

Structured Notes According to **SURGERY**

Revision friendly **Fully Colored Book/Structured Notes**

For Best results, watch the video lectures along with reading notes



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(Author)

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CONTENTS



SURGERY VOLUME I

UNIT 1 - ENDOCRINE SURGERY

1.	Breast Part-1	7
2.	Breast Part-2	23
3.	Thyroid Part-1	42
4.	Thyroid Part-2	56
5.	Parathyroid and Adrenal Gland	66

UNIT 2 - HEPATOBILIARY PANCREATIC SURGERY

6.	Liver Part-1	92
7.	Liver Part-2	102
8.	Portal Hypertension	111
9.	Gallbladder	123
10.	Bile Duct Part-1	138,
11.	Bile Duct Part-2	146
12.	Pancreas Part-1	154
13.	Pancreas Part-2	166

UNIT 3 - GASTROINTESTINAL SURGERY

14.	Esophagus Part-1	190
15.	Esophagus Part-2	201
16.	Stomach Part-1	215
17.	Stomach Part-2	227
18.	Peritoneum	236
19.	Intestinal Obstruction	244
20.	Small Intestine	258
21.	Large Intestine Part-1	270
22.	Large Intestine Part-2	282
23.	Ileostomy and Colostomy	293
24.	Inflammatory Bowel Disease Part-1	296
25.	Inflammatory Bowel Disease Part-2	306
26.	Vermiform Appendix	320
27.	Rectum and Anal Canal	326

28.	Hernia and Abdominal Wall Part-1	343
29.	Hernia and Abdominal Wall Part-2	354
30.	Spleen	368

UNIT 3 - UROLOGY

31.	Kidney and Ureter Part-1	381
32.	Kidney and Ureter Part-2	398
33.	Kidney and Ureter Part-3	406
34.	Urinary Bladder	417
35.	Prostate and Seminal Vesicles	428
36.	Urethra and Penis	438
37.	Testis Scrotum Part-1	452
38.	Testis and Scrotum Part-2	460



Breast Part-1

1. Anatomy
2. Nipple Discharge
 - 2.1 Cause of Nipple Discharge
3. Breast Cancer
 - 3.1 Risk Factors for Breast Cancer
 - 3.2 Risk Assessment Models of Carcinoma Breast
 - 3.3 WHO Classification of Breast Cancer** **Must Know**
 - 3.4 DCIS
 - 3.5 LCIS
 - 3.6 Breast Cancer in Detail** **Must Know**
 - 3.7 TNM Classification** **Good to Know**
 - 3.8 8th AJCC TNM Classification for Breast Cancer
 - 3.9 Lymph Node Staging
 - 3.10 Staging
 - 3.11 Management of Breast Cancer
 - 3.12 Locally Advanced Breast Cancer (LABC)
 - 3.13 Metastatic Breast Cancer** **Must Know**
 - 3.14 Chemotherapy Regimens of Breast Cancer** **Must Know**
 - 3.15 Hormone Therapy** **Good to Know**

Breast Part-2

1. Lymph node levels in relation to Pectoralis Minor
2. Types of Mastectomy
- 3. Complications of Mastectomy** **Must Know**
- 4. Breast Conservation Surgery (BCS)** **Good to Know**
 - 4.1 Contraindications to BCS** **Good to Know**
5. Breast reconstruction
 - 5.1 TRAM flap
 - 5.2 DIEP flap** **Good to Know**
 - 5.3 Latissimus dorsi flap
 - 5.4 Placement of Breast implants
6. Breast Cancer follow-up
 - 6.1 Prognostic factors in carcinoma of the breast

- 7. Sentinel Lymph Node Biopsy
 - 7.1 Contraindications of SLN biopsy in carcinoma of the breast
 - 7.2 Complications of SLN biopsy

8. Inflammatory Breast cancer **Must Know**

- 8.1 Definition
- 8.2 Clinical features
- 8.3 Investigations
- 8.4 Treatment

9. Breast Cancer in Pregnancy

- 9.1 Clinical features
- 9.2 Investigations

9.3 Treatment **Good to Know**

10. Male breast cancer

10.1 Similarities between male and female breast cancer **Good to Know**

- 10.2 Risk factors for male breast cancer
- 10.3 Clinical features
- 10.4 Investigation and Treatment

11. Paget's disease of Nipple **Good to Know**

- 11.1 Diagnosis
- 11.2 Treatment

12. Cystosarcoma Phyllodes **Must Know**

- 12.1 Origin
- 12.2 Pathology
- 12.3 Structures not involved are
- 12.4 Clinical features
- 12.5 Diagnosis
- 12.6 Treatment

13. Molecular classification of breast cancer (Luminal criteria) **Must Know**

- 14. Multigene Tests
- 15. BRCA1 vs BRCA2
- 16. Cancer risk associated with Benign breast disease and Carcinoma in situ
- 17. Aberrations in Normal Development and Involution (ANDI)

- 17.1 Fibroadenoma

17.2 Mastalgia **Good to Know**

- 17.3 Breast Cyst

17.4 Breast abscess **Good to Know**

17.5 Zuska's disease **Good to Know**

Thyroid Part-1

1. Anatomy
2. Physiology
3. Congenital Disorders of Thyroid

3.1 Thyroglossal cyst

Must Know

4. Goiter

4.1 Retrosternal goiter / Substernal goiter / Mediastinal goiter

Must Know

4.2 Solitary Thyroid Nodule (STN)

Good to Know

5. The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC)
6. Function of Thyroid Hormone

6.1 The signs and symptoms of both hypothyroidism and hyperthyroidism.

Good to Know

7. Graves' Disease

- 7.1 Characteristic features
- 7.2 Pathophysiology
- 7.3 Clinical features
- 7.4 Findings in thyroid gland in Grave's disease
- 7.5 Investigations for diagnosis

7.6 Management

Good to Know

8. Hashimoto's Thyroiditis

- 8.1 Etiopathogenesis
- 8.2 Clinical features
- 8.3 Investigations
- 8.4 Management

9. Acute Suppurative Thyroiditis

- 9.1 Route of infection
- 9.2 Clinical features
- 9.3 Diagnosis
- 9.4 Management

10. Subacute Thyroiditis

- 10.1 Stages
- 10.2 Clinical features
- 10.3 Investigations
- 10.4 Management

11. Riedel's Thyroiditis

- 11.1 Clinical features
- 11.2 Diagnosis
- 11.3 Management

Thyroid Part-2

1. Papillary Carcinoma of Thyroid	Good to Know
1.1 Pathology	Must Know
1.2 Clinical features	
1.3 Route of spread	
1.4 Investigation	
1.5 Treatment	
2. Follicular Carcinoma	
2.1 Clinical features	
2.2 Investigations	
2.3 Treatment	Must Know
3. Post-Operative Management of Well-Differentiated Thyroid Cancer	Good to Know
3.1 Investigations useful for post-operative follow-up	
3.2 Indication of PETS can	
3.3 Management of recurrence	
3.4 Prognostic indicators in well-differentiated thyroid cancer	
3.5 Prognostic factors	
4. Medullary Carcinoma of Thyroid (MCT)	
4.1 Types of Medullary Carcinoma	
4.2 Clinical Features	
4.3 Route of Spread	
4.4 Diagnosis	
4.5 Treatment	
5. Anaplastic Carcinoma	
5.1 Clinical features	
5.2 Investigation	
5.3 Treatment	
6. Thyroid Lymphoma	
6.1 Clinical Features	
6.2 Investigations	
6.3 Treatment	
7. Thyroidectomy	
7.1 Vascular Anatomy and Nerve Supply	
7.2 Parathyroid Gland	
7.3 Complications of Thyroidectomy	
8. MIVAT (Minimally Invasive Video-Assisted Thyroidectomy)	
8.1 Indications of MIVAT	
8.2 Contraindication of MIVAT	

Parathyroid and Adrenal Gland

1. Multiple Endocrine Neoplasia Syndrome (MEN Syndrome)	Must Know
2. MEN 1 / Wermer Syndrome	
2.1 Characteristic Features	
2.2 Parathyroid tumors	Good to Know
2.3 Pancreatic Neuroendocrine tumor	
2.4 Pituitary adenoma	
3. MEN 2 / Sipple Syndrome	
3.1 Characteristics of MEN 2 / MEN 2A (Mnemonic: "MPin PHC")	Good to Know
3.2 Gene responsible	
4. MEN-3 / MEN 2B	
4.1 Characteristic features (Mnemonic: "MPhad 3MIs)	
4.2 Gene responsible	
5. MEN-4 / MEN X	
5.1 Characteristic features (Mnemonic: "HPTARGet")	
6. Comparison of MEN syndromes	
7. Functions of Parathyroid Hormone	
7.1 Manifestations of 1° Hyperparathyroidism (HPT)	
7.2 Manifestations of 2° HPT	
7.3 Manifestations of 3° HPT	
8. Disorders of Parathyroid Gland	
8.1 Primary Hyperparathyroidism	Must Know
8.2 Secondary Hyperparathyroidism	
8.3 Tertiary Hyperparathyroidism	
9. Parathyroid Carcinoma	
9.1 Clinical features	
9.2 Route of spread	
9.3 Management	
10. Adrenal Incidentaloma	
10.1 Diagnostic workup for incidentaloma	Good to Know
10.2 Treatment	
11. Adrenocortical Carcinoma	
11.1 Clinical features	
11.2 Investigation	
11.3 Treatment	
12. Pheochromocytoma	Good to Know
13. Paraganglioma	
13.1 Risk factors	

- 13.2 Pathology
- 13.3 Diagnosis
- 13.4 Pathophysiology
- 13.5 Management
- 13.6 Clinical Features
- 13.7 Important points related to applied biochemistry
- 13.8 Investigations
- 13.9 Treatment

14. Malignant pheochromocytoma

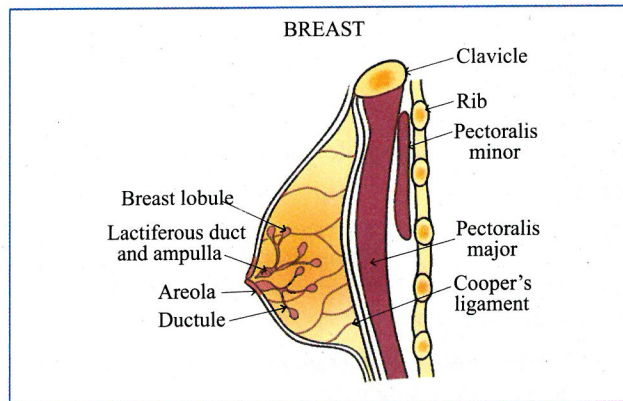
Good to Know

- 15. Neuroblastoma
 - 15.1 Clinical features
 - 15.2 Important points related to metastasis
 - 15.3 Important Image Based Questions
 - 15.4 Investigations
 - 15.5 Treatment
- 16. Esthesioneuroblastoma
 - 16.1 Clinical Features
 - 16.2 Treatment

1 BREAST PART-1

Anatomy

Anatomy



- Breast is a **modified sweat gland** which extends from the **2nd rib to the 6th rib**.
- When expressed in **medial to lateral direction**, it extends from the lateral border of the **sternum to the anterior axillary line (AAL)**.
- The following observations can be made from the diagram:
 - Two muscles can be noted from the diagram. They are **pectoralis major** and behind it, the **pectoralis minor** is present.
 - **Breast lobule** which is the basic structural unit of the breast. The breast lobule empties into the **lactiferous duct** through the **ductule**.
 - About **10 to 100 breast lobules** empty into the ductule.
 - The number of lactiferous ducts in a breast is about **15 to 20**.
 - Around the nipple is the **areola** on which multiple **sebaceous glands** are present.
 - During pregnancy, the sebaceous glands enlarge and are called as the **Montgomery tubercles**.
 - **Cooper's ligament** if involved in malignancy, there will be dimpling of the skin overlying the carcinoma.
- Some of the important points regarding the **lymphatics of breast** are as follows:
 - **80%** of the lymphatic drainage of the breast goes to the **axillary lymph node**.
 - **15%** of the lymphatic drainage of the breast goes to the **internal mammary lymph node**.

Nipple Discharge

- Three major points are discussed under nipple discharge. They are:
 - The most common cause of **bloody nipple discharge**: **Duct papilloma**
 - **Serous nipple discharge** common cause: **Fibrocystic disease**
 - **Duct ectasia** can lead to any kind of nipple discharge.
- Each of these points will be discussed in detail further.

Cause of Nipple Discharge

Bloody Nipple Discharge

00:07:03

- Following are the three causes of bloody nipple discharge:
 - Duct papilloma
 - Carcinoma
 - Duct ectasia
- Out of these three, the most common cause is duct papilloma.

Serous Nipple Discharge

- The common causes of serous nipple discharge are as follows:
 - Fibrocystic disease, a.k.a fibroadenosis (M/C cause)
 - Carcinoma
 - Duct ectasia
- The most common cause among these is fibrocystic disease.

Greenish/Blackish/Grumous/Pultaceous Nipple Discharge

- Seen in duct ectasia
- Most of the patients with nipple discharge have benign etiology rule out the possibility of any malignancy → the underlying cause has to be treated.

Benign	Malignant
<ul style="list-style-type: none">• Young individual (Age < 40 years)• Serous nipple discharge• Multiple ducts discharge• Bilateral• B/L cyclical mastalgia• No mass	<ul style="list-style-type: none">• Age > 40 years• Bloody nipple discharge• Arising from single duct• Palpable mass

Investigations

- The first investigation done in the case of a suspected case of breast cancer is mammography.
- Ductography is done when there is a bloody nipple discharge.
- Ductography:
 - The dye is injected inside the nipple and X-ray is taken in order to carry out ductography.
 - The findings of ductography are as follows:
 - Single, smooth, intraluminal filling defect: Papilloma (Rx: Microdochectomy)
 - Multiple, irregular, intraluminal filling defects: Carcinoma
 - Duct appears dilated: Duct ectasia (Rx- Hadfield's operation → conical excision of involved duct)

Breast Cancer

Pathology

00:14:30

- Generally, there are two common malignancies. They are:
 1. **Adeno carcinoma:** Generally, arises from glands. It is most commonly seen in people of high socio-economic status.
 2. **Squamous cell carcinoma:** Generally found in people of low socio-economic status.

Risk Factors for Breast Cancer

Adeno Carcinoma

- Advancing age
- Origin: Western countries
- High socio-economic status.
- Alcohol intake
- High fat diet → obesity
- State of hyper-estrogenemia which causes:

- Early menarche
- Late menopause
- Nulliparity
- Late first full-term pregnancy
- Positive family history : maternal side
- Personal history of malignancy:
 - Carcinoma endometrium
 - Carcinoma ovary
- Genetic mutations (BRCA1 mutation and BRCA2 mutation)
 - Both BRCA1 mutation and BRCA2 mutations are responsible for breast cancer in males and females.
 - **BRCA1** mutation: breast cancer in **females**.
 - **BRCA2** mutation: breast cancer in **males**.
- Hormone replacement therapy: It is given after menopause
- History of therapeutic radiation exposure:
 - In therapeutic radiation therapy, the exposure is generally 40-60 gray.
 - Generally, 1.8-2 gray per day is given 5 days a week. This much radiation is given for a duration of 4-6 weeks.

Important Information

- OCPs and smoking are not considered as significant risk factors for breast cancer.
 - Smoking increases the risk of **breast cancer, duct ectasia, Mondor's disease, Zuska's disease**
- Long duration breast feeding is protective for breast cancer.

Risk Assessment Models of Carcinoma Breast

00:22:23

- Two main risk assessment models are used:
 1. Gail model
 2. Claus model

Gail model	Claus model
<ul style="list-style-type: none"> ● Most commonly used ● Includes (mnemonic- NANA): <ul style="list-style-type: none"> ○ Number of breast B_x ○ Age at menarche ○ Number of first-degree relatives with carcinoma breast ○ Age at first live birth 	<ul style="list-style-type: none"> ● More information about family history ● Based on: <ul style="list-style-type: none"> ○ Decades of life ○ First and second degree relative with carcinoma breast. ○ Age of the relatives at the age of diagnosis.

WHO Classification of Breast Cancer

00:24:12

- It divides breast cancers into 3 types:
 1. In-situ carcinoma
 2. Invasive carcinoma
 3. Paget's disease of nipple

In-situ carcinoma	Invasive carcinoma	Paget's disease of nipple
<ul style="list-style-type: none"> • DCIS (Ductal Carcinoma in situ) (ipsilateral breast) • LCIS (Lobular carcinoma in situ) (multicentric and B/L) 	<ul style="list-style-type: none"> • Ductal carcinoma (Most common type seen in both males and females) • Lobular carcinoma (exclusively seen in females) • Tubular carcinoma (Cribriform) (Least malignant with the best prognosis) • Mucinous (Colloid) (Excessive mucin production) • Medullary • Papillary (Least common type) • Metaplastic • IBC (Most malignant with the worst prognosis) 	<ul style="list-style-type: none"> • PYQ: FMGE 2019 • PYQ: FMGE 2021 • PYQ: FMGE 2022

- In female breasts there are both ducts and lobules and in males, only ducts are present.
- Hence, ductal carcinoma in-situ and invasive ductal cancer are both found in both males and females.
- Lobular carcinoma is exclusively seen in females as only they have lobules.
- If a patient has lobular carcinoma in-situ, since it is multi-centric and bilateral, it increases the risk of bilateral breast cancer.
- Ductal carcinoma in-situ also increases the risk of ipsilateral breast cancer

DCIS

00:29:15

- **DCIS: Ductal Carcinoma In-situ.**
- It increases the risk of ipsilateral invasive ductal cancer.
- It can be seen in both males and females.

Pathology

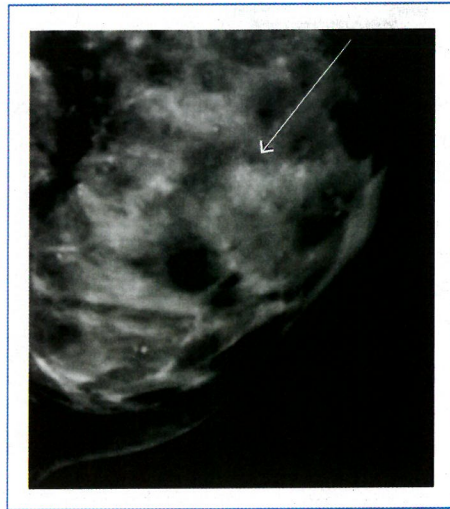
- DCIS can be classified on the basis of:
 - Nuclear grade
 - Necrosis

Low grade DCIS	High grade DCIS
<ul style="list-style-type: none"> • Cribriform • Papillary • Micro-papillary 	<ul style="list-style-type: none"> • Solid carcinoma • Comedocarcinoma

Investigation

- Generally, in the case of DCIS, there is **micro-calcification**.
- For the detection of micro-calcification, **mammography** is the preferred investigation technique.
- But since soft tissue abnormality is there, **MRI** is considered to be the best investigation method for DCIS.
- The best investigation technique for detecting micro-calcification associated with DCIS is mammography as MRI has poor sensitivity for the detection of micro-calcification.

Findings in Mammography



- Micro calcification - $< 0.5\text{mm}$

Treatment

- Treatment depends on the size and grade of the DCIS.
- **Non-palpable DCIS** (can be detected using mammography): Excision with needle localization & specimen mammography.
- Low-grade DCIS: Lumpectomy
- DCIS with limited disease or high-grade: Lumpectomy + Radiotherapy (to avoid recurrence)

LCIS

00:34:22

- **LCIS: Lobular Carcinoma In-Situ.**
- Origin: It arises from terminal duct lobular units.
- Lobules are seen only in female breasts. Hence, they are exclusive to females.
- They are multicentric and bilateral and hence increases the risk of bilateral breast cancer.

Pathology

- There is presence of **cytoplasmic mucoid globules**.
- Histological hallmark: There is tendency of tumor cells to invade in a linear strand. And when they do, it is known as "**Indian file pattern**" which is considered to be the **histological hallmark of LCIS**.

Clinical Features

- M/c presentation: lump

Diagnosis

- **Neighborhood calcification** can be found in the mammography.

Treatment

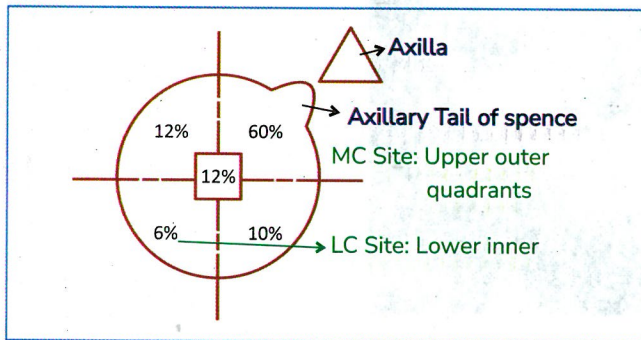
- Observation or chemo-prevention.
- Drugs: **Tamoxifen** and **Raloxifene**
- Can also adopt for prophylactic bilateral mastectomy

 PYQ: NEET PG 2019

Breast Cancer in Detail

00:38:40

- The most common histological type is adeno carcinoma.
- **Most common subtype:** Invasive ductal cancer.
- **Least common subtype:** Papillary.
- **Most malignant type of breast cancer having worst prognosis:** Inflammatory breast cancer.
- **Least malignant having best prognosis:** Tubular



- In the above figure, the triangular region represents the **axilla**.
- Hence, we can locate the **axillary tale of spence**.

Important Information

- **Most common site:** Upper outer quadrant.
- **Least common site:** Lower inner quadrant

- In adeno carcinomas the most common route of spread is through the **lymphatics**.
- The most common route of spread in the case of carcinomas is **hematogenous**.
- Breast cancer is nothing but adeno carcinoma. Hence, the most common route of spread is the lymphatics.
- In breast cancer, the **most common site of metastasis is the bone**.
- The bones are involved via the hematogenous spread.
- **Most common bone site:** Lumbar vertebra > Femur > Thoracic vertebra (Mnemonics: "LFT").

PYQ: FMGE 2021

- Most common primary for both osteolytic and osteoblastic secondaries in females: **CA breast**.
- **Most common:** Osteolytic.
- The **most common cause of death in CA breast:** Malignant pleural effusion.

Pathway of Spread

00:44:35

- The breast cancer cells first invade the **posterior inter-costal vein** via which it invades the **vertebral venous plexus (Batson plexus)**.
- Through the Batson plexus, the malignant cells reach the **lumbar vertebra** and the **dural venous sinuses** as the Batson plexus is valveless.

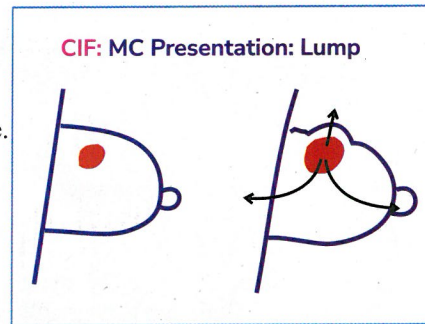
Important Information

- Breast cancer cells invade → Posterior inter-costal vein → Batson plexus → Lumbar vertebra and Dural venous sinuses → involvement of **leptomeninges**

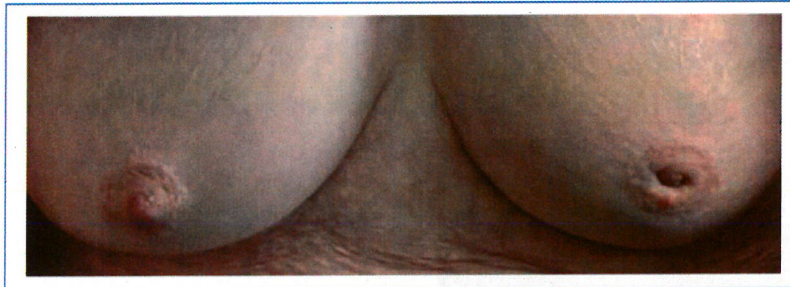
- After that, brain metastasis takes place.
- The most common primary for **leptomeningeal metastasis:** CA breast
- The most common primary for **brain metastasis:** Carcinoma lung > carcinoma breast

Clinical Features of Breast Cancer

- The most common presentation in most of the individuals is the **lump**.
- In most cases, an educated female identifies a lump when formed and immediately calls for medical assistance.
- Suppose, if the female is not educated enough to identify a breast lump and simply ignores it, over a period of time, the lump will increase in size and gradually architectural distortion of the breast takes place. As a result of which breast becomes **asymmetrical**.
- After which the lump can involve the breast skin, chest wall, nipple etc.
- Skin involvement can cause **skin fixity**.
- Nipple involvement causes **nipple retraction, deviation and ulceration**.
- Chest wall involvement can lead to **fixity to chest wall**.

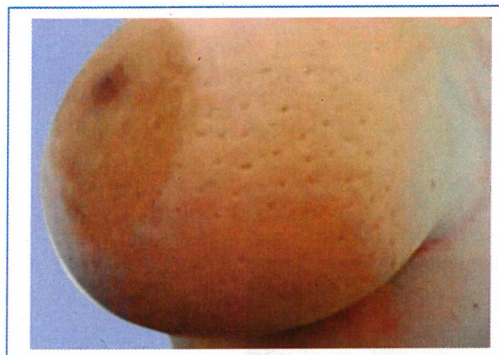



1.



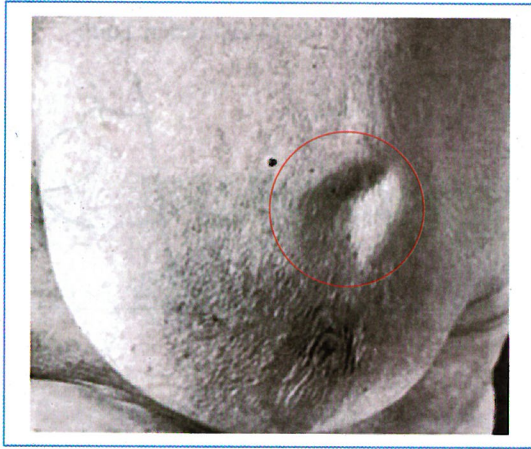
- The right nipple appears normal and the left one is retracted.
- This condition is known as **nipple retraction**.

2.



- Depressions and cutaneous edema can be observed on the breast shown above.
 - The breast has an orange peel appearance.
 - The nipple appears retracted.
 - This condition is known as **Peau-D orange**. This is the most conspicuous sign of breast cancer.
-  PYQ: FMGE 2020
- Cause of Peau-D orange: The tumor cells enter the lymphatics of skin (lymphatic permeation), which causes lymphatic obstruction. The lymphatic obstruction causes cutaneous edema as a result of which, skin appears like an orange.

3.



- Depression on the skin.
- Skin dimpling involves the ligament of Cooper.
- This sign is known as **dimpling**.

4.



- Wrinkling or skin fold.
- This sign is known as **puckering**.
- Cause: Infiltration of the ligament of Cooper.

5.



- Multiple nodules and ulceration can be seen on the right breast.

- This is due to the involvement of breast skin and chest wall.
- The condition is known as **cancer-en-cuirasse**.
- Signs and symptoms of metastasis:
 - **Bony metastasis:** Causes back ache
 - **Brain metastasis:** Head ache
 - **Metastasis in liver:** Jaundice
 - **Metastasis involving lung/pleura:** Dyspnea
 - Patients suffer from **anorexia** and **weight loss**

Components of Triple Assessment

- Clinical: signs and symptoms are assessed.
- Imaging: Mammography or ultra-sound is performed.
- Tissue sampling: FNAC/Biopsy is performed. There are various names for biopsy:
 - Tru cut biopsy
 - Core cut biopsy
 - Needle biopsy
- The **positive predictive value of triple assessment:** 99.9% (Almost 100%).

Important Information

- First investigation done in a suspected case of breast cancer: Mammography
- Investigation of choice for diagnosis of breast cancer: **Biopsy (B_x)**

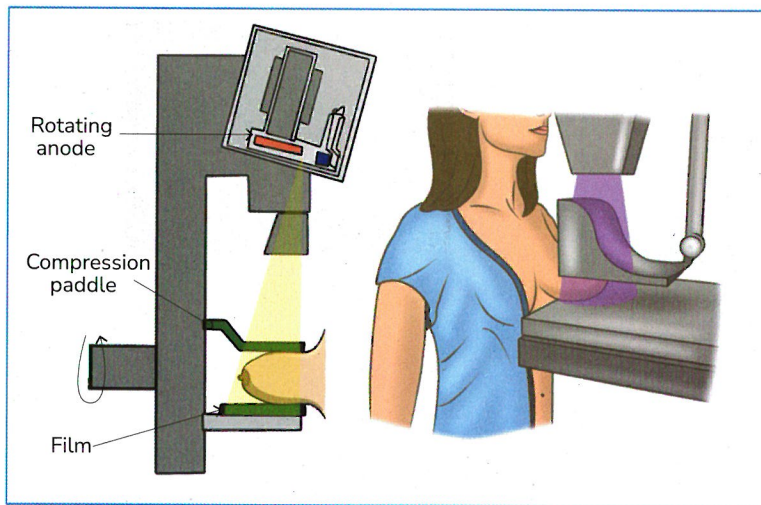
Difference between FNAC (Fine Needle Aspiration Cytology) and biopsy

FNAC	Biopsy
<ul style="list-style-type: none"> • Size of needle is 22-26 Gauge. • An experienced cytopathologist is required. • It is hard to distinguish between carcinoma in-situ from invasive ductal cancer. • High chances for false positive/false negative results. • Difficult to assess hormone receptor status. 	<ul style="list-style-type: none"> • Size of needle is 14-16 Gauge. • Diagnosis is made easily • It is easy to differentiate between DCIF from invasive ductal cancer. • Its easy to asses hormone receptor status. • It is more painful.

Mammography

01:01:39

- **Investigation of choice for screening of breast cancer.**
- It is recommended for all females.
- According to current recommendations, mammography should be started in all female individuals at the **beginning of 45 years annually**.
- The name of the X-ray used: **Bremstrahlung**.
- Radiation exposure: **0.1 centigrade/study**.
- Mammography does not increase the risk of breast cancer as the dose of radiation exposure is only 0.1 centigrade.
- **One mammography = 4 chest X-rays.**



Mammography apparatus.

- The components of the apparatus are as follows:
 - Rotating anode
 - Compression paddle
 - Film: Breast is rested here.
- The compression paddle compresses the breast.
- There are 2 views in mammography

Cranio-Caudal View	Mlo View
<ul style="list-style-type: none"> • Medial aspect is assessed • Breast compression is assessed. 	<ul style="list-style-type: none"> • Maximum amount of breast tissue is assessed. • Axillary tail of spence is also assessed.

- Advantages of mammography:
 - Carcinoma breast in early stages can be detected which helps to start the treatment in the early stage itself.
 - Good prognosis is an advantage of mammography.
 - Decreased mortality.
 - Improved survival (more than 33%).
- Findings to be focused in mammography:

