BREAST CANCER

MASTECTOMY
MRM?
BCS?

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ANATOMY OF AXILLA

- pyramid shaped space between upper thoracic wall and arm.

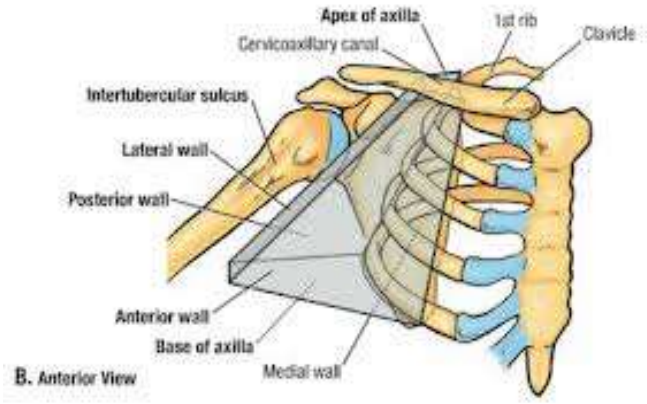
- Passing through the axilla are the major vessels, nerves, and lymphatics of the upper limb, the proximal parts of two muscles of the arm, the axillary process of the breast, and collections of lymph nodes, which drain the upper limb and chest wall.

AXILLARY INLET

- medial margin is the lateral border of rib I
- anterior margin is the posterior surface of the clavicle
- posterior margin is the superior border of the scapula

- The subclavian artery becomes the axillary artery as it crosses the lateral margin of rib I and enters the axilla
- The axillary vein becomes the subclavian vein as it passes over the lateral margin of rib I and leaves the axilla to enter the neck.
- The inferior trunk (lower trunk) of the brachial plexus lies directly on rib I
- The axillary vein is anterior to the axillary artery, which, in turn, is anterior to the trunks of the brachial plexus

ANTERIOR WALL OF AXILLA



- Lateral part of the pectoralis major muscle
- The pectoralis minor muscle
- The subclavius muscles
- The clavipectoral fascia

ANTERIOR WALL OF AXILLA

PECTORALIS MAJOR	**CLAVICULAR HEAD-anterior surface of medial half of clavicle; STERNOCOSTAL HEAD-anterior surface of sternum; first seven costal cartilages, aponeurosis of external oblique**	**Lateral lip of inter-tubercular sulcus of humerus**	**Medial and lateral pectoral nerves**	• **Thoracoacromial artery** • **Lateral thoracic artery** • **Internal mammary artery** • **Intercostal arteries**
PECTORALIS MINOR	Anterior surfaces and superior borders of ribs III to V Deep fascia overlying the related intercostal spaces	Coracoid process of scapula	Medial pectoral nerve	Thoracoacromial artery
SUBCLAVIUS	First rib at junction between rib and costal cartilage	Groove on inferior surface of middle one-third of clavicle	Nerve to subclavius	Clavicular branch of thoracoacromial artery and subclavian artery

MEDIAL WALL OF AXILLA

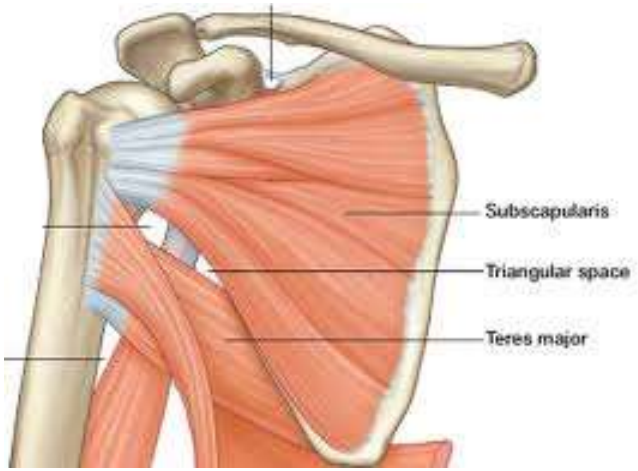
- Serratus anterior muscle
- Upper thoracic wall with the ribs and intercostal tissue

	ORIGIN	INSERTION	NERVE SUPPLY	BLOOD SUPPLY
SERRATUS ANTERIOR	Lateral surfaces of upper 8-9 ribs and deep fascia overlying the related intercostal spaces	Costal surface of medial border of scapula	Long thoracic nerve of Bell	Lateral thoracic artery

LATERAL WALL OF AXILLA

Intertubercular sulcus of humerus with inserstion of 3 muscles

- Pectoralis major on lateral lip of sulcus
- Teres major on medial lip
- Latissimus dorsi on floor of sulcus



POSTERIOR WALL OF AXILLA

- Subscapularis muscle
- Latissimus dorsi
- Teres major muscle

FLOOR OF AXILLA

The floor of the axilla is formed by fascia and a dome of skin that spans the distance between the inferior margins of the walls supported by the clavipectoral fascia

POSTERIOR WALL

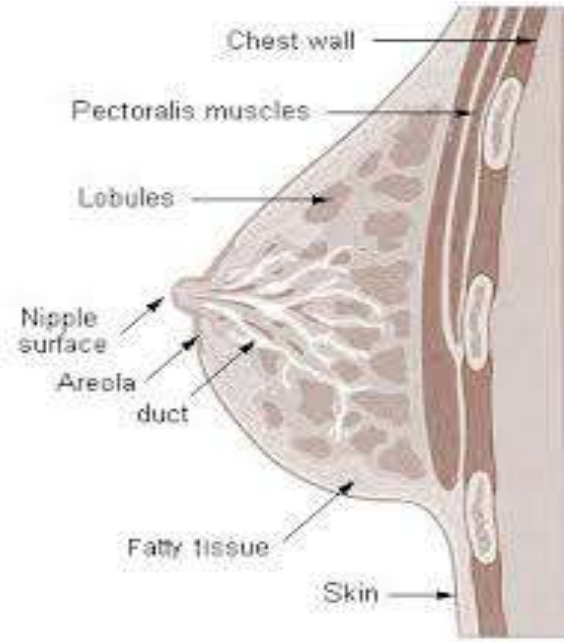
SUBSCAPULARIS	Medial two-thirds of subscapular fossa	Lesser tubercle of humerus	Upper and lower subscapular nerves	Subscapular artery
TERES MAJOR	Posterior surface of the inferior angle of the scapula	Medial lip of the inter-tubercular sulcus of the humerus	Lower subscapular nerve	Scapular anastomosis
LATISSIMUS DORSI	• Spinous processes of lower six thoracic vertebrae and related inter-spinous ligament • Thoracolumbar fascia • Iliac crest • Ribs 9-12	Floor of intertubercular sulcus	Thoracodorsal nerve	Subscapular artery

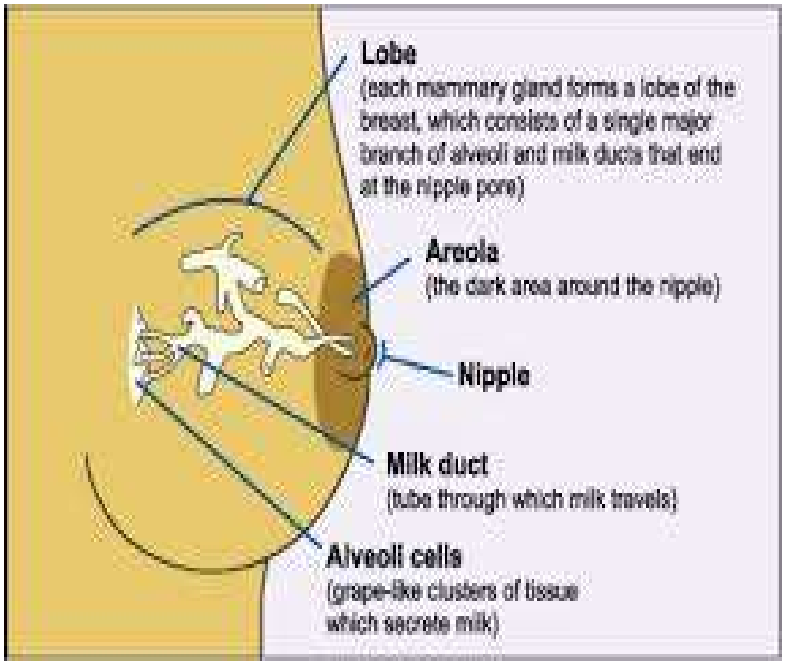
CONTENTS

- Axillary artery and branches
- Axillary vein and tributaries
- Infraclavicular part of brachial plexus
- Five groups of axillary lymph nodes and associated lymphatics
- Long thoracic and intercostobranchial nerves
- Axillary fat and areolar tissue
- Proximal parts of biceps brachii and coracobrachialis muscle

ANATOMY OF BREAST

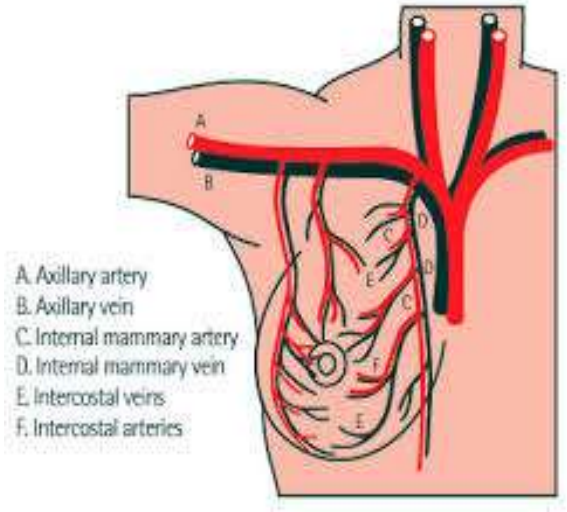
- located within the superficial fascia of the anterior chest wall
- extends from the second rib above to the sixth or seventh rib below, and from the sternal border medially to the mid axillary line laterally
- Two-thirds of the base of the breast lies anterior to the pectoralis major muscle; the remainder lies anterior to the serratus anterior muscle
- composed of 15 to 20 lobes , each composed of several lobules
- Fibrous bands of connective tissue travel through the breast (Cooper's suspensory ligaments), insert perpendicularly into the dermis, and provide structural support


Chest wall
Pectoralis muscles
Lobules
Nipple surface
Areola
duct
Fatty tissue
Skin


Lobe
(each mammary gland forms a lobe of the breast, which consists of a single major branch of alveoli and milk ducts that end at the nipple pore)
Areola
(the dark area around the nipple)
Nipple
Milk duct
(tube through which milk travels)
Alveoli cells
(grape-like clusters of tissue which secrete milk)

ARTERIAL SUPPLY OF THE BREAST

- Laterally, vessels from the axillary artery
  - superior thoracic
  - thoracoacromial (pectoral branches)
  - lateral thoracic (most important)
  - subscapular arteries
- Medially, branches from the internal thoracic artery
- The second to fourth intercostal arteries via branches that perforate the thoracic wall and overlying muscle.



VENOUS DRAINAGE OF BREAST

- The axillary, internal thoracic, and the third to fifth intercostal veins
- The axillary vein is formed by the junction of the basilic and brachial veins and receives one or two pectoral branches from the breast
- The perforating tributaries from the medial half of the breast carry the greater part of the venous drainage. They enter the internal thoracic vein, which joins the brachiocephalic vein
- The intercostal veins communicate posteriorly with the vertebral venous system, which enters the azygos, hemiazygos, and accessory hemiazygos veins, which in turn drain to the superior vena cava.

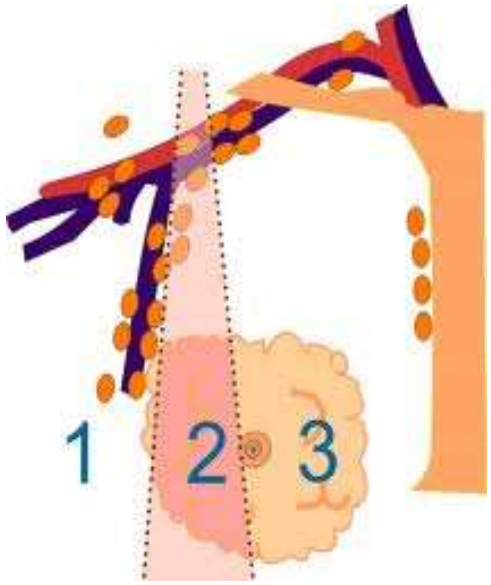
LYMPHATIC DRAINAGE OF THE BREAST

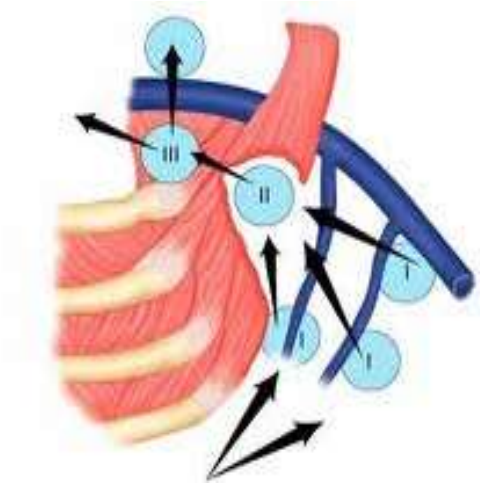
1. Axillary: Interpectoral (Rotter's) nodes and lymph nodes along the axillary vein and its tributaries
2. Internal mammary: Lymph nodes in the intercostal spaces along the edge of the sternum

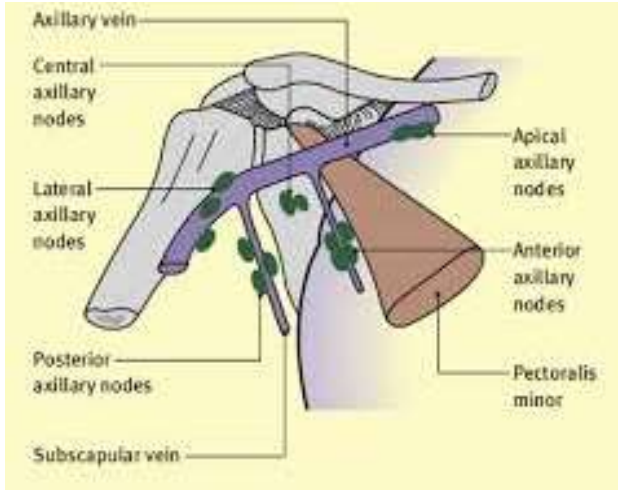
Axillary nodes are divided into

- Level I (low axilla): lymph nodes lateral to the lateral border of the pectoralis minor muscle
- Level II (midaxilla): lymph nodes between the medial and lateral borders of the pectoralis minor muscle and the interpectoral (Rotter's) lymph nodes
- Level III (apical axillary): lymph nodes medial to the medial margin of the pectoralis minor muscle including those designated as subclavicular, infraclavicular, or apical

LYMPHATIC DRAINAGE







INNERVATION OF BREAST

- Innervation of the breast is via anterior and lateral cutaneous branches of the second to sixth intercostal nerves.
- The nipple is innervated by the fourth intercostal nerve.
- **Thoracodorsal Nerve**: arises deeply from the posterior cord of the brachial plexus and innervate the latissimus dorsi muscle
- **Long Thoracic Nerve:** innervates the serratus anterior muscle and lies on it
- **Anterior Thoracic Nerves (Pectoral):**
- **Intercostobrachial Nerve:** lateral cutaneous branch of the 2nd or 3rd intercostal nerve

ROLE OF SURGERY IN BREAST CANCER

- TO ESTABLISH THE DIAGNOSIS:

a) Biopsy.

b) Impalpable breast lesion: image guided localisation and excision

- CURATIVE SURGERY: Surgery of the primary tumour in the breast
- AXILLA MANAGEMENT:
- for staging and local control of axillary metastasis.
- there is a shift from routine axillary dissection in all patients to avoidance of axillary dissection by SLNB in impalpable ln where SLNB is negative for malignancy
- REHABILATION AND RECONSTRUCTION:

a) Autologous tissue transfer: TRAM or LD flap

b) Prosthetic reconstruction: silicone,saline filled or combined implants

MANAGEMENT OF PRIMARY IN THE BREAST

A. WHOLE BREAST REMOVAL

1. Modified Radical Mastectomy (MRM) with routine axillary clearance
2. Total mastectomy with sentinel node biopsy and proceed to axillary clearance only if SLNB positive for malignancy

B. BREAST CONSERVATIVE SURGERY

1. Wide local excision with routine axillary clearance
2. wide local excision or with SLNB and proceed based on SLNB findings.

WHOLE BREAST REMOVAL

MODIFIED RADICAL MASTECTOMY

- Complete removal of breast tissue,underlying pectoralis major fascia and removal of axillary lymph nodes.
- Done by elliptical transverse incision that encompasses the nipple areola complex and any biopsy scar if open biopsy was performed.
- Skin flaps are created in the plane between subcutaneous fat and underlying breast tissue.
- Dissection extends superiorly from inferior border of clavicle,inferiorly to superior extent of rectus sheath,laterally to latissimus dorsi muscle and posteriorly to fascia of pectoralis major.
- Once breast is lifted of the chest wall ,clavipectoral fascia is incised to gain entry into axilla.

INDICATIONS OF MASTECTOMY

- Patient choice: not desiring of breast conservative surgery.
- Patient with contraindications to BCS: like more than 1 primary in separate quadrants,diffuse microcalcification, persistent positive margin after repeated surgical attempts,large tumour compared to small breast.
- Patient with contraindications to radiotherapy: that follows BCS like pregnancy,previous therapautic radiation history,collagen vascular diseases

SIMPLE MASTECTOMY

TOTAL MASTECTOMY

- Removal of entire breast with same limits of excision as MRM
- Axillary nodes are preserved
- INDICATIONS

- DCIS patients electing mastectomy
- Prophylactic mastectomy
- Recurrence in breast following BCS where axillary dissection was already done
- Toilet mastectomy in metastatic disease .

VARIATIONS OF MRM

- Patey's operation: includes removal of pectoralis minor muscle, removal of all 3 levels of axillary nodes.
- Scanlon's operation: pectoralis minor is incised
- Auchincloss operation: pectoralis minor is left intact and pectoral nerves are preserved

EVOLUTION OF MRM

- HALSTED RADICAL MASTECTOMY(1894):

STRUCTURES REMOVED	STRUCTURES PRESERVED
• ENTIRE BREAST WITH NIPPLE AREOLA COMPLEX CONTAINING THE TUMOUR • PECTORALIS MAJOR AND MINOR MUSCLES • FAT FASCIA AND LYMPH NODES OF AXILLA • FEW DIGITATIONS OF SERRATUS ANTERIOR	• AXILLARY VEIN • BELLS NERVE (NERVE TO SERRATUS ANTERIOR) • CEPHALIC VEIN

↓

NEW YORK MEMORIAL HOSPITAL STUDY(1940-43)

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EXTENDED RADICAL MASTECTOMY: ADDS en block REMOVAL OF INTERNAL MAMMARY LNS

↓

NSABP B-04 TRIAL

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MODIFIED RADICAL MASTECTOMY

- MODIFIED RADICAL MASTECTOMY:

Structures preseved .

- Pectoralis major muscle.
- Nerve to serratus anterior (long thoracic nerve)
- Nerve to latissimus dorsi (thoracodorsal nerve)
- Intercosto brachial nerve (if possible)

COMPLICATIONS OF MASTECTOMY

- Wound infection:

MC organisms streptococcus or staphylococcus aureus.

More in 2 step procedures like open biopsy followed by mastectomy

Prolonged suction catheter drainage

- Necrosis of skin flaps

Denuding subcutaneous fat from flaps

Closure under tension

Occlusive pressure dressing

- Seroma formation

Very common.

BREAST CONSERVING SURGERY

- BCS is part of BCT(breast conserving therapy) where bulk of tumour removed surgically and radiation used to eradicate any residual disease

- WIDE LOCAL EXCISION: Tumour with rim of about 1 cm normal tissue

SURGICAL PRINCIPLES OF BCS

- Curvilinear incision following langer's line
- Incision over or close to the tumour
- 1cm or larger margin of normal breast tissue in all 3 direction excised
- Pectoralis fascia for deep breast lesions may be included
- If tumour invades pectoralis major muscle wide local excision of muscle performed
- Specimen orientation and frozen section for evaluation of margins
- Separate incision for axillary dissection
- Placement of radioopaque hemoclips to mark base of biopsy site for future radiotherapy

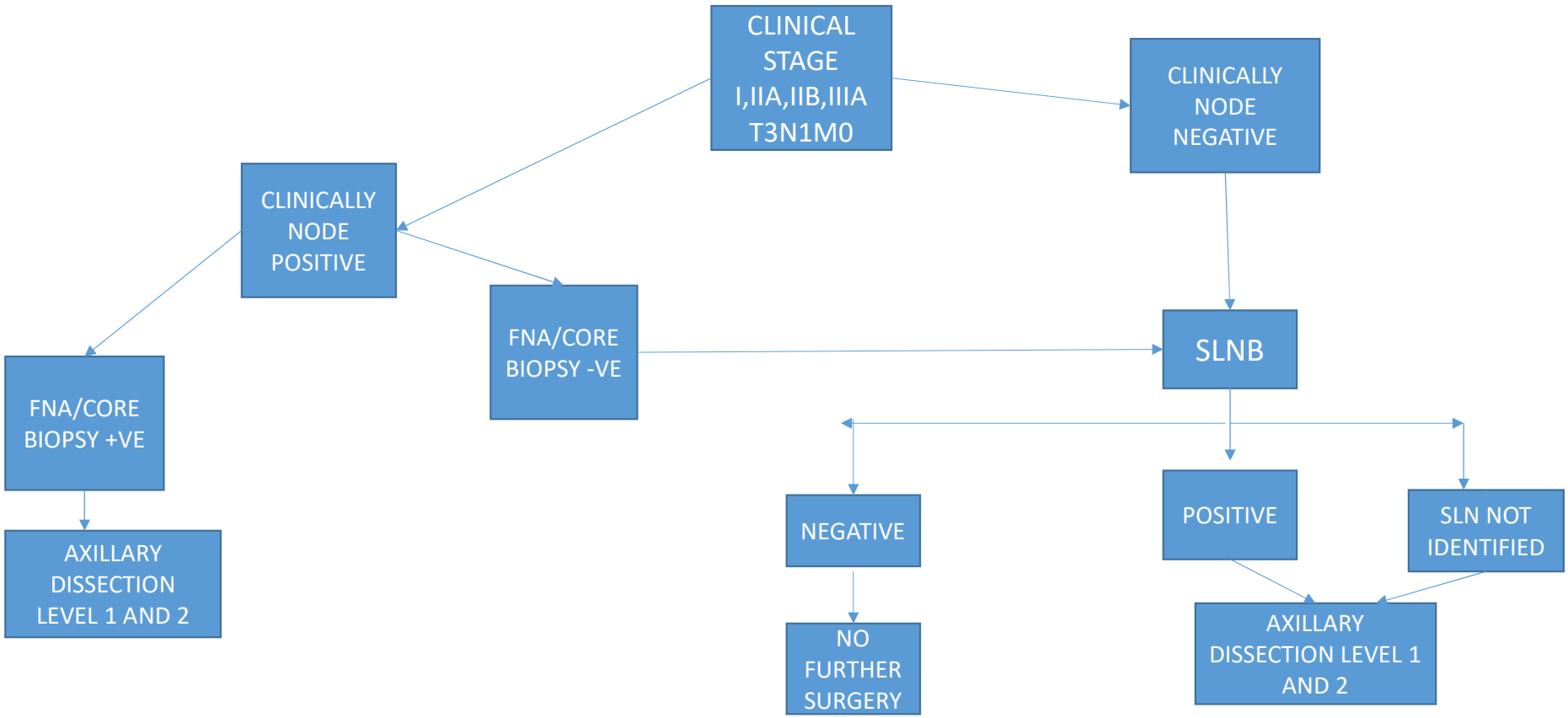
CONTRAINDICATION TO BCT

- ABSOLUTE CONTRAINDICATIONS
  - Pregnancy
  - 2 or more primary in separate quadrants
  - Diffuse malignant appearing microcalcifications
  - Persistent positive margin after reasonable surgical attempts.
  - Inflammatory breast carcinoma.
- RELATIVE CONTRAINDICATION
  - History of collagen vascular diseases like scleroderma, active SLE.
  - Prior Radiation to chest wall or breast.
  - Large tumour compared to small breast
  - Genetic predisposition,BRCA,Li Fraumani.

EXTENSION OF BCT INDICATION

- locally advanced breast cancer following neoadjuvant chemotherapy
- Subareolar tumours and paget's disease: if disease confined to central unifocal area then central segmentectomy followed by nipple areola reconstruction
- Multiple tumours: if single excision specimen can encompass all the tumours with negative margin and cosmetically satisfactory residual breast

MANAGEMENT OF AXILLARY LYMPH NODES



MANAGEMENT OF AXILLA

- Routine axillary LN dissection includes level Iand II lymph nodes
- Aim is local control in axilla and accurate axillary staging
- Done in all clinically or radiologically axillary node positive cases (in both mastectomy and BCS surgery)
- In Mastectomy axillary dissection done by extension of mastectomy incision and incising clavipectoral fascia
- in BCS separate axillary incision given below axillary skin fold extending from lateral border of pectoralis major to anterior border of latissimus dorsi.

EXTENT OF AXILLARY LN DISSECTION

- Plane of dissection is 5mm beneath skin
- Dissection from axillary vein to fifth intercostal space
- Level I lns lateral to pectoralis minor dissected and level II lying posterior is dissected by elevating the muscle by retractor
- level III dissected only if there is grossly positive level II axillary nodes
- Long thoracic, Thoracodorsal and medial pectoral nerve should be preserved

SENTINEL LYMPH NODE BIOPSY

- Sentinel lymph node is the first node that drains a cancer
- Indicated in small primary with clinically negative axillary nodes and no prior axillary surgery
- Aim is to avoid axillary dissection in selected node negative cases
- Uses : Dual technioque is preferred with
  - Radioactive Tag: filtered Tc 99m sulfur colloid
  - Vital dye like 1% isosulfan blue,lymphazurin about 4-5ml dye injected

Radioactive tag is identified using handheld gamma probe intra operatively or by lymphoscintigraphy using gamma camera before surgery

when vital dye is used SLN is identified visually intra op as the most proximal blue node in axilla.

INDICATIONS	CONTRAINDICATIONS
• Early stage invasive breast cancer • Clinically node negative • Unifocal or multicentric disease • Either gender • All ages • Previous fine-needle aspiration, core biopsy, or excisional biopsy	• Pregnant or lactating women • Inflammatory breast cancer • Preoperative chemotherapy recepients • Grossly palpable, N2 lymph nodes • Prior axillary surgery

COMPLICATIONS OF AXILLARY LN DISSECTION

- Injury or thrombosis of axillary vein
- Injury to motor nerves of axilla
- Lymphedema of arm
- Edema of breast
- Seroma formation
- Shoulder dysfunction
- Numbness and parasthesia in upper arm

COMPLICATIONS

DYE COMPLICATIONS	SURGICAL COMPLICATIONS#
▪ Allergy (urticaria and anaphylaxis) due to blue dye ▪ Pseudosaturation on pulse oximetry due to isosulfan blue ▪ Staining of epidermis, greenish discoloration of stool and urine ▪ Skin erythema, superficial ulceration, or necrosis (methylene blue)	▪ Wound infection ▪ Seroma ▪ Lymphedema* ▪ Parasthesia of upper arm Lymphedema 5% in SLNB compared to 13% in ALND

SUMMARY :

- MRM and BCS are equivalent surgical options in early breast cancer.
- Long term studies have shown similar Overall survival with both procedures,although the local recurrence is 2-3 % higher in BCS group.
- Radiotherapy is compulsary in case of BCS.
- Chemotherapy indications does not depend on MRM or BCS,it depends on other factors like tumour size,node positivity.
- BCS can also be offered in highly selective Locally advanced breast cancer patients with complete response after chemotherapy.

Thank You