

PRINCIPLES OF SURGERY

VOLUME II

MINYA 3RD YEAR MEDICAL STUDENTS

BY

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Dedication

Allah all merciful, I beg thee.
To accept this effort for the soul of my mother.
She was your gift to me.

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Preface

This book provides an update for medical students who need to keep abreast of recent developments. I hope it will also be useful for those preparing for postgraduate examination.

This book is designed to provide a concise summary of General surgery, which medical students and others can use as study guide by itself or with readings in current textbooks, monographs, and reviews.

The author is extremely grateful to all the contributors for the high standard of the new chapters, and hopes that you the reader will enjoy going through these pages as much as he had.

M. El-Matary

Acknowledgement

I'd like to thank those who have worked to let this version of the book come to light.

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LYMPHATIC SYSTEM

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LYMPHATIC SYSTEM

Functions of lymphatic system

1. Uptake, transportation, & return of fluid, foreign substances & macromolecules from the interstitial space to the systemic circulation.
2. Protection of the host by a filtration system that resists infection & impede the spread of neoplasm.
3. Secretion of T cells, B cells, cytokines & vascular endothelial growth factor that stimulate lymphangiogenesis.

Lymphadenopathy

Definition

- Lymph node enlargement.

Mechanism of lymphadenopathy

- **Hyperplasia:** in response to immunologic or infectious stimuli
- **Infiltration:** infiltration by various cell types, including cancer cells, lipid cells or glycoprotein laden macrophages.

Etiology

⇒ **Infection:**

➤ Viral

- ↳ Infectious mononucleosis, Infectious hepatitis, Herpes simplex,
- ↳ Adenovirus, HIV

➤ Bacterial

- ↳ Streptococcus, Staphylococcus, Cat-scratch disease.
- ↳ Tuberculosis, Syphilis, Leprosy.

➤ Chlamydia

- ↳ Lymphogranuloma venereum and Trachoma

➤ Rickettsial

- ↳ Scrub, typhus.

➤ Fungal

- ↳ Histoplasmosis .

➤ Parasitic

- ↳ Toxoplasmosis. Leishmaniasis

⇒ **Malignant :**

- Hodgkin's lymphoma.
- Non-Hodgkin's lymphoma.
- T-cell lymphoma
- Acute lymphoblastic leukemia.
- Chronic lymphoblastic leukemia
- Hairy cell leukemia.
- Multiple myeloma with amyloidosis
- Metastatic

⇒ **Immunological:**

- Rheumatoid arthritis.
- Systemic lupus erythematosus (SLE)
- Sjogren's syndrome
- Silicone associated
- Graft versus host disease.

⇒ **Lipidosis:**

- Gaucher's disease.
- Niemann-Pick's disease.
- Hand-Schuler-Christian's disease.

⇒ **Endocrinial:**

- Hyperthyroidism. Thyroiditis.
- Adrenal insufficiency

⇒ **Medications:**

- Allopurinoll used in treatment of hperurecaemia.
- Captopril used in treatment of hypertension.
- Carbimazole used in treamnent of thyrotoxicosis.
- Carbamazepine aniconvulsions.
- Cephalosporin
- Gold. Hydralazine
- Penicillin
- Phenytoin. Quinidine

⇒ **Miscellaneous:**

- Sarcoidosis
- Histiocytosis x

Clinical types

- ⇒ Normally LNs can't be seen or felt.
- ⇒ **In children:** palpable lymph nodes are usually due to continuous exposure to new antigens
- ⇒ **In adults:**
- ⇒ Lymph nodes larger than 1 cm in diameter are generally considered abnormal.
- ⇒ However, lymph nodes 1 to 2 cm in diameter in the groin are sufficiently frequent to often be considered "normal".
- ⇒ Any lymph node less than $\frac{1}{2}$ -1cm is clinically insignificant

⇒ **Pathologic Lymph Node**

- Larger than >2cm in children and 1cm in adult.

⇒ **Acute lymphadenopathy**

- < 2 weeks duration

⇒ **Subacute Lymphadenopathy**

- 2-6 weeks duration

⇒ **Chronic Lymphadenopathy**

- > 6 weeks duration

⇒ **Persistent Lymphadenopathy**

- Presence of > 1 LN in two or extra –inguinal sites for >3 months without an obvious cause

⇒ **Lymphadenopathy may be localized or generalized**

	Localized	Generalized
Definition	<ul style="list-style-type: none"> - Enlargement of single group 	<ul style="list-style-type: none"> - Enlargement of Multiple nodal regions (more than 2 non-contagious nodes)
Aetiology	<ul style="list-style-type: none"> - Inflammatory <ul style="list-style-type: none"> a. Acute lymphadenitis: -Acute non-specific lymphadenitis. -Acute specific as infectious mononucleosis b. Chronic lymphadenitis which may be. -Chronic non-specific lymphadenitis. -Chronic specific lymphadenitis: lymph borne T.B & - Syphilis (Irr& 3rd) - Malignant - Early lymphoma and metastasis - 	<ul style="list-style-type: none"> - Inflammatory <ul style="list-style-type: none"> • Bloodborn T.B lymphadenitis. • Second stage of syphilis. • Fevers (see medicine). - Malignant <ul style="list-style-type: none"> • Advanced lymphoma • Metastasis • Leukemia - Autoimmune and collagen diseases
Painful causes	<ul style="list-style-type: none"> - Skin infection - Pharyngitis - Oral/genital herpes - Cat scratch disease (typically cervical or - Axillary adenopathy) - Lymphogranuloma venereum (bubo) - Chancroid - Kawasaki disease (usually unilateral) - Cervical lymphadenopathy) 	<ul style="list-style-type: none"> - Tuberculosis, sarcoidosis - Systemic lupus erythematosus - Metastases - Residual lymph nodes after overcoming an infection

	<ul style="list-style-type: none"> - Mononucleosis (bilateral cervical) - Lymphadenopathy) - Rubella (especially postauricular nodes), mumps 	
Painless causes	<ul style="list-style-type: none"> - Viral infections <ul style="list-style-type: none"> • CMV • HIV • Mumps, measles, rubella • Varicella - Bacterial infections <ul style="list-style-type: none"> • Listeriosis • Brucellosis • Syphilis - Parasitic infections <ul style="list-style-type: none"> • Malaria • Schistosomiasis 	<ul style="list-style-type: none"> - Malignancy <ul style="list-style-type: none"> • Malignant lymphoma (NHL, Hodgkin • lymphoma) • Leukemia - Autoimmune <ul style="list-style-type: none"> • Circulating immune complexes (due to medication or allergies) • Sjogren syndrome - Others <ul style="list-style-type: none"> • Lysosomal storage disease Gaucher disease, Niemann-Pick disease, Fabry disease

Inflammatory Disorders

Acute Lymphangitis

⇒ **Definition:**

- Inflammation of lymphatic vessels.

⇒ **Etiology:**

- Commonest organisms are **streptococci**.

⇒ **Clinical Picture:**

- **General:** Fever, rigors & general constitutional disturbances.
- **Local:** pain, edema & red tender streaks.
- **Regional LNs:** are enlarged & tender.

⇒ **Complications:**

- **Complete obliteration** of the affected lymphatics & if the condition is repeated or involves major number of lymphatics draining an organ or a limb → permanent **edema or elephantiasis**.

⇒ **Treatment:**

- TTT of the cause.
- Antibiotics, especially penicillin & broad-spectrum antibiotics.
- Local rest of the affected part & local heat to help resolution.
- If suppuration occurs, it needs an incision.

Acute Septic Lymphadenitis

⇒ **Definition:**

- Inflammation of lymph Nodes.

⇒ **Site:**

- Along the lymphatics from inflamed focus.

⇒ **Pathology:**

- LN are enlarged, congested and edematous.
- Cut section shows leucocytic infiltration.
- Periadenitis may occur.



⇒ **Clinical Picture:**

- The picture of the causative lesion.
- General constitutional manifestations.
- Locally the nodes are enlarged, red, hot, tender, firm or soft & if suppuration occurs → fluctuation.
- Overlying skin is red and warm
- Intervening lymphatics between the cause and lymph nodes shows picture of lymphangitis

⇒ **Complications:**

- Spread to proximal LNs.
- Spread to nearby tissue.
- Suppuration → abscess.

⇒ **Treatment:**

- TTT of the causative focus.
- General rest & antibiotics and warm fomentations
- If an abscess form → incision & drainage.

Chronic Non-Specific Lymphadenitis

It is very common BUT clinically non important.

⇒ **Site:**

- Chronic nonspecific deep cervical LNs in patients with septic tooth, chronic tonsillitis or sinusitis.
- Chronic nonspecific inguinal LNs in people walking bare footed.

⇒ **Cause:**

- Chronic infection of nearby focus.
- Incomplete resolution of acute lymphadenitis.

⇒ **Clinical Picture:**

- Manifestations of the cause
Nodes are slightly enlarged less than 1 cm, mobile, discrete, slightly tender & firm in consistency.

⇒ **Treatment: of the cause.**

- If persists for > 3 or 4 m, TB must be excluded.

T.B Lymphadenitis

Types

1. **Lymph borne** (common in young).
2. **Blood borne** (in elderly).

⇒ **Aeotiology :**

⇒ **Predisposing factors :**

- Poverty
- Bad health habits and Deficit diet
- Poor general resistance
- Debilitating diseases
- Immune deficiency as DM and AIDS

Causative Organism: Mycobacterium tuberculosis

Sites: Lymph-borne (fibrocaseous type) (the commonest)

- ⇒ **Cervical LN groups (commonest):** the organisms reach from the tonsils.
- ⇒ **Mediastinal & axillary groups (esp.in children):** ± T.B lesions in the lung.
- ⇒ **Abdominal LNs (children & adolescents):** Organisms from the ingested milk pass through the lacteals to reach LNs without affecting intestinal wall.
- ⇒ **Tabes mesentrica(>50y):** common finding in x-ray is multiple mottled calcific shadows of mesenteric LNs (old T.B nodes healed by fibrosis & calcification).

Pathophysiology

⇒ **Lymph-borne**

- The organism is highly virulent and reaches the LNs by afferent lymphatics thus, reaching the capsule 1st → T.B periadenitis → matting of the nodes.
- Then the cortex will be affected & finally the medulla.
- Multiple tubercles will form, coalesce together, may caseate & break down → cold abscess that may rupture through the skin → T.B. sinus or ulcer.

⇒ **Blood-borne**

- The organism is weak and reaches the LNs by the artery at the hilum
- Initial lesion starts in the medulla and doesn't reach the capsule --- no periadenitis ---- no matting
- No caseation---- no cold abscess --- no TB sinus

⇒ **Microscopic picture :**

- **Central zone** : Structureless eosinophilic caseous material containing bacilli
- **Mid-zone:** Epithelioid cells and Langhan's giant cells (peripheral multinucleated arranged in horse-shoe manner).
- **Peripheral zone** : Lymphocytes



C/P	Lymph borne type	Blood borne type
Incidence	Common	Rare
• Age	• Children	• Usually, elderly
• General manifestations	• More common • TB toxemia is minimal	• Rare • TB toxemia is marked
• Primary focus	• No evidence	• Manifestations of primary focus
Local Signs	<ul style="list-style-type: none"> • Localized lymphadenopathy affects upper deep cervical LNs. • Variable consistency. • Early → Firm. • Caseation → Cystic. • Calcification → Hard. • LNs are matted together. L.N.s. may be arranged in beaded cords due to thickening of connecting lymphatics. 	<ul style="list-style-type: none"> • Generalized lymphadenopathy. • Rubbery to firm in consistency resembling Hodgkin's lymphoma hence the name lymphadenoid type of tuberculosis. • LNs are discrete. • The organism enters LN through hilum, so there is no peradenitis & there is no breaking down, caseation or cold abscess.
Caseation	<ul style="list-style-type: none"> • Cold abscess → T.B. sinus. 	<ul style="list-style-type: none"> • No cold abscess. No sinus.

Complications

- ⇒ **Caseation:** may burrow through the deep fascia or an overlying muscle → bilocular (collar stud abscess) that shows cross fluctuation. Secondary infection may occur → difficult ttt.
- ⇒ **Cold abscess:** is actually neither cold (clinically warm) nor abscess (contents are not pus but caseating material).
- ⇒ **Sinus:** with a thin cyanotic undermined edges & thin serous discharge and secondary TB of the skin
- ⇒ **Spread** to other groups of L.N.s or blood spread causing miliary TB : if the disease is left untreated.
- ⇒ **Rarely pressure on surrounding structures** e.g. O.J and mediastinal syndrome

Investigation

- ⇒ Chest x-ray.
- ⇒ Tuberculin test: good –ve indicator.
- ⇒ Biopsy from the nodes → establish the diagnosis.
- ⇒ Aspiration of cold abscess for microscopical pus exam (acid fast bacilli) & PCR
- ⇒ Blood picture, shows anemia and leucopenia with relative lymphocytosis.
- ⇒ ESR: important for follow-up

Treatment

⇒ **Tuberculous lymphadenitis before caseation:**

- Good diet & vitamins.
- At least 2 antituberculous drugs (Rifampicin + INH) for at least 9 months.
- Surgical excision: for single LN group with no response to medical ttt after 6 M.

⇒ **Cold abscess:**

- Antituberculous drugs.
 - Aspiration & injection of streptomycin solution (to prevent sinus formation):
 - ⇒ Needle is inserted in a healthy part of the skin away from the abscess.
 - ⇒ The site of puncture should be in a non-dependent part.
 - ⇒ The needle should pass in a **Valvular** manner (i.e points of entry through skin & abscess cavity should not be opposite to each other).
 - ⇒ Aspiration usually needs repetition every few days until abscess dries.
 - Incision:
 - ⇒ Indicated in the following conditions:
 - ✓ 2ry infection.
 - ✓ If the abscess is imminent to rupture.
 - Excision:
 - ⇒ If the nodes need excision.
- ⇒ **TTT of a tuberculous sinus:**
- Antituberculous treatment and dressing with streptomycin powder until it closes
 - If resistant to conservative measures → excise with underlying nodes.
- ⇒ **D- TTT of blood borne type :**
- Only medical treatment and no place for surgery

Syphilitic lymphadenitis

⇒ **Syphilis is rare nowadays, it is divided into 3 stages:**

➤ **Primary stage:**

- Genital chancre → 1 week after its appearance inguinal L.Ns of both sides are enlarged, firm, mobile, discrete, painless & not tender.

➤ **In secondary stage:**

- 5-6 weeks after primary condition
- There is generalized lymphadenopathy
- L.Ns. affected are Painless, smooth surface, slippery (freely mobile), rubbery, discrete, skin over it normal.
- Usually affect epitrochlear and cervical L.Ns
- Enlargement of epitrochlear lymph nodes is characteristic

➤ **In tertiary stage:**

- Acute septic lymphadenitis may arise from secondary infection of a nearby gumma (gumma of L.N is extremely rare)

Toxoplasmosis

- ⇒ **Caused by**
 - Toxoplasma gondii
- ⇒ **Route of infection:**
 - Consumption of undercooked meat-
 - Ingestion of oocysts from cat feces
- ⇒ **Symptoms:**
 - Malaise, fever, sore throat, myalgia.
 - 90% have cervical lymphadenitis.
- ⇒ **Diagnosis:**
 - By serologic testing.

Infectious Mononucleosis

- ⇒ **Caused by**
 - Epstein Barr Virus
- ⇒ **Signs/Symptoms**
 - Fever
 - Exudative pharyngitis
 - Painless generalized lymphadenopathy
 - Splenic enlargement
- ⇒ **Diagnosis**
 - Positive monospot test
 - Serum Antibody definitive

Viral lymphadenopathy

- ⇒ **Most common form of reactive Lymphadenopathy**
- ⇒ **Often bilateral, diffuse, non tender**
- ⇒ **Common viruses involved:**
 - Adenovirus
 - Rhinovirus
 - Coxsackievirus A and B
 - EBV

Malignant lymph node enlargement

Lymphomas

Definition

⇒ Malignant neoplasm that arises in LNs or extra nodal lymphoid tissue.

Types

- Hodgkin's disease.
- Non-Hodgkin's lymphoma.
- Burkitt's lymphoma.

Hodgkin's Disease (more common)

Pathology

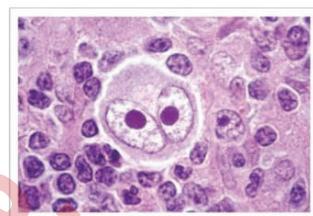
⇒ **Gross picture:**

- **Site:** Lymph nodes & extranodal tissue in spleen, liver & bone marrow.
- It usually starts in cervical lymph nodes.
- Affected nodes are moderately enlarged, discrete, rubbery, and have a pink color with minimal hemorrhage and necrosis.
- A large lymph node in the center with smaller lymph nodes around it.

⇒ **Microscopically:**

- There are variable densities of lymphocytes.
- **Diagnostic feature** finding characteristic **Dorothy-Reed Sternberg cells**.
- Giant cells with even number of nuclei (2 or 4) arranged in a mirror image.

Reed-Sternberg cell



⇒ **Spread:**

- **Direct:** delayed invasion of the capsule and surrounding structure
- **Lymphatic:** mainly spread by lymphatics to the other groups of L.N s
- **Blood:** late to extra-nodal sites

Types

- ⇒ **Lymphocyte predominance:** Giant cells are rare, but there are abundant lymphocytes & histiocytes. This type is the best prognosis.
- ⇒ **Nodular sclerosis:** commonest type & characterized by broad fibrous bands that disrupt the lymph node architecture and thickening of the capsule
- ⇒ **Mixed cellularity:** Heterogenous cellular component of eosinophils, lymphocytes, neutrophils , plasma cells & the giant Reed Sternberg cells. Bad prognosis
- ⇒ **Lymphocyte depletion:** considerable fibrosis, variable amount of Sternberg cells & absent lymphocytes. Worst prognosis.

Staging

- ⇒ **Stage I:** Single involved lymph node group (I), or single extra lymphatic site (IE).
- ⇒ **Stage II:** Two or more involved lymph node groups limited to one side of the diaphragm or a solitary extra lymphatic site and one or more lymph node areas on the same side of the diaphragm (IIE).
- ⇒ **Stage III:** Involvement of both sides of the diaphragm.
- ⇒ **Stage IV:** Extra lymphatic spread including liver, lung, bone marrow, skin & gut.

- ⇒ **All stages are subdivided into either:**
- A → No systemic symptoms.
- B → One or more of 3 symptoms: fever, night sweats or weight loss > 10% in 6 M.

Clinical Picture

⇒ Incidence:

- Caucasians are affected by Hodgkin's disease more than the other races.
- Disease shows two age peaks, 1st between 15-35 y & other > 50 y.
- More in males

⇒ Symptoms & Signs:

➤ Local Manifestations

- The commonest presentation is painless progressing enlargement of LNs.
- Usually starts in the cervical LNs.
- Then become generalized.
- The affected lymph nodes

⌚ Early:

- ✓ Enlarged, mobile painless, not tender, discrete, firm(rubbery).
- ✓ They vary greatly in size, the large glands lying towards the center of the mass (satellite appearance).

⌚ Late:

- ✓ Fixed, painful matted &
- ✓ Firm

⌚ Immediate

- ✓ Pain in diseased areas after drinking alcoholic beverages

➤ General Manifestation

➤ Common in late stages:

- Fever, Sometimes Pel-Ebstein fever occurs (few days of Fever alternating with few weeks of freedom)
- Night sweat.
- Unexplained loss of weight
- Pruritis, skin eruptions, fatigue, anaemia, malaise

- **In late cases,**

- Many groups of lymph nodes are affected with variable sizes with hepatomegaly, jaundice, ascites, splenomegaly & IVC. compression, mediastinal syndrome, S.V.C compression, pleural effusion, bony pain and spinal cord compression

Investigations

- ⇒ **Lymph node biopsy:** under G.A. (cornerstone of diagnosis).
 - **Site of biopsy: Neck** (Inguinal lymph nodes better avoided as they are commonly enlarged as a result of chronic nonspecific lymphadenitis).
- ⇒ **Full blood picture:**
 - Anemia.
 - Eosinophilia or lymphocytosis.
 - High ESR in advanced cases .
- ⇒ **Alkaline phosphatase:** elevated in cases with bone or liver involvement.
- ⇒ **Lactic dehydrogenase:** (LDH) & beta-2 microglobulin usually elevated.
- ⇒ **Beta 2 microglobulin**
- ⇒ **Renal and liver functions tests** (if impaired liver biopsy is indicated)
- ⇒ **Chest x-ray and CT scan:** detection of intrathoracic disease.
- ⇒ **Mediastinal and Abdominal ultrasound and CT scan and MRI :** have replaced staging laparotomy
- ⇒ **Barium study of GIT**
- ⇒ **Bone marrow biopsy.**
- ⇒ **Immunophenotyping:** technique of identifying molecules associated with lymphoma & leukemia cells and that help identify their subtypes.
- ⇒ **PET-CT scan.**

Treatment

- ⇒ **Stage IA, IB, and IIA:** Radiotherapy to affected & adjacent group of L.N.
- ⇒ **Stage IIB:** Radiotherapy & 6 cycles of combination chemotherapy.
- ⇒ **Stage III and IV:** 12 cycles of chemotherapy.
 - **Radiotherapy** is used as a supplement to control bulky cervical nodes.
 - **Chemo drugs:** Doxorubicin, bleomycin, vinblastine and dacarbazine.

Prognosis

- ⇒ **Interventional prognostic score (IPS) : evaluation of prognosis in patients with advanced disease (for each factor present , the patient receives one point)**
 - **IPS factors**
 - ⌚ Albumin < 4 g/dL
 - ⌚ Hemoglobin < 10.5 g/dL
 - ⌚ Gender ♂
 - ⌚ Age ≥ 45 years
 - ⌚ Stage IV disease
 - ⌚ Leukocytosis: WBCs more than 15.000/ µL
 - ⌚ Lymphopenia: lymphocyte count < 8% of WBC count and/or absolute lymphocyte (for count < 600 cells/µL

➤ IPS categories :

- ⌚ Good prognosis (IPS 0–1)
- ⌚ Fair prognosis (IPS 2–3)
- ⌚ Poor prognosis (IPS 4–7)

➤ Unfavorable factors for Hodgkin lymphoma (relevant when selecting a treatment regimen)

- ⌚ High ESR
- ⌚ High LDH
- ⌚ Involvement of three or more lymph node
- ⌚ Large mediastinal tumor areas
- ⌚ Bulky disease (tumors measuring ≥ 10 cm across)

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Non-Hodgkin's lymphoma (NHL)

Each type the cells may be arranged in nodular or diffuse

⇒ **B-cell lymphoma (80-85%): is further classified into**

- Small cell lymphoma
- Mixed small& large cell lymphoma
- Large cell lymphoma
- Immunoblastic lymphoma

⇒ **T-cell lymphoma.**

⇒ **Lymphoblastic lymphoma.**

⇒ **Histiocytic lymphoma.**

Etiology

⇒ **Exact cause is unknown but increased incidence with:**

- Sjogren's disease & benign lymphoepithelial lesions of salivary glands.
- Immune deficiency AIDS & with prolonged immunosuppression.
- Human T- cell leukemia/lymphoma virus (HTLV-I).
- Systemic lupus erythematosus (SLE).

Clinical Picture

⇒ **Incidence:**

- More in old ages
- More in males

⇒ **Symptoms & Signs:**

➤ Local Manifestations

- Lymph node enlargement is similar to that of Hodgkin's disease, Progression of it doesn't follow an orderly anatomical pattern as in Hodgkin's lymphoma.
- The LNs are :
 - ⌚ **Early:** mobile, painless, not tender, discrete and hard.
 - ⌚ **Late:** (usually seen in this stage).
 - ✓ Fixed, painful amalgamated by infiltration.
 - ✓ Variable consistency but usually hard.
 - ✓ Pressure on the surrounding structures.
 - ✓ Fungation through the skin.
- NHL is more likely to affect extra nodal sites than Hodgkin's lymphoma.
 - ⌚ Gastric lymphoma produces manifestations that are similar to carcinoma.
 - ⌚ Intestinal lymphomas → intestinal obstruction, bleeding or perforation.
- Mycosis fungoides is a variant of NHL affects skin & has eruptions.
- The disease is likely to be disseminated at the time of presentation.

➤ General manifestations :

- Usually not present

Treatment**➤ Radiotherapy & combination chemotherapy according to the stage.**

- **Common drugs:** Cyclophosphamide, Adriamycin, Vincristine, bleomycin, and prednisolone.

➤ Surgery:

- **Indication:** Gastric & intestinal affection.
- **Method:** Gastrectomy & intestinal resection followed by radio & chemotherapy.

Prognosis

⇒ Gastric lymphoma is better than Gastric adenocarcinoma.

Burkitt's Lymphoma**⇒ Etiology:**

- **Unknown** may be infection with **EBV**.
- Malaria may have a role to induce the disease.

⇒ Pathology:

- Malignant tumor of the **B-lymphocytes** that occurs at jaw and ovaries.

⇒ Type of patient:

- ♂<12 y in eastern Africa.

⇒ Clinical Picture:

- Painless progressively enlarging jaw swelling.
- Distorts face, displaces eye & partially occludes the mouth.

⇒ Treatment:

- **Chemotherapy:** Cyclophosphamide & cytosine arabinoside followed by radiotherapy for bulky sites

**Leukemias****Definition**

⇒ Generalized enlargement of lymph nodes, spleen & liver with marked increase in total leucocytic count mostly made of immature forms.

Chronic Myeloid Leukemia

⇒ **Incidence:**

- Affects both sexes equally between the ages of 35 & 70 years.

⇒ **Clinical Picture:**

- **Onset:** Insidious.
- **Symptoms:** Anaemia, weight loss, spontaneous haemorrhage.
- **Signs:**
 - ⌚ **Nodes** are slightly enlarged & discrete.
 - ⌚ **Marked** splenomegaly, hepatomegaly & generalized lymphadenopathy.

⇒ **Investigations:**

- **CBC:** progressive anemia with increased white cell count up to 1000,000/uL, **80-90%** of them are immature with granular series.

Chronic Lymphocytic Leukemia

- Affects elderly people, especially males.

⇒ **Clinical Picture:**

- Moderate enlargement of all lymph nodes & lymphoid tissues, but spleen is much smaller than myeloid leukemia.

⇒ **Investigation:**

- **CBC** shows moderate anemia with great increase in white count up to 500,000/uL, **80-90%** are immature lymphocytes.

⇒ **Treatment:** Chemotherapy & biological therapy.

⇒ **Prognosis:** 5-year survival is about 80%.

Secondary Deposits

⇒ **Secondary carcinoma:** is very common in lymph nodes as a result of lymphatic extension from a primary lesion in their drainage areas. Such deposits are especially common in the neck from epithelioma of the mouth, pharynx, nose and scalp, but sometimes the primary growth lies in a hidden site and may be overlooked, as in the ear, hypopharynx, nasal sinuses, nasopharynx, bronchi, stomach and testis.

⇒ **Clinically:** The affected nodes are stony hard, painless and mobile at first, but soon they become fixed and painful and may ulcerate and fungate through the skin.

⇒ **Treatment:**

⇒ **In early cases**, removal of the primary tumor with radical block dissection of the affected nodes is the ideal treatment.

⇒ **Late cases with inoperable primary or fixed nodes** are treated by palliative radiotherapy or chemotherapy.

Characteristic	Benign / inflammatory lymphadenopathy	Malignant / mycobacterial lymphadenopathy
Pain	Tender	Non-tender
Consistency	Soft	Hard
Fixation	Mobile	Fixed
Location	Cervical (anterior to sternomastoid) inguinal	Cervical (dorsal to sternomastoid) supraclavicular
Progression	Acute enlargement	Slow progressive enlargement

⇒ **Anatomical considerations**

➤ Lymphatic levels

- **Level I**- Submental & submandibular.
- **Level II**- Upper jugulo-digastric.
- **Level III**- Middle jugular.
- **Level IV**- Inferior jugular.
- **Level V**- Posterior triangle. (Occipital & Supra-clavicular)
- **Level VI**- Anterior compartment. (Pre-tracheal & pre-laryngeal

SWELLINGS

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Swellings

Cysts in surgery

⇒ **Definition:**

- Collection of fluid in a sac

⇒ **Classification: according to lining endothelium**

- **True cyst:** Lined by endothelium or epithelium which is usually responsible for the secretion of fluid. Ex: Thyroglossal cyst, Dermoid cyst, Bartholin cyst
- **False cyst:** result from discharge or degeneration. Ex: pseudocyst of pancreas, cystic degeneration of tumor

⇒ **According to etiology:**

A. Congenital:

- ⌚ Sequestration dermoid: - Due to: Displacement of epithelium along the suture line during closure
- ⌚ Tubulodermoid / Tubuloepidermoid: - Due to: 1. Abnormal budding e.g. thyroglossal cyst. 2. Dilation of vestigial remnants e.g. urachal cyst, vitello-intestinal cysts, Hydatid cyst of Morgagni and branchial cysts.
- ⌚ Cysts of embryonic origin

B. Acquired:

- ⌚ **Retention cysts:** Due to: Blocking of a glandular duct e.g. sebaceous cyst, ranula, bartholin's gland cyst or hydronephrosis.
- ⌚ **Distention cysts:** e.g. dilated acini of thyroid follicles or in the ovary or lymphatic cyst as cystic hygroma. 3. Cystic tumors e.g. cystadenoma, cystadenocarcinoma of the ovary.
- ⌚ **Parasitic cysts** e.g. hydatid cysts.
- ⌚ **Pseudocysts:** Due to: Liquefaction by necrosis or hemorrhage e.g. necrosis tumors.
- ⌚ **Exudation cysts:** exudation into an anatomical space already lined with epithelium e.g. hydrocele.
- ⌚ **Traumatic cysts:** hematoma may resolve into a cyst which becomes lined with endothelium (cure requires excision not aspiration).

⇒ **Hamartoma**

- Mal-arrangement of normal tissue.

Examples include:

- ⌚ Congenital vascular diseases a. Hemangioma b. Vascular malformations
- ⌚ Pigmented skin lesions. a. Naveus b. Melanocyte tumors
- ⌚ Neurofibromas
- ⌚ Lung hamartomas
- ⌚ Bony hamartomas.

Sebaceous (epidermoid) cyst

Definition

- ⇒ A retention cyst caused by blockage of a sebaceous gland duct.



Pathology

- ⇒ Lining: stratified squamous epithelium. (a true cyst)
- ⇒ Content: a foul-smelling, white material composed of keratin, epithelial cells, and granular debris.

Clinical picture

- ⇒ **Type of patient:** Rarely before adolescence.
- ⇒ **Symptom → Slowly growing cysts.**
 - Site: most commonly in scalp, face, neck, or scrotum but can occur anywhere except palm or sole of foot (devoid of sebaceous glands).
- ⇒ **Signs:**
 - A small, well defined, cystic swelling which is usually attached to the skin at one point which is the site of the punctum.
 - The swelling is mobile over the deep structures.
 - Sometimes a sebaceous cyst attains a large size.
 - The lesion may be solitary or multiple.



Complications

- ⇒ **Infection (The commonest):**
 - **C/P:**
 - ⇒ The cyst becomes painful and tender.
 - ⇒ There is overlying redness and an abscess may form.
 - **Early cases** → may subside by antibiotics.
 - **If an abscess form** → incised for drainage (excision is delayed as infection makes cyst wall adherent to surrounding tissues).
- ⇒ **Localized alopecia.** Due to stretch of the skin for a long time
- ⇒ **Sebaceous horn:** dried inspissated sebum. Protrude from the punctum over the skin.
- ⇒ **Cock's peculiar tumor (very rare) (ulceration of sebaceous horn)** NB: it simulates SCC but the base is not indurated

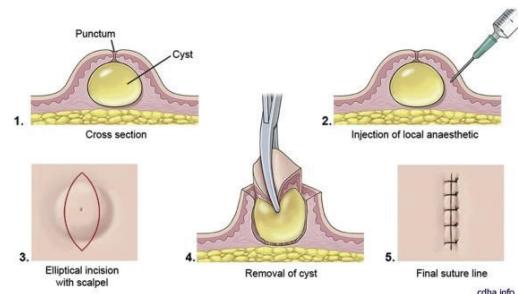
Infected Sebaceous Cyst

Investigations

- Not important as it is a clinical diagnosis.
- **May be needed with complications:**
 - ⇒ Biopsy: in cock's peculiar tumor. Culture and sensitivity with recurrent infection.
 - ⇒ Fasting blood sugar with recurrence of infection in spite of adequate treatment
- ⇒ **DD**
 - Dermoid cyst
 - Cock's tumor ,SCC and BSC.

Treatment

- Complete cyst excision with **an ellipse** of overlying skin containing the punctum to avoid recurrence.
 - ⇒ If the cyst is small → local anesthesia.
 - ⇒ In case if multiple cysts of the scrotum: excision of the skin bearing the cysts



Dermoid cyst

Definition

- ⇒ A cyst lined by stratified squamous epithelium & contains sebaceous material.

Types

⇒ Sequestration dermoid cysts:

- **Etiology:** subcutaneous inclusion of portions of surface epithelium along the lines of fusion of cutaneous dermatomes during fetal life.
- **Time of presentation:** after a few years when the cyst begins to distend (although present since birth).
- **Sites:**
 1. External angular at the outer angle of the eye.
(commonest)
 2. Internal angular
 3. Root of nose.
 4. Around the ear.
 5. Along the midline of the body.
 6. Sublingual or supramylohyoid (in the floor of the mouth), Inframylohyoid, suprasternal



Never in limbs as it develops from buds so there is no line of fusion

Clinical picture:

- **Age:** in childhood
 1. A well-defined, globular, cystic swelling not attached to skin.
 2. The underlying bone may be hollowed out & there may even be a connection to dura matter.

External angular dermoid cysts lie on bone defects caused by constant pressure.
- **Complication:**
 - ⇒ As any cyst : infection, rupture, pressure, calcification
 - ✓ Cerebral compression (very rare) in case of dumbbell shaped or hourglass dermoid
 - ✓ Intracranial complication with the dura matter should be investigated by skull x-ray before excision to be sure the sutures are closed.
 - ✓ Recurrence after excision) if incompletely excised

- **Investigation:**
 - ⇒ Skull x ray to exclude presence of bone defect .. if present we wait till it closes
- **Treatment :**
 - ⇒ Uncomplicated: Surgical excision (best lines of treatment). In children with dermoid cyst in the scalp it is better to wait till closure of the skull sutures because some cysts may communicate with the dura.
 - ⇒ Infected: incision and drainage followed by excision after inflammation subsides

⇒ **Tubulo-dermoid cysts:**

- **Etiology:** distension of remnants of embryonic ducts such as:
 - ⇒ Thyroglossal duct → Thyroglossal cyst.
 - ⇒ Cervical sinus → Branchial cyst.

⇒ **Teratomatous dermoid cysts (benign forms of teratomas):**

- **Lining:** squamous epithelium.
- **Contents:** teeth, hairs, bone, cartilage, or glands.
- **Site:**
 - ⇒ The ovary (Most common).
 - ⇒ The testis.
 - ⇒ Posterior mediastinum.



⇒ **Implantation dermoid cysts:**

- **Etiology:** 2nd to punctured wounds → displace some epithelial cells into S.C. tissue → retain their viability & form a dermoid cyst.
- Acquired dermoid cyst
- It can be caused due to Use of skin as graft in hernioplasty
- **Site:**
 - ⇒ Fingers (mainly).
 - ⇒ Palm & sole.
 - ⇒ Related to scar traumatic or surgical
- **C/P:** They are usually small and tense The overlying skin is sometimes scarred. It may be tender due to compression on nerve endings at pulp of fingers



⇒ **Inclusion dermoids**

- These are due to inclusion of the epidermis during closure of a cavity. They include sublingual, suprasternal, intracranial and intraspinal dermoids

Treatment

⇒ **Surgical excision:**

- In children with dermoid cyst in the scalp → **wait** until closure of the skull sutures (as some cysts may communicate with the dura).
- Dermoid cyst near eyebrow, the hair of this region may not regrow after shaving or if the hair follicles are cut by an incision.

Vascular Anomalies

- Multiple terms were used to describe vascular anomalies as "Cavernous", and "Strawberry" have been abandoned.
- Current nomenclature is biologically based:
 1. **Hemangioma.**
 2. **Vascular malformations:**
 - A. Low flow lesions:
 - i. Capillary malformation.
 - ii. Venous malformation.
 - B. High flow lesions:
 - i. Arterial.
 - ii. Arterio-venous.
 - C. Lymphatic malformations.

Hemangioma (Previous name → Strawberry mark)

Definition

- ⇒ Benign proliferative neoplasm of vascular spaces endothelial lining.

Incidence

- ⇒ Affects 10% of white infants.
 ⇒ most common and most rapidly growing tumor in infancy
 ⇒ 70% are present at birth and 30% appear within the 1st year of life.
 ⇒ Female to male ratio is 3:1.
 ⇒ Most lesions affect the **head and neck.**

Stages

1. Stage of proliferation (shortly after birth):

- A reddish patch that increases in size over the few following months.

2. Involution phase (starts at the end of the 1st year):

- C/P: Central pallor appears & color of lesion slowly fades.
- There is a progressive decrease in the size of the lesion.
- Continuous until the age of 10 years.

3. Involved phase:

- The skin becomes normal in about 50% of patients.
- Some residual changes as discoloration, scarring or telangiectasia may persist.



Complications

- ⇒ A periorbital hemangioma → may encroach on visual field leading to amblyopia and blindness
- ⇒ In the face it can cause squint.
- ⇒ Ulceration is a common complication but bleeding is not common
- ⇒ Infection
- ⇒ Airway obstruction
- ⇒ Serious bleeding from a ruptured large liver hemangioma.
- ⇒ Large cutaneous or visceral hemangiomas:
 - Congestive HF.
 - Entrap platelets → thrombocytopenia.

Treatment

- ⇒ **Reassurance** of the parents and observation are recommended (skin appearance after involution is better than the scar following excision).
- ⇒ When it is necessary to interfere, the following are helpful:
 - Oral or intralesional corticosteroids.
 - Laser photocoagulation.
 - Surgical excision.
- ⇒ **Vascular malformations:**
 - Definition: structural abnormalities in the blood vessels due to embryological error.
 - Time of presentation: may be present at birth, but often later.
 - Incidence: male= female
 - Vascular malformations grow proportionately with the child & **do not regress or involute**.

Investigations

- ⇒ Doppler ultrasound → differentiates high-flow from low-flow lesions.
- ⇒ MRI and/or (MRA) (**The most useful**) Assess extent of lesion & degree of involvement with surrounding.
- ⇒ Angiography.

Vascular malformations

A. Capillary malformation (Port-wine stain): (low flow)

- Presentation: since birth and do not undergo involution.
- The commonest type of vascular malformation
- C/P:
 - ⇒ Lesion is dark purple and is not raised above the surface.
 - ⇒ Applying pressure → blanching but color returns immediately after release.
 - ⇒ Sometimes takes the distribution of one of branches of trigeminal nerve but does not cross the middle line.
 - ⇒ Sometimes associated with similar lesions in the meninges (**Sturge-Weber syndrome**).



- **Treatment:**
 - ⌚ **Pulsed dye laser** (of choice during childhood) Requires general anesthesia & multiple sessions may be needed.
 - ⌚ **YAG laser** during adulthood (Results not as good as in children).
- **Capillary malformation: Salmon patch**
 - ⌚ Nearly half of all babies have salmon patch. Appear as pink, flat marks on the forehead, back of the neck or on the lip. The skin is not thickened. Usually covered by hair and out of sight (at the back of neck).

B. Venous malformation: (low flow)

- Like hemangioma in clinical picture but usually appears later.
- As it is a malformation → does not undergo involution.
- **Sites:**
 - ⌚ **External:** Cheeks, lips Tongue, eye, ear extremitiesect
 - ⌚ **Internal:** the commonest site is liver.
- **Clinical picture:**
 - ⌚ Present since birth / no spontaneous involution.
 - ⌚ Compressible swelling with some discoloration of overlying skin.
 - ⌚ Sign of emptying is very characteristic: Pressure causes blanching but colour returns immediately after release of pressure.
 - ⌚ If in the liver it leads to sequestration of platelets and thrombocytopenic purpura
- **Investigation**
 - ⌚ Arteriography: pre-operative : shows extent of the lesion (both diagnostic & therapeutic).
 - ⌚ CT Scan : to show extent of the lesion
- Treatment:
 - ⌚ **Percutaneous sclerosis** with hypertonic saline, 100% alcohol or sodium tetradecyl sulfate. (There is a high recurrence rate → multiple sessions required).
 - ⌚ **Surgical excision** → Preoperative embolization or sclerosis → facilitates hemostasis.
 - ⌚ **Interstitial laser coagulation.**



C. Arterial malformations (Cirsoid aneurysm) (high flow)

- **Definition:** Abnormal development of arterial structures, including stenosis or hypoplasia, duplication and/or tortuosity.
- **Site:** in the **scalp** (mostly) especially in the temporal or occipital regions and may involve the underlying bone.
- **C/P:**
 - ⌚ Soft, **Compressible** & pulsating swelling with a marked bruit. By auscultation: machinery murmur is heard
 - ⌚ Ulceration of underlying skin may occur → serious hemorrhage.
 - ⌚ It causes headache and cosmetic disfigurement
 - ⌚ Signs: General: fever if inflamed, water hammer pulse



- **Complications:**
 - ⌚ Hemorrhage (very dangerous as it's arterial).
 - ⌚ Cosmetic disfigurement.
 - ⌚ Infection.
 - ⌚ Ulceration of skin overlying.
 - ⌚ Degenerative changes e.g. calcification
- **Investigation:**
 - ⌚ Doppler or duplex
 - ⌚ External carotid angiography
 - ⌚ Xray on the skull shows rarefaction of the bone
- **Treatment:**
 - ⌚ Difficult as the swelling is supplied by multiple feeding arteries which have to be ligated.
 - ⌚ Surgical excision with the following precautions:
 - ✓ Semisitting position.
 - ✓ General hypotensive anesthesia.
 - ✓ Preoperative embolization.
 - ✓ Temporary ligation of the external carotid artery.

D. Arterial venous malformations (AVMs) (high flow)

- **Definition:** abnormal **connections** between arteries and veins without an intervening capillary bed (high flow lesion).
- **Presentation:** at birth but may not be evident until late childhood
- **C/P:**
 - ⌚ Localized AVM → localized swelling with increased surface temperature (There may be palpable thrill or murmur).
 - ⌚ Diffuse AVMs → growth disturbance or skeletal distortion.
- **Treatment:**
 - ⌚ Excision one day after embolization of feeding vessels.
 - ⌚ Extensive coverage by a free flap may be needed.

⇒ Lymphatic malformations (LMs):

- **Classification:** microcystic or macrocystic (Lymphangioma)
- May have a component of venous malformation.
- **Site:** The head & neck region or the axillae (majority of cases).
- Neck masses may extend into the mediastinum or pectoral area.
- **Consequences:** congenital macroglossia, macrotia & macrocheilia (lip enlargement) (skeletal involvement may cause distortion)

Lymphangioma (Cystic Hygroma)

Definition

- ⇒ Are benign multilocular cystic masses lined by endothelial cells.



Etiology

⇒ **Normal development:**

- The lymphatic system develops by the coalescence of multiple small lymph vesicles → large accumulation that is present lateral to the jugular vein and is called the jugular lymph sacs.

⇒ **Abnormal development**

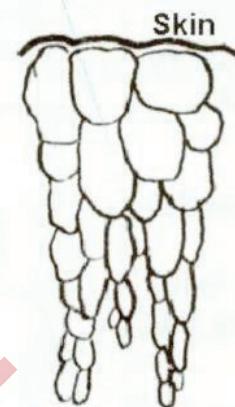
- If some vesicles of the jugular lymph sac fail to join the lymphatic system, they become sequestered and form a **cystic hygroma**.
- They can also arise from trauma (including surgery), inflammation, or obstruction of a lymphatic

⇒ **Site:**

- Most commonly in the posterior triangle of the neck (**75%**) with left sided predilection
- In the axilla (**20%**).
- The remainder is in the mediastinum, retroperitoneum, pelvis & groin.

⇒ **Type of patient:**

- **50-65%** appear at birth & **90%** are evident by the **second** year of life.



Clinical picture

⇒ **Symptoms:**

- The majority are asymptomatic (a painless swelling).
- Large lesions invading the floor of the mouth → symptoms referable to pharyngeal or upper airway obstruction.

⇒ **Signs:**

- The skin is never involved, although the lesion may be densely adherent to the undersurface of the dermis.
 - ⇒ CHs are typically soft, painless, compressible (doughy) masses.
 - ⇒ A CH typically transilluminates.
 - ⇒ In children who present with CH of the neck, closely evaluate for tracheal deviation or other evidence of impending airway obstruction.
 - ⇒ Closely inspect the tongue, oral cavity, hypopharynx, and larynx because any involvement may lead to airway obstruction.

⇒ **Notes**

- CH can be visualized using **abdominal ultrasonography** by 10 weeks' gestation.
- Elevated **alpha fetoprotein** levels in amniocentesis fluid
- Cystic hygroma Can involve both the **anterior and posterior triangles of the neck**.
- The cysts are typically **large and thick walled**.

- The overlying skin can take on a **bluish hue or may appear normal**.
- Often present with a sudden increase in size secondary to **infection or intralesional bleeding**.
- Rarely, children with CH display symptoms of newly onset **obstructive sleep apnea syndrome (OSAS)**.
- It may present as Potentially life-threatening airway compromise that manifests as **noisy breathing (stridor) and cyanosis**.
- It can cause **Feeding difficulties, as well as failure to thrive** when the lesion affects structures of the upper aerodigestive tract.

Investigations

- MRI is the study of choice. Contrast can be used to differentiate hemangiomas from lymphangiomas.
- CT scanning not very good.
- Ultrasonography: It is very useful in demonstrating the relationship of CH to the surrounding structures.

Treatment

⇒ There are two modes of treatment; the choice depends on imaging studies (CT, MRI):
 ⇒ Watchful waiting should be considered only in patients who are asymptomatic.

⇒ **Sclerotherapy:**

- Indications: is most effective for unilocular or macrocystic lesions.
- Disadvantages: → short-term improvement & usually requires additional treatment.
- Method: Intralesional injection of a sclerosing agent as:
 - ⦿ OK-432 (a lyophilized mixture of Streptococcus pyogenes & penicillin G potassium).
 - ⦿ Bleomycin.
 - ⦿ Doxycycline.
- An infected CH should be treated with intravenous antibiotics, and definitive surgery should be performed once the infection has resolved

⇒ **Excision:**

- The mainstay of treatment is surgical excision.
- Technically easier as child grows (wait until at least **3 years** of age).
 - ⦿ Method: with bipolar cautery to ensure a hemostatic dissection & decrease the incidence of lymph leak and nerve injury.
 - ⦿ The recurrence rate following surgery is 50%.
 - ⦿ Radiofrequency ablation for intraoral lymphatic malformations, especially microcystic lesions.
 - ⦿ Magnetic resonance-controlled laser-induced interstitial thermotherapy.
 - ⦿ The ex utero intrapartum treatment (EXIT) procedure

⇒ **Other vascular malformation**

➤ **Glomus Tumor (Angioneuroma)**

- ⦿ **Definition:** The tumor arising from A-V shunt in extremities.
- ⦿ **Pathology:** Vascular, neuron & smooth muscle fibers elements.
- ⦿ **Clinical picture:** Appear as minute very tender purple spot under the nail - Paroxysmal pain is induced by pressure or change in temperature.
- ⦿ **Treatment:** by excision

➤ **Spider nevi**

- ⦿ Lesion arise in patient with liver cirrhosis. May be due to hyperestrogenism
- ⦿ Lesion consist of small tiny arterial nevus which radiate multiple capillaries.

➤ **Hereditary hemorrhagic telangiectasia**

- ⦿ They are multiple angiomas in the skin & mucosa with strong tendency to bleed

⇒ **Syndromes**

➤ **Sturge Weber Syndrome**

- ⦿ Lepto-menigial A-V malformation covering comprises over sensory & motor area
- ⦿ Capillary vascular malformation in face not crossing midline
- ⦿ Commonly associated with portwine stain
- ⦿ A-V malformation in extremities (gigantism seen in middle finger, left thumb, scrotum, whole lower limb)

➤ **Klippel Trenaunay Syndrome**

- ⦿ Port wine + 2ry various veins due to A-V malformation

Lipoma

Definition

- ⇒ A benign tumor that is composed of fatty tissue arranged in lobules.



Pathology

⇒ **Gross picture**

- The tumor has **a lobulated surface** and a yellowish color Enclosed in a false thin fibrous capsule → can be enucleated.
- **Size:** variable.
- **Shape:** oval or rounded.
- **Surface:** Lobulated.
- **Consistency:** Always soft. Except, Firm in Fibrolipoma (due to fibrous tissue elements), Subfascial lipoma (as it is under tension).
- **Color:** Yellowish.
- **Cut section:** thin fibrous capsule sends fibrous tissue septa divide the tumor into multiple spaces.
- **Capsule:** 2 capsules: an Inner true: Formed of fibrous tissue. an Outer false: Formed by compressed surrounding structures. Between the 2 capsules there is a line of cleavage that facilitates enucleation. Lipoma can be classified according to presence or absence of the capsule into: encapsulated or diffuse.
- **Origin:** adipose tissue.
- **Blood supplv:** through the pedicle at one side of the tumor.
- **Number:**
 - ⇒ Solitary well defined swelling .
 - ⇒ Multiple lipomatosis is when the limbs or the trunk are the seat of multiple lipomas.
 - ⇒ Diffuse lipomatous deposits: this can occur in certain areas e.g.: patient with myxedema has supraclavicular fatty deposits, elderly persons may develop lipomatous deposits below the chin and sometimes females may develop painful fatty deposits in the thigh (Dercum's disease)

⇒ **Microscopic picture**

- Aggregation of fat cells with signet ring appearance. separated by fibrous connective tissue stroma containing blood vessels arising from the pedicle
- May Contain excess fibrous tissue (**fibrolipoma**), angiomatic tissue (**angiolipoma**) angiolipoma is partially compressible as BV are compressible while fat is not, or myxomatous tissue (**myxolipoma**). Or it can be pure lipoma (non compressible)

⇒ **Course → Grows very slowly.**



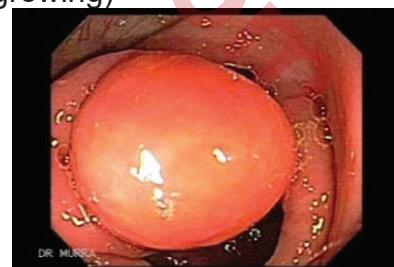
Clinical picture

- ⇒ A solitary well-defined swelling.
- ⇒ Multiple lipomatosis → multiple lipomas in limbs or trunk (differential diagnosis of multiple swellings).
- ⇒ Complaint Painless slowly growing swelling, Cosmetic disfigurement. Painful lipoma include (neurolipoma, dercum, complicated lipoma)

Classification

⇒ **According to site:**

- **Subcutaneous lipomas (The commonest): Characters:**
 - ⦿ Slowly growing.
 - ⦿ Painless and not tender.
 - ⦿ Lobulated surface → may attach to the skin at multiple points.
 - ⦿ Consistency is soft (Some lipomas especially in warm weather may give pseudo fluctuation) → due to:
 - ✓ Mobility of the tumor in its bed.
 - ✓ Fat at warm temperature may undergo liquefaction.
 - ⦿ Well-defined & slippery edge as tumor moves inside the capsule.
 - ⦿ The swelling is mobile over deep structures.
 - ⦿ May be pedunculated (lipoma arborescens)
- **Subfascial lipomas (under the deep fascia):**
 - ⦿ Firm
 - ⦿ Not attached to skin & doesn't have **slippery edge** → difficult diagnosis.
 - ⦿ Occurs under deep fascia e.g. palmar or plantar fascia or in the areolar layer in the epicranial aponeurosis
 - ⦿ Increased incidence in forehead.
- **Intermuscular lipoma:**
 - ⦿ Swelling is masked by overlying muscles → difficult to diagnose.
 - ⦿ Common in thigh, shoulder with normal skin overlying
 - ⦿ Fixed deeply.
 - ⦿ It becomes more firm on muscle contraction
 - ⦿ When the muscle contracts → **disappear** (or become more prominent if they are pushed out of the muscle).
 - ⦿ **Differential diagnosis:** fibrosarcoma (hard & rapidly growing)
- **Submucous lipomas**
 - ⦿ **Site:** larynx, stomach, or intestine.
 - ⦿ A submucous lipoma in the larynx → **respiratory obstruction**.
 - ⦿ A submucous lipoma in the intestine → intussusception → **I.O.**
- **Parosteal lipomas**
 - ⦿ Arise in relation to the skull and may cause bone erosion.



- **Sub synovial lipoma .**
 - ⇒ Beneath synovial membrane of the joint .
 - ⇒ Rounded or oval swelling related to a joint with normal skin overlying.
 - ⇒ If around the knee it can be differentiated from baker's cyst by being constant in consistency whether the joint is flexed or extended
- **Subperiosteal lipoma .**
 - ⇒ Swelling in relation to long or flat bones. . It is difficult to be differentiated from osteoma.
- **Extradural:**
 - ⇒ Only in spinal cord, never in the cranium as there is no fat. . Presented by pressure symptoms. Can cause paraplegia
- **Subserous lipoma:**
 - ⇒ Beneath visceral or parietal peritoneum or pleura.
- **9. Intraglandular lipoma:**
 - ⇒ Inside the gland as parotid gland, thyroid gland and breast
- **Retroperitoneal lipoma:**
 - ⇒ Behind post. parietal peritoneum.
- **11. Lipoma in the suprasternal area (Burn's space) (rare type)**

Diffuse lipomatosis "Dercum disease":

- Type of patient: Female, usually post menopausal. Site: Usually in lower limb. Characterized by small, multiple swellings and painful.

Complications

- ⇒ Degeneration → calcification.
- ⇒ **Malignant transformation** (very rare) may occur in **retroperitoneal** and in **deep types affecting limbs**.
- ⇒ Dangerous types of lipoma: Submucous lipoma: as it may cause respiratory obstruction or intussusceptions. Retroperitoneal: as it may turn malignant. Some surgeons believe that liposarcoma is malignant from the start. Extradural lipoma: as it causes pressure manifestations in spinal cord
- ⇒ Infection.
- ⇒ Ulceration of overlying skin and mucous membranes.

A lipoma is generally a very innocent tumor which does not cause any problem except in:

- a. **Submucous lipoma in the intestine.**
- b. **Extradural lipoma of the spinal canal.**

Investigations

- ⇒ Excisional biopsy.
- ⇒ X-Ray: if Subperiosteal.
- ⇒ CT spinal cord if it is extradural.

Treatment

- ⇒ A subcutaneous lipoma is usually excised for **cosmetic** reasons.
- ⇒ The operation: enucleation of the tumor from inside its capsule.
- ⇒ **Prognosis:** Subcutaneous lipoma never turns malignant, but in thighs and buttocks there is increased incidence of malignant transformation. Retroperitoneal lipoma: more liable to turn malignant.

Tumors of The Nerves

⇒ **Neurofibromatosis**

⇒ **Ganglioneuroma:**

- It is a benign tumor, arises from the ganglion of sympathetic trunk or the suprarenal gland (medulla) and usually affects children
- Usually presents as round swelling in the abdomen or space occupying lesion in the chest
- **Treatment:** Excision (well encapsulated thus it is easily enucleated)

⇒ **Neuroblastoma:**

- It is a highly malignant tumor,
- Affects young infants
- It arises from the sympathetic chain or suprarenal medulla
- The patient presents with a rapidly growing swelling, reddish purple, soft +/- secondaries (blood and lymph) especially for bone marrow

⇒ **Stump neuroma:**

- It is a traumatic neuroma,
- Arising in a divided nerve
- It is composed of fibrous tissue, growing axons and neurolemma cells
- **Types:**
 - ⌚ Painless or painful.
 - ⌚ Terminal, central or lateral
- **Treatment** Excision +/- sympathectomy in cases of neuralgia

1. **Neurofibroma:**

• **Introduction:**

- ⌚ Neuron is formed of (cell body, nerve axon, dendrites).
- ⌚ It is the functional unit of nervous system
- ⌚ Nerve axon is surrounded by Schwann cell which produce neurolemmal sheath

• **Definition:**

- ⌚ It is a tumor-like mass formed from nerve sheaths either neurolemma (neurofibroma) of spinal nerves or schwannoma from cranial nerves usually the 8th nerve
- ⌚ It is considered as hamartoma

• **Types:**

- ⌚ Generalized (Von Recklinghausen's disease)
- ⌚ Solitary.
- ⌚ Patchy dermatome (Plexiform neuroma).
- ⌚ Molluscum Fibrosum.
- ⌚ Elephantiasis neurofibromatosis
- ⌚ Acoustic 8th nerve

- **Clinical picture:**
 - ⌚ Symptoms: Patient usually presented with painless swelling that moves across and not along the nerves of gradual onset and slowly progressive course
- **On examination**
 - ⌚ No.: Solitary or multiple.
 - ⌚ Size: variable.
 - ⌚ Shape: rounded.
 - ⌚ Site: subcutaneous.
 - ⌚ Edge: well defined.
 - ⌚ Consistency: firm.
 - ⌚ Mobility: not attached to skin.
 - ⌚ Cafe au lait patches: brown patches seen all over the body.
- **According to different types:**
 - ⌚ **Generalized neurofibromatosis (von reckling hausen disease):**
 - ✓ The most common type
 - ✓ Often it is familial
 - ✓ No.: multiple
 - ✓ Size: variable
 - ✓ Consistency: firm.
 - ✓ Mobility: across not along the nerve
 - ✓ Café au lait patches especially on the back
 - ✓ Special characters: tender, increase intracranial tension if arise from intracranial nerve, no sensory or motor loss.
 - ✓ Pheochromocytoma may be present (MEN IIb).
 - ✓ Malignant transformation is associated with pain, anesthesia, paralysis and progressive increase in the size of lesion.
 - ⌚ **Solitary neurofibroma:**
 - ✓ No.: single.
 - ✓ Size: variable.
 - ✓ Consistency: firm, tender (due to compression of nearby nerve fibers not infiltration).
 - ✓ Mobility: across but not along the nerve
 - ✓ Cafe au lait patches.
 - ⌚ **Pachy dermatocoele (plexiform neuroma):**
 - ✓ Cystic swelling gives sensation as a bag of worms due to presence of multiple nerve fibers inside the swelling
 - ✓ Swelling is common in face leading to facial deformity
 - ⌚ **Molluscum fibrosum:**
 - ✓ Soft fibrous swellings(cutaneous nerve endings are affected) - Scalp, face and trunk are commonly affected (hand and feet escape).

⦿ **Elephantiasis neurofibromatosis:**

- ✓ Skin becomes thickened and replaced by grayish white glistening tissue (diffuse affection of the nerves of the skin and subcutaneous tissue).
- ✓ Commonly in children in limbs.
- ✓ Hypertrophy of a huge part of a limb.
- ✓ Differentiated from lymphedema by congenital nature & cafe au lait patches.

⦿ **Acoustic neuroma:**

- ✓ May be associated with acoustic nerve tumor. - it has a striking familial incidence showing itself as Mandelian dominant trait.
- ✓ it is often associated with tumors of the dura and choroid plexus.

2. Neurofibrosarcoma:

- Arise de novo or may develop by malignant transformation in a neurofibroma.
- It forms a painful rapidly growing tumor which invades the surrounding tissues producing anesthesia and paralysis and forms distant metastasis.
- Wide excision should be carried out in localized tumors, but amputation is indicated for extended tumors and post operative recurrence.
- **Complications:**
 - ⦿ Pressure symptoms e.g. deafness in acoustic neuroma.
 - ⦿ Malignant transformation(neurofibrosarcoma): Sudden change in behaviour:- pain -rapid growth-hard in consistency-never paralysis.
- **DD. (Multiple swellings)**
 1. Multiple neurofibromatosis.
 2. Multiple lipomatosis.
 3. Multiple melanoma
 4. Multiple angioma.
 5. Multiple lymph node enlargement.
 6. Multiple warts.
 7. Multiple exostosis (bony swellings).

Investigation: mainly clinical diagnosis.

- ⦿ Search for associated conditions as MEN IIb (blood pressure, serum calcitonin, urinary catecholamines)
- **Treatment**
 - ⦿ Surgical excision is the treatment of choice
 - ⦿ **BUT**
 - ✓ Debulking of the lesion is necessary to improve self image of the patient.
 - ✓ With high rate of recurrence till age of puberty -> repeated partial excision.
 - ✓ Patient with generalized neurofibromatosis -> must be fully examined because they might have acoustic neuroma.

Notes:

- ⇒ Neurofibroma doesn't affect nerves except neurofibrosarcoma and acoustic neuroma
- ⇒ Familial neurofibroma: Von reckling hausen disease and MEN IIb

Swellings of The Hand

Incidence

⇒ The great majority (**94%**) are benign.

⇒ **Ganglion:**

- **Types:**
 - ⌚ Simple Ganglion.
 - ⌚ Compound palmar ganglion.
 - ⌚ Giant tumor of tendon sheath.
 - ⌚ Glomus tumor
 - ⌚ Implantation dermoid cyst

1. Simple ganglion:

- **Definition:** a small cyst that contains a clear gelatinous fluid. Related to tendon
- **Pathogenesis:**
 - ⌚ Protrusion of a joint or tendon synovial membrane → becomes isolated → form ganglion content.
 - ⌚ Synovial membrane protrusion may be acute or chronic.
 - ⌚ Sometimes may develop due to myxomatous degeneration in the tendon sheath.
- **Site:** most found on the dorsum of the wrist.
- **Pathology:** cyst containing jelly like mucin
- **Clinical features:**
 - ⌚ **Symptoms:** A painless small, rounded cystic swelling usually on the dorsum of the wrist (less commonly on the dorsum of the foot).
 - ⌚ **Signs:** tense cystic giving a false impression of being hard.
 - ⌚ **A characteristic sign** is that the mobility of the swelling is markedly restricted by stretching or by contraction of the related tendons.
 - ⌚ It moves across the tendon

Investigation: X-ray on the hand , excisional

Treatment (Not indicated unless the patient insists)

- ⌚ Aspiration or rupturing the cyst (by applying direct pressure) → temporary disappearance followed by **recurrence** in 20-50%.
- ⌚ Excision (the only **definitive** treatment).
 - ✓ Done under general anesthesia & a tourniquet is applied. In the presence of good light and bloodless field
 - ✓ Excise the wall completely, otherwise recurrence occurs.



2. Compound palmar ganglion (TB of ulnar bursa):

- **Definition:**
 - ⌚ TB synovitis of synovial flexor sheath at the fingers distended with TB granulation tissues
- **Etiology:**
 - ⌚ **Causative organism:**
 - ✓ Mycobacterium TB.
 - ⌚ **Route of infection:**
 - ✓ Direct inoculation,
 - ✓ Lymphatic spread,
 - ✓ Blood spread.
- **Pathology:**
 - ⌚ **Site:** Palm, Distal part of the forearm.
 - ⌚ **Macroscopic:** Aggregation of TB follicles lymphangitis and lymphadenitis.
 - ⌚ **Microscopic:** TB tubercle formed of central caseation surrounded by epithelial cells, giant langhans cells , fibroblasts and fibrocysts.
- **Clinical picture:**
 - ⌚ **Symptoms:**
 - ✓ Swelling at palm of the hand and distal part of the forearm.
 - ✓ May be associated with TB toxemia, night fever, night sweating, anorexia and loss of weight.
 - ⌚ **Signs:**
 - ✓ General: TB toxemia.
 - ✓ Local: inspection: swelling at the palm and distal part of forearm, larger in size, may extend to thumb or little finger. Overlying skin may show signs of inflammation.
 - ✓ Palpation: Swelling with smooth surface, ill-defined edge, cystic in consistency and fluctuant: show "cross-fluctuation" due to band of contraction at flexor retinaculum.

LNs may show TB lymphadenitis.
- **Complication:**
 - ⌚ Secondary infection.
 - ⌚ Hemorrhage.
 - ⌚ TB spread and toxemia.
 - ⌚ Rupture.
- **Investigations:**
 - ⌚ **Lab:**
 - ✓ Tuberculin test.
 - ✓ ESR >100
 - ✓ Aspiration and culture on Lowenstein Jensen media.
 - ✓ PCR.
 - ✓ CBC leukopenia with relative lymphocytosis.
 - ⌚ **Imaging:**
 - ✓ CXR
- **Treatment:**
 - ⌚ **Medical treatment:**
 - ✓ Sanatorial treatment.
 - ✓ Immobilization in plaster of paris.
 - ✓ Antituberculous drugs.

⦿ Surgical:

- ✓ Aspiration by z-technique.
- ✓ If failed : Complete excision under umbrella of anti-tuberculous drugs

3. Giant cell tumor of tendon sheath:

- Painless mass on volar or dorsal aspects of finger
- Interfere with tendon movements, compress digital nerve & erode bone.
- **Treatment:** meticulous excision
- **Recurrence** is treated by re-excision combined with radiotherapy

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Other miscellaneous swellings

⇒ Pneumatocele

- **Definition:**
 - ⇒ Herniation of the lung apex through weak Sibson's fascia (suprapleural membrane) which extends from the transverse process of C7 to the 1st rib.
- **Clinical picture:**
 - ⇒ Cystic swelling in the supracularicular region.
 - ⇒ Becomes prominent on straining.
 - ⇒ Resonant & compressible
- **Treatment:**
 - ⇒ Factor of straining should be corrected.
 - ⇒ Plication of Sibson's fascia

⇒ Subhyoid bursitis

- This is a rare tender oval swelling which lies transversely below the hyoid bone. It moves up & down with deglutition and with protrusion of the tongue.

⇒ Keloid:

- **Definition:** Dense over growth of granulation tissues after wounds
- **Incidence:**
 - ⇒ It is especially common in the face, neck, front of chest & abdomen.
 - ⇒ Negros (common in negros). Tendency to develop keloid is inherited.
- **Clinical picture:**
 - ⇒ The affected scar becomes firm raised above the surface
 - ⇒ Early it is pink or reddish in color (acute phase) & later it becomes pale (chronic phase).
 - ⇒ Common as postoperative complication of thyroidectomy, so we do collar incision
- **DD:**
 - ⇒ Hypertrophied scar (limited to the scar and never grows)
- **Treatment:**
 - ⇒ Continuous pressure by silicone gel sheets.
 - ⇒ Intralesional steroids.
 - ⇒ Surgical excision. Recurrence rate after simple excision may reach 80%. To minimize recurrence intramarginal excision of the scar is recommended with intraoperative injection of steroids.

⇒ Bakers Cyst

- Herniation of synovial membrane of knee joint through the capsule
- it simulates semimembranous bursitis, but it occurs in the midline.
- If ruptures: severe pain (DD: DVT).
- **Investigation:** Doppler US
- **Treatment** of the cause

⇒ **Bursae**

- **Definition:** It is a sac lined with synovial membrane containing fluid
- **Anatomical:**
 - ⦿ Around the knee: pre-patellar (housemaid) ,Infra-patellar (clergyman's knee) ,Semi-membranous
 - ⦿ Olecranon (students)
 - ⦿ Subhyoid
 - ⦿ Radial bursa
 - ⦿ Ulnar bursa

⇒ **Adventitious:**

- Over the head of shoulder (porters)
- Over external malleoli (tailors)
- Over the big toe (bunion)
- Over the amputation stump

⇒ **Bursitis**

- Traumatic: affect anatomical and adventitious
- Infective: Syphilis, Tuberculous, Suppurative
- Tumors: very rare

⇒ **Semimembranous Bursitis**

- **History (symptoms):** Adult age, presenting with painless or painful swelling in the popliteal fossa
- **On examination (signs):** cystic swelling on upper medial part of popliteal fossa, flaccid with flexion, and tense with extension.
- **Differential diagnosis:**
 - ⦿ Baker's cyst
 - ⦿ Popliteal aneurysm
 - ⦿ Other swellings in the popliteal fossa
- **Investigations:** Plain X-ray for the knee joint may be done to diagnosis associated lesion

Treatment: Excision for primary type - if secondary to knee effusion, treat the cause

⇒ **Surgical skin lesions**

- **Benign lesions of the skin and subcutaneous tissue:**
 - ⦿ Sebaceous cyst.
 - ⦿ Dermoid cyst.
 - ⦿ Callosity.
 - ⦿ Corn.
 - ⦿ Warts.
 - ⦿ Papilloma.
 - ⦿ Kerato-acanthoma.
 - ⦿ Hemangioma.
 - ⦿ Lymphangioma.
 - ⦿ Lipoma.
 - ⦿ Neurofibromatosis.
 - ⦿ Navi.

- **Precancerous skin lesions**
 - ⦿ Squamous keratosis.
 - ⦿ Bowen's disease.
- **Malignant neoplasia of the skin**
 - ⦿ Basal cell carcinoma.
 - ⦿ Squamous cell carcinoma.
 - ⦿ Melanoma.
 - ⦿ Malignant skin tumors of vascular origins

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THE NECK

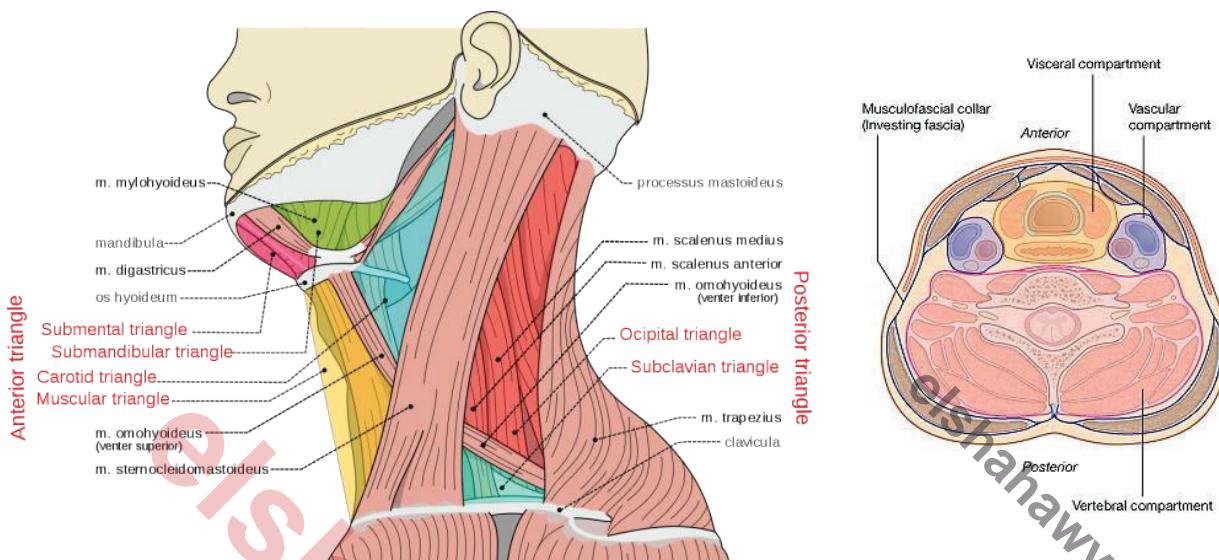
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The Neck

⇒ Anatomical divisions of the neck:

- **Triangles:** Each side of the neck is divided by sternomastoid muscle into:
 - ⌚ Posterior triangle. Boundaries of posterior triangle are: posterior border of sternomastoid, mid third clavicle, anterior border of trapezius
 - ⌚ Anterior triangle. Boundaries of anterior triangle: midline of the neck, body of the mandible, the anterior border of sternomastoid. It is → further divided by both bellies of digastric muscles and superior belly of omohyoid muscle into 4 triangles
 - ✓ **Submandibular (digastric) triangle Boundaries:**
 - Above → body of the mandible.
 - Posteriorly → posterior belly of digastric.
 - Anteriorly → anterior belly of digastric.
 - **Contents:** The submandibular salivary glands and submandibular lymph nodes
 - ✓ **Carotid triangle boundaries:**
 - Posteriorly → sternomastoid muscle.
 - Superiorly → posterior belly of the digastric.
 - Inferiorly & anteriorly → superior belly of omohyoid.
 - **Contents:** The carotid artery, the internal jugular vein, the vagus nerve and the internal and external laryngeal nerves
 - ✓ **Muscular triangle boundaries:**
 - Posteriorly → the sternomastoid muscle
 - Superiorly → the superior belly of omohyoid
 - Anteriorly → the middle line.
 - The two muscular triangles form together a diamond-shaped area.
 - **Contents:** The deep structures including the larynx, trachea, thyroid and the oesophagus
 - ✓ **Submental triangle boundaries:**
 - Superiorly: the chin
 - Laterally: the two anterior bellies of the digastric muscle
 - Medially: the midline
 - **Contents:** The submental lymph nodes
 - ⌚ The posterior triangle is further divided by inferior belly of omohyoid into 2 triangles
 - ✓ **Occipital triangle**
 - Boundaries: Anteriorly: the Sternocleidomastoid muscle
 - Posteriorly: The Trapezius muscle
 - Inferiorly: The Omohyoid muscle
 - ✓ **Supraclavicular triangle**
 - **Boundaries:**
 - Anteriorly: the posterior border of the Sternocleidomastoid
 - Superiorly: the inferior belly of the Omohyoid muscle
 - Inferiorly: the clavicle
 - **Contents of posterior triangle**
 - Most lumps arising from the posterior triangle are due to enlarged occipital or supraclavicular lymph nodes. Other important structures include the subclavian artery, the external jugular vein, the accessory nerve, the phrenic nerve and parts of the brachial plexus.



⇒ **Compartments:** In a cut section, the neck is divided into two compartments.

- **The musculo-skeletal compartment:**
 - ⌚ Lies posteriorly & is separated from the visceral compartment by thick fascia (**the prevertebral fascia**).
- **The visceral compartment:**
 - ⌚ Lies anteriorly and is enclosed in the investing fascia of the neck.
 - ⌚ **Contents:** the esophagus, trachea, thyroid & parathyroid glands, carotid arteries, vagus nerve, and the jugular veins.
 - ⌚ Because it is enclosed within such a fascial covering a swelling in this visceral compartment → pressure symptoms & signs as dysphagia, dyspnea, or weak carotid pulse.

Differential diagnosis of neck swellings

⇒ **Mid-line swellings:**

- **Solid swellings:**
 - ⌚ Submental LN enlargement.
 - ⌚ Nodule in the isthmus of the thyroid gland.
 - ⌚ Subcutaneous: Lipoma of Burn's space (Suprasternal notch).
- **Cystic swellings:**
 - ⌚ Dermoid cyst.
 - ⌚ **Thyroglossal cyst** (moves up & down with deglutition also moves up with tongue protrusion).
 - ⌚ **Subhyoid bursitis:**
 - ✓ A rare tender, oval swelling which lies transversely below the hyoid.
 - ✓ It moves up & down with deglutition and with tongue protrusion.
 - ⌚ **Cysts in the thyroid gland.**
 - ⌚ **Laryngocoele:**
 - ✓ Rare swelling in musicians who play air-blown instruments, it is herniation of laryngeal mucosa through thyrohyoid membrane.
 - ✓ It is resonant, compressible & increases in size with coughing or blowing.

⇒ **Swellings in the submandibular triangle:**

- Enlarged submandibular LNs (multiple and can be rolled over the edge of the mandible).
- Enlarged submandibular salivary gland.

⇒ **Swellings in the carotid triangle:**

- **Solid swellings:**
 - ⇒ Enlarged upper deep cervical LNs.
 - ⇒ Carotid body tumor.
- **Cystic swellings:**
 - ⇒ Cold abscess.
 - ⇒ Branchial cyst.

⇒ **Swellings in the posterior triangle:**

- **Solid swellings:**
 - ⇒ Enlarged LNs.
 - ⇒ Cervical rib.
 - ⇒ Neurofibroma arises from the brachial plexus.
- **Cystic swellings:**
 - ⇒ Cystic hygroma.
 - ⇒ Pharyngeal pouch.
 - ⇒ Cold abscess.
 - ⇒ Pneumatocele → caused by herniation of the pleura into the base of the neck
→ a cystic swelling in the supraclavicular region (Resonant and compressible).

⇒ **Other swellings that may arise anywhere:**

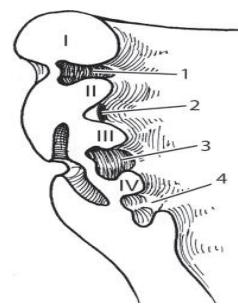
- Swellings of skin & S.C. tissue are common in the neck.
- They are added to any of the previous lists.
 - ⇒ Lipomas.
 - ⇒ Sebaceous cysts.
 - 1. Hemangiomas

Branchial Anomalies

Etiology

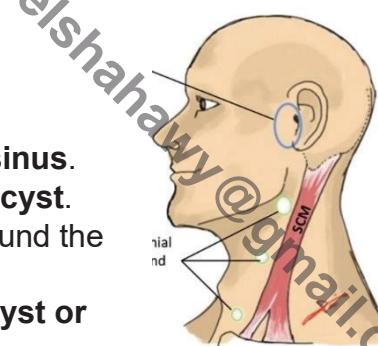
⇒ **Normal development:**

- During the first month of intrauterine life, the region of the primitive neck shows branchial apparatus formed of **6 parts** called **arches**.
- The depression on outer aspect of each arch called **cleft** → covered by **ectoderm**.
- And inner aspect called **pouch** → lined by **endoderm**.



⇒ **Abnormal development (Branchial anomalies):**

- Tract of branchial origin → form complete **fistula**.
- One end may be obliterated → form external or internal **sinus**.
- Both ends may resorb leaving aggregate of cells → form **cyst**.
- Others include skin tags, cartilaginous rest especially around the auricle.
- **2nd branchial arch anomalies 95% it may present as cyst or fistula at the ant border of sternocleidomastoid.**
 - ⇒ A **branchial fistula** develops if the 2nd arch doesn't completely fuse w/the neck.
 - ⇒ If the cervical sinus persists → **branchial cyst**.



Locations for Cysts and Fistula

Clinical findings:

⇒ **A branchial cyst:**

- Presents at late childhood as a swelling protruding from beneath the anterior border of the upper third of the sternomastoid muscle (90%).
- **Only the posterior part of the cyst is covered by muscle.**
- When the muscle contracts then tension inside the cyst increases and produces bulge of anterior part of the cyst in the carotid triangle (**Sign of paradox**).
- Commonly mistaken for a **cold abscess** (differentiated by finding cholesterol crystals in the aspirate).
- Spontaneous rupture of an infected branchial cyst may result in a purulent draining sinus to the skin or the pharynx.
- May present with locally compressive symptoms.



⇒ **A branchial fistula:**

- Presents at **birth** as a pinpoint opening at the anterior border of the **sternomastoid muscle**. Usually discharges a mucoid or purulent material.
- may occasionally be confused with a **tuberculous sinus**.
- Present mostly in infancy as chronic discharge along anterior border of SCM in lower 1/3.

⇒ **Diagnosis**

- Ultrasonography.
 - Upper airway endoscopy.
 - FNAC
 - A contrast enhanced CT scan shows a cystic and enhancing mass in the neck.
- ⇒ Periauricular sinus, cysts or skin tags may contain cartilage.
- ⇒ Sinuses and cysts are prone to repeated infection producing abscess or cellulitis formation.

Differential diagnosis

DD Neck mass in carotid triangle	
Lymph node swelling	<ul style="list-style-type: none"> a- Acute suppurative lymphadenitis due to staph aureus shows signs of inflammation and responds to antibiotics. b- Granulomatous lymphadenitis: due to mycobacterium infections may produce cystic lymph nodes and draining sinuses. Chronic inflammatory reaction precedes the purulent discharge. c- Lymphoma: produce multiple firm masses
Hemangiomas and Lymphangiomas	<ul style="list-style-type: none"> - Soft, spongy tumor masses. - Lymphangioma may transilluminate.
Carotid body tumors	<ul style="list-style-type: none"> - Firm, located at carotid bifurcation. - Occur in older patients
Carotid aneurysm	<ul style="list-style-type: none"> - Cystic, Pulsatile, Compressible
DD Neck sinuses and fistulae	
Branchial fistula	<ul style="list-style-type: none"> - Mucoid material expressed from the opening of branchial sinuses or fistula; Firm cordlike tract may be felt along its course.
TB sinus	<ul style="list-style-type: none"> - Painless slowly progressive lymphadenopathy then affected lymph nodes undergo breakdown and sinus is formed. - Associated with weight loss, fatigue, night sweats and fever.
Thyroglossal cyst	<ul style="list-style-type: none"> - Midline cyst, move up and down with deglutition and tongue protrusion.

Treatment

⇒ **Branchial cyst:**

- By Excision through a transverse neck incision.

⇒ **Branchial fistula:**

- The whole track should be excised → through multiple transverse neck incisions.
- Step ladder incision
- Surgery done when the patient is at least age 3 months old.
- Surgery should not be attempted during an episode of acute infection or if an abscess is present.

Nearly all branchial abnormalities should be excised early in life since repeated infection is common → difficult resection.

⇒ **Infected sinuses and cysts:**

- Require initial incision and drainage.
- **6 weeks later** (when the acute inflammation subsides) → staged excision of the tracts.
 - ⦿ Ensure **complete excision of cyst wall or fistula tract** (including skin punctum) since incomplete removal → Recurrence & infection.
 - ⦿ **Take care not to injure the following important surrounding structures:**
 - ✓ Nerves: The Facial, Hypoglossal & Glossopharyngeal.
 - ✓ The carotid artery.
 - ✓ Internal jugular vein.

➤ **Preauricular lesions:**

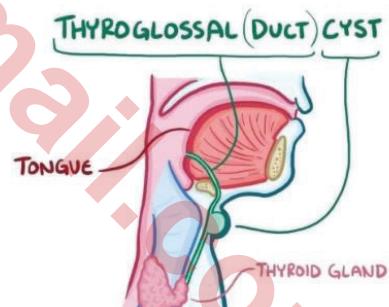
- Anomalous development of the auricle → Preauricular sinuses, cysts & cartilaginous.
- Are unrelated to branchial anomalies.
- The sinuses are often short and end blindly.
- They can be cosmetically unappealing and often become infected.
- Superficial skin tags and cartilaginous rests are easily excised without risk to other structures.
- Preauricular sinus tracts may be very deceptive in their extent and extensive dissection has risks to damage branches of facial nerve.

Thyroglossal Cyst

Etiology

⇒ **Normal development:**

- During **the 4th week** of gestation, the thyroid gland develops from an invagination in the floor of the primitive pharynx located between **the first pair of pharyngeal pouches at the foramen cecum of the tongue**.
- Then descend in front of the larynx till it reaches the site of the **future isthmus (in front of 2nd, 3rd, 4th tracheal rings)**.



⇒ **Abnormality:**

- If the thyroid does not normally descend → The gland may form at the base of the tongue or remain as a mass anywhere in the midline of the neck along path of descent.
- **The most common site is the subhyoid location. (75%)**
- If the thyroglossal duct persists → the epithelial tract forms a cyst that usually communicates with the foramen caecum of the tongue.
- The thyroglossal duct descends through 2nd branchial arch (which becomes the hyoid bone) before its fusion in the midline → **therefore, the persistent tract often penetrates the hyoid bone.**

- The thyroglossal duct can assume a variable relationship to the hyoid bone: Behind, in front or through the body of the bone.
- Carcinoma develops more frequently in ectopic thyroid tissue than in normal thyroid glands.

Clinical picture

- ⇒ A midline tubulodermoid cyst arising in thyroglossal duct remnant.
- ⇒ Site:
 - At any level from the foramen caecum of the tongue to the suprasternal notch.
 - **Commonly → In the midline just below the hyoid bone, (at the level of the thyroid cartilage → displaced usually to the left).**
- ⇒ **Type of patient:**
 - At any age but is most common during childhood.
- ⇒ **Symptoms:**
 - A painless cystic swelling in the **midline** of the neck.
 - Cystic midline mass that **moves up and down on swallowing** (since they are deep to the cervical strap muscles) **and tongue protrusion** (due to its relation to the hyoid bone).
 - There may be a palpable track extending from the hyoid bone upwards towards the tongue.
 - The fluid in the cyst is usually under pressure → giving the impression of being a solid tumor.



Complications

- ⇒ **Thyroglossal fistula (Never congenital):**
 - **Etiology:**
 - ⌚ The wall of the cyst is rich in lymphatics that communicate with the cervical lymph nodes → Infection → Spontaneous rupture or incision & drainage → Fistula.
 - ⌚ Inadequate removal of the cyst.
 - **Clinical picture:**
 - ⌚ The opening of the fistula is near the midline on the left side with a crescentic fold.
 - ⌚ Discharges mucus & presents with recurrent inflammation.
- ⇒ **Excision of an ectopic thyroid → Remove all thyroid tissue → Hypothyroidism.**



Differential Diagnosis

From midline neck swellings		
1- Lymph nodes (nodes are usually multiple) 2- Dermoid cyst: subcutaneous and doesn't move with swallowing. 3- Nodule of thyroid isthmus (doesn't move with tongue protrusion).		
From tongue swellings		
<ul style="list-style-type: none"> - Lingual thyroid may be confused with: <ul style="list-style-type: none"> 1- Hypertrophied lingual tonsil. 2- Fibroma 3- Angioma 4- Sarcoma 5- Carcinoma of the tongue - These lesions and Thyroglossal cysts distinguished from aberrantly located thyroid glands by Needle aspiration or radioiodine isotopic scan. 		
From neck fistulae and sinuses		
	Branchial fistula	Thyroglossal fistula
Origin	Ectoderm	Endoderm
Etiology	Congenital/Acquired	Only Acquired on top of infected cyst.
Site	Lateral along anterior border of sternomastoid.	Midline
Bilaterality	Unilateral / Bilateral	Always single
Movement with deglutition and with tongue protrusion	No movement	Moves up

There is a malignant potential of the dysgenetic thyroid tissue located in a thyroglossal duct cyst.

Treatment

- ⇒ Complete excision is indicated because of the risk of infection and the possibility of developing papillary carcinoma later in life.
- ⇒ Acute infection in thyroglossal tracts should be treated with local heat and antibiotics.
- ⇒ After the inflammation subsides (≈ 6 weeks) → incision & drainage.
- ⇒ Method: **Sistrunk procedure** → Remove:
 - Thyroglossal cyst.
 - Its epithelial tract.
 - The mid-portion of the hyoid bone should be removed en bloc with the thyroglossal tract to the base of the tongue.
 - → When the hyoid is not removed, or the cyst was infected or drained→ Recurrences.



Sternomastoid tumour and congenital torticollis

Clinical picture

- ⇒ **Presents at birth or 2nd - 6th weeks of life (more common).**
- ⇒ Presents with a hard, non-tender, fibrotic mass within the sternomastoid muscle.
- ⇒ Generally, the "tumor" initially grows, then stabilizes, and in about half the cases recedes spontaneously after a few months. It may leave a residual torticollis or may be associated with a facial or cranial asymmetry of a delayed torticollis
- ⇒ The muscle is shortened → the mastoid process on the involved side is pulled down toward the clavicle & manubrium → the head is abducted to the ipsilateral side and rotated to the contralateral side (toward the opposite shoulder)
- ⇒ The shoulder on the affected side is raised, and there may be cervical and thoracic scoliosis.
- ⇒ Passive rotation of the head to the involved side → Resistance & limited movement to varying degrees & muscle appears as a protuberant band.



➤ Normal development

- The sternomastoid muscle develops through the union of **three somites** each with its own blood supply.

➤ Abnormal development

- **Interruption of the blood supply** to the central somite (either before or at birth) → muscle **infarction** → Becomes swollen (**Called sternomastoid tumor**) → Fibrous tissue will replace infarcted part → contraction causing congenital torticollis.

- ⇒ The etiology is unknown, a direct cause and effect relationship to birth trauma has been largely disproved although approximately half these children are products of breech deliveries.

Treatment

⇒ **With an active range of motion exercises:**

- The child's shoulders are held flat to a table and the head is tilted and rotated in a full range of motion.
- Performed at least 4 times a day for 2-3 months.
- Approximately half of these "tumors" will resolve spontaneously without sequelae.

⇒ **Surgery (rarely necessary):**

- **Indication:** If the muscle continues to become progressively shortened with a facial and occipital skull deformity
- **Method:** both heads of the sternocleidomastoid muscle should be divided through a small transverse incision just above the clavicle.
- This procedure does not reverse the bony changes that have already developed but prevents progression of the process.
- Recurrence is rare

➤ **Carotid body tumor:**

- Incidence: a rare slowly growing **malignant** tumor. Represent about 65% of head and neck paragangliomas.
- Origin: from chemoreceptors at bifurcation of carotid artery. Develop within the adventitia of the medial aspect of the carotid bifurcation.
- Types:
 - 3 different types: Familial, Sporadic, Hyperplastic. The sporadic form is the most common type, representing approximately 85% of carotid body tumors (CBTs). The familial type (10-50%) is more common in younger patients. The hyperplastic form is very common in patients with chronic hypoxia, patients living at a high altitude, COPD or cyanotic heart disease
- Epidemiology:
 - The mean age of onset is 45 years. Age of onset in the familial group is younger, in the second to fourth decade.
 - About 5% of carotid body tumors (CBTs) are bilateral and 5-10% are malignant.
 - Risk factors are chronic hypoxic stimulation and the genetic predisposition
- C/P:
 - Slowly growing swelling at middle age which is usually smooth but may be lobular in anterior triangle of the neck
 - Swelling moves from side to side **but not vertically**. Typically fixed vertically because of its attachment to the bifurcation of the common carotid (**Fontaine sign**).
 - Exhibits **transmitted** pulsations from underlying carotid artery.
 - By auscultation: bruit
 - Approximately 10% of the cases present with cranial nerve palsy with paralysis of the hypoglossal, glossopharyngeal, recurrent laryngeal, or spinal accessory nerve, or involvement of the sympathetic chain. May be associated with pain, hoarseness, dysphagia, Horner syndrome, or shoulder drop.
 - It can cause fever of unknown origin
 - In cases of functional CBTs, symptoms similar to those of pheochromocytoma, such as paroxysmal hypertension, palpitations, and diaphoresis, are seen.
- Investigation:
 - Angiography → Splaying of the Bifurcation.
 - Check urinary catecholamines in patients who have any symptoms of a functional carotid body tumor.
 - Color Doppler USG, which can assess the vascularity of the neck mass.
 - CT scanning typically reveals a hypervascular tumor located between the external and internal carotid arteries.
 - MRI imaging is IOC and the tumor has a characteristic salt and pepper appearance on T1-weighted image.
MRA provides better insight into the vascularity of the tumor and its feeder vessels.
Angiography shows the typical **lyre sign**. also helpful for better visualization of the feeder vessels
 - MIBG scans in patients who have functional tumors
 - Biopsy even with a fine needle is contraindicated as tumor is highly vascular.
- Carotid body tumor staging:
 - Shamban describes 3 different types or stages of carotid body tumors.
 - Type I consists of a small tumor that is easily dissected from the adjacent vessels in a periadventitial plane.
 - Type II tumors are larger and more adherent and partially surround the vessel.
 - Type III tumors are large and completely surround the carotid bifurcation.
- Treatment:
 - **Excision** with preservation of the internal carotid artery.
 - If not possible to separate from the tumor, the ICA is excised & replaced by a synthetic graft.
 - radiotherapy is reserved for the elderly, patients who are poor surgical candidates, individuals with multiple paragangliomas in whom resection may be highly morbid

⇒ **Laryngocele**

- Anomalies of the supraglottic larynx.
- Result of air or fluid filled dilation of the laryngeal ventricle, which communicate with the laryngeal lumen. Classified as "internal" or "external".
- Internal laryngocoeles, are comprised of a collection of air or serous fluid and mucous in the anterior portion of the laryngeal ventricle. Their sac remains within the confines of the thyroid cartilage.
- In contrast, as external laryngocoeles enlarge, their sac may protrude through the thyrohyoid membrane and present as anterior neck mass.
- Laryngocoeles may be congenital and may also be acquired. They are often seen in glassblowers due to continual forced expiration producing increased pressures in the larynx which leads to dilatation of the laryngeal ventricle. It is also seen in people with chronic obstructive airway disease
- **Laryngocoele presentation**
 - ⇒ Lateral Compressible Neck Mass that increases in size with increase in intralaryngeal pressure, Cough, Hoarseness and possible airway compromise.
 - ⇒ Laryngocoeles may also become infected, in which case they are called Laryngopyoceles.
 - ⇒ If infected present with fever, pain, leukocytosis etc
- **Diagnosis**
 - ⇒ Indirect mirror exam.
 - ⇒ Flexible fiberoptic laryngoscopy.
 - ⇒ CT of the neck with IV contrast.
- **Treatment**
 - ⇒ Internal laryngocoeles are managed endoscopically.
 - ⇒ External laryngocoeles and combined internal and external laryngocoeles are managed through an open approach.
 - ⇒ All procedures, both open and endoscopic, typically begin with upper airway endoscopy to evaluate the lesion completely.

⇒ **Pharyngeal pouch:**

- Zenker diverticula occur in a muscular dehiscence that is present most commonly between the oblique muscle fibers of the inferior constrictor muscle and the transverse fibers of the CP muscle. □ This area is known as the Killian triangle

Pathophysiology:

- ⇒ Herniation of the esophageal mucosa posteriorly between the cricopharyngeus (CP) muscle and the thyropharyngus part of inferior pharyngeal constrictor muscles.
- ⇒ Hypothetical abnormalities include the following:
 - ⇒ Abnormal timing of deglutition resulting in closure of the CP muscle when ideally it should be opening. Incomplete CP muscle relaxation
 - ⇒ Elevated resting tone of the entire upper esophageal sphincter (UES)
 - ⇒ Loss of CP muscle elasticity
- **CP muscle myopathy or denervation atrophy**
 - ⇒ Central nervous system (CNS) injury with a focal spastic CP muscle
 - ⇒ CP muscle spasm in response to gastroesophageal reflux disease (GERD)
 - ⇒ Van Overbeek system: Criteria of the van Overbeek system are as follows:
 - ⇒ Small sacs are less than 1 vertebral body in length
 - ⇒ Intermediate sacs are 1-3 vertebral bodies in length
 - ⇒ Large sacs are greater than 3 vertebral bodies in length

- **Presentation:**

- Dysphagia - Most patients (98%) present with some degree of dysphagia
- Regurgitation of undigested food hours after eating
- Sensation of food sticking in the throat
- Special maneuvers to dislodge food
- Coughing after eating
- Aspiration of organic material
- Unexplained weight loss
- Fetor ex ore (halitosis)
- Borborygmi in the neck

- **Complication:**

- The most common life-threatening complication in patients with a Zenker diverticulum is aspiration.
- **Other complications include**
 - ✓ Massive bleeding from the mucosa or from fistulization into a major vessel,
 - ✓ Esophageal obstruction, and fistulization into the trachea.
 - ✓ Coexistent hiatal hernia,
 - ✓ Esophageal spasm,
 - ✓ Achalasia, and esophagogastrroduodenal ulceration are common.
 - ✓ Squamous cell carcinoma (SCC) within a Zenker diverticulum is extremely rare, occurring in 0.3% of Zenker diverticula worldwide.

- **Diagnosis:**

- Barium swallow with videofluoroscopy. This study provides information about the size, location, and character of the mucosal lining of the Zenker diverticulum.
- Esophageal manometry
- Rigid or flexible esophagoscopy is essential before surgical management to assess the nature of the mucosa of the Zenker diverticulum and to exclude the presence of SCC or carcinoma in situ.

- **Treatment:**

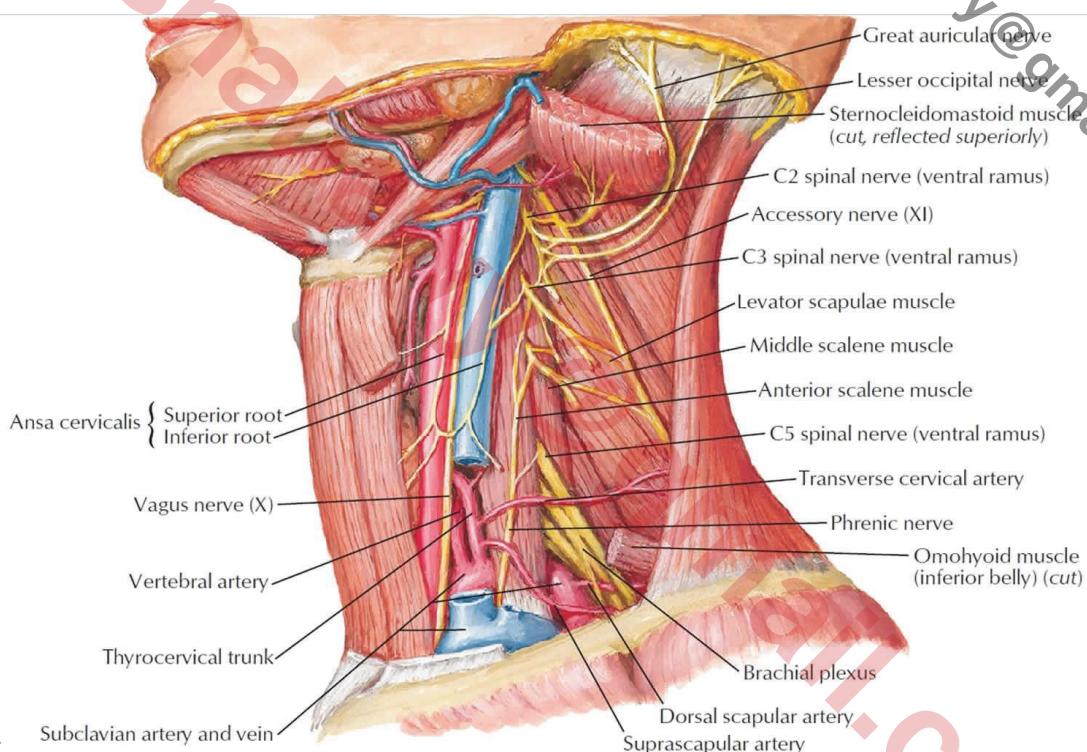
- Patients with diverticula of under 1 cm or in patients with medical comorbidities precluding surgery. Botulinum toxin may be used to provide temporary relief of dysphagia symptoms.
- Zenker diverticula require intervention only if they produce symptoms. Small lesions(6 cm) are best managed with excision with CP myotomy or a diverticulopexy with CP myotomy, depending on the health of the patient.

- **Complications of surgical treatment:**

- Recurrent laryngeal nerve (RLN) paralysis
- Esophageal stenosis
- Mediastinitis
- Pharyngocutaneous fistula
- Hematoma
- Esophageal perforation

➤ **Cervical lymphadenopathy:**

- $\frac{1}{2}$ of the LNs of the body are present in the neck → drain the head & neck.
- In addition, the supraclavicular nodes are 2nd stations for the breast, apex of lung, upper limbs, abdominal viscera, and testes.
- Accordingly, cervical lymphadenopathy is very common.



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PLASTIC

Reactive Disorders

- ⇒ Salivary glands react to injury or obstruction by undergoing atrophic degeneration and necrosis with replacement of the parenchyma by inflammatory cells, and ultimately fibrosis and scarring.

A. Mucous Extravasation Phenomena

⇒ Ranula

- **Definition:** It is mucous extravasation cyst that occurs at the floor of the mouth as a result of injury to the submandibular duct (Wharton's duct) , the submandibular gland , or the sublingual salivary gland
- **Pathology:** Wall is composed of a thin fibrous capsule lined by macrophages. Definition Pathology Predisposing factors Types - It may contain gelatinous material. - If it extends down into the neck over the posterior margin of the mylohyoid (diaphragm of the mouth) → a plunging ranula. - It may rupture but usually refills again.
- **Clinical picture:** It is a pseudocyst that has its capsule formed of compressed surrounding tissues. It fulfill all criteria of a cyst like:
 - ⌚ +ve fluctuation test.
 - ⌚ Soft in consistency
 - ⌚ Aspiration reveals saliva.
 - ⌚ It is present in the floor of the mouth on one side of the tongue and is bluish in color. It is translucent. with prominent blood vessels running over its surface with stretched submandibular duct.
 - ⌚ Plunging ranula is a condition in which massive mucous extravasation occur through the myelohyoid muscle into submental, submandibular, or sublingual region. Plunging ranula may cause sever compromise of the airway if the secretion extends deep into the neck and involve the juxtahyiod region.
- **Complications:**
 - ⌚ Air way compromise.
 - ⌚ Compression of the feeder gland = obstructive changes
- **Treatment**
 - ⌚ Excision of the sublingual gland with the cyst is very difficult (as the wall is thin and adherent).
 - ⌚ Marsupialization (Partial excision of the roof then suturing the edges to the mucosal lining the floor of the) → treatment of choice.
 - ⌚ Small ranula → can be excised
 - ⌚ Large ranula → deroofing or marsupialization –
 - ⌚ Plunging ranula → the underlying feeder gland should br removed to minimize the chance for recurrence.



⇒ **Lingual and sublingual dermoid:**

- **C/P:** Opaque Whitish swellings lined by stratified squamous epithelium.
- **Origin:** germinal epithelium entrapped at the lines of fusion during embryonic development
- **Pathology:** true cysts, The cysts are filled with mucous (fluctuant) or with a doughy mass of keratin.
- **Site:** They are found in the midline of the tongue or in the floor of the mouth (either in midline “the commonest “or laterally in the submandibular region).
- **Presentation:** after puberty (although congenital).
- **Treatment:** excision through the floor of the mouth (If large → submandibular incision).



⇒ **Mucocele**

- It is a mucous extravasation cyst that occurs as a result of injury of a minor salivary gland duct.
- Usually it is found in the lower lip as a result of lip biting.
- Usually found in children and young adults, although it may occur at any age.
- It is bluish, soft and fluctuant □
- **D.D.:** There are some neoplastic lesions that may clinically resemble mucoceles mainly mucoepidermoid carcinoma.
- This fact dictated that all suspected mucoceles should be submitted for microscopic examination.
- **Treatment:** Excisional Biopsy.

B. Mucous Retention Cyst

- **Definition:** It is a true cystic swelling caused by an obstruction of a salivary gland excretory duct resulting in an epithelial - lined cavity containing mucus.
- **Clinically:** More often, mucus retention cysts arise in the oral minor salivary glands. They most commonly occur in the floor of the mouth. They are painless, cystic and fluctuant
- They rarely involve the major salivary glands, when they do so, they are often multiple (polycystic disease of the parotid gland).
- **Clinically:** a mucus retention cyst is indistinguishable from a mucocele and may resemble low grade mucoepidermoid carcinoma
- **Histopathologically:** The surface stratified squamous mucosal epithelium of the oral cavity is distended by a cystic cavity that is lined by cuboidal epithelium

Sialolithiasis

- **Definition:** The presence of stones in the salivary system (gland or ducts).

- **Pathology:**

- ⦿ Common in case of xerostomia and chronic sialadenitis.
- ⦿ The stones usually impact at the hilum of the gland or in the duct.
- ⦿ Submandibular salivary gland affected in more than 80% of the cases due to:
 - ✓ Viscid secretions with high calcium content.
 - ✓ Duct is independent.
 - ✓ Long tortuous course of the duct



- **Clinical picture:**

- ⦿ 80% of the stones are formed in the major salivary glands and 20% in the minor one.
- ⦿ Submandibular gland is affected in 75% of cases, the parotid in 20% and the sublingual in 5% of cases.
- ⦿ The average age is 45 years - stones are rare in children.
- ⦿ There is no sex preference.
- ⦿ Although some stones are asymptomatic and are detected on dental radiographs taken for other purposes, most will cause symptoms
- ⦿ Recurrent attacks of acute painful swelling.
 - ✓ Attacks precipitated by eating.
 - ✓ Attacks relieved spontaneously few hours after meals.
- ⦿ Affected gland is firm and tender.
- ⦿ Duct may express pus with gentle compression on the gland.



- **Investigations:**

- ⦿ Plain x-ray (Occlusal view): A stone in the submandibular gland is radio-opaque in 80% of cases (Because of its high calcium content).
- ⦿ Ultrasound: show the stone as well as dilated duct proximally.
- ⦿ Ascending sialography: rarely needed. □ If the obstruction is partial and the dye passed, the proximal ducts appear dilated (sialectasia). If the obstruction is complete, the dye stops short at the site of the stone

- ⦿ CT scan

Treatment

- ⦿ Small stones may pass spontaneously.
- ⦿ Impacted stones can be retrieved by trans ductal endoscopic extraction.
- ⦿ Large stones → lithotripsy.
- ⦿ **Surgical removal in:** a. Failure of the above measures. b. Glandular stones.

- **Indications of Sialadenectomy (Gland removal)**

- ⦿ Intraglandular stone
- ⦿ Multiple stones within the duct
- ⦿ Diffuse glandular calcification
- ⦿ Long standing obstruction with chronic inflammatory process
- ⦿ Stone within the proximal part of the duct.

- **Sialodocholithotomy**

- ⦿ Means removal of the stone from the salivary ducts. This is done after performing a proximal holding stitch to prevent backward displacement of the stone. It is indicated if there is a single stone in the distal part of the duct and is palpable in the floor of the mouth

Acute Bacterial Sialadenitis

- **Etiology**

- ⦿ **Causative organism:**

- ✓ *Staphylococcus aureus* (The commonest).

- ⦿ **Predisposing factors:**

- ✓ Elderly.
- ✓ Postoperative patients (combination of bad oral hygiene and dehydration).
- ✓ Immune compromised patients, CRF, chemotherapy, or Immune-suppressive drugs.
- ✓ Ductal obstruction: by stricture or stone.



- **Clinical picture**

- ⦿ **Symptoms:**

- ✓ **General:** fever.

- ✓ **Local:**

- Pain:
 - Is marked because the swollen gland lies within the tough parotid fascia. Increases with talking and mastication. ✓ If an abscess forms → becomes throbbing.
- Swelling of the affected gland.

- ⦿ **Signs:**

- ✓ Inspection:

- Whole gland is diffusely enlarged & the skin is red

- ✓ Palpation:

- The swelling is markedly tender and firm.
- A stone is sometimes felt in the duct by bimanual examination.
- Gentle pressure on the gland → a bead of pus at the duct opening.
- If an abscess is formed:
 - No fluctuation (because the gland is covered by tough fascia).
 - Known by the development of skin edema.



- **Investigation**

- ⦿ Ultrasonography: the affected gland is swollen, tender on probing, and may show pus formation or stone.

- **Treatment**

- ⦿ **Prophylactic:** oral hygiene.

- ⦿ **Hydration:** fluids, lozenges, avoid anticholinergic drugs.

- ⦿ **Curative:**

- ✓ Clindamycin is used initially (this antibiotic attains the highest salivary concentration). b. Failure of 48-h conservative treatment or evidence of abscess formation → surgical drainage.

Recurrent subacute and chronic sialadenitis

- **Etiology:**
 - ⦿ Try to an abnormality in the salivary gland as: Sialectasis, stones, or autoimmune diseases.
- **C/P of chronic sialadenitis of the submandibular salivary gland:**
 - ⦿ a swelling in the digastric triangle which may be confused with submandibular lymph nodes.
- **The disease is Characterized by:**
 - ⦿ History of pain and increase in the size of the swelling during eating.
 - ⦿ The swelling is solitary and cannot be rolled over the mandibular edge
 - ⦿ Bimanual palpation → the swelling fills the floor of the mouth.

Salivary Neoplasms

- **Incidence**
 - ⦿ 1.2% of all neoplasms & 5% of head and neck tumours.
 - ⦿ 85% benign, 15% malignant.
 - ⦿ **Age:** usually after the age of 40y, malignant after 60y.
 - ⦿ In children → rare and mostly malignant.
- **Site:**
 - ⦿ 80% in parotid glands, 10-15% in submandibular glands, the remainder in sublingual and minor salivary glands.
 - ⦿ **Parotid:** 80% Benign (60% pleomorphic adenoma), 20% Malignant (mucoepidermoid carcinoma).
 - ⦿ **Submandibular:** 50% Benign (pleomorphic adenoma). 50% Malignant (adenoid cystic carcinoma).
 - ⦿ **Sublingual and minor glands** 10% Benign. 90% Malignant.
- **Types and Classification**
 - ⦿ **Benign**
 - ✓ Pleomorphic adenoma.
 - ✓ Adenolymphoma (Warthin's tumour).
 - ✓ Oncocytoma (oxyphil adenoma).
 - ✓ Monomorphic adenoma.
 - ⦿ **Malignant**
 - ✓ Mucoepidermoid carcinoma.
 - ✓ Adenoid cystic carcinoma.
 - ✓ Acinic cell carcinoma.
 - ✓ Adenocarcinoma.

1. **Pleomorphic adenomas**

- **Incidence:**
 - ⦿ 75% of parotid & 50% of submandibular gland neoplasms.
 - ⦿ Minor salivary gland pleomorphic adenoma occur mainly in the palate, followed by buccal mucosa and
 - ⦿ Mean age affection is 40 years, however it may affect any age. The female to male ratio is 2-1
 - ⦿ It is the most common benign salivary gland tumor.

- **Macroscopic picture**
 - ⦿ Characterized by an incomplete capsule that allows extension of the neoplastic epithelium into the surrounding tissues
- **Clinically:** It is a well defined, freely mobile, soft or slightly firm on palpation. It is generally spherical in shape. Occasionally, tumors that have been present for many years will become lobulated and multinodular.
- **Microscopic picture:**
 - ⦿ Has epithelial, myoepithelial and stromal components.
 - ⦿ Has wide variations in cellular and architectural morphology.
- **Course:**
 - ⦿ It grows slowly without infiltrating the facial nerve.
 - ⦿ Long-standing (more than 10 years) rarely turns malignant. The possibility of malignant transformation increases in the following conditions:
 - ✓ If left untreated for a long time.
 - ✓ Multiple recurrence after inadequate surgical excision.
 - ✓ Previous radiotherapy.
- **Investigation:**
 - ⦿ Fine needle aspiration.
 - ⦿ CT scan.
 - ⦿ MRI
- **Treatment:**
 - ⦿ Adenomas arising in the major gland are treated by lobectomy or sialadenectomy.
 - ⦿ Simple enucleation is contraindicated as recurrence is common due to the presence of extracapsular foci.
 - ⦿ Palatal adenoma are excised together with the overlying mucosa to minimize recurrence

2. Monomorphic adenoma

- **Definition:** Group of salivary gland tumors composed of a proliferation of a single epithelial cell type
- **Adenolymphoma (Warthin's tumour)**
 - ⦿ It is the most common monomorphic adenoma that is also called "Warthin Tumor" and "Papillary cystadenoma lymphomatosum"
 - ⦿ **Site:** usually in the lower part of the parotid gland, Bilateral in 10 -15% of cases.
 - ⦿ **Incidence:** 15% of all parotid tumours.
 - ⦿ **Origin:** arise from heterotopic salivary tissue in the parotid LN.
 - ⦿ **Microscopically:** formed of epithelial lined spaces filled with creamy material, that are surrounded by lymphoid tissue.
 - ⦿ **Consistency:** Soft or cystic.
 - ⦿ **Type of patient:** elderly people.
 - ⦿ **Investigation:**
 - ✓ FNAB
 - ✓ CT scan is a must before surgery to exclude bilateral or multicentric adenoma.
 - ✓ Technitium scan: is helpful as the tumor readily takes up the isotope and appears as a hot nodule
 - ⦿ **Treatment:** Simple enucleation is adequate for most cases, however, due to the potential for multicentricity, most surgeons recommend superficial lobectomy to prevent recurrence

3. Mucoepidermoid carcinoma

- The commonest malignant type.
- Origin: arises from the ductepithelium.
- Clinically:
 - ⌚ Age: 30-70 however, it may occur in teenagers.
 - ⌚ Sex: There is significant female predilection
 - ⌚ Site: usually the parotid. followed by the palate
- Grades: 3
 - ⌚ **Low (the most common & can affect children).**
 - ✓ Low grade lesions in parotid
 - ✓ They appear as well defined focal nodules. They may be movable which is an uncommon feature for a malignant lesion. They are often fluctuant .Facial nerve affection is uncommon
 - ✓ Low grade lesions in oral cavity
 - ✓ They represent the most cases. They are submucosal masses that have an intact, nonulcerated surface. They are often multiple cystic spaces containing mucin that may give a bluish tinge to the overlying mucosa and are easily mistaken for a mucocele
 - ⌚ **Intermediate.**
 - ⌚ **High- grade tumours.**
 - ✓ High grade lesions in parotid
 - ✓ They are usually indurated and fixed to the adjacent tissues. Facial nerve affection may occur
 - ✓ High grade lesions in oral cavity: May show surface ulceration.
- Prognosis:
 - ⌚ Usually not invade the facial nerve.
 - ⌚ Excellent prognosis.
 - ⌚ With ≈98.8% 5 year survival rate.
- Histopathology:
 - ⌚ **Three dominant cell types are present which are mucous, epidermoid, and intermediate cells.**
 - ✓ Low grade type → + mucous cells + cystic spaces - epidermoid cells
 - ✓ High grade type → - mucous cells - cystic spaces + epidermoid cells
 - ✓ Intermittent grade type □ between the high and low grade
- Investigation:
 - ⌚ FNAB
 - ⌚ CT
 - ⌚ MRI
- Treatment:
 - ⌚ **Low grade type:**
 - ✓ Superficial parotidectomy
 - ✓ Facial nerve preservation
 - ✓ Neck dissection if lymph nodes are palpable.
 - ⌚ **High grade type:**
 - ✓ Total parotidectomy
 - ✓ Facial nerve preservation unless involved
 - ✓ Radical neck dissection



⦿ **Intermediate type:**

- ✓ Total parotidectomy
- ✓ Facial nerve preservation
- ✓ Radical neck if lymph node

4. Adenoid cystic carcinoma

- The commonest malignancy affecting the minor salivary glands.
- **Origin:** Ductal and myoepithelial cells.
 - ⦿ Its distinctive features are slow rate of growth & perineural spread → infiltrates facial nerve.. So, brain metastasis may occur in palatal involvement due to spread along the mandibular and maxillary nerves
 - ⦿ Grow in different patterns: tubular, cribriform, and/or solid.
- **Prognosis:** Poor with high frequency of local and distant recurrence
- **Clinically:**
 - ⦿ **Age:** It can occur at any age, the peak incidence is in the 6th decade.
 - ⦿ **Sex:** Slight female predilection.
 - ⦿ **Site:**
 - ✓ Either major or minor salivary gland. – The submandibular gland mass becomes quite large before the patient notices its presence. Despite its malignant nature, its growth rate is slow. Over time, the mass becomes indurated and fixed
 - ✓ In the palate:
 - The adenoid cystic carcinoma appears as an eccentric nodule that is usually ulcerated.
 - There may be some palatal paraesthesia due to involvement of the greater palatine nerve
- **Histopathology:** Swiss cheese appearance where multiple microcystic spaces divides the lobules into multiple cylinders
- **Treatment:**
 - ⦿ Total sialadenectomy.
 - ⦿ Partial maxillectomy in palatal lesion
- **Differential diagnosis**
 - ⦿ True parotid enlargement:
 - ✓ As inflammation, calculous obstruction, sialosis.
 - ✓ The gland is diffusely enlarged with no definite lump.
 - ⦿ Extra parotid swellings:
 - ✓ Subcutaneous lipoma.
 - ✓ Lymph nodes.
 - ✓ Mandibular and maxillary tumours.
 - ✓ Hypertrophy of the masseter (bilateral in most cases).

⇒ **NB > Hypertrophy of the masseter:**

- **Etiology:** usually bilateral in women with habitual involuntary grinding of their teeth or in those who have orthodontic treatment
- **Investigation:** CT scan in difficult cases to differentiate it from a true parotid enlargement

- **Clinical picture:** Benign neoplasms
 - ⦿ **Symptoms**
 - ✓ Swelling on the side of the face which is:
 - Painless.
 - Present for months or years.
 - Slowly growing or has stopped growing.
 - ⦿ **Signs**
 - ✓ Swelling that is:
 - Localized to the parotid.
 - Hemispherical or U shaped.
 - Raises the ear lobule.
 - It may attain a large size.
 - Non-tender.
 - Firm in consistency (an adenolymphoma feels soft or cystic).
 - Smooth or bosselated surface.
 - Does not infiltrate the skin, the masseter or mandible.
 - ✓ Examine the mouth cavity:
 - Tumours arising in the deep part of the parotid.
 - May bulge in the oropharynx behind the tonsil and may cause depression of the soft palate.
 - Facial nerve infiltration
 - Not present.
 - Cervical Lns
 - Not enlarged.
 - No evidence of distant metastases

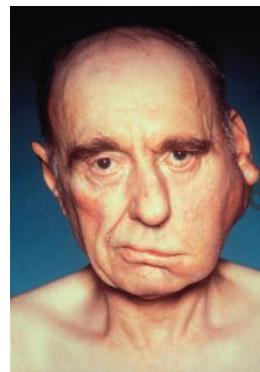
5. Other Malignant neoplasms

- ⦿ **Symptoms**
 - ⦿ Swelling on the side of face that is: - Steadily enlarging. - Sometimes painful, radiating to the ear & increases with mastication.
 - ⦿ In carcinoma ex pleomorphic adenoma: - Patient may give a history of a painless swelling that has been stationary for years & is now getting bigger.
- **Signs**
 - ⦿ **A mass that is:**
 - ✓ Usually warm.
 - ✓ Mildly tender.
 - ✓ Firm or hard and has an irregular surface.
 - ✓ Maybe adherent either to the skin, the masseter or the mandible.
 - ✓ The overlying skin may show induration and/or ulceration .Surface telangiectasia
 - ⦿ **Facial nerve infiltration**
 - ✓ Present with evident.
 - ✓ Weakness or paralysis of facial muscles.

⦿ **Cervical LNs**

- ✓ Sometimes involved.
- ✓ Rarely metastasize to the lungs.

NB Salivary malignancies do not usually grow as fast as other cancers in the body



Pleomorphic adenoma

Malignant parotid tumour with left facial nerve infiltration

- **Treatment:** By Surgery (The only reliable form of treatment):

⦿ **Benign salivary tumours:**

- ✓ According to the site of the tumour:

- In parotid gland: Superficial parotidectomy (The standard treatment)
 - Operation:
 - Removal of all parotid tissue that is superficial to the facial nerve and its branches (taking great care not to injure them).
 - Ensures removal of the tumour and its tiny tissue extensions outside the defective capsule.
 - Simple enucleation is contraindicated → high incidence of recurrence.
 - If the nerve is accidentally injured → immediate repair by microsurgical techniques either by direct suturing or by a nerve graft from the great auricular nerve or sural nerve.
- In submandibular gland: (Submandibular sialadenectomy)
 - Operation:
 - An incision is made parallel to & 2 cm from the lower border of the mandible (to ensure safety of the mandibular division of facial nerve)
 - Lingual & hypoglossal nerves are at risk when dissecting the deep aspect of the gland (should be preserved)

⦿ **Malignant salivary Tumours:**

- ✓ For low grade tumours as mucoepidermoid carcinoma:

- Excision of the tumour with safety margin.
- In case of partoid gland: superficial parotidectomy with preservation of the facial nerve.

- ✓ For high grade tumours:

- Radical excision: total gland excision and block neck dissection if lymph node are involved.
- In case of parotid gland: total gland excision entails removal of the whole gland with facial nerve and masseter muscle.

- ⦿ Malignancy should be confirmed either by:
 - ✓ Preoperative: needle biopsy.
 - ✓ Intraoperative: frozen section examination.
- ⦿ Radiotherapy is of limited value.
 - ✓ Administered as postoperative adjuvant therapy for tumours of high grade malignancy.
- ⦿ Patient should be warned against
 - ✓ The possibility of accidental facial nerve injury or intentional sacrifice (in malignant lesion).
 - ✓ Facial nerve weakness occurs even with successful preservation (because of neurapraxia) that (recovers after a few months).
- ⦿ The majority of parotid pleomorphic adenomas arise in the part that is superficial to the facial nerve

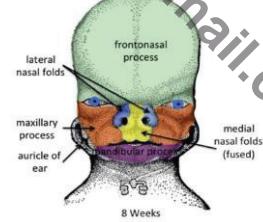
Congenital anomalies of the face and neck

- ⇒ Cleft lip and palate
- ⇒ Thyroglossal anomalies.
- ⇒ Branchial Anomalies

Cleft Lip and palate

⇒ Development of the face:

- The human face is formed by fusion of 5 embryonic prominences.
- Each process is formed of a core of mesenchymal tissue lined by epithelium of endodermal origin and covered by surface ectoderm.
- They encircle the stomodaeum (Primitive mouth).
 - ⦿ One fronto-nasal process (indented by two olfactory pits dividing it into a median and two lateral processes).
 - ⦿ Two maxillary processes.
 - ⦿ Two mandibular processes (will form the floor of mouth, lower jaw, and lower lip).

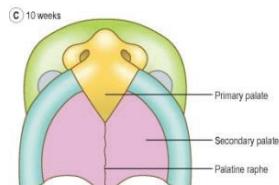


⇒ Development of the lips:

- Upper lip → formed of the maxillary processes.
- The middle part of upper lip (philtrum) is formed of the median part of the frontonasal process. - Lower lip → formed by fusion of the two mandibular processes.

⇒ Development of the palate:

- Primary palate: - The anterior part of the palate & is also called the premaxilla.
 - ⦿ It carries four incisor teeth.
 - ⦿ Derived from the median part of the frontonasal process.
- Secondary palate:
 - ⦿ Formed between 7 and 8 weeks of development
 - ⦿ From each maxillary process a palatal process grows medially across the dorsum of the tongue → the two palatal processes unite with each other & with the premaxilla together with the nasal septum → separating nasal cavities from each other & from the oral cavity.



⇒ Congenital anomalies:

- **Cleft lip.**
 - ⌚ The most frequent congenital anomalies of the face (1:700 live births)
 - ⌚ The incidence is less in black & oriental races
- **Cleft palate.**
- **Preauricular sinus:**
 - ⌚ Due to imperfect fusion of the tubercles that form the ear auricle.
 - ⌚ When occluded → a cyst develops → might develop into abscess → bursts → resistant ulcer.
- **Dermoid cysts:**
 - ⌚ Sequestration dermoid cysts occur at the lines of embryonic fusion.
 - ⌚ The most frequent of which is the external angular dermoid.
- **Pierre Robin syndrome** consists of cleft palate associated with receding mandible (micrognathia) and posterior displacement of the tongue that is prone to obstruct the oropharyngeal airway.
- **Mandibular prognathism:** Protrusion of the mandible.



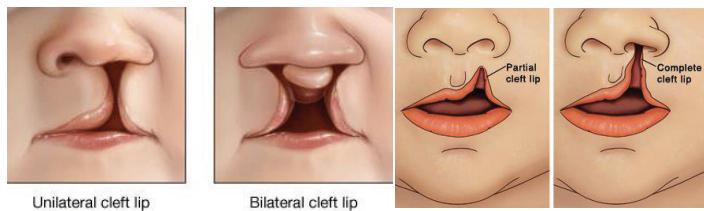
⇒ Anatomical Consideration:

- **The Lip**
 - ⌚ **Normal Anatomy**
 - ✓ The orbicularis oculi muscle forms a complete circle and is attached with each other in the central part of the upper lip
 - ⌚ **Abnormal Anatomy**
 - ✓ The circle is incomplete and the muscle fibers inserts in the base of the ala of the nose in the cleft side.
 - ✓ In bilateral cleft lip, the central part of the lip
- **The Palate**
 - ⌚ **Normal Anatomy**
 - ✓ The levator palati and the tensor palati muscles take their origin from the skull base and insert in the midpalatal aponeurosis in the midline.
 - ✓ They act as sling to pull the soft palate upward and backwards against the posterior pharyngeal wall Velopharyngeal compitance.
 - ⌚ **Abnormal Anatomy**
 - ✓ The muscles are oriented more longitudinally and insert in the posterior edge of the palatal bone and along the bony cleft margin

⇒ Cleft lip and palate

- **Etiology**
 - ⌚ Familial disease is due to genetic susceptibility.
 - ⌚ Consanguinity.
 - ⌚ Prenatal exposure to alcohol, anticonvulsants, Steroids, Aspirin , Tranquilizers , x-ray, or viral infection as German measles in the first trimester.

- **Pathology of cleft lip**



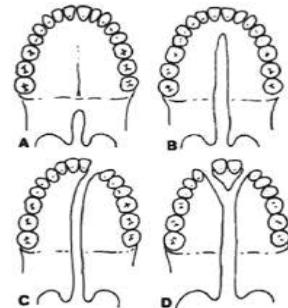
- ⦿ Failure of fusion between the median part of the frontonasal process and one (unilateral) or both (bilateral) lateral maxillary processes in the developing face.
- ⦿ There is deficient muscle (and sometimes skin and bone) and abnormal insertion of orbicularis oris in the base of ala nasi.
- ⦿ The cleft can be complete (reaching nostril floor) or incomplete.
- ⦿ Complete lip clefts → Orbicularis oris muscle is completely interrupted → flaring & flatness of the nares on the affected side.
- ⦿ The cleft lip may be isolated or associated with cleft palate or alveolus.
- ⦿ A cleft lip does not interfere with suckling, but it may be associated with abnormal teeth growth.
- ⦿ Cleft lip associated with other congenital anomalies in 35%.

- **Pathology of cleft palate**

- ⦿ Arrest of fusion between two palatal processes with the premaxilla.

- **Types:**

- ⦿ Cleft soft palate.
- ⦿ Cleft soft and hard palate (complete).
- ⦿ Complete cleft palate plus one side of premaxilla (bipartite).
- ⦿ Complete cleft palate plus both sides of premaxilla (tripartite).



- **LAHSHAL CLASSIFICATION**

- ⦿ L = Lip (right) A = Alveolus (right) H = Hard Palate (right) S = Soft Palate (median) H = Hard Palate (left) A = Alveolus (left) L = Lip (left)

- **Physiological Aspects**

- ⦿ **Feeding**
 - ✓ For normal feeding to occur, there must be a negative intraoral pressure to help the newborn to do normal sucking.
 - ✓ The normal muscles insertion is responsible for this.
- ⦿ **Speech**
 - ✓ Good closure of the velopharyngeal sphincter is responsible for efficient vocal cord action.
 - ✓ Velopharyngeal compitance → No nasal escape of voice & negative pressure in the pharynx → firm closure of the vocal cords → clear strong vocal note.

- **Problems associated with cleft patients:**

- ⦿ **Feeding problems:**

- ✓ Abnormal muscle insertion → no negative intraoral pressure → no proper sucking.
 - ✓ The child works to the point of exhaustion.
 - ✓ Sleep is due to fatigue and not due to full stomach. He wakes up few hours later still hungry.
 - ✓ **Solution:**
 - Passive delivery of the milk into the mouth.
 - Large cross cuts in a soft nipple.
 - Cleft palate nipple with a rubber flange to obturate the defect.

- ⦿ **Speech problems:**

- ✓ VPI "Velopharyngeal incompitance" → improper function of vocal cords due to escape of the air through the nose → hypernasalspeech.
 - ✓ **Solution:**
 - Speech aid prosthesis to obturate the defect.
 - Surgical correction.
 - Speech therapy "speech therapist".

- ⦿ **Weight Loss:**

- ✓ Occurs due to improper feeding

- ⦿ **Chest infection**

- ✓ Occurs due to frequent aspiration of milk into the upper respiratory passages.

- ⦿ **Middle ear problems**

- ✓ Occurs due to escape of milk to the eustichian tube → closure of the tube → otitis media, which is frequently associated with the cleft patients

- ✓ **Solution:**
 - Drainage of the middle ear by Gromet'stubue

- ⦿ **Malocclusion**

- ✓ Due to impaired growth of the maxilla

⇒ **Syndromes associated with cleft lip and palate**

- **Van der Woude Syndrome**

- ⦿ Lip pits in the lower lip at the junction of dry and wet vermillion and they are either oval or transverse in shape. Pits traverse the underlying orbicularis muscle and end in a blind pouch on the buccal side and communicate with minor salivary glands.
 - ⦿ Missing maxillary or mandibular second premolar teeth, absent maxillary lateral incisor and ankyloglossia.
 - ⦿ Other extra-oral manifestations though rare include accessory nipples, congenital heart defects, Hirschsprung disease and popliteal web

- **Pierre Robin sequence**

- ⦿ Triad of glossoptosis, micrognathia and airway obstruction
 - ⦿ Although cleft is not included in the triad, it is frequently associated.
 - ⦿ Oligohydramnios also plays a role because lack of amniotic fluid leads to deformation of the chin and subsequent impaction of the tongue between palatal shelves

- **Velocardiofacial syndrome**

- ⦿ Cleft palate, cardiac anomaly,.. These children may have medial displacement of the carotid artery over the cervical vertebrae There is a close association between VCFS and DiGeorge syndrome which includes small or absent thymus, tonsils, adenoids and hypocalcaemia.

- **Treacher colloid syndrome**

- ⦿ Disorder which arises during early embryonic development from the first and second branchial arches .
- ⦿ Symmetrical lateral downward sloping of palpebral fissures,coloboma of the lowereye lids, hypoplasia of the mandible and zygomatic complex, cleft palate

- **Treatment of cleft lip**

- ⦿ The cleft lip is repaired at first.
- ⦿ The patient should fulfil the "Rule of Ten":
- ⦿ Not less than 10 weeks age.
- ⦿ Not less than 10 pounds weight,
- ⦿ Haemoglobin not less than 10 grams.

- ⦿ **Surgery (The only treatment):**

- ✓ Timing:
 - **Unilateral:** best performed at the age of 3-6 months.
 - **Bilateral:** within 2 weeks to limit protrusion of premaxilla
- ✓ Principles of the operation:
 - Paring of the edges.
 - Repairing the defect by suturing the three layers of the lip (skin, muscle, and mucous membrane) taking care to adjust the vermillion and mucous borders.
 - ✓ The sutures are not made in a straight line but in a zigzag way (Millard technique) → Avoid notching of the lip margin as the scar contracts.
 - ✓ Correction of nasal deformity is best postponed to 6 years of age.



- **Treatment of cleft palate**

- ⦿ **Timing of operation:12-18 months.**

- ⦿ **Preoperative management:**

- ✓ Attention to feeding (In an upright position, feeds are given either by a bottle with a large hole or with a spoon).
- ✓ Prevention and treatment of chest infection.

- ⦿ **Objectives of surgery:**

- ✓ Closure of oro-nasal communication.
- ✓ Achieving a competent velopharyngeal sphincter.



- ⦿ **Principles of surgery:**

- ✓ Trimming of edges.
- ✓ Suturing in 3 layers in middle line (nasal mucosa, muscle & oral mucosa).
- ✓ Lateral relaxation incisions are needed or Z-flaps[Von-Langenbeck repair]
- ✓ Fracture of the pterygoid hamulus to relax the tensor palati.

- ⦿ **Post-operative treatment:**

- ✓ Speech therapy.
- ✓ Orthodontic treatment

Oral Cancer

⇒ **Incidence:**

- Oral cancer represents 3% of all cancers in males and 2% of all cancers in female.

⇒ **Oncogenes:**

- They are cancer producing genes. They stimulate certain proteins "Kinases" that stimulate the process of mitosis and neoplastic growth.

⇒ **Antioncogenes:**

- They are cancers suppressor genes. They stimulate certain proteins "Cyclins" that inhibit mitosis.

⇒ **Carcinogeneic Factors:**

- Tobacco: Smoked tobacco (cigar, cigarette, pipe, goza) □ Smokless tobacco (Quid, snuff, chewing tobacco)
- Actinic radiation: Light – skinned individuals who sustain prolonged occupational exposure to direct sunlight are at a greater risk of developing squamous cell carcinoma of the lower lip
 - ⇒ The condition is proceeded by actinic chelitis in which there is hyperkeratosis, epithelial atrophy and dysplasia. The exposed mucosal surface appears mottled "red due to atrophy and white due to hyperkeratosis".

• **Infections:**

- ⇒ Bacterial:Treponema pallidum (syphilitic mucous patches)
- ⇒ Fungi:Candida Albicans.
- ⇒ Viruses: HPV (human papilloma virus) – EPV (Ebstein Bar virus) – HIV (Human Immunodeficiency)

• **Immunosuppression:**

- ⇒ AIDS: Oral Kaposi sarcoma and lymphoma in AIDS having patients are much more common than squamous cell carcinoma.

• **Nutritional deficiencies:**

- ⇒ Plummer-Vinson syndrome: Patients with chronic iron deficiency anaemia are at a higher risk of developing oral and oesophageal cancer.

• **Preexisting oral diseases:**

- ⇒ Oral Submucous fibrosis.
- ⇒ Oral lichen planus: is still being debated

• **Cofactors:**

- ⇒ Alcohol consumption.
- ⇒ Chronic irritation "ill-fitting dentures"
- ⇒ Liver cirrhosis

• **Sites and incidence:**

- ⇒ Lower lip 35%
- ⇒ Lateral tongue 25 %
- ⇒ Floor of the mouth 20 %
- ⇒ Soft palate 15 %
- ⇒ Gingival \ alveolar ridge 4 %
- ⇒ Buccal mucosa 1%

⇒ Lip cancer

- **Etiology:**
 - ⦿ Prolonged exposure to ultraviolet rays of the sun.
 - ⦿ Chronic smoking.
- **Pathology:**
 - ⦿ **Histological picture:**
 - ✓ **Squamous cell carcinoma (the commonest) (Epithelioma)** is usually well-differentiated contain significant amount of keratin, and the tissue resembles normal stratified squamous epithelium. It has the best prognosis
 - ⦿ **Gross picture:**
 - ✓ Site: **The lower lip** is more affected than the upper.
 - ✓ The lesion usually starts as a nodule or erosion which resists treatment. Later the typical ulcer becomes evident:
 - Raised everted edges.
 - Indurated base and margin (induration extend beyond the edge).
 - Possibly spread to cervical LNs:
 - The central part of lower lip → submental nodes.
 - The lateral parts → submandibular nodes.
- **Treatment:**
 - ⦿ **1st tumor** → Surgical excision of the lesion with a safety margin or by radiotherapy (**Squamous cell carcinoma is radio-sensitive**).
 - ⦿ **Lymph** nodes → If there are LNs metastases → suprathyroid or a complete block dissection.
- **Prognosis:**
 - ⦿ Epitheliomas of the lip have a better prognosis than those in the rest of the oral cavity.



Upper deep cervical LNs

⇒ Tongue ulcers

- **Dental ulcer:**
 - ⦿ **Etiology:** repeated trauma by a broken tooth or ill fitted denture.
 - ⦿ **Site:** at the side of the tongue near the offending tooth (might not be apparent when the tongue is protruded for inspection)
 - ⦿ **Gross picture:** The ulcer is small, oval, or rounded with granulation tissues at the floor, soft base, and sloping margins.
 - ⦿ **Clinical picture:** painful with septic enlargement of draining LNs.
 - ⦿ In chronic cases the edges may be raised with indurated base → biopsy is needed to exclude malignancy.
- **Treatment:**
 - ✓ Removal of the offending cause.
 - ✓ The use of antiseptic mouthwash.
- **Aphthous ulcers:**
 - ⦿ **Etiology:** not exactly known, may occur with GI upset. Maybe related to Crohn's disease.

- ⌚ **Pathology:** multiple, small ulcers affecting all mucosal lining of the oral cavity with red margin & soft base.
- ⌚ **C/P:** very **painful**, rounded, yellow ulcers & no LN enlargement.
- ⌚ **Site:** near the tip of the tongue.
- ⌚ **Treatment:** (normally heals in **2 weeks**). By antiseptic mouth wash, alkaline lotion as 2% sodium bicarbonate and anesthetic gel.
- **Neoplastic ulcers:**
 - ⌚ Usually, **squamous** cell carcinoma

⇒ **Carcinoma of the tongue**

- **Incidence**
 - ⌚ Usually above 60 years.
 - ⌚ Nowadays, it is just slightly higher in males.
 - ⌚ The recent **lowering of the incidence in males** is due to:
 - ✓ More efficient treatment of syphilis.
 - ✓ Improved oral hygiene.
 - ✓ Discontinuing use of clay pipes.
 - ✓ Reduced spirits consumption.
 - ⌚ Recent increased females' incidence is due to increase of smoking.
- **Etiology**
 - ⌚ **Predisposing factors:** Chronic irritation by smoking, sepsis, spices, spirits, sharp teeth & bad oral hygiene.
 - ⌚ **Precancerous lesions:**
 - ✓ Dental ulcers.
 - ✓ Chronic superficial glossitis.
 - ✓ Leukoplakia (any white lesion which cannot be rubbed off)
- **Pathology:**
 - ⌚ **Site:**
 - ✓ The lateral margin of the anterior is 2/3 (**The commonest, 50%**).
 - ✓ The posterior 1/3 (the 2nd common).
 - ✓ The ventral & dorsal surface.
 - ✓ The tip (rare).
 - ⌚ **Gross types:**
 - ✓ **Malignant ulcer** with deep irregular floor with necrotic tissues raised nodular everted edges and a hard indurated base.
 - Raised oval plaque.
 - Diffuse infiltrating tumor (**wooden base**) is rare.
 - ✓ The surrounding mucous membrane may show leukoplakia.
- ⌚ **Microscopic appearance:**
 - ✓ **Squamous cell carcinoma (90%).**
 - Tumors of the posterior third are usually less differentiated: There is no keratin with lack of normal architecture and marked atypia. It has worst prognosis



- Those that occur on the lateral border of the tongue are often moderately differentiated contain little keratin. The tissue still could be recognized as stratified squamous epithelium
- Carcinoma in situ, means evidence of malignant cells without invasion of the basement membrane → no lymphatic or blood spread.

⌚ **Spread:**

✓ **Direct spread:**

- Tumors of anterior 2/3 → laterally and may reach the floor of the mouth before they cross the midline (may invade the mandible).
- Tumors of posterior 1/3 → to tonsils, pharyngeal wall, and larynx. (May cross to the other side of the tongue).

✓ **Blood spread (rare, more in tumors of the posterior third) often to the lungs**

✓ **Lymphatic spread (occurs early)**

- Of the tip of the tongue → submental LN → bilaterally to submandibular → upper deep cervical nodes.
- Of the lateral 1/3 → ipsilateral submandibular → upper deep cervical LNs (Those near the midline disseminate bilaterally).
- Posterior third → directly to the upper deep cervical LNs.

• **Staging**

T	N
T_0	No evidence of tumor.
T_{is}	Carcinoma in situ.
T_1	<2 cm.
T_2	2-4 cm.
T_3	>4 cm.
T_4	Involvement of base.
	N_0 N_1 N_2 N_3
	No lymph nodes. Ipsilateral single node <3 cm. Ipsilateral or contralateral LNs <6 cm. Lymph nodes >6 cm.
M	
M_0	No metastasis.
M_1	Distant metastasis.
• Stage (I)	→ $T_1 N_0 M_0$
• Stage (II)	→ $T_2 N_0 M_0$
• Stage (III)	→ $T_3 N_0 M_0$ → $T_1 T_2 T_3 N_1 M_0$
• Stage (IV)	→ T_4 → $N_2 N_3$ → M_1

• **Clinical picture**

⌚ **Early cases:**

- ✓ **Symptomless** (patient may complain of a persistent ulcer with indurated base and everted edges).

⦿ **Late presentation:**

- ✓ **Pain in the tongue:**
 - Cause: 1st due to infection, later due to lingual nerve infiltration.
 - Referral: to the ear or temple through the chorda tympani via the auriculo-temporal nerve.
 - In tumors of the posterior third pain may be felt on swallowing.
- ✓ **Salivation**
 - Due to the pain plus restricted tongue mobility.
 - It may be blood-stained & smell bad (necrosis and infection).
- ✓ **Inability to articulate clearly.**
- ✓ **Enlarged cervical lymph nodes.**
- ✓ **Ankyloglossia (tongue fixation)**
 - Due to extensive infiltration of the floor of the mouth.

- **The classic picture of tongue cancer** is that of an old man sitting in the outpatient clinic with cotton wool in his ear & blood-stained saliva dribbling from the mouth.
- Any ulcer or fissure-like lesion that resists treatment should be biopsied.

T	N
T ₀ No evidence of tumor.	
T _{is} Carcinoma in situ.	N ₀ No lymph nodes.
T ₁ <2 cm.	N ₁ Ipsilateral single node <3 cm.
T ₂ 2-4 cm.	N ₂ Ipsilateral or contralateral LNs <6 cm.
T ₃ >4 cm.	N ₃ Lymph nodes >6 cm.
T ₄ Involvement of base.	

M
M ₀ No metastasis.
M ₁ Distant metastasis.

- **Complication**

- ⦿ Inhalation of necrotic tissues → bronchopneumonia.
- ⦿ Combined cancer cachexia & starvation due to pain and dysphagia.
- ⦿ Hemorrhage from lingual artery erosion.
- ⦿ Asphyxia is due to either pressure of enlarged fixed LNs on the air passages or edema of the glottis

⇒ **Investigations**

- **Biopsy from the ulcer edge** [Incisional - excisional - aspiration - true cut needle - Frozen section]
- **Fine needle aspiration cytology** of suspected cervical LNs.
- **Plain X-ray** chest
- **Abdominal sonography**
- **CT scan** (lesion-chest-spine) to detect the local and the systemic extension including the associated lymph nodes
- **MRI**

⇒ Treatment Radical treatment for early cases

- **Surgery:**

- **Indications:**

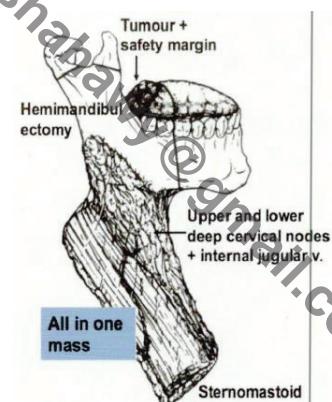
- ✓ Small growths (T1 and T2).
- ✓ Incomplete regression or recurrence after radiotherapy.
- ✓ Cancer on top of a precancerous lesion as leukoplakia.
- ✓ The presence of the tumor very close to the mandible or infiltrating it.

- **Preoperative preparation:**

- ✓ Care of teeth and oral hygiene.
- ✓ Preoperative irradiation by 4000 rad may be advised.

- **Resection procedures:**

- ✓ Excision with a safety margin of **1.5 cm -2cm** → **Partial or near total glossectomy.**
- ✓ If there are metastatic LNs → modified neck dissection.
- ✓ If the mandible is affected → excised together with the tongue and the affected LNs (Combined mandibulectomy and neck dissection operation is known as **Commando operation**).
- ✓ Close the huge defects following major resectional operations on tongue, floor of the mouth & mandible by various plastic procedures as pectoralis major myocutaneous flap or free tissue transfer.



- **Radiotherapy:**

- **Indications:**

- ✓ **Postoperative indications:**

- No safety margin.
- More than one pathologically positive lymph node.
- Perinodal infiltration.
- Postoperative recurrence

- ✓ **Preoperative indications:**

- Large primary T4
- Alternative to excision in early cases. **T1 and T2 (< 4 cm)** "equally benefit from surgery or radiotherapy."
- Tumours of the posterior third of the tongue.
- Inoperable cases.

- **Advantages:**

- ✓ Avoiding the disfiguring side effects of surgery.

- **Disadvantages:**

- ✓ Mucositis, dysphagia, and osteoradionecrosis.

Surgery and radiotherapy are the main lines of treatment. Chemotherapy is used as an adjuvant in some cases and Preoperative "New adjuvant" → Down size and not down stage of the tumor

⇒ Carcinoma of the cheek

- **Etiology**
 - ⌚ (As cancer tongue).
- **Pathology**
 - ⌚ **Squamous cell carcinoma (the commonest).**
 - ⌚ Adenocarcinoma of minor salivary glands (less common).
- **Clinical picture**
 - ⌚ An ulcerated mass with raised everted edges & indurated nodular floor.
- **Treatment**
 - ⌚ Interstitial or external beam radiation (**Treatment of choice**).
 - ⌚ Surgery:
 - ✓ Indication: recurrent or residual tumors.
 - ✓ Followed by reconstruction (as for the tongue cancer).
 - ✓ Lymph nodes metastasis is treated by neck dissection.



Jaw Swellings

⇒ Cysts of the jaw

- Odontogenic cysts
- Non-odontogenic cysts

⇒ Tumors of the Jaw

- Odontogenic
- Non-odontogenic

A. Cystic swellings

- **Characters of a cystic jaw swelling:**
 - ⌚ Like other cyst elsewhere, it is composed of three basic structure: a central cavity (lumen), an epithelial lining, and an outer wall (capsule). The central cavity usually contains fluid or semifluid material such as cellular debris, keratin, or mucous. The epithelial lining differs among cyst types.
 - ⌚ Most cysts of the oral region are true cysts since they possess an epithelial lining. Few cysts are pseudocysts that do not have an epithelial lining (traumatic, aneurysmal and static bone cyst).
 - ⌚ The cysts may show fluctuation and may show egg-shell cracking sensation.
 - ⌚ Aspiration through the outer cortex reveals the contents of the central cavity

B. Odontogenic cysts

- **Definition:**
 - ⌚ A cyst in which the lining epithelium is derived from epithelium produced during tooth development.
 - ⌚ N.B → To facilitate understanding of the origin and classification of odontogenic cysts, an understanding of odontogenesis is necessary

- **Odontogenesis**

- ⦿ Tooth formation originates from the oral epithelium covering the maxillary and mandibular alveolar processes.
- ⦿ Budding of the basal cell layer leads to the formation of a solid tube like structure that penetrates the connective tissue and is called the dental lamina
- ⦿ When the appropriate depth is reached, the basal cell layer at the tip of the dental lamina thickens to form a cap like structure (cap stage) followed by a bell like structure (bell stage), and the epithelium is differentiated into top layer of epithelium (outer enamel epithelium) and a bottom layer of epithelium (inner enamel epithelium) which forms the enamel. The intervening zone is a loosely arranged star-shape cells (stellate reticulum)
- ⦿ This specialized epithelium (O.E.E & I.E.E) induces the adjacent connective tissue to be modified into a circumscribed zone of connective tissue that will form the pulp or dentin. This outer zone of connective tissue that encapsulates the developing tooth bud is dense and fibrous and called the reduced enamel epithelium
- ⦿ After the shape of the tooth crown and root has been formed, a thin transient membrane is formed around the length of the root and forms the Hertwig's epithelial root sheath. Remnants of dental lamina is called rests of serres. Remnants of the hertwig's epithelial root sheath is called Rests of Malassez.

- **Periapical Cysts (Radicular]**

- ⦿ **Pathogenesis:**

- ✓ Dental caries → pulpitis → periapical abscess → periapical granuloma → stimulation of epithelial rests of malassez → inflammatory mass → cystic degeneration.

- ⦿ **Clinical picture:** It is the most common type of cysts preceded by caries of the corresponding non vital tooth and rarely exceeding 1 cm in diameter.

- ⦿ **Radiographic picture:** Rounded well circumscribed periapical radiolucency.

- ⦿ **Histopathology:** Cavity lined with a layer of non-keratinized squamous epithelium.

- ⦿ **Treatment:**

- ✓ Caries removal.
- ✓ Root canal treatment
- ✓ Apicectomy
- Cyst enucleation

- **Dentigerous cyst**

- ⦿ **Pathogenesis:**

- ✓ Fluid accumulation between the reduced enamel epithelium and the enamel surface, resulting in a cyst in which the crown is located within the lumen of the cyst and the roots are located outside .

- ⦿ **Clinical picture:**

- ✓ Commonly associated with unerupted mandibular or maxillary 3rd mola as well as r maxillary canines.
- ✓ Usually remains asymptomatic but may produce some pain or swelling particularly if large or inflamed.
- ✓ Missed tooth in the arch

- ⦿ **Radiographic picture:** Well-circumscribed radiolucency surrounding the crown of the tooth.
- ⦿ **Histopathology:** Their cystic cavity is lined by non-keratinized, stratified, squamous epithelium.
- ⦿ **Complications:**
 - ✓ Epithelium may become keratinized → Keratocyst transformation. - May change into Ameloblastoma.
 - ✓ Dysplasia of the epithelium → Squamous C.C.
 - ✓ Variable numbers of mucus cells are seen in the epithelial lining that may undergo mucus metaplasia → Mucoepidermoid carcinoma. Treatment: Enucleation + tooth extraction.
 - ✓ Maxillary canine = The cyst maybe enucleated or marsupialized and the tooth brought into proper alignment in the arch with the aid of an orthodontic appliance

⇒ **Difference between**

	Dental cyst	Dentigerous cyst
Pathogenesis	- Develops in connection with a pulpless infected tooth , which causes chronic irritation of the parodontal epithelial debris of Malassez.	- At or after 2 nd dentition in relation to an unerupted tooth (canine, premolar or third molar). - It affects the lower jaw more commonly. - It may be due to irritation of parodontal epithelial debris of Malassez or cystic degeneration of dental follicles.
Type of patient	- Usually occurs in adult. - A painless, slowly growing swelling that usually arises in the anterior part of upper jaw. - As it expands the jaw, the bone becomes so thin that it gives a sensation of eggshell crackling when pressing on it.	- In children and adolescents. - This is similar to dental cyst, but it usually occurs in the lower jaw near the angle of the mandible and there is a missing tooth (unerupted).
C/P		

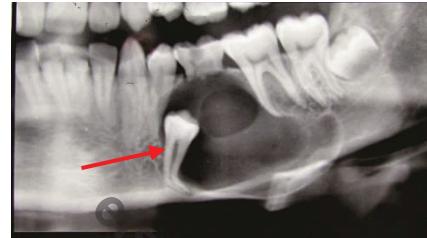
Investigation

- X-ray → expansion of the jaw around a well-defined cavity **containing no teeth** or trabeculae.

**Treatment**

- **Extraction** of the affected tooth then open the cyst through an incision in the gum & enucleation of the cyst with removal of the lining membrane & fluid.
- The bone may be crushed to keep the shape of the alveolus

- X-ray → expanded jaw and a clear cyst **with a tooth inside** it.



- **Deroofing** of the cyst with removal of the lining epithelium and fluid.
- The unerupted tooth is removed.
- The expanded jaw is crushed to restore its shape

C. Odontogenic Keratocyst

- **Pathogenesis:**

odontogenic Keratocyst originates from:

1. Rests of serra which are the remnants of the dental lamina.
2. Lining of the dentigerous cyst.

- **Clinical Picture:**

- ⇒ Occurs in patients with a wide range of age from 1st to 8th decade with peak incidence in the 2nd and 3rd decade.
- ⇒ Usually present as a single lesion, occasionally occur as a multiple cysts that sometimes occupy all four quadrants of the jaw. Multiple odontogenic keratocysts are one of the constant features of Basal cell nevus syndrome which is an autosomal dominant syndrome. Predominant features of this syndrome in addition to multiple keratocysts are, multiple basal cell carcinomas, pseudohypertelorism, palmar pits, planter pits, bifid ribs and spina bifida.
- ⇒ OKC differs significantly from other odontogenic cysts in that:
- ⇒ It possess a high growth potential greater than other odontogenic cysts, and can attain a larger size resulting in massive bone destruction.
- ⇒ OKC exhibits a recurrence rate of 25% to 60%, similar to that of a neoplasm owing to the presence of a daughter cysts and microcysts nearby the original one. Radiographic picture: well-defined solitary lesion or multilocular polycystic radiolucency exhibiting a thin corticated margin unless the cortex is perforated.

- **Histopathology:**
 - ⦿ The cyst is lined with keratinized stratified squamous epithelium.
 - ⦿ The lumen contains variable amounts of keratin.
 - ⦿ The capsule wall contains microcysts.
- **Complications:**
 - ⦿ Ameloblastoma.
 - ⦿ Sq. C.C.
 - ⦿ Mucoepidermoid C
- **Treatment:**
 - ⦿ Intact cortex = Enucleation
 - ⦿ Perforated cortex = Resection.

N.B: Marsupialization is ineffective in reducing the size of keratocyst

D. Non odontogenic cysts

1. Nasopalatine duct cyst

- Also called incisive canal cyst that arises from the embryonic remnant of the nasopalatine duct.
- Develop in midline of the anterior maxilla near the incisive foramen.
- Most of them are asymptomatic and discovered during routine radiologic examination as well-demarcated-oval-shaped radiolucency of the midline extended between the roots of the central incisors.
- It is enucleated via a palatal approach.

2. Nasolabial Cyst

- It is a developmental cyst of soft tissue of the muco-buccal fold beneath the ala of the nose, mostly derived from remnants of the inferior portion of the nasolacrimal duct.
- Appears as a unilateral or bilateral painless soft tissue swelling that results in flattening of the nasolabial crease on the skin below the ala of the nose, and if the upper lip is retracted, the cyst can be seen intraorally as a swelling located at the depth of the maxillary vestibule.
- Not apparent radiologically because it is located within the soft tissue.
- Removed by enucleation.

3. Globulomaxillary Cyst

- It occurs in the alveolus between the premaxilla and the maxilla (between the lateral incisors and the canine tooth). It frequently causes displacement of the neighboring teeth.

4. Median Maxillary Palatal Cyst

- It occurs in the midline between the palatal shelves and may involve the nose and the maxillary sinus.

5. Median Mandibular cyst

- Extremely rare and occurs at the mandibular symphysis

⇒ **Tumors of the jaw**

1. Odontogenic Tumours

- **Benign**
 - ⌚ **Epithelial**
 - ✓ Ameloblastoma
 - ✓ Calcified epithelial odontogenic tumour
 - ✓ Adenomatoid odontogenic tumour
 - ⌚ **Mesenchymal**
 - ✓ Odontogenic fibroma
 - ✓ Odontogenic myxoma
 - ✓ Cementoblast
 - ⌚ **Mixed**
 - ✓ Ameloblastic fibroma
 - ✓ Odontoma
 - ✓ Ameloblastic fibro- odontoma
- **Malignant**
 - ⌚ Malignant ameloblastoma
 - ⌚ Odontogenic carcinoma
 - ⌚ Primery intraosseous carcinoma

2. Non-odontogenic tumors

- **Benign**
 - ⌚ Osteoma
 - ⌚ Osteoblastoma
 - ⌚ **Fibroosseous lesions**
 - ✓ Fibrous dysplasia
 - ✓ Ossifying fibroma
 - ✓ Cherubism
 - ⌚ **Giant cell lesions**
 - ✓ Peripheral G.C.L
 - ✓ Central G.C.L
 - ✓ Giant cell tumour (osteoclastoma)
 - ⌚ **Metabolic conditions**
 - ✓ Paget's disease
 - ✓ Hyperparathyroidism
- **Malignant**
 - ⌚ **Primaries**
 - ✓ Osteogenic sarcoma
 - ✓ Chondrosarcoma
 - ✓ Ewing sarcoma
 - ✓ Fibrosarcoma
 - ✓ Angiosarcoma
 - ✓ Lymphomas
 - ✓ Sarcoma
 - ⌚ **Secondaries**

⇒ Adamantinoma (ameloblastoma)

Incidence

- ⇒ Affects middle-aged females (**25-45 years**).
- ⇒ It occurs commonly in **the lower** than the upper jaw.

Pathology

- ⇒ Arises from remnants of enamel, dental lamina, or odontogenic cyst ,Rests of serres-Rest of malass
- ⇒ Adamantinoma is Benign,epithelial, slowly growing , **locally malignant** tumor.
- ⇒ Starts near the **angle** of the mandible and grows slowly both:
 - Forwards → in body of the mandible.
 - Upwards → in the ascending ramus.
- ⇒ It is well encapsulated by fibrous tissue and expands the jaw.
- ⇒ Trabeculae traverse the tumor dividing it into lobes and lobules.
- ⇒ **Clinical subtypes:**
 - Common (polycystic) ameloblastoma
 - Unicystic ameloblastoma
 - Extraosseous (peripheral) ameloblastoma
- ⇒ **Site**
 - Polycystic type → most commonly occurs in the mandible in the molar and ascending ramus.
 - Unicystic type → most commonly occurs in the maxilla in the molar area
- ⇒ **Histopathological types:**
 - Follicular type.
 - Acanthomatous type.
 - Granular cell type.
 - Plexiform type
- ⇒ The cut section is pink or whitish with multiple cystic & solid areas.
 - **Cystic** areas are lined by columnar cells that have a tendency for the nucleus to move from the basement membrane to the opposing end of the cell, a process referred to as reverse polarization & contain brownish mucoid fluid.
 - **Solid** areas consist of fibrous tissue with particles of enamel.
 - Osteoclasts are not present.

Clinical

- ⇒ A painless, lobulated, slowly growing swelling (usually in lower jaw)
- ⇒ It expands the jaw more on the outer than the inner side → more obvious from the cheek than from the mouth.
- ⇒ It is well defined and not-tender.
- ⇒ The swelling is bony hard in consistency, but **eggshell crackling** can be elicited over large tumors.

Complications

- ⇒ Ulceration, infection, bleeding and falling teeth.
- ⇒ It is locally malignant → liable to recurrence after inappropriate surgery.
- ⇒ Sometimes, it turns malignant, (either from fibrous tissue element → sarcoma or from epithelial cells → carcinoma)

Investigation

- ⇒ Plain X-ray → an expanding, translucent, well-defined shadow, divided by bony septa into a more or less equalized lobules (**fine soap bubble or honeycomb appearance**).
 - Root resorption of the corresponding teeth
- ⇒ CT scan and MRI.
- ⇒ Biopsy.



Treatment

- ⇒ Resection of the part of the mandible carrying the tumor with a safety margin (which may amount to hemi-mandibulectomy).
- ⇒ Reconstruction is done either immediately or at 2nd stage by:
 - A bone graft (defect <5cm).
 - Free or vascularized rib graft (defect >5cm).
 - Prosthesis (high failure rate after average of 1.5 years).

⇒ Odontoma

- Mixed odontogenic tumor composed of mature enamel, (ectodermal) dentin, and pulp (mesodermal).
- Maybe (compound) → multiple radiopaque structures in the anterior part of the mouth.
- Maybe (complex) → a solid radiopaque mass found in the posterior part of the mandible.

Treated by enucleation

Giant cell lesions of the

⇒ Giant cell granuloma:

- **Pathology:**
 - ⦿ Site: affects the lower jaw more commonly.
 - ⦿ Gross: This is like osteoclastoma in large bones but is **benign**.
 - ⦿ It arises above symphysis menti as a soft reddish mass & grows backwards in body of mandible but not upwards in ascending ramus.
 - ⦿ The cut section shows a lobulated tumor.
 - ⦿ Histologically: giant cells, spindle cells & numerous blood vessels.
 - ⦿ It is like brown tumors of parathyroids and giant cell epulis (**myeloid epulis**).
- **Clinical features:**
 - ⦿ A painless, slowly growing tumor, expanding the jaw equally on both sides (due to presence of osteoclasts) → eggshell crackling.
- **Investigations:**
 - ⦿ Plain x-ray → expanding translucent shadow with unequal trabeculae (**soap bubble appearance**).
 - ⦿ CT scan and MRI
 - ⦿ Biopsy.
 - ⦿ Serum calcium & parathormone to exclude hyperparathyroidism.
- **Treatment:**
 - ⦿ Careful enucleation and gentle curettage.
 - ⦿ In large tumors → resection of the mandible.

⇒ Osteoclastoma:

- This is a rare tumor that is like the foregoing; but is **malignant** on histological examination.

⇒ Aneurysmal bone cyst:

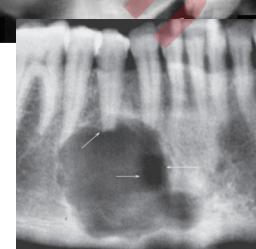
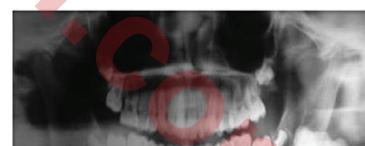
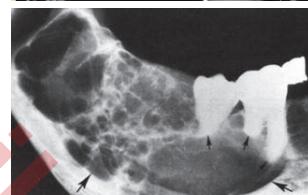
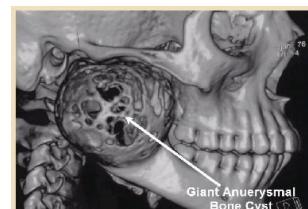
- It forms a soft, sponge-like tumor which oozes blood **until enucleated completely**.
- **Osteoma**: May be of an ivory or a cancellous variety:

⇒ Ivory osteoma:

- Affects the bones which develop from membrane as the ascending ramus of the mandible, outer surface of the maxilla, palate, antrum, and orbit.
- Treatment by excision.

⇒ Cancellous osteoma:

- Affects the bones which develop from cartilage as the maxilla & the symphysis menti.
- Treatment is by excision.



Peripheral tumours

⇒ **Definition:** Solid swelling situated on the gum. They are called peripheral swellings "Epulides"

⇒ Types

- **Fibrous epulis:**

- **Definition:** localized inflammatory hyperplasia of gum submucosa.
- **Etiology:** chronic irritation.
- **Clinical picture:** a small, painless, pedunculated swelling arising between two teeth.
- **Treatment:** extracting the teeth on either side of the tumor and excision of the tumor with a wide base of mucoperiosteum.

- **Granulomatous epulis:**

- **Definition:** a mass of granulation tissue adjacent to a carious tooth or gingivitis.
- **Pathology:** It forms a red, soft, lobulated mass over the jaw, which bleeds easily on touch because it is devoid of epithelial cover.
- **Treatment:** Excision of the excess granulation tissue is done with diathermy, together with removal of the offending tooth.



- **Myeloid Epulis:**

- **Incidence:** affects the **lower** jaw more than the upper.
- **Origin:** from **inner** osteoclastic layer of periosteum or alveolus itself
- **Grossly:** a soft, lobulated, encapsulated swelling with cystic areas in cut sections
- **Microscopically:** spindle cells & giant cells together with fibroblasts and fibrous tissue.
- **Clinical features:** The swelling is sessile, lobulated, bluish or brownish & covered with intact mucosa (fixed to underlying bone)
- As it enlarges, the adjacent teeth are loosened and fall off.
- The mucous membrane is intact unless bitten by the upper teeth.
- **Investigation:** X-ray of the jaw → shows eating up of the bones.
- **Treatment:** Wide excision with a safety margin.



- **Sarcomatous epulis:**

- A **Parosteal fibrosarcoma** arising from **outer** layer of periosteum.
- **Clinical features:** The tumor is sessile and fixed to the bone. It is of variable consistency.
- **Investigation:** X-ray → shows infiltration of the bones
- **Treatment:** Wide excision with the underlying bone up to hemimandibulectomy.



- **Carcinomatous epulis:**

- **Definition:** an epithelioma arising from **the mucous membrane** covering the gum.
- **Clinical picture & treatment:** like carcinoma of the floor of the mouth, but radiotherapy has no role.
- Other peripheral swelling: Peripheral ameloblastoma. Peripheral ossifying fibroma. Peripheral CEOT "central epithelial odontogenic tumor"

- **Malignant bone tumors:**

- **Osteogenic sarcoma:**

- ✓ Commoner in the **upper** jaw.
- ✓ May occur on top of Paget's disease of bones & is like osteogenic sarcoma anywhere.

- **Fibrosarcoma (parosteal fibrosarcoma):**

- ✓ May arise from the jaw periosteum.

- **Secondary carcinoma:**

- ✓ Reach the jaw by **direct spread** from nearby carcinoma as lip, tongue, or floor of mouth.
- ✓ **Treatment:** is that of the primary together with resection of the mandible (no role for radiotherapy to avoid mandible necrosis)

- **Malignant maxillary tumours:**

- ✓ Carcinoma
- ✓ Sarcoma:
 - Osteogenic sarcoma.
 - Spread from ethmoid sarcoma.
- ✓ Malignant lymphoma (Burkitt's lymphoma).