- T⁰=Febrile
 - Complications (like perforation→peritonitis...)
- See more physical findings for complicated PUD under the discussion of complications of PUD...

Investigations

Diagnostic studies

✓ *Upper GI endoscopy*

- ✓ UGIE have both diagnostic (to take biopsy) & therapeutic use
- ✓ What to look?
 - for ulcers, protruding mass or any active bleeding
- ✓ How to differentiate benign ulcer from malignant one on visualization?
 - Benign ulcers ...
 - Have smoother, more regular, rounded edges with a flat, smooth ulcer base.
 - Malignancy is more often associated with...
 - A mass that may protrude into the lumen or having folds surrounding the ulcer crater (cavity) →which is nodular, clubbed, fused, or stop short of the ulcer margin
 - Multiple biopsy specimens are necessary for any of these ulcers to r/o malignancy.(see the next section for gastric ca)

✓ *Double contrast barium meal*

- ✓ It demonstrates barium within the ulcer crater
 - useful to determine the location and the depth of penetration of the ulcer as well as the extent of deformation from chronic fibrosis
 - larger size, irregular filling defects→suggestive of malignancy
 - Site→little predictive value, since malignancy can occur in any site.

➤ *H. pylori testing*

- ✓ Non-invasive tests
 - ✓ Stool H.pylori Ag
 - ✓ Serum H.pylori Ab
 - ✓ Urea breathe test
- ✓ Invasive tests (need sample from gastric mucosa)
 - ✓ Rapid urease test, histology and culture

Imaging studies

- ✓ Plain chest X-ray (CXR)
 - ✓ What to look for perforated PUD?...Air under the diaphragm
 - ✓ 10-20% may not have free air under the diaphragm. In this case U/S or CT may help
- ✓ Abdominal/pelvic CT with IV & oral contrast
 - ✓ For staging of gastric ca.

Other important IXs

- ✓ CBC
- ✓ Serum electrolyte
- ✓ OFT
- ✓ Serum gastrin level (for ZES)...in patients with ulcers that are refractory to medical therapy or requiring surgery

PUD mgt

Aim

- Symptomatic relief
- Healing the ulcer
- Preventing recurrence

NB* Elderly pts + pts with co-morbid illnesses (like DM, HTN, dyslipidemia...) with dyspeptic symptoms should have ECG to r/o acute coronary syndrome. Since this presentation may be angina equivalent & better to consider the life threatening condition first.

1. Non pharmacologic

- Life style modification
 - Stop smoking
 - Avoid alcohol & NSAIDS

2. Pharmacologic Rx

- Antacids
 - MOA: React with HCL to form salt and water →inhibits peptic activity by raising the pH
 - Magnesium antacids tend to be the best buffers
- H2-receptor antagonists
 - structurally similar to histamine
 - cimetidine ,Famotidine...

- Protein pump inhibitors (PPIs)
 - most potent antisecretory agents
 - Omeprazole, pantoprazole...
- sucralfate
 - Dissociates under the acidic conditions in the stomach & produce a kind of protective coating that can last for up to 6 hours

➤ *In case of H. pylori infection*

- Triple (eradication) therapy
 - ✓ PPIs + 2 antibiotics
 - Antibiotics such as clarithromycin, amoxicillin or metronidazole
 - ✓ Duration #For 2wks
 - ✓ For failures → quadruple therapy with bismuth added to the triple regimen is recommended

3. Surgical Rx

- Indication for surgery;
 - perforation
 - Hemorrhage
 - Intractability (Non healing)
 - Obstruction

NB*see below for complications of PUD

- Surgical methods
 - Vagotomy
 - ✓ 3 levels...
 - Truncal
 - Highly Selective Vagotomy (Parietal Cell Vagotomy)
 - Truncal Vagotomy +antrectomy
 - Subtotal gastrectomy
 - ✓ Usually reserved for patients with underlying malignancies or patients who have developed recurrent ulcerations after truncal vagotomy and antrectomy

Complications of PUD

1. Bleeding---most frequent complication

- ❖ CP
 - ✓ Melena (Tarry, foul smelling stool→indicates bleeding above ileo-cecal valve)
 - ✓ Hematemesis (Vomiting of red blood or coffee-ground material from bleeding in the GIT above the ligament of Treiz)
 - ✓ Shock
 - ✓ Abdominal pain is quite uncommon
- ❖ Ix
 - ✓ BG & Rh
 - ✓ X-match
 - ✓ Hct→Hemo-concentration
- ❖ DDx
 - ✓ Esophageal varices
 - ✓ Mallory Weiss syndrome
 - ✓ Erosive esophagitis
 - ✓ Gastric ca.
- ❖ Mgt
 - ✓ ABC of life & resuscitation
 - ✓ Localize bleeding
 - NGT aspirate
 - Endoscopy
 - Diagnostic & therapeutic importance
 - ✓ Initiate therapy
 - If the bleeding is controlled...
 - Initiate long-term medical therapy This includes;
 - Anti-secretory agents, usually in the form of a PPI or
 - H. pylori treatment (eradication therapy) for positive test results.
 - Eradication of H.pylori should be documented after therapy
 - If the bleeding continues or recurs, surgery may be indicated

2. Perforation---fatal complication

CP

- Present as an acute abdomen
- The patient can typically recall the exact time of the onset of abdominal pain
- frequently accompanied by fever, tachycardia, dehydration, and ileus
- Peritoneal signs +ve

IX

- Upright CXR--Free Air under the diaphragm in~80%

Mgt

- Surgical emergency...
 - After the diagnosis is made, operation is performed in an expeditious fashion following appropriate fluid resuscitation

3. Obstruction---GOO

Clinical presentation of GOO

History

- cardinal symptoms
 - Nausea & Vomiting (non-bilious ,Ingested matter)
- Others symptoms
 - If the obstruction is incomplete→Gastric retention symptoms like...
 - Early satiety
 - Bloating/ epigastric fullness
 - Indigestion
 - Anorexia
 - Epigastric pain→not frequent in GOO. Usually related to the underlying cause...
 - Wt. loss, symptom complex of anemia

Physical Examination

- ASL on chronic base
- V/S derangement
- Signs of anemia
- Signs of dehydration

Dehydration

- *Dry skin & tongue
- *Sunken eye ball
- *Poor capillary filling
- *oliguria

- **Abdomen**
 - Distended stomach
 - succussion splash may be audible --With Stethoscope placed in epigastric area

NB**

GOO 2^o to PUD can occur both in

- ❖ acute setting---due to inflammation & edema
- ❖ chronic setting---due to scarring & fibrosis→part of the healing process

Ix

- ❖ UGIE
- ❖ Sr.electrolyte
- ❖ RFT

Mgt of GOO

- NGT suction
 - *for relief of the obstructed stomach*
- Dealing with metabolic abnormalities
 - Rehydration with IV fluid--isotonic saline
 - Correct electrolyte disturbance--with potassium & chloride supplementation

NB***

- ❖ GOO pts are @ risk of Hypokalemic hypochloremia
 - secondary to loss of gastric juice rich in hydrogen, chloride, and potassium ions
- ❖ Metabolic abnormalities (acid-base disturbance) will be less pronounced if it's due to malignancy
- Acid suppression
- Dealing with mechanical obstruction based on the underlying etiology
 - Benign obstruction
 - ✓ Like GOO 2^o to PUD
 - Vagotomy & antrectomy→standard
 - Alternative vagotomy + gastrojejunostomy...
 - Malignant obstruction
 - ✓ see the next section on Gastric ca.mgt

II) GASTRIC CA.

Risk Factors

- ✓ Environmental & host factors
 - Age--elderly
 - Diet
 - ✓ Salted & smoked foods (used as preservative)
 - ✓ Nitrate rich foods
 - Chronic H.pylori infection
 - ✓ 3 times increased risk than non-infected individuals
 - ✓ Causes atrophic gastritis, intestinal metaplasia, dysplasia → precursors for Gastric ca
 - ✓ H.pylori affects about 50% of the population but only 5% of the population develops ca. why?
 - Genetic susceptibility
 - Different strain of H.pylori
 - Previous gastric surgery (>10 yrs ago)
 - ✓ Why? Surgery may alter the normal PH production...
 - Pernicious anemia
 - ✓ IF deficiency
 - Radiation exposure
 - Smoking (#pack years)
- ✓ Genetic factors
 - Family hx of gastric ca
 - Blood group A
 - Others that'll predispose to gastric ca
 - ✓ HNPCC
 - ✓ FAP...

NB*

Adenocarcinoma 95% cmn

Clinical Presentations of Gastric ca

History

- ✓ Early → asymptomatic
- ✓ In advanced cases...
 - Constitutional symptoms of malignancy
 - ✓ Wt. loss, Anorexia & Easily fatigability
 - Early satiety → May be due to...
 - The tumor mass & or
 - Poor stomach distensibility
 - N & V
 - Bloating
 - Tinnitus, blurring of vision & light headedness (symptom complex of anemia) -- Due to chronic occult blood loss
 - Overt bleeding (<20% of the cases)
 - ✓ Melena
 - ✓ Hematemesis
 - Dysphagia → Cmn if the tumor arises from GE junction
- ✓ Paraneoplastic syndromes — rarely present

Physical examination → late events

*P/E is typically normal. If present... usually indicate incurability

- G/A
- V/S
- Focused examination...
 - HEENT
 - Signs of anemia → Pale conjunctiva, Pale buccal mucosa
 - Hepatobiliary involvement → Icteric sclera
 - LGS -- Look for LAP in the neck, axilla...
 - ✓ Especially ...Virchow's node (left supraclavicular LN)
 - Chest examination
 - Metastatic pleural effusion
 - ✓ Inspection
 - Chest lag on the affected site
 - ✓ Palpation
 - Tracheal deviation away from the affected site
 - Asymmetrical chest expansion

- Decreased tactile fremitus on the affected site
 - ✓ Percussion
 - Stony dullness on the affected site
 - ✓ Auscultation
 - Absent/decreased air entry on the affected site
- Abd. examination
 - Palpable mass → If 1^o tumor is large
 - Palpable mass 2^o to metastasis
 - ✓ Hepatomegally
 - ✓ Sister Mary Joseph nodules → Periumbilical metastasis -- pathognomonic of advanced disease
 - ✓ Carcinomatosis (metastasis to the peritoneum) including krukemberg's tumor of ovary
 - Evidence of malignant ascites
 - ✓ Dull abdomen, fluid shift, fluid thrill
 - In case of GOO
 - ✓ Distended stomach with succussion splash
 - ✓ Visible peristalsis may be present
 - DRE
 - ✓ Hard, nodular mass may be palpable anteriorly & extraluminally -- Drop metastasis on blumer shelf (in the pouch of Douglas)
 - ✓ Heme +ve stool on examining finger
- IGS -- Palmar pallor

Ix

- ✓ See the investigations listed under PUD

Mgt

- Surgical resection (Gastrectomy) -- Radical subtotal gastrectomy → standard
- Chemotherapy & radiation...

Complications

- ✚ GOO -- see above... under PUD complications
- ✚ Obstruction of gastroesophageal (GE) junction

III) IHPS

- ✓ **Comn=3-6wks of age**

RFs

- ✓ **Male sex--5 times more common**
- ✓ **Family hx**
- ✓ **Drugs**
 - **erythromycin in early infancy**
- ✓ **B & O blood group**

CP

Hx

- ✓ **Non-bilious vomiting**
 - **Progressively become projectile**
 - **Occurs immediately after feeding**
- ✓ **After vomiting→Become hungry→wants to feed again**
- ✓ **Become increasingly dehydrated-- Wet dippers become less frequent**
- ✓ **Yellowish discoloration of the body (Jaundice)→indirect hyperbilirubinemia**

P/E

- ✓ **Palpation of "olive" shaped, firm, movable mass in the RUQ--pyloric mass--Best palpated after vomiting**
- ✓ **Presence of visible gastric peristalsis from left to right--Best seen after eating**
- ✓ **Look for signs of DHN**

The 4 important DHN signs & symptoms in well-nourished child are:

	No Dehydration	Some Dehydration	Severe Dehydration
mental status	Alert	Restless,irritable	Lethargic or unconscious
eye ball	No sunken eyes	sunken eyes	sunken eyes
Drinking	Drinking normally	Eager to drink	Unable to drink
Skin turgor	Normal skin turgor	Skin pinch returns slowly	Skin pinch returns very slowly

Ix

✓ U/S

➤ What to look for IHPS?

<ul style="list-style-type: none"> ▪ Channel length <ul style="list-style-type: none"> • In IHPS>16mm ▪ Pyloric thickness <ul style="list-style-type: none"> • In IHPS >4mm ▪ Pyloric diameter <ul style="list-style-type: none"> • In IHPS<12mm
--

✓ Contrast studies→what to look?

➤ String sign

▪ Due to elongated pyloric channel

➤ Shoulder sign

▪ Due to bulging of pyloric muscle in to the antrum

➤ Double tract sign

▪ Parallel streaks of barium in the narrowed channel

Rx

- ✓ **Medical emergency not surgical**
 - **First**→fluid resuscitation with correction of electrolyte abnormalities
 - **NB***Hypochloric, hypokalemic metabolic alkalosis**
- ✓ **Surgical Rx**→pyloromyotomy

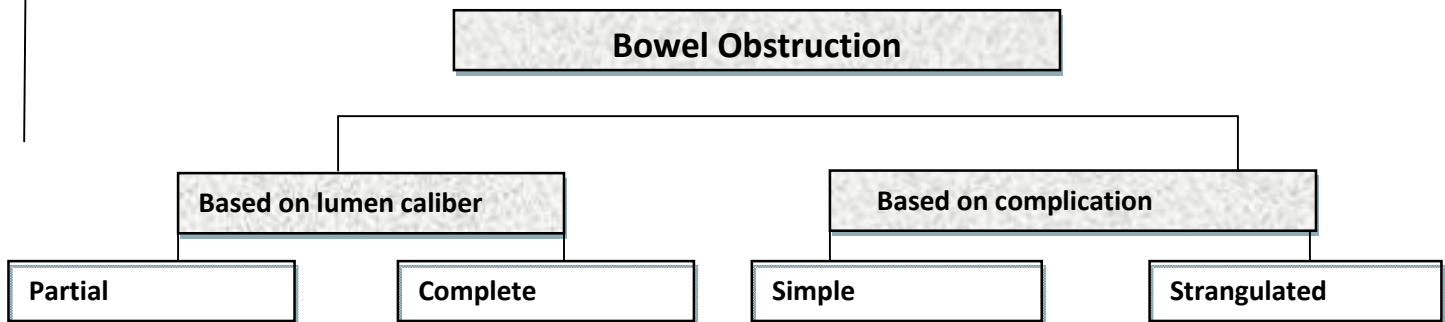
C/C***Vomiting of 1month duration*****HPI**

This patient was LRH 1month back at which time he started to experience non-projectile, non-blood tingled, non-bilious vomiting of ingested matter 2-3X/day. The vomiting starts about 2hrs after taking meal and it is aggravated by hunger. Associated with this he has loss of appetite, feeling of early satiety & significant wt. loss of 4kg for the past 06months (from 70 to 66kg→>5% in 06 month). 04 days prior to admission he started to experience projectile, blood tingled, non-bilious vomiting of ingested matter 5-6X per day. In addition he has tinnitus, blurring of vision & light headedness.

Since for the past 02 years he was having intermittent burning type of epigastric pain with no radiation which was aggravated by taking spicy foods like “key wot.” The pain usually awakens the pt @ the night. For the above compliant he visited a nearby health center where he was given Omeprazole to be taken 2X/day for 14days. For the past 2yrs he took similar medication for > 4 times.

- ✓ No hx NSAID use.(NSAIDS--RF)
 - ✓ No hx of cigarette smoking or chronic alcohol consumption. (RFs)
 - ✓ His regular dietary habit is ‘injera’ made of ‘teff’ & ‘shiro’ made of ‘atter.’(Dietary RFs—smoked food...)
 - ✓ He has no hx of previous abdominal surgery. (RF)
 - ✓ No hx of burn or trauma to the head. (stress ulcer)
 - ✓ No hx of similar illness in the family. (RF-- PUD +Gastric ca)
 - ✓ No hx of radiation therapy.(RF-gastric ca)
 - ✓ No hx of swelling in the neck or axilla. (LAP in gastric ca)
 - ✓ No hx of yellowish discoloration of the eye or itching sensation (hepatobiliary disease with vomiting-DDx)
 - ✓ No hx of chronic cough, contact with chronic cougher or previous TB Rx.(gastric TB)
 - ✓ No self/family hx of DM, HTN or asthma
 - ✓ Has been screened for RVI 08 months back & found to be NR
- Finally he was admitted to our hospital supported by his families

BOWEL OBSTRUCTION

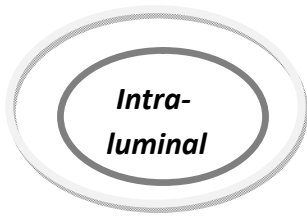


1. Small Bowel Obstruction

SBO 2^o to ...

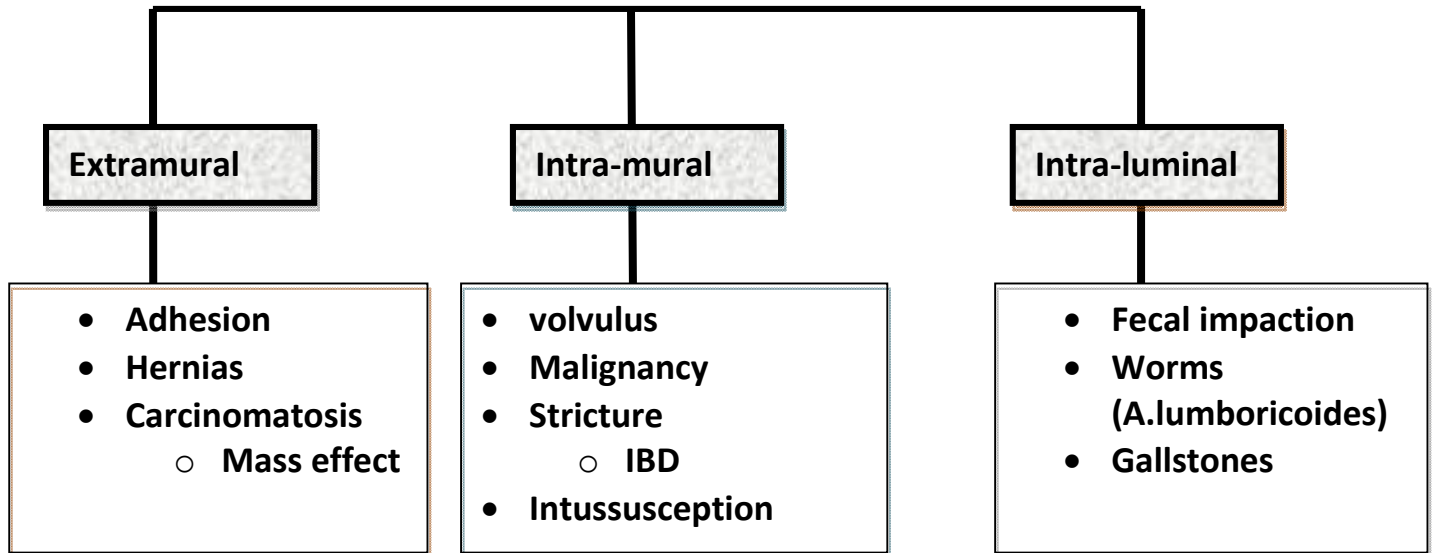
DDx

- Volvulus
 - ✓ Volvulus is a twisting of portion of bowel about its mesentery
 - ✓ Common in rural parts of Ethiopia
 - * Why?
 1. Redundant small bowel (vegetarians)
 2. Heavy meal (1-2X/day)
 3. Strong abdominal muscle
- Post-op adhesion
 - Previous abdominal or pelvic surgery → Common in developed countries & major cities of Ethiopia
- Incarcerated hernia
 - Incarcerated = permanent trapping
 - Strangulation = incarcerated + arterial & venous occlusion
- Malignancy
 - E.g. lymphoma...
- Inflammatory Bowel Diseases
 - Crohn Disease
- Infection
 - Intestinal TB
- In Pediatric group
 - Intussusception



Extra-mural

APPROACH TO SBO



Clinical Presentations (SBO)

1) History

A. Nausea & Vomiting

i. If frequent

➤ It tells us the level of obstruction

❖ More frequent in proximal obstruction

ii. Timing (between the onset of the pain & the vomiting)

➤ Early → suspect proximal obstruction

NB*Be careful → → rapid dehydration → electrolyte derangement

B. Crampy Periumbilical pain

i. Simple obstruction → intermittent pain

ii. Strangulated → steady pain

**In distal SBO pain is predominant*

C. Constipation

i. Absolute constipation/ obstipation

➤ absence of feces + flatus → complete

ii. Relative

➤ Can pass flatus → partial

D. Distension

- In distal SBO =central distension
- In proximal SBO=minimal distension
- In LBO =pronounced distension

Cardinal Clinical features of acute obstruction

		SBO		LBO
		Proximal	Distal	
	Vomiting	Early & profuse	delayed	Mayn't have vomiting
	Abd. Pain		Predominant (periumblical)	lower abdominal
	Constipation	It may take 1 or 2 days to empty the bowel distal to the obstruction. Because it was already there!!!		Early
	Distension	Minimal	Central distension	Pronounced distension
Radiograph		Little evidence of dilated loops	Multiple dilated small bowel loops	The colon proximal to the obstruction is dilated *Small bowel will be dilated only if incompetent ileo-caecal valve

2) Physical Examination

- ✓ **General Appearance**
 - Acutely sick looking (in pain...vomiting...etc)
 - Quietly lying down or not
- ✓ **Vital signs**
 - BP→if in shock due to GI loss (repeated vomiting)

 - PR
 - Tachycardia due to strangulation, the pain per se...etc
 - Feeble pulse incase of shock
 - T⁰→ febrile incase of strangulation
 - RR→ tachypnea in case of metabolic derangement
- ✓ **Look for Signs of dehydration**
- ✓ **On Abdominal examination**
 - **Inspection**
 - Abdominal distension→Proximal vs distal
 - visible peristalsis
 - Look for surgical scars
 - look hernial sites carefully
 - **Palpation**
 - Tenderness, mass
 - **Percussion**
 - Tympanicity, signs of fluid collection
 - **Auscultation**
 - Bowel sounds
 - Early→Hyperactive
 - Late→Hypoactive
- On DRE...**
 - If gross blood on examining finger→ malignancy or strangulation
 - Presence or absence of fecal matter
 - Complete vs partial

NB* intestinal strangulation is a surgical emergency
Evidences to consider strangulation

On History #abdominal pain → become steady #Fever	Physical Examination #General appearance Quietly lying down #Vital signs ✓ Febrile ✓ Tachycardic #Abdominal examination ✓ Peritoneal signs +ve (Tenderness, Rigidity)	Investigation #CBC=leukoctosis
--	---	--

NB*

When you try to Dx → Follow

1. Is it mechanical obstruction or ileus?
*Colicky pain is not a feature of paralytic ileus + paralytic ileus become significant if 72 hrs lapsed after laparotomy but still...
 - No bowel sound
 - No passage of flatus
2. What is the underlying cause?
3. Is it partial or complete obstruction?
4. Is it simple or strangulated?

NB * ureteral colic= G/Appearance → restless patient...busy finding comfortable position

SAMPLE HX

C/C

Abdominal pain of 3 days duration

HPI

This pt was last relatively healthy 3 days back at which time he started to experience sudden onset severe intermittent crampy periumblical abdominal pain without known aggravating, relieving factor or radiation noticed by the patient. About 3-4hrs after the onset of the pain he started to experience bilious, non-projectile, non-blood tingled, non-foul smelling vomiting about 5-7X/day. Associated with this he started to experience failure to pass flatus of 03 days duration associated with abdominal distention. 01 day prior to presentation he totally failed to pass feces.

For the above complaint he visited a local health center where he was given 01 bag of Normal saline and referred him to our hospital for better investigation and management.

- No hx of previous abdominal surgery.(post-op adhesion)
- No hx of fever, wt loss or swelling in the neck, axilla or groin.(lymphoma)
- No hx of chronic cough, contact with chronic cougher or previous TB Rx (intestinal TB)
- No hx of yellowish discoloration of the eyes or itching sensation.(hepatobiliary disease...)
- His regular diet is “shiro” made of “atter” & “injera” made of “teff”, 2-3x/day.
- No self/ family hx of DM,HTN or asthma
- Not screened for RVI but he has no hx of multiple sexual partner, chronic diarrhea or HZV attack.

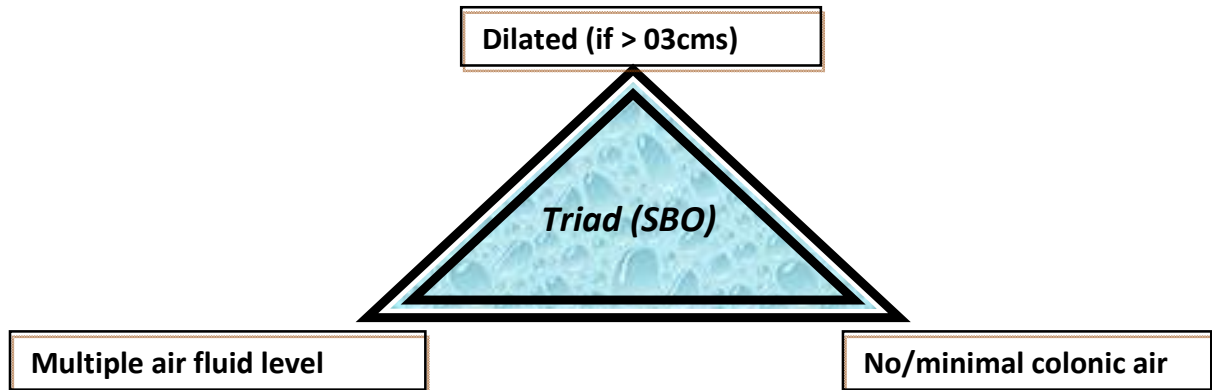
Finally he was admitted to our hospital.....

Investigations

Diagnostic

✓ Plain abdominal x-ray

- **What to look on x-ray for SBO? The triad**
 - **Air-fluid level**
 - **Width of the bowel**
 - **Paucity of Colonic air**

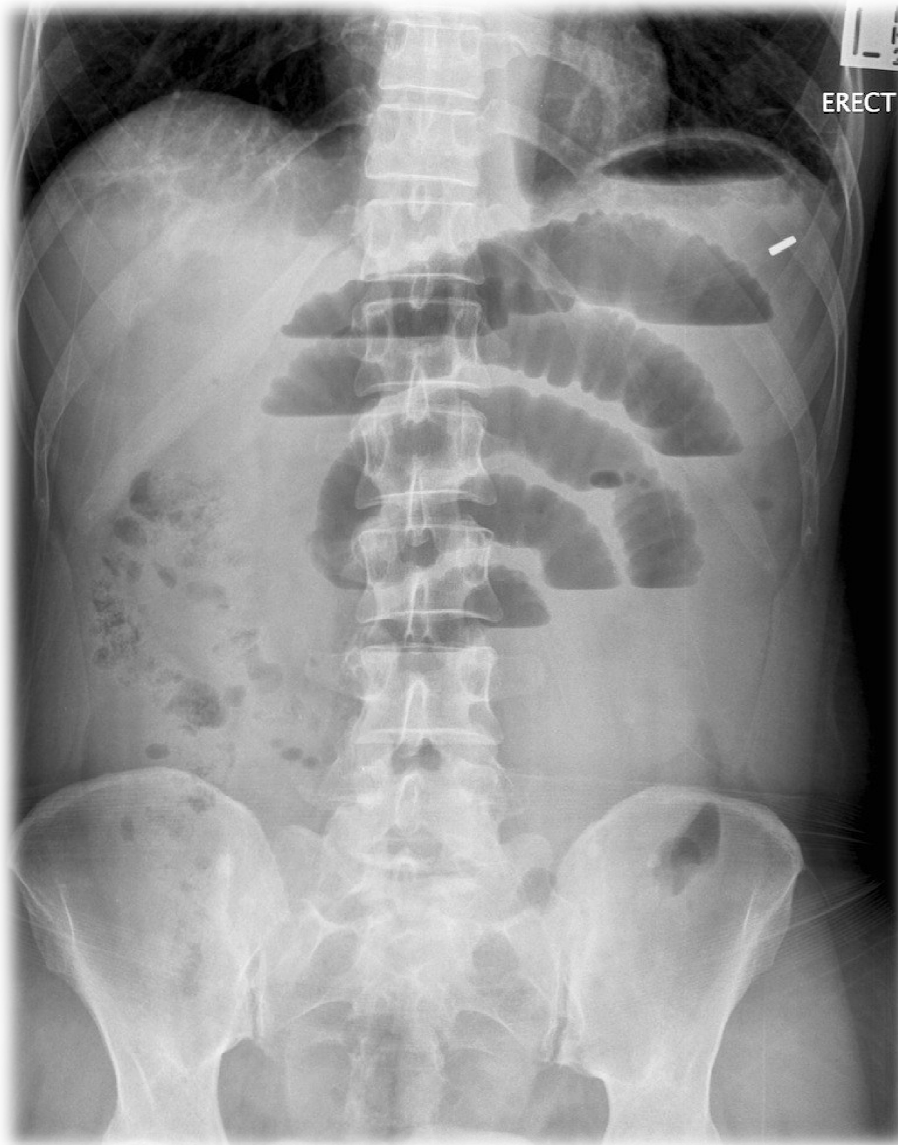


• **Other evidences for small bowel involvement**

1) **Site=the obstructed bowel is central & lie transversely in SBO**

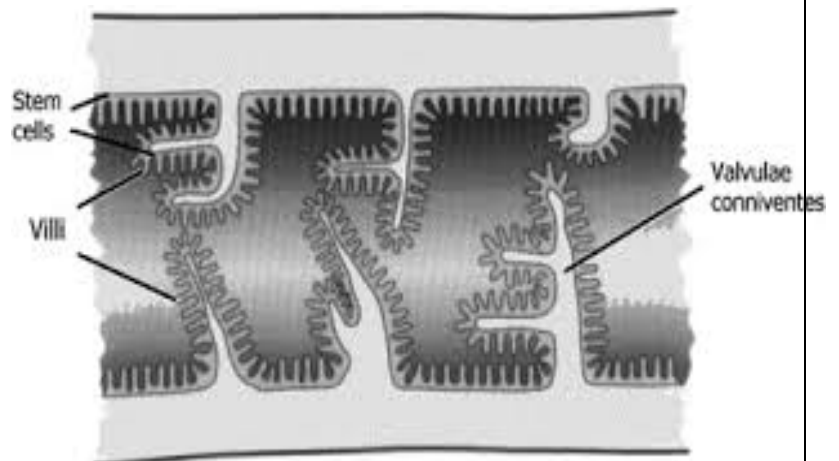
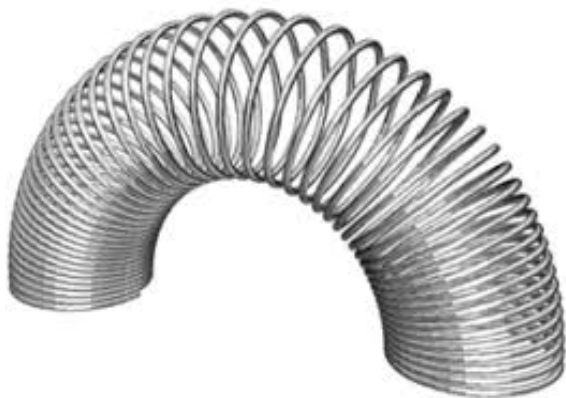
2) **Anatomical landmarks**

- **Valvulae conniventes of small bowel completely pass across the width of the bowel & are regularly spaced "coiled spring appearance" → unlike haustral folds in large bowel**



Notice

1. Central
2. Coiled spring appearance
3. Air-fluid level
4. Width of the bowel
5. Paucity of Colonic air



- ✓ Other investigation modalities
 - ✓ Enteroclysis → gold standard to Dx partial vs complete obstruction
 - barium as a contrast is contraindicated if perforation exists → peritonitis
 - ✓ CT-scan & MRI
 - ✓ U/S

Lab. Studies

- ✓ CBC
 - in case of strangulation → leukocytosis
- ✓ Degree of dehydration
 - RFT, Hct
- ✓ Sr. electrolyte
 - <<>> dehydration → electrolyte imbalance

NB Dehydration & electrolyte loss are due to*

- 1) Reduced oral intake
- 2) Defective intestinal absorption
- 3) Loss as a result of vomiting
- 4) Sequestration in the bowel lumen
- 5) Transudation of fluid in to the peritoneal cavity

Management

1. Conservative(supportive) Rx

- Secure NGT for bowel decompression
- Secure IV line
 - Fluid & electrolyte replacement
- Insert foley catheter & follow the UOP
- Anti-emetic
- Antibiotics (broad spectrum)
 - Mandatory for all pts undergoing surgery

2. Surgical Rx

- Indication for early intervention
 - Signs & symptoms of intestinal strangulation
 - Obstructed external hernia
 - Obstruction in a 'virgin' abdomen

Operative decompression

- The type of surgical procedure required will depend upon the cause of obstruction
 - Division of adhesions (enterolysis/adhesiolysis)
 - Excision
 - Bypass or proximal decompression

Intussusception

- peak incidence between 5 & 10 months of age
- 90% idiopathic, but upper respiratory tract infection (URTI) or acute gastro-enteritis (AGE) may precede the condition
- ileo-colic common in most children (77%)

➤ Clinical presentation

Hx

- bloody diarrhea (currant jelly stool)
- intermittent crying with the laps towards the abdomen

P/E

- Dance's sign-elongated mass in RUQ with absence of bowel in the RLQ
- DRE → blood stained mucus on examining finger (use little finger)

➤ Investigations

- Barium enema-ileocolic
 - Claw sign



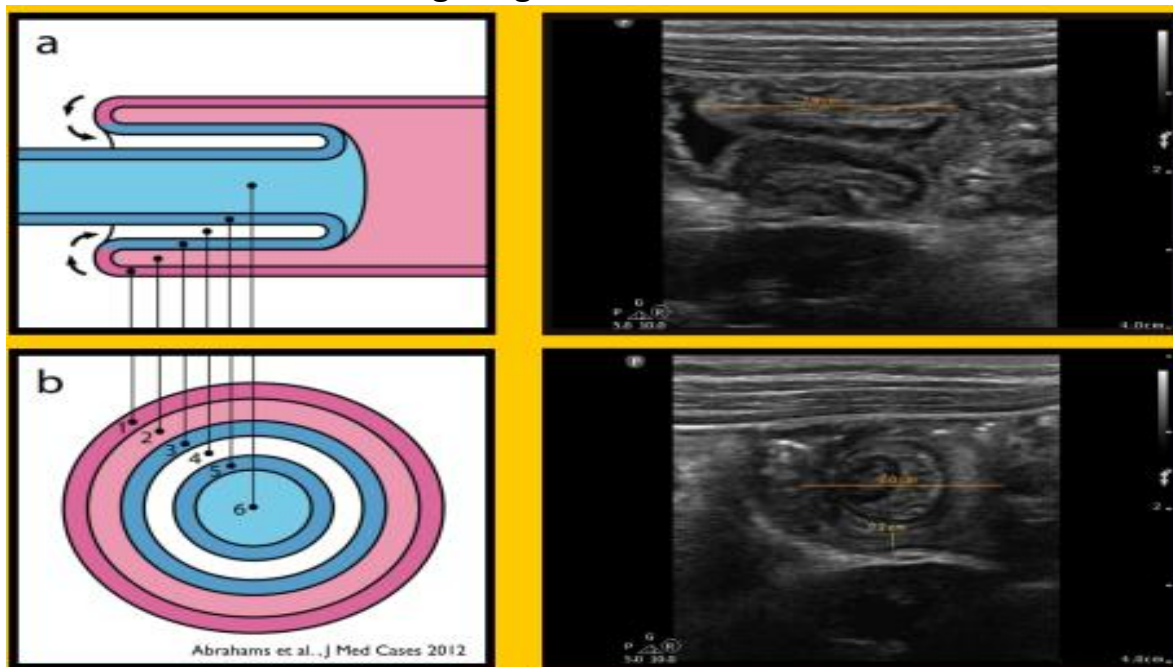
➤ Abdominal u/s = high diagnostic sensitivity

○ Doughnut sign

- Appearance of concentric rings in transverse section



▪ Target sign



➤ Treatment of intussusceptions

- Resuscitation
- IV antibiotics
- Radiographic (pneumatic or hydrostatic) or surgical reduction

2. Large Bowel Obstruction

Risk Factors

- Age--Elderly
- Anatomical RFs
 - Example in case of sigmoid volvulus...
 - Long mesentery
 - Narrow base
 - Elongated colon (redundant)
- Diet--High residue diet
- Chronic constipation...

LBO 2^o to ???

DDx

- ✓ Volvulus
 - Sigmoid volvulus
 - Cecal volvulus
 - Colonic
- ✓ Malignancy
 - Like Colorectal ca.
- ✓ Fecal Impaction
- ✓ Stricture
 - IBD
 - Diverticular disease
- ✓ Pediatric group
 - Imperforate anus

Clinical Presentation

1) History

- Abdominal distension
- Failure to pass feces & or flatus
- Nausea & Vomiting
 - ❖ LBO may not cause vomiting despite markedly distended abdomen
- Crampy abdominal pain
- Ask about...
 - ❖ The onset
 1. Abrupt→consider acute obstructive events (Cecal or sigmoid volvulus)
 2. Chronic constipation, straining @stool→consider diverticular disease, malignancy

2) Physical Examination

1) General appearance

2) Vital signs

3) Signs of dehydration

4) Abdominal examination

i) Hyper-tympanic on percussion

ii) Hypoactive bowel sound

iii) May be tender

- Also check for inguinal & femoral hernial sites

5) DRE

- Hard stool → impaction

- Empty vault → obstruction proximal to the level that our finger can reach

SAMPLE Hx

C/C

Failure to pass feces of 2days

HPI

This patient was last relatively healthy 03 days back at which time he started to experience severe intermittent crampy lower abdominal pain without known aggravating or relieving factor. Associated with this he has failure to pass feces of 03 days & flatus of 02 days duration with progressive distension of the abdomen. He has nausea but no vomiting.

He had history of similar episode #03months back for which he was deflated with rectal tube in our hospital.

- ✓ No hx of rectal bleeding, tenesmus or wt loss**
- ✓ No hx of tinnitus, vertigo or blurring of vision**
- ✓ No hx of previous abdominal surgery**
- ✓ No hx of chronic cough, contact with chronic cougher or previous TB Rx**
- ✓ No self/family hx of DM, HTN or asthma**
- ✓ Screened for RVI 2 months back & found to NR**

Finally he was admitted to our hospital supported by his families

Investigations

Diagnostic

✓ Radiograph

• Plain abdominal x-ray

*What to look ?

✓ Dilated bowel loop

- >06 cms for large bowel
- >09 cms for cecum
- >03 cms for small bowel

✓ Paucity of air

- Absent or reduced air in the rectum

✓ Important to differentiate complete from partial obstruction

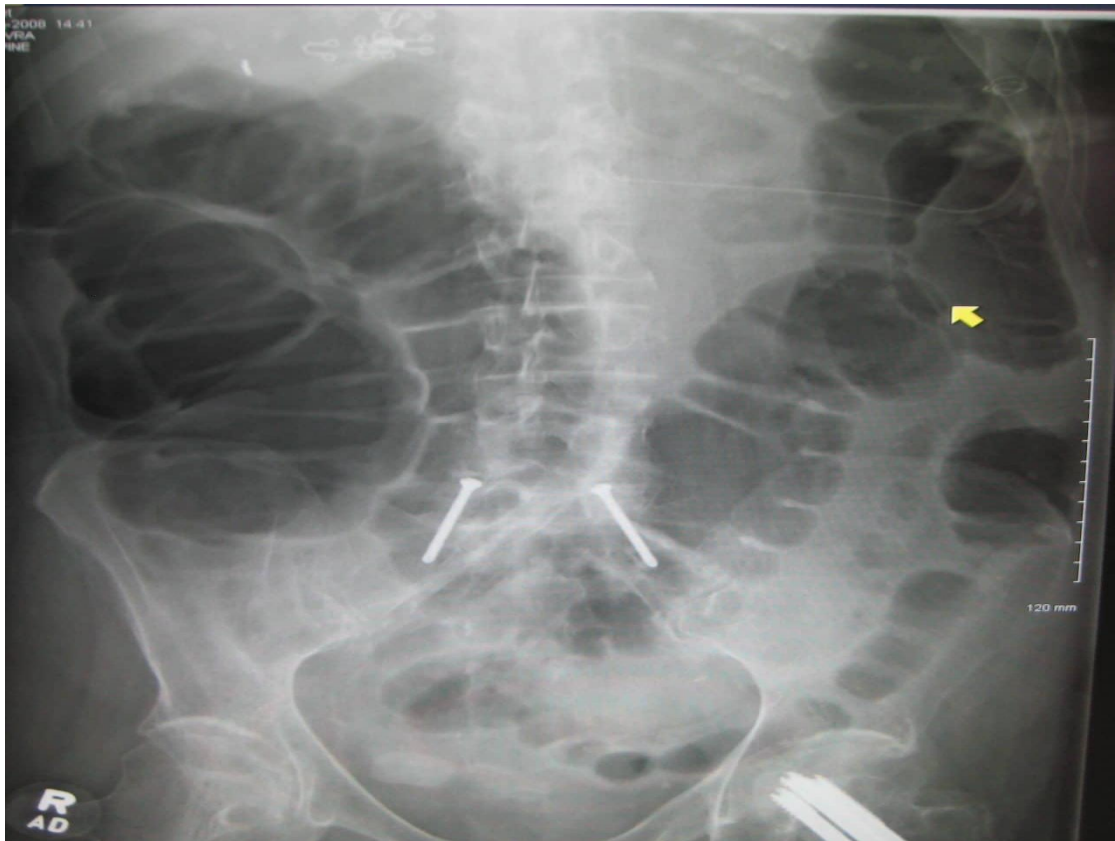
✓ Air fluid level

*How to differentiate LBO from SBO?

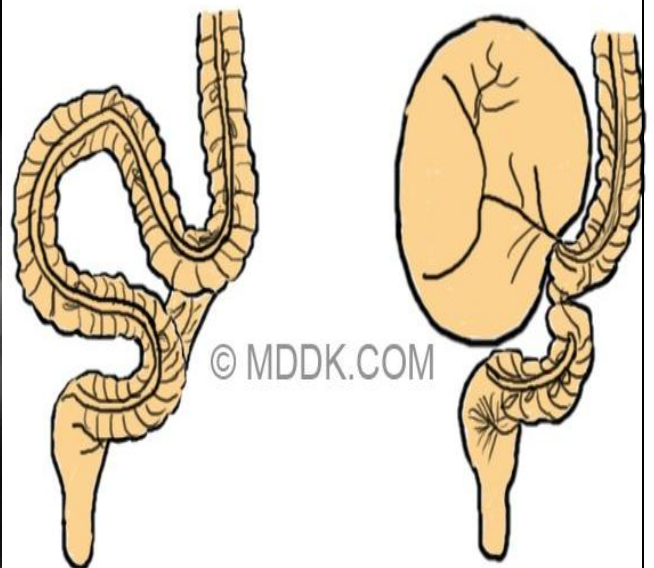
<<>>Anatomic markers

- ✓ Haustral markings → LBO
- ✓ Valvulae conniventes → SBO

<<>>Colonic air absent in case of SBO



LBO



Coffee bean appearance

✓ **Lower GI Endoscope**

❖ **E.g. sigmoidoscopy--has diagnostic & therapeutic importance**



✓ **Contrast studies with enema**

○ **Contraindicated in case of perforation or gangrenous change**

✓ **CT-scan**

Lab. studies

✓ **CBC**

✓ **Serum electrolyte**

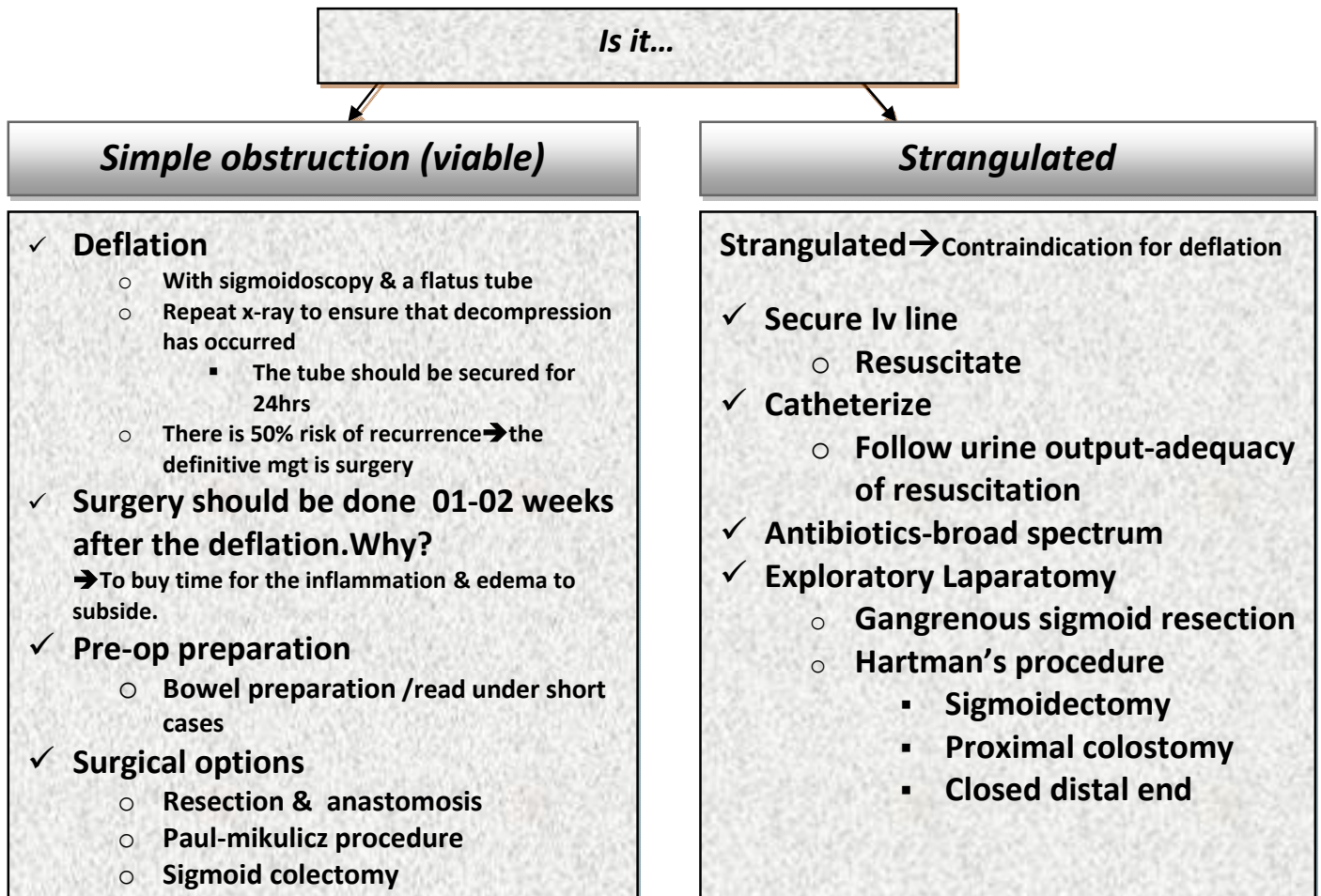
Management

Goal

1. to prevent the development of gangrene
2. to address the anatomic abnormality that led to the volvulus

Mgt depends upon the underlying cause

- LBO 2^o to sigmoid volvulus



- Cecal volvulus--Surgical approaches like cecopexy, cecostomy, and cecal resection



COLORECTAL CA

Risk Factors

1) Aging

- >50yrs → increased risk
- Median age @ Dx of colorectal ca is 62.

2) Genetic factors

- Progression from premalignant to invasive Ca.
 - FAP (Familial adenomatous polyposis)
 - Mutation in APC gene
 - More than 100 colonic adenomas are diagnostic
 - Rare but in known FAP pts life time risk of developing colorectal ca is 100% by age of 50
 - Prophylactic surgery is indicated to prevent colorectal ca.
 - HNPCC (hereditary non-polyposis colon ca.) or lynch syndrome
 - Error in mismatch repair
 - More common than FAP & in known HNPCC patients there is 70-80% life time risk of developing colorectal ca.
 - Pts with HNPCC → subjected to regular colonoscopic surveillance
- Familial colorectal ca.(Hereditary)
 - Accounts 10-15% of colorectal ca.
 - Risk rises with no# of first degree relatives affected
- Hx of breast ca. --BRCA 2
- Hx prostate or lung ca in men

3) Environmental factors

- **"SAD"** factors
 - **S** Smoking
 - **A** Alcohol abuse
 - **D** Dietary factors
 - High intake of red meat--Red meat components (haem & N-nitroso cpds) have shown effect on the DNA in colorectal mucosa
 - High intake of animal fat--Direct toxic effect to the colonic mucosa → early malignant change

- Low fiber diet--Because of increased exposure to dietary carcinogens
 - increased roughage is associated with reduced bowel transit time→reduced exposure

➤ obesity & sedentary life style

3) Inflammatory

- IBD--Particularly chronic UC
 - chronic inflammation predisposes the mucosa to malignant changes

4) Others

- Previous hx of surgery for colorectal ca.--Recurrence risk 20-40%
- Pelvic irradiation
- ?Cholecystectomy--Possibly as a consequence of increased bile acid exposure
- ureterosigmoidostomy

Approach to RFs of colonic ca.

Aging→dominant RF



Clinical Presentation

- CP of colorectal ca depend on tumor size, type & location

1) History

- ✓ Rectal bleeding
 - Gross
 - For suspected occult bleeding → FOBT (I_x)
 - ✓ Change in bowel habit--Chronic constipation or diarrhea
 - ✓ May complain of abdominal pain
 - ✓ Feeling of incomplete voiding
 - ✓ Symptoms of Intestinal obstruction → left sided ca.
 - ✓ Tenesmus → common in rectal ca.
 - ✓ Anemia symptoms (tinnitus, blurring of vision & light headedness)
 - Common as initial presentation in Rt. sided tumors
 - ✓ Unexplained wt. loss
 - ✓ easy fatigability
 - ✓ anorexia
- constitutional symptoms of malignancy

2) Physical Examination

- ❖ G/A
 - Chronically sick looking
 - Nutritional status (looks malnourished)
- ❖ V/S
- ❖ HEENT
 - Signs of anemia
 - Signs of liver metastasis= icteric sclera
- ❖ LGS
- ❖ Chest examination
 - If metastasis...signs of pleural effusion
- ❖ Abd. examination
 - In advanced cases there may be...
 - Palpable abdominal mass, Hepatomegally, Ascites
 - DRE
 - In case of rectal ca.
 - Characterize tumor size, location, surface, consistency, fixation to the underlying or overlying structure
 - Blood on examining finger

NB*

Common sites of distal metastasis

- ✓ Liver
- ✓ Lung
- ✓ Carcinomatosis = Diffuse peritoneal metastasis

Modes of spread (colorectal ca)

- 1) Local
- 2) Lymphatic
- 3) Hematogenous
- 4) Transcoelomic

NB*

- Tumors that arise from distal rectum may metastasis initially to the lung.
- 75-80% pts present with localized disease
- Adenocarcinoma >95%
- When you write your ass't be specific → don't say colorectal ca...colonic or rectal ca.

DDx

- Inflammatory bowel disease (IBD)
 - CD
 - UC
- Diverticulosis
- Hemorrhoids (bright red bleeding +/- pain)
- Anal fissure (bright red bleeding + pain)

SAMPLE Hx

C/C

Bleeding per rectum of 06 months duration

HPI

This patient was LRH 06 months back at which time she started to experience dark red bleeding per rectum. Associated with tinnitus, blurring of vision & light headedness. In addition she started to experience loss of appetite, easy fatigability & significant weight loss of 8% for the past 06 months (59→54kg). She also has dull aching left lower abdominal pain & mucoid, foul smelling diarrhea 4-5x/day but no tenesmus, feeling of incomplete defecation, abdominal distension or failure to pass feces.

For the above complaints she visited a local health center @ Dabat 02 weeks prior to admission where stool examination was done & given yellowish circular tablet to be taken four tabs per day for three days. But there was no improvement in her symptoms & finally they referred her to our hospital for better investigation & management.

- Her father died 20yrs back @ the age of 73 by similar illness.(Genetic Rfs)
- No hx of breast, endometrial or ovarian cancer.(Rfs)
- She has no hx previous abdominal surgery.(for colorectal ca—recurrence)
- Her regular dietary habit is “injera” made of “teff” & shirowot made of “atter.” (SAD...Rfs)
- She has no hx chronic alcohol consumption or cigarette smoking.(SAD...Rfs)
- She has no hx of radiation therapy.(Rfs—radiation to the pelvic)
- No hx of yellowish discoloration of the eyes, bone pain or hemoptysis.(metastasis)
- No hx of chronic cough, contact with chronic cougher or Previous TB Rx
- She has no self or family hx of DM, HTN or asthma
- She was screened for RVI 4 months back & found to be NR

Finally she was admitted to our hospital.....

Investigations

Diagnostic

✓ Colonoscopy

Advantages

- ✓ You can see the entire colon
- ✓ Has advantage on detecting synchronous ca.
 - ❖ *Synchronous colorectal carcinoma refers to more than one primary colorectal carcinoma detected in a single patient at initial presentation. Or pt presented with colorectal ca within #06 month after surgery was done for colorectal ca.*
 - ❖ *NB*Metachronous→ defined as a secondary colorectal cancer occurring more than 6 months after the index cancer.*
- ✓ You can take biopsy

Disadvantages

- ✓ Most invasive
- ✓ Needs bowel preparation & IV sedation
- ✓ Risk of perforation, bleeding
- ✓ costly

✓ Sigmoidoscopy

Advantages

- ✓ Enemal bowel preparation only but sedation isn't necessary
- ✓ Slight risk of perforation or bleeding

Disadvantages

- ✓ you can see only up to splenic flexure (60cms)
 - You may miss detecting synchronous polyps (I.e. you may miss proximal lesions)
- ✓ Colonoscopy is required if polyp is found

✓ Imaging

✓ *Double contrast barium enema (DCBE)*

- A double-contrast barium enema is a form of contrast radiography in which x-rays of the colon and rectum are taken using two forms of contrast to make the structures easier to see.
 - (1) Liquid containing barium (that is, a radio-contrast agent) is put into the rectum.
 - (2) Air is also put into the rectum and colon to further enhance the x-ray.

✓ What to see?

- ✓ Constant irregular filling defects ('Apple core' sign)

Advantages of DCBE

- Examines entire colon
- Good sensitivity for polyps >1cm

Disadvantages

- Require bowel preparation
- Less sensitivity for polyps <1cm
- May miss lesions in sigmoid colon
- Colonoscopy required if +ve result

✓ Abdomino-pelvic CT-Scan

- For diagnosis & staging

Lab studies

✓ FOBT(fecal occult blood test)

✓ Blood studies

✓ CBC

✓ OFT

✓ Tumor markers

- ✓ Serum CEA level → More sensitive indicator of recurrence (important for post-op follow-up), but no role in screening or Dx.

Metastatic workup

✓ Abd. U/S -- liver

✓ CXR

✓ Abdominal/ pelvic/chest CT-Scan

✓ Abdominal/ pelvic MRI

Management

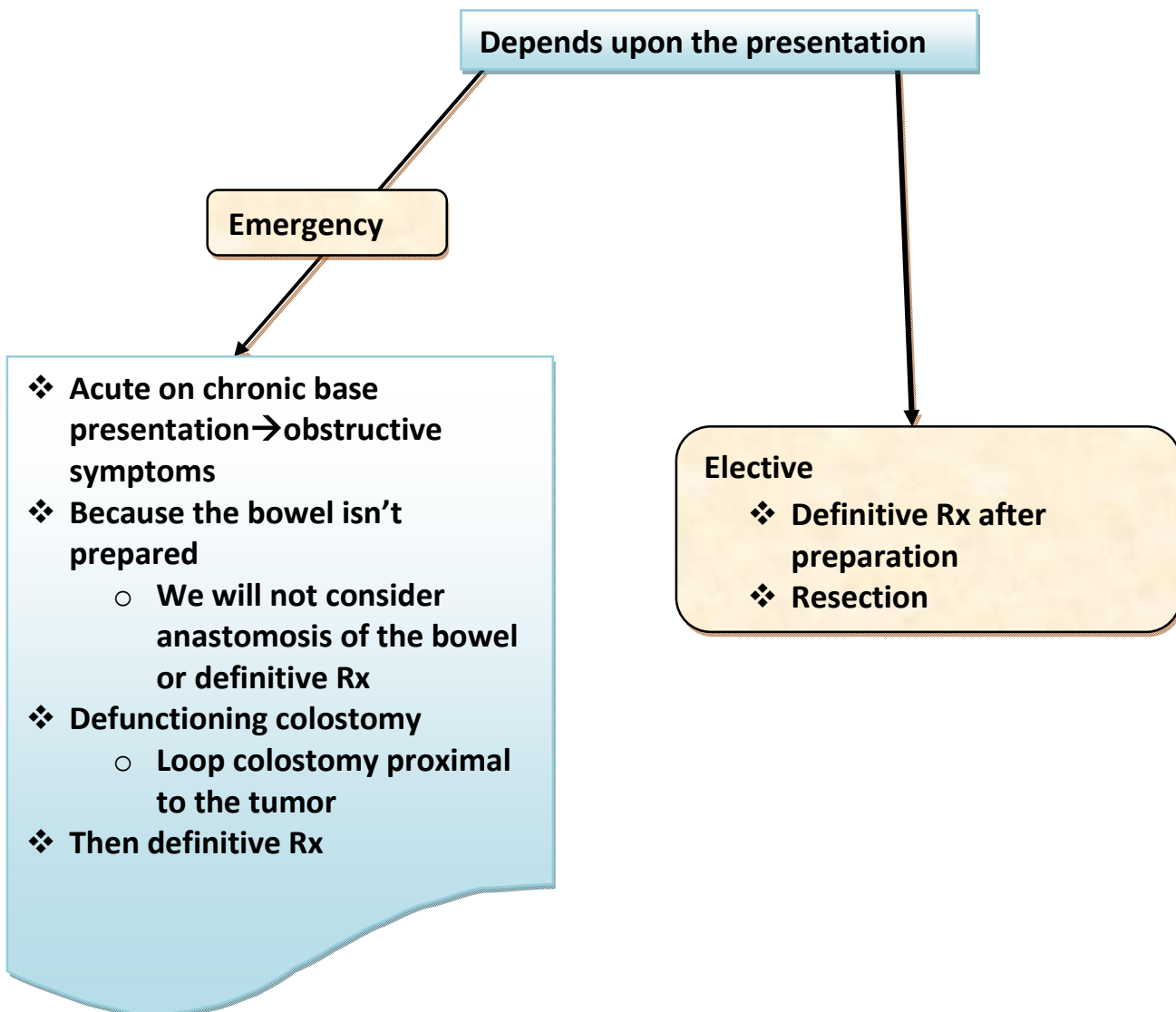
Pre-op preparation

- ✓ **Correct Anemia**
 - Hct should be >30 –pre-op
 - if emergent surgery is needed → consider blood transfusion
- ✓ **Bowel preparation -- For elective pts**

Principle of colorectal ca. mgt

- **Surgical Rx**
- **Medical care**
 - **Chemotherapy**
 - **Radiation therapy**

1) Surgical Rx



- ❖ Principle of resection in colorectal ca. is the complete removal of
 1. The tumor
 2. The major vascular pedicles
 3. The lymphatic drainage &
 4. Involved adjacent structures (difficult in case of rectal ca.)
- ❖ Types of resection (colectomy) in colonic ca.
 - ✓ Right hemicolectomy
 - ✓ Extended Rt. hemicolectomy
 - ✓ Left hemicolectomy
 - ✓ Extended left hemicolectomy
 - ✓ Sigmoid colectomy
 - ✓ Total colectomy with ileorectal anastomosis
- ❖ Types of resection in rectal ca. is based on the distance from the anal sphincter → Rigid proctosigmoidoscopy should be used to accurately measure the exact distance of the tumor.
 - ❖ Anterior resection
 - ❖ Lower anterior resection
 - ❖ Abdomino-perineal resection (APR) → If below 7cms
 - complete excision of the rectum and anus & End permanent colostomy

2) Medical care

- ✓ Chemotherapy
- ✓ Radiation therapy

Post-op complications

- ❖ Bleeding
- ❖ Anastomosis leak
- ❖ Colostomy related complications
- ❖ Intra- op injury to the adjacent structures
- ❖ DVT & embolism
- ❖ Wound related complications
- ❖ Anesthesia related complications
- ❖ Recurrence

Post-op follow-up

- ❖ Nutritional rehabilitation
- ❖ Serum CEA level
- ❖ Metastatic work up
- ❖ Psychological support

NB*

Adverse prognosis if

- Younger age < 40 yr
- Longer duration of symptoms
- Obstruction/ perforation
- Ulcerative lesion

BLADDER OUTLET OBSTRUCTION

BOO 2^o TO???

DDX

1. BPH
2. Prostatic ca
3. Bladder ca
4. Urethral stricture
5. Bladder neck contracture
 - ✓ E.g. following aggressive resection of a small prostate
6. Bladder stone
7. Bladder trauma
8. Neurogenic bladder—functional obstruction

Discussion of the DDX

I) BPH

- Common cause of BOO in elderly > 70yrs
- LUTS (Lower Urinary Tract Symptoms)
 - The voiding dysfunction that results from prostatic enlargement & Bladder Outflow Obstruction (BOO)
 - Not all men with BPH have LUTS & the vice versa
- BPH--hyperplasia of the gland → on periurethral & transitional zone

Clinical presentation

1) History

- Approach to symptoms of BPH--**LUTS**

Voiding (obstructive) symptoms

- Hesitancy
- Poor flow--Ask if Improved/ not by straining
- Intermittent stream--Stops and starts
- Dribbling--Including Post-micturition
- Sensation of poor bladder emptying

Storage (irritative) symptoms

- Frequency
 - Put it in Day to Night ratio
- Urgency
- Nocturia
- Urge incontinence

Special attention to....

- Onset & duration of symptoms
- Severity of symptoms & how they are affecting the patients quality of life
- Precipitating factors
 - postponement of micturation--Cmn after heavy drinking of alcohol in social gathering
 - Medications
 - Perianal pain
 - UTI
- General health issues including sexual history (...Erectile & ejaculatory dysfunction)
- Medication intake
 - E.g.anti-histamines, anti-hypertensives, anti-cholinergics, tricyclic antidepressants→these drugs can induce retention
- Previously attempted Rx

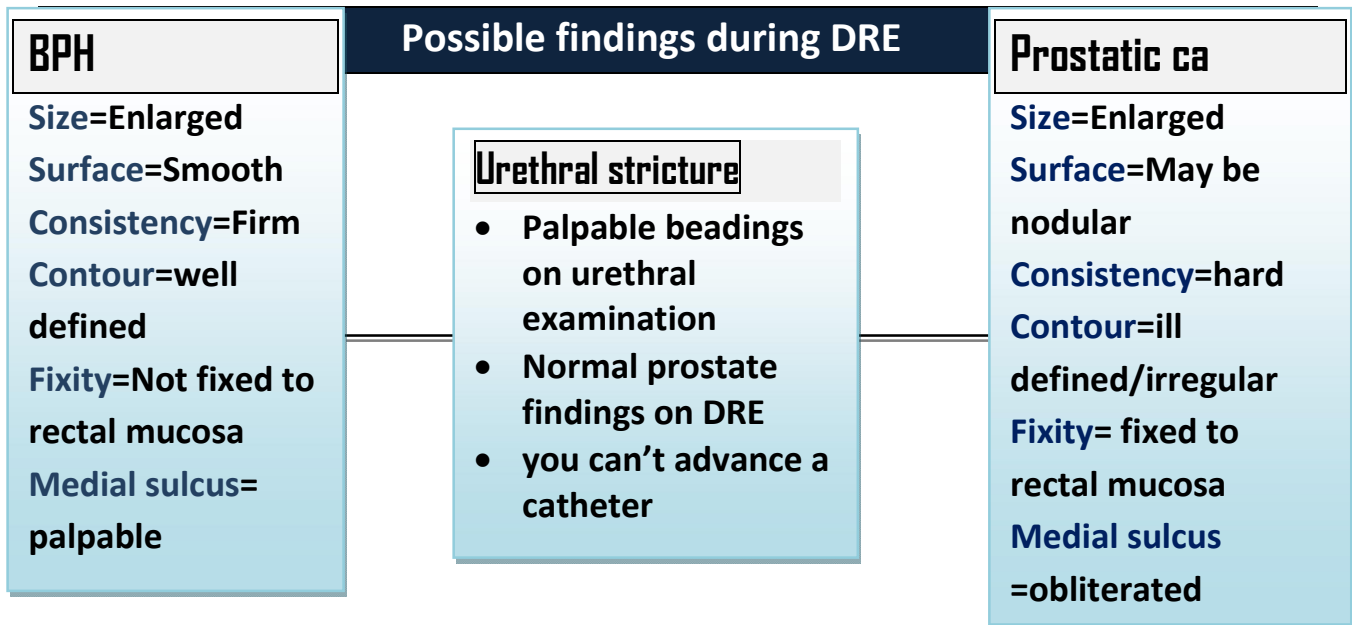
2) Physical Examination

➤ Focus on

- ❖ Signs of anemia
 - Kidney →erythropoietin production...
- ❖ Suprapubic area--For bladder distension
- ❖ DRE--Prostate
 1. Size--Measure (by finger) → if reachable
 2. surface
 3. Consistency
 4. Contour
 5. Fixity
 6. Medial sulcus
 - Also assess...
 - Absence or presence of fluctuation
 - Prostatic abscess
 - Tenderness
 - Prostitis
 - Anal sphincter tone & bulbocavernous muscle reflex
 - neurological disorder

DRE reporting format

- **Inspection**
 - No ulceration or visible protruding mass
- **Palpation**
 - Normotonic anal sphincter
 - There is palpable mass anteriorly which is non-tender with smooth surface & regular border. Firm in consistency, no fixity to the rectal mucosa. It has palpable medial sulcus but the upper border isn't reachable.
 - No blood on the examining finger



Ix

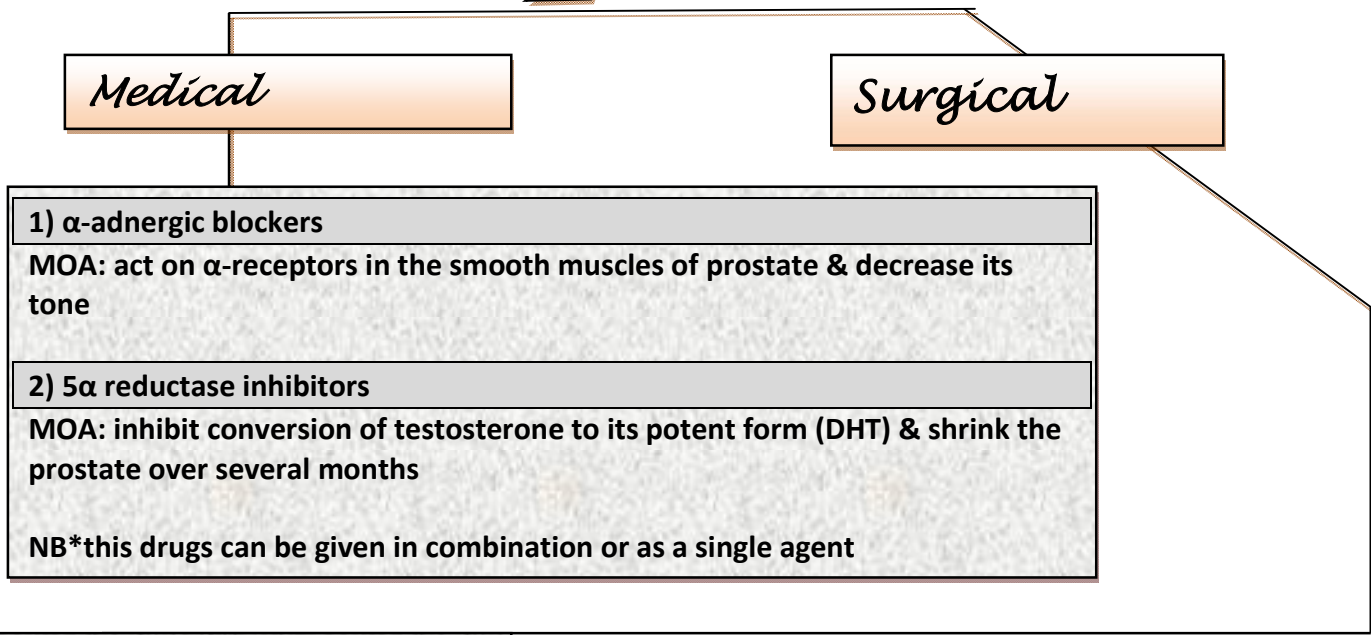
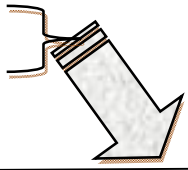
- Urine analysis
- Urine culture
- Sr electrolytes
- Sr creatinine
- Hct

International prostate symptom score (IPSS)

- scored out of 35 & has 7 components--it tells us how severe the patients' symptoms are
- 0-7=Mild
- 8-19=Moderate
- 20-35=Severe

Management of BPH

- Watchful waiting
 - For mild symptoms, follow-up → 1 to 2 times yearly
 - Offer suggestions that help to reduce symptoms
 - Avoid caffeine and alcohol
 - Avoid decongestants and antihistamines
- Medical mgt
- Surgical mgt



Indications

- AUR
- Chronic urinary retention & renal impairment
 - Hydroureter or hydronephrosis
 - Residual urine ≥ 200 ml
 - Uraemic manifestations
- Complications of BOO
 - infection, stone, diverticulum formation...
- 4) Symptoms are severe enough to bother the patient and affect his quality of life
- 5) Failed medical Rx

Surgical methods

Minimally invasive procedure

1) Trans-urethral resection/TURP
*Gold standard

Open surgery

2) Retropubic--commonly done in our setup (GUH)

3) Transvesical

4) Perineal--Obsolete nowadays

Specific complications of the Surgery

- 1) Bleeding
- 2) Retrograde ejaculation
- 3) Incontinence
- 4) Impotence
- 5) Urethral stricture
- 6) Bladder neck contracture

NB--If the pt present with AUR @ EOPD → Catheterize the pt then arrange uro-surgical mgt...

II) Prostatic ca.

Risk Factors

- Genetics
- Diet--Fat intake
- Obesity
- Hormonal
 - High levels of LH , testosterone to DHT ratio

When compared to prostatic ca
BPH causes LUTS earlier. **WHY?**

Clinical Presentation

- Urinary complaints or retention
- Back pain
- Hematuria

- Advanced disease
 - Wt loss, anorexia
 - Anemia
 - Bone pain with /without pathologic fracture
 - Neurologic deficit from spinal cord compression
 - Lower extremity pain & edema due to obstruction of venous & lymphatic tributaries by nodal metastasis

Prostatic ca.

- 70% arise from peripheral zone
- 95% are adenocarcinoma

Investigations

- PSA level
 - PSA velocity
 - PSA density [percentage of free PSA]
 - The lower the percentage of free PSA -- the higher the likelihood of ca.
- Prostate biopsy
 - Done when PSA level is elevated or abnormal DRE
- Ultrasonography
 - What to look on u/s for prostatic ca.?
 - Enlarged prostate
 - Nodular surface
 - calcifications
 - Capsular invasion
- CT , MRI -- for staging
- Bone scan

Mgt of prostatic ca.

Localized disease

- ❖ Radical prostatectomy
- ❖ Radiation therapy
- ❖ Active surveillance
- ❖ Androgen deprivation therapy [ADT]

Metastatic disease

- ❖ Palliation of pain
- ❖ Attempt to slow further progression of disease
 - ✓ LHRH agonists
 - ✓ Antiandrogens
 - ✓ Orchiectomy

III) Bladder ca.

Risk Factors

- Environmental factors (80%)
 - Cigarette smoking
 - Occupational exposures
- Medical RFs
 - Radiation therapy to the pelvis
 - Chemotherapy with cyclophosphamide
 - Prolonged indwelling catheter due to spinal cord injury →RF for Squamous Cell Ca.(SCC)
- S.hematobium →SCC

NB**transitional (urothelial) cell carcinoma is the most common--90%
**common in males & elderly

Clinical Presentation

- ❖ Irritative bladder symptoms(20-30%)→appear before the hematuria
 - Dysuria, Urgency & Frequency
 - ❖ Painless gross hematuria (80-90% of cases) →terminal reddish discoloration of urine
-
- ❖ In advanced cases
 - Pelvic/ bone pain
 - Lower extremity edema --Due to compression of iliac vessels
 - Flank pain--Due to ureteral obstruction

NB

Source of hematuria--based on the timing during micturition

- ✓ @ the beginning→urethra
- ✓ @ the end→bladder neck + prostate
- ✓ Throughout→high up in the kidneys & ureter

Investigations

- Urinalysis
- urine culture--before any endoscopic procedure
- Urine cytology
- Cystoscopy
- u/s
- LFT, ALP (liver metastasis & bone metastasis)

Mgt of Bladder ca.

• Non muscle invasive

- Immunotherapy & chemotherapy
 - Intravesical BCG
- TURBT
 - Electrocautery
- Radical cystectomy
 - High risk

• Muscle invasive

- Radical cystectomy
- Pelvic lymphadenectomy
- Urinary diversion
- Neoadjuvant chemotherapy

• Metastatic

- Chemotherapy
- Radiation therapy

IV) Urethral Stricture

Causes

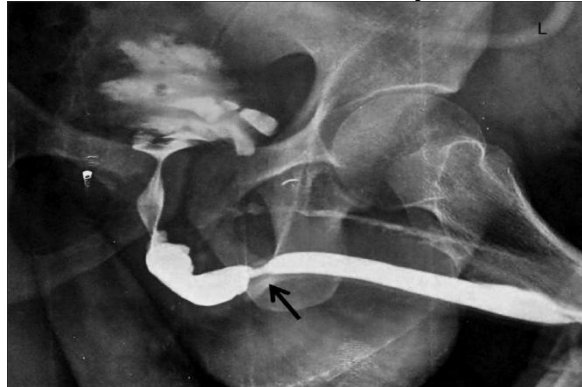
- ✓ Inflammatory/infectious/ stricture
 - ✓ Gonococcal infection
 - ✓ CP--Penile discharge, dysuria...
 - ✓ Bulbar urethra—cmn site
 - ✓ TB → prostate—cmn site
 - ✓ multiple strictures @ the site
- ✓ Traumatic stricture
 - ✓ Instrumentation (for therapeutic or diagnostic)
 - E.g. *prolonged catheterization...*
 - ✓ pelvic injury

Clinical presentation

- ✓ The voiding symptoms of urethral stricture are very similar to BPH
- ✓ Suspect the Dx in a young man with poor urinary stream

Ix

- Urethroscopy
 - The stricture will be viewed as circumferential scar
- Urethrography
 - Show the extent & severity of the stricture



Mgt

- Urethral dilation
- Endoscopic (internal) urethrotomy
- Urethroplasty

NB*

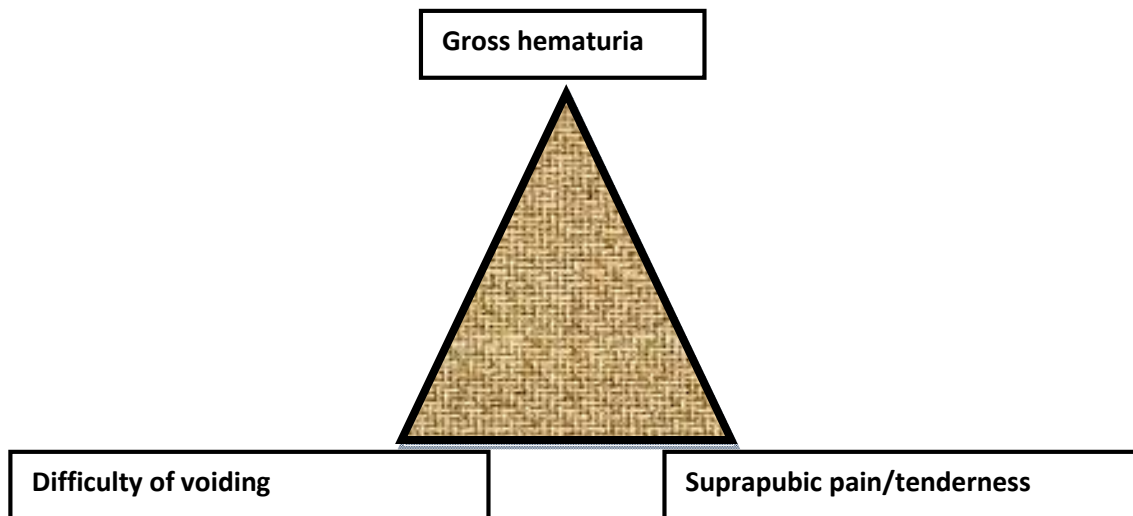
In case of AUR → suprapubic cystostomy

++ Bladder+prostatic+urethral stone

- Common in male children
- Is the difficulty of urination *position dependent* or not? → bladder stone
- Pain on the tip of the penis + hx of stone passage → urethral

++ Bladder trauma

✓ Triad of symptoms



Complications of BOO

- Urinary retention
 - Acute Urinary Retention (AUR)
 - Chronic urinary retention
 - The Vesiculoureteral junction incompetence may lead to--
Bilateral hydronephrosis...
- Renal insufficiency
- Recurrent UTI
- Gross hematuria
- Bladder calculi
- Dierticulum formation
- Renal Failure-rare

SAMPLE Hx

C/C

Difficulty of urination of 06 months duration

HPI

This patient was LRH 06 months back at which time he started to experience difficulty of urination which made him to strain to initiate & maintain his urination. Associated with this he started to experience urgency & frequency of urination with D:N ratio of 10 to 6 which made his bed time difficult. He also had post-micturition dribbling & a feeling of incomplete voiding.1 month back he was totally unable to pass urine after drinking about 2 Liters of local “tella” on a social gathering for which he visited our hospital where he was catheterized & the catheterization was successful.

- **No hx penile discharge, genital ulcer or MSP** (urethral stricture→NB*this pt was catheterized successfully—which is against stricture)
- **No hx chronic cough, contact with a chronic cougher or previous TB Rx.** (urethral stricture—TB)
- **No hx trauma to the pelvis.** (traumatic stricture)
- **No hx of anorexia, easily fatigability or significant wt loss.**(malig. constitutional smxs)
- **No hx of reddish discoloration of urine, cigarette smoking, radiation therapy to the pelvis or river water contact.** (bladder ca)
- **No hx medication intake like anti-histamines & anti-cholinergics.** (Retention)
- **No hx of position dependent sudden cessation of urine** (bladder stone—cmn in children)
- **No hx of fever, chills or rigor.** (complication—symptomatic UTI)
- **No hx of tinnitus, blurring of vision or light headedness.**(complication—renal insufficiency→anemia)
- **No hx of bone pain, hemoptysis or yellowish discoloration of the eyes.** (metastasis—this pt has no constitutional smxs of malig.-->so including this statement maynot be relevant)
- **No self /family hx of DM, HTN or Asthma**
- **Screened for RVI & found to be NR 06 months back.**

Finally he was admitted to our hospital.....

General list of investigations in BOO

- **CBC**→Anemia, leukocytosis
- **Urine analysis**
 - Early morning , clean catch , midstream urine
 - Information we may get→Blood, leukocytes, bacteria, protein or glucose
- **Urine culture**→to r/o infectious causes of irritative voiding
 - When? if the Urine analysis result is suggestive of infectious causes
- **Sr. electrolytes & RFT**→chronic renal insufficiency...
- **Ultrasound (abdominal ,renal ,trans-rectal)**

- **Prostate, what to look?**
 - Size
 - Surface--Smooth/nodular
 - Capsular invasion
 - calcification
- **Bladder, what to look?**
 - Size
 - stone
- **Ureter + kidney, what to look?**
 - Degree of hydronephrosis

- **IVP /intravenous pyelography**
- **cystoscopy**
- **Urine cytology**→Bladder ca.
- **PSA**
 - Screening for prostate ca.
 - 4ng/ml
- **Prostate biopsy**
 - In pts with elevated PSA
 - Abnormal DRE
- **CT/MRI--For staging**
- **Urodynamic flow studies**
 - Done in best setups

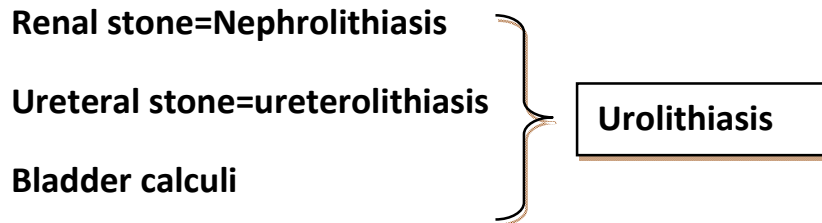
UROLITHIASIS

Risk Factors

- Infection...
 - E.g. Due to chronic catheterization
- Dietary + environmental factors...
 - Low fluid intake(dehydration)→low urine output
 - increased concentration of urinary solutes→@ risk of stone formation
 - So, ask about fluid intake habit & the type of the fluid...
 - Vitamin A deficiency
 - Cause desquamation of renal epithelium→which act as a nidus for stone deposition
 - Diet rich in red meat, fish, egg (rich in proteins (purines))
 - Lead to hyperuricemia
 - Living in hot climate area
- Medical conditions...
 - Hyperparathyroidism
 - Result in a great increase in the elimination of calcium in the urine -- these pts “pass their skeleton in their urine”
 - Gout
 - Increases uric acid level & causes multiple uric acid stones
 - Ask hx of joint pain, swelling, disability--Especially at the base of big toe
 - Crohn’s disease--hyperoxaluria & malabsorption of magnesium
 - Obesity
 - HTN
 - Medication hx -- e.g.
 - acyclovir,sulfadiazine
 - loop diuretics→increase calcium renal excretion
 - gluco-corticosteroids →increase bone resorption
 - Prolonged immobilization
- Surgical hx--Gastric bypass procedures, bariatric surgery, short bowel syndrome
 - Enhanced enteric oxalate absorption→increased risk of stone formation

- Anatomical...
 - Inadequate urinary drainage. E.g. Horse shoe kidney, un-ascended kidney
- Others...
 - Prior hx of nephrolithiasis→recurrence
 - Family hx of nephrolithiasis

NB



Clinical Presentation

- May be clinically silent (asymptomatic)
- Symptomatic stones are commonly associated with pain in the flank area
- Site of obstruction determine the location of the pain
 - ✓ Upper ureteral or renal pelvic obstructions lead to flank pain
 - which is dull aching to pricking type
 - ✓ Lower ureteral obstructions lead to colicky type of flank pain with radiation from the loin to the groin area
 - The radiation is due to irritation of genitofemoral nerve
 - Patients are usually quite agitated and have difficulty in getting a comfortable position unlike peritonitis pts. (writhe)
 - The severity of the pain isn't associated with the size of the stone
- In majority of symptomatic pts there is microscopic or gross hematuria
- Nausea and vomiting commonly accompany ureteral colic--as a result of pressure on the renal capsule
 - ✓ Because of the common innervation pathway of the renal pelvis, stomach & intestine --the celiac axis and vagal nerve afferents
- Due to recurrent UTI--the pt may present with
 - ✓ dysuria, frequency, urgency
 - ✓ Fever
 - ✓ pyuria
- Urinary urgency or frequency may also be present if the obstruction is in the distal ureter
- On P/E -- there may be guarding & rigidity on the back & abdominal muscles during severe attacks of the pain

Complications

- **Calculus hydronephrosis**
 - due to back pressure→renal enlargement→pain
- **Calculus pyonephrosis**
 - Calculus hydronephrosis→infected
- **Renal failure**
 - bilateral staghorn calculi can lead to renal failure over years because these stones typically are not symptomatic unless they result in urinary tract obstruction or infection
- **Squamous cell ca**→long standing stones increase the risk of developing scc

DDX

1. Pyelonephritis

CP

- fever, chills, N & V
- CVAT

2. Renal Cell Carcinoma (RCC)

RFs

- Cigarette smoking , Obesity , HTN, Long term dialysis

CP

- Flank pain, Hematuria
- Palpable abdominal/flank mass
 - Firm, homogenous, non-tender & moves with respiration

Mgt principles

- surgery , radiation therapy , chemotherapy , hormonal therapy , immunotherapy...combinations

3. Peri-renal abscess

4. Bladder ca

5. Renal trauma

6. Polycystic kidney disease

- Hematuria
- Hypertension
- Bilateral renal mass
 - Nodular, firm to hard sometimes cystic

7. Renal TB--Frequency→earliest, sterile pyuria, Hematuria...

8. In females consider gynecologic cases

SAMPLE Hx**C/C****Left flank pain of 1day duration****HPI**

This pt was LRH 1 day back @ which time she started to experience sudden onset severe intermittent colicky left flank pain with radiation to the left groin area & the left medial thigh which was aggravated by going up stairs but no relieving factor noticed by the pt. The pain started while she was trying to urinate after drinking about 1.5 liters of tella on social gathering. Associated with this she experienced nausea & 4 episodes of non-bilious, non-blood tingled vomiting of ingested matter. She also has dysuria, urgency & frequency of 5:3 but no fever, chills or rigor. In addition she noticed decreased amount of her urine when compared to the previous times. This pt had hx of deep dull aching right flank pain 01 year back for which she visited a private clinic in Gondar town where abdominal u/s was done and told to have small renal stones. She was given antipain & advised to drinking plenty of water. She was also told to have check-up u/s every 3 month but she didn't have follow-up since then.

- ✓ **Her LMP was 03 wks back, no vaginal bleeding**
- ✓ **No hx of foul smelling vaginal discharge**
- ✓ **She usually drinks up to 02 glass of water/day. (dietary RF)**
- ✓ **Her regular dietary habit is "shiro" made of "atter" & "enjera" made of "teff." (dietary RF)**
- ✓ **No hx of catheterization.(UTI--RF)**
- ✓ **No hx of prolonged immobilization. (RF)**
- ✓ **No hx of abdominal surgery. (RF--bariatric surgery...)**
- ✓ **No hx of medication intake except the antipain.(medication hx-RF)**
- ✓ **No self/family hx of DM, HTN or gout.(medical conditions-RF)**
- ✓ **No hx of tinnitus, blurring of vision or light headedness.**
- ✓ **No hx of chronic cough, contact with chronic cougher or previous TB Rx. (renal TB)**
- ✓ **No hx of anorexia, easily fatigability or significant wt loss**
- ✓ **No hx of bone pain or hemoptysis**
- ✓ **He has been screened for RVI 1yr back & found to be NR**

Finally she was admitted.....

Investigations

Lab. studies

1. U/A-- Information we get...

- Crystals--ca oxalate , uric acid , cystine
- PH
 - ✓ PH > 7-- urea-splitting micro-organisms
 - proteus , pseudomonas , klebsiella , struvite stone
 - ✓ PH < 5 -- uric acid stones
- Bacteria, Leukocytes
- Hematuria

2. CBC--Anemia, leucocytosis

3. RFT

4. Serum electrolytes

Radiological studies

1. Abdominal u/s

- Advantage
 - no radiation
 - Sensitive for Dx of urinary tract obstruction
 - Can detect radiolucent stones missed on KUB
- Drawback--May miss small stones & ureteral stones

2. Non-contrast enhanced helical CT scan--Gold standard

3. Plain abdominal x-ray (KUB)---KUB=Kidney+ureter+bladder

- Will sufficiently identify large radio-opaque stones
- Drawback
 - will miss radiolucent uric acid stones or stones over bony structures
 - will not detect obstruction

4. IVU (intra-venous urography)

- It tells the presence & anatomical position of a calculus
- Also gives information on the function of the kidneys
- Hydronephrosis, Hydrouretronephrosis can also be seen
 - >6mm of ureter – hydroureter
- Drawback
 - Potential contrast rxn
 - Higher radiation exposure

5. Retrograde pyelography

Mgt

1. Medical Rx -- Conservative

- a. Pain mgt—NSAIDS
- b. Hydration--Small stones <5mm can pass with intake of plenty amount of fluid
 - How plenty u advice them to drink? It is not how much they drink but how much output they should have. 2-2.5L urine output per day.
- c. alpha-adrenergic blockers--ureteral smooth muscle relaxing effect
- d. alkalization of urine→to dissolve the calculi
 - Using NaHCO₃ or K⁺ citrate (urinary PH should be between 6.5-7)
 - Which stones dissolve?
 - ✓ uric acid stones, cystine stones
- e. Chemoprophylaxis→to prevent recurrence
 - ❖ Addition of stone formation inhibitors (Magnesium & citrate) or intestinal Calcium binders
 - ❖ Avoid excess salt / protein intake
 - ❖ Allopurinol

2. Surgical Rx

- a. Non-invasive procedures
 - ❖ PNL (percutaneous nephrolithotomy)
 - ❖ ESWL (extracorporeal shock wave lithotripsy)
- b. Open surgery
 - ❖ Pyelolithotomy--Indicated for stones in the renal pelvis
 - ❖ Nephrolithotomy

Emergency management of renal colic

- a. Secure IV line & give
 - ❖ analgesics
 - ✓ Parental narcotics
 - ❖ Fluid
 - ✓ IV hydration
 - ❖ antiemetic
- b. obstruction / infection
 - ❖ needs emergent decompression

Ureteric calculus → Indications for surgical removal

- Repeated attacks of pain and the stone is not moving
- Stone is enlarging or too large to pass
- Urine is infected
- Stone is obstructing solitary kidney or there is bilateral obstruction

Surgical Rx of ureteric calculus

Endoscopic stone removal

- ✓ Dormia basket
- ✓ Ureteric meatotomy

Ureteroscopic stone removal

- ✓ Push bang
- ✓ Lithotripsy in-situ

Open surgery

- ✓ ureterolithotomy

NB

If UTI is present, appropriate antibiotic should be given & continued during & after surgery

CHOLELITHIASIS

Risk factors

- Gender-- Female sex -- 03 times increased risk
- Increasing age
- Obesity
- Factors that predispose to gallbladder stasis. E.g...
 - Pregnancy
 - Mechanism=increased progesterone exposure during pregnancy will reduce gallbladder contractility→bile stasis
 - prolonged NPO with parenteral nutrition
 - Previous abdominal surgery. e.g. vagotomy→ Mechanism=denervation of gallbladder→affects its motility
- Surgery. E.g. ...
 - Truncal vagotomy in case of GOO(Rx)
 - Post surgical biliary tract stricture
 - Terminal ileum resection
 - Mechanism--It affects enterohepatic circulation
- Drugs
 - Estrogen formulations--E.g. OCP, medications for Prostatic ca.
 - Mechanism--by increasing biliary cholesterol secretion
 - Colfibrate (hypolipidemic drug)
 - Mechanism=by increasing hepatic elimination of cholesterol via biliary system
 - Somatostatine analogues
 - Mechanism=CCK inhibition...decrease gallbladder emptying
- ☞ Hereditary 25%
- ☞ Disorders of hemolysis
 - Sickle cell anemia, Hereditary spherocytosis, Beta-thalassemia...

Clinical Presentation

1. Lithogenic stage
2. Asymptomatic stage
- 3. Symptomatic stage**
- 4. Complicated stage**

1) History

***About 2/3 of pts with gallstone present with chronic cholecystitis characterized by recurrent attacks of pain.**

➤ **Pain -- character**

- **Site--localized to the RUQ/epigastrium**
- **Quality--colicky**
- **Pattern--episodic in chronic one & Persistent in acute cholecystitis**
- **Radiation--May radiate to the right upper back or between the scapulae**
- **Aggravating & relieving factors**
 - **Usually begins postprandial after fatty meal**

➤ **Associated symptoms**

- ✓ **Nausea & vomiting**
- ✓ **fever**

***Acute cholecystitis is secondary to gallstones in 90-95% of the cases (calculus cholecystitis)**

- **about 80% of pts have compatible hx with chronic cholecystitis**
- ✓ **but the pain is unremitting type & may persist for several days**
 - ✓ **the pt is often febrile ,complains of anorexia, nausea & vomiting**
 - ✓ **they are reluctant to move**

Pain characterization

➔ **OPQR²S²**

- **Onset(1)**
- **Pattern(3)**
- **Quality(4)**
- **Radiation(6)**
- **Relieving & Aggravate factors(7)**
- **Severity(2)**
- **Site(5)**

E.g.... sudden onset severe intermittent colicky RUQ pain with radiation to the right upper back which was aggravated by taking fatty meals & relieved by....

2) Physical examination

- G/A
- vital signs
- HEENT
- Abdominal examination...
 - In chronic cholecystitis P/E may reveal mild RUQ tenderness during episodes of pain
 - In acute cholecystitis
 - Focal tenderness & guarding are usually present in RUQ
 - Guarding=contraction of abdominal muscles on palpation
 - Murphy's sign positive--Inspiratory arrest during deep palpation in the right subcostal area

Complications of gallstone

1. Cholecystitis

- Well localized steady pain with rebound tenderness & guarding
- Murphy sign +ve
- No peritoneal signs present unless perforated
- Differentiate calculus vs a calculus cholecystitis
 - Calculus--Hx of biliary pain
 - Acalculous
 - Persistent steady pain for > 6-8hrs
 - No previous hx of biliary pain
 - In severely ill pts...e.g.elderly with DM

Have high index of suspicion for complications when there is

- *Fever
- *Tachycardia
- *Hypotension
- *Jaundice

2. Choledocholithiasis + or - Ascending cholangitis

- Charcot triad→ Reynolds'pentad

3. Acute pancreatitis

- Pain--severe steady sharp epigastric/mid-abdominal
- Radiation to the back
- Relieving factor--leaning forward
- Associated smx--anorexia, N & V ,diarrhea may be present

4. Gallbladder empyema

5. Gallstone ileus

6. Mirizzi syndrome

- Distended gallbladder causing common bile duct obstruction
- Cause elevated LFT

DDX

- PUD (without perforation/Perforated)
- Acute pancreatitis
- Acute hepatitis
- Acute pyelonephritis
- Liver abscess
- Renal calculi
- Diverticulitis
- Pneumonia
- Appendicitis--Before it shifts to RLQ
- Myocardial ischemia—elderly patients & pts with co morbid illness like DM, HTN, dyslipidemia may not present with typical MI symptoms. So it is better first to rule out life threatening conditions. Do ECG, troponin...
- HZA involving IC nerves
- Gallbladder ca--Pain is late manifestation in malignancy

SAMPLE Hx**C/C****Right upper abdominal pain of 03 days duration****HPI**

This patient was LRH 03 days back at which time she started to experience abrupt onset severe intermittent colicky RU abdominal pain with radiation to the right upper back which was aggravated by taking fatty meal but no relieving factor noticed by the pt. Associated with this she started to experience nausea & bilious,non-projectile,non-blood tingled,non-foul smelling vomiting about 4-5X/day immediately after taking a meal. In addition she started to experience low grade intermittent fever but no chills or rigor.For the above compliant she visited a LHC @ Dabat town 01 day prior to admission where she was given #01 bag of IV fluid & they referred her to our hospital for better investigation & management.

- ✓ She was on oral contraceptive pill for the last 3 years but no hx of other medication intake**
- ✓ She is a grand mutipara mother**
- ✓ She has no history of abdominal surgery**
- ✓ She has no hx of similar illness in the family**
- ✓ She has history of burning epigastric pain for the past 02 years but no hx NSAID use or chronic alcohol consumption.(PUD)**
- ✓ She has no history of yellowish discoloration of eye, itching sensation or color change in the urine & stool (choledocholithiasis)**
- ✓ No hx of MSP, contact with jaundiced person or blood transfusion (hepatitis)**
- ✓ She has loss of appetite but no significant wt loss or easily fatigability**
- ✓ She has no history of chronic cough but has history of contact with known TB patient who was on Anti-TB medication after diagnosed by sputum & CXR examination.**
- ✓ She has no self or family history of DM, HTN or asthma.**
- ✓ She was screened for RVI 9 month back and found to be NR.**

Finally she was admitted to our hospital by.....

Investigations

Imaging modalities

- *Abdominal Ultrasound*--Standard Diagnostic test

What to look on U/S for Acute cholecystitis?

1. Acoustic shadow (stone)
2. Gall bladder wall thickening--Acute cholecystitis→ if >3mms
3. Pericholecystic fluid
4. Sonographic murphy's sign

- HIDA Scan→positive if there is lack of filling of the gallbladder in 4 hours
- Computed tomography (CT) scan→less sensitive than U/S

Lab. studies

- CBC with differential--Degree of leukocytosis
- LFT
 - Sr bilirubin (direct & total), Albumin, PT & PTT
 - In case of Mirrizi syndrome→LFT elevated
- RBS --DM
- Amylase /Lipase
- Urinalysis

Management

Acute cholecystitis

Conservative Rx

- NPO
- IV fluid
- Analgesics
- Antibiotics
 - Criteria--Broad spectrum, Single, Effective, Fast acting
 - First choice empiric antibiotic therapy (gram -ve & anaerobes)
 - Monotherapy with a beta-lactam/beta-lactamase inhibitor
 - *Combination of 3rd generation cephalosporins + metronidazole*
 - Alternative empiric regimen
 - Fluoroquinolones (ciprofloxacin, levofloxacin) + metronidazole
 - ✓ NB – Fluoroquinolones have potential for fetal toxicity
 - Monotherapy with a carbapenem

Definitive Rx--surgery

- Cholecystectomy
 - Timing – within 2-3 days of the illness (preferred)
 - Methods
 - ✓ Laparoscopic cholecystectomy
 - ✓ Open cholecystectomy

Chronic cholecystitis

- While waiting for surgery avoid dietary fats & large meals. Control comorbidities.
- Cholecystectomy

Indications for surgery

- Symptomatic/complicated cholecystitis
- Rare indications in asymptomatic cholecystitis → for prophylaxis
 - Elderly with DM
 - In individuals to be isolated from medical care for long period of time
 - In population with increased risk of gallbladder ca
 - Porcelain gallbladder

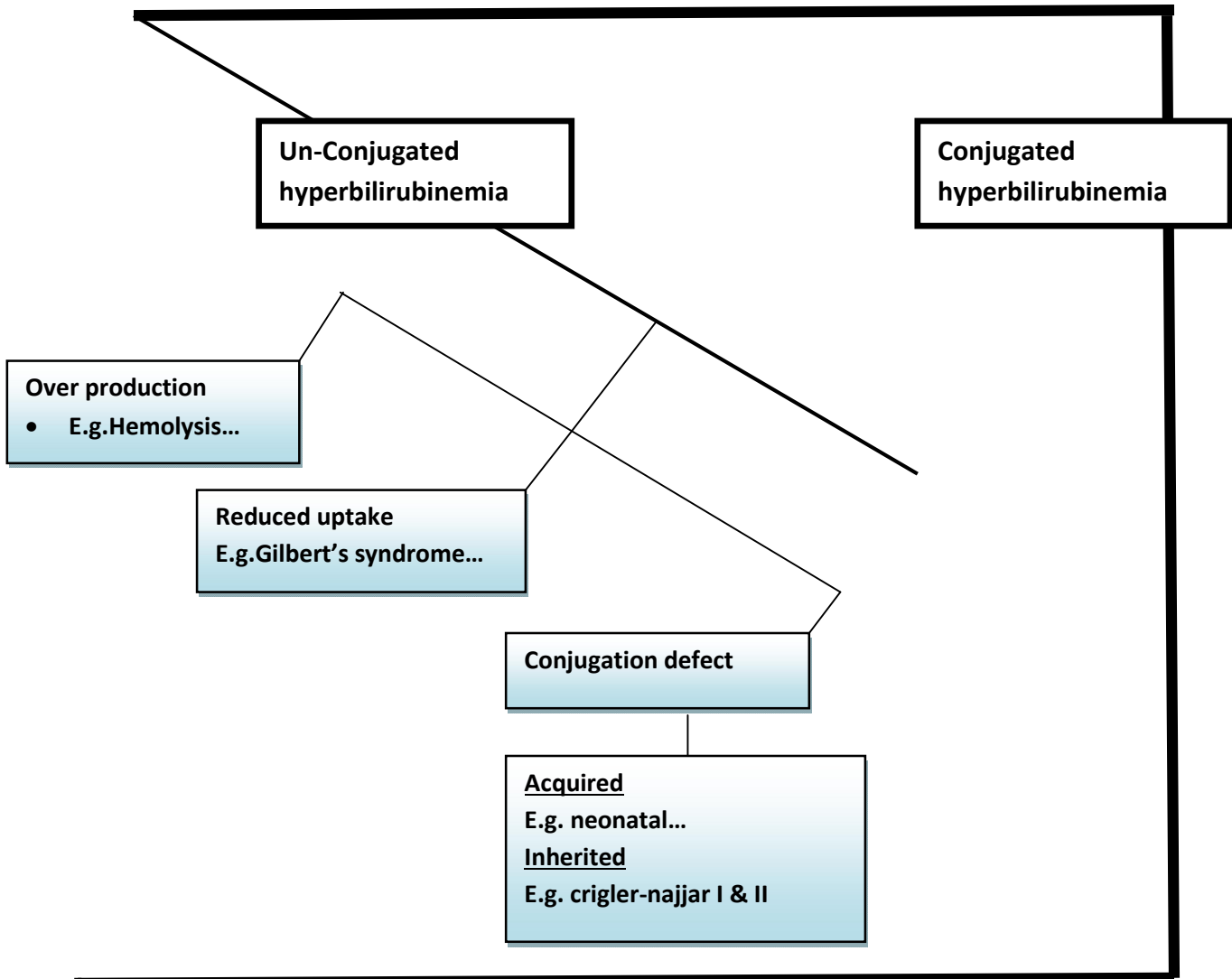
TOKYO GUIDELINE (TG18)

Severity assessment—acute cholecystitis

Grade I (Mild)	<p>Acute cholecystitis in healthy pt with no organ dysfunction. Mild inflammatory change in the gall bladder making cholecystectomy a safe & low-risk operative procedure</p> <ul style="list-style-type: none"> ➤ Immediately initiate antibiotics & general supportive care (IV fluid, electrolyte compensation, NPO, IV analgesics) ➤ Early Laparoscopic cholecystectomy (LC) within 7days (within 72hrs is better) of onset of symptoms ➤ Conservative Rx but worsening in conditions or no improvement observed within 24 hrs→reconsider early LC if <7days since symptoms onset or biliary drainage (cholecystostomy)
Grade II (Moderate)	<p>Associated with any one of the following conditions</p> <ol style="list-style-type: none"> 1. Elevated WBC (>18,000/mm³) 2. Palpable tender mass in RUQ of abdomen 3. >72 hrs of compliant duration 4. Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis) <ul style="list-style-type: none"> ➤ General support + antibiotics ➤ Perform urgent/early LC if the pt is in good performance status & advanced LC technique is available ➤ If not—urgent /early biliary drainage or delayed /elective LC ➤ Culture from blood, bile or both
Grade III (Severe)	<p>Associated with dysfunction of any one of the following organs/systems</p> <ol style="list-style-type: none"> 1. Cardiovascular dysfunction 2. Neurological dysfunction 3. Respiratory dysfunction 4. Renal dysfunction 5. Hepatic dysfunction 6. Hematological dysfunction <ul style="list-style-type: none"> ➤ General support + antibiotics ➤ Urgent /early biliary drainage in pts with high surgical risk ➤ Early LC at advanced center if neither negative predictive factor (i.e. jaundice (Bil-T≥2), neurological dysfunction, respiratory dysfunction) nor favorable organ system failure & if the pt has good performance status ➤ Culture from blood, bile or both

OBSTRUCTIVE (SURGICAL) JAUNDICE

Jaundice-recap



Extra-hepatic cholestasis

Intra-hepatic cholestasis

**Surgical
Jaundice**

- hepatitis
 - viral
 - alcohol
 - drugs
- NASH
- Primary biliary cirrhosis
- TPN...

APPROACH

Intra-ductal causes

- Stone disease
 - cholidocholilithiasis
- Neoplasms
 - Cholangiocarcinoma
 - Gall bladder ca.
- Biliary stricture
 - Surgical trauma
 - Erosion by gallstone
- Parasitic infection
 - A.lumbricoides
- Primary sclerosing cholangitis/PSC/
 - Underlying UC
- AIDS cholangitis
- Choledocal cyst
- Biliary TB--rare

Extra-ductal causes

- Pancreatitis
- 2^o to neoplasms
 - Periampullary ca.
- Portal adenopathy
 - Metastasis
 - GIT
 - breast
 - TB
- Cystic duct stones
 - Mirizzi syndrome

NB

Periampullary ca. includes

1. Pancreatic head ca.
2. Cholangiocarcinoma
3. Duodenal ca.

1) History

- Pale stool
- Dark urine
- Pruritus--May be related to the circulating bile acid or our body response...
- Jaundice

NB

Urine darkening, stool changes & pruritus are often noticed by the pt before clinical jaundice. Usually clinical jaundice is noticed by the pt & the family when it reaches 6-8mg/dl. Physicians can usually detect it @ 2.5-3mg/dl.

- Also consider
 - Pt's age & associated conditions
 - Presence/absence of pain--Location & character
 - Stone in CBD→severe colicky pain
 - Periapillary ca. →mild discomfort
 - Acuteness of symptoms
 - Stone in CBD→long duration
 - Periapillary ca→short duration (1-3months)
 - Presence of systemic symptoms
 - Fever
 - Wt loss--Significant in periapillary ca.
 - Symptoms of gastric stasis→/GOO/
 - Early satiety, belching, vomiting
 - Anemia symptoms--Usually present in periapillary ca.
 - Previous malignancy
 - GI bleeding
 - Hepatitis
 - Known gallstone disease
 - Previous biliary surgery
 - Diabetes or diarrhea of recent onset
 - alcohol, drugs & medications

2) Physical Examination

- G/A
- V/S
- Signs of jaundice—sclera, skin
- LAP
- Gall bladder may be palpable
 - Courvoisier sign-- Suspect underlying pancreatic malignancy
- Signs of cirrhosis
 - Ascites, GI bleeding
- Xanthomas—PBC (primary biliary cirrhosis)
- Excoriations
 - Prolonged cholestasis /high grade biliary obstruction

NB

Malignancy is more commonly associated with the absence of pain & tenderness

1) Choledocholithiasis

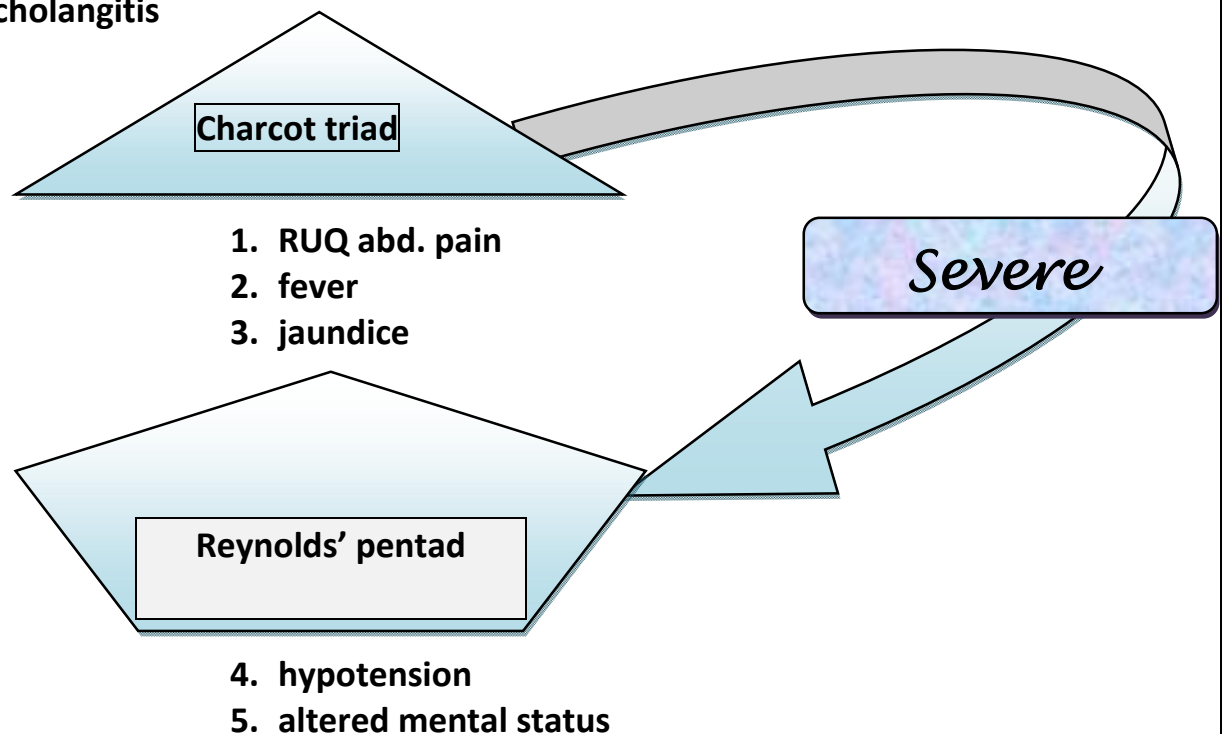
- ✓ Gall stone in CBD (common bile duct)
- ✓ Common 2^o to passage of stone from gall bladder to CBD
- ✓ 1^o → less common

Clinical Presentation

- ✓ Asymptomatic--85%
 - Symptomatic → Pain is similar to biliary colic--Usually intermittent
 - Usually with nausea and vomiting

Complications

❖ Acute cholangitis



❖ Acute pancreatitis

- pain → severe steady sharp epigastric/mid-abdominal pain
- Radiation to the back
- Relieving factor → leaning forward
- N & V
- Anorexia, diarrhea may be present

2) Periampullary carcinoma

1) Pancreatic ca.

- ❖ 95% --exocrine portion
- ❖ 75%--@ the pancreatic head & neck

Etiology + Risk Factors

- ✓ Sporadic→40%
- ✓ Smoking→30%
- ✓ Dietary factors→5-10% --Especially red meat –processed kind
- ✓ Hereditary→5-10%
- ✓ DM→2X increased risk
- ✓ Underlying chronic pancreatitis→<5%
- ✓ Alcohol→not independent RFs
- ✓ Industrial carcinogen exposure

Clinical Presentation

History

- ✓ Painless obstructive jaundice+ Pruritus
- ✓ Significant wt loss
 - Carcinoma associated, or
 - Malabsorption from exocrine pancreas insufficiency
- ✓ If abdominal pain present--Mid epigastric pain
 - Radiation to mid/lower back may be present
 - Unrelenting in nature—night time
- ✓ Onset of DM within the previous years
- ✓ Migratory thrombophlebitis (Trousseau sign) + venous thrombosis

Physical Examination

- ✓ Palpable, non tender gall bladder
- ✓ Skin excoriations
- ✓ Advanced
 - Ascites
 - Palpable abd.mass
 - Hepatomegally--metastasis
 - Splenomegally--portal venous obstruction
 - sister mary joseph nodule
 - virchow's node
 - blumer's shelf also possible→palpable rectal mass in rectal pouch

II) Cholangiocarcinoma

Clinical Presentation

History

- jaundice
- clay-colored stools
- dark urine → bilirubinemia
- pruritus
- wt loss...(variable)
- abdominal pain...dull ache in RUQ of the abdomen

Physical Examination

- ✓ palpable gall bladder may be present
 - Courvoisier sign

SAMPLE Hx 1

C/C

Failure to communicate of 1hr duration

HPI

This is a known DM pt for the past 10yrs on insulin injection 20/10. He claimed to be adherent to his medication. But has overall poor control.

This patient was LRH 04 wks back at which time he started to experience dark colored urine & pale stool. Associated with itching sensation which began from his hands & later progressed to include all of his body parts. The itching worsens during night time. 2 wks prior to admission his families began to notice persistent yellowish discoloration of his eyes. In addition he started to experience steady epigastric pain without radiation or known aggravating or relieving factor. He also started to experience low grade intermittent fever but no chills or rigor. 03 days prior to admission he started to experience nausea & non blood tingled, non bilious vomiting of ingested matter about 6X/day. For the above complaints he visited a traditional healer where he was cauterized on his back. One hour prior to admission he experienced failure to communicate.

- ✓ Has anorexia, easily fatigability & unquantified wt loss for the past 1 month to the extent his trousers become loose**
- ✓ Has hx of tinnitus, blurring of vision & light headedness**
- ✓ No hx of cigarette smoking or chronic alcohol consumption**
- ✓ His regular dietary habit is “shiro” made of “atter” & “injera” made of “teff”**
- ✓ No hx of similar illness in the family**
- ✓ No hx of previous abdominal surgery**
- ✓ No hx of MSP, contact with jaundiced pt or blood transfusion**
- ✓ No hx of medication except the insulin injection explained above**
- ✓ No hx of chronic cough, contact with chronic cougher or previous TB Rx**
- ✓ No self/family hx of HTN or asthma. No family hx of DM**
- ✓ He has been screened for RVI 1yrs back & found to be NR**

Finally, he was admitted.....

SAMPLE Hx 2

C/C

Yellowish discoloration of the eyes of 01 month duration

HPI

This pt was LRH 01yr back at which time he began to experience severe intermittent colicky right upper abdominal pain with radiation to the right shoulder. The pain was aggravated while taking fatty meal but no relieving factor noticed by the pt. 03 months prior to admission he started to experience low grade intermittent fever but no chills & rigor. 01 month prior to admission his families started to notice intermittent deep yellowish discoloration of the eye. In addition he started to experience mild itching sensation all over the body but no change in urine or stool color. For the above complaints he visited a traditional healer repeatedly, where he was given herbal medication & got cauterized. But he didn't get any relief from his symptoms for which he came to our hospital.

- ✓ He has hx of nausea but no vomiting**
 - ✓ No hx of altered mentation**
 - ✓ No hx of easily fatigability or significant wt loss**
 - ✓ No hx of smoking or alcohol abuse**
 - ✓ No hx of MSP, contact with jaundice person or blood transfusion**
 - ✓ No hx of abdominal surgery**
 - ✓ No family hx of similar illness**
 - ✓ No hx of chronic cough or previous TB Rx but he has hx of contact with known TB patient who was on medication.**
 - ✓ No self/family history of DM, HTN or asthma.**
 - ✓ He was screened for RVI 9 month back and found to be NR**
- Finally he was admitted to our hospital.....**

Investigations

Lab.studies

- ❖ LFT
 - Serum bilirubin (Total & Direct), ALP, SGOT, SGPT, GGT
 - PT
 - Vit. K administration--Hepatic failure/cholestasis?
- ❖ Viral markers
- ❖ CBC—acute cholangitis
- ❖ Urine bilirubin

Imaging

- ❖ Abdominal U/S
 - Important for documenting stones in the gallbladder (if still present) & determines size of CBD. Dilated CBD--when >8mm in diameter
- ❖ Contrast CT-scan (abdominal)
- ❖ MRI

Cholangiography

- ❖ ERCP (Endoscopic retrograde cholangiopancreatography)
 - Endoscopic cholangiography→gold standard for Diagnosing CBD stones + advantageous for therapeutic options @ the time of Dx.
- ❖ PTC (Percutaneous transhepatic cholangiography)
 - Examination of liver and bile ducts by x-ray. This is accomplished by the insertion of a thin needle into the liver carrying a contrast medium to help to see blockage in liver and bile ducts.

***In both cases fluorescent fluids are used to create contrasts -- to make the diagnosis possible**

Mgt

1) Choledocholithiasis--Complications

➤ If acute cholangitis

TOKYO GUIDELINE (TG18)

Severity assessment--acute cholangitis

Grade I (Mild)	➤ Doesn't meet the criteria for G III & GII
	➤ After Dx immediately start antibiotics & general supportive care (IV fluid resuscitation, Correct electrolyte derangement, IV analgesics) ➤ Perform biliary drainage when no symptom improvement is observed within 24hr
Grade II (Moderate)	Associated with any two of the following conditions 1. Abnormal WBC ($>12,000/\text{mm}^3$ or $<4,000$) 2. High fever ($>39^{\circ}\text{C}$) 3. Age ≥ 75 yrs 4. Hyperbilirubinemia (Bil-T $\geq 5\text{mg/dl}$) 5. Hypoalbuminemia ($>$ upper limit of normal value $\times 0.7$)
	➤ Antibiotics + general supportive care ➤ Perform biliary drainage immediately ➤ Culture from blood/ bile or both
Grade III (Severe)	Associated with dysfunction of any one of the following organs/systems 1. Cardiovascular dysfunction 2. Neurological dysfunction 3. Respiratory dysfunction 4. Renal dysfunction 5. Hepatic dysfunction 6. Hematological dysfunction
	➤ Apply organ support & emergency biliary drainage ➤ Culture from blood/ bile or both

Consider surgical procedures (endoscopic, percutaneous or operative intervention) to remove the cause of acute cholangitis after biliary drainage & amelioration of organ failure (i.e. once the acute illness has been resolved)

➤ If acute pancreatitis--Biliary pancreatitis

- Stabilize the patient
- ERCP
- Cholecystectomy +/- CBD exploration

2) periampullary ca.

I) Pancreatic ca.

↻ Palliative

- Pain → Narcotics, Celiac plexus block
- Jaundice and pruritis
 - Stenting
 - Cholidochoduodenostomy
 - Cholidochojejunostomy
 - Cholecystojejunostomy
- Duodenal obstruction (20%) → Prophylactic bypass in unresectable disease → controversial
- Adjuvant therapy → Chemotherapy, Radiotherapy

↻ Curative

- Surgical resection--whipple's (with or without pylorus sparing)
- Adjuvant therapy
 - Chemotherapy
 - Radiotherapy

II) cholangiocarcinoma

➤ Surgery is the only curative treatment

- > half of the patients have unresectable tumor on intraoperative finding
 - biliary decompression + cholecystectomy (to prevent cholecystitis)
 - Unresectable perihilar tumor → Roux-en-Y cholangiojejunostomy
- Distal bile duct tumors often resectable → Pylorus preserving pancreaticoduodenostomy
- No proven benefit of adjuvant chemotherapy
- intraoperative radiation and external beam radiation for unresectable tumor

LIVER ABSCESS

Liver abscess may be due to→

Etiologic classification

1) Pyogenic liver abscess

Risk Factors

- ✓ Impaired bile drainage
 - Biliary tract disease→causing ascending cholangitis
- ✓ Systemic bacteremia→Hematogenous dissemination
 - Subacute Endocarditis, Infected indwelling catheter, Pyelonephritis...
- ✓ Local spread of infection
 - like gangrenous cholecystitis, perforated ulcers, subphrenic abscess...
 - diverticulitis, Crohn's disease→direct extension to liver
- ✓ Hepatic trauma
 - penetrating→Direct inoculation of microorganisms
 - Blunt→by causing localized hepatic necrosis + hemorrhage+bile leakage...
- ✓ As a complication of...
 - Cholangiography, percutaneous transhepatic stents, endoscopic stent placement, biliary-enteric anastomosis...

NB--E.coli in 2/3 of cases

Clinical presentation

i) History

Usually sub-acute and nonspecific, leading to delay in presentation, Dx & Rx.

- RUQ pain→Referred pain to the right shoulder may be present
- Fever, chills
- Anorexia, malaise
- Yellowish discoloration of eyes & skin may present in 1/3rd of pts
- Anemia of chronic illness
- Cough may be present due to diaphragmatic irritation

NB--When abscesses are seen in children & adolescents--underlying immune deficiency, severe malnutrition or trauma frequently exists.

ii) Physical Examination

- Tender hepatomegally
 - Intercostal tenderness→ differentiate it from acute cholecystitis
 - Palpable mass may not be present
- Decreased breath sounds in the Rt. basal lung zone may be present

- Pleural or hepatic friction rub may be present due to...
 - Diaphragmatic irritation
 - Inflammation of glisson capsule
- Jaundice may be present (1/3rd of pts) usually when associated with biliary tract disease

Complications

- Generalized sepsis
- Pleural effusions, Empyema, pneumonia...
- Intraoperative rupture which is frequently fatal.
 - Usually the abscess does not rupture, but develops a controlled leak resulting in a perihepatic abscess.
- Hemobilia (Hemorrhage in bile)
- Hepatic vein thrombosis

Investigations

Lab. studies

- CBC=Leukocytosis
- Raised ESR
- Elevated ALP level
 - Significant abnormality in the remaining LFTs are unusual
- Blood culture → only in 50% of pts show the causative organism

Imaging

- Abdominal u/s
 - What to look for abscess?
 1. Round/oval hypoechoic lesions
 2. Well defined border
 3. Variable no# of internal echoes
- CT-scan
 - Hypodense with peripheral enhancement
 - May contain air fluid level

Mgt

Antibiotics

- Aminoglycoside + clindamycin + ampicillin/vancomycin.
 - Fluoroquinolones can replace aminoglycosides, and metronidazole can be used instead of clindamycin
- Duration=#02 weeks

Aspiration and Percutaneous Catheter Drainage

- **Aspiration**→useful in guiding subsequent antibiotic therapy
- **Percutaneous catheter drainage** is only beneficial for a minority of pts
 - **Because most pyogenic abscesses are quite viscous**
- **Patients in whom percutaneous drainage is not appropriate include...**
 - ✓ **multiple large abscesses**
 - ✓ **known intra-abdominal source that requires surgery**
 - ✓ **an abscess of unknown etiology**
 - ✓ **Ascites**
 - ✓ **abscesses that require transpleural drainage**

Surgical Drainage

- **indications**
 - **pts that have failed non-operative therapy**
 - **those who need surgical Rx of the underlying source**
 - **those with multiple macroscopic abscesses**
 - **those on steroids**
 - **those patients with concomitant ascites**

2) Amebic liver abscess

Risk Factors

- ✓ Low socioeconomic status and unsanitary conditions are significant independent risk factors
 - Contaminated food & water
 - ✓ living or visiting an endemic area
 - ✓ Presence of immunosuppression
- NB--*E. histolytica* → causative organism

CP

- May be acute with fever and RUQ abdominal pain or
- sub-acute with
 - Weight loss, less frequent fever and abdominal pain.
- The usual case of amebic liver abscess doesn't present with concurrent colitis, but patients may have had dysentery within the last year.

Complications

- ✓ Peritonitis
 - due to rupture in the majority and secondary to necrotizing or perforated amebic colitis
- ✓ Thoracic amebiasis
 - empyema, broncho-hepatic fistulas, and pleuropulmonary abscess
 - If the abscess ruptures into the pleural cavity--it usually occurs suddenly, collapsing the lung & filling up the pleural space.
 - If the abscess ruptures into the bronchi, this complication causes sudden onset of coughing with expectoration of copious brown sputum.
- ✓ Pericardial amebiasis
 - acute pericarditis with tamponade
- ✓ Hematogenous spread to lung, brain, skin and genitourinary tract

Ix

Lab. studies

- ✓ CBC=leukocytosis
- ✓ Mildly elevated ALP
- ✓ Serologic tests (fluorescent antibody test) → can remain +ve after clinical cure
- ✓ Stool examination

Imaging

- ✓ Ultrasound, CT, and MRI are all excellent methods of detecting but are nonspecific

Diagnostic Aspiration

- ✓ Usually done when amebic serologies are negative and a pyogenic cause needs to be ruled out.
- ✓ The fluid of an amebic abscess is odorless, and Gram's stain and cultures are negative.
- ✓ Aspiration should not be done if an echinococcal cyst or a cancer is suspected.

Mgt

Antibiotics

- Metronidazole → DOC

Drainage

- ✓ Indications
 - patients that have no clinical response to drug therapy within 5–7 days
 - those with a high risk of abscess rupture (cavity >5 cm in diameter)
 - The presence of lesions in the left lobe → because @ risk of rupture into the pericardium
- Drainage may be by...
 - Percutaneous → Image-guided -- Procedure of choice for decreasing the size of an abscess.
 - Surgical → Indications
 - abscesses that have failed to respond to more conservative therapy
 - life-threatening hemorrhage
 - when the amebic abscess erodes into a neighboring viscus
 - Sepsis due to a secondarily infected amebic abscess if percutaneous treatment fails

DDX

- Biliary diseases -- Refer the topic on obstructive jaundice
- Hepatocellular ca. (HCC)
 - Risk factors
 - Hep. B & C infection
 - Alcoholic cirrhosis
 - Hemochromatosis...

○ CP

- Hx
 - ✓ Dull, vague, RUQ pain, sometimes → referred to the shoulder
 - ✓ Constitutional symptoms of malignancy
 - ✓ Yellow discoloration (50%)
 - ✓ GI bleeding (10%)
 - esophageal varices (50%)
 - have an extraordinarily poor prognosis, with a median survival measurable in weeks.
 - intraportal thrombus
 - which further increases the portal pressure and makes bleeding varices more difficult to control

NB--Slowly growing tumor but majority of patients present at an advanced stage and most are beyond curative treatments

- P/E
 - G/A → chronically sick looking, looks severely malnourished
 - HEENT → pale conjunctive, icteric sclera
 - LGS → LAP....check Virchow's node
 - Abdominal exam.
 - Hepatomegaly → nodular, irregular, hard
 - *Vascular bruit (25%)*
 - Signs of fluid collection

NB--Signs of decompensated liver disease →

- Typical symptoms include ascites, jaundice or encephalopathy.
- Ix
 - Imaging
 - Abdominal u/s
 - CT/MRI
 - Lab → AFP > 500 ng/dl
 - Metastatic work-up
- Mgt
 - Surgical resection but the majority of patients are not eligible because of the tumor extent or underlying liver dysfunction

- Other treatment modalities available...
 - Liver transplantation
 - Radiation therapy
 - chemotherapy

➤ Hydatid cyst

- Parasitic infestation→E.granulosus

RFs

- Hx of living or visiting an endemic area
- Ingestion of food or water contaminated by the definitive host

CP

- CP depend on
 - the site, size, stage of development,
 - Site→Liver(63%) & lung (25%)
 - whether the cyst is alive or dead
 - Whether the cyst is infected or not
- Initially→non-specific...RUQ/ epigastric pain, cough, low-grade fever & sensation of abd. Fullness
- Mass/pressure effect→long time
 - liver
 - Symptoms of obstructive jaundice & abd. pain
 - Biliary rupture→Biliary colic, jaundice & urticaria
 - Lung involvement→Chronic cough, dyspnea, pleuritic chest pain & hemoptysis
 - Cerebral involvement→Headache, dizziness & decreased level of consciousness

Ix

- Serology--Determination of specific antigens and immune complexes of the cyst with ELISA
- Imaging
 - Ultrasound and CT→Classic findings include calcified thick walls, often with daughter cysts.
 - Ultrasound defines the internal structure, number, and location of the cysts and the presence of complications
 - Computed tomography gives more specific information about the location and depth of the cyst within the liver

- ERCP
 - show communication between the cysts and bile ducts
 - Can be used to drain the biliary tree before surgery

Mgt

- Most are asymptomatic on presentation, but complications such as pulmonary infection, cholangitis, rupture, and anaphylaxis → give good reason to consider treatment for all
- Basic principles of treatment are...
 - eradication of the parasite within the cyst
 - protection of the host against spillage of scoleces
 - management of complications
- The Rx may be...
 - Medical--Antihelminthics
 - percutaneous aspiration & drainage
 - surgical

Other DDx

→Pneumonia

→Empyema (pleuropulmonary)

SAMPLE Hx

C/C

Abdominal pain of 04 months duration

HPI

This pt was LRH 04 months back @ which time he started to experience gradual onset constant dull aching type right upper abdominal pain with radiation to the right upper back & inter scapular region without aggravating or relieving factor. Associated with this he has low grade intermittent fever, loss of appetite & nausea but no vomiting, diarrhea or constipation. In addition he has easily fatigability & significant wt loss abt 8kg for the past 04months. 03 months prior to the re-admission he started to experience tinnitus & light headedness but no blurring of vision. 01 month prior to the re-admission his wife noticed yellowish discoloration of his eyes but no itching sensation, urine or stool color change. For the above complaints he visited a nearby health center in 'Chilga' where he was given #04 drugs; red & yellow circular, white oval & omeprazole, each to be taken 2X/day for 10days. He kept visiting the health center repeatedly but he didn't get relief from his pain. Finally, # 01 month prior to the re-admission he was referred from the LHC to our hospital for better investigation & mgt. After admission to our hospital, aspiration was taken from his right upper abdomen. Then he was discharged with metronidazole to be taken 3X/day, 3@ once for 10 days & he was given appointment for follow-up. But 20 days prior to the re-admission the pt discontinues the medication complaining of no improvement by medical Rx & he went to a traditional healer & cauterized on both arms & @ the back of his neck.

- ✓ He has no hx contact with jaundiced person, blood transfusion or MSP (hepatitis)
- ✓ He used to drink local 'areke' up to 50gm/day for > 20 yrs (HCC-RF)
- ✓ He has no hx of cough, hemoptysis or bone pain (HCC-metastasis)
- ✓ He has hx of palpitation but no dyspnea , orthopnea, PND or lower leg swelling
- ✓ He has no hx of abdominal trauma or surgery (inoculation or blunt)
- ✓ He has no hx of contact with chronic cougher or previous TB Rx
- ✓ No self or family hx of DM, HTN, asthma
- ✓ He has been Screened for RVI 3yrs back & found to be non reactive

Finally he was admitted to our hospital supported by his families.

FRACTURE

Causes

- Traumatic fracture
 - Motor vehicle accidents (MVA)
 - Gunshot injuries
 - Blast & bomb injuries
 - Assaults--stone, knife, sickle, axe, stick
 - Fall down injuries
 - Burn
- Stress fractures
- Pathologic fracture

Clinical Presentation

- Before taking Hx & doing P/E--you should first apply ATLS primary survey ("ABCDE") in all trauma patients→then act accordingly
- Hx, P/E ,Ix & Definitive mgt are part of ATLS secondary survey

i) History

- Mechanism of injury (MOI)
- Duration
- Degree of violence
 - ✓ MVA
 - Speed of the vehicle
 - Crush/not
 - Was there external damage to the vehicle, such as deformation to the front from Head-on collision?
 - It raises suspicion of hip dislocation...
 - Pedestrian/passenger
 - If passenger
 - Pre-crash
 - What was the pre-crash location of the pt? It can tell us the type of #. E.g. lateral compression # of the pelvis from a side impact in vehicle collision
 - Was the pt wearing seat belt/not?

○ Post-crash

- What was the post-crash location? Inside or ejected--If ejected→distance thrown & landing condition...
- Was the pt crushed by an object? If so, site+weight+duration...

✓ Gun shot

- Distance of shooting
- Type of gun
- Entry & exit wound of the bullet

✓ Fall down

- Height or depth of fall
- Landing condition—stony ground or not

✓ Blast & bomb injury

- What was the pts distance from the blast?
 - Primary blast injury Vs secondary (secondary→from the blast effect→accelerated debris or objects)

➤ Injury Site

➤ Extent of bleeding (estimated)

➤ Change in limb function--Is the pt able to use the injured limb/not?

➤ Concomitant injury

✓ Head injury

- Hx of Loss of consciousness
- Abnormal body mov't

✓ Spinal cord injury

- Urine or fecal incontinence or unable to void

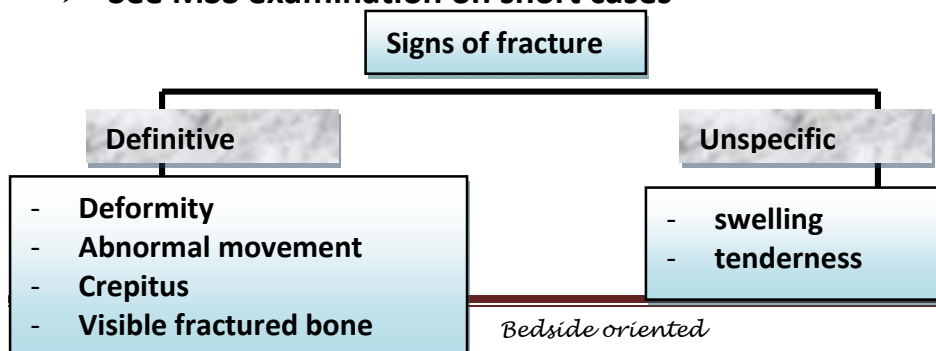
✓ Bladder injury

- Hematuria, suprapubic pain & difficulty of voiding

➤ As with all trauma patients, documenting any available history regarding pre-existing medical conditions, medication and drug allergies will be useful...

ii) Physical Examination

➤ See MSS examination on short cases



Complications of fracture

- **Delayed union (if > 4month)**
- **Non-union (if > 6month)**
 - **Tests of union**
 - **Clinical**
 - i. **Absence of mobility between fragments**
 - ii. **Absence of tenderness on firm palpation**
 - iii. **Absence of pain when angulation stress is applied**
 - **Radiological**
 - i. **Visible callus bridging the fracture & blending with both fragments→early→reliable**
 - ii. **Continuity of the bone trabeculae across the fracture**
 - **Causes of delayed union & non-union**
 - i. **Inappropriate immobilization**
 - ii. **Infection**
 - iii. **Bone loss**
 - iv. **Soft tissue interposition...**
- **Mal-union**
 - **Overlapped or**
 - **Angulated**
- **Shortening**
 - **Significant when >2cms**
 - **Causes**
 - i. **Malunion**
 - ii. **Actual bone loss or crushing**
 - iii. **Interference with growth plate (in children)**
- **Avascular necrosis**
 - **Death of bone due to deficient blood supply**
 - **Common sites**
 - i. **Head of the femur after femoral neck fracture/hip dislocation**
 - ii. **Proximal half of Scaphoid bone**
 - iii. **Body of talus**
- **Infection**
 - **Virtually confined to open fractures**
 - **See bone infection on short cases**
- **Neuro-vascular injuries**
 - **Nerves--e.g.**
 - i. **Humerus--Radial nerve→wrist drop**
 - ii. **Knee--Common peroneal nerve→foot drop**

- **Vascular--e.g.**
 - i. **Shoulder dislocation—axillary artery**
 - ii. **Supracondylar fracture of humerus/elbow dislocation--Brachial artery**
 - iii. **Knee dislocation/proximal tibial fracture--Popliteal artery**

➤ **Compartment syndrome—Signs (the 6 Ps)**

1. **Pain**
2. **Pallor**
3. **Pulselessness**
4. **Paresthesia**
5. **Paralysis**
6. **Perishingly (extremely) cold**

- **Cmn sites--Lower leg , Forearm, Foot, Hand, Gluteal region, Thigh...**
- **Pulmonary complications--E.g. Fat embolism**

NB*Normal repair of tubular bone has five stages

- a. **Stage of hematoma**
- b. **Stage of cellular perforation**
- c. **Stage of callus**
- d. **Stage of consolidation**
- e. **Remodeling**

NB*generally fracture is classified as Closed or Open based on its communication to its external environment.

SAMPLE Hx

C/C

Bullet injury of 02 hours duration

HPI

This patient was apparently healthy 02hours back @ which time he sustained a bullet injury to his left leg from about 2 meters distance by a known offender (his neighbour) on land dispute. The bullet entered around his left knee anteriorly & exited on lateral side of his left thigh. He had moderate bleeding from the site of injury but no of loss of consciousness or trauma to other sites.

- ✓ has tinnitus, vertigo & blurring of vision**
- ✓ No hx of chest pain or breathing difficulty (if u suspect chest injury)**
- ✓ No hx of urine or fecal incontinence (ask if u suspect spinal injury)**
- ✓ No hx of lower abdominal pain or reddish discoloration of urine(ask if u suspect bladder trauma)**
- ✓ No self/family hx of DM ,HTN or Asthma**
- ✓ Not screened for RVI but has no hx of chronic diarrhea, HZA or MSP.**

Finally he was admitted.....

Investigations

1. Imaging

➤ X-ray (Antero-posterior (AP) & Lateral)

Should Answer....

- ✓ Traumatic Vs Fatigue Vs pathologic fracture
- ✓ Displaced or not
- ✓ If displaced, in which direction
- ✓ Alignment of the fragments, satisfactory or not
- ✓ Recent fracture or not
 - If not→evidences of union may be there
- ✓ Associated injury
 - To adjacent joints or bones

NB* Patterns of fracture

1. Transverse
2. Oblique
3. Spiral
4. Comminuted(>2 fragments)
5. Compression (crush)
6. Green stick (peculiar to children)→incomplete fracture

...This patterns may indicate

- Nature of causative violence
 - Important for choosing easiest method of reduction
- The likely stability of fragments after reduction

- CT-scan
- Angiography
- Arthroscopy

2. Lab.

- Hct
- BG & Rh

Management

ATLS

1. Primary survey & resuscitation

- ✓ Assess "ABCDE" & act accordingly...
 - ✓ Air way
 - ✓ Breathing
 - ✓ Circulation
 - ✓ Neurological exam
 - ✓ Exposure

2. Secondary survey

- Take Hx
- Do P/E
- Work up the pt
- Definitive mgt
 - *Reduction*
 - *Immobilization*
 - *Rehabilitation*

Definitive mgt of fracture

A. Reduction

1. Closed manipulation
 - ✓ Using general anesthesia → sometimes local/regional -- may be possible
 - ✓ Grasp the fragments through the soft tissue then adjust them as nearly as possible to their correct position
2. Mechanical traction (With or without manipulation)
 - ❖ Used when the contraction of large muscles exert a strong displacing force
 - ❖ Traction
 - Weight or
 - Screw device
3. Operative reduction
 - ❖ Reduction under direct vision

B. Immobilization

- Why we immobilize them?
 - To prevent angulation/displacement
 - To prevent mov't that may interfere with union
 - To relieve pain
- Immobilization must include the joint above & below the #

...How???

1. POP (plaster of Paris)

- Indications
 - ✓ Undisplaced fractures
 - ✓ Tolerable displacement
 - ✓ Closed reduction of displacement possible
 - ✓ Fracture in children (Upper and lower extremities)
- Types
 - Circular
 - Slab
 - Padded
 - Un padded
- Application of POP
 - Long arm
 - Short arm
 - Long leg
 - Short leg
 - Hip spica
- Advantages;
 - Easy
 - No risk of infection
- Disadvantages;
 - ✓ Damage to vessels & nerves by compression
 - Compartment syndrome—Mgt
 - All constrictive dressings must be released
 - If no significant change after 30-60 min of monitoring→fasciotomy is required
 - ✓ Difficult for wound care
 - ✓ Needs strict control

2. Splinting--continual traction

✓ Traction

A. Skin traction--In children

B. Skeletal traction

➤ Pin insertion sites

- condyle of the femur (distal femur)

- proximal tibia

- Pin--insert from lateral to medial

- Where? 1 finger below then 1 finger lateral to tibial tuberosity

- Why? To prevent neurovascular damage-- If common peroneal nerve is damaged--foot drop

- Weight applied= $1/10^{\text{th}}$ to $1/6^{\text{th}}$ of pts weight

- Calcaneus

- Pin--insert from medial to lateral

- Weight applied → usually up to 3kg

- Commonly used for femoral neck fracture

➤ Disadvantages

- Long immobilization time (usually up to 06 wks)

- bed sore--on bony prominences

- Pin site infection--Grade

- Grade I--pain(tenderness)

- G II--all cardinal signs of inflammation present

- G III-- Serous discharge

- G IV-- Purulent discharge

- G V-- Bone involvement (osteomyelitis)

- When to act

- G V → remove

- G IV + loose pin → remove

- G IV → Antibiotics

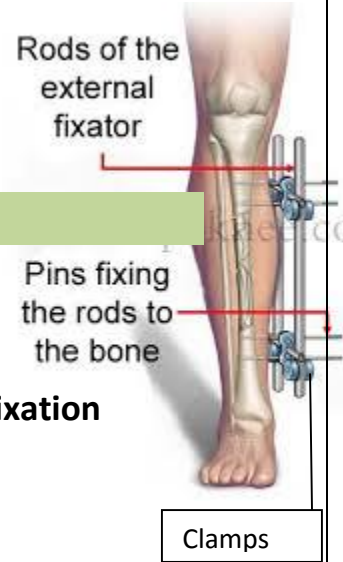
- Joint and muscle contracture

- Deep vein thrombosis, pulmonary embolism—
UFH/heparin prophylaxis

➤ Follow-up after traction

- Follow by measuring the true length--Shortening up to 2cms may be acceptable

- For a significant shortening → add weight & for lengthening the vice versa.



3. External & internal fixation /operative Rx

➤ Internal fixation

○ Methods

- Metal Plate held by screws/pins
- Intramedullary nailing with or without cross screw fixation
 - Site=femur, Tibia, Humerus
- Tension band wiring
 - Site=patella , olecranon , Ankle
 - wire tied over 2 kirschner wires or pins

➤ External fixation

- ✓ For grade III open fractures (see the Gustilo and Anderson grading below)
- ✓ External fixator should be applied 1.5-2cms away from the wound site
- ✓ Advantage
 - wound accessible for treatment<<>>wound care
 - skin graft or flap rotations possible after wound healing
- ✓ Disadvantage
 - pin tract infection

Operative treatment

✓ Advantages

- Anatomical reduction
- Early mobilization & return of function

✓ Disadvantages

- Expensive
- Risk of infection

Gustilo and Anderson Open Fractures classification

➤ Criteria for the classification

- Wound size
- Level of contamination
- Soft tissue injury (STI)
- Bone injury

Type	Wound size	Level of contamination	Soft tissue injury	Bone injury
I	<1cm long	Clean	Minimal	Simple, minimal comminution
II	>1cm long	Moderate	Moderate, some muscle damage	Moderate comminution
III				
A	Usually >10cm long	High	Severe with crushing	Usually comminuted; soft tissue coverage of bone possible
B	Usually >10cm long	High	Very severe loss of coverage; usually requires soft tissue reconstructive surgery	Bone coverage poor; variable, may be moderate to severe comminution
C	Usually >10cm long	High	Very severe loss of coverage plus vascular injury requiring repair; may require soft tissue reconstructive surgery	Bone coverage poor; variable, may be moderate to severe comminution

C. Rehabilitation

- Purpose--to preserve & restore function to normal as far as possible
- Should begin as soon as fracture comes under definitive treatment
- By Physiotherapist

HEAD INJURY

- Normal intracranial contents are
 - ✓ Brain tissue
 - ✓ CSF
 - ✓ Arterial and venous blood
- Monro-kellie doctrine
 - States that the total volume of the intracranial contents must remain constant.
 - ✓ Why? Because the cranium is a rigid & non-expandable container
 - ✓ Total volume=Brain tissue +CSF fluid + intravascular blood
 - Venous blood & CSF fluid may be displaced out of the container to provide pressure buffering (keeping the total volume constant). So early after injury the pt may have normal ICP, but once the limit of displacement reached→ICP rapidly increases
- Classification of head injury
 - Based on GCS
 - Mild head injury--GCS=13-15
 - Moderate head injury --GCS=9-12
 - Severe head injury --GCS=3-8
 - Based on type of injury
 - ✓ Blunt
 - ✓ Penetrating
 - High velocity→like gunshot injury
 - Low velocity→like stab injury

Scalp injury

- ❖ Highly vascularized→significant blood loss can occur
- ❖ Mgt
 - Direct pressure initially controls the bleeding, allowing close inspection to the injury
 - Simple laceration→copiously irrigate & close primarily
 - Laceration→short, a single layer→percutaneous suture
 - Laceration→long or has multiple arms --debridement & closure in OR

Skull fracture

➤ Skull vault fracture

- Open Vs Closed
- Depressed Vs non-depressed
- Linear Vs comminuted

➤ Indications for craniotomy

- Depression if greater than cranial thickness
 - To elevate the #, repair dural disruption & to secure hemostasis
- Intracranial hematoma
- Frontal sinus involvement

➤ Basal skull fracture

- May or may not be associated with CSF rhinorrhoea, otorrhoea or cranial nerve palsy.
 - CSF leak--mgt
 - elevation of head off the bed for several days may heal it
 - In addition lumbar drain can augment this method. Lumbar drain allows the defect to heal by eliminating normal hydrostatic pressure.
 - Traumatic cranial neuropathy--mgt
 - Facial nerve palsy→steroids
 - If no response after 48-72hrs→surgical decompression of the petrous portion of CN-VII may be considered
 - Anosmia (CN-I damage→loss of smell)
- Battle's sign (bruising over the mastoid process)
- Raccoon eyes (bilateral periorbital bruising)

Traumatic brain injury (TBI)

- **Primary brain injury--occurs @ the time of impact and includes injuries such as**
 - ✓ Brainstem and hemispheric contusions
 - ✓ Diffuse axonal injury &
 - ✓ Cortical lacerations
- **Secondary brain injury--occurs @ some time after the moment of impact and is often preventable. The causes of secondary brain injury include**
 - ✓ Hypoxia
 - ✓ Hypotension
 - ✓ Raised ICP→ICP >20mmHg
 - ✓ Reduced cerebral perfusion pressure (CPP)
 - $CPP = \text{Mean arterial pressure (MAP)} - \text{ICP}$
 - ✓ So, CPP will be reduced if low MAP or high ICP
 - ✓ In order to maintain the CPP we have to control not only rise in ICP but also decline in MAP (i.e. hypotension)
 - ✓ metabolic disturbances
 - ✓ pyrexia

Types of closed head injury

- **Concussion**
 - A temporary neuronal dysfunction following non-penetrating head trauma
 - Deficit resolve over minutes to hrs
 - CT-Scan=normal
- **Contusion**
 - A bruise in the brain
 - Mechanism
 - ✓ either coup (at the point of impact),
 - ✓ counter-coup (on the other side of the head) or
 - ✓ as the brain slides forwards and backwards over the ridged cranial fossa floor
 - commonly affected sites
 - ✓ frontal, occipital and temporal poles
 - Edema may develop→mass effect
 - CT-scan= contused areas appear bright

➤ Traumatic intracranial hematomas

✓ May be...

• Epidural hematoma

- ✓ Common site → temporal bone -- the pterion
 - the thinnest part of the skull + overlies the largest meningeal artery

• Subdural hematoma

- ✓ Acute Vs Chronic
 - Acute SDH -- Due to disruption of a cortical vessel (venous) → accumulation
 - Chronic SDH -- collection of blood break down products that is @least 2-3wks old

• Intraparenchymal hemorrhage

- ✓ Most often associated with
 - Hypertensive hemorrhage
 - AV malformation
- ✓ In traumatic one -- bleeding may occur from the contused area → mass effect...

Initial steps in head injury → as in all trauma pts → ATLS

○ Primary survey & resuscitation

➤ "ABCDE" of life

▪ **D=Disability...**

- Pupillary size & reactivity
- GCS
- Presence of focal neurological deficit

...Consider the possibility of cervical spine injury before 2^o survey...

○ Then...Secondary survey

- Hx, P/E, Ix & Definitive mgt → see below for secondary survey components

Clinical presentation

1) History

- **MOI**
 - ✓ **MVA**
 - Collisions between vehicles
 - Pedestrians stuck by motor vehicle
 - Bicycle accidents...
 - ✓ **Fall down injury**
 - ✓ **gunshot**
 - ✓ **Assaults**
 - ✓ **Sport related injuries...**
- **Hx of LOC (loss of consciousness)**
 - Was the patient responding, moving and talking appropriately after the incident? ... mentation @ the scene
 - NB--A head injury with LOC but no clear accidental mechanism of injury → you should think of non-accidental causes of collapse, such as syncope, aneurysmal subarachnoid haemorrhage, hypoglycaemia...
- **Hx of abnormal body movement at the scene**
- **Hx of forgetfulness for events after the injury or preceding the injury**
 - Amnesia (may be antegrade or retrograde)
- **As with all trauma patients, the following should be asked...**
 - Medical hx
 - Medication and drug allergies
 - In particular, the use of medications such as anti-coagulants or anti-platelet drugs will be relevant to a patient with an intracranial haematoma
- **Hx of prior head injuries**
- **Is there history of alcohol or illicit drug use? remote/active**
- **carefully consider past psychiatric disease & pre-morbid hx of headaches**

2) Physical examination

➤ G/A

➤ V/S

➤ HEENT

✓ Head

- On inspection there may be evidence of external head injury such as subgaleal haematoma or scalp laceration which may be a cause of significant external blood loss
 - Palpation of a scalp laceration may reveal an underlying skull fracture & depression
- ✓ Look for clinical evidence of basal skull fracture
- Head= Battle's sign
 - Ear= CSF otorrhea, haemotympanum, active bleeding
 - Eye= Raccoon eyes
 - Nose=CSF rhinorrhea

➤ Nervous system examination

✓ GCS

✓ Eyes opening (E)

- Spontaneously → 4
- To verbal command → 3
- To painful stimulus → 2
- Do not open → 1

✓ Verbal (V)

- Normal oriented conversation → 5
- Confused → 4
- Inappropriate/words only → 3
- Sounds only → 2
- No sounds → 1
- Intubated patient → T

✓ Motor (M)

- Obeys commands → 6
- Localises to pain → 5
- Withdrawal/flexion → 4
- Abnormal flexion (decorticate) → 3
- Extension (decerebrate) → 2
- No motor response → 1

Write it like...GCS=14/15 (E3, V5, M6)

NB*the lowest score is 3/15

➤ MMSE

➤ Cranial nerve examination—focus on

- Pupillary size & reactivity
 - Asymmetrical sluggish response→may suggest partial third nerve dysfunction on that side
 - implying uncal herniation as a result of a mass on the ipsilateral side of sluggish pupil
 - As the third nerve becomes increasingly compromised the ipsilateral pupil will become fixed and dilated
- Anosmia (CN-I)
 - Associated with rhinorrhea→this pts are @ risk of ascending meningitis
- CN VI palsy
 - Raised ICP
- CN VII & VIII palsy
 - Basal skull fracture

➤ Motor examination—look for lateralizing sign

Clinical presentation based on the underlying mechanism....

Epidural hematoma patients

➤ CP--Typical presentation

- ✓ Initially unconscious
- ✓ Then awoken & has lucid interval when the patient complains of headache. But fully alert and orientated with no focal deficit
- ✓ After minutes or hrs→a rapid deterioration occurs, with
 - contralateral hemiparesis,
 - reduced consciousness level and
 - ipsilateral pupillary dilatation as a result of brain compression and herniation

Subdural hematoma pts

➤ Acute SDH

- Due to brain atrophy. Elderly & alcoholics are @ high risk
- ✓ CP
 - present with an impaired consciousness level from the time of injury, but further deterioration can occur as the hematoma expands

⤷ Chronic SDH

- usually occur in alcoholics, the elderly and in those pts on anti-coagulant/anti-platelet agents
- usually but not always has history of minor head injury, weeks or months prior to presentation
- ✓ CP
 - Headache, seizures, cognitive decline, focal neurological deficits, or coma.
 - It is important to exclude hypoxic, metabolic and endocrine disorders in this group of patients

Long term complications of head injury

- neuropsychology
 - Post-concussional symptoms include
 - headache, dizziness
 - impaired short-term memory and concentration
 - easy fatigability, emotional disinhibition and depression
- Seizures
- Delayed CSF leak

NB

1) Symptoms of raised ICP

- ⤷ Projectile Vomiting
- ⤷ Headache
 - Classically morning headache which may awaken the pt from sleep, worsen by coughing/sneezing, bending. Progressively worsens over time...
- ⤷ Seizure
- ⤷ Dropping consciousness...

2) Signs of raised ICP

- ⤷ Cushing's triad
 - BP=increased systolic blood pressure, widened pulse pressure
 - PR=bradycardia
 - RR=abnormal respiratory pattern
- ⤷ Lateralizing signs
- ⤷ Papilledema (swelling of optic disc)
- ⤷ CN VI palsy

SAMPLE Hx**C/C****Axe injury of 5 hrs duration****HPI**

This Patient was last relatively healthy 5 hrs back at that time she sustained axe attack to the head & distal forearm by a known offender, her psychiatric brother in law. She was attacked 02 times; one on the left side of the head and the other on the right distal part of the forearm. After the injury she lost her consciousness for 04hrs. She was found falling on a cement floor by her mother. She had massive bleeding from the site of injury. They took her to local health center where they tried to stop the bleeding by dressing. She was given diclofenac 75 mg IM stat & TAT 3000 IU IM stat. Then she was referred to our hospital for better mgt. 01 hrs prior to admission she gained her consciousness, while she was on the way to our hospital. She was totally unable to use her right upper extremity. In addition she experienced 02 episodes of projectile, bilious vomiting on her arrival to our hospital, associated with throbbing type of generalized headache which worsen during bending. The only thing she remembered about the accident was running & trying to escape from the attacker but no hx of forgetfulness for events that happened before the accident or those events after she re-gained her consciousness. She has tinnitus, blurring of vision & light headedness.

- No hx of abnormal body mov't, failure to control urine or feces
- No hx of failure to use the extremities except the injured one (localizing sign--ICP)
- No hx of watery or bloody discharge from the ear or nose.(oto/rhinorrhea + bleeding from ear→basal skull fracture)
- She has no hx of breathing difficulty or chest pain (chest injury)
- No hx of illicit drug use or alcohol abuse
- No self and family hx of DM, HTN or asthma
- Not screened for RVI but has no hx of chronic diarrhea, MSP or HZA.

Finally she was admitted.....

Investigations

Imaging

- Skull x-ray (AP & lateral)

- Is there # or not?

- If fractured

- Is it depressed or not

- ✓ If depressed. Is it significant?

- Linear Vs comminuted

- CT-scan--What to look?

- Epidural hematoma

- ✓ hyperdense (bright) lesion

- ✓ lentiform (lens-shaped or biconvex)

- ✓ well defined border (between the skull and brain)

- ✓ may or may not cross the midline

- Subdural hematoma

- ✓ Acute SDH

- Hyperdense (acute blood)

- crescent shaped (lunate)

- may have less distinct border

- doesn't cross midline

- ✓ Chronic SDH

- Variable appearance

- Acute blood (up to 3dys)—hyperdense

- Subacute blood—isodense relative to brain

- Chronic (>2wks)—hypodense

- Acute-on-chronic SDH

- MRI

Lab. studies

- Hct

- BG & Rh

- Sr.electrolytes

- OFT

Mgt

Mild head injury

- Observation for 24 hrs
- Criteria for discharge
 - ✓ Pt must have GCS=15/15 with no focal neurological deficit
 - ✓ verbal and written head injury advice must be given to the pt and pt's attendant
 - advice to return if the pt experience persistent or worsening of headache despite analgesia, persistent vomiting, drowsiness, visual disturbance such as double or blurred vision, and development of weakness or numbness in the limbs.

Moderate to severe head injury

- Aim --To prevent secondary brain injury
- The cervical spine must be immobilized
- Cerebral contusion
 - ✓ admit for observation
 - because these lesions tend to mature and expand 48–72 hours following injury
 - rarely requires emergent evacuation
 - some pts may require delayed evacuation to reduce mass effect
- Extradural (epidural) hematoma
 - neurosurgical emergency
 - immediate surgical evacuation via craniotomy & hemostasis
- Subdural hematoma
 - ✓ Acute SDH
 - Evacuation via craniotomy
 - Indication
 - Thickness >1cm
 - Midline shift >5mm
 - GCS drop ≥ 2 from the time of injury to hospitalization
 - ✓ Chronic SDH
 - Indication for drainage
 - Chronic SDH >1cm or
 - Symptomatic pt
 - Evacuation via burr hole(s)

➤ **Intraparenchymal hemorrhage**

- ✓ Pts with contusion on the initial CT-scan should be reimaged (24 hrs after the trauma)
- ✓ Indication for craniotomy
 - Any clot volume $>50\text{cm}^3$
 - clot volume $>20\text{cm}^3$ with
 - neurologic deterioration (GCS=6-8) &
 - midline shift $>5\text{mm}$ or basal cistern compression

Medical mgt of raised ICP

- Head elevation 30°
- Normothermia
- Seizure control
- Sedation +/- muscle relaxant
- Normocapnia
- Avoid obstruction of venous drainage from head--check the cervical collar
- Mannitol
- Serum electrolyte balance

ESOPHAGEAL CA.

Risk factors

- Hereditary factors
- Cigarette smoking
- Chronic alcohol consumption
 - ≥ 30 gm/day → for non-smokers and ≥ 15 gm/day for smokers
- High BMI especially those with central obesity (> 25 kg/m²)
- GERD and associated Barrett esophagus
- Diet
 - Drinking scalding hot liquids
 - Vitamin deficiency (e.g. Riboflavin)
 - Certain food stuff. E.g. betel quid and areca nuts
 - Zinc deficiency & low selenium level
- Underlying esophageal diseases like achalasia, caustic stricture
- Infectious conditions
 - HPV infection (serotype 16 & 18)
- Prior gastrectomy
- Atrophic gastritis
- Tylosis

NB*

- SCC accounts for the majority of esophageal ca. followed by adenocarcinoma
- SCC is common in middle 1/3 & adenocarcinoma is common in the lower 1/3
- More common in men than women (3-4: 1)
- Occurs at the age of 6th-7th decade

Clinical presentation

1. History

- **Dysphagia**
 - most common presentation
 - Initially for solid foods eventually progressing to include liquid food
- **Weight loss (2nd most common)**
- **Bleeding (from the tumor)**
- **Epigastric or retrosternal pain**
- **Bone pain (with metastasis)**
- **Hoarseness of voice (with RLN infiltration)**
- **Respiratory symptoms (due to invasion or aspiration)--Persistent cough**

2. Physical Examination

- **Typically--no finding unless metastasized**
- **G/A--chronically sick looking (cachexic)**
- **HEENT**
 - signs of anemia and liver metastasis
- **LAP in the lateral cervical or supraclavicular areas (esp. Virchow's nodes)**
- **Chest finding (in case of metastasis)**
- **CVS**
 - Ejection systolic murmur, gallop ← → high output failure
- **Abd. Examination**
 - Hepatomegaly (if liver metastasis),
 - signs of fluid collection

DDx

1. Esophageal Stricture

- majority of the strictures result from long-standing gastroesophageal reflux
- Rx usually involve dilation combined with acid-suppressive therapy

2. Benign esophageal tumors

- Esophageal leiomyoma (accounts for $\geq 50\%$)

3. Achalasia

- Is characterized by
 - Aperistalsis
 - Partial or incomplete relaxation of the LES
 - Increased resting tone of the LES

- **Pathogenesis**
 - 1^o --poorly understood
 - 2^o -- chagas disease → trypanosome cruzi → distraction of myoenteric plexuses
 - Other causes--DM, polio, sarcoidosis, amyloidosis, malignancy and caustic stricture
- **Clinical feature**
 - Similar to that of SCC of the esophagus
 - Sensation of food sticking in the lower esophagus
 - Nocturnal cough
 - Retrosternal Chest pain induced by eating
- 4. Gastric cancer**
 - Most pts with gastric ca are symptomatic and already have advanced incurable disease at the time of presentation
 - **Clinical features**
 - Wt. loss and persistent abdominal pain are the most common symptoms at initial diagnosis.
 - *Read more on gastric ca under GOO*
- 5. Esophageal perforation**
 - Most esophageal perforations are iatrogenic (59 %)
 - Causes of non-iatrogenic esophageal perforation is
 - ✓ spontaneous rupture 15 % (Most common cause)
 - ✓ foreign body ingestion 12 %
 - ✓ trauma 9% and
 - ✓ malignancy

SAMPLE Hx

C/C

Difficulty of swallowing of 6 months duration

HPI

This patient was LRH six months back @ which time he began to experience difficulty of swallowing initially for solid foods like 'injera' and bread but latter it progressed to liquid foods with dull aching type of retrosternal pain. He has unquantified weight loss to the extent his trousers became loose & easy fatigability at minimal exertion. Associated with blurring of vision, tinnitus and light headedness. Since 6 years back he had the retrosternal pain and burning epigastric pain for which he repeatedly took omeprazole 20 mg po BID for 02 wks at local health center & private clinic. But no improvement in the retrosternal pain. He has hx of alcohol intake about 05 bottles of beer per day for the past 25 years but no hx of smoking.

- ❖ He was screened for RVI and found to be NR
- ❖ He has usually eats "Ingera" made of "Teff" with "Shiro wot."
- ❖ He has no hx of radiation therapy of the neck or chest.
- ❖ He has no hx of multiple sexual partners (RF→HPV)
- ❖ He has no hx of drug use other than the medications mentioned above
- ❖ He has no hx of previous surgery
- ❖ He has no hx of similar illness in the family
- ❖ He has no hx of change in voice
- ❖ He has no hx of cough, dyspnea or hemoptysis.
- ❖ He has no self or family hx of DM, HTN or Asthma

Finally he was admitted.....

Investigations

- ❖ **UGI endoscopy**
 - To visualize growth and take biopsy
- ❖ **Ultrasound**
 - Endoscopic ultrasound is the most sensitive for determining
 - Depth of penetration (T → staging)
 - Presence of enlarged periesophageal lymph nodes (N → staging)
- ❖ **Barium swallow**
 - Very sensitive for detecting strictures and intraluminal mass
 - Detect mucosal irregularities and filling defects
 - Helps to study the distal anatomy in obstructing tumors that are not accessible for endoscopy
 - Does not allow staging or biopsy
- ❖ **Bronchoscopy**
 - To exclude invasion of the trachea or bronchus (for ca. of the upper & middle 1/3 esophagus)
- ❖ **PET scan**
 - Detect occult distant lymph node metastasis & bone spread
- ❖ **Esophageal Monometry**
 - Measures the motility and function of the esophagus and esophageal sphincter
- ❖ **Chest x-ray**
 - Mediastinal widening or posterior tracheal indentation
 - Rule out aspiration pneumonia
- ❖ **Lab. studies**
 - CBC, Serum electrolyte, OFT
- ❖ **Metastasis workup**

Rx plan depends on the following

- **Staging : nearby structures involvement, lymph nodes involvement , other organs**
- **Cancer location within the esophagus**
- **General health of the patient**

Treatment options

Endoscopic Mucosal Resection (EMR)



- **Surgery:**
 - **Transhiatal**
 - **Rt. Thoracotomy (Ivor – Lewis)**
 - **Lt. thoracotomy**
 - **Radical – En – Block**
- **Chemotherapy**
 - **Cisplatin, 5-FU, Paclitaxel, and Anthracyclines**
- **Radiotherapy (relieving dysphagia)**
- **Combined-modality therapy**
- **Palliative Therapy**
- **Laser**
 - **Phototherapy**
 - **Stent**

APPENDICEAL MASS & APPENDICITIS

Acute appendicitis

- How we diagnose acute appendicitis?
 - E(s) + E(o) + Ix
 - The Alvarado scoring system
- What is expected after the diagnosis of acute appendicitis?
 - Understand the mgt options (based on Alvarado score)
 - Pre-op preparation
 - Post-op follow-up

Pathogenesis

- Luminal Obstruction
 - Mechanism varies depending upon the pt's age
 - In the young--lymphoid follicular hyperplasia due to infection
→the main cause
 - In older patients more likely to be caused by
 - Fibrosis, fecaliths or neoplasia (carcinoid, adenocarcinoma or mucocele)
 - In endemic areas—parasites can cause obstruction @ any age & group

Subjective evidences--E(s)

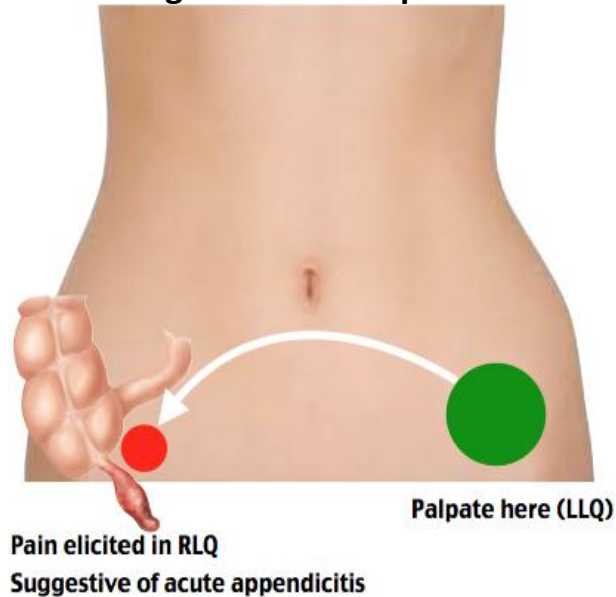
- Abdominal Pain
 - 1st noticed in the peri-umbilical area→then shifts to the right iliac fossa
 - Mechanism of pain--As the appendix becomes engorged, the visceral afferent nerve fibers entering the spinal cord at T8-T10 are stimulated, leading to vague central or periumbilical abdominal pain. Well-localized pain occurs later in the course when inflammation involves the adjacent parietal peritoneum
- Associated with anorexia, nausea & vomiting
- Cough & sudden mov't exacerbate the pain
- Atypical presentation
 - Predominantly somatic or visceral & poorly localized (elderly)

- Inflamed appendix in the pelvis never produces pain in abdominal wall instead these pts present with supra-pubic discomfort & tenesmus with tenderness on DRE.

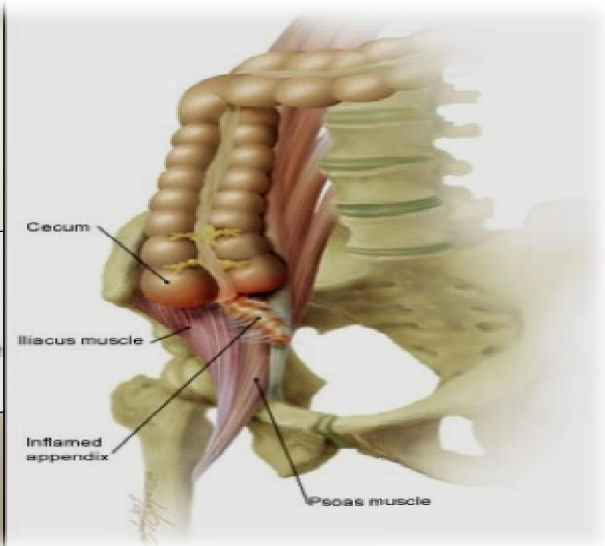
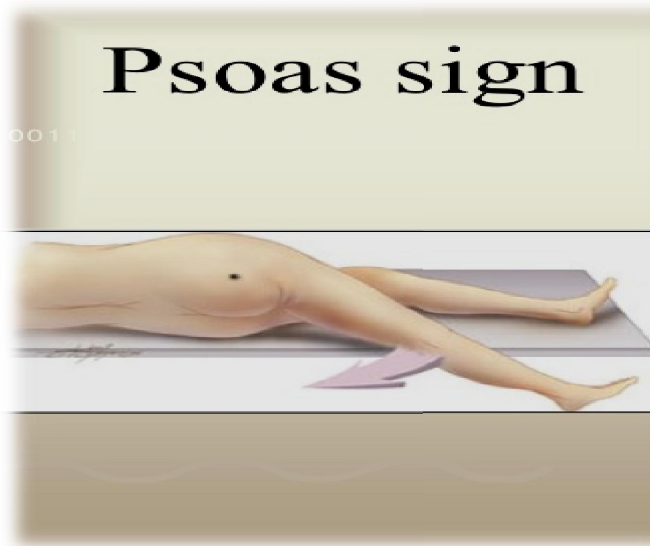
NB*The symptoms of appendicitis vary depending upon the location of the tip of the appendix

Objective evidences-E(o)

- G/A – Acutely Sick Looking (in pain)
- V/S--Low grade fever
- Abdomen
 - Direct & rebound tenderness
 - Mc Burney’s point -- point of maximum tenderness
 - 1/3 from ASIS & 2/3 from umbilicus
 - Rovsing’s sign/ indirect tenderness
 - deep palpation of Lt. iliac fossa→pain in Rt. iliac fossa
 - indicative of right-sided local peritoneal irritation

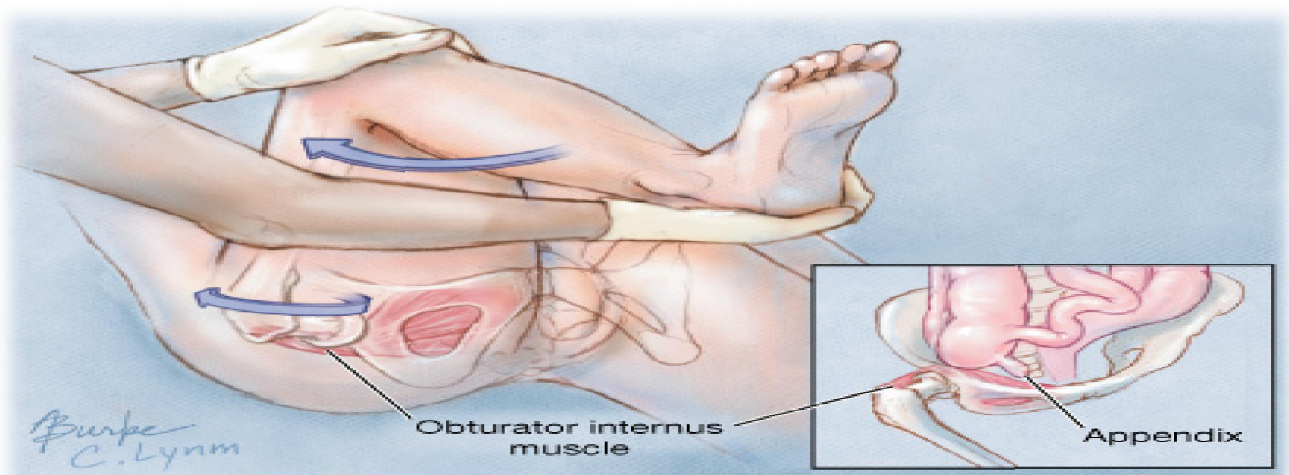


- Psoas sign
 - RLQ pain with passive right hip extension. For this reason patients lie with right hip flexed to get pain relief
 - Associated with a retrocecal appendix



➤ **Obturator sign**

- flexing the patient's right hip and knee followed by internal rotation of the right hip → elicits RLQ pain
- Associated with a pelvic appendix
- sensitivity is low



Source: Simel DL, Rennie D: *The Rational Clinical Examination: Evidence-Based Clinical Diagnosis*: <http://www.jamaevidence.com>
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Investigations

- **CBC**
 - A mild leukocytosis (WBC >10,000 cells/micro-L) is present in most patients with acute appendicitis
- **Ultrasound findings**
 - An appendiceal diameter of >6 mm --The most accurate ultrasound finding for acute appendicitis
 - Reliable for confirmation of the clinical Dx but not for exclusion

NB*

Urine HCG → should be done for all women of childbearing age to exclude pregnancy related causes of acute abdomen.

The Alvarado score

Why we need the scoring system? For mgt purpose

- **“MANTREL”**

	Criteria	score
E(s)	1 Migratory right iliac fossa pain	1
	2 Anorexia	1
	3 Nausea/vomiting	1
E(o)	4 Tenderness in the right iliac fossa	2
	5 Rebound tenderness in the right iliac fossa	1
	6 Fever >37.5°C	1
Ix	7 Leukocytosis	2
Total score		9

Alvarado score	Interpretation
Low score <5	has more diagnostic utility to “rule out” the Dx
High score ≥7	to “rule in” the diagnosis

Mgt based on alvarado score

- **Score of 0-3**
 - considered to have a low risk of appendicitis
 - Can be discharged with advice to return if no improvement in symptoms
- **Score of 4-6**
 - Should be admitted for observation and re-examination
 - If the score remains the same after 12 hours, operative intervention is recommended
- **Score of 7-9**
 - Male patient → should proceed to appendectomy
 - A female patient who is not pregnant should undergo diagnostic laparoscopy, then appendectomy (if indicated by the intra-op findings)

Pre-op preparation

- Adequate hydration with IV fluids
- Follow vital signs and urine output closely
- Antibiotics
 - Prophylactic antibiotics
 - To preventing wound infection and intra-abdominal abscess following appendectomy
 - Should be administered within a 60-minute "window" before the initial incision
 - non-perforated appendicitis
 - a single preoperative antibiotic dose → adequate
 - perforated appendicitis
 - Regimen → empiric broad-spectrum therapy with activity against gram-negative rods and anaerobic organisms pending culture results
- Prepare OR materials
- Take informed consent

Post-op follow-up

- NPO till bowel is active then start on a clear liquid diet (sips) then advance to regular diet as tolerated
- Pain mgt
- Early ambulation

- **Follow for complications**
 - **Infection**
 - **a simple wound infection or an intraabdominal abscess→Both occur typically in patients with perforated appendicitis**
 - **Pylephlebitis**
 - **Which refers to thrombosis and infection within the portal venous system**
 - **uncommon but should be considered in patients with fever and abnormal LFT**

NB

- **Antibiotics are not required postoperatively in non-perforated appendicitis**
- **Pts with non-perforated appendicitis can be discharged within 24 to 48 hours of surgery**
- **Pts with Perforated appendicitis, post-operatively**
 - **often have an ileus, and diet should only be advanced as the clinical situation warrants**
 - **Patients may be discharged once they tolerate a regular diet, usually in five to seven days**

1. Parietal swellings→become more prominent on head or leg raising test

- **Parietal wall abscess**
 - Pyogenic that occurs in hematoma or pyaemic abscess in DM pts
 - Very tender, warm surface with fever, chills & rigor
- **Desmoids tumor**
 - Unencapsulated fibroma
 - In multiparous(repeated stretching of abd. Wall), abd.wall injury (e.g. laparotomy)
 - Firm to hard in consistency
 - Rx→no capsule.so, wide excision followed by reconstruction by using mesh

2. Intra-abdominal swellings

From normal structures

From intestine

- **Appendicular mass**
 - Tender, soft to firm
 - Consists of omentum, terminal ileum, caecum, with pericaecal fat & inflammatory edema
 - Mgt
 - Conservatively by IV antibiotics and fluids as well as bowel rest. Pts should be closely monitored. If fever, tenderness, and leukocytosis improve, diet can be slowly advanced, usually within three to five days. Patients are discharged home when clinical parameters have normalized.
 - Attempt to remove the appendix may result in fecal fistula
 - 6-8wks late--appendectomy /interval appendectomy
 - To prevent recurrence of appendicitis
 - To exclude neoplasms
 - Conservative Rx failure, as evidenced by bowel obstruction, sepsis, persistent pain, fever or leukocytosis requires immediate appendectomy

- **Appendicial abscess**
 - Very tender, firm, fixed
 - Relatively delayed presentation
 - High grade fever, tachycardic
 - Mgt
 - Abscess drainage
 - Proper antibiotic coverage

What is phlegmonous appendix?

- **Ileocaecal TB**
 - Chronic, non-tender, firm, nodular, may have mobility & slightly higher side (lumbar area)
 - Features of TB are present
 - Mgt--limited resection followed by ileocolic anastomosis
- **Carcinoma caecum**
 - More in females, 40-50yrs
 - Bleeding per rectum, severe anemia
 - Hard, irregular, fixed/restricted mobility
 - Psoas spasm--indicate infiltration
 - Mgt --Rt.radical hemicolectomy
- **Ameboma**
 - Tender, soft to firm
- **Intussusceptions**
 - Tender soft to firm
 - *For detailed info read under SBO*
- **Actinomycosis**
 - Rare, 2-3months after appendicectomy
 - Hard, indurated, tender mass with multiple sinuses
 - Unlike TB→no narrowing of gut lumen & LN enlargement

From LNs

- Acute lymphadenitis
- Lymphoma
- Secondaries

Retroperitoneal structures

- Sarcoma
 - Cmn in young

- Huge, nodular, fixed (to the posterior abd. Wall), edema of legs (IVC obstruction), hydronephrosis (pressure on ureter)
- Mgt -- wide excision then radio/chemotherapy
- Aneurysm
 - Iliac artery → rare, in elderly pts
 - Soft, pulsatile, bruit & thrill
- Iliopsoas abscess

In females

- Ovarian cyst
 - Smooth surface, round border, cystic, freely mobile & can be pushed back to pelvis
- Fibroid of uterus/ myoma
 - Firm to hard, nodular
- Tovo-ovarian mass
 - Tender, soft to firm, can be bilateral, pelvic infection present/PID

From abnormal structures

- Undescended kidney
- Normal mobile kidney
- Undescended testis/ seminoma

SPLEENIC ABSCESS

Mechanisms of splenic abscess

- ✓ Hematogenous infection
- ✓ Contiguous infection
- ✓ Hemoglobinopathy
- ✓ Immunosuppression, including HIV infection and chemotherapy
- ✓ Trauma

CP

- Fever
- Left upper quadrant pain
- Splenomegaly

NB

- ✓ Presentation frequently is delayed

Complication

- ✓ The abscess may rupture & cause peritonitis

Ix

- CBC—leukocytosis
- The diagnosis is confirmed by
 - Abd.ultrasound or CT scan

Mgt

- Broad-spectrum antibiotics should be started
 - Revise the antibiotics based on culture results
 - Duration=02wks
- Drainage of the splenic abscess by percutaneous means under radiological guidance
- Splenectomy
- Rx of the underlying cause

Post-splenectomy possible complications

- ✓ hemorrhage resulting from a slipped ligature
- ✓ Left basal atelectasis
- ✓ pleural effusion
- ✓ damage to adjacent structures
 - A fistula may form from damage to the greater curvature of the stomach during ligation of the short gastric vessels
 - Damage to the tail of the pancreas may result in pancreatitis, a localised abscess or a pancreatic fistula

- ✓ **Axillary or other venous thrombosis**
 - Because the blood platelet count may rise
 - If platelet count exceeds $1 \times 10^6 \text{ ml}^{-1}$, prophylactic aspirin is recommended
- ✓ **Septicaemia**
 - Etiologic agents--*Streptococcus pneumoniae*, *Neisseria meningitidis*, *Haemophilus influenzae* and *Escherichia coli*
- ✓ **Opportunist post-splenectomy infection (OPSI)—major concern**
 - Prevention methods
 - appropriate and timely immunization
 - antibiotic prophylaxis
 - education
 - Prompt treatment of infection

NB

Risk of overwhelming sepsis is greatest within the first 2–3 years after splenectomy

CASE REPORT SAMPLE (HX & P/E ONLY)

History

ID

Here is Ato Mamo Lakew a 55 years old male married orthodox Christian farmer from koladba admitted to GUH department of surgery ,surgical ward, bed no# 20 on Miazia 20/2010 e.c

Previous Admission

None

C/C

Difficulty of urination of 06 months duration

HPI

This patient was LRH 06 months back at which time he started to experience difficulty of urination which made him to strain to initiate & maintain his urination. Associated with this he started to experience urgency & frequency of urination with D:N ratio of 10 to 6 which made his bed time difficult. He also had post-micturition dribbling & a feeling of incomplete voiding.1 month back he was totally unable to pass urine after drinking about 2 Liters of local “tella” on a social gathering for which he visited our hospital where he was catheterized & the catheterization was successful.

- No hx penile discharge, genital ulcer or MSP
- No hx chronic cough, contact with a chronic cougher or previous TB Rx.
- No hx trauma to the pelvis.
- No hx of anorexia, easily fatigability or significant wt loss
- No hx of reddish discoloration of urine, cigarette smoking, radiation therapy to the pelvis or river water contact.
- No hx medication intake like anti-histamines & anti-cholinergics
- No hx of fever, chills or rigor.
- No hx of tinnitus, blurring of vision or light headedness.
- No hx of bone pain, hemoptysis or yellowish discoloration of the eyes.
- No self /family hx of DM, HTN or Asthma
- Screened for RVI & found to be NR 06 months back.

Finally he was admitted to our hospital.....

Past illnesses

- No hx of childhood illnesses like chicken pox, mumps or small pox. Not vaccinated.
- No hx of previous surgery, trauma, psychiatry problems or drug allergy.

Review of system (ROS)

H.E.E.N.T

- **Head:** No hx of headache or head injury
- **Eyes:** No hx of blurring of vision, pain in the eyes, eye itching, or spontaneous lacrimation
- **Ears:** No hx of Earache, difficulty of hearing, ear discharge, vertigo or tinnitus
- **Nose:** No hx of nasal bleeding or discharge
- **Mouth and throat:** No hx gum bleeding, tooth extraction

Lymphoglandular system (LGS):

- No hx of swelling in the neck, axilla or groin.
- No hx of heat or cold intolerance.

Respiratory System (RS): No hx of cough, chest pain or fast breathing

Cardiovascular system (cvs): No hx dyspnea, orthonea or PND

Gastrointestinal system (GIS): No hx of diarrhea or constipation

Genitourinary system (GUS): No hx of flank pain, see HPI

Integumentary system (IGS): No hx of skin rash or ulcers

Muskuloskeletal system (MSS): No hx of loss of limb function or joint pain.

Central nervous system (CNS): No forgetfulness, abnormal body mov't or insomnia.

Personal History

- He was born and raised in koladba, where he lived all his life. He had a healthy childhood and was an active boy who liked helping his father around the farm. There is no school near his village and like his parents, he never went to school. But he is able to read and write numbers.
- He is a farmer and also raises cattle, sheep and goat.
- He usually eats 'injera' made of 'teff & 'shiro' made of 'atter'
- He is currently married and has ten children. All are alive & healthy.
- He occasionally drinks alcohol but no smoking

Family History

Father and mother:

- Both his father and mother are dead. His father died around 30 years ago at unknown age by unknown cause while his mother died two years ago at age 86 by natural cause.

Siblings:

- He has two sisters and four brothers. All are alive & well.

Family Diseases:

- No family history of DM, hypertension, Asthma, tuberculosis, allergy or sudden deaths.

Physical Examination

General Appearance

Acutely sick looking, not in cardiopulmonary stress, looks well nourished, conscious & alert

Vital signs

BP: 110/70mmHg, right arm, sitting position

PR: 95bpm, Rt radial artery, regular & full volume

RR: 18 breath/min, shallow & regular

T^o: 36.2^oc, axillary, @10 AM

Weight: 65kg

Height: 160cms

BMI: 25.4

H.E.E.N.T

Head: Normal hair distribution, No scar or tenderness

Ears: Normal contour of pinna. Clear external ear canal.

Eyes: No periorbital edema, ptosis, exophthalmoses

- Pink conjunctivae, Non icteric sclera

Nose: The nasal septum is central. There is no polyp or active discharge

Mouth and throat: no fissure or ulceration on the lip

- The gums are intact, no active bleeding . There are no carious teeth, extraction, dentures or filling.
- Tongue – no atrophied papillae, The buccal mucosa is pink & wet.

Lymphoglandular system

- There is no significantly enlarged lymphadenopathy in peripherally accessible lymph node areas
- The thyroid gland is not enlarged
- Descended testicles bilaterally

Respiratory System

Inspection:

- No peripheral or central cyanosis or clubbing of the finger nails
- Breathing is shallow and regular
- No SC or IC retraction
- No chest wall deformity or surgical scar
- No chest lag

Palpation:

- Trachea is central

- No subcutaneous emphysema
- No chest wall tenderness
- Tactile fremitus is comparable on both sides
- Chest expansion is symmetrical

Percussion:

- Resonant all over lung fields

Auscultation:

- Vesicular breath sound all over the lung field
- No added breath sound (wheezing, crepitations, stridor or pleural friction rub)

Cardiovascular system

Arterial:

- All peripherally accessible arteries are palpable
- No thickening of vessels wall
- No radio-femoral delay

Venous:

- JVP is not raised
- No distended neck vein
- Negative Hepato-jugular reflex

Precordial examination

Inspection:

- No precordial bulging
- Quite precordium
- The apical impulse is not visible

Palpation:

- No palpable heart sound
- The PMI is at the 5th ICS lateral to MCL, localized & tapping.
- There is no parasternal or apical heave. There is no thrill.

Auscultation:

- S1 & S2 well heard
- No murmur or gallop

Abdominal examination

Inspection:

- The abdomen is flat & symmetrical
- It moves with respiration.
- The flanks are not full
- No distended abdominal vein
- No surgical scar
- The umbilicus is inverted with circular slit
- Hernia sites are free
- No visible pulsation or peristalsis

Auscultation:

- Normo-active bowel sound (8/min)
- No bruit over renal artery, abdominal aorta or liver area

Palpation:

- ❖ Superficial palpation:
 - There is no tenderness
 - No superficially palpable mass
- ❖ Deep palpation:
 - No organomegally

Percussion:

- No sign of fluid collection (shifting dullness/fluid thrill)
- Total vertical liver span (TVLS) along the right mid-clavicular line = 6cms

DRE

-
- Inspection
 - No ulceration or visible mass
 - Palpation
 - Normal anal sphincter tone
 - There is a mass which has smooth surface, regular border, firm consistency, not fixed to rectal mucosa & palpable medial sulcus but the upper border isn't reachable
 - No blood on the examining finger

Genitourinary System

- No costo-vertebral angle tenderness (CVAT)
- Kidneys are not bimanually palpable

Integumentary System

- No palmar or plantar pallor
- No rash, scar or ulcer

Musculoskeletal System

- No muscle tenderness or spasm.
- No bone deformity or tenderness.
- No stiffness of joints
- No edema.

Nervous system

Mental Status:

- GCS=15/15→E4V5M6
 - conscious & alert
- MMSE
 - He knows what day it is, where he is and what his name is.→Orientation
 - He remembers what he ate for breakfast. He also remembers where he used to live→Memory
 - He speaks in moderate voice with no hesitancy or gaps in the flow and rhythm of his words. →Speech

Cranial Nerve examination:

CN-I: he can smell soap via each nostril.

CN-II:

- He can differentiate 2 fingers at about 6 meters. (Visual Acuity)
- He sees wagging of finger approximately 100⁰ from axis of eye. (Visual Fields)
- He differentiates green and red colors. (Color Appreciation)

CN-III, IV & VI:

- The eyes can move in all directions. There is no nystagmus or diplopia. The pupils are round, regular in outline and equal in size. They react to light directly and consensually.

CN-V:

- He identifies light touch and pin prick over the mandibular, maxillary and ophthalmic areas of the face. He closes his eyes at the touch of the cornea with a cotton swab. Contraction of the temporal and masseter muscles is symmetrical and strong.

CN-VII:

- The face is symmetrical at rest and during voluntary movements (smiling, frowning). He can close both eyes equally and forcefully.

CN-VIII:

- He can hear rubbing of the fingers on both ears.

CN-IX & X:

- The soft palate rises in the midline when saying 'ah!'
- He can swallow his saliva

CN-XI:

- The Sternocleidomastoid and trapezius muscles contract on turning the head and on shrugging the shoulder against resistance, respectively.

CN-XII:

- The tongue protrudes in the midline and shows no fasciculation or atrophy.

Motor examination:

- **Muscle bulk:**
 - Comparable muscle bulk between the left and the right extremities. There is no spontaneous as well as induced fasciculation.
- **Muscle tone and power;**

	TONE		POWER	
	Upper	Lower	Upper	Lower
Right	Normo-tonic	Normo-tonic	5	5
Left	Normo-tonic	Normo-tonic	5	5

Reflexes:

- **Superficial reflexes:**
 - Abdominal reflex is absent both in upper and lower quadrants.
 - Corneal reflex is intact in both eyes .
 - Plantar reflex is down going on both sides.
- **Deep tendon reflexes:**

	Biceps	Triceps	Supinator	Patellar	Ankle
Right	++	++	+	++	+
Left	++	++	+	++	+

- **Clonus:** No clonus

Coordination:

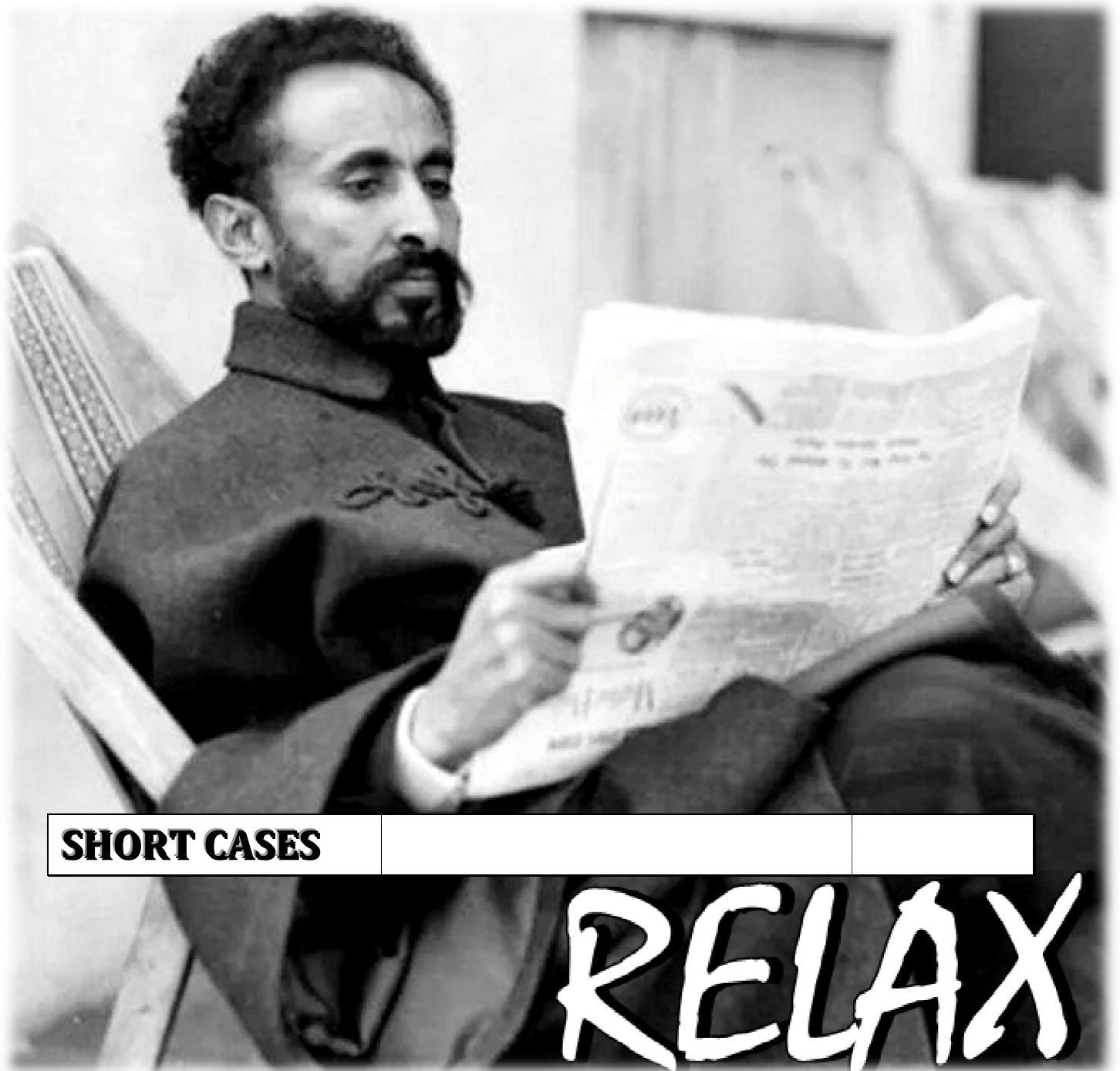
Finger to nose, heel to shin and rapid alternating movement of the arm were done without any abnormalities.

Sensory:

- He identifies light touch and pin prick over the extremities and trunk.
- He appreciates the form of a key by means of only touch (Stereognosis)
- He recognizes writings of different numbers on his palm (Graphesthesia)
- He is able to differentiate 2 pin pricks up to 4 mm apart over the finger tips (2 pt discrimination).
- He is able to recognize different movements of the toes with his eyes closed.(Position sense)
- Vibration sense was not assessed due to lack of Tuning Fork.

Meningeal Sign:

- No neck stiffness.
- Kernig's Sign is negative.
- Brudzinski's Sign is negative



SHORT CASES

RELAX

&

Study hard

RESPIRATORY RELATED

CHEST INJURY

- 25% of all injuries
- As in all trauma pts
 - Apply ATLS 1^o then 2^o survey
- Investigations
 - X-ray is the first choice
 - Chest tube (Diagnostic & therapeutic)
 - Chest Ultrasound
 - CT scan

Immediate life threatening

1. Airway obstruction

- Dentures, teeth, secretion & blood
- Bilateral mandibular #, expanding neck hematomas, laryngeal trauma(thyroid & cricoid#) or tracheal injury
- Mgt → intubation with cervical spine protection

2. Tension pneumothorax

- 01 way valve air leak from lung or chest wall → air forced to into thoracic cavity without any means to escape → collapse of lung → mediastinal displacement → decreased venous return → compromising opposite lung
- CP
 - Tachypnea, dyspnea, distended neck veins, tracheal deviation, hyper-resonance & absent breath sound
- Mgt
 - Immediate decompression
 - Large bore needle in to the 2nd ICS @ MCL
 - Chest tube

3. Pericardial Tamponade

- Similar Clinical presentation as tension pneumothorax
- All pts with penetrating chest injury near the heart + shock → cardiac injury unless proven otherwise
- Classically → increased venous pressure, decreased arterial pressure, tachycardia & muffled heart sounds
- Dx
 - CXR -- enlarged heart shadow
 - Echo—fluid in pericardial sac

- Mgt
 - needle pericardiocentesis → stabilization until definitive mgt
 - But high risk of iatrogenic injury to the heart
 - Definitive mgt → operative (sternotomy or left thoracotomy & repair of the heart)

4. Open pneumothorax (sucking chest wound)

- Large open defect in the chest (>3cm) → equilibrium between intrathoracic & atmospheric pressure → air in hemothorax not lung → hypoventilation
- Mgt → closing defect with sterile occlusive plastic dressing taped on 3 sides to form a 1 way valve (prevents tension pneumothorax) & chest tube inserted in a site remote from injury site.
 - Definitive mgt → formal debridement & closure

5. Massive hemothorax

- Usually from IC vessels or internal mammary artery
- CP
 - Hemorrhagic shock (flat neck veins), absent breath sounds & dull on percussion
- Mgt → correct the shock (read shock mgt under short cases)
 - Insert IC drain
 - Intubation (in some cases)
 - Thoracotomy → indications
 - Drainage of 1500ml of blood or ongoing hemorrhage of >200ml/hr over 3-4hrs

6. Flail chest

- 3 or more contiguous ribs are fractured in @least 02 locations
- Paradoxical mov't of free floating segment of chest wall
- Mgt → mechanical ventilation until fibrous union of broken ribs occur
 - O₂ administration, adequate analgesia & physiotherapy

Potentially life threatening injuries

1. Thoracic aortic disruption

- CP
 - Asymmetry of upper or upper & lower extremity BP
 - Widened pulse pressure
 - Chest wall contusion
- CXR → widened mediastinum

2. Tracheobronchial injuries

- Subcutaneous emphysema with respiratory distress
- Dx → bronchoscopy
- Mgt → intubation of unaffected bronchus followed by operative repair

3. Blunt myocardial injury

- Suspected when in pts with blunt trauma + EEG abnormality
- Echo → wall motion abnormalities
- @ risk of developing sudden onset dysarrhythmia

4. Diaphragmatic injuries

- Any injuries to or below 5th ICS
- Herniation of abdominal contents to chest & strangulations
- Most are silent
- Dx
 - CXR after NGT insertion—herniation of stomach
 - Contrast studies of the upper & lower GI tract
 - CT-scan

5. Esophageal injury

- Usually from penetrating trauma
- CP
 - Odynophagia/ pain on swallowing foods & fluids
 - Subcutaneous/mediastinal emphysema
 - Pl. effusion
 - Unexplained fever within 24hr of injury
- Mgt → operative repair & drainage

6. Pulmonary contusion

- Major cause of hypoxemia after blunt trauma
- CP
 - Natural progression of worsening of hypoxemia for 1st 24-48 hrs
- Dx
 - contrast CT-scan—confirmatory
 - Hemoptysis or blood in endotracheal tube
- Mgt →
 - Mild—O₂ administration, aggressive pulmonary toilet & adequate analgesia
 - Severe—mechanical ventilation

CHEST TUBE INSERTION (THORACOSTOMY)

Indications

1. Empyema
2. Pneumothorax
3. Hemothorax
4. Chylothorax
5. For pleurodesis...

Relative Contraindications

1. Bleeding diathesis
2. Skin infection over the chest tube insertion site
3. Transudative pleural effusion

Site of insertion

- + Generally
 - @ 5th Intercostal Space (ICS) in mid axillary line
 - @ 2nd ICS in mid clavicular line
- + Safe triangle
 - Anterior border of the latissimus dorsi,
 - The posterior border of the pectoralis major and
 - The superior border of the fifth rib

When to remove?

- + To minimize the risk of infectious complications, the tube should be removed as soon as it is safe to do so.
 - Removal Criteria: Pneumothorax
 - When the lung is fully expanded (on CXR)
 - No visible air leak is present and air does not accumulate when suction is removed.
 - Removal Criteria: pleural fluid
 - When the lung is fully expanded
 - Fluid output is less than ~ 200 mL/day.

Complications

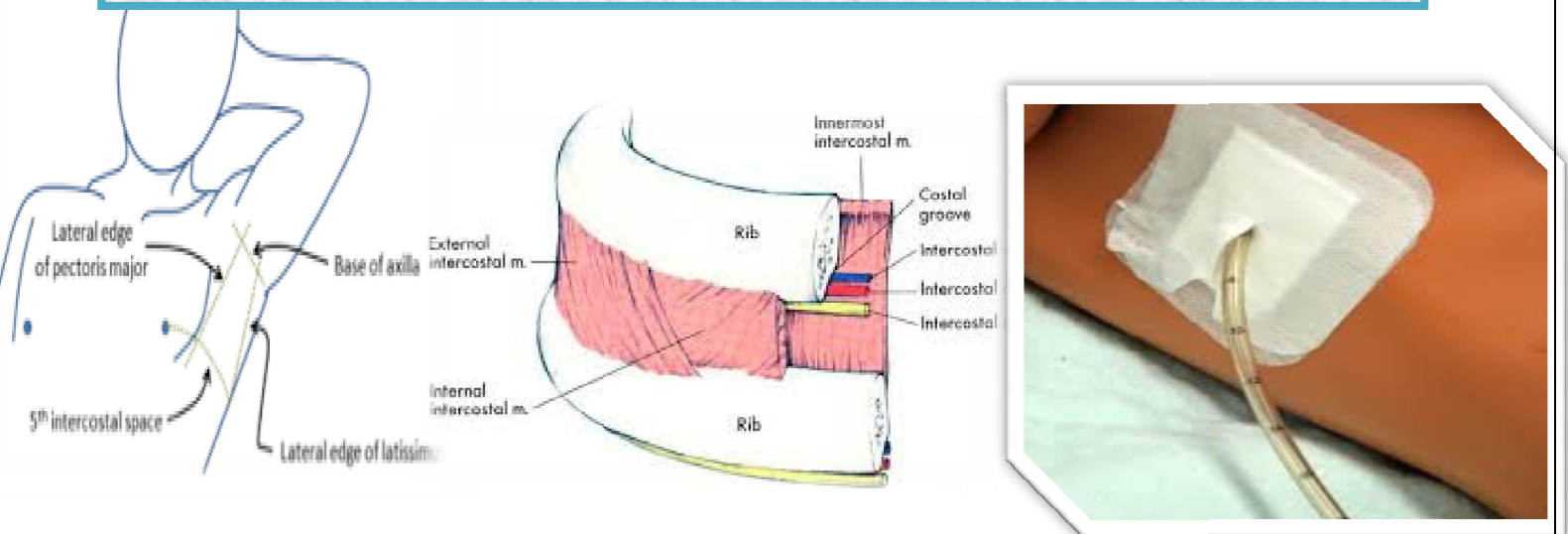
1. Hemorrhage
2. Organ injury (lung, mediastinum...)
3. Damage to intercostals nerves & vessels
4. Introduction of pleural infection
5. Subcutaneous emphysema (usually @ the site of insertion)

6. Pulmonary edema

- ✚ Why? Due rapid drainage of large volumes of pleural fluid → which lead to rapid pulmonary expansion (RPE).
- ✚ To minimize this risk, it's better to limit initial drainage to 1-1.5 liters.

THORACOSTOMY—click on the link below & watch the video

<https://www.youtube.com/watch?v=kEc8fn6ownc>



NB

- ✓ To check functionality of chest tube, see
 - Continuous bubbling in the bottle (air)
 - Oscillations (fluid)—e.g. by asking the pt to cough
- ✓ In order to decide on the removal of the chest tube--follow the output on 24hrs base.
- ✓ Comment on the color of the output

Chest tube insertion procedure

Materials

- Sterile sheets, gloves and gown
- Antiseptic solution, swabs
- Local anesthesia(lidocaine)
- Syringe, scalpel blade and suture
- Needle holder, dissecting forceps, scissors
- Chest drainage tube
- underwater seal drainage bag containing about 200 mL sterile water
- one straight clamp, one curved clamp,
- Dressing and adhesive tape



Procedure

- Position the patient
- Follow possible aseptic techniques to make everything sterile
- Mark the site of insertion
- Infiltrate the skin, subcutaneous tissue and the parietal pleura with 3-5mg/kg injection lidocaine without epinephrine.
- Make a short skin incision with a scalpel blade at the level of the upper border of the rib →at the selected site.
- Separate intercostal muscles using curved clamp and reach up to the parietal pleura.
- Complete the blunt dissection with the index finger
- Thrash the chest tube held by a haemostatic forceps through the pleura, and the tube is inserted into the pleural cavity.
- Aim the tube apically for evacuation of a pneumothorax and basally for evacuation of any fluid
- The tube is clamped with a haemostatic forceps and the closed end is cutoff...the tube is connected to a water seal drainage bag so that the tube inside the bag remains under the level of the water.
- The drain is fixed to the skin by inserting a stitch through the skin but not piercing the drain.
 - Insert a stitch in circular fashion through the skin around the tube and kept untied (Which will be tied after removal of the tube).
- A sterile dressing is applied at the exit of the tube.
- Control chest x-ray should be done after 08hrs of the procedure to check proper insertion

ENDOTRACHEAL INTUBATION

Indications

- Airway problems--inability to maintain a patent airway with potential airway compromise due to;
 - Inhalational injury
 - Retropharyngeal hematoma
 - Facial fractures
- Breathing problems
 - inability to maintain adequate oxygenation by face-mask O₂ supplementation
 - presence of apnea
- Disability problems
 - Inability to protect airway due to altered mental status(GCS≤8)
 - Risk of aspiration of blood or vomitus
 - Sustained seizure activity

Contraindication (relative)

- Unstable cervical spine injury--needs care to insert

How to know the correct placement of the tube?

1. Audible breath sound (auscultate bilateral chest)
2. Hearing no borborygimi in the epigastrium
 - If u hear it during inspiration→suggests esophageal intubation
3. CXR
4. CO₂ detector (capnograph or calorimetric CO₂ monitoring device)

Complications

- Malposition→esophagus
- Vomiting
- Bronchospasm
- Exacerbation of spinal cord injury

Procedural note on ET insertion

Materials

- **Laryngoscope**
 - check size – the blade should reach between the lips and larynx – size 3 for most patients
 - turn on light
- **Cuffed endotracheal tube**
- **Syringe for cuff inflation**
- **Face mask**
- **Ventilation bag**
- **Oxygen supply**
- **Suction**
- **Adhesive tape**
- **Monitors**
 - Like: end-tidal CO2 monitor, pulse oximeter, cardiac monitor, blood pressure
- **Medications in awake patient: hypnotic, analgesia, short-acting muscle relaxant (to aid intubation)**

Laryngoscope insertion technique

- **Give medications if required**
- **Pre-oxygenate patient with high concentration oxygen for 3-5mins**
- **Position patient**
 - Neck flexed to 15°, head extended on neck (i.e. chin anteriorly), no lateral deviation
- **Stand behind the head of the patient**
- **Open mouth and inspect: remove any dentures/debris, suction any secretions**
- **Holding laryngoscope in left hand, insert it looking down its length**
- **Passing the tongue**
 - Slide down right side of mouth until the tonsils are seen
 - Now move it to the left to push the tongue centrally until the uvula is seen
- **Advance over the base of the tongue until the epiglottis is seen**

Tube insertion technique

- Apply traction to the long axis of the laryngoscope handle (this lifts the epiglottis so that the V-shaped glottis can be seen)
- Insert the tube in the groove of the laryngoscope so that the cuff passes the vocal cords
- Remove laryngoscope and inflate the cuff of the tube with ~ 15ml air from a 20ml syringe
- Attach ventilation bag/machine and ventilate (~10 breaths/min) with high concentration oxygen and observe chest expansion and auscultate to confirm correct positioning
- Consider applying CO2 detector or end-tidal CO2 monitor to confirm placement
- Secure the endotracheal tube with tape
- If it takes more than 30 seconds, remove all equipment and ventilate patient with a bag and mask until ready to retry intubation

Click the link below & watch the video

https://www.youtube.com/watch?v=10enx5T-2_8



TRACHEOSTOMY

Indications

- Acute upper airway obstruction. E.g.
 - Severe croup in children
 - Upper airway foreign body that can't be dislodged with Heimlich and basic cardiac life support maneuvers
 - a large pharyngo-laryngeal tumor
- For mgt of patients who require prolonged artificial ventilation
 - E.g. Severe tetanus
- Bilateral vocal cord paralysis
 - E.g. if RLN is injured during thyroidectomy
- Laryngeal fracture or laryngo-tracheal separation in whom cricothyroidectomy may cause further damage
- After major surgery involving the oral cavity, pharynx, larynx or neck
 - Since there is a potential risk for upper airway obstruction due edema
- For pts with neurologic deficits that impair protective airway reflex

Site

- 2nd & 3rd tracheal rings

Complications

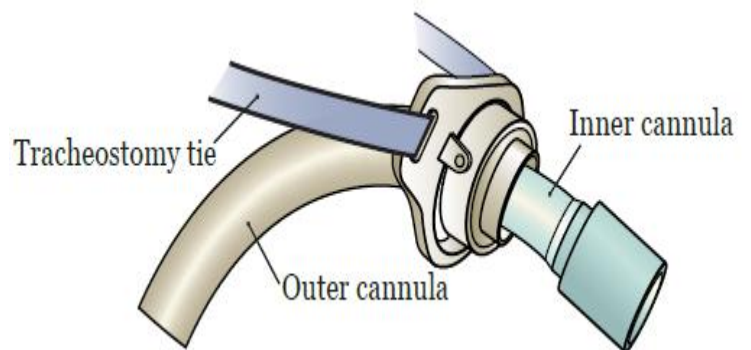
- Intra-op
 - hemorrhage
 - injury to paratracheal structures
 - ✓ Carotid artery, recurrent laryngeal nerve (RLN)...
- Early
 - Hemorrhage
 - Pneumothorax
 - Pneumo-mediastinum
 - Tube blockage
- Late
 - Local infection
 - Tracheal stenosis
 - Difficulty in decannulation
 - Persistent tracheo-cutaneous fistula

TRACHEOSTOMY—click the link below & watch video
<https://www.youtube.com/watch?v=osfsrvvoHGU>

	Tracheostomy	Intubation (ET)
Advantage	<ul style="list-style-type: none"> • Ease of replacement (once tract has formed) • Speech, mobility, and swallowing enhanced • Patient can be nursed outside of ICU • Ease of suctioning • Patient comfort 	<ul style="list-style-type: none"> • Rapid insertion by skilled consultant in most settings • Lack of need for surgical procedure (risk, expense) • Lack of stomal complications
Disadvantage	<ul style="list-style-type: none"> • Complications at cuff site • Stomal complications • Possible contribution to ultimate laryngeal injury, Tracheo-innominate artery fistula formation • Possible increase in pulmonary infections • Access to mediastinum by infectious agents after local surgery • High mortality for inadvertent decannulation before tract formation 	<ul style="list-style-type: none"> • Complications at cuff site • Laryngeal complications • Replacement requires skill at all times • Generally requires ICU level supervision • Injuries at nose or mouth

Tracheostomy techniques

1. Percutaneous tracheostomy
2. Operative tracheostomy



Operative tracheostomy procedure

1. Incision

- Supine position, extend the neck using shoulder roll & stabilize it by doughnut cushion
- Under possible aseptic technique
 - ✓ Inject lidocaine (with epinephrine)
 - ✓ 2 cm horizontal skin incision—2 finger breadth above sternal notch

2. Dissection

- Retract superior & inferior skin flaps
- Make vertical incision in the midline fascia b/n the strap muscles—usually bloodless plane
- Laterally retract the strap muscles & the anterior jugular veins
- Proceed the dissection vertically in the midline through the pretracheal tissue & fat. Place the lateral retractors deeper in the wound as the dissection proceed to a deeper level
- The cricoid cartilage & thyroid isthmus are encountered
- Retract the isthmus by Allis clamp superiorly
 - ✓ If difficult to retract, transect it. A horizontal incision is made in the anterior suspensory ligament of the thyroid, which is between the inferior edge of the cricoid cartilage & the isthmus. A curved hemostat is used to dissect the thyroid isthmus from the anterior surface of the trachea & the thyroid isthmus is transected using electrocautery. Care is taken to not violate the anterior surface of trachea or to pass hemostat deep to the cricoid cartilage
 - ✓ The pretracheal tissue is palpated in this area for a “high riding” innominate artery before the tracheostomy incision is made.
 - ✓ The anterior surface of trachea is further cleaned ; the tracheal fascia is incised vertically in the midline & bluntly dissected laterally

- ✓ A 2ml injection of 4% lidocaine plane is given intraluminally. This is especially important in awake pts to prevent coughing & anxiety while placing the tracheostomy tube
- ✓ Before entering the airway all necessary instruments & previously tested tracheostomy ube should be readily available & placed in order of need on mayo stand
- ✓ The anesthetist untapes the ETT, holds it in place & waits for instruction
- ✓ A horizontal incision (5-8mm length) is made directly above the tracheal ring of choice (2nd ,3rd or 4th) using scalpel, taking care not to puncture the cuff or ETT
- ✓ The incision continues in a manner necessary to remove an anterior portion of the ring
- ✓ The trachea is delivered into the wound & stabilized using retractors already in place or a cricoids hook
- ✓ A 2.0 silk is suture is placed through the inferior & superior tracheal rings , from outside to inside the lumen. The needles are removed & the sutures are not cut :the ends are brought out through the wound & can be used for retraction
- ✓ The ETT is now withdrawn under direct visualization .The cuff is deflated & ventilation is stopped
- ✓ The tracheostomy tube will be placed (with obturator in place) into the airway under direct visualization. The tube is introduced at a right angle & then turned inferiorly
- ✓ Once the tube is in place the obturator is removed, the inner cannula is placed the cuff is inflated & the ansthesia circuit is hooked to the tracheostomy tube. Confirm return of co2 .
Auscultate the chest bilaterally
- ✓ Place tracheostomy ties around the neck, Sew the flanges of the tube—to prevent accidental decannulation
 - Remove the stay sutures @ 5th post op day

GASTRO-INTESTINAL
RELATED

ABDOMINAL INJURY

- One of the commonest surgical emergency
- Based on post resuscitation physiologic condition pts with Abdominal injury can be;
 - a. Hemodynamically normal
 - b. Hemodynamically stable
 - c. Hemodynamically unstable

Types

- I. Blunt abdominal injury(BAT)
- II. Penetrating abdominal injury

BAT

- BAT with poly trauma is the commonest cause of death in young population.
- MOI in BAT may be Road traffic accident(commonest), Fall down injury, Seat belt syndrome, Assault...
- Mechanism of BAT injury
 1. Rapid deceleration
 2. Crushing(compression)effect

Approach for BAT patient

- Primary survey and act accordingly
- Secondary survey
 - Hx
 - pain, abdominal distention, fever
 - P/E
 - tachycardia, tachypnea
 - Abrasion, contusion, ecchymosis over the abdomen
 - Abdominal tenderness
 - Febrile, guarding, decrease bowel sound—suggestive of peritonitis
 - Follow abdominal girth by measuring with tape meter

- **Ix**
 - **Follow with serial Hct**
 - **CBC, BG & Rh, Cross match, U/A**
 - **OFT**
 - **Imaging**
 - **Contrast CT--gold standard for intra-abdominal diagnosis**
 - ✓ **Demonstrate vascular & visceral perfusion of solid organ**
 - ✓ **Severity grading**
 - ✓ **Sensitive for blood, so very important in dx of retroperitoneal injury.**
 - ✓ **Difficult in dx of hollow viscous injury (sensitive only 29%-35%)**
 - ✓ **Used for stable patient but for unstable patient laparotomy is indicated**
 - **Focused abdominal sonar for trauma (FAST)--U/S evaluation of abdomen to look for intrabdominal fluid**
 - **Accurate to detect >10ml of free blood (+ve) but operator & experience dependent**
 - **Diagnostic laparoscopy**
 - **Diagnostic peritoneal lavage (DPL); used to assess presence of intrabdominal blood. Steps;**
 - I. **Empty stomach and bladder by gastric tube & catheter respectively**
 - II. **Insert cannula below the umbilicus & push postero-caudally**
 - III. **Aspirate blood, if >10ml --insert 1000ml RL solution to the abdomen & aspirate again**
 - **Interpretation; If RBC >100,000/ul & WBC>500/ul -- it is +ve which is equivalent to 20ml of blood. i,e laparotomy is needed**

LIVER INJURY

- The mortality associated with these blunt hepatic injuries is 14.9%.
- Mechanisms of blunt hepatic injury
 1. Rapid deceleration--Tear hepatic tissue, vascular and ligament attachment
 2. Crushing effect--Compression b/n of rib cage and vertebral column
- Grading

Grade	hematoma(s.a)	laceration(cm)	vascular injury
1	Subcapsular tear (<10%of surface area)	<1cm parenchymal depth	–
2	Sub capsular tear 10-50%	1-3cm depth <10cm length	–
3	Sub capsular tear >50%	>3cm depth	
4		Parenchymal disruption(25-75% of H.lobe)	
5		Parenchymal disruption(>75% of H.lobe)	Juxtahepatic vein injury (Vena cava, Major hepatic vein)
6	-		Hepatic avulsion

Management

- Depends upon
 - The hemodynamic status of the patient
 - Grade of liver injury, and
 - Presence of other injuries and medical comorbidities
- The unstable patient with a positive FAST scan or DPA/DPL requires emergent abdominal exploration and control of bleeding may be through a damage-control approach or by using specific techniques for liver hemostasis.
- Stable patient who do not have other indications for abdominal exploration can be observed.
- Stable patients with right-sided penetrating thoracoabdominal injuries that lacerate the liver can also be observed, provided there are no associated intraabdominal injuries.

SPLenic INJURY

- Splenic injuries appear as disruptions in the normal splenic parenchyma, frequently with surrounding hematoma and free intra-abdominal blood.
- Spleen is commonly the bleeding intra-abdominal organ in unstable patient undergoing laparotomy.

Mechanism of blunt splenic injury can include;

- Direct compression
- Deceleration mechanism-- that tears the splenic capsule or parenchyma, mainly at areas fixed or tethered to the retro peritoneum

SPLenic INJURY GRADING

Grading	
I	<ul style="list-style-type: none">✓ Hematoma: 10% of surface area✓ Laceration: <1 cm in depth into the parenchyma
II	<ul style="list-style-type: none">✓ Hematoma: 10 to 50% of surface area✓ Laceration: 1 to 3 cm in depth
III	<ul style="list-style-type: none">✓ Hematoma: >50% of surface area✓ Laceration: >3 cm in depth or involving a trabecular vessel
IV	<ul style="list-style-type: none">✓ Segmental or hilar vessels laceration &✓ >25 % of spleen is devascularizes
V	<ul style="list-style-type: none">✓ Hematoma: shattered spleen✓ Laceration:hilar vascular injury which devascularizes spleen.

Approach

- Primary survey “ABC of life”
- Secondary survey—Hx, P/E, Ix & mgt

Ix

- FAST—hypo echoic (i.e, black) rim of sub-capsular or intraperitoneal fluid
- On Contrast CT
 - ✓ Hemi peritoneum
 - ✓ Hypo density
 - ✓ Contrast blush-hyper dense areas within the splenic parenchyma

- ✓ Active extravasation of contrast -ongoing bleeding
- ✓ organ-based ultrasound imaging
- ✓ MRI

MGT

- ✓ Unstable & positive FAST scan or DPA/DPL requires emergent exploratory laparotomy
- ✓ Stable & low-grade (I to III) blunt or penetrating splenic injuries can be observed safely by contrast CT
- ✓ Splenectomy may be a safer option, especially in the unstable patient with multiple potential sites of bleeding

Pancreatic injury

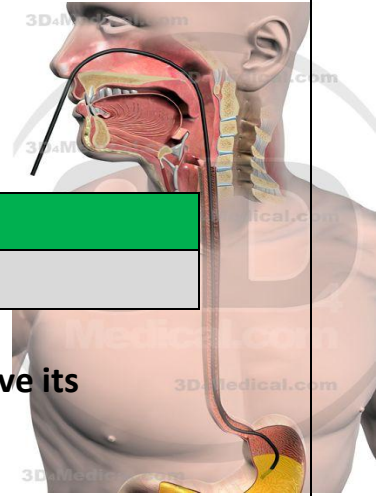
- Rare but remain a serious problem. Because the pancreatic enzymes result in massive systemic inflammation, with subsequent poor outcomes.
- Mechanism of injury
 - Direct penetration
 - Crushing
- It is difficult to diagnose, because;
 - Physical examination is less helpful
 - It is a retroperitoneal organ, so DPL, FAST, etc are non-specific
- CT remains the mainstay of accurate diagnosis, but limited sensitivity
 - CT finding of pancreatic injury include;
 - Disruption of parenchyma
 - surrounding fluid, or
 - Hematoma and stranding in the adjacent soft tissue.
- Elevated serum amylase levels 3 hours after admission shows pancreatic injury. It may be sensitive But unknown specificity.
- Imaging of pancreatic ducts with ERCP and MRCP may be helpful, especially for those who lack supporting studies. They may assist in planning therapy and determining an operative approach
- The mainstay of therapy for pancreatic injuries is surgical, exposure of the entire gland to evaluate the pancreas comprehensively.

Small Bowel Injuries

- ✓ The small intestine is one of the most frequently injured organs due to large percentage of the abdomen it occupies.
- ✓ Penetrating injuries can vary from tiny perforations to large destructive injuries that destroy circumferential segments of small bowel.
- ✓ The repair of small bowel injuries depends on the extent of intestinal wall destruction in relation to the luminal circumference.
 - ✓ Small perforations that can be closed without compromising the intestinal lumen can be debrided and repaired with one or two layers.
 - ✓ Injuries occupying over 50% of the intestinal wall circumference should be addressed with resection and anastomosis either by stapled or hand sewn anastomoses for intestinal resections. Hand-sewn anastomoses are frequently constructed in two layers
 - ✓ The damage control approach is important for rapid closure of perforations to control contamination and to control bleeding.

Damage control surgery

- ✓ Is operation done until the physiological derangement can be corrected
- ✓ It has two goals:
 1. stopping any active surgical bleeding
 2. Controlling any contamination
- ✓ The key philosophy is
 - to keep the patient alive at any cost
 - Be part of the resuscitation process, in which there is initial surgical control of hemorrhage and contamination followed by rapid closure
- ✓ The stages of damage control surgery
 - I. Patient selection
 - II. Control of hemorrhage and control of contamination
 - III. Resuscitation continued in the intensive care unit
 - IV. Definitive surgery
 - V. Abdominal closure



NASO-GASTRIC TUBE (NGT)

Indications

1. Gastric decompression
 - Removal of accumulated gastrointestinal air & fluid to relieve its pressure effect
2. Bowel irrigation
 - To lavage (wash) the stomach in case of poisoning or overdose of medications
3. For feeding--In patients with risk of aspiration
4. For administration of medication--To clients unable to swallow medications without aspirating it to the lungs
5. To obtain specimen from gastric content for analysis
6. After bowel surgery--To promote healing
7. To administer radiographic contrast media to GIT for imaging

Contraindications

- Absolute
 1. severe mid-face trauma
 2. Recent nasal surgery
- Relative
 3. coagulation abnormality
 4. Esophageal stricture → fear of perforation
 5. Esophageal varices → fear of bleeding

How to confirm that the tube is in stomach?

- Inject about 5mL of air through the tube. Audible gurgling sound in the epigastrium with a stethoscope indicate the tube is in the stomach
- Aspirate the tube with a syringe → if the aspiration is greenish gray colored fluid → the tube is in the stomach
- Listen to the end of the tube @ the nose → the sound of moving air indicate that the tube is in trachea, not in the stomach.
- X-ray

Complications

- Some degree of pt discomfort--can induce gagging or vomiting
- GERD
- Esophageal perforation
- Epistaxis
- Respiratory tree intubation /malposition

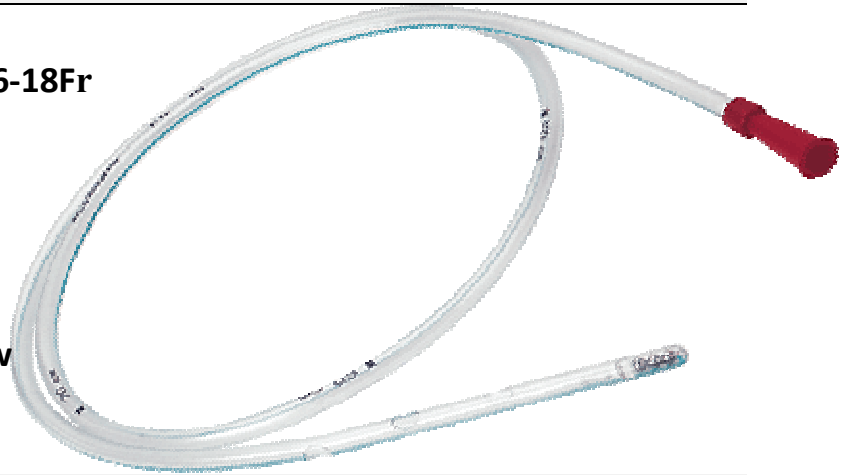
Click the link below & watch the video

<https://www.youtube.com/watch?v=en5ctZlnOyA>

Procedural note on NGT insertion

Materials

- Nasogastric tube –Adult 16-18Fr
- KY gell
- drainage bag
- gloves
- Syringe
- stethoscope
- Glass of water with a straw
- adhesive tape



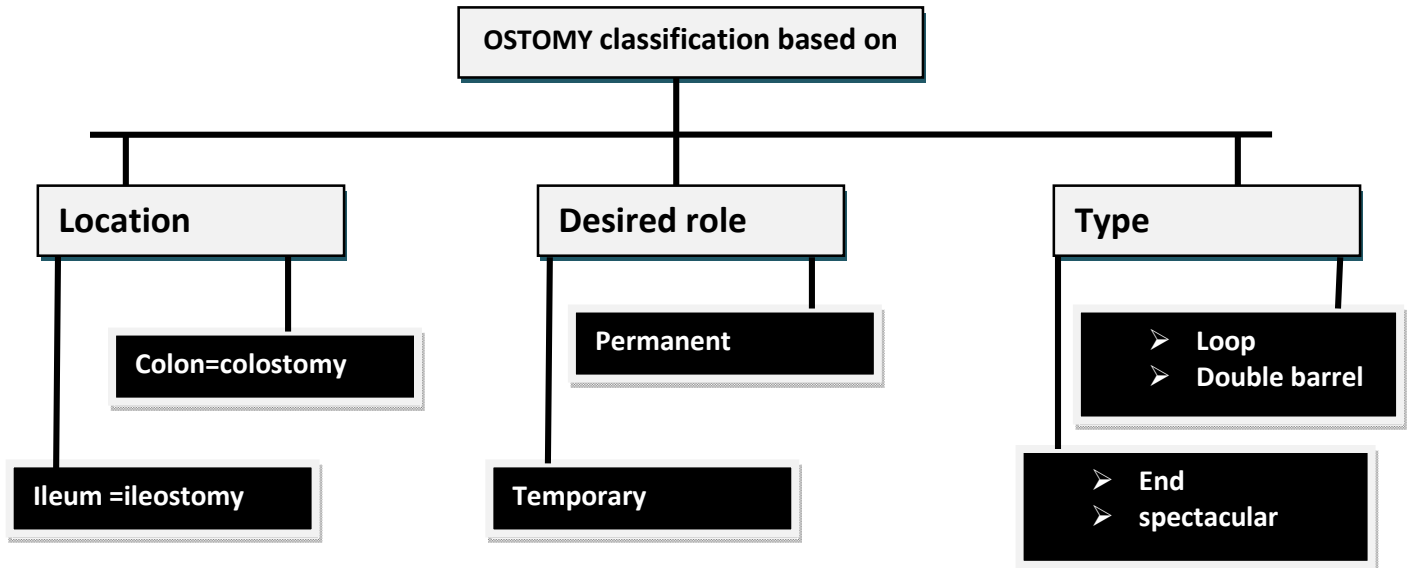
Procedure

- Explain the patient that a tube is going to be inserted through his nose & that...
 - ✓ He/she has to swallow the tube
 - ✓ There may be some cough during insertion of the tube
- Measure distance from the nostril to the tip of ear lobe then from the earlobe to the tip of xiphoid process → mark
- Lubricate the NG tube & choose the nostril which has the wider channel
- Pass the NG tube horizontally through the nose. As the tube touches the posterior pharyngeal wall the patient will gag
 - ✓ Patient may be given a little water to sip. The tube is then slowly advanced as the patient is asked to swallow the tube. During swallowing the cricopharyngeus muscle will relax and the tube will enter into the esophagus.
 - ✓ when the pt breathes → Stop inserting the tube for a moment
 - ✓ don't use force
- The tube is further advanced till the second ring in the tube lies at the level of nostril when the tip will lie in the stomach
- The tube is secured to the nose with an adhesive tape
- The tube is then connected to a plastic drainage bag to siphon out the stomach contents
- If required the stomach content may be sucked out

STOMA (COLOSTOMY , ILEOSTOMY)

General indication

- When restoration of intestinal continuity is contraindicated or not feasible



Indication for temporal "ostomy"

1. Gangrenous bowel obstruction
2. Penetrating colon injuries
3. High risk of anastomosis leak
 - ✓ In Immunocompromised pts, Severely malnourished pts...
4. Hemodynamic instability
 - ✓ In Pts with trauma, Sepsis...
5. Complex perianal fistulas

NB-As a general rule, closure of a temporary colostomy is delayed for weeks to months to assure complete resolution of the underlying condition and to permit softening of the adhesions. However, closure of the colostomy may be performed within three to six weeks if studies indicate that the need for diversion no longer exists (eg, if the distal anastomosis is well healed)

Indication for permanent "ostomy"

1. After excision of the rectum for carcinoma
2. Total abdominal proctocolectomy for severe IBD

"Stoma" complications

- **Early (<3months)**
 - ✓ **Leakage**
 - ✓ **Skin irritation--Common in ileostomy**
 - ✓ **Stomal necrosis**
 - ✓ **Stomal retraction**
- **Late**
 - **Parastomal hernia**
 - **Stomal prolapse**
 - **Stomal stenosis**
- **Psychosocial problem**

Colostomy

- ✓ **Colostomy refers to a surgical procedure where a portion of the large intestine is brought through the abdominal wall to carry stool out of the body.**
- ✓ **Colostomy bypasses distal colon, rectum or anus.**
- ✓ **May be**
 - **Temporary**
 - **To decompress an obstructed or perforated distal colon**
 - **To permit healing of fistulous tract or acute inflammatory process distally**
 - **For protection of distal anastomosis when delayed healing is anticipated**
 - **Permanent**
 - **In case if distal rectum & anorectal sphincter mechanisms are removed**

NB-Colostomy diarrhea may be present

Ileostomy

- ✓ **Ileostomy refers to a surgical procedure where a portion of the small intestine (the ileum) is brought through the abdominal wall to carry stool out of the body.**
- ✓ **Ileostomy bypasses the entire colon & rectum.**
- ✓ **May be temporary or permanent**

NB-- ileostomy patients are more likely to develop fluid and electrolyte problems ++ skin irritation

How to differentiate stomas?

1. The content that is coming out
 - ✓ Mucus--in colostomy
 - ✓ Watery--in ileostomy
2. Skin around the stoma
 - ✓ More skin irritation in ileostomy
 - ✓ Pink in colostomy
3. Odor
 - ✓ Foul smelling in colostomy
4. Size of stoma
 - ✓ Wider in colostomy than ileostomy
5. If you insert your hand in stomas you will be able to differentiate loop Vs end ostomy
6. ? Site??

BOWEL PREPARATION

- Aim--To decrease the bacterial load which in turn decreases risk of infection & anastomosis leak
- Total duration—For 03 days
- How

- 02 methods

1. Mechanical bowel preparation

Using cleansing enema
(water & soap)

2. Pharmacologic bowel preparation

- ✓ Laxatives

- Castor oil
- Polyglycol solution

		Treatments:
22/10/10	2:00 ^{PM}	<u>New order</u> - cleansing enema BID #03 days - castor oil 15ml po BID #03 days - put him on MF #03 days
24/10/10	2:00 ^{PM}	<u>Added order</u> - Amoxicillin 500mg po at 7:00LT(D), 8:00LT(D) & at 5:00LT(N) - Metronidazole 500mg po at 7:00LT(D), 8:00LT(D) & at 5:00LT(N) - NPO after mid night

- Keep on fluid diet→For 03 days

- Antibiotics

- ✓ Which drug to choose?

- Coverage--Broad spectrum
- Route--PO
- Poorly absorbable from GI system

- ✓ Drug of choice (DOC)

- Metronidazole & Neomycin
 - If neomycin isn't available we can use others like Ampicillin, Amoxicillin, erythromycin...

- ✓ When?

- If the surgery is scheduled tomorrow morning, the antibiotic should be given today @ 1:00 PM then @ 2:00PM & 11:00PM. (i.e. in local time--7, 8 (in the afternoon) & 5 O'clock in the night)
- Antibiotics also should be given 30 minutes prior to surgery-- Ceftriaxone 1gm IV stat

- NPO (nothing per os)→08 hrs prior to surgery

NB* Complete bowel obstruction & perforation are contraindications for bowel preparation

HERNIA

- **Abnormal protrusion of viscus through its containing wall.**

RFs

- **Any condition that raise intra-abdominal pressure**
 - ☞ **Chronic cough**
 - ☞ **Straining on micturation and defecation**
 - ☞ **ascites**
- **Abdominal surgery**
- **Anatomical weaknesses...**
 - ☞ **Where structures pass through the abdominal wall**
 - ☞ **Where muscles fail to overlap**
 - ☞ **Where there is no muscle → only scar tissue**
- **Congenital--persistent processes vaginalis sac**
 - **indirect hernia**
- **Collagen fiber disorder**
 - **Acquired → smoking**

Composition of hernia

Consist of 3 parts

1. The sac
 - **Has mouth, neck, body and fundus**
2. Covering of the sac
3. Content of hernia
 - A. **Omentum → omentocele**
 - B. **Intestine → enterocele**
 - C. **Portion of intestine → richter's hernia**
 - D. **Bladder**
 - E. **Ovaries**
 - F. **fluid**
 - G. **Meckel's diverticulum → littré's hernia**

Classification

<<>>Irrespective of the site

- Reducible
 - ❖ content can be returned to the abdomen
- Irreducible
 - ❖ content cannot be reduced but no complication
- obstructed
 - ❖ bowel in the hernia has good blood supply but bowel is obstructed
- Incarcerated
 - ❖ The lumen of that portion of the colon occupying a hernial sac is blocked with feces. But the hernia has good blood supply
- Strangulated
 - ❖ irreducible + impaired blood supply

Characteristics of asymptomatic/reducible hernias are

- ☞ Swelling or fullness at the hernia site
- ☞ Aching sensation
- ☞ No true pain or tenderness upon examination
- ☞ Enlarges with increasing intra-abdominal pressure and/or standing

Characteristics of incarcerated hernias are

- ☞ Painful enlargement of a previous hernia or defect
- ☞ Irreducible either spontaneously or manually
- ☞ Nausea, vomiting, and symptoms of bowel obstruction(possible)

Characteristics of strangulated hernias are

- ☞ Patients have symptoms of an incarcerated hernia
- ☞ pain and tenderness
- ☞ Systemic toxicity secondary to ischemic bowel is possible

<<>>Depending on the site→in order of decreasing frequency

1. Inguinal
2. Incisional
3. Umbilical and epigastric
4. Femoral

INGUINAL HERNIA

Boundary of inguinal canal

- ✓ Anteriorly → external oblique aponeurosis
- ✓ Posteriorly → fascia transversalis
- ✓ Superiorly → conjoined muscle of internal oblique and transversalis
- ✓ Inferiorly → inguinal ligament

NB-- Inferior epigastric vessels lie posteriorly and medially to deep inguinal ring

Contents of inguinal canal

- ✓ Spermatic cord
- ✓ Ilioinguinal nerve and
- ✓ Genital branch of genitofemoral nerve
 - Round ligament replace the spermatic cord in females

Hesselbach's triangle

- ✓ Lateral boarder of rectus sheath
- ✓ Inguinal ligament
- ✓ inferior epigastric vessels

Indirect/oblique inguinal hernia

- most common form of hernia
- mostly due to Congenital causes → persistent processes vaginalis sac
- young male

Direct/acquired inguinal hernia

- older male
- due to poor lower abdominal musculature (Hesselbach's triangle)

DDx

In males

- Vaginal hydrocele
- Encycted hydrocele of the cord
- Spermatocele
- Undescended or ectopic testis
 - empty scrotum on affected side
- Lipoma of cord
- Femoral hernia

In females

- Hydrocele of the canal of nuck
- Femoral hernia

FEMORAL HERNIA

- common in multiparous women

DDx

- Inguinal hernia → medial & above to inguinal ligament
 - femoral hernia → lateral & below to inguinal ligament
- Saphenavarix
 - fluid thrill may present
- An enlarged femoral lymph node
- Lipoma
- Femoral aneurysm
- Psoas abscess
- Distended psoas bursa
- Rupture of the adductor longus with hematoma formation

INCISIONAL HERNIA

Risk factor

- Obesity
- DM
- Ascites
- Steroid
- Smoking
- Wound infection

Click the link below & watch video on how to examine hernia

<https://www.youtube.com/watch?v=JR27rKrhvkE>

Physical examination of hernia

Inspection → on standing position

- Shape of the swelling
- location of the swelling
- unilateral or bilateral
- overlying skin
- see for expansile cough impulse
 - Ⓢ Hernia with no expansile impulse
 - omentocele with adhesion
 - obstructed hernia
 - strangulated hernia
- see position of penis

Palpation

- temperature
- Tenderness
- Consistency
 - ✓ Soft and elastic → enterocele
 - ✓ Firm and doughy → omentocele
 - ✓ Tense and tender → strangulation
 - ✓ Bag of warms → varicocele
- Reducibility
 - ✓ Direct inguinal hernia reduce by itself on lying down
 - ✓ Indirect inguinal hernia → reduce manually
 - ✓ Enterocele → the first part difficult to reduce but the last reduce easily
 - ✓ Omentocele → the first part reduce easily but the last reduce with difficulty due to adhesion
 - ✓ Not reducible → strangulated

- **Invagination of scrotal skin by index finger to examine**
 - ✓ **Size of superficial inguinal ring**
 - ✓ **Direction of the hernia sac**
 - ✓ **Direction of expansile impulse**
 - ✓ **Not performed in children**
- **Do Internal ring occlusion test**
- **Examine normal side**
- **Examine abdomen → for any surgical scar**

HEMORRHOIDS, ANAL FISSURE, FISTULA IN ANO & PERIANAL ABSCESS

Hemorrhoids

Hemorrhoids are pathologically swollen blood vessels in the lower rectum.

Classification

I. Internal hemorrhoids

II. External hemorrhoids

By dentate line

RFs

- Constipation & Straining
- Pregnancy
 - Postpartum hemorrhoids from straining during labor
- Low fiber diet
- Age (elderly)
- Family hx
- Chronic diarrhea
- prolonged toilet sitting
- Colon malignancy
- IBD
- Heavy weight lifting

CP

Hx

- Per rectal...
 - Bleeding--Usually bright red
 - If it's darker or blood mixed with stool → better to suspect a more proximal cause of bleeding
 - Pain -- External Vs internal
 - External → painful because of somatic innervation
 - Pruritis
 - Prolapse--Ask if reducible (by itself or manually) or not
- Change in bowel habit
- Ask pt's immune status...

HPI

- This pt was LRH 02 weeks back @ which time he started to experience bright red bleeding per rectum. Associated with this he has manually reducible, painless per rectal swelling...

P/E

- Inspection of the rectum
 - Skin tags → Redundant tissue from old thrombosed external hemorrhoids
 - Fissure
 - Fistula
 - Signs of infection or abscess formation
 - hemorrhoidal prolapse
- DRE
 - Indurated/ulcerated area
 - Mass, tenderness, mucoid discharge or blood
 - Anal tone
 - Palpate the prostate in all men

Ix

- CBC--Infection, anemia
- Anoscopy, flexible sigmoidoscopy

Grading of internal hemorrhoids

- I. Projection into the anal canal + often bleed + no prolapse
- II. Protrusion beyond anal verge with defecation + spontaneous reduction
- III. Protrusion + manual reduction
- IV. Chronic protrusion + not reducible
 - This pts are @ risk of strangulation

DDx

- Condyloma acuminata
- Anal fissure
- Anal fistula
- Peri-anal abscess
- Proctitis
- Rectal prolapse
- Colorectal ca

Mgt

1. Conservative Rx
 - a. Give stool softener (e.g. bisacodyl)
 - b. Advice on
 - i. high fiber diet
 - ii. increasing fluid intake

- iii. Avoidance of straining
- iv. Good hygiene
- 2. Non-surgical
 - a. Rubber band ligation
 - b. Infrared photo-coagulation
 - c. Sclerotherapy
- 3. Surgical
 - a. Excision of thrombosed external hemorrhoids
 - b. Operative hemorrhoidectomy

Complications of hemorrhoidectomy

- Post-op pain
- bleeding
- Urinary retention
- Infection
- Transient incontinence
- Anal stenosis

Anal fissure

- Anal fissure is a tear in the anoderm distal to the dentate line.
 - ✓ Acute if <6wks
- Tend to occur in younger & middle aged person

RFs

- Trauma
 - From passage of hard stool or
 - Chronic diarrhea
- Low fiber diet
- Prior anal surgery

CP

- Severe pain during bowel mov't...
 - Afraid of bowel mov'ts→constipation(hard stool)→more anal pain
 - Burning, tearing or cutting type of pain
- Bright red blood (hematochezia) on the toilet or stool (few drops)
- Spasm of the anus
- Fissures can often be seen in the anoderm
- Cmn site→posterior mid line
 - Off the midline--raise the possibility of CD(IBDs), AIDs, Syphilis, TB, leukemia..
- Pts are always too tender to tolerate DRE

Mgt

1) Conservative Rx→to minimize anal trauma

- Bulk agents
- Stool softeners
- Warm sitz baths
- Analgesic creams

2) Surgical Rx→for chronic fissures that failed medical therapy

- Lateral sphincterotomy
 - To decrease spasm of internal sphincter by dividing a portion of the muscle

Fistula in ano/ anorectal fistula

Fistula in ano is an abnormal tract or cavity with an external opening in the perianal area by identifiable internal opening.

RFs

- ✓ Previous anorectal abscess
- ✓ Cryptoglandular infection (Infection→abscess→fistula)
- ✓ Trauma
- ✓ CD (Crohn's disease)
- ✓ Anal fissures
- ✓ Anal carcinoma
- ✓ Radiation therapy for prostatic ca.
- ✓ Actinomycosis
- ✓ TB
- ✓ LGV

CP

Hx

- ✓ Perianal discharge, Pain, Swelling
- ✓ Bleeding, Diarrhea
- ✓ Skin excoriation

P/E

Look for

- ✓ an external opening
- ✓ Spontaneous discharge

DRE

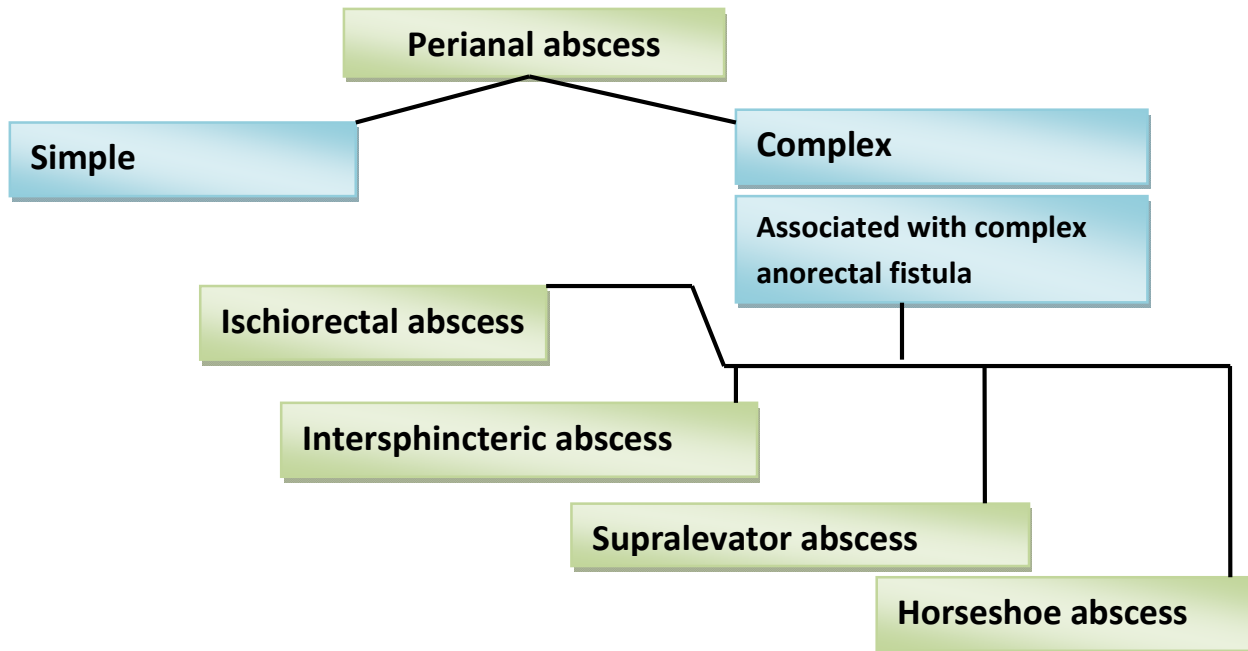
- ✓ Fibrous/chord like tract beneath the skin
- ✓ Abscess if not yet drained
- ✓ Indurations

Mgt

- ✓ Drainage
- ✓ Eradicating the fistulous tract

Perianal abscess

The majority of anorectal abscesses originate from infected anal glands



CP

Hx

- Severe constant perianal pain
- Fever
- Malaise
- Purulent discharge may be noted if it started to drain spontaneously

P/E

- fluctuant, tender mass or a patch of erythematous, indurated skin overlying perianal skin
- in some types of abscess there may not be finding on inspection (E.g. supralelevator abscess), so do DRE

Complication

- chronic fistula

DDX

- anorectal fistula
- presacral epidermoid cyst
- hidradenitis suppurativa

- **internal hemorrhoid**
- **pilonidal disease**
- **bartholine duct abscess**

Ix

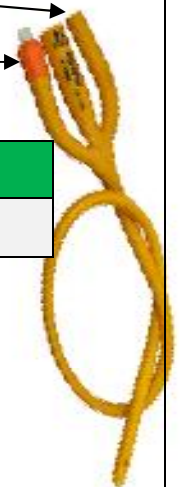
- **Blood sugar level**
- **PICT**
- **CBC**

Principles of mgt

- **Abscess drainage in a timely manner.**
 - **Lack of fluctuance should not be a reason to delay treatment**
- **Antibiotics may have a role in special circumstances including valvular heart disease, immunosuppression, extensive cellulitis, or diabetes**

GENITO-URINARY
RELATED

- 1) irrigation
- 2) drainage of urine
- 3) inflation



URETHRAL CATHETERIZATION

Indications

- Therapeutic
 - ✓ Acute Urinary Retention(AUR)
 - Due to BPH or Blood clots
 - ✓ For continuous bladder irrigation
 - ✓ Chronic urinary retention that cause hydronephrosis
 - ✓ Hygienic care for bedridden pts with incontinence
 - ✓ To Instill medication
- Diagnostic
 - For collection of uncontaminated urine sample
 - To monitor urine output
 - Imaging of the urinary tract

Contraindications

- In presence of traumatic injury to lower urinary tract
 - E.g. Urethral tear
 - This condition must be suspected in patients with a pelvic or straddle-type injury.
- Relative contraindication
 - Urethral stricture
 - Recent urethral or bladder surgery

Complications

- UTI
- Urethral stricture
- Urethral perforation
- bleeding
- Paraphimosis
- Non deflating retention balloon
- Chronic catheterization may lead to...
 - Bladder calculi formation
 - Bladder ca.

Types of catheter

- condom catheter
- straight catheter(1 way)
- Foley catheter (2 way)
- 3 way catheter--for continuous bladder irrigation

Procedural note on urethral catheterization

Materials

- ✓ Sterile gloves, sterile dressing, sterile draping sheet
- ✓ Catheter, urine bag
- ✓ lubricant, antiseptic soln.
- ✓ syringe, distilled water
- ✓ lidocaine

Procedure

- ✓ Explain the procedure to the patient
- ✓ Position → supine with legs apart (frog leg position with knees flexed)
- ✓ Scrub and put-on sterile gloves
- ✓ clean the genitalia with antiseptic solution and drape the area
- ✓ Clean the glans penis with antiseptic solution
- ✓ Using a syringe with no needle, instill 5-10 mL of lidocaine 2% into the urethra. Place a finger on the meatus to help prevent spillage. Allow 2-3 minutes before proceeding with the urethral catheterization (not the usual experience in our setup)
- ✓ The penis is held vertically upwards to straighten the penile urethra
 - by encircling a sterile gauze around the penis
- ✓ The lubricated Foley's catheter is then pushed gently through the external urethral meatus and gradually advanced till it reaches the bladder
 - urine will be seen coming-out through the catheter
- ✓ Advance the catheter a little further
- ✓ Inflate the balloon with 10 mL of sterile water
- ✓ After the balloon is inflated the catheter is gently pulled outward to confirm that the balloon is properly inflated
- ✓ Connect the catheter to the urine bag

What may be the cause of failure to insert a catheter?

- Size of the catheter
- Urethral stricture
- Bladder neck contracture
- Tight phimosis
- Meatal stenosis

Click the link below & watch video on u. catheterization of

Male-<https://www.youtube.com/watch?v=hhGqHDHIVXo>

Female-<https://www.youtube.com/watch?v=JaT3ZWB2OHw>

SUPRAPUBIC CYSTOSTOMY

Indications

1. AUR
 - When urethral catheter cannot be passed 2^o to Urethral stricture, Bladder neck contractures...
2. Urethral trauma
 - Have high index of Suspicion of urethral trauma in pts with Pelvic fracture/Saddle-type injuries
 - Triad (CP)
 1. Blood @ urethral meatus
 2. Inability to urinate &
 3. Palpably distended bladder
3. Mgt of complicated lower genito-urinary tract infection
 - E.g. acute bacterial prostatitis
4. Requirement for long term urinary diversion
 - E.g. neurogenic bladder

Contraindications

1. Absolute
 - a. If the bladder is not distended
 - b. Hx of bladder ca.
2. Relative
 - a. Coagulopathy
 - b. Previous lower abdominal or pelvic surgery
 - c. Pelvic cancer

Complications

- Extravasation (Intraperitoneal & or extraperitoneal)
- Obstruction (by blood, mucous, kinking...)
- Exit site infections or leakage
- Serious complications of the procedure include bowel perforation and other intra-abdominal visceral organ injuries
- Possible complications from long-term catheter use include; recurrent symptomatic UTI, bladder and renal calculi formation, deterioration of renal function, and increased risk of bladder cancer

Suprapubic cystostomy techniques

- 1) Open surgical technique
- 2) Percutaneous Suprapubic Cystostomy

Click below & watch → open surgical cystostomy video

https://www.youtube.com/watch?v=GoHLB3j_ZAA



SCROTAL SWELLING

DDX for scrotal swelling

- ✓ **Hernia** (read on hernia under short cases)
- ✓ **Hydrocele**
 - Fluid collection in the tunica vaginalis of the scrotum or along the spermatic cord. May be communicating or non-communicating hydrocele.
- ✓ **Hematoma**
- ✓ **Epididymal cyst**
 - Cystic degeneration of the epididymis filled with crystal clear fluid.
- ✓ **Testicular torsion** (read below...)
- ✓ **Epididymo-orchitis** (read below...)
- ✓ **Testicular tumor**
 - Seminoma Vs Non-seminoma
- ✓ **Varicocele**
 - is a result of dilation of veins that drain into the internal spermatic veins
 - Left side → most commonly affected
 - Examination of a man with varicocele when he is upright reveals a mass of dilated, tortuous veins lying posterior to and above the testis. It may extend up to the external inguinal ring, and the Valsalva maneuver can increase the degree of dilation
- ✓ **Syphilitic gumma...**

How to differentiate?

Answer the following during your Physical Examination...

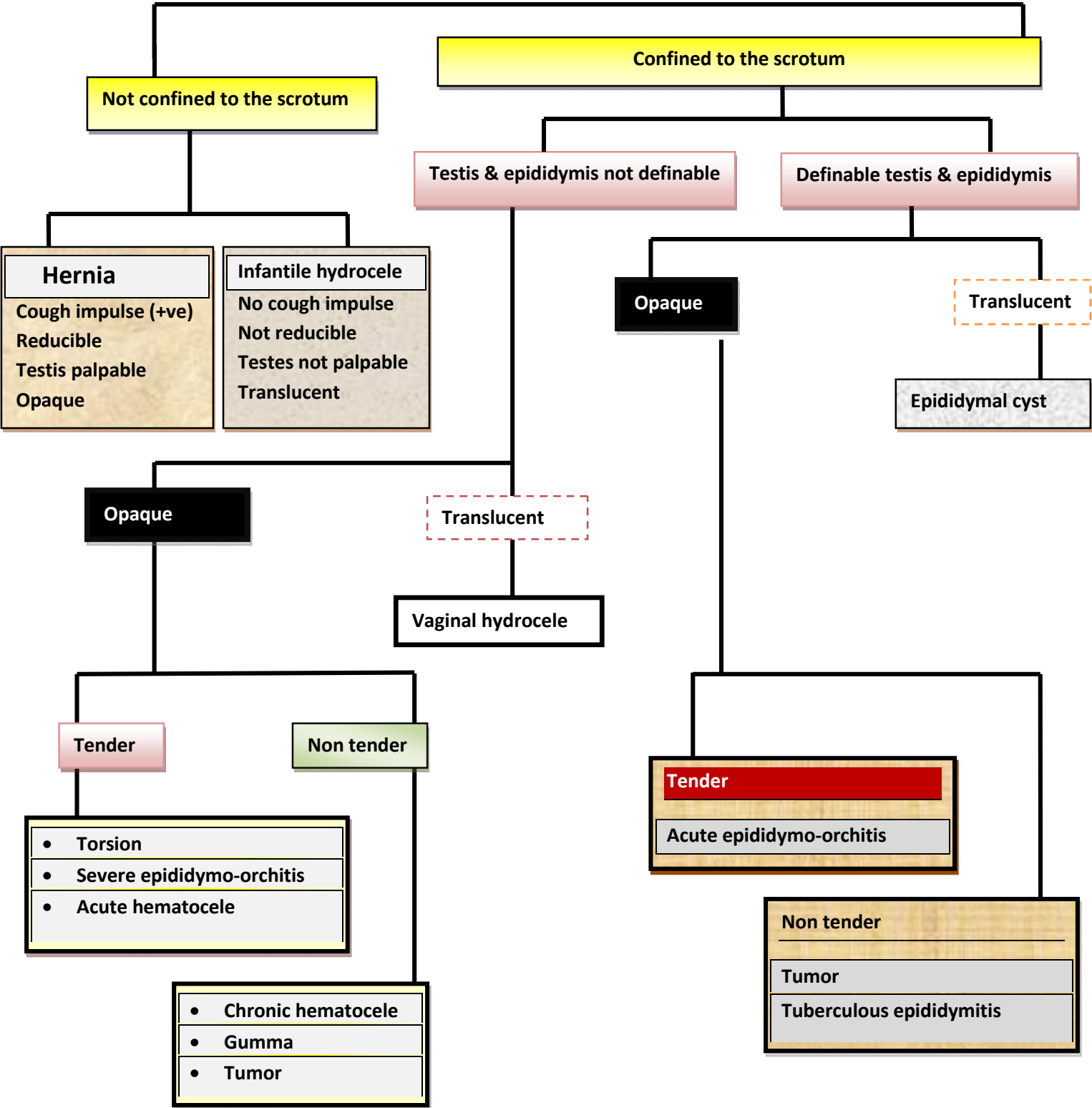
1. Can you get above the swelling?
2. Can you identify the testis & epididymis?
3. Is the swelling translucent?
4. Is the swelling tender?

Click the link below & watch video on how to examine scrotal swelling @

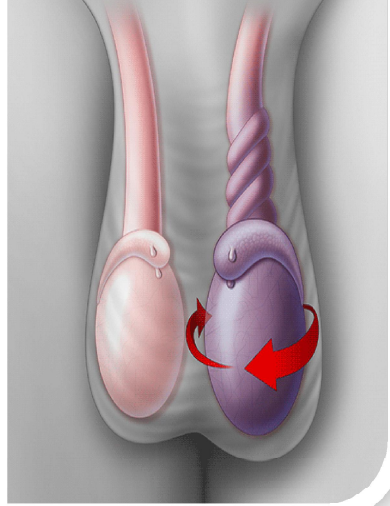
<https://www.youtube.com/watch?v=CCpxEePuc24>

Then use the algorithm below...

Scrotal swelling



Testicular torsion



- Testicular torsion refers to the twisting of the spermatic cord structures resulting in subsequent loss of blood supply to the epididymis & the testis.
- a urologic emergency that requires rapid diagnosis and intervention in order to maintain viability of the testicle

RFs for torsion

- Undescended testis
- Testicular tumor
- “bell clapper deformity”--High investement of the tunica vaginalis causes the testis to hang within the tunica vaginalis like a clapper in a bell

CP

Hx

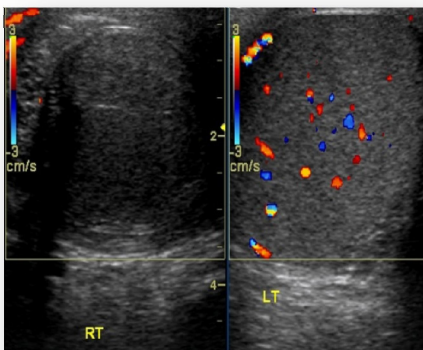
- ✓ Sudden onset of testicular pain
- ✓ Subsequent swelling
- ✓ The patient feels nauseated & may vomit

P/E

- ✓ Inspection--Swollen, asymmetric scrotum
- ✓ Palpation
 - Tender, firm testicle
 - high riding testicle
 - may have horizontal lie of testicle
 - The posteriorly positioned epididymis may be positioned differently
 - No pain relief with elevation of the testicle→makes it worse
 - The spermatic cord may appear thickened
 - cremasteric reflex→lost

Ix

- ✓ Doppler scrotal ultrasound



- What to look? Decreased/absent intra-testicular blood flow on the affected testis
- Other advantages--Can rule out an associated testicular tumor

NB*Diagnostic testing should not delay treatment

Mgt

- Immediate surgical exploration
 - Early diagnosis and treatment are vital to saving the testicle and preserving future fertility.
 - The rate of testicular viability decreases significantly after 6 hours from onset of symptoms
 - Immediate surgical exploration (<6hrs after the onset of symptoms) can salvage an ischemic testis in >80% of pts
 - if 12hrs lapsed the rate decreases to 20%

Surgical exploration

Detorsion—rotate the testicle to its normal position to restore blood flow to the testicle

Then assess for viability after being given time for normal blood flow to resume

Viable

Non viable

orchiopexy of the affected and the contralateral testicle

- ✓ orchidectomy of the affected testicle
 - To avoid later risk of abscess formation if the testis is clearly necrotic
 - ✓ orchiopexy of the contralateral side
 - Fixed to dartos fascia
- Why orchiopexy to the contralateral normal testis?
- because of the possibility of the same anatomic defect

Epididymo-orchitis

- Inflammation confined to the epididymis is epididymitis. when it spreads to the testis--called epididymo-orchitis

Causes

- Is typically result of bacterial infection originating in the urinary tract
- Generally epididymitis arises
 - ✓ In sexually active young men from a genital infection. Common causative agent of epididymitis→ chlamydia trachomatis
 - ✓ Older male→ from urinary infection (as in case of BOO) or May be secondary to urethral catheterization

CP

- Hx
 - ✓ Unilateral scrotal pain
 - ❖ The onset is fairly rapid, but not as sudden as testicular torsion
 - ✓ swelling of the epididymis & or testis
 - ✓ Often with fever
 - ✓ May have initial symptoms of urinary or genital infection
- P/E
 - ✓ The scrotum wall become red, edematous & shiny
 - ✓ May become adherent to the epididymis
 - ✓ Elevation of the testis reduces the pain

Ix

- CBC--WBC count is often raised
- Ultrasound
 - ✓ May provide supporting evidence
 - ❖ Such as increased blood flow to the epididymis
 - ❖ A reactive hydrocele may be present
 - ❖ Reduced testicular blood flow→In case of ischemic orchitis 2^o to intratesticular infection
- U/A →pyuria--will usually show leukocytosis

Mgt

- Antibiotics
 - ✓ Route-PO
 - ❖ If the pt is not markedly febrile & is otherwise stable

- ✓ **Route-Parenteral → hospitalization**
 - ❖ **If high fever or significantly elevated WBC or if hemodynamically unstable**
- ✓ **Initial DOC in young pts**
 - ❖ **Doxycycline or**
 - ❖ **Quinolone**
 - Contact tracing → Rx if necessary**
- ✓ **Initial DOC in older pts**
 - ❖ **Quinolone**
 - ❖ **If evidence of systemic sepsis**
 - ✓ **IV antibiotics directed @ urinary pathogens**
- ✓ **Duration**
 - ❖ **It should continue for at least 02 wks or until the inflammation subside**
- **Other measures**
 - ✓ **All pts should drink plenty of fluid**
 - ✓ **Scrotal support**
 - ✓ **Analgesics**
- **Surgery**
 - ✓ **Drainage indicated if suppuration occurs**

HYPOSPADIA, EPISPADIA & BLADDER EXSTROPHY

Hypospadias

- ✓ The most common congenital abnormality of the urethra in males in which it opens abnormally on the ventral surface of the penis (1 in 200–300 male live births).
- ✓ There are 3 characteristic features
 - external meatus opens on the underside of the penis or the perineum
 - ventral aspect of the prepuce is poorly developed ('hooded prepuce') and
 - ventral deformity of the erect penis (chordae)

Classification

- ✓ *Glandular hypospadias*--placed on the glans penis, but proximal to the normal site of the external meatus (blind pit)
- ✓ *Coronal hypospadias*--placed at the junction of the underside of the glans and the body of the penis
- ✓ *Penile and penoscrotal hypospadias*--on the underside of the penile shaft
- ✓ *Perineal hypospadias*--bifid scrotum, urethra opens between its two halves with testicular maldescent, rarest and most severe

Features

- ✓ Absence of urethra and corpus spongiosum distal to abnormal urethral orifice
- ✓ Bowing or bending of penis distal to abnormal urethral opening (chordee), with poorly developed prepuce over inferior aspect
- ✓ Urine soilage over the scrotum with dermatitis and infection
- ✓ Associated congenital anomalies

Treatment

- ✓ Does not cause either obstruction or urinary tract infection. Surgery is indicated to improve sexual function, to correct problems with the urinary stream and for cosmetic reasons.

Epispadias

- ✓ Urethral opening is on the dorsum of the penis and is associated with an upward curvature of the penis. Epispadias are very rare but often coexists with bladder exstrophy and other severe developmental defects. Most common site is at the abdomino-penile junction.

Treatment

- ✓ Correction of incontinence of urethra
- ✓ Urinary diversion

Bladder exstrophy

- ✓ Incomplete development of the infraumbilical part of the anterior abdominal wall and anterior wall of the bladder. Associated with spina bifida and other anomalies. 1:50 000 births (m:f-4:1)

Features

- ✓ Penis is broad and short ± bilateral inguinal hernia
- ✓ Red mucus membrane of posterior bladder wall protrudes out
- ✓ With visible urine efflux from ureteric orifice
- ✓ Umbilicus absent with separation of the pubic bones
- ✓ females, defective external genitalia

Problems

- ✓ Repeated soakage
- ✓ Ulceration
- ✓ Pain
- ✓ Recurrent pyelonephritis
- ✓ Renal failure (50% of pt die)

Long-term complications

- ✓ stricture at the site of anastomosis
- ✓ hyperchloremic acidosis
- ✓ adenoma and adenocarcinoma at the site of a ureterocolic anastomosis(20-fold)

Treatment

- ✓ Bladder is closed in the 1st yr of life, osteotomy of both iliac bones, reconstruction of the bladder neck and sphincters.
- ✓ urinary diversion

MMUSCULO-SKELETAL
RELATED

AMPUTATION

Indications

- ✓ PVD/peripheral vascular disease/--DM accounts around 50%
- ✓ Trauma
 - High grade open fractures with associated nerve injury, soft tissue loss & ischemia + un-reconstructable neurovascular injury
- ✓ Tumor
 - Malignant bone & soft tissue tumors
- ✓ Infections
 - fulminating gas gangrene
 - acute/ chronic bone infection that is unresponsive to antibiotic or surgical debridement
- ✓ Congenital anomalies/ deformities
- ✓ Burns & frostbite

Types of limb amputations

1. Leg amputations → can be divided into 2 broad categories:

Major amputations:

- Below-knee amputation/BKA
- Knee disarticulation
- Above-knee amputation (transfemoral)
- Rotationplasty
 - Foot being turned around and reattached to allow the ankle joint to be used as a knee
- Hip disarticulation
- Hemi-pelvectomy

Minor amputations:

- Amputation of digits
- Partial foot amputation
- Ankle disarticulation

2. Arm amputation

- Amputation of digits
- Metacarpal amputation
- Wrist disarticulation
- Forearm amputation (transradial)
- Elbow disarticulation
- Above-elbow amputation (transhumeral)
- Shoulder disarticulation and forequarter amputation
- Krukenberg procedure

Complications of Amputation

- Phantom pain
- Hematoma
- Infection
- Failure of wound to heal
- edema
- Contracture
- Neuroma
- Psychological distress
- Complications due to immobility & pressure...

General principle of amputation

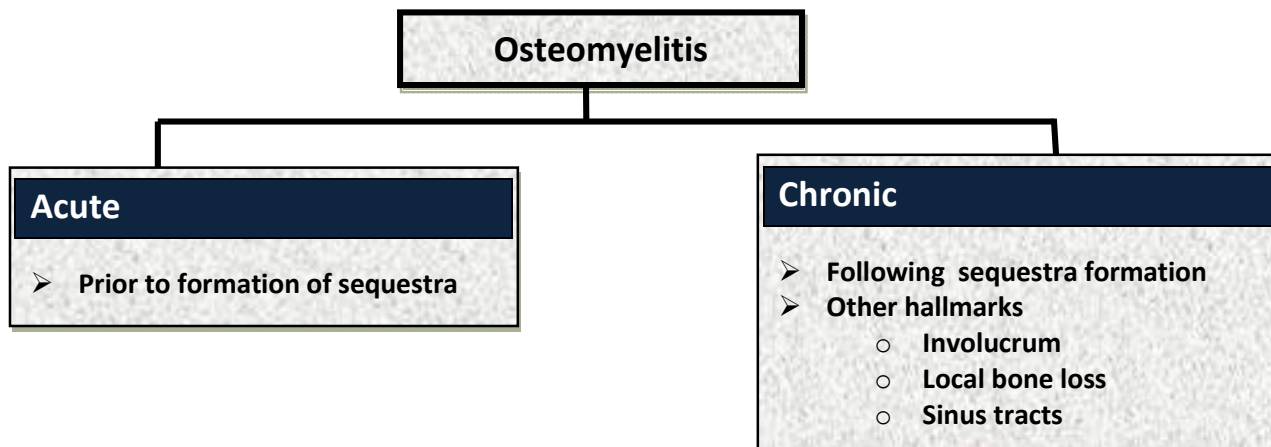
- Appropriate mgt of Skin, Bone, Nerves & Vessels
- Procedure
 - Remove the diseased tissue and any crushed bone
 - Smooth uneven areas of bone
 - Seal off blood vessels and nerves
 - Cut and shape muscles so that the stump, or end of the limb, will be able to have an artificial limb (prosthesis) attached to it

Types of prosthesis

1. Endoprosthesis--implants used in orthopedics surgery
2. Exoprosthesis --external replacement for lost limb. May be temporary or permanent.

MGT OF FRACTURE

Read under long case of fracture on section of fracture mgt



NB

Sequestrum=necrotic bone

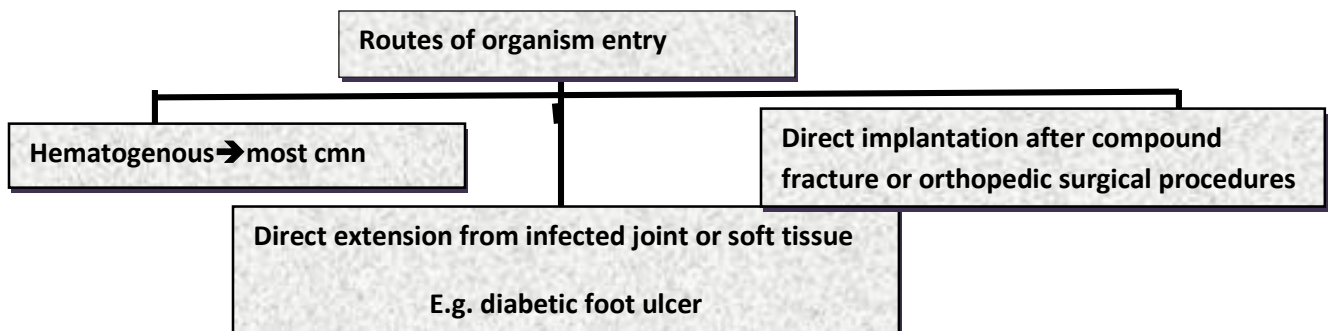
Involucrum=new bone formation around the dead bone

NB

- ☐ Although the time limits delineating one category from the other are somewhat arbitrary, as a rule
 - ✓ infections up to 3 months--acute
 - ✓ Longer than 3 months--chronic
 - ✓ Some include a third category, "subacute," for patients who exhibit symptoms that endure longer than 3 months but who have not developed extensive necrotic bone

Etiology

- Pyogenic osteomyelitis (Staph.aureus)--common
 - Cmn Sites
 - ✓ In children--long bones--metaphysis
 - ✓ in adults--Vertebrae
- Tuberculous osteomyelitis
 - the spine is the most cmn site → pott's disease



RFs

- ✓ Immunodeficiency disorders
- ✓ Sepsis
- ✓ Minor trauma coincident with bacteremia
- ✓ Indwelling vascular catheters
- ✓ Chronic hemodialysis vascular access
- ✓ Sickle cell disease

CP

- Classic signs of inflammation
 - Local bone pain, swelling, Redness...
- Fever
- Draining sinus

Ix

- CBC--Leucocytosis may be observed in acute osteomyelitis but is unlikely in chronic osteomyelitis
- Increased ESR & CRP
- Blood culture--may be positive in about half of cases of acute osteomyelitis
- Discharge analysis--Culture and Gram staining
- Radiograph--may be normal up to 10days
 - Within 72 hr →deep-soft tissue edema (swelling) with displacement of the deep muscle planes
 - In 5-7 days→Periosteal reaction
 - After 7-14 days→Lytic bone changes, which are not visible until 30-50% of the bony matrix is destroyed
 - Infection in flat and irregular bones can take longer to appear
- Radionuclide scanning
- MRI—very sensitive for the detection of acute osteomyelitis and demonstrates abnormal marrow edema as early as three to five days following onset of infection

Complications of chronic osteomyelitis

- Pathologic fracture
- Sepsis, endocarditis
- Squamous cell carcinoma (Marjolin's ulcer) of sinus tract
- Osteosarcoma
- Growth plate involvement in children--impaired bone growth
- Septic arthritis

Mgt

Acute recent infection

1. Establish free drainage
2. Antibiotics--choice depends on
 - Age
 - Underlying medical condition
 - Suspected pathogens and their susceptibility pattern
 - Antibiotic safety and efficacy and availability
- DOC
 - Cloxacillin /Naficillin /clindamycin plus
 - Ceftriaxone /cefotaxime /cefuroxime or chloramphenicol
- Duration # 3-6 weeks
- IV to PO--When patients' condition has stabilized, usually 5 -10day of IV antibiotics
 - Afebrile for the past 48- 72 hours
 - Local signs and symptoms of infection are reduced considerably
 - Peripheral leukocyte count has normalized
 - ESR has decreased by at least 20 percent or there has been a 50 percent decrease in the concentration of CRP
- ➔ Indicators of quiescence are...
 - Discharge of pus ceases
 - Wound become lined by healthy granulations
 - NB @ this stage wound closure may be attempted by 2^o suture (if practicable) or by grafting
3. Indication & Principles of surgical Rx
 - Indications
 - Unresponsive to specific antibiotic Rx (Prolonged fever, Persistent pain and swelling)
 - Evidence of persistent soft tissue abscess/ subperiosteal collection
 - If concomitant joint infection is suspected
 - Chronic osteomyelitis
 - Principle of surgical mgt
 - Adequate drainage
 - Extensive debridement of necrotic tissue
 - Mgt of dead space
 - Adequate soft tissue coverage
 - Restoration of blood supply

Bone Tumors

RFs

- Paget's disease
- Radiation
- Fibrous dysplasia
- Hereditary...

Classification of bone tumors

Primary

Osteogenic tumors

1. Benign
 - ✓ Osteoid osteoma
 - ✓ osteoblastoma
2. malignant
 - ✓ osteosarcoma

Chondrogenic tumors

1. Benign
 - ✓ Osteochondroma
2. Malignant
 - ✓ chondrosarcoma

Marrow derived

- ✚ Malignant
 - Myeloma
 - lymphoma

Secondary/metastasis → cmn

1. Breast
2. Prostate
3. Lung
4. Renal
5. Thyroid

Others

- Ewing's sarcoma

Primary

Bone forming /osteogenic tumors

Benign

Osteoid osteoma	Osteoblastoma
➤ <i>< 2cm in diameter</i>	➤ <i>Larger</i>
➤ <i>< 25yrs of age</i>	➤ <i>Relatively older</i>
➤ <i>Affect appendicular skeleton esp. femur & tibia</i>	➤ <i>Affect mostly the spine</i>
➤ <i>Very painful (nocturnal) which responds to aspirin</i>	➤ <i>Dull achy pain which doesnot respond to aspirin</i>
➤ <i>Elicits tremendous amount of reactive bone</i>	➤ <i>Less reactive bone</i>

Malignant/ Osteosarcoma

- ❖ Most common primary bone malignancy
- ❖ Most common in distal femur, followed by proximal tibia
- ❖ Aggressive lesions that metastasize through the blood stream early in their course
 - The lungs are common sites of metastases

Cartilage tumors

- Osteochondroma
 - benign cartilaginous capped bony projection → growing away from the joint towards the diaphyseal region
 - can be pedunculated or sessile
- chondrosarcoma
 - 2nd most common malignant bone tumor
 - They arise in central portions of the skeleton
 - Patients present with painful progressively enlarging masses
 - Metastases show predilection for lungs and skeleton

Others

- Ewing's sarcoma
 - Tends to arise in the diaphyses of long bones/pelvis
 - CP
 - painful mass +general symptoms with fever, anemia
 - Increased ESR
 - X-ray
 - 'moth-eaten' bone + 'onion skin' periosteal rxn

Metastatic (2^o) tumor

❖ Can be

- Lytic → Kidney, Lung...
- Sclerotic → Prostatic ca.
- Mixed...

Common sites of metastasis

- Spine
- Proximal femur
- Proximal humerus

FOOT DEFORMITY

Can be congenital or acquired

- Examples of acquired causes
 - bunion/Hallux valgus
 - Hallux virus
 - hammer toe
 - foot drop
 - flat feet
- Examples of congenital causes
 - pigeon toe
 - club foot
 - pes caves
 - rocker bottom foot....etc

Club foot (congenital talipes equinovarus)

- Relatively common birth defect, occurring in about one in every 1,000 live births
- Approximately 1/2 of people with clubfoot have it affect both feet, which is called bilateral club foot. In most cases it is an isolated disorder of the limbs. It occurs in males twice as frequently as in females.
- The affected foot appears to have been rotated internally at the ankle
- Without treatment, people with club feet often appear to walk on their ankles or on the sides of their feet. However, with treatment, the vast majority of patients recover completely during early childhood and are able to walk and participate in athletics just as well as patients born without the deformity.

Diagnosis

- Clinical
- Foot x-ray → Dr's interest
- In-utero ultrasound

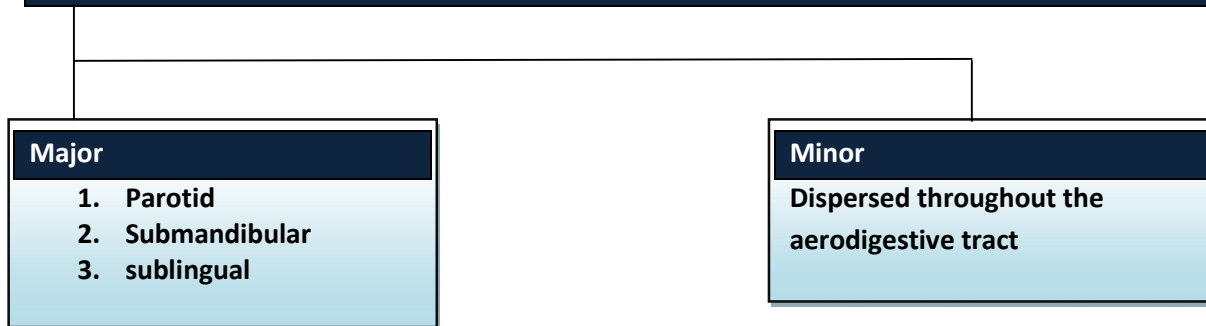
Treatment

- French method
- ponseti method
- surgery

**HEENT+LYMPHOGLANDULAR
RELATED**

SALIVARY GLAND TUMORS ,INFECTIONS & CALCULI

SALIVARY GLANDS



Salivary gland tumors (SGTs)

CP--benign SGTs

- Painless, slow growing mass
- Well circumscribed
- Almost always freely mobile
 - Face→parotid gland
 - unaffected facial nerve function
 - Angle of jaw→DDx
 - Submandibular gland
 - Tail of parotid gland
 - Floor of mouth→Sublingual gland
- Parotid→80% of the SGTs
 - 80% benign
 - pleomorphic adenomas→most cmn-60%
 - warthin tumor→5-15%

CP—malignant SGTs

- Rapid growth
- pain
- Bleeding
- Airway compromise
- Nerve dysfunction
 - E.g. paresthesia, facial palsy...
- Skin fixation

See how to examine mass under short case (swelling examination)

Salivary gland infection & calculi

- 80% in Submandibular gland

Submandibular calculi (Sialolithiasis)

- factors which encourage stasis in the submandibular duct
 1. Anatomy of the duct → gravity
 2. Quality of mucus

CP

- The main symptoms are
 1. swelling
 - ✓ start to worsen just before eating
 2. Pain
 - ✓ dull aching
 - ✓ worsen during eating
 - ✓ goes away before the swelling
- ***purulent saliva may be present

Submandibular sialadinitis

- 2^o to the presence of a stone in its duct or the damage done by a stone which has passed through the duct.
- Staphylococcus → commonest etiology

CP

- Pain, which is
 - severe, throbbing, continuous
 - Exacerbated by eating

CLEFT LIP & PALATE

Clefting of the lip and or palate occur around the 8th week of embryogenesis, either by

- failure of fusion of the medial nasal process and the maxillary prominence or
- by failure of mesodermal migration and penetration between the epithelial bilayer of the face

Etiology--Multifactorial

- Familial—more common in cleft lip or combined cleft lip and palate (Risk increased by 4%)
- increased parental age, drug use (steroids /diazepam) and infections during pregnancy
- Protein and vitamin deficiency
- Rubella infection
- Radiation
- Chromosomal abnormalities
- smoking during pregnancy

Classification

I. Cleft lip alone

- ✓ Central –Rare
 - In upper lip. Between two median nasal processes. (Hare lip)
- ✓ Lateral--commonest
 - maxillary and median nasal process
 - can be unilateral or bilateral
- ✓ Incomplete → cleft lip does not extend into nose
- ✓ Complete cleft lip → extends into nasal floor
- ✓ Simple cleft lip → only cleft in the lip
- ✓ Compound cleft lip → cleft lip with cleft of alveolus

II. Cleft of primary palate (in front of incisive foramen) only

- a. Complete—absence of pre-maxilla (anterior hard palate)
- b. Incomplete—rudimentary pre-maxilla
 - i. Unilateral
 - ii. Bilateral
 - iii. Median

III. Cleft of secondary palate (behind the incisive foramen) only

- a) Complete—nasal septum and vomer are separated from palatine process
- b) Incomplete
- c) Sub-mucous
 - Cleft with soft palate involvement
 - Cleft without soft palate involvement

IV. Cleft of both primary and secondary palates

V. Cleft lip and cleft palate together

- often associated with other congenital anomalies of cardiac, GI, nervous system
 - E.g. Pierre-Robin syndrome, Klippel-Feil syndrome, Stickler's syndrome, Shprintzen's syndrome, Down's syndrome, Treacher-Collin's syndrome, Apert's syndrome and trisomy.

Problems in Cleft Disorders

- Difficulty in sucking and swallowing. This is commonly observed in cleft palate than in cleft lip.
- Speech is defective especially in cleft palate. Mainly to phonate B, D, K, P, T and G.
- Altered dentition or supernumerary teeth
- Recurrent upper respiratory tract infection
- Respiratory obstruction (in Pierre Robin syndrome)
- Chronic otitis media, middle ear problems
- Cosmetic problems
- Hypoplasia of the maxilla
- Problems due to other associated disorders

Treatment for Cleft Lip

- Principles of cleft lip repair
 - ❖ "Rule of 10' should be fulfilled
 - 10 pound in weight
 - 10 weeks old
 - 10 gm % hemoglobin
 - ❖ Before 6 months--should be operated
 - ❖ Proper postop mgt like control of infection, training for sucking, swallowing and speech
 - ❖ Millard advancement flap is commonly used for unilateral cleft lip repair

- ❖ Bilateral cleft lip repair can be done either in single or two stages (with 6 months gap between each stage)
- ❖ Management of associated primary or secondary cleft palate deformity

Cleft Palate

- It is due to failure of fusion of the two palatine processes
- Defect in fusion of lines between premaxilla (developed from median nasal process) and palatine processes of maxilla one on each side
- When premaxilla and both palatine processes do not fuse, it leads into complete cleft palate (Type I cleft palate)
- Incomplete fusion of these three components can cause incomplete cleft palate beginning from uvula towards posteriorly at various lengths. So it could be Type II a–bifid uvula, Type II b–bifid soft palate (entire length) or Type II c –bifid soft palate and posterior part of hard palate (but anterior part of hard palate is normal).

Feature

- Small maxilla with crowded teeth, absent/poorly developed upper lateral incisors
- Bacterial contamination of upper respiratory tract with recurrent infection is common
- Chronic otitis media with deafness may occur
- Swallowing difficulties to certain extent and speech problems can occur
- Cosmetic problems

Treatment for Cleft Palate

- Cleft palate is usually repaired in 12-18 months. Early repair causes retarded maxillary growth (probably due to trauma to growth center and periosteum of the maxilla). Late repair causes speech defect.
- Both soft and hard palates are repaired--called palatoplasty
- Regular examination of ear, nose and throat during follow up period
- Post-op speech therapy
- Secondary management:
 - Hearing support--using hearing aids if defect is present, control of otitis media
 - Speech problems – speech therapy
 - Dental problems corrected by proper dentist opinion, and reconstructive surgery
 - Orthodontic management

MISCELLANEOUS

EXAMINATION OF MSS, SWELLING & ULCER

Examination of musculoskeletal system (MSS)

General approach

- ❖ Inspection [look]
- ❖ Palpation [feel]
- ❖ Range of Motion (ROM) [move]
- ❖ Measurement [measure]

i) Look

- Expose both sides , adequate light

Specific to the site of interest

- Look for asymmetry
- Deformity
- Visible fractured bone
- Swelling
- Laceration
- Bruising /discoloration
- Abnormal movement
- Atrophy...

ii) Feel

- Temperature
 - Compare both sides of extremities with back of your hand
- Tenderness
- Check pulses
 - ✓ If lower extremity
 - ⊕ Dorsalis pedis artery
 - ⊕ Posterior tibialis artery
 - ⊕ Popliteal artery...
 - ✓ If upper extremity
 - ⊕ Radial artery
 - ⊕ Brachial artery
- Compare muscle bulk--By measuring with tape meter
- Asses capillary refill--If >2sec→abnormal
- Swelling →characterize...

iii) Move

Range of motion (Active)

- Ask the patient to move the affected site
- Watch for decreased or increased movement of the joint compared to the other side as well as the normal
- Watch for pain with movement
- Listen for crepitus or “popping”
- Watch for abnormal movements

ROM (passive)

- Move the joints passively, comparing the end points to the active
- Again note any decreased or increased movement
- Pain with the movement
- Crepitus or “popping”

iv) Measure

Apparent length

- From xiphisternum or umbilicus to medial malleolus

Real length

- From greater trochanter of the femur up to the medial malleolus

True length

- Between two bony prominences

NB

During short examination on fracture, first you will be asked to explain what you see on the patient like External fixation, POP, Traction, Surgical dressing....

- Read on fracture mgt --under fracture (long case)

Examination of swelling/mass

Inspection

- Shape
- location
- Overlying skin color change
- Any ulceration or discharge

Palpation

- Temperature → compare
- Tenderness
- Size--Measure
- Number
- Surface (Smooth Vs Nodular)
- Border (Regular Vs irregular)
- Fixity--To the overlying or underlying tissue
- Consistency (Soft Vs firm Vs hard)

Specific

- Fluctuant--Indicate abscess collection
- Transillumination---E.g scrotal swelling (hydrocele)
- Reducibility—E.g. hernia , hemorrhoidal swelling
- Compressibility--Characteristic of vascular hemangioma
- Pulsatility

Click below & watch video on how to examine swelling

<https://www.youtube.com/watch?v=GUX6UpRiU9c>

NB

When you are asked to list DDx for a swelling...Think of the structures that are found underlying/overlying the swelling like fibrous connective tissue, adipose tissue, vessels, skeletal muscles, nerves & bone. Then list the benign & malignant causes of swelling of each structure. E.g. fibroma, fibrosarcoma (for fibrous Connective tissue)

Examination of ulcer

Inspection

- Location of ulcer. E.g.
 - ✓ Varicose ulcer--lower leg
 - ✓ Rodent ulcer— face, nose
 - ✓ Tuberculosis ulcer--over the neck
- Size
- Number --Single or multiple
 - ✓ Is there any similar ulcer in other part of body?
- Margin--Type
 1. Healing ulcer--Have 3 lines
 - White (outer), blue (center) & red (inner)
 2. Inflamed margin
 - Red, irregular with inflamed surrounding skin
 3. Fibrosed margin
 - Thicken white skin margin without the blue line of growing epithelium
- Floor of the ulcer (surface of ulcer)
 - ✓ Granulation, sloughing , discharge...
- Surrounding skin
 - ✓ Redness
 - ✓ Pigmentation
 - Dark pigmentation of skin →typical for varicose ulcer
 - Hypopigmentation of surrounding skin→in non-healing ulcer

Palpation

- ✓ Surrounding skin for hotness and tenderness
- ✓ Ulcer--Edge →confirm size
- ✓ Floor--see if it bleeds on touch
- ✓ check the involvement of underlying structures

Related examination

- ✓ Related lymph nodes
- ✓ Related arteries, veins and nerves
- ✓ Movement in neighboring joints
 - Restriction to movement indicates muscle involvement or painful inflammation...

Click below & Watch video on how to examine ulcer @

<https://www.youtube.com/watch?v=S1FpVuyUJ6Q>

WOUND

Definition--A wound is a break in the integrity of the skin or tissues, associated with disruption of the structure and function.

CLASSIFICATION OF WOUNDS

I. Surgical Wound classification

- a) Clean wound--Infective rate is less than 2%
 - Herniorrhaphy, excisions
 - Surgeries of the brain, joints, heart, transplant...
- b) Clean contaminated wound--Infective rate is 10%
 - Appendicectomy, Bowel surgeries
 - Gallbladder, biliary and pancreatic surgeries
- c) Contaminated wound--Infective rate is 15-30%
 - Acute abdominal condition, Open fresh accidental wounds
- d) Dirty infected wound--Infective rate is 40-70%
 - Abscess drainage, Pyocele, Empyema gallbladder, Fecal peritonitis.

II. Rank and Wakefield Classification

A. Tidy wounds

- Incised (sharp objects), clean, healthy wound without any tissue loss. Heal by primary intention. Primary suturing is done.

B. Untidy wounds

- Crushed, devitalized, unclean. Wound dehiscence, infection, delayed healing is common. Liberal excision of devitalized tissue and healing by secondary intention is the management. Secondary suturing, skin graft or flap may be needed.
- E.g--crushing, tearing, avulsion, devitalized, vascular injury, multiple irregular wounds and Burns

III. Classification based on Type of Wound

- Clean incised wound→clean-cut wound with linear edge
- Lacerated wounds--ragged edges with devitalization
- Bruising and contusion--soft tissue injury with discoloration and haematoma formation without skin break
- Hematoma—subcutaneous, intramuscular, subfascial or intra-articular blood collection
 - Small hematoma get absorbed. Large hematoma once get infected should be drained under general/regional anesthesia adequately.

- Closed blunt injury
- Puncture wounds and bites
- Abrasion--superficial shearing of skin (only epidermal injury). Heals by epithelialization.
- Traction and avulsion injury
- Crush injury--caused by war wounds, road traffic accidents, tourniquet.
 - Leads to Compartment syndrome, Muscle ischemia, Gangrene and loss of tissue.
- War wounds and gunshot injuries
- Injuries to bones and joints→may be open or closed
- Injuries to nerves→either clean cut or crush
- Injuries to arteries and veins (major vessels)
- Injury to internal organs→may be of penetrating or nonpenetrating (blunt) types
- Penetrating wounds
 - Stab, bullet

III. Classification based on Thickness of the Wound

- Superficial wound→only epidermis and dermal papillae
- Partial thickness → deep dermis. With only deepest part of the dermis, hair follicle shafts and sweat glands are left behind.
- Full thickness →entire skin and subcutaneous tissue causing spacing out of the skin edges.
- Deep wounds →across deep fascia into muscles or deeper structures.
- Complicated wounds → associated with injury to vessels or nerves
- Penetrating wound →penetrates into either natural cavities or organs.

IV. Classification based on Involvement of Structures

- Simple wounds → only one organ or tissue
- Combined wounds → mixed tissues

V. Classification based on the Time Elapsed

- Acute wound →up to 8 hours of trauma
- Chronic wound →after 8 hours of trauma

WOUND HEALING

Wound healing is complex method to achieve anatomical and functional integrity of disrupted tissue

Types of Wound Healing

- **Primary Healing (First Intention)** → Clean incised wound or surgical wound. Wound edges can be approximated by sutures. More epithelial regeneration than fibrosis.
 - Heals rapidly with complete closure. Scar will be linear, smooth, and supple.
- **Secondary Healing (Second Intention)** → Extensive soft tissue loss like in major trauma, burns and wound with sepsis. Heals slowly with fibrosis. A wide scar, often hypertrophied and contracted. May lead to disability.
- **Healing by Third Intention (Tertiary Wound Healing or Delayed Primary Closure)** → After wound debridement and control of local infection, wound is closed with sutures or covered using skin graft. Primary contaminated or mixed tissue wounds heal by tertiary intention.

Stages of Wound Healing

- Stage of inflammation
- Stage of granulation tissue formation and organization. Fibroblastic activity, synthesis of collagen and ground substance.
- Stage of epithelialization
- Stage of scar formation and resorption
- Stage of maturation

Phases of Wound Healing

Inflammatory Phase (Lag or Substrate or Exudative Phase)

- It begins immediately after wound healing. It lasts for 4-6 days.
- Features of inflammation are rubor, calor, tumour, dolor and loss of function.
- Macrophages secrete fibroblastic growth factor which enhances angiogenesis.
- PMN leukocytes appear after 48 hours which secrete inflammatory mediators and bactericidal oxygen derived free radicals.
- These cells also remove clots, foreign bodies and bacteria.
- Chemical factors involved in wound healing are: Growth factor—platelet derived, epidermal, transforming, Interleukin, Tumour necrosis factor, ,Prostaglandins, Collagenase, Elastase.

These actions are reduced in diabetes mellitus, Cushing's syndrome and immunosuppression increasing the rate of sepsis.

Proliferative Phase (Collagen/Fibroblastic Phase)

- Collagen and glycosamines are produced by fibroblasts.
- It begins in 7 days and lasts for 6 weeks.
- Hydroxyproline and hydroxylysine are synthesized by specific enzymes using iron, alpha ketoglutarate and vitamin C.
- Tropocollagen is produced which aggregates to form collagen fibrils.
- 80–90% of their final strength (in postoperative wounds) is achieved in 30 days.

Remodeling Phase (Maturation Phase)

- It begins at 6 weeks and lasts for 2 years.
- There is maturation of collagen by cross-linking which is responsible for tensile strength of the scar.
- Collagen production is not present after 42 days of wound healing.

Scar strength is 3% in 1 week; 20% in 3 weeks; 80% in 12 weeks. But it will never get its original strength.

Management of Wounds

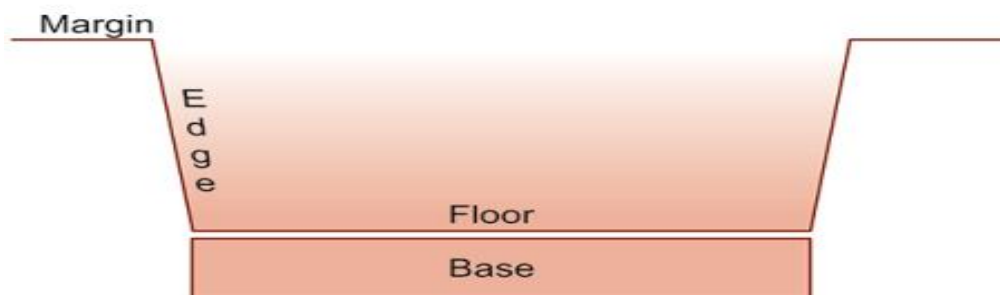
- ❖ ABC of life
 - ❖ Incised wound----primary suturing after thorough cleaning.
 - ❖ lacerated wound ----wound is excised and primary suturing
 - ❖ Crushed or devitalized wound ---- there will be edema and tension in the wound. So, after wound debridement or wound excision edema is allowed to subside for 2-6 days. Then delayed primary suturing is done.
 - ❖ Deep devitalized wound ---- after wound debridement, it is allowed to granulate completely. Later if the wound is small, secondary suturing is done. If the wound is large, a split skin graft is used to cover the defect.
 - ❖ Wound with tension ---- fasciotomy is done so as to prevent the development of compartment syndrome.
 - ❖ Vascular or nerve injuries are dealt accordingly
 - ❖ Internal injuries has to be dealt accordingly. (intracranial by craniotomy, intrathoracic by intercostal tube drainage, intra-abdominal by laparotomy).
 - ❖ Antibiotics, fluid and electrolyte balance, blood transfusion, tetanus toxoid (0.5 ml intramuscular to deltoid muscle), or antitetanus globulin (ATG) injection.
-
- ❖ Wound debridement (wound toilet, or wound excision) →is liberal excision of all devitalized tissue at regular intervals (of 48-72 hours) until healthy, bleeding, vascular tidy wound is created.
 - ❖ Primary suturing →means suturing the wound immediately within 6 hours. It is done in clean incised wounds.
 - ❖ Delayed primary suturing →means suturing the wound in 48 hours to 10 days. It is done in lacerated wounds. This time is allowed for the edema to subside
 - ❖ Secondary suturing→means suturing the wound in 10-14 days or later. It is done in infected wounds. After the control of infection, once healthy granulation tissue appears, secondary suturing is done.

ULCER

Definition→An ulcer is a break in the continuity of the covering epithelium, either skin or mucous membrane.

Parts of an Ulcer

- **Margin:** It may be regular or irregular. It may be rounded or oval.
- **Edge:** Edge is the one which connects floor of the ulcer to the margin.
 - ❖ **Sloping edge**--It is seen in a healing ulcer. Its inner part is red because of red, healthy granulation tissue. Its outer part is white due to scar/fibrous tissue. Its middle part is blue due to epithelial proliferation.
 - ❖ **Undermined edge**-- is seen in a tuberculous ulcer. Disease process advances in deeper plane (in subcutaneous tissue), whereas (skin) epidermis proliferates inwards.
 - ❖ **Punched out edge**-- is seen in a gummatous (syphilitic) ulcer and trophic ulcer. It is due to endarteritis.
 - ❖ **Raised and beaded edge (pearly white)** -- is seen in a rodent ulcer (Basal Cell Carcinoma). Beads are due to proliferating active cells.
 - ❖ **Everted edge (rolled out edge)**-- It is seen in a carcinomatous ulcer(SCC) due to spill of the proliferating malignant tissues over the normal skin.
- **Floor:** It is the one which is seen. Floor may contain discharge, granulation tissue or slough
- **Base:** Base is the one on which ulcer rests. It may be bone or soft tissue.



Classification

Clinical

a. Spreading ulcer:

- ❖ Edge is inflamed and edematous

b. Healing ulcer:

- ❖ Edge is sloping with healthy pink/red granulation tissue with serous discharge.

c. Callous ulcer:

- ❖ Floor contains pale unhealthy granulation tissue with indurated edge/base. It lasts for many months to years. Ulcer doesn't show any tendency to heal. It is due to callous attitude of the patient.

Pathological

1. Specific ulcers:

- ✓ Tuberculous ulcer
- ✓ Syphilitic ulcer--It is punched out, deep, with "wash-leather" slough in the floor and with indurated base
- ✓ Actinomycosis

2. Malignant ulcers:

- ✓ Carcinomatous ulcer
- ✓ Rodent ulcer
- ✓ Melanotic ulcer

Nonspecific ulcers:

1. Traumatic

- ✓ Physical→Electrical
- ✓ Chemical→Caustics
- ✓ Mechanical→Dental ulcer, pressure from splint, etc...

2. Arterial--Atherosclerosis, TAO, Raynaud's disease

3. Venous--Venous ulcer, Post-thrombotic ulcer, gravitational ulcer

4. Neuropathic (Neurotrophic or Perforating)

- ✓ Diabetes, leprosy, tabes dorsalis, spina bifida, paraplegia, syringomyelia

5. Tropical ulcers--Tropical countries

6. Metabolic →Diabetes ,Gout

7. Secondary to diseases like
 - Rheumatoid arthritis
 - Erythrocyanosis frigida
 - Osteitis Deformans (Paget’s disease of the bone)
 - Avitaminosis
8. Ulcers complicating blood diseases
 - Sickle cell anemia
 - Mediterranean anemia
 - Felty’s syndrome (look for spleen)
9. Ulcer occurring on paralysed leg
 - ✓ usually seen in anterior poliomyelitis
10. Factitious ulcer (Artefact ulcer)
11. Diphtheritic desert sore
12. Yaws
13. Decubitus ulcer
14. Iatrogenic ulcer → extravasation of IV fluid
15. Ulcers in congenital arteriovenous fistula
16. Miscellaneous → Martorell’s ulcer

Classical sites for commonly seen ulcers

<i>Type of ulcer</i>	<i>Site</i>
Venous ulcer	Just above the medial malleolus (Gaiter area)
Arterial ulcer	Tips of toes and between the toes (where the pressure is lowest), over the malleoli and heel (pressure areas)
Neuropathic ulcer	Over the heads of the first and second metatarsal .
Traumatic ulcer (footballer’s ulcer)	Shin (the tibia is subcutaneous and there is lack of underlying muscle with resultant reduced blood supply)
Rodent ulcer (BCC)	Above a line joining the angle of the mouth to the lobule of the ear
Tuberculous ulcer	Seen in neck, axilla and groin (where tuberculous lymph nodes are seen)
Gummatous ulcer	Over the subcutaneous bones such as sternum, skull, tibia, etc.
Trophic ulcers	On the heel and ball of the foot

Types of discharge & the probable cause	
Discharge	Cause
Serous	In healing ulcer
Seroanguineous	Tuberculous ulcer
Greenish/ bluish	Ulcer infected with pseudomonas
Yellow discharge & creamy pus	Staphylococci
Watery & opalescent	Streptococcus
Yellow granules	Actinomycosis

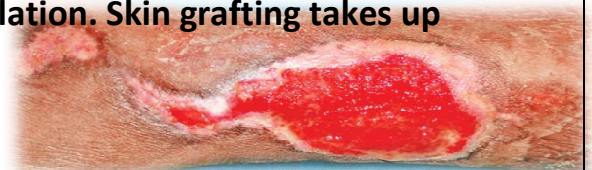
GRANULATION TISSUE

It is proliferation of new capillaries and fibroblasts intermingled with red blood cells and white blood cells with thin fibrin cover over it. Granulation tissue signifies healing. It is usually pink with red dots. The red dots are seen at the sites of capillary loops.

Types

Healthy granulation tissue

- It occurs in a healing ulcer. It has got sloping edge. It bleeds on touch. It has got serous discharge. 5 Ps of granulation tissue → Pink, Punctate hemorrhages, Pulseful, Painless, Pin head granulation. Skin grafting takes up well with healthy granulation tissue.



Unhealthy granulation tissue

- Pale with purulent discharge. Its floor is covered with slough. Its edge is inflamed and edematous. It is a spreading ulcer



INVESTIGATIONS

- Discharge analysis → GS, AFB, Culture and sensitivity, cytology
- Edge biopsy → Biopsy is taken from the edge because edge contains multiplying cells. Usually two biopsies are taken. Biopsy taken from the centre may be inadequate because of central necrosis
- X-ray of the part to look for periostitis/osteomyelitis
- FNAC of the lymph node
- Chest X-ray, Mantoux test in suspected case of tuberculous ulcer
- Blood sugar
- Doppler

Debridement of an ulcer

- It is removal of devitalized tissue. Small ulcers are debrided in ward. Large ulcers are debrided in operation theatre under general anaesthesia. All dead, devitalized, necrotic tissues are removed. Slough should be separated adequately before debridement. Often devitalized tissue separates on its own by autolysis if not enzymes like collagenase are used for debridement. Hydrotherapy and dressings are mechanical nonselective method of debridement.

• Ulcer cleaning

- is done using dilute povidone iodine and normal saline (better and ideal). It should be done daily or two times a day depending on the severity.

• Dressing of an ulcer

- is done to keep ulcer moist, keep surrounding skin dry, reduce pain, soothen the tissue, protect the wound and as an absorbent for the discharge

Discussion on some common ulcer types

TRAUMATIC ULCER

- ✓ Such ulcer occurs after trauma. It may be mechanical— dental ulcer along the margin of the tongue due to tooth injury; physical like by electrical burn; chemical like by alkali injury.
- ✓ Such ulcer is acute, superficial, painful and tender. Secondary infection or poor blood supply of the area make it chronic and deep.
- ✓ Footballer's ulcer is a traumatic ulcer occurring over the shin of males due to direct knocks on the shin. It is staphylococcal infection with a chronic and deep ulcer.
- ✓ Traumatic ulcers can occur anywhere in the body due to trauma.
- ✓ Trauma causes infection, necrosis, fasciitis, crush injury, endarteritis of the skin leading into formation of large/deep nonhealing ulcer.
- ✓ Treatment depends on size and extent of ulcer. Regular dressing, later skin grafting is done.

TROPHIC ULCER (PRESSURE (BED) SORE/ DECUBITUS ULCER)

Pressure sore is tissue necrosis and ulceration due to prolonged pressure. Blood flow to the skin stops once external pressure becomes more than 30 mmHg (more than capillary occlusive pressure) and this causes tissue hypoxia, necrosis and ulceration. It is more prominent between bony prominence and an external surface.

CP

- ◆ Occurs in 5% of all hospitalized patients
- ◆ Painless ulcer which is punched out
- ◆ Ulcer is non-mobile with base formed by bone

Mgt

- ◆ manage the underlying cause
- ◆ Nutritional supplementation
- ◆ Rest, antibiotics, slough excision, regular dressings
- ◆ Vacuum assisted closure (VAC): It is the creation of intermittent negative pressure of minus 125 mmHg to promote formation of healthy granulation tissue. Negative pressure reduces tissue edema, clears the interstitial fluid and improves the perfusion. Increases the cell proliferation and so promotes the

healing. A perforated drain is kept over the foam dressing covered over the pressure sore. It is sealed with a transparent adhesive sheet. Drain is connected to required vacuum apparatus.

- ◆ Once ulcer granulates well, flap cover or skin grafting is done
- ◆ Excision of the ulcer and skin grafting
- ◆ Flaps—local rotation or other flaps (transposition flaps)
- ◆ Cultured muscle interposition

PREVENTION

◆ Proper care

- ✓ Change in position once in 2 hours
- ✓ Lifting the limb upwards for 10 seconds once in 10 minutes
- ✓ Nutrition
- ✓ Use of water bed/air bed/air-fluid floatation bed and pressure dispersion cushions to the affected area
- ✓ urinary and fecal care
- ✓ hygiene
- ✓ psychological counseling
- ✓ Regular skin observation
- ✓ keeping skin clean and dry (using regular use of talcum powder); oil massaging of the skin and soft tissues using clean, absorbent porous clothing; control and prevention of sepsis helps in the management.

DIABETIC ULCER

Cause

- ◆ Increased glucose in the tissue precipitates infection.

Sites

- ◆ Foot/plantar aspect—is the most common site
- ◆ Leg
- ◆ Upper limb, back, scrotum, perineum
- ◆ Diabetic ulcer may be associated with ischemia
- ◆ Ulcer is usually spreading and deep

Mgt

- ◆ Control the sugar level
- ◆ Antibiotics

- ◆ Nutritional supplements
- ◆ Regular cleaning, debridement, dressing
- ◆ Once granulates, the ulcer is covered with skin graft or flap
- ◆ Toe/foot/leg amputation
- ◆ Microcellular rubber (MCR) shoes to prevent injuries; care of foot

TUBERCULOUS ULCER

It is due to M.tuberculosis. It is usually due to cold abscess later forming ulcer in the neck, chest wall, axilla and groin.

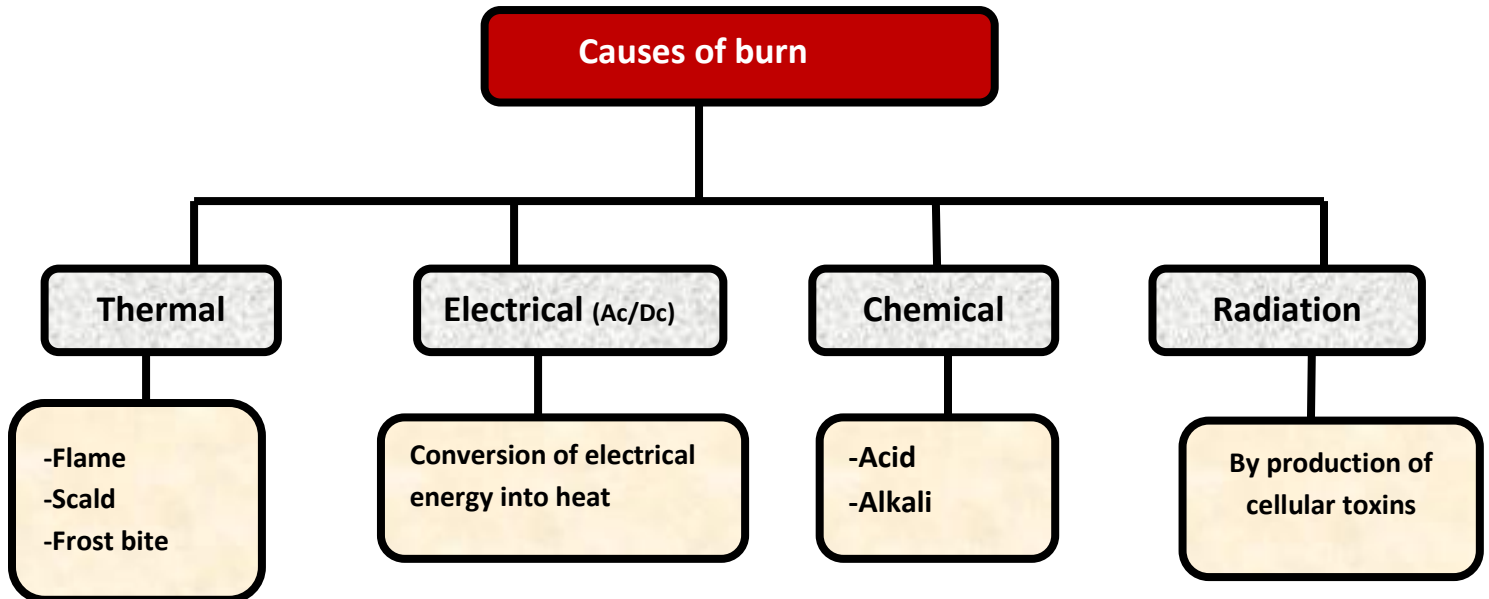
- It can also be primary tuberculosis of the skin (commonly in face)
- Ulcer can be single or multiple; oval or rounded; with undermined edge (due to progression of disease outwards underneath and healing inwards by skin), painful and tender with caseating material on the floor.
- Ulcer is usually not deep. Regional lymph nodes may be enlarged matted, firm, and nontender

Mgt

- ✓ Anti TB

BURN

Definition: Burn is a type of coagulative necrosis caused by heat (usually $> 44^{\circ}\text{C}$) transferred from the source to the body.



Pathophysiology

- In burn by far the most common organ affected is the skin. However, burns can also damage airway and lungs. As in all trauma related deaths, burn deaths occur immediately after the injury or weeks later as a result of multisystem organ failure.
- The following mechanisms have been proposed in the pathophysiology of burns shock
 - Increased capillary permeability
 - Decreased plasma oncotic pressure
 - Increased capillary hydrostatic pressure
 - Reduced clearance of fluid and protein
 - intracellular fluid accumulation
 - increased osmotic pressure in burned tissue
 - increased Evaporative water loss
 - depressed myocardial function

Burn wound assessment

Classified according to depth of injury or extent of BSA involved

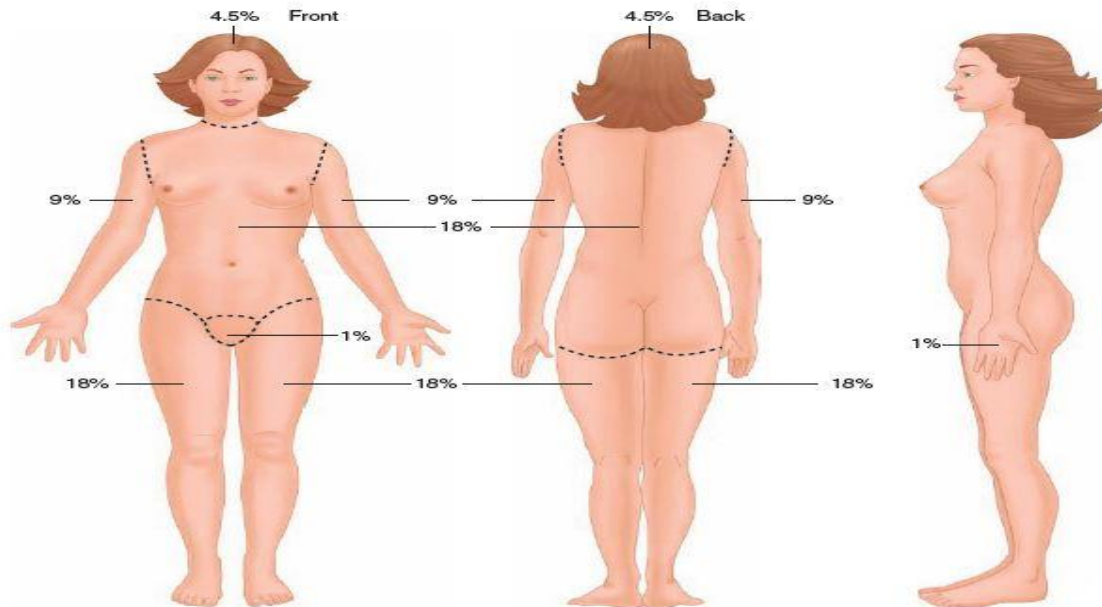
Degree		Extent	Characteristics	Remark
First degree or superficial		Localized to the Epidermis	Erythema,blanch to touch,painful	Eg.Sunburns Doesn't result in scars
Second degree	Superficial	Epidermis + portion of dermis(papillary)	Erythema,blanch,painful,often blister and weeping	There may be slight skin discoloration after healing
	Deep	Epidermis + dermis(up to reticular dermis)	More pale,mottled,do not blanch to touch,not sensitive to touch but sensitive to pin prick	Heals with sever scarring
Third degree		Full thickness(epidermis +dermis), no epidermal or dermal appendages remain	Hard,leathery,eschar,painless and nonblanching	Require excision with skin grafting
Fourth degree		Involving organs beneath the skin such as muscle or bones		Common in electrical burn

Local changes in burn

Zones	Damage	Blood flow	Remark
Zone of coagulation (center of the wound)	Irreversible	None	
Zone of stasis	Can be reversible or become irreversible based on the wound environment	Decreased perfusion	Vascular damage and vessel leakage
Zone of hyperemia	Reversible (contains clearly viable tissue)	Vasodilation	Healing process begins here

Burn size estimation

Rule of nine is a quick and easy method that divides the body adequate for initial assessment for adult burns.



NB***palm method**--small or patchy burns can be approximated by using the surface area of the patients palm.The entire(including fingers) is approximately 1% and is used in pediatric burn patients.

INJURY TO THE AIRWAY AND LUNGS

- **Physical burn injury to the airway above the larynx:**
 - The hot gases can physically burn the nose, mouth, tongue, palate and larynx. Once burned, the linings of these structures will start to swell. After a few hours, they may start to interfere with the larynx and may completely block the airway→ if action is not taken to secure an airway
- **Physical burn injury to the airway below the larynx(rare):**
 - steam has a large latent heat of evaporation and can cause thermal damage to the lower airway. In such injuries, the respiratory epithelium rapidly swells and detaches from the bronchial tree. This creates casts, which can block the main upper airway
- **Metabolic poisoning:**
 - There are many poisonous gases that can be given off in a fire, the most common being carbon monoxide. This is the usual cause of a person being found with altered consciousness at the scene of a fire. Carbon monoxide binds to haemoglobin with an affinity 240 times greater than that of oxygen and therefore blocks the transport of oxygen. Levels of carboxyhaemoglobin in the bloodstream can be measured.

- Concentrations above 10% are dangerous and need treatment. Other gases such as hydrogen cyanide causes a metabolic acidosis.
- **Inhalational injury**
 - Inhalational injury is caused by the minute particles within thick smoke, which, because of their small size, are not filtered by the upper airway, but are carried down to the lung parenchyma and can cause chemical pneumonitis which causes alveolar edema with in 24hrs.

OTHER LIFE-THREATENING EVENTS WITH MAJOR BURNS

- **The immune system and infection:**
 - Cell-mediated immunity is significantly reduced in large burns leaving them more susceptible to bacterial and fungal infections.
- **Changes to the intestine:**
 - The inflammatory stimulus and shock can cause microvascular damage and ischaemia to the gut mucosa. This reduces gut motility and can prevent the absorption of food.

NB → curling ulcer: occurs within 24 hrs after burn due to decreased GI blood flow and mucosal damage, this can be treated with H2 blockers, mucoprotectants and early enteral nutrition.
- **Danger to peripheral circulation:**
 - In full-thickness burns, the collagen fibres are coagulated. The normal elasticity of the skin is lost. A circumferential full-thickness burn to a limb acts as a tourniquet as the limb swells. If untreated, this will progress to limb-threatening ischemia.

IMMEDIATE CARE OF THE BURN PATIENT

Pre-hospital care

- ensure rescuers safety
- **Stop the burning process**
- **Check for other injuries**
- **Cool the burn wound**
- **Give oxygen**
- **Elevate** → Sitting a patient up with a burned airway may prove life-saving in the event of a delay in transfer to hospital care

Criteria for admission

- TBSA >10%
- Suspected airway or inhalational injury
- Pts with burns of any significance to the hands, face, feet or perineum
- Any burn with associated potentially serious sequelae including high-tension electrical burns & concentrated hydrofluoric acid burns
- Any burn likely to require fluid resuscitation
- Any burn likely to require surgery
- Pts whose psychiatric or social background makes it inadvisable to send them home
- Any suspicion of non-accidental injury
- Any burn in pts @ extremes of age

Hospital care

- The principles of managing an acute burn injury are the same as in any acute trauma case:
 - “ABCD” of life plus E and F (exposure and fluid resuscitation)

Airway/Breathing

- 3 components
 - Upper airway swelling → Edema occurs within 12-24 hours
 - Early intubation indicated
 - Look for stridor, wheezing, grunting
 - Acute respiratory failure
 - Carbon monoxide intoxication
 - 100% O₂ --Decreases CO half life

Fluid resuscitation

Types of fluids

- There are three types of fluid used. The most common is Ringer’s lactate or Hartmann’s solution;
 - Some centers use human albumin solution or fresh-frozen plasma, and some centers use hypertonic saline.
- It...
 - Restores plasma volume
 - Avoids microvascular ischemia
 - Maintains vital organ function

- Use parkland formula to calculate the required fluid...

• **Parkland formula** → $4 \times \text{Wt}(\text{kg}) \times \% \text{TBSA} = \text{mL to be given in 1 day}$

- Half over 1st 8hrs (subtract what was given)
 - Give other Half over next 16 hours
-
- TBSA → Figure it out by
 - “rule of nines” or
 - entire palmar surface of pt’s hand = 1%
 - Do not give colloid in first 24 hrs

Monitoring of resuscitation

- The key to monitoring of resuscitation is urine output.
 - Titrate to UOP of 0.5mL/kg/hr in adults and 1mL/kg/hr in children
- If the urine output is below this, the infusion rate should be increased by 50%. If the urine output is inadequate and the patient is showing signs of hypo-perfusion (restlessness with tachycardia, cool peripheries and a high haematocrit) → then a bolus of 10 ml/kg body weight should be given.

Other managements

- pain management
- Avoid hyperthermia
- Topical antibiotics
 - silver sulfadiazine, silver nitrate solution, and silver-impregnated dressing
- Energy balance and nutrition
- Physiotherapy
- Psychological support
- Escharotomy
 - Circumferential full-thickness burns to the limbs require emergency surgery. The tourniquet effect of this injury is easily treated by incising the whole length of full-thickness burns.

Electrical burns

- ✓ Coagulation necrosis
- ✓ Frequently only entry (yellow-white) and exit (blow out) wounds are visible masking extensive tissue damage.

Types of Electrical Current

- ✓ Direct current
 - Lightning, car batteries, and defibrillators
- ✓ Alternating current
 - Household appliances
 - More dangerous than direct current at low voltage
 - High voltage, high frequency AC is equally damaging as DC
 - Currents >15mA result in tetany preventing voluntary release:
 - NO LET GO PHENOMENON
 - 1000 volts is the minimum value for extensive tissue necrosis and loss of limbs

NB*

- AC injuries have 3 times higher mortality/morbidity than DC.
- Electrical burns are more severe at the point of exit.

Severity of Electrical Shock

- Voltage and amperage of the current
- Alternating or Direct current
- Amount of time the patient is exposed
- Amount of body surface in contact with water
- Area of the body through which the current passes
- Amount of moisture on the patient

Pathophysiology

- Current Follows path of least resistance towards ground → Nerve, blood vessels, muscle, skin, tendon, fat and then bone (in order of increasing resistance). Electrical energy is converted to heat in direct proportion to the resistance of the tissue.

Specific organs affected

Neurological system

- Most commonly affected
- May experience Numbness/tingling, Loss of consciousness, Amnesia, Coma , Spinal cord involvement...

Cardiac Injuries

- cardiac dysrhythmia's
- Sudden death (Ventricular Fibrillation)

Vascular Injuries

- Result of vascular spasm
 - Coagulation
 - Vascular occlusion
- Compartment Syndrome
 - Acute ischemic insult
 - Rhabdomyolysis

Renal Injuries

- Occur due to:
 - Rhabdomyolysis--Myoglobinuria
 - Acute Renal Failure (ARF)--Myoglobin crystallization

Musculoskeletal

- Spasms, tetany, contractures, compartment syndromes
- Fractures due to powerful muscular spasm

Gastrointestinal

- Ileus

Pulmonary

- Muscular paralysis

Management

Peculiarities

- ✓ High voltage burns require large amounts of fluid.
- ✓ Maintain adequate ventilation→risk of Central apnea in Lightning strike
- ✓ TBSA may be difficult to assess

SHOCK

Shock is defined as a failure to meet the metabolic demands of cells and tissues and the consequences that ensue.

Forms

Strict adherence to a classification scheme may be difficult from a clinical standpoint

- ❖ Hypovolemic Shock
- ❖ Obstructive Shock
- ❖ Cardiogenic Shock
- ❖ Neurogenic shock
- ❖ Septic shock
- ❖ Traumatic shock

Hypovolemic shock

- ❖ most commonly encountered in surgical practice
- ❖ It can be non hemorrhagic or hemorrhagic shock
- ❖ Classified into four

PARAMETER	CLASS			
	I	II	III	IV
Blood loss (mL)	<750	750–1500	1500–2000	>2000
Blood loss (%)	<15	15–30	30–40	>40
Heart rate (bpm)	<100	>100	>120	>140
Blood pressure	Normal	Orthostatic	Hypotension	Severe hypotension
CNS symptoms	Normal	Anxious	Confused	Obtunded

Mgt of hemorrhagic shock

- ❖ The first step in the initial management of shock in trauma patients is to recognize its presence.
- ❖ The second step in the initial management of shock is to identify the probable cause of the shock state.
 - ❖ Mostly this is associated with trauma so first apply ATLS

An initial, warmed fluid bolus is given. The usual dose is 2 L RL or NS for adults and 20 mL/kg for pediatric patients.

Follow the BP, PR, UOP & mental status

If responsive, The fluids are slowed to maintenance rates

If not responsive repeat 1x in adult(total 2x) & 2x in pediatrics(total 3x)

If not responsive with the above fluid give blood

Failure to respond to crystalloid and blood administration in the ED dictates the need for damage control surgery

N.B.....And assess other causes of shock E.g septic, Cardiogenic... but in trauma the most cause of nonresponsive shock is unidentified ongoing bleeding

- ✓ NGT
 - prevent aspiration
 - Prevent bradycardia
- ✓ Catheterization
 - Follow-up
- ✓ Analgesic

Based on the initial fluid resuscitation

	RAPID RESPONSE	TRANSIENT RESPONSE	MINIMAL OR NO RESPONSE
Vital signs	Return to normal	Transient improvement, recurrence of decreased blood pressure and increased heart rate	Remain abnormal
Estimated blood loss	Minimal (10%–20%)	Moderate and ongoing (20%–40%)	Severe (>40%)
Need for more crystalloid	Low	Low to moderate	Moderate as a bridge to transfusion
Need for blood	Low	Moderate to high	Immediate
Blood preparation	Type and crossmatch	Type-specific	Emergency blood release
Need for operative intervention	Possibly	Likely	Highly likely
Early presence of surgeon	Yes	Yes	Yes

How do differentiate nonresponsive causes of shock

Hemorrhagic shock	Cardiogenic shock
Central venous pressure (CVP) is decreased	CVP is increased

Cardiac tamponade	Tension pneumothorax
Tachycardia	Absent breath sound
Distant heart sound	Hyperesonant
Distended neck veins	Distended neck veins
Breath sound normal	

Condition	How shock???
Tension pneumothorax	Compress heart → increased RV pressure finally decreased venous return
Massive hemothorax	Due to lost compression effect, like that of T.pneumothorax
Cardiac tamponade	Decreases the cardiac filling like that of T.pneumothorax

Septic shock

- ❖ Sepsis--evidence of an infection, as well as systemic signs of inflammation (e.g., fever, leukocytosis, and tachycardia).
- ❖ Severe sepsis--Hypo perfusion with signs of organ dysfunction
- ❖ Septic shock
 - requires the presence of the above, associated with more significant evidence of tissue hypoperfusion and systemic hypotension.
 - Severe sepsis plus hypotension persisting ≥ 1 hour despite fluid resuscitation
- ❖ Hemodynamic changes are ...
 - Early septic shock (warm or hyperdynamic) characterized
 - ✓ peripheral vasodilation,
 - ✓ flushed and warm extremities, and
 - ✓ a compensatory elevation in cardiac output
 - ✓ Although an increase in venous capacitance diminishes venous return to the heart, cardiac output is maintained via tachycardia and the decrease in afterload due to systemic vasodilation
 - Late septic shock (cold or hypodynamic) characterized by
 - ✓ impaired myocardial contractility due to local and systemic release of cardiac depressants,
 - ✓ worsening peripheral perfusion, vasoconstriction, extremity mottling, oliguria, and hypotension

Mgt of septic shock

- ❖ If we diagnosed it from the out set
 - ABC of life
 - Stabilize respiration- airway and breathing
 - Severely obtunded & labored breathing -- require intubation and ventilation
 - Secure IV line or insert catheter(CVC)
 - 5-6 liters in 6 hours of therapy. i.e. initial 1-2L bolus in the first 1-2hour(least 30 mL/kg within the first 4 to 6 hours)
 - Assess V/S & presence/absence of pulmonary edema
 - Transfusion
 - Inotropic/Vasopressor: 2nd line
 - ❖ Dopamine--start with 2-4 μ g/kg/min up to 30-50 μ g/kg/min and escalate every 15-20 min maintain for at least 6 hours before tapering then discontinue
- ❖ Control of septic focus
 - Identification of septic focus: plus blood culture 2x
 - empirical antimicrobial agent in the 1st hour +/- surgical debridement
- ❖ Corticosteroids
 - hydrocortisone 50 mg IV every 6 hr and
 - fludrocortisone 50 μ g orally once daily

Assessment of end points in resuscitation

- ❖ Generally those are classified as
 - ✓ Systemic (global)
 - ✓ V/S (BP, PR , UOP)
 - ✓ Lactate
 - ✓ Cardiac output
 - ✓ Base deficit
 - ✓ Oxygen delivery and consumption
 - ✓ Tissue specific
 - ✓ Cellular

BLOOD TRANSFUSION

Blood components

Banked Whole Blood

- Now rarely indicated and rarely available. With the new preservatives, the shelf life has been extended to 40 ± 5 days. At least 70% of the transfused erythrocytes remain in the circulation for 24 hours after transfusion and are viable. The hemolysis that occurs during storage is insignificant.

Fresh Whole Blood

- Refers to blood that is administered within 24 hours of its donation and is rarely indicated. Because of the time required for testing for infectious disease, it must be administered untested. One unit of platelet concentrate has more viable platelets than 1 unit of fresh blood. Fresh whole blood is a poor source of platelets and factor VIII.

Packed red cells

- Cells are spun down and concentrated.
- Each unit = 330 ml(hct=50–70%)
- PRCs are stored in a SAG-M solution (saline–adenine–glucose–mannitol) to increase shelf-life to 5 weeks at $2-6^{\circ}\text{C}$.

Fresh-frozen plasma

- is rich in coagulation factors & removed from fresh blood and stored at -40 to -50°C with a 2 years shelf-life. It is the first-line therapy in the treatment of coagulopathic haemorrhage .

Platelet

- pooled platelet concentrate containing about 250×10^9 cells per litre. Platelets are stored on a special agitator at $20-24^{\circ}\text{C}$ and have a shelf-life of only 5 days.

Cryoprecipitate

- is precipitate of FFP
- rich in factor VIII and fibrinogen
- stored at -30°C with a 2-year shelf-life
- given in low-fibrinogen states or in factor VIII deficiency

Prothrombin complex concentrate

- contain factors II, IX and X(factor VII may be included)
- indicated for the emergency reversal of anti-coagulant (warfarin) therapy in uncontrolled haemorrhage

Indications for blood transfusion

- Acute blood loss, to replace circulating volume and maintain oxygen delivery; in case of hemorrhagic shock, major surgery, extensive burns.
- Perioperative anaemia, to ensure adequate oxygen delivery during the perioperative phase
- symptomatic chronic anaemia without haemorrhage or impending surgery

Complications from a single transfusion

ABO incompatibility

- CP=hematuria, bilateral loin pain, fever, chills, rigor, oliguria(ATN)
- RX=stop blood transfusion. send it to blood bank & recheck.
 - Repeat coagulation profile
 - Iv fluids, monitor UOP, U/A for Hgb
 - Diuretic- furosemide

Minor incompatibility reaction

- Due to extra vascular hemolysis(mild , occur 2-21days)
- CP-fever, malaise & jaundice
- RX-supportive

Febrile reaction

- Due to sensitization to WBCs or platelets
- ↑ temperature but no hemolysis
- Use of 20-40mm filter or leukocyte depleted blood avoids it.

Allergic reaction

- Due to allergy to plasma products
- CP-chills, rigor & rash
- RX- antihistamines

Embolism

- Although air embolism has been reported as a complication, healthy individuals can tolerate large amounts of air injected intravenously at a rapid rate. The normal adult can tolerate an embolism of 200 mL of air. Smaller amounts, however, can cause alarming signs. Manifestations of venous air embolism include a rise in venous pressure, cyanosis, a "mill

wheel murmur" over the precordium, tachycardia, hypotension, and syncope.

- Treatment - consist of placing the patient on the left side in a head down position with the feet up. Arterial air embolism may be visible in the retinal vessels or as blood flows from transected vessels. Plastic tubes used for transfusion can break off within a vein and embolize into the right atrium or pulmonary artery. Embolized catheters have been successfully removed.

Thrombophlebitis

- Prolonged infusions into a peripheral vein are associated with venous thrombosis. Intravenous infusions that last more than 8 hours are more likely to be followed by thrombophlebitis, with an increased incidence in the lower limbs.
- Treatment consists of discontinuation of the infusion and the application locally of warm moist compresses. Embolization from superficial thrombophlebitis or venous thrombosis is extremely rare.

Overtransfusion and Pulmonary Edema

- Overloading the circulation is an avoidable complication. It can occur with rapid infusion of blood, plasma expanders, and other fluids, particularly in patients with heart disease. To prevent the complication, the central venous pressure should be measured whenever large amounts of fluid are administered. Circulatory overload is manifest by a rise in venous pressure, dyspnea, and cough. Rales can generally be heard at the lung bases.
- Treatment consists of diuresis, placing the patient in a sitting position, and, occasionally, venesection.

Syndrome of transfusion-related acute lung injury (TRALI)

- is sometimes seen after transfusion and is characterized as mild to life-threatening. Noncardiogenic pulmonary edema is often accompanied by fever, rigors, and a "white out" chest x-ray.
- Treatment is discontinuation of any transfusion, notification of the transfusion service, and intensive pulmonary support, sometimes including intubation. This type of pulmonary edema does not respond to diuretics and is thought to be caused by infused donor antigrenulocyte or anticlass I or II MHC antibodies.

Infection

- Bacterial infection - contamination of infused blood is rare and can be acquired from contaminated collection bags or poor cleaning of the donor's skin. Gram-negative organisms, especially coliform and *Pseudomonas* species, which are capable of growth at 4°C (39.2°F), are the most common cause. Clinical manifestations include fever, chills, abdominal cramps, vomiting, and diarrhea. There may be hemorrhagic manifestations and increased bleeding. If the diagnosis is suspected, the transfusion should be discontinued and the blood cultured. Emergency treatment includes oxygen, adrenergic blocking agents, and antibiotics.
- Hepatitis, HIV, malaria, syphilis.
 - it is mandatory to screen the blood for these diseases before transfusion.

Complications from massive transfusion

The term massive transfusion implies a single transfusion greater than 2500 mL or 5000 mL transfused over a period of 24 hours

- Coagulopathy
- Hypocalcaemia
- Hyperkalaemia
- Hypokalaemia
- Hypothermia
- iron overload due to repeated transfusions over long periods of time (eg. Thalassaemia)
 - Each transfused unit of RBCs contains 250 mg of elemental iron

FLUID & ELECTROLYTE IMBALANCE

BODY FLUIDS

- ❖ Total Body Water(TBW)
 - ✓ 60% in an average young adult male & 50% in young adult female
 - ✓ The highest percentage of TBW is found in newborns, with approximately 80% of their total body weight.

Classification of Body Fluid Changes

- ❖ Disorders in fluid balance may be classified into three general categories: disturbances in;
 - a) volume
 - b) concentration &
 - c) Composition
- ❖ Although each of these may occur simultaneously, each is a separate entity with unique mechanisms demanding individual correction

Disturbances in Fluid Balance

- ❖ Extracellular volume deficit is the most common fluid disorder in surgical patients and can be either acute or chronic.
 - Acute volume deficit is associated with cardiovascular and central nervous system signs (shock)
 - Chronic deficits display tissue signs, such as a decrease in skin turgor and sunken eyes (dehydration), in addition to cardiovascular and central nervous system signs.
 - Shock vs. dehydration???

FLUID AND ELECTROLYTE THERAPY

- ❖ The type of fluid administered depends on the patient's volume status and the type of concentration or compositional abnormality present.
- ❖ Both RL & NS are considered isotonic crystalloids and are useful in replacing GI losses and correcting extracellular volume deficits.

Crystalloids

- ✓ Are balanced salt solutions
- ✓ use to restore extracellular volume by exerting significant hydrostatic effect on capillaries due to this pulmonary & GI wall edema is common
- ✓ Causes hemodilution due larger volume required
- ✓ Although it expands the intravascular volume, it also expands the interstitial space by approximately three times as much as the plasma.
- ✓ Cheap

colloids

- ✓ Contain larger molecules & remain in the intravascular compartment
- ✓ expand the plasma by increasing the colloid oncotic pressure
- ✓ requiring smaller volumes for resuscitation than crystalloids
- ✓ Allergic reaction is common
- ✓ Pulmonary edema possible if given in injured lung b.c it can extravasates
- ✓ Expensive

❖ **Crystalloids**

- ❖ Solutions of electrolytes and water are collectively referred to as crystalloids
- ❖ the most widely used fluids for parenteral administration
- ❖ Inexpensive , highly effective for fluid maintenance and replacement, and have outstanding safety profiles

Types of crystalloids

- **RL (ringer lactate)**
 - ✓ Slightly hypotonic in that it contains 130 mEq of lactate.
 - ✓ It is ideal for the replacement of existing fluid deficits when serum electrolyte concentrations are normal. why?
 - Because Lactate is used rather than bicarbonate because it is more stable in IV fluids during storage. It is converted into bicarbonate (used to buffer acid base imbalance) by the liver after infusion, even in the face of hemorrhagic shock.
- **NS (normal saline /Sodium chloride(0.9%))**
 - ✓ is mildly hypertonic, containing 154 mEq of sodium that is balanced by 154 mEq of chloride.
 - ✓ The high chloride concentration imposes a significant chloride load on the kidneys and may lead to a hyperchloremic metabolic acidosis.
 - So, it is an ideal solution, for correcting volume deficits associated with hyponatremia, hypochloremia, and metabolic alkaloids
- **D5W (5% dextrose)**
 - ✓ 50 g of dextrose per liter--supplies 200 kcal/L
 - Dextrose is always added to solutions containing <0.45% sodium chloride (hypotonic) to maintain osmolality and thus prevent the lysis of RBCs that may occur with rapid infusion of hypotonic fluids. The addition of potassium is useful once adequate renal function and urine output are established.
- **0.45% sodium chloride**
 - ✓ useful for replacement of ongoing GI losses as well as for maintenance fluid therapy in the postoperative period.
 - ✓ This solution provides sufficient free water for insensible losses and enough sodium to aid the kidneys in adjustment of serum sodium levels.
 - ✓ This hypotonic solution causes lysis of RBCs--to prevent this add 5% dextrose (50 g of dextrose per liter)

Alternative Resuscitative Fluids

❖ Hypertonic saline

- ✓ Hypertonic saline solutions (3.5% and 5%)--used for correction of severe sodium deficits
- ✓ Hypertonic saline (7.5%)
 - has been used as a treatment modality in patients with closed head injuries.
 - It has been shown to increase cerebral perfusion and decrease intracranial pressure, thus decreasing brain edema.
 - appears to increase intravascular volume in patients more quickly than isotonic solutions, and the total resuscitation volume requirement may be decreased
 - reduces the systemic inflammatory response syndrome (SIRS) and may attenuate multiple organ dysfunction syndrome
 - These cardiovascular and hemodynamic effects are short-lived, in general lasting from 60 to 120 minutes. The addition of colloids such as dextran or hetastarch can prolong the effect.
 - Adverse effect
 - ❖ increased bleeding--because hypertonic saline is an arteriolar vasodilator
 - ❖ electrolyte abnormalities such as hypernatremia

❖ Colloids

- ✓ also are used in surgical patients
- ✓ Due to their molecular weight, they are confined to the intravascular space, and their infusion results in more efficient transient plasma volume expansion.
- ✓ However, under conditions of severe hemorrhagic shock, capillary membrane permeability increases; this permits colloids to enter the interstitial space, which can worsen edema and impair tissue oxygenation
- ✓ Colloid solutions with smaller particles and lower molecular weights exert a greater oncotic effect but are retained within the circulation for a shorter period of time than larger and higher molecular weight colloids.
- ✓ Are limited in use because of their doubtful effectiveness, cost, and potential complication.

Four major types of colloids are available

- ✓ Albumin
- ✓ Dextrans
- ✓ hetastarch, and
- ✓ Gelatin

❖ Albumin (molecular weight 70,000)

- ✓ is prepared from heat-sterilized pooled human plasma.
- ✓ It is typically available as either a 5% solution (osmolality of 300 mOsm/L) or 25% solution (osmolality of 1500 mOsm/L).

- ✓ Because it is a derivative of blood, it can be associated with allergic reactions.
- ✓ Albumin has been shown to induce renal failure and impair pulmonary function when used for resuscitation in hemorrhagic shock.
- ❖ **Dextrans**
 - ✓ are glucose polymers produced by bacteria grown on sucrose media and are available as either 40,000 or 70,000 molecular weight solutions.
 - ✓ They lead to initial volume expansion due to their osmotic effect but are associated with alterations in blood viscosity.
 - ✓ Thus dextrans are used primarily to lower blood viscosity rather than as volume expanders.
 - ✓ Dextrans have been used, in association with hypertonic saline, to help maintain intravascular volume.
- ❖ **Hetastarches**
 - ✓ Administration of hetastarch can cause hemostatic derangements related to decreases in von Willebrand's factor and factor VIII
 - ✓ and its use has been associated with postoperative bleeding in cardiac and neurosurgery patients.
 - ✓ Hetastarch also can induce renal dysfunction in patients with septic shock and in recipients of kidneys procured from brain-dead donors.
 - ✓ Currently, hetastarch has a limited role in massive resuscitation because of the associated coagulopathy and hyperchloremic acidosis (due to its high chloride content).

Correction of Volume Abnormalities

➤ Maintenance Fluid (MF) Therapy

- ✓ It is the usual daily requirement. It to replace basal fluid requirement i.e the sensible and insensible losses
- ✓ Calculation of MF replacement doesn't include replacement of either preexisting deficits or ongoing additional losses

Calculated as;

For 0-10 kg	Give 100 mL/kg/d
For the next 10-20 kg	Give an additional 50 mL/kg/d
For weight >20 kg ^b	Give 20 mL/kg/d

E.g. MF for 70kg pt (10kgX100ml +10kgX50ml+50kgX20ml) = 2500ml per day

- $2500\text{ml} / 3 = 833 \text{ ml over } 8\text{hrs}$
 - 1ml=20drops through IV line
 - 833ml=16,660 drop
 - 8hrs=8X60min=480 min
- If we want 16,660 drop (meaning 833ml) over 480min (meaning 8 hrs), we have to adjust by counting the drop to around 35 drops per minute.(16,660/480)

- ✓ For maintenance therapy, 1 to 2 mEq/kg per day of sodium is required & Potassium requirements are approximately 0.5 to 1 mEq/kg per day.
 - e.g. If sodium is replaced at 2 mEq/kg per day and potassium is replaced at 1 mEq/kg per day, a 70-kg patient requires 2,500 mL of water containing 140 mEq of sodium and 70 mEq of potassium.
- ✓ Short-term maintenance therapy generally does not require addition of calcium, phosphate, or magnesium
- ✓ Replacement of Ongoing Fluid Losses
 - Once volume deficits have been replaced and maintenance fluids have been calculated and given, the overall fluid balance of the patient can be maintained by replacement of fluid losses beyond those considered to be maintenance
 - Ongoing losses from nasogastric tubes, stomas, fistulas, and other measurable sources are recorded during the course of care and can be replaced in fairly straight forward fashion
- ✓ Intraoperative Fluid
 - Intraoperative replacement with isotonic solutions is usually accomplished at rates of 500 to 1,000 mL/h.
- ✓ Postoperative Fluid Therapy and Monitoring
 - is adjusted to the patient's volume status at the completion of the operative procedure, as well as to anticipated ongoing fluid losses
 - Isotonic solutions should be used for volume resuscitation during the early postoperative period.
 - It is best not to give potassium supplements during this period without indication. Why? because surgery by itself causes Hyperkalemia due cell damage & stress.
 - Routine monitoring of postoperative fluid status consists
 - ✓ serial vital signs and urine output measurements
 - ✓ intake and output data are recorded
 - ✓ Weight should also be recorded daily. Because postsurgical rapid fluctuations in weight are generally related to changes in TBW
 - ✓ Urine specific gravity
 - ✓ greater than 1.010 to 1.012 indicates that the urine is being concentrated (relative to plasma)
 - ✓ less than 1.010 indicates that dilute urine is being produced
 - ✓ Both volume depletion and cardiac failure are accompanied by increased urine concentration and low urine outputs.
 - ✓ Urine specific gravity in the range of plasma (1.010 to 1.012) may indicate either adequate hydration or the inability of the kidneys either to dilute or concentrate the urine

Correction of Life-Threatening Electrolyte Abnormalities

Hypernatremia

- Hypernatremia is a less common problem in surgical patients than hyponatremia. Mainly due to concentration changes in body fluids. I.e. sodium abnormality is mainly affected by body fluid status (Volume excess or deficits) than intake.
- It can happen in low, normal or high volume status

Clinical Features

- ❖ Symptomatic hypernatremia usually occurs only in patients with impaired thirst or restricted access to fluid, because thirst will result in increased water intake.
- ❖ Symptoms are rare until the serum sodium concentration exceeds 160 mEq/L but, once present, are associated with significant morbidity and mortality.
- ❖ symptoms are related to hyperosmolarity, central nervous system effects predominate
- ❖ Water shifts from the intracellular to the extracellular space which results in cellular dehydration
- ❖ range from restlessness and irritability to seizures, coma, ataxia, spasm and death

Treatment

- ❖ Treatment of hypernatremia usually consists of treatment of the associated water deficit.
- ❖ In hypovolemic patients, volume should be restored with normal saline before the concentration abnormality is addressed
- ❖ The formula used to estimate the amount of water required to correct hypernatremia is as follows:

$$\text{water requirement} = \frac{\text{desired change in } [Na^+]_s \times \text{TBW}}{\text{desired } [Na^+]_s}$$

- ❖ E.g. a 70-kg patient with a TBW of 42 L (TBW 60%) has serum sodium concentration of 170 mEq/L. So what is his water requirement?
 - Given
 - ❖ current serum sodium = 170 meq/l
 - ❖ TBW = 42 L
 - ❖ normal sodium = 154 meq/l
 - Required = water requirement?
 - Solution
 - ❖ Desired change in Na = 170 - 154 = 16 meq/l
 - ❖ Water requirement = $16 \times 42 / 154 = 4.36$ L
- ❖ How much the rate?
 - ✓ Slow for chronic hyponatremia. why?

- In chronic hypernatremia, the cells in the brain gradually adapt by increasing intracellular osmotic solute content, thereby regaining cellular volume. These cellular changes are not readily reversed. A sudden decrease in extracellular sodium concentration, and therefore osmolality, results in cell , brain edema.
- ❖ The rate of fluid administration should be titrated to achieve a decrease in serum sodium concentration of no more than 1 mEq/h and 12 mEq/day for the treatment of acute symptomatic hypernatremia.
- ❖ Even slower correction should be undertaken for chronic hypernatremia (0.7 mEq/h),
- ❖ Oral or enteral replacement is acceptable in most cases, or IV replacement with half- or quarter-normal saline can be used
- ❖ Frequent neurologic evaluation as well as frequent evaluation of serum sodium levels also should be performed.

HYPONATREMIA

- ❖ frequently seen in the post-op or post injury period when ADH is elevated as a component of the normal stress response to injury
- ❖ as a consequence of either sodium depletion or dilution
- ❖ Because volume expansion and hyponatremia diminish the effects of ADH on the collecting tubules--is usually self-limited under these circumstances, with serum sodium concentration rarely falling below 130 mEq/L unless exacerbated by exogenous free water administration.

Clinical Features

- ❖ Chronic hyponatremia is often asymptomatic until serum [Na+] falls below 110 to 120 mEq/L
- ❖ in acute drop serum [Na+] to the 120 to 130 mEq/L range may symptomatic
- ❖ Symptoms related to the CNS result largely from cellular water intoxication, and permanent CNS injury can occur if it is left untreated.
- ❖ Central nervous system
 - ✓ Headaches, Confusion, Delirium, Coma, Seizure...
- ❖ Gastrointestinal Anorexia
 - ✓ Nausea & Vomiting
- ❖ Musculoskeletal Weakness
 - ✓ Fatigue, Muscle cramps...

Treatment

- ❖ Most cases of hyponatremia can be treated by free water restriction and, if severe by administration of sodium.
- ❖ If neurologic symptoms are present, 3%NS should be used to increase the sodium by no more than 1 mEq/L per hour until the serum sodium level reaches 130 mEq/L or neurologic symptoms are improved.
- ❖ Correction of asymptomatic hyponatremia should increase the sodium level by no more than 0.5 mEq/L per hour to a maximum increase of 12 mEq/L per day, and even more slowly in chronic hyponatremia.
- ❖ The rapid correction of hypomania not recommended

Hyperkalemia

- ❖ Defined as a serum potassium concentration > the normal range (3.5 to 5.0 mEq/L)
- ❖ It is caused by
 - ✓ excessive potassium intake--can be either from oral or IV supplementation, or from red cell lysis after transfusion
 - ✓ increased release of potassium from cells--Acidosis and a rapid rise in extracellular osmolality from hyperglycemia or IV mannitol can raise serum potassium levels by causing a shift of potassium ions to the extracellular compartment.
 - ✓ impaired potassium excretion by the kidneys—as in case of potassium-sparing diuretics, Renal insufficiency/failure...
 - ✓ Because 98% of total body potassium is in the intracellular fluid compartment, even small shifts of intracellular potassium out of the intracellular fluid compartment can lead to a significant rise in extracellular potassium.

Clinical feature

- ❖ clinical manifestations of hyperkalemia are primarily related to membrane depolarization related to intra & extracellular imbalance
- ❖ The most life-threatening manifestations are related to the cardiac effects
 - ✓ Arrhythmia, arrest
 - ✓ peaked T waves (early), widened QRS complex, flattened P wave, prolonged PR interval, sine wave formation, and ventricular fibrillation.
- ❖ Neuromuscular manifestations of severe hyperkalemia include weakness progressing to flaccid paralysis
- ❖ GI... Nausea/vomiting, colic, diarrhea

Treatment goals

- ❖ protecting the cells from the effects of increased potassium (neutralization)
- ❖ reducing the total body potassium
- ❖ shifting potassium from the extracellular to the intracellular space
- ❖ For all patients, exogenous sources of potassium should be removed, including potassium supplementation in IV fluids and enteral and parenteral solution.
- ❖ Potassium removal--Is the definitive therapy
 - ✓ removed from the body using a cation-exchange resin such as Kayexalate that binds potassium in exchange for sodium
 - ✓ Kayexalate --usual oral dose is 40 g dissolved in 20 to 100 mL of sorbitol
 - ✓ Each gram removes approximately 1 mEq of potassium
- ❖ Shift potassium
 - ✓ regular insulin 5–10 units IV & Glucose 1 ampule of D50
 - ✓ Why D50 added...? To avoid insulin-induced hypoglycemia
 - ✓ Bicarbonate 1 ampule IV--MOA; the increase in extracellular pH shifts potassium into the cells
- ❖ Counteract cardiac--urgent & first Rx in severe cases
 - ✓ Calcium gluconate 5–10 mL of 10% solution
 - ✓ to counteract the myocardial effects of hyperkalemia
 - ✓ The effects are transient and usually last approximately 30 minutes

Hypokalemia

- ❖ Hypokalemia is much more common than hyperkalemia in the surgical patient.
- ❖ caused by
 - ✓ inadequate potassium intake
 - ✓ excessive renal potassium excretion
 - ✓ potassium loss in pathologic GI secretions, such as with diarrhea, fistulas, vomiting, or high nasogastric output
 - ✓ intracellular shifts from metabolic alkalosis or insulin therapy.

Potassium decreases by 0.3 mEq/L for every 0.1 increase in pH above normal.

Symptoms

- Ileus, constipation
- Decreased reflexes, fatigue, weakness, paralysis
- Cardiovascular Arrest

Treatment

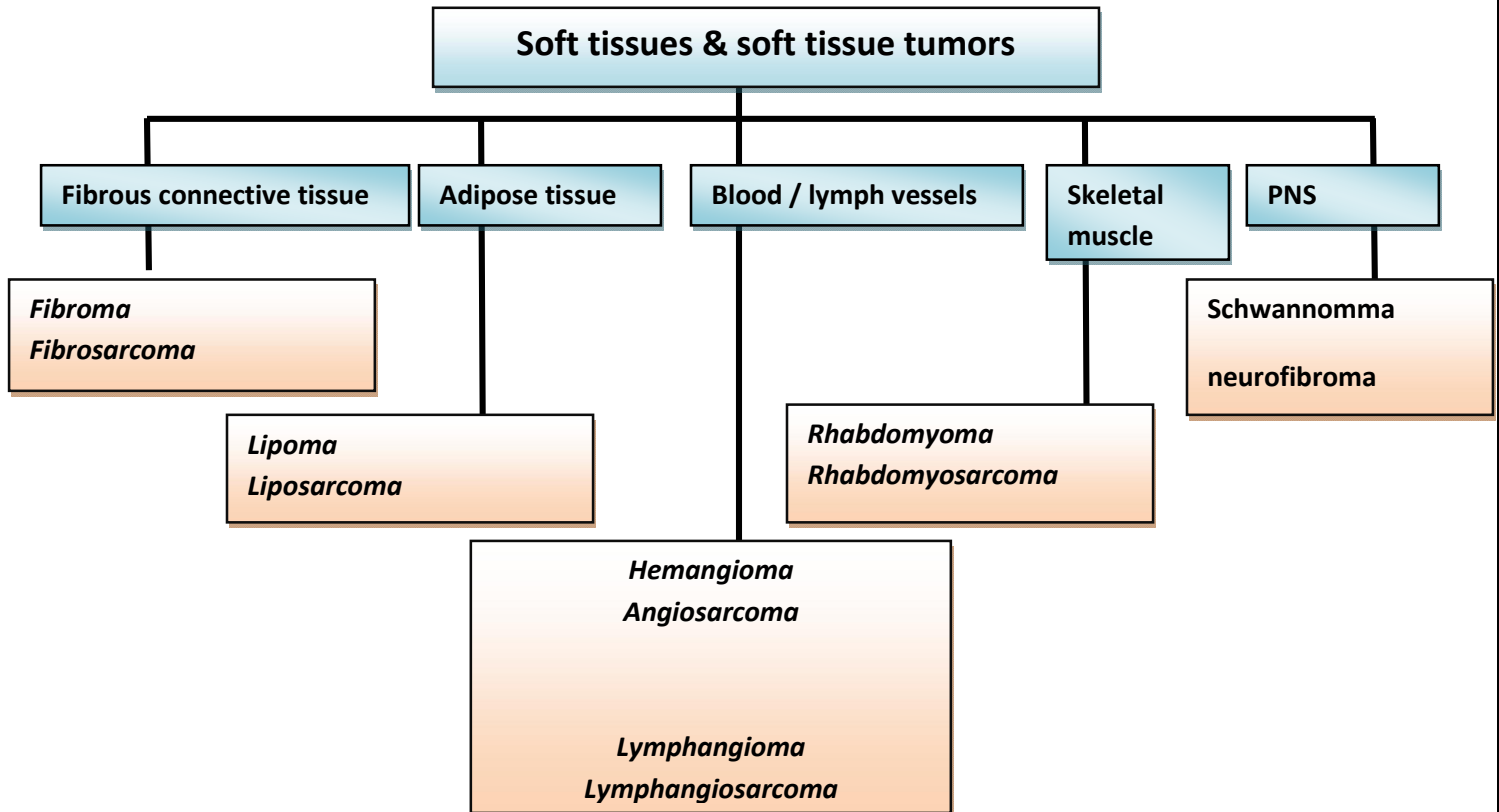
- consists of potassium repletion, the rate of which is determined by the symptoms
 - ✓ Oral repletion is adequate for mild, asymptomatic
 - ✓ If IV repletion is required, usually no more than 10 mEq/h is advisable in an unmonitored setting but in monitored setting can be increased to 40 mEq/h
 - ✓ Caution should be exercised when oliguria or impaired renal function is coexistent

SOFT TISSUE TUMORS

Soft tissue = supportive tissue of various organs & the non-epithelial, extra-skeletal structures exclusive of lymphohematopoietic tissues

NB***

When you are asked to list DDx for a swelling...think of the structures that are found underlying/overlying the swelling like fibrous connective tissue, adipose tissue, vessels, skeletal muscles, nerves & bones. Then list the benign & malignant disease forms of each structure. E.g. fibroma, fibrosarcoma (for fibrous CT)



RFs

- Genetic factors
- Radiation
- Chronic lymphedema
- Environmental carcinogens
- Infections

CP

- Mass –common sign of soft tissue tumor. Usually painless
 - If it has rapid growth suspect malignancy
- See mass examination under short cases

SKIN GRAFT AND FLAP

Graft

- A tissue of epidermis and varying amounts of dermis that is detached from its own blood supply and placed in a new area with a new blood supply.

Flap

- Any tissue used for reconstruction or wound closure that retains all or part of its original blood supply after the tissue has been moved to the recipient location.

Classification of graft

1. Auto-graft--a tissue transferred from one part of the body to the other body part
2. Homograft(allograft)-- a tissue transferred from a genetically different individual of the same species
3. Xeno-graft--a tissue transferred from an individual of one species to other species

Indications

- Generally to achieve temporary or permanent cover
 - temporary cover—for open wound & to prevent infection
 - Permanent cover for
 - Skin loss 2^o to
 - post traumatic (avulsion and degloving injuries)
 - post-surgical (excision of burn wound)
 - infection
 - Mucosal loss (excision lesion of oral cavity or tongue)
 - Cosmetic reasons

Contraindication

- Beta hemolytic streptococcal Infection
- Infected wound with copious discharge
- Avascular wound

Types of skin grafts

Type	Definition
Split-thickness grafts	<ul style="list-style-type: none"> • superficial and some deep layers of skin (contain 100% of the epidermis & some part of dermis) • Split-thickness grafts are used for non-weight-bearing parts of the body • Donor sites: - thigh, buttock & abdomen • Can be of two type:- thin split thickness and thick split thickness
Full-thickness grafts	<ul style="list-style-type: none"> • Contains all of the layers of the skin including blood vessels • For weight-bearing portions of the body and friction prone areas such as, feet and joints. • Resistant to trauma with minimal secondary contractions • Donor sites: - groin and medial aspect of the arm
Pinch grafts	<ul style="list-style-type: none"> • quarter inch pieces of skin • will then grow to cover injured sites (grow even in areas of poor blood supply and resist infection)
Pedicle grafts	<ul style="list-style-type: none"> • skin used from the donor site will remain attached to the donor area (remainder is attached to the recipient site) • Blood supply remains intact at the donor location until the new blood supply has completely developed. • Mostly used for hands, face or neck areas of the body

Comparison between grafts

Type of Graft	Advantages	Disadvantages
Thin Split Thickness	<ul style="list-style-type: none"> - Best Survival - Heals Rapidly 	<ul style="list-style-type: none"> - Least resembles original skin. - Least resistance to trauma. - Poor Sensation - Maximal Secondary Contraction
Thick Split Thickness	<ul style="list-style-type: none"> - More qualities of normal skin. - Less Contraction - Looks better - Fair Sensation 	<ul style="list-style-type: none"> - Lower graft survival - Slower healing
Full Thickness	<ul style="list-style-type: none"> - Most resembles normal skin. - Minimal Secondary contraction - Resistant to trauma - Good Sensation - Aesthetically pleasing 	<ul style="list-style-type: none"> - Poorest survival. - Donor site must be closed surgically. - Donor sites are limited.

Requirement for graft survival

- **Bed must be well vascularized**
- **Contact between graft and recipient should be immobile**
- **Low bacterial count at the site**

Factors that contribute for graft failure

- **Malnutrition**
- **Sepsis**
- **DM, HIV, immune status, malignancy, CKD, liver failure**
- **Drugs: - steroids, chemotherapy, vasoconstrictors**
- **Recipient site of the graft like bone, tendon, infected wound & highly irradiated areas**

Ideal donor site would provide: -

- **Skin that is identical to the skin surrounding the recipient area in terms of Color, thickness, hair & texture.**

ANESTHESIA

Anesthesia → temporary induced loss of sensation or awareness.

- It may include
 - analgesia (relief from or prevention of pain)
 - paralysis (muscle relaxation)
 - amnesia (loss of memory) or
 - Unconsciousness.

TYPES OF ANESTHESIA

1) General anesthesia

- ✓ To do most complex surgical procedures.
- ✓ Has 3 distinct phases
- ✓ Induction
 - For adults is usually achieved with the injection of intravenous medications. Propofol is commonly used because of its favorable recovery profile and short elimination half-life. But may induce bradycardia & hypotension. Other less commonly used drugs are etomidate & ketamine.
 - Etomidate : used when vasodilation and cardiac depression are undesirable
 - Ketamine: analgesia, preserve respiratory drive, bronchodilator and CVS stimulant.
- ✓ Maintenance
 - achieved with volatile or intravenous (IV) anesthetics.
 - Volatile agents are popular because of their ease of delivery, reliable recovery, excellent safety profile and mode of onset. But can cause fulminant hepatic necrosis
- ✓ Emergence ("waking up")
 - Patient backs to a restored state of consciousness.
 - Autonomic hyper-responsiveness → short period of time in which patient's body is aware of emergence without full return to consciousness. Manifest as hypertension, tachycardia, bronchospasm, or laryngospasm. Short acting narcotics, beta blockers or lidocaine can blunt these responses

2) Peripheral nerve block

- ✓ For procedures involving the extremities.
- ✓ major relaxation and analgesia of the selected area without hemodynamic instability
- ✓ Also used for operative anesthesia or post-operative pain control.
- ✓ Commonly blocked nerve groups
 - Brachial plexus(interscalene block, infraclavicular block)
 - The sciatic nerve (posterior or lateral approach), and
 - The femoral nerve group (3 in 1 block)

3) Intravenous regional block(Bier block)

- is alternative to peripheral nerve block for extremity surgery, usually the hand or forearm. It can be applied in pain therapy (eg, chronic regional pain syndrome)

4) Neuraxial anesthesia

- ✓ for patients undergoing surgery of the lower extremities or abdomen
 - A) Spinal anesthesia
 - B) Epidural Anesthesia

A) Spinal anaesthesia

- also called spinal b ,subarachnoid b ,intradural b and intrathecal block
- Involves the injection of a local anaesthetic into the subarachnoid space.

Indications

- Hemorrhoidectomy
- Hernia (inguinal or epigastric)
- Transurethral resection of the prostate and transurethral resection of bladder tumors
- Hysterectomy in different techniques used
- Caesarean sections
- Orthopedic surgery on the pelvis, hip, femur, knee, tibia, and ankle
- Vascular surgery on the legs
- Endovascular aortic aneurysm repair
- Nephrectomy and cystectomy in combination with general anaesthesia
- severe respiratory disease such as COPD as it avoids intubation and ventilation

Contraindications

- Non-availability of patient's consent
- Local infection or sepsis at the site
- Bleeding disorders, thrombocytopaenia, or systemic anticoagulation
- Space occupying lesions of the brain
- Anatomical disorders of the spine
- Hypovolemia
- stenosis valvular diseases
- allergy to anesthetics
- Multiple sclerosis-controversial...

Complications

- Hypotension (Neurogenic shock) - Due to sympathetic nervous system blockade.
 - treated with iv fluid and sympathomimetic drugs
- post spinal head ache --associated with size and type of spinal needle used
- Cauda equina injury--very rare, due to the insertion site being too high
- Cardiac arrest--very rare, usually related to the underlying medical condition of the patient
- Spinal canal hematoma--Urgent CT/MRI to confirm the dx followed by
 - urgent surgical decompression to avoid permanent neurological damage
- Epidural abscess--May present as meningitis or and abscess.
 - Urgent CT/MRI confirms the dx followed by antibiotics and urgent surgical drainage

Limitations

- Limited to procedures involving most structures below the upper abdomen.
- To administer a spinal anesthetic to higher levels may affect the ability to breathe by paralyzing the intercostal respiratory muscles, or even the diaphragm in extreme cases (called a "high spinal", or a "total spinal", with which consciousness is lost), as well as the body's ability to control the heart rate via the cardiac accelerator fibres.
- Also, injection of spinal anaesthesia higher than the level of L1 can cause damage to the spinal cord, and is therefore usually not.

ABCDE OF LIFE (1^o SURVEY)

1. AIRWAY MAINTENANCE WITH CERVICAL SPINE PROTECTION

- a. **Assessment**
 - i. **Ascertain patency**
 - ii. **Rapidly assess for airway obstruction**
- b. **Management—Establish a patent airway**
 - i. **Perform a chin-lift or jaw-thrust maneuver**
 - ii. **Clear the airway of foreign bodies**
 - iii. **Insert an oropharyngeal airway**
 - iv. **Establish a definitive airway**
 1. **Intubation**
 2. **Surgical cricothyroidotomy**
 - v. **Describe jet insufflation of the airway, noting that it is only a temporary procedure.**
- c. **Maintain the cervical spine in a neutral position with manual immobilization as necessary when establishing an airway**
- d. **Reinstate immobilization of the cervical spine with appropriate devices after establishing an airway**

2. BREATHING: VENTILATION AND OXYGENATION

- a. **Assessment**
 - i. **Expose the neck and chest, and ensure immobilization of the head and neck**
 - ii. **Determine the rate and depth of respirations**
 - iii. **Inspect and palpate the neck and chest for tracheal deviation, unilateral and bilateral chest movement, use of accessory muscles, and any signs of injury**
 - iv. **Percuss the chest for presence of dullness or hyperresonance**
 - v. **Auscultate the chest bilaterally**
- b. **Management**
 - i. **Administer high-concentration oxygen**
 - ii. **Ventilate with a bag-mask device**
 - iii. **Alleviate tension pneumothorax**

- iv. Seal open pneumothorax
- v. Attach a CO2 monitoring device to the endotracheal tube
- vi. Attach a pulse oximeter to the patient

3. CIRCULATION WITH HEMORRHAGE CONTROL

a. Assessment

- i. Identify source of external, exsanguinating hemorrhage
- ii. Identify potential source(s) of internal hemorrhage
- iii. Assess pulse: Quality, rate, regularity, and paradox
- iv. Evaluate skin color
- v. Measure blood pressure, if time permits

b. Management

- i. Apply direct pressure to external bleeding site(s)
- ii. Insert two large-caliber IV catheters
- iii. Simultaneously obtain blood for hematologic and chemical analyses;BG & RH, cross-match...
- iv. Initiate IV fluid therapy with warmed crystalloid solution and blood replacement
- v. Prevent hypothermia
- vi. Consider presence of internal hemorrhage and potential need for operative intervention, and obtain surgical consult

4. DISABILITY: BRIEF NEUROLOGIC EXAMINATION

- a. Determine the level of consciousness using the GCS
- b. Check pupils for size and reaction
- c. Assess for lateralizing signs and spinal cord injury

5. EXPOSURE/ENVIRONMENTAL CONTROL

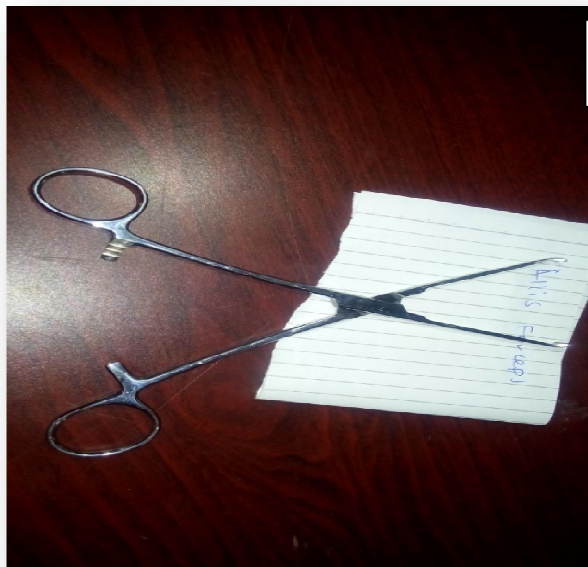
- a. Completely undress the patient, but prevent hypothermia

SOME BASIC SURGICAL INSTRUMENTS IN PICTURE



Artery forceps/ Haemostat

•



Alli's forceps



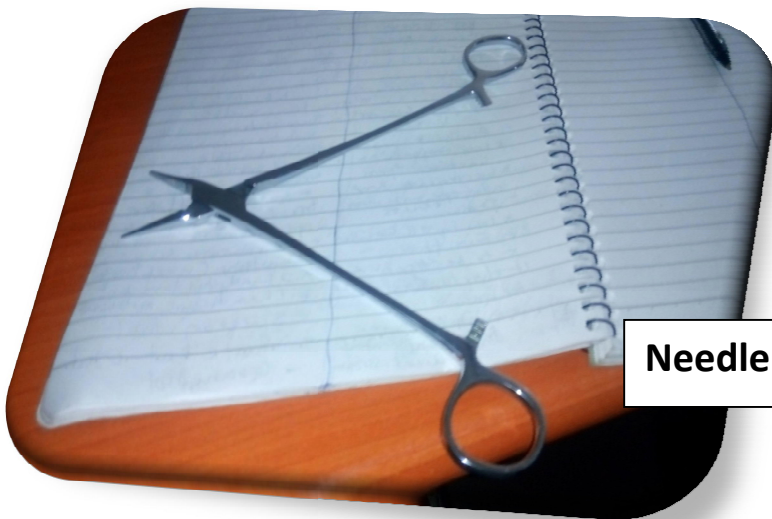
Alli's forceps



Sponge forceps



Babcock



Needle holder



Dissector



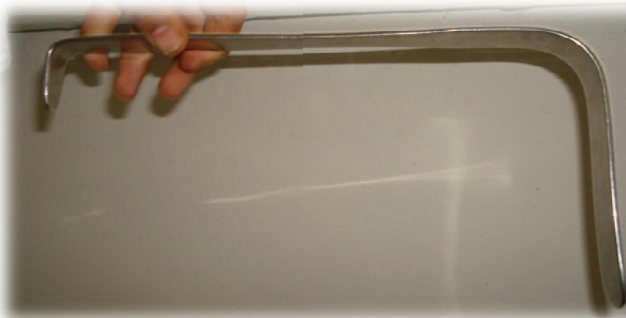
Abdominal wall retractor



Abdominal spatula



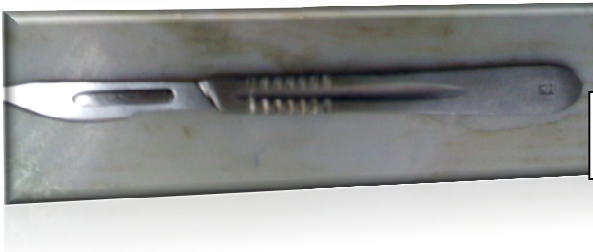
Ambu bag



Bladder retractor



Blade holder



Knife/scalpel



Cervical thongs traction



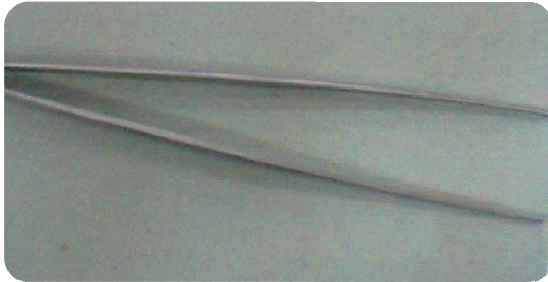
Curette



Deaver retractor



Doines retractor



Tissue forceps /pick up
Non-toothed
Toothed



Gally pot



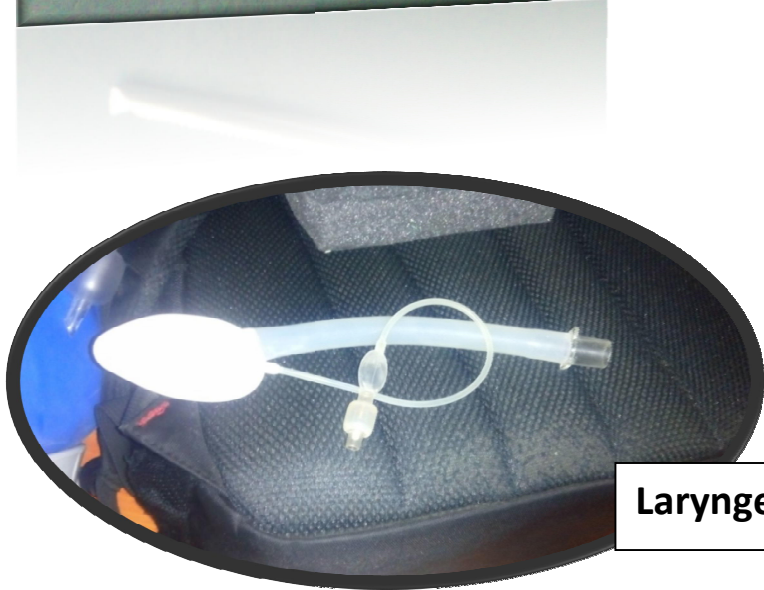
GB (gall bladder) forceps



kocher



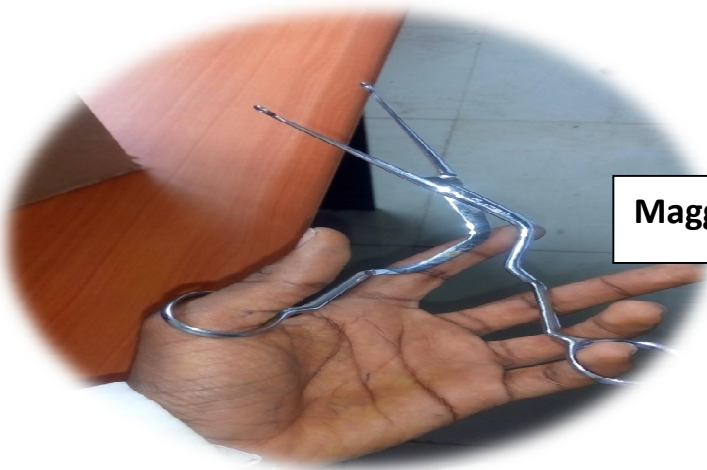
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Laryngeal mask airway (LMA)



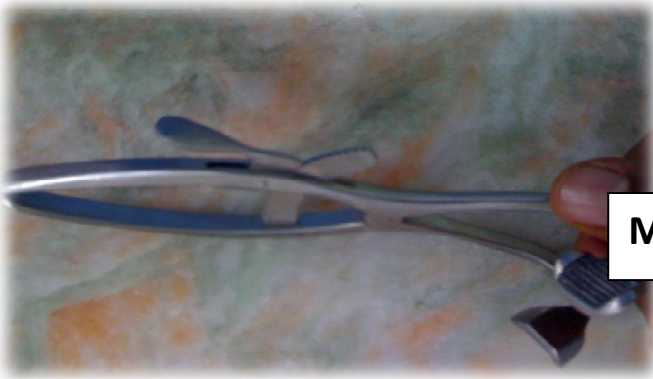
Lungenbek retractor



Maggille's forceps



Maggille's forceps



Mastoid retractor



Tissue scissor



Kidney dish



Stich scissor



Towel clip

<https://www.youtube.com/watch?v=RiqQleLPIBg>

Miscellaneous—watch examination of Varicose Vein

<https://www.youtube.com/channel/UCZ0IBTvCctutXxL462pe-RQ>

DEBOL DFP YOUTUBE CHANNEL

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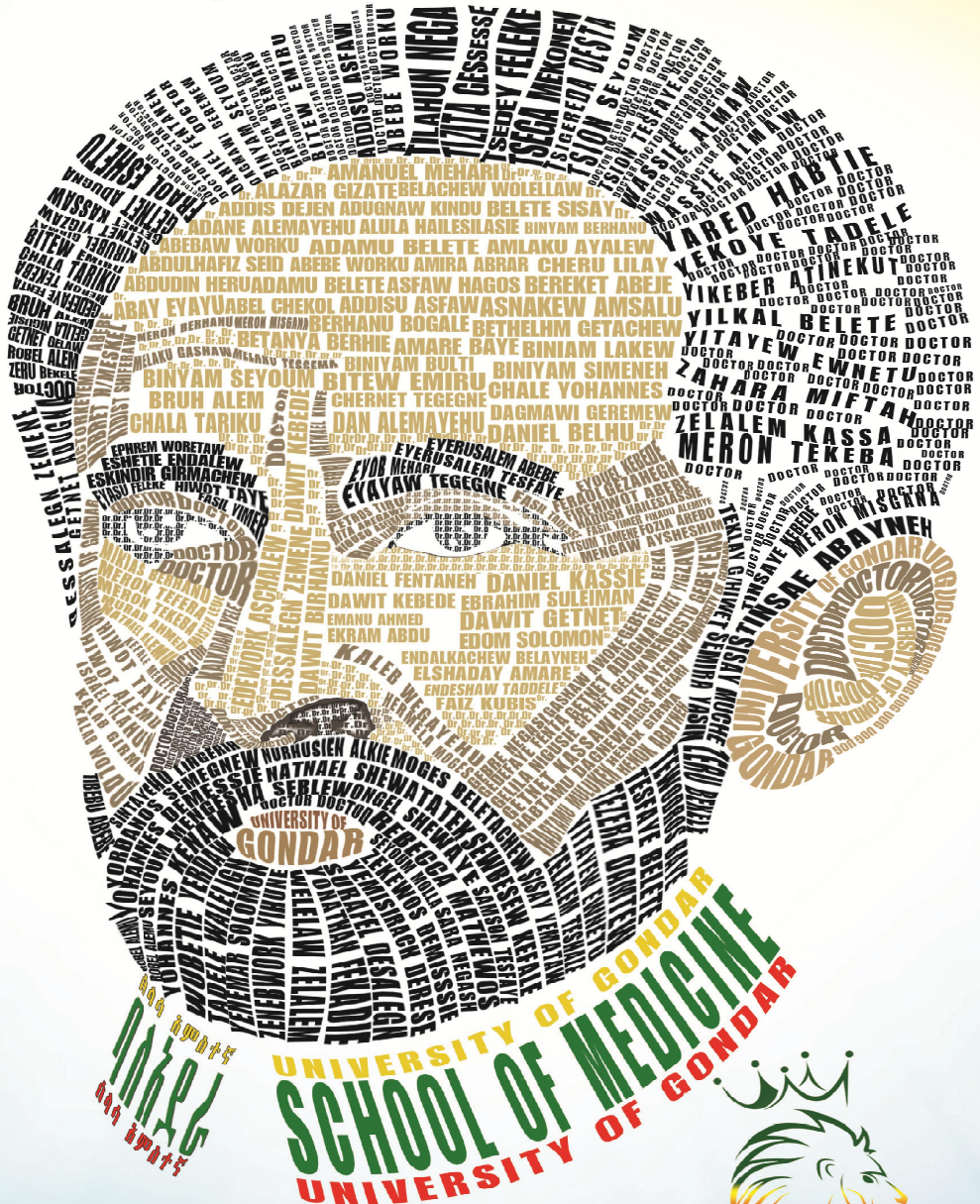


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