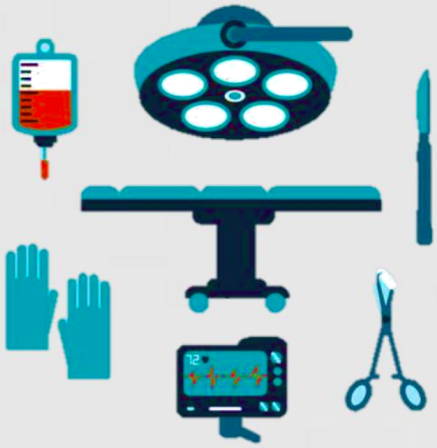

Review File

This is a review file containing only key important points, it is for **revision** and should **not** be used alone as a REFERENCE.

GOOD LUCK!

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Editing file

Feedback

Table of Content: click on the page number for a fast delivery to the lecture ☺

Mechanism of Trauma

- Factors affecting types of injury:
    - Ability of body to disperse energy delivered.
    - Force and energy (size of object, velocity, acceleration or deceleration and affected body area).
    - Duration and direction (the larger the area, the more energy will be dissipated).
    - Position of victim.
    - The impact resistance of body parts has a bearing on types of tissue disruption (gas > easily compressed, **l**iquid > **l**ess compressible).
- Other factors that will affect energy dissipation in a crash include:
    - Vehicle's angle of impact.
    - Difference in sizes of the two vehicles.
    - Restraint status and protective gear of occupants.
- **Kinetic energy of a subject in motion that stops suddenly must be transformed or applied to another object.**
- Types of trauma:

1. Blunt trauma: injuries in which tissues are not penetrated by external object.
    a. Motor vehicle crashes: five phases of trauma:
        i. Phase 1: vehicle deceleration.
        ii. Phase 2: occupant deceleration.
        iii. Phase 3: deceleration of internal organs.
        iv. Phase 4: secondary collisions.

Coup-contrecoup injury: a classic injury to the brain that primarily start the hit on the frontal lobe after deceleration and percussion will occur resulting in an occipital lobe injury (coup is the direction of the impact -ex: temporal if the impact was lateral- contre means that it also occurred on the opposite side of the first hit or coup).

- Additional impact patterns:
    - Frontal or head-on impacts: passengers decelerate as same rate as vehicle, sudden stop, two trajectories: down and under, up and over.
    - Lateral or side impacts: impact energy to the near-side occupant, the body is pushed in one direction and the head moves toward the impacting object.
    - Rear impacts: best prognosis, whiplash injury is common.
    - Rotational or quarter-panel impacts: the vehicle's forward motion stops but the side continues in rotational motion.
    - Rollovers: patients may be ejected, so they may be struck hard against the interior of the vehicle.
- Restrained occupants: seat belts can cause injuries such as cervical fractures (whiplash) and neck sprains, air bags can cause secondary injuries due to direct contact (burns) or due to chemicals.
- Pedestrian injuries: three predominant injuries:
    - First impact: car strikes body with its bumpers.
    - Second impact: adult is thrown on hood and/or grille of vehicle.
    - Third impact: body strikes the ground or some other object.
- **Waddell triad for children:** bumpers hits pelvis and femur, chest and abdomen hit grille, head strikes vehicle and ground.
- Severity of injuries in falls from heights depend on: height, position, surface and physical condition.

2. Penetrating injury: involves disruption of skin and tissues in a focused area:
    - Low velocity: caused by sharp edges.
    - Medium and high velocity: objects might flatten out, tumble or ricochet.

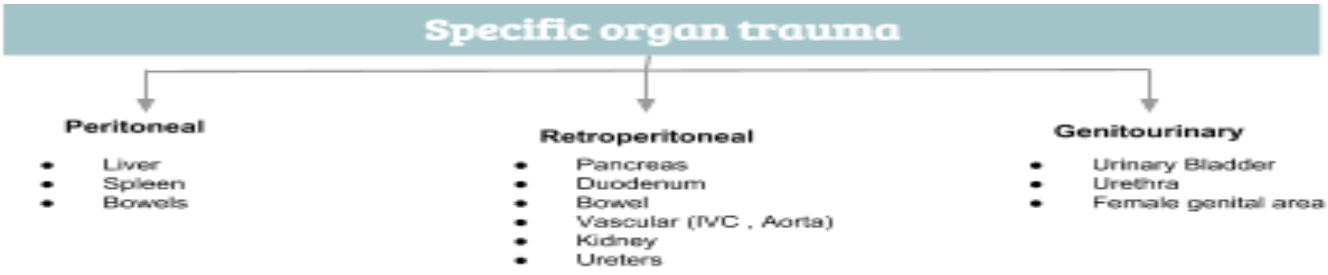
❖ Stab wounds.

❖ Gunshot wounds: handgun (less accurate), shotguns, rifles (more accurate), the most important factor for seriousness of wound is type of tissue involved. Entry wound is characterized by the effects of the initial contact and implosion.

3. Blast injuries:
    - ➢ Primary: damage is caused by pressure wave generated by explosion, most common injuries occur to the ear.
    - ➢ Secondary: due to flying debris, may cause blunt and penetrating injuries.
    - ➢ Tertiary: when a person is hurled against a stationary, rigid objects (ex. Ground shock: physical displacement when the body impacts the ground).
    - ➢ Quaternary (miscellaneous): burns, respiratory injury, crush injury, entrapment. Caused by biologic, chemical or radioactive contaminants added to an explosive “dirty bombs”.

Specific Organ Trauma

- The primary management of abdominal trauma is determination that an intra abdominal injury EXISTS and operative intervention is required.



- **Hospital care and diagnosis:**
    - **Primary survey:**
        - **Airway** (& C-spine Immobilization)
        - **Breathing**
        - **Circulation** (with hemorrhage control)
        - **Disability**
        - **Exposure**/environmental control.
        - Full **vital signs**
    - **Secondary survey:**
        - History and Physical examination.
- **Abdominal trauma:**
    - **Diagnostic procedures:**
        - Peritoneal lavage (DPL) **Most informative** initial investigation. (in non-stable patients).
        - USG (Ultrasonography) abdomen (FAST in non-stable patients).
        - CT abdomen in stable patients.
- **Liver Trauma:**
    - The commonest organ injured in case of penetrating trauma.
    - Diagnosis of hepatic injury is often made at laparotomy in patients presenting with penetrating injuries requiring immediate Surgery.

- **Diagnostic peritoneal lavage (DPL):**
  - If +ve → patient should be taken to the OR without delay.
  - If DPL is negative, we push 1L normal saline into the peritoneal cavity then suck it back, if it was red → it is +ve, GO TO OR.

- **Splenic Trauma :**
  - Most commonly injured organ in patients who have suffered **blunt abdominal trauma.**
  - **Diagnosis:**
    - LUQ bruising or abrasion
    - Left lower ribs fracture
    - Kehr's sign : shoulder tip pain.
    - Ballance's sign : LUQ mass
- **Renal Trauma:**
  - Symptoms and signs (3 Fs):
    - Flank abrasion.
    - Fracture of the ribs.
    - Fracture vertebral transverse process.
  - Investigations:
    - Intravenous urography (IVU).
    - CT scan.
  - Management:
    - **Minor injuries:** US scan, percutaneous drainage , antibiotic usage.
    - **Severe injuries:** Partial nephrectomy or total nephrectomy.

Trauma Care

Trimodal death distribution:		
Immediate death (1st Peak):	**Early deaths (2nd Peak):**	**Late deaths(3rd Peak):**
deaths occurring **immediately** after or within a few seconds of injury,contributes up to **50%** of the total.	up to **4 hours** after injury, accounts for 30% of deaths	accounts for **20%** of deaths (usually in an intensive care unit) **days** to **weeks** after the event.

Primary and secondary survey
- **Primary:** Consists of the **ABCDE** • The goal of primary survey is to identify and treat conditions that constitute an immediate threat to life. • ATLS provides a structured approach to the trauma patient with standard Algorithms of care. same to all patients • The cases with special considerations in the primary survey : Trauma in elderly Pediatric trauma where a heart rate of 120 in a 2 y.o is normal Trauma in pregnancy
- **Secondary :** • Secondary survey is the complete history and Physical examination • Has to be done when : Primary survey is completed - ABCDEs are reassessed - Vital functions are returning to normal

The components of the secondary survey?

1. History: Allergies, Medications, Past illnesses … etc
2. Physical exam
3. Complete neurologic exam
4. Special diagnostic tests
5. Reevaluation

Advanced Trauma Life Support (ATLS):

ABCDE approach to evaluation and treatment

- **A**irway with c-spine protection
- **B**reathing / ventilation / oxygenation
- **C**irculation: stop the bleeding!
- **D**isability / neurological status
- **E**xpose / Environment / body temperature

Treat greatest threat to life first

Definitive diagnosis not immediately important

Time is of the essence

Do no further harm

- **Lethal triad:**
  - **Hypothermia , Coagulopathy, Acidosis.**

Glasgow coma scale(GCS):

Table 7.1 Glasgow Coma Scale

Eyes open	
• Spontaneously	4
• To verbal command	3
• To pain	2
• No response	1
Best motor response	
To verbal command	
• Obeys verbal command	6
To painful stimulus	
• Localizes pain	5
• Flexion withdrawal	4
• Abnormal flexion (decorticate rigidity)	3
• Extension (decerebrate rigidity)	2
• No responses	1
Best verbal response	
• Orientated and converses	5
• Disorientated and converses	4
• Inappropriate words	3
• Incomprehensible sounds	2
• No response	1
Total number of points (minimum 3, maximum 15)	

Immediate life threatening injuries

- **Laryngotracheal injury / Airway obstruction - Massive hemothorax - Cardiac tamponade**

- **Tension pneumothorax:**

(Depresses ipsilateral hemidiaphragm, Shift the mediastinal structures to contralateral chest, Subsequently the contralateral lung is compressed, The heart rotates about the superior and inferior vena cava, this decreases venous return and ultimately cardiac output which results in cardiovascular collapse.)
Diagnosis: Respiratory distress, hypotension , distended neck veins, Tracheal deviation, Subcutaneous emphysema , Lack or decreased breath sounds.\ **Treatment**: First:Immediate needle thoracostomy(In second intercostal space midclavicular line), Then: Insert Tube thoracostomy (In fifth intercostal space midaxillary line)

- **Open pneumothorax (or sucking chest wound).**

This occurs with full-thickness loss of the chest wall, permitting free communication between the pleural space and the atmosphere. \ **Treatment**: First:Close the chest wall defect Then:tube thoracostomy.

- **Flail chest with underlying pulmonary contusion**

occurs when three or more contiguous ribs are fractured in at least **two locations** , Paradoxical movement of this free-floating segment of chest wall. **\ Treatment:** intubation and mechanical ventilation

Breast Diseases

- The majority of the breast drains into the axillary lymph nodes. Which can be divided into 3 levels surgically in relation to **pectoralis minor**: **Level 1** (below pectoralis minor tendon), **Level 2** (behind pectoralis minor tendon), and **Level 3** (above pectoralis minor tendon).

Breast diseases can present in 1 of 4 ways:

1. Breast pain: cyclic (NSAID + reassurance) or noncyclic (needs investigation)
2. Mass: apply **triple assessment** → H&P + imaging (mammogram) + biopsy (FNA)
3. Skin changes
4. Nipple discharge: physiological (bilateral & by squeezing) or pathological (unilateral & **spontaneous**)

Benign Conditions	Characteristics	Signs & Symptoms	Investigations	Management
Fibrocystic changes	• Caused by hormonal changes prior to menses. • Age: 30-40 "middle age".	• **Cyclic pain.** • Lumpy, bumpy breasts	**US** (best), and if age >40 do mammogram (to rule out pathology)	**Reassurance.**
Simple or complicated cyst	Can be simple or complicated (solid + cystic component)	Present with swelling (**mass**) and or localised tenderness (**pain**).	Ultrasound + Aspirate fluid (if bloody or histology indicates → biopsy)	• If simple: reassure • If complicated (or not resolving): **biopsy** +/- excision
Fibroadenoma	• Age: 15-30 (teens to early adulthood) • Benign.	• Firm, rubbery, round, well circumscribed, mobile **mass**. • Pain**less**	• **Triple assessment** (must be applied to any breast mass) • U/S, Mammogram. • Biopsy to confirm.	Reassure + follow up. **Indication for surgery (very important)** Size > 4cm / phylloides / painful / unusual age / unclear pathology / +ve family history / no access for follow up / giant fibroadenoma
Intraductal papilloma	Most common cause of persistent **bloody** nipple **discharge.**	• **Spontaneous** discharge • Pain, **no** mass.	• Test for occult blood • U/S, Mammogram rule out malignancy • Biopsy	**Resolves** by itself (if persists → excision)
Mammary duct ectasia	• Inflammation and **dilation** of sub-areolar ducts behind nipples. • Age: **35** and above	• Multiple **discharge** (green, cheesy, etc..) • Slit like nipple • Palpable mass	• Test for occult blood • **US** (diagnostic) • Mammogram (differentiate from malignancy) • Biopsy (if mass)	**Assure** patient then: If Infection: antibiotic If Abscess: drainage (small abscess respond well to antibiotic)
Mastitis (breast infection)	• Diffuse bacterial infection of the breast without pus. • Usually during **lactation**.	• Pain and tenderness • **Fever and rigor**	**Clinically** diagnosed.	Antibiotics + analgesia + continue breastfeeding.
Breast abscess	May be complication of mastitis.	Pain, fever, localized induration, nipple discharge.	US to detect the abscess	• Incision & drainage. • Antibiotics + Needle aspiration
Fat necrosis	Necrosis of adipose tissue. **Caused by trauma** to breast (ex: **car accident**)	Pain or firm + irregular **mass**	U/S, mammogram. Core biopsy (diagnostic to differentiate from malignancy)	Assure the patient (resolves w/o treatment)
Phyllodes tumor	• Variation of fibroadenoma • Rapid growth. • **Malignant potential**.	Firm mass (small or large) increasing in size.	Mammography and ultrasound (appears similar to fibroadenoma).	Core biopsy + excision w/ clear margins (**any phyllodes has to be excised**)
Galactocele	• A cyst containing milk. • In **lactating** woman.	Pain but **no** fever.	Ultrasound	Needle aspiration

Male gynecomastia	Must exclude testicular, liver, and adrenal malignancies	-----	-----	• Pre-puberty: wait • Change meds • Treat underlying dis.

- Sebaceous cyst → gets blocked and presents as **mass with punctum (black spot) and pain.**

<table>
<tr><th colspan="3">Breast Cancer</th></tr>
<tr><td>Risk Factors</td><td colspan="2">In order from most to least significant: Female > 45 years, previous benign disease, cancer in other breast, age at first pregnancy, exposure to ionizing radiation.</td></tr>
<tr><td>Types</td><td colspan="2">• Ductal carcinoma in situ → cancer is confined to the duct and with treatment has high cure rate (up to 90%). DCIS does not spread to the axillary lymph nodes so they are usually not removed.
• Invasive ductal carcinoma → most common type of breast cancer; invades the wall of the duct.
• Others → invasive lobular carcinoma, medullary, colloid , tubular, and adenoid carcinoma
• Pagets disease → may present as skin ulceration of the nipple and can be mistaken as eczema. If diagnosed we go for mastectomy.
• Sarcoma → managed like sarcoma → surgery w/o lymph nodes because its spreads by blood.</td></tr>
<tr><td>Staging</td><td colspan="2">Prognostic factors: size of tumor, grade of tumor , and lymph node involvement (# of axillary nodes is most important!)
Classification:
<table>
<tr><th>Stage 1</th><th>Stage 2</th><th>Stage 3</th><th>Stage 4</th></tr>
<tr><td>Tumor < 2 cm</td><td>2 cm - 5 cm</td><td>Tumor > 5 cm</td><td>Any size with distant metastases.</td></tr>
<tr><td>No lymph node involvement</td><td>1 ipsilateral axillary node involvement (moveable)</td><td>Skin involvement or fixation of LN</td><td>Supraclavicular node involvement</td></tr>
</table>
Survival rates (depending on stage at diagnosis):
• Localised → 96.8%
• Regional → 75.9%
• Distant → 20.6%</td></tr>
<tr><td rowspan="3">Approach</td><td>H & P</td><td>Most common presentation of cancer is painless mass. Full H & P should be done!</td></tr>
<tr><td>Screening</td><td>1. MAMMOGRAM (screening tool for pts aged 40 and above) → can detect calcifications:
○ Macrocalcification → BENIGN (almost always not cancer and require NO follow up)
○ Microcalcifications → usually non-cancerous but can be a sign of malignancy (up to 90% of DCIS can appear as microcalcifications)
2. MRI → can be used for high risk patients</td></tr>
<tr><td>Diagnosis</td><td>1. MAMMOGRAM: malignancies can appear as spiculated mass/margins which will require biopsy.
2. Ultrasound (US)
• not good for screening, usually used in younger women or to characterise lesion.
• Looks for location of lesion, helps determine if solid or cystic, margins, etc..
• Findings → cyst (smooth margins with no or few echos) benign mass (hyperechoic, lobulated, smooth margin, uniform internal appearance) and malignant mass (hypoechoic, spiculated, irregular margins, heterogeneous internal appearance)
3. CYTOLOGY: FNA, core biopsy, excisional biopsy
4. CT CAP + bone scan → rule out metastases</td></tr>
</table>

	Treatment	○ **Stage 1 & 2** → conservative (**lumpectomy + sentinel lymph node + radiotherapy**) ○ **Stage 3** → first we give **neoadjuvant chemotherapy** to downstage the tumor (reduce the size), if that works we continue with **conservative treatment** (just like stage 1 and 2), and if not we do **mastectomy + sentinel lymph node** ○ **Stage 4** → **chemotherapy and refer to oncology.** ● Lines of treatment: 1. **Surgery:** conservative (wide local excision/lumpectomy) or mastectomy +/- axillary clearance (sentinel lymph node biopsy). Complications of mastectomy/axillary clearance: **lymphoedema**, winged scapula, and etc... 2. **Radiotherapy**: Indication:**always w/ conservative breast surgery**, total mastectomy (axilla), **preoperatively** (reduce tumor size and downgrade) Side effects: **lymphoedema**, and etc.. 3. **Chemotherapy**: side effects include **hair loss, neutropenia**, and etc.. Given as neoadjuvant to reduce tumor size before conservative breast surgery or as a main treatment. 4. **Hormonal therapy**: Tamoxifen → given to estrogen receptor positive breast cancer and increases survival and significantly r**educes the risk of developing cancer in the opposite breast**. Side effects: **endometrial cancer, DVT**, etc.. 5. **Ovarian ablation** 6. **Biological treatment**: monoclonal antibody ex: herceptin. 7. **Postoperative breast reconstruction**: tissue expander w/breast implant, or flap reconstruction.

Adrenal Diseases

- Layers of the adrenal:

Medulla	Cortex		
	Glomerulosa	Fasciculata	Reticularis
Epinephrine and norepinephrine	Androges	Cortisol	Aldosterone

- Cushings → too much **cortisol**!
  - Cortisol may be exogenous (most common) or endogenous (from adrenal or ectopic → pancreas, lung, etc…)
  - Present with: hyperglycemia (**diabetes**), excess hair, acne, **truncal obesity**, moon face, **poor wound healing**, **hypertension**.
  - To diagnose: 24 hr urinary free cortisol and/or dexamethasone suppression test.
- Conns → too much **aldosterone** (usually caused by adrenal tumor)!
  - How do patients present? With uncontrolled hypertension (**not** responding to medication) and serum will show: **hypernatremia** and **hypokalemia**.
  - We also do: ECG (signs of hypokalemia), and CT (to rule out tumors).
  - Treatment → adrenalectomy.
- Addison's → hypofunction of adrenal cortex (can be autoimmune, iatrogenic, infection related)!
  - Symptoms: fatigue, weight loss, skin pigmentation, anxiety, etc..
  - Investigations: **hypotension**,hypoglycemia, **hyponatremia**, **hyperkalemia**.
  - Also order: 24 hours urinary 17-OHCS2
  - Management → lifelong hormonal replacement therapy + general advice (salt food, wear medical alert bracelet, carry a kit of 100 mg hydrocortisone IM).
  - Complications → **adrenal crisis**, electrolyte imbalance.
- Pheochromocytoma → tumor of adrenal medulla secreting EP & NE released sporadically.
  - Present with episodic **headache**, tachycardia, **hypertension** (200/150), diaphoresis.
  - Investigations → **24h urine- VMA,** metanephrine (urine and plasma), CT, (NOTE: serum Na+ and K+ are usually normal)
  - Management → surgical removal of tumor (treatment of choice), BUT the patient should come to operation with **blood pressure and pulse rate controlled** to reduce risk of adrenal crisis!

- Incidentaloma → mass discovered incidentally by imaging done for other reasons.
  - Once discovered you have to answer 2 questions: is it functional? Is it a malignancy?
  - Management → if > 4 cm take it out, if less follow up with imaging and if it increases > 1 cm in 1 year then take it out.
  - **Possible case scenarios**: **1)** OB/GYN patient was referred to you with 1 cm mass on the adrenal found by US (done for fibroid). Patient has NO complaint. **2)** A patient diagnosed with breast cancer 10 years ago, and she is presenting with a mass on the adrenal. → You have to rule out cancer (metastasis).

Principles of Surgical Oncology

- **Types of Tumors:**
  - **Benign.**
    - Treatment: **Local excision of benign.**
  - **Malignant: (**Carcinoma: Epithelial origin) and (Sarcoma: Mesothelial origin).
    - Features of malignant tumors:
      - Non encapsulated.
      - Usually invades (Invasion: is a Continuity of the primary tumor).
      - Metastasize (Metastasis: is a tumor cell that has discontinued from the primary tumor).
    - Treatment: **Radical excision.**
  - **Teratoma:**Teratoma is made up of several different types of tissue that are **not normally found at that site,** Best Example: Dermoid cyst of ovaries and testes.
  - **Hamartoma:** Composed of tissue that are **normally found at that site but are disorganized.** Best example: angiomyolipoma of the kidney.
- **Carcinoma in situ:** is the presence of tumor cells inside the epithelium but did not invade the basement membrane.
- **Malignant cells features:**
  - Small cytoplasm
  - Multiple nuclei
  - Multiple and large nucleoli
  - **Coarse chromatin**
- **Metastasis:**
  - Lymphatic :Regional & distant lymph nodes.
  - Homogeneous: e.g. Liver, lung, bones.
  - Transcoelomic e.g peritoneal & pleural cavity.
- **Cytology:** Examination of morphology of **individual cells** under the microscope.
  - Exfoliative : urine (voided urine specimen, for urinary bladder carcinoma), sputum.
  - Fluid aspiration (ascitic fluid,pleural fluid).
  - Fine needle aspiration (FNA).
  - Pap smear.
- **Biopsy:** Examination of histological **tissue** characteristics under the microscope.
  - Core biopsy E.g. Tru-cut.
  - Incisional biopsy: removes a small accessible piece of the lesion.
  - Excisional biopsy: Complete removal of a discrete lesion.
- **Tumors markers:**
  - Important in follow up: (PSA 'Prostate specific antigen').

Superficial Swelling

- History of a lump or ulcer:
  - Duration, first symptom, other symptoms, progression, persistence, any other lumps or ulcers, cause, who discovered it.
- Examination of a lump:
  - Inspection: shape, site, color, skin changes, size.
  - Palpation: temperature, tenderness, surface, edges, consistency, mobility, pulsation, compressibility, fluctuation, transillumination test.
- Lump classification: congenital (solid or cystic) and acquired (solid or cystic).
- Benign lumps:
  1. Papilloma (warts):
     a. Finger-like projection of all skin layers.
     b. Can be pedunculated (have a stalk) or sessile.
     c. Treatment: cauterization (if small or multiple) or surgical excision (if large).
  2. Hypertrophic scar:
     a. Excessive fibrous tissue, confined to scar, NO neovascularization.
     b. Raised, nontender swelling with no itching.
  3. Keloids:
     a. Excessive fibrous and collagenous fibers, that usually extend beyond the scar, WITH neovascularization.
     b. More common in dark skinned, and is raised, pink, tender, and itchy.
  4. Infantile hemangioma (strawberry naevi):
     a. Bright red raised lesion with irregular surface, which changes to a blue color when the baby cries.
     b. Most commonly in the skin, especially head, neck, trunk, and extremities.
     c. Resolve spontaneously.
- Skin Cysts:
  1. Congenital dermoid:
     a. Benign, common at neck, root of nose, inner or outer angles of eyes.
     b. Appear in childhood or adults, painless, spherical, cystic with smooth surface.
     c. Illumination test is negative.
     d. Treat by excision and drainage.
  2. Implantation dermoid:
     a. Post-traumatic dermoid, commonly seen in fingers and hands of farmers or tailors.
     b. Tense, attached to scarred skin, may be hard and tender.
     c. Excision is curative.
  3. Epidermoid (sebaceous) cyst:
     a. Most commonly in the scalp; a spherical, tense swelling attached to skin with punctum.
     b. Usually asymptomatic but may be complicated by infection (presents with throbbing pain and redness).
     c. Uninfected cyst → Simple excision.
  4. Lymphatic malformation (cystic hygroma):
     a. Congenital malformation, commonly in neck or axilla.
     b. Painless, irregular, filled with clear fluid (+ve transillumination).
     c. Becomes red when infected.

5. Branchial cyst:
    a. Congenital cyst originates from the 2nd and 3rd branchial arches.
    b. Tense with distinct edges, +ve fluctuation, -ve transillumination.
6. Ganglion cyst:
    a. Cystic swelling of synovial membrane of tendon or capsule in small joints, commonly in dorsum of hand and wrist, or palmar aspect of wrist and fingers.
    b. Slow growing, firm, painless, cystic swelling.
    c. Reassure (if asymptomatic) or aspirate / excise (if symptomatic).

- Tumors of muscles and connective tissue:
    1. Lipoma:
        a. Benign tumor of fat, presenting as painless, nontender, soft and lobulated lump.
        b. Has well defined edges, and is freely mobile. Positive slipping sign.
        c. Can be diagnosed clinically or with fine needle aspiration.
        d. Reassure (if small and asymptomatic) or excise after appropriate imaging (if large, symptomatic, and deep)

Common Neck Swellings

Goiter (thyroid swelling)		
Thyroid cyst	**Multinodular goiter (Simple goiter)**	**Inflammatory (thyroiditis)**
• Painless • Normal thyroid function Diagnosis : Ultrasound and FNA Treatment : Aspiration. **In thyroglossal cyst** If it moves then it is one of two: Thyroid lump "goiter" or Thyroglossal cyst. Then you ask the patient to stick his tongue out and if the lump moves then it is a thyroglossal cyst. Because Thyroglossal cysts extend to the tongue.	• Benign condition • 80% normal thyroid function • If it starts to secrete thyroxine we called (toxic multinodular goiter) Treatment : Surgery if only symptomatic	- Autoimmune inflammation (Hashimoto's thyroiditis) Caused by: Chronic thyroiditis Diagnosis: FNA Treatment : Surgery only if: symptomatic or to R\O malignancy)
Lymph node swelling (Majority occur in the posterior triangle)	1. **Inflammatory:** • Acute (tonsillitis) • Chronic (TB)	2. **Neoplastic:** • Primary (Lymphoma) • Secondary (Metastasis)

Thyroid tumor		
Clinical Features	1. Painless 2. Hoarseness of voice 3. Dysphagia	4. Lymphadenopathy 5. normal thyroid function

Investigations:	1 Ultrasound 1st diagnostic method. 2- Fine Needle Aspiration (FNA) Most important method.

Types of Thyroid tumor

1. Papillary carcinoma

A. Young age (children)
B. Most common endocrine cancer is thyroid cancer
C. Increases risk with exposure to radiation
D. Lymphatic spread.
E. Metastasizes to lung & bone.
F. Good prognosis
G. Treatment : thyroidectomy, chemotherapy is not used.

2. Follicular carcinoma

- 30–50 year age group
- Blood spread. Doesn't spread to lymph.
- Management : Treatment consists of total thyroidectomy with preservation of the parathyroids (radionuclear iodine radiation for metastasis)

3. Medullary carcinoma

- Associated with MEN 2
- (important to investigate pheochromocytoma)
- Poor prognosis.
- solid, containing amyloid, nodular tumor that does not take up radioiodine and secretes calcitonin

4. Undifferentiated (Anaplastic)

- Elderly age.
- Locally invasive → causing compression (dyspnea) and hoarseness of voice
- the worst prognosis.
- Rarely cured

5. Lymphoma

Higher risk in Hashimoto's.

- In primary hyperparathyroidism the parathyroid gets swollen and manifests as
  - Renal stones. Due to hypercalcemia
  - Bone loss and joint pain. العظم ينكسر من ابسط ضربة
  - Abdominal groans.
  - Psychic moans.
  - Fatigue overtones.

Skin and Soft Tissue Tumors

1. Cysts:
   a. Dermoid:
      i. Congenital cysts are found at the sites of embryonic fusion (most commonly the lateral brow in the line of fusion of the maxilla and frontal bone -external angular cyst-).
      ii. Contain sebum, degenerate cells and sometimes hair.
      iii. Treatment is excision after a CT scan is done to know the extent of the cyst.
   b. Epidermoid:
      i. Fixed to the skin with central punctum.
      ii. Contain cheesy like material (not sebum).
      iii. Self limiting.

2. Benign skin lesions:
    a. Seborrhoeic keratosis: yellowish-brown or dark, thick greasy plaques with a shiny appearance, common in elderly.
    b. Actinic keratosis: scaly erythematous macule or patch of skin. People with excessive sun exposure are at risk of developing it.
    c. Keratoacanthoma: grow rapidly over 2-3 months from a small red papule to a large hemispherical nodule with a friable keratin core then regresses spontaneously, can be confused with squamous cell carcinoma.
    d. Benign naevi:
        i. Sebaceous nevus of jadassohn: arise from sebaceous glands most commonly in the skull.
        ii. Congenital melanocytic nevus: present at birth, has a 0.7-2% risk of transforming to melanoma, excision is indicated if there's an increase in pigmentation, irregular color or border, itching or bleeding, and if it looks different from the others (the ugly duck sign).

3. Malignant skin lesions:
    a. Malignant non-pigmented skin lesions:
        i. Basal cell carcinoma: slow growing, locally invading, most common neoplasm in caucasians in the western world, firm nodules with pearlescent,shiny telangiectatic ulceration. 80% in sun exposed areas (especially the nose), treated by excision.
        ii. Cutaneous squamous cell carcinoma: more aggressive and faster growing than BCC, arises from the stratum spinosum of the epidermis, hard erythematous nodule which proliferate and occasionally ulcerate. Smoking is an important risk factor other than sun exposure.
    b. Malignant pigmented skin lesions: malignant melanoma: risk factors: premalignant lesions, previous melanoma, age, race, fitzpatrick type 1 and 2, sunburn and sunbed use, naevi.

- Marjolin's ulcer: malignant degeneration within a pre-existing scar or chronic inflammatory lesion with an average latency period of around 30 years. The incidence is highest in old burn scars followed by osteomyelitic wounds; however, they also occur in areas of venous insufficiency and on pressure sores, treated by excision.

General Complication of Surgery

- **Airway obstruction:**
    - **Obstruction by the tongue:** May occur with a depressed level of consciousness (like sleeping disorders or obstructive sleep apnea).
    - **Tracheal compression:** A Patient had a **total thyroidectomy** and post-operatively in the recovery room the nurse calls you because the patient can not breathe. what are you going to do? Stabilize the patient and **OPEN THE WOUND.** Because thyroid is highly vascular and the surgery will cause hematoma (which will compress the airway).
- **Pulmonary complications:**
    - **Atelectasis:**
        - The **most common** cause of Day 1-2 **fever.**
        - Treatment: Incentive spirometry and ask the patient to cough.
    - **Acute respiratory distress syndrome:**
        - Pulmonary artery wedge pressure <= 18 mmHg.

        - Ratio of PaO2/FiO2(partial pressure of arterial oxygen to fraction of inspired oxygen) of <= **200**.
- **Cardiac surgery:**
    - **Arrhythmia:**
        - Sinus tachycardia is the most common and may be a physiological response to hypovolemia or hypotension.
- **Urinary complications:**
    - After groin, pelvic or perineal operations, or operations under spinal/epidural anaesthesia.
    - **Management:** catheterization of the bladder.
- **SIRS (systemic inflammatory response):**
    - **Two of:**
        - **Hyperthermia** (>38°C) or **hypothermia** (<36°C).
        - **Heart rate** (>90/min more than 100, no β-blockers).
        - **Tachypnoea** (>20/min), or **PaCO2** < 32 mmHg.
        - **White cell count** >12 × 109/l or <4 × 109/l or > 10 % bands.
- **Surgical site infection:**
    - **Wound infection:**
        - The most common complication in surgery.
        - Local erythema, tenderness, swelling, cellulitis, wound discharge or frank abscess formation.
        - Antibiotics are only required if there is evidence of associated cellulitis or septicaemia:
            - If the patient has **redness only (cellulitis) without collection:** give them **antibiotics**.
            - If the patient has a **drainable collection**: you should **drain it** (usually if you drain the collection the cellulitis will subside, but if didn't then you should give them antibiotics).
- **Postoperative fever 7 Ws:**
    - **Wind:** Atelectasis, Day 1-2.
    - **Water:** UTI, Day 3.
    - **Wound:** Including wound infection & anastomotic leak, Day 5-7 (can be up to 14 days).
    - **Walking:** DVT & PE, Day 7.
    - **Wonder Drug:** Anytime (like antibiotics).
    - **Waste:** C diff (clostridium difficile) colitis, anytime.
    - **Waterway:** Blood stream eg.central line infection, anytime.

Nutrition in Surgical Patients

- **Malnutrition:**
    - A broad term that can be used to describe any imbalance in nutrition; from overnutrition (Why is overnutrition considered as a malnutrition? for example in **renal patients** if you give them overdose of proteins, it will be considered malnutrition) to under-nutrition.
- **How to detect patients at risk:**
    - BMI <18 kg/m
    - Combined: weight loss >10% or >5% over 3 months and reduced BMI or a low fat free mass index (FFMI).
    - **Preoperative serum albumin < 30 g/l** (with **no evidence of hepatic or renal dysfunction**).
- **Laboratory measures:**

- Serum proteins such as **albumin and prealbumin**. Albumin is the most important indicator of nutrition before surgery, but it could give false positive in case of renal or liver problems, so in this case we will use prealbumin, so **prealbumin is more accurate than albumin.**
  - Albumin needs **23 days** to peak, so it is helpful to measure the nutrition status in months.
  - Prealbumin gives an estimation about the patient's nutrition status **in the last 7 days.**
- Transferrin gives an estimation about the patient's nutrition status in the last 3 days.
- Electrolytes.
  - Electrolytes are the **second most important indicator** of the patient's nutrition.
  - **K (potassium)** is the most important electrolyte in nutrition.
- Indicators of inflammation such as: C-reactive protein and Total lymphocyte count .

- **Preoperative nutritional care:**
  - Fasting from midnight is unnecessary in most patients.
  - ALLOW clear fluids until two hours before anaesthesia.
- **Postoperative management:**
  - Oral intake, including clear liquids, can be initiated within hours after surgery in most patients.
- **Modes Of Administration:**
  - **Enteral (EN) more prefered:**
    - **Indications:** Malnourished patient expected to be unable to eat adequately for > 5-7 days, Adequately nourished patient expected to be unable to eat > 7-9 days (Maxillofacial and esophageal surgery), head and neck or gastrointestinal surgery for cancer, brain injury, patients on a ventilator.
    - **Contraindications:** Intestinal obstructions or ileus, Severe GI bleeding.
  - **Parenteral Nutrition:**
    - **Indications:** Ileus, Intestinal fistula (high-output), Initial phase in case of short bowel or after small bowel transplant or during periods of rejection, PN should only be initiated if the duration of therapy is anticipated to be >7 days, active crohn's.
    - **Contraindications:** Functional gastrointestinal tract, Colonic ileus (not a dysfunctional gut), Awaiting flatus or bowel sounds following surgery, Patient does not want to eat or does not want a feeding tube.
    - **Side effects:** Thrombophlebitis.
- **Energy and protein needs :**

BMI (kg/m2)	Weight (kg)	Kcal/kg	Protein(gm/kg)
< 30	Actual	20-25 (minor) 25-30 (major)	1g/kg/day (minor) 1.5-2.0 (major)
30-50	Actual	11-14	1.9-2.0 (IBW) (Ideal body weight)
> 50	Ideal	22-25	2.5 (IBW)

- **Nutrition Intervention for ostomy (Colostomy/Ileostomy):**

Surgery	Nutrition Sequelae	Nutrition Management
Partial colon resection	• Loose bowel movements	Initially low-residue nutrition (low-residual fibers) progress to regular diet as tolerated.
Total colectomy	• Diarrhea • Dehydration • Electrolyte imbalance	increase fluid and electrolyte intake **especially Na.**

Rectal with colostomy	• Psychosocial issues caused by fear of expelling gas, odor-producing foods.	Avoidance of potentially gas- and odor-producing foods like beans, onions, garlic.
Small bowel resection	• Varies depending on length of small bowel resected.	If more than 100 cm ileum is resected, increased fluid and electrolyte balance problems; long-term vitamin (magnesium, B-12) supplementation.

- **Modified Diet in case of High output ostomy:**
  - Avoid obstructing food like bean, corn.
  - Limit fluids with meals / 30 min before or after.
  - Restrict ORAL FLUIDS to **500ml daily** (Meet fluid /electrolyte needs intravenously), low osmolality fluids like milk.

Hand Injuries

Hand injuries

History

Age - Dominance - Occupation - Previous hand injuries - Smoking - Tetanus vaccine

IMPORTANT !!

Mechanism of injury

Close: Completely flexed and then sudden severe hyperextension of the fingers as Jersey finger

Open: 1- laceration > Knife
2- Crush injury > Heavy objects
3- Degloving injury

Hand infections

Paronychial infection: Nail surrounding infection "Most common hand infection" caused commonly by staph aureus & Treated by antibiotics and soaking or I & D (Incision and Drainage)

Felon: Fingertip pulp infection "swelling and very severe pain" Treated by antibiotics and soaking or I & D .. The incision made to drain felon is called (Hockey stick incision)

Herpetic whitlow: HSV vesicular eruption of finger tip "painful finger vesicles containing clear fluid" DENTISTS are more prone to have it. Treated by analgesics, acyclovir and isolation.

Collar abscess: Abscess of hand web-space "disseminatable" (Painful, red, swollen web spaces with abducted fingers) Treated by antibiotics and soaking or I & D then reconstruction.

Flexor tenosynovitis: Flexor tendon and synovial sheath infection (sausage shaped fingers, Flexed position, Painful with passive extension, Tender along the tendon. immediate high risk of sepsis, necrosis and amputation! Treated by antibiotic and analgesia with Admission & observation for 24hrs - After 24hrs no response (Intervention incision and drainage, Catheter irrigation with saline)

Hand bites: By dogs, cats etc.. you should know the animal to have an idea about the possible organism - decide the treatment (Rabies treatment : IgG and rabies vaccine 5 injections in the abdomen)

Necrotizing fasciitis: Mostly in immunocompromised people .. Happens with fever and high HR and low BP with Skipped lesions "fascia is involved" - Caused by group A beta-hemolytic streptococci .
Treated by extensive debridement and IV antibiotics, if there is no respond to the debridement and there is an extension ongoing then > Amputation.

Carpal Tunnel Syndrome	• The most common nerve compression in the upper limb " More common with DM, Pregnancy and Hypothyroidism "
	• **Pathophysiology :** EIther swelling of flexor retinaculum content or Reduced tunnel size leading to compressed flexor retinaculum - compressed Median nerve .
	• **Symptoms and signs :** Pain "could radiate to the shoulder", Numbness, Weakness, Paresthesia, Clumsiness.
	  ▪ + ve Tinel's sign, Thenar muscle atrophy, +ve Phalen test
	• **Investigations :** Nerve conduction studies to confirm, X-ray, CT, MRI
	• **Treatment :** A) Non operative - for pregnants and patients refusing surgery : Splint - NSAIDs - Steroid injections "not preferred"
	  ○ B) Operative - Has 3 techniques . (All open technique, Limited incision or Endoscopic technique.

Peripheral Nerve Injuries

- Brachial plexus roots:
  - C5 → motor: shoulder abduction + external rotation / sensory: shoulder tip + lateral arm.
  - C6 → motor: elbow flexion / sensory: lateral forearm + thumb and index fingers.
  - C7 → motor: wrist extension / sensory: middle finger.
  - C8 → motor: making a fist / sensory: ring and little finger + lower medial forearm.
  - T1 → motor: finger crossing / sensory: upper medial forearm + entire medial arm.

Nerve	Cause of injury	Motor	Sensory	Special sign
Lower brachial plexus (erb)	Difficult delivery, car accident	Hand is intact, BUT shoulder adducted with internal rotation, elbow extended, wrist flexed.	Loss of sensation over **C5, 6, and 7**	**Waiter's tip** (associated with phrenic nerve injury)
Upper brachial plexus (klumpke)	Trauma (car accident), traction.	Shoulder, elbow, wrist are normal BUT pt cannot make a fist or use intrinsics → clawing.	Loss of sensation over **C8 and T1**	**Ape's hand** (associated with horner syndrome)
Axillary	**Shoulder** surgery or dislocation.	Limited shoulder **abduction.**	Loss of **sensation of deltoid** & lateral upper arm.	None
Musculo-cutaneous	**Stab wound** near axilla.	Limited **elbow flexion.**	Loss of sensation over **lateral forearm.**	None
Radial	Compression in the axilla "**crutch palsy**" or "**saturday night palsy**"	Loss of elbow, wrist, thumb, and finger **extension**.	Loss of sensation over **dorsal** 3 ½ **lateral** fingers.	**Wrist drop** with elbow flexion
	Fracture of humerus at spiral groove.	Normal elbow. Loss of wrist, thumb, and finger extension.	Loss of sensation over **dorsal** 3 ½ **lateral** fingers.	**Wrist drop**

	Radial head dislocation → **posterior interosseous** nerve.	Normal elbow and wrist. Loss of thumb and finger extension.	**NO sensory loss** (normal).	None
Median	**Wrist** laceration or **suicide**, carpal tunnel syndrome.	Loss of thumb opposition and abduction. Loss of radial 2 lumbricals.	Loss of sensation over **palmar** 3½ **lateral** fingers.	None
	Supracondylar fracture of **humerus** → **anterior interosseous** nerve.	Loss of deep 2 ½ muscles of forearm.	NO sensory loss (normal).	**O sign**
Ulnar	Medial epicondyle dislocation at **elbow.**	Loss of flexion of ring and little finger + Loss of little finger opposition & abduction + cannot adduct or abduct fingers.	Loss of sensation in **palmar** & **dorsal** 1 ½ **medial** fingers.	**Ulnar claw hand**
	Laceration at **wrist.**	Loss of little finger opposition & abduction + cannot adduct or abduct fingers.	Loss of sensation in **palmar** & **dorsal** 1 ½ **medial** fingers.	**Froment's sign**
Femoral	---	Loss of **knee extension.**	Loss of sensation in anterior thigh and inner thigh.	Pt **can't walk**
Common peroneal	Fracture of **neck of fibula.**	Loss of ankle and toe extension.	Loss of sensation of **dorsal** foot.	**Drop foot**
Posterior Tibial	Injury behind **medial malleolus.**	---	Loss of sensation in **sole** of foot	**Clawing of toes**

Common Congenital Neurosurgical Diseases

- Headache or facial pain:
  - Primary: benign, recurrent headaches not caused by underlying disease (tension-type headache).
  - Secondary: caused by underlying disease, red flags (SSNOOP): systemic symptoms, systemic disease, neurologic symptoms or signs, sudden onset, onset after the age of 40, previous headache history, progressively worsening.
- Congenital disease:
  1. Hydrocephalus: an increase in the CSF volume, associated with increased ventricular size (**not the same as ventriculomegaly**). Causes include obstruction, under absorption or overproduction of CSF (which is produced mainly by choroid plexus). Types:
     i. Communicating: **overproduction or under absorption of CSF**.
     ii. Non-communicating: **blockage of the flow of CSF**, could be congenital or acquired.
     b. Clinical features:
     i. Infants: increased head circumference, vomiting, bulging anterior fontanelle.

ii. Adults (signs of increased ICP): headache, N/V, decreased level of consciousness, focal neurological deficit and papilledema.

c. Causes of hydrocephalus include:
   i. Congenital:
      1. Aqueductal anomalies (stenosis): the baby presents 2 weeks after he's born, with a very rapid increased head circumference, on MRI the lateral and 3rd ventricles are dilated but not the 4th.
      2. Dandy walker malformation: a cyst obstructing the pathway of the 4th ventricle, leading to accumulation of CSF in the posterior fossa.
      3. Chiari II malformation: a herniation of the contents of the posterior fossa below the foramen magnum, important types:
         a. Type 1 (adult type): extension of the cerebellar tonsils without the brainstem, leading to symptoms of headache, ataxia, and hydrocephalus (papilledema).
         b. Type 2 (children type): extension of **both** cerebellar and brainstem tissue, associated with myelomeningocele and hydrocephalus.
      4. Myelomeningocele.
      5. Vein of galen aneurysms.

   ii. Acquired:
      1. Germinal plate hemorrhage in premature babies.
      2. Post-meningitis (due to scarring after inflammation which decreases the absorption of CSF).
      3. Tumors.
      4. SAH.
      5. Severe traumatic brain injury.

d. Investigations: CT or MRI.
e. Treatment:
   i. Communicating: medical or surgical.
   ii. Obstructive: **surgical.**

2. Neural tube defect: failure of closure of posterior neural arch, prevented by **folic acid supplements before pregnancy in high dose**, types:
   a. Spina bifida occulta (closed): asymptomatic, maybe a tuft of hair, dimple sinus or port wine stain. A common presentation is a 20 year old presenting with back pain during weight lifting, we just reassure the patient.
   b. Meningocele (closed): cystic CSF-filled cavity lined by meninges, there is no neural tissue and no neurological deficits. Diagnosed by U/S or MRI, treated surgically **only if** it ruptures.
   c. Myelomeningocele (open): spinal cord and roots protrude through bony defect, lie within cystic cavity, can present with neurological deficits. Note the dilated bladder and patulous anal sphincter. Diagnosed by U/S or MRI, treatment is closure.
3. Other congenital anomalies:
   a. Encephalocele.
   b. Arachnoid cyst.
   c. Craniosynostosis: head shapes:
      i. Scaphocephaly: premature closure of sagittal suture, elongated head shape (enlarged antero-posterior diameter).

ii. Plagiocephaly: premature closure of coronal suture (anterior plagiocephaly) or lambdoid suture (posterior plagiocephaly).

Raised Intracranial Pressure

- Contents of the cranium (brain, blood, and CSF) are in balance. Increased volume of one component must be compensated by decreased volume of the other components.
- Manifestation of raised intracranial pressure depends on the **rate** of increase of the volume.
- Cerebral perfusion pressure = mean arterial pressure - intracranial pressure (**CPP = MAP - ICP**)
- Normal values: ICP (in adults < 10 - 15) CCP = 70 (50 - 140 mmHg).
- Causes of raised intracranial pressure: tumor, hydrocephalus, hemorrhage (full list: VITAMEN D)
- Raised intracranial pressure can lead to herniation:
    - Uncal herniation → common, seen with epidural hematoma when the temporal bone is injured leading to middle meningeal artery bleed. This pushes the uncus through the tentorial notch.
    - Tonsillar herniation → very common, can result from LP done on a patient with raised intracranial pressure. The cerebellar tonsils herniate through the foramen magnum leading to weakness and decreased/compromised breathing.
    - Others: central, outside, and cingulate herniation.
- Symptoms of raised ICP:
    - Early **morning** throbbing **headache** (increases with sneezing/coughing)
    - **Papilloedema** (takes several days)
    - **Vomiting**
- Signs of raised ICP
    - Cushings triad: **hypertension**, **bradycardia**, and **lower respiratory rate**.
    - Neurological exam may show pupillary dilation and hemiplegia.
- **Glascow Coma Scale**

Eyes open	Motor response	Verbal response
• Spontaneously **4** • To verbal command **3** • To pain **2** • No response **1**	• Obeys verbal command **6** • Localises pain **5** • Flexion withdrawal **4** • Abnormal flexion (decorticate rigidity) **3** • Extension (decerebrate rigidity) **2** • No response **1**	• Oriented and converses **5** • Disoriented and converses **4** • Inappropriate words **3** • Incomprehensible sounds **2** • No response **1**
Score: (3 lowest , 15 highest) **3**-**8** → severe head injury (poor prognostic indicator) / **9**-**12** → moderate head injury / **13** & **14** → mild head injury		

- Investigation: urgent **head CT!**
- Management:
    - General measures: head elevation, no neck compression, mannitol, dexamethasone (for tumors only!!! # in trauma), hyperventilation (controlled to PCO2 35 - 40 mmHg).
    - Then manage the underlying cause: vascular (evacuation), abscess (drain), tumor (resection), hydrocephalus (shunt), etc..