

**“A STUDY ON THE INCIDENCE OF SEROMA AND
LYMPHEDEMA FOLLOWING AXILLARY TREATMENT
OF BREAST CANCER”**

**A DISSERTATION SUBMITTED TO THE TAMILNADU
DR MGR MEDICAL UNIVERSITY
CHENNAI**

**In partial fulfillment of the requirement for the degree of
M.S. (GENERAL SURGERY)
BRANCH – I
Register No: 221711368**



**DEPARTMENT OF GENERAL SURGERY
TIRUNELVELI MEDICAL COLLEGE
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MAY 2020

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PRINCIPAL INVESTIGATOR: POST GRADUATE STUDENT

DESIGNATION OF PRINCIPAL INVESTIGATOR: DR.M.SENTHIL KUMAR, MBBS.

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Dear Dr. M.SENTHIL KUMAR, MBBS: The Tirunelveli Medical College Institutional Ethics Committee (TREC) reviewed and discussed your application during the 180th meeting held on 27.10.2017.

THE FOLLOWING DOCUMENTS WERE REVIEWED AND APPROVED

1. TREC Application Form
2. Study Protocol
3. Department Research Committee Approval
4. Patient Information Document and Consent Form in English and Vernacular Language
5. Investigator's Structure
6. Proposed Methods for Patient Annual Progress
7. Curriculum Vitae of The Principal Investigator
8. Insurance / Compensation Policy
9. Investigator's agreement with sponsor
10. Investigator's Undertaking
11. DCGI/DOPT approval
12. Clinical Trial Agreement (CTA)
13. Memorandum of Understanding (MOU)/Material Transfer Agreement (MTA)
14. Clinical Trials Registry-India (CTRI) Registration

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1. The approval is valid for a period of 2 year/s or duration of project whichever is later
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3. A written report should be submitted 3weeks before for renewal / extension of the validity
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6. At the time of PI's retirement/leaving the institute, the study responsibility should be transferred to a person named by NGO.
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<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5841370/>
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LIST OF ABBREVIATIONS

ACOSOG	-	American College of Surgeons
ALND	-	Axillary Lymph Node Dissection
BCS	-	Breast Conserving Surgery
BMI	-	Body Mass Index
BRCA	-	Breast Cancer
CI	-	Confidence Interval
DCIS	-	Ductal Carcinoma Insitu
ER	-	Estrogen Receptor
HR	-	Hazard Ratio
LABC	-	Locally Advanced Breast Cancer
LCIS	-	Lobular Carcinoma Insitu
MRM	-	Modified Radical Mastectomy
MUAC	-	Mid Upper Arm Circumference
NLN	-	National Lymphedema Network.
PR	-	Progesterone Receptor.
RT	-	Radiotherapy
SLN	-	Sentinel Lymph Node
SLND	-	Sentinel Lymph Node Dissection
TNM	-	Tumour Node Metastasis
WHO	-	World Health Organisation

INTRODUCTION

Breast cancer accounts for 26% of all female cancers (excluding non melanoma skin cancers and insitu cancers).despite significant studies in the treatment of breast cancer,more than 40000 women die of the disease each year.the public has become increasingly aware of the disease and as a result ,women presenting with breast complaints are anxious about the possibility of being diagnosed with breast cancer.clinicians evaluating women with breast complaints should provide a comprehensive ,efficient and timely consultation so that anxiety can be relieved by a benign diagnosis or a treatment plan can be instituted properly should the cancer be diagnosed.treatment for a breast cancer is a multidisciplinary approach.it involves surgery ,radiotherapy and chemotherapy.there are a spectrum of surgical options available such as breast conservation,mastectomy with or without axillary dissection.there are different kinds of mastectomy –simple mastectomy ,extended simple mastectomy,subcutaneous mastectomy,skin sparing mastectomy,nipple areola sparing mastectomy,patey’s modified radical mastectomy,scanlon’s MRM,auchincloss MRM,halstead radical mastectomy.likewise there are diferent modes of radiotherapy available-external beam radiotherapy ,brachytherapy ,intensity modulated radiotherapy with or without including the axilla .complications are therefore inevitable following treatment of breast cancer.among those,I have intended to study two most important and troublesome complications viz seroma and lymphedema and the various risk factors which predispose to their occurrence,in patients of tirunelveli medical college hospital.

OBJECTIVES OF THE STUDY

1. To Estimate the incidence of seroma and lymphedema in breast cancer patients who are subjected to surgery and radiotherapy involving the axilla.
2. To determine the factors which predispose to the incidence of seroma and lymphedema.

REVIEW OF LITERATURE

ANATOMY OF BREAST:

Breast tissue is a modified sweat gland. It is a mammary gland which arises or develop within the ‘milk line’ which extends between the limb buds from the primordial axilla distally to the inguinal area. In humans only one pair of glands normally develop in the pectoral region¹. Development of breast starts at the fifth or sixth weeks of fetal development. Milk mammary ridges is nothing but thickened Ectoderm. Each breast develops when an ingrowth of ectoderm forms a primary tissue bud in mesenchyme. 15 to 20 Secondary buds develop from primary bud from secondary buds, Epithelial cords develop and extend in surrounding mesenchyme major Lactiferous ducts develops and open into a mammary pit. Mesenchyme proliferates and transform the mammary pit into nipple during infancy. Breasts are identical in male and female during birth until puberty. After puberty female breast enlarges in response to Ovarian Estrogen and Progesterone, by proliferation of Epithelial and connective tissue elements, Complete development and functional maturation of breast develops only during pregnancy

Functional Anatomy of breast:

Breast is located within the deep part of superficial fascia. It extends Cranio caudally from 2nd or 3rd rib to 6th or 7th rib , medially upto lateral margin of sternum and laterally upto anterior axillary line.

Petromammarybursa is located on the posterior aspect between deep layer of superficial fascia and fascia of pectoralis major and muscles of chest wall. Cooper's ligament is a fibrous thickening of supporting connective tissue which interdigitate between the breast parenchyma in perpendicular fashion extending from deep layer of superficial fascia upto dermis of skin. This ligament is responsible for contour and structural support of breast and mobility of the breast. Breast parenchyma extends into anterior axially fold as Axillary tail of Spence. Greater volume of breast is contained in the upper outer quadrant. Breast is related posterior to pectorals major, Serratus anterior, external oblique muscles and part of anterior rectus sheath.

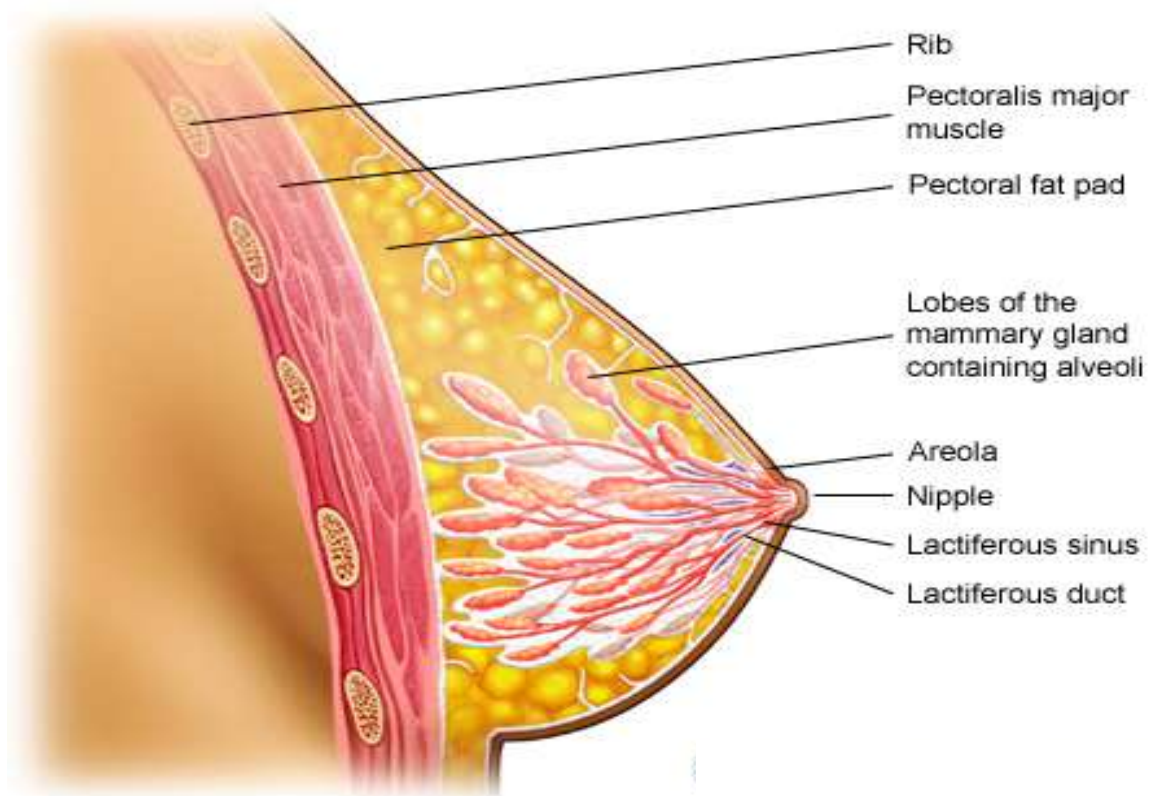


Fig 1;gross anatomy of breast

Breast contains lobes (15 to 20 in number) which are glandular tissues. Fibrous connective tissue that supports the lobes and adipose tissue that resides between the lobes. Each lobes contain several lobules. Each lobe terminates in major lactiferous duct (2-4 mm) in diameter which opens through the orifice of 0.4 to 0.7 mm in diameter. Each major duct has a dilated portion immediately below the nipple areolar complex, which is called lactiferous sinus.

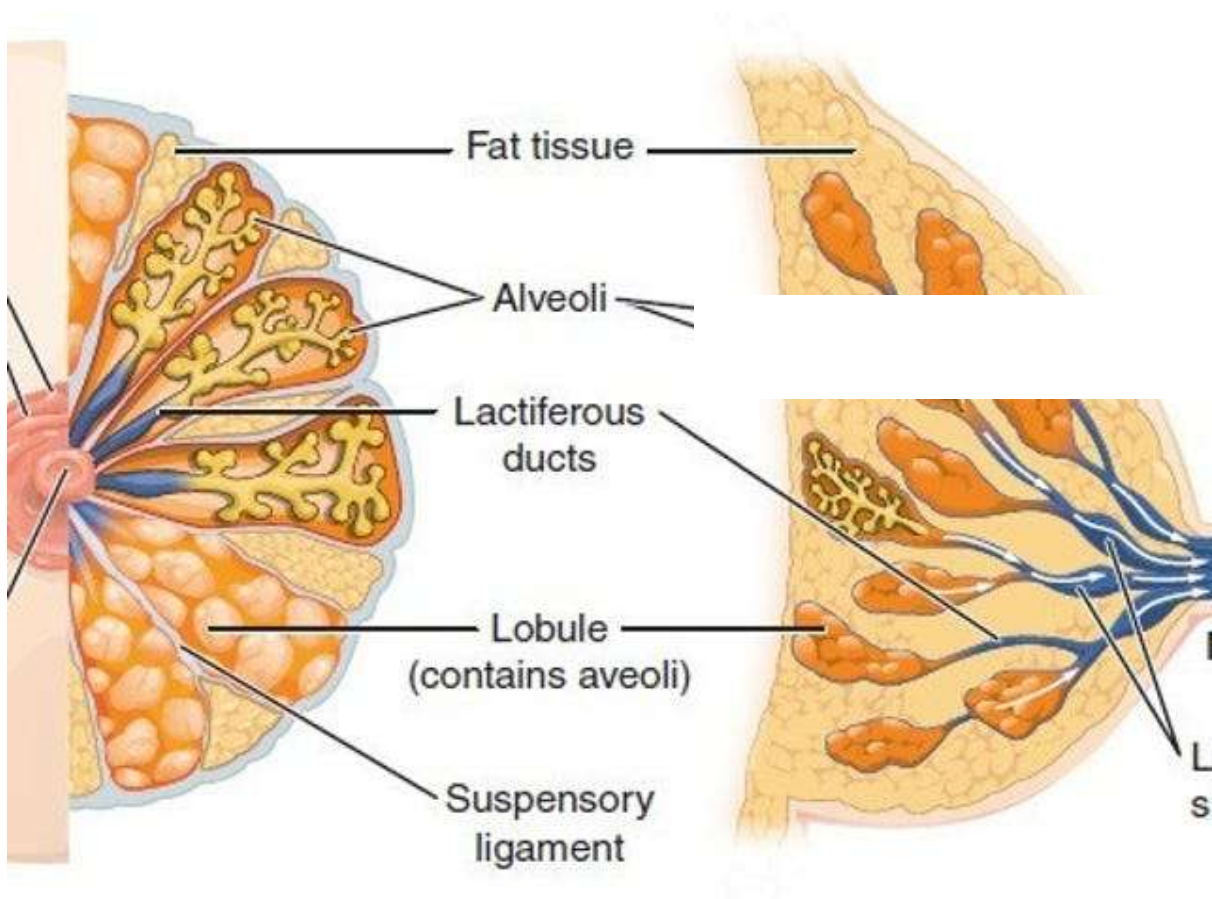


Fig 2; Cross sectional anatomy of female breast

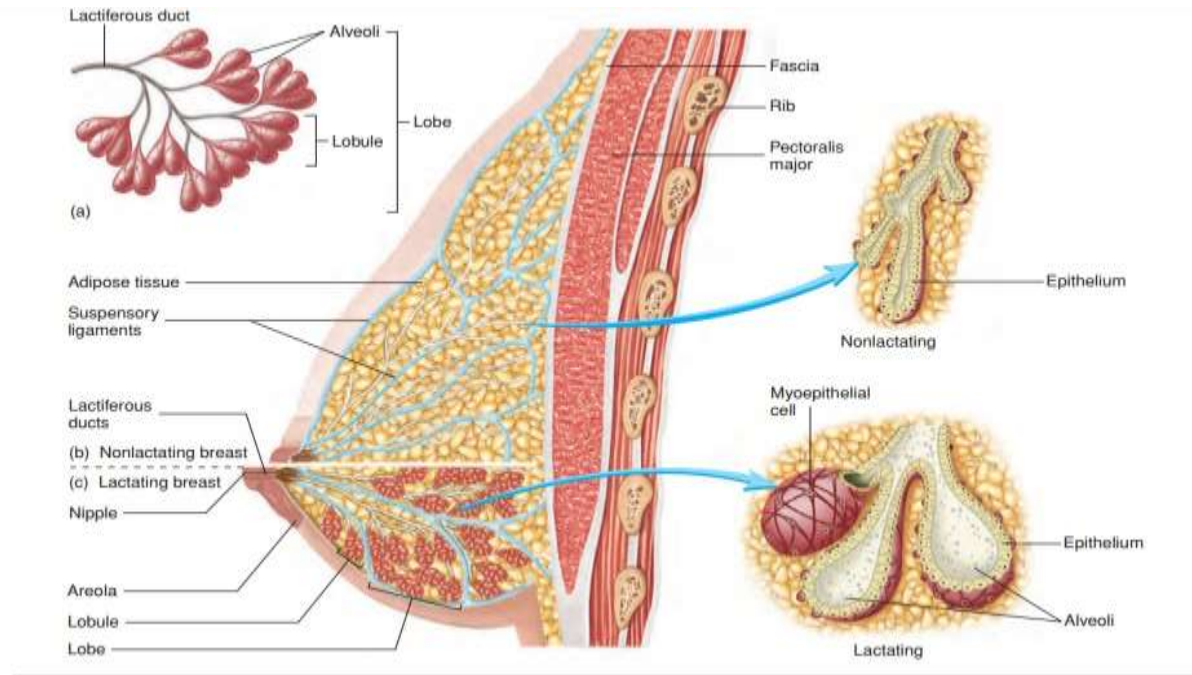


Fig 3; Lactating and non lactating breast

Anatomy of axilla:

Axilla is a pyramidal compartment, which has four boundaries with an apex and a base. Base is oblique and curved containing axillary fascia.

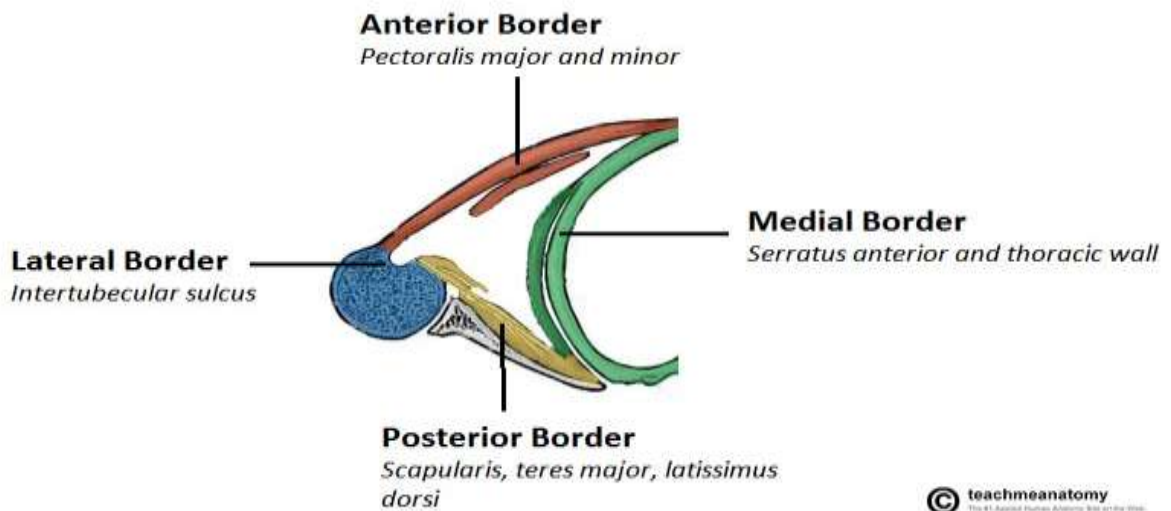


Fig 4; Boundaries of Axilla

Cervico-axillary canal is an aperture at the apex of the axilla that extends into posterior triangle of neck.

Anterior wall of axilla- Pectoralis major and minor.

Posterior wall: Subscapularis

Lateral wall: Bicipital groove

Medial wall: Serratus anterior

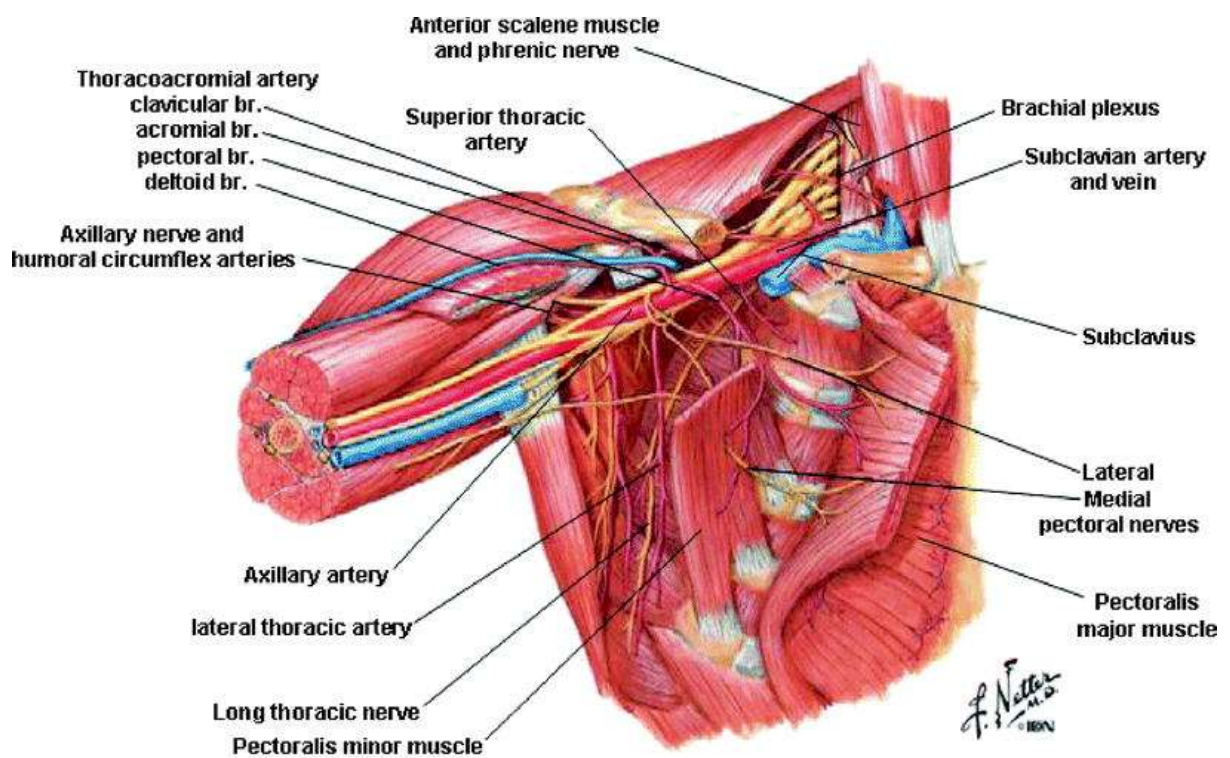


Fig 5; Branches of axillary artery and its relations.

Pectoral fascia invests the Pectoralis major muscle superficially and clavipectoral fascia invests posteriorly. The latter encloses subclavius and pectoralis minor muscle. Halsted's ligament is a dense condensation of clavipectoral fascia that extends from the medial aspect of clavicle attaches to 1st rib and invests the subclavian artery and vein.

Blood Supply of Breast:

Arterial supply

1. Perforating branches of internal mammary artery
2. Lateral branches of the Posterior intercostals arteries.
3. Branches of the axillary artery.
 - Supreme thoracic Artery (from 1st part of axillary artery)
 - Lateral thoracic artery (from second part of axillary artery)
 - Pectoral branches of Thoraco acromial artery.(second part of axillary artery)

Venous drainage:

Preferential directional flow toward the axilla veins parallel with arterial distribution. Circulus Venosus anastomosis around the nipple areolar complex and drains blood towards the periphery to one of the following veins

- 1) Perforating branches of internal mammary vein
- 2) tributaries of axillary vein
- 3) perforating branches of posterior intercostal.

The Posterior intercostal veins communicates with Vertebral venous plexus called Bateson Plexus through which carcinoma breast metastasise to vertebra and distant organs.

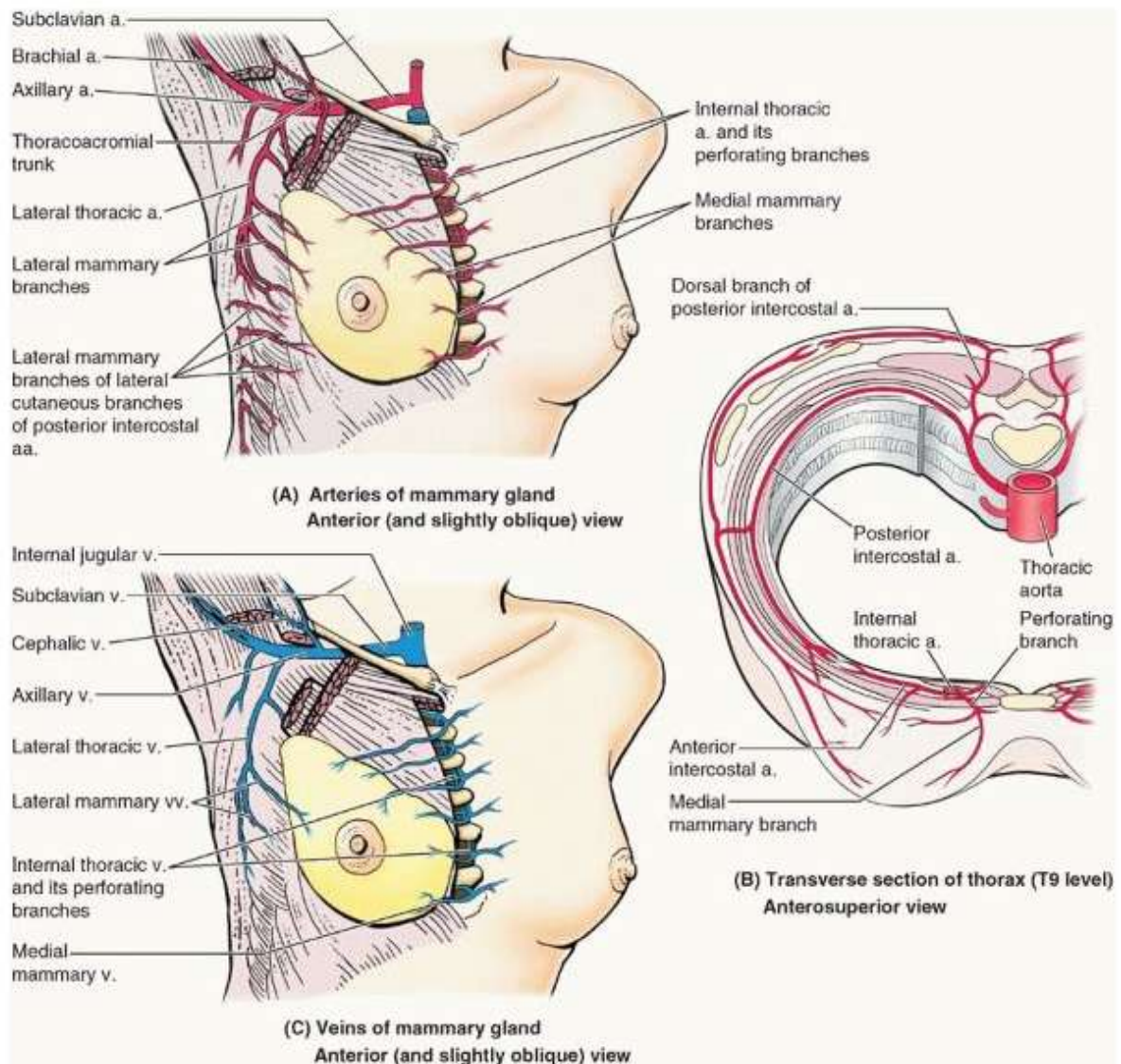


Fig 6; Blood supply of breast

Nerve Supply of breast :

Lateral and anterior cutaneous branches of second to sixth intercostals nerves. The third to sixth branches are called Lateral mammary branches, which supply majority of surface of breast. The Intercostobrachial nerve, a large and constant sensory nerve, takes origin from the lateral branch of second Intercostal nerve. It joins the medial cutaneous nerve of arm. Injury to

intercostobrachial nerve during axillary dissection causes loss of sensation over upper medial aspect of arm and axilla.

Lymphatic drainage of breast:

1. Axillary Lymph node groups (majority)
2. Internal mammary nodes

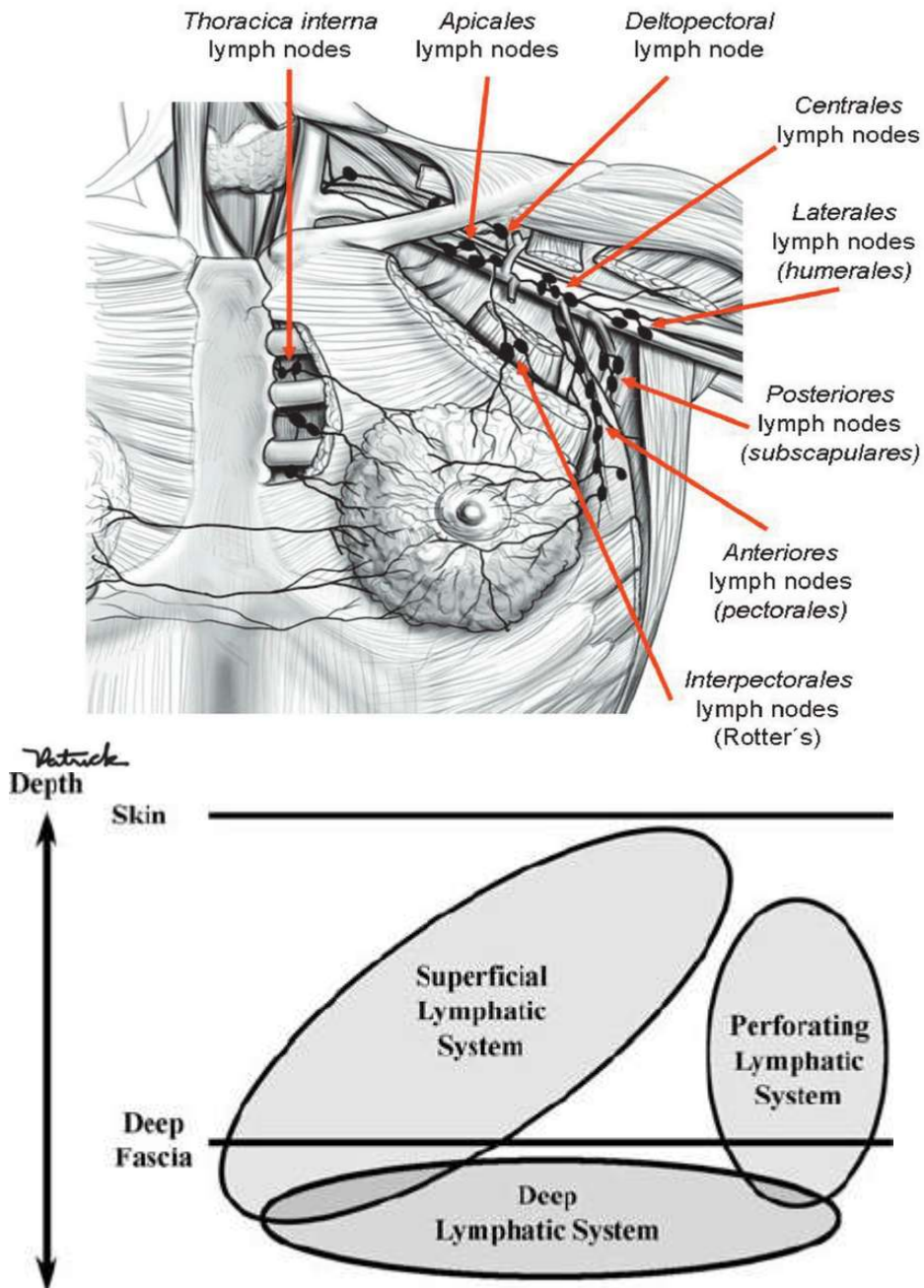


Fig 7; Lymphatic drainage of breast

Axillary nodes are classified into:

1. Axillary vein group: (Lateral group)

Consists of 4 to 6 nodes anterior and medial to axillary vein. Drains majority of upper extremity.

2. External mammary group: (anterior group)

Consists of 5 to 6 nodes. Located along the lateral thoracic vessels, along the lower border of Pectoralis minor.

3. Scapular group: (posterior group)

Consists of 5 to 7 nodes along the posterior wall of axilla at the lateral border of axilla contiguous with subscapular vessels.

4. Central group:

Contains 3 to 4 nodes lying immediately posterior to pectoralis minor muscles. They receive lymphatic drainage from anterior, posterior and lateral group of lymph nodes.

5. Subclavicular group: (apical group)

6 to 12 nodes lie posterior superiorly to upper border of pectoralis minor. They receive lymphatic drainage from the above mentioned lymph node groups.

6. Interpectoral (Rotter's) nodes:

Contains 1 to 4 nodes. Between pectoralis and pectoralis minor muscles. They drain directly into central and subclavicular groups.

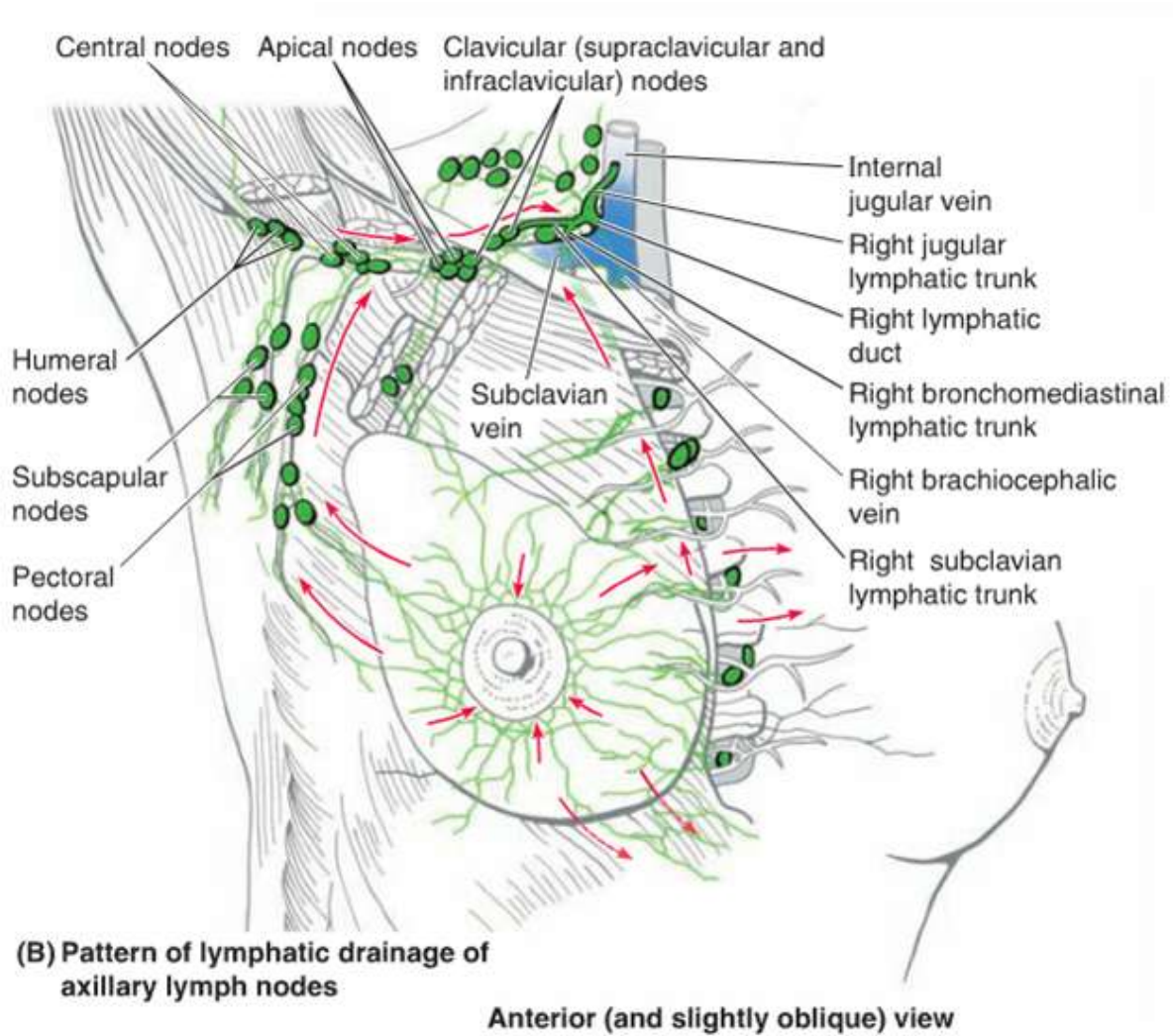


Fig 8; Pattern of lymphatic drainage of breast

Lymph nodes are assigned levels according to their relation with pectoralis minor.

- | | |
|------------|--|
| Level I: | Anterior group
Posterior group
Lateral group |
| Level II: | Central group
Interpectoral group |
| Level III: | Subclavicular group |

Internal mammary nodes:

Some Central and medial breast lymphatics pass medially parallel to the course of major blood vessels and terminate in Internal mammary nodes. They are located within the retrosternal interspace between the costal cartilages approximately 2 to 3cm within sternal margin.

They drain into subclavicular groups. There are three interconnecting groups of Lymphatic vessels that drain the breast ².

1. Primary vessels originate as channels within the gland in the interlobular spaces and parallel to the lactiferous ducts of breast parenchyma.

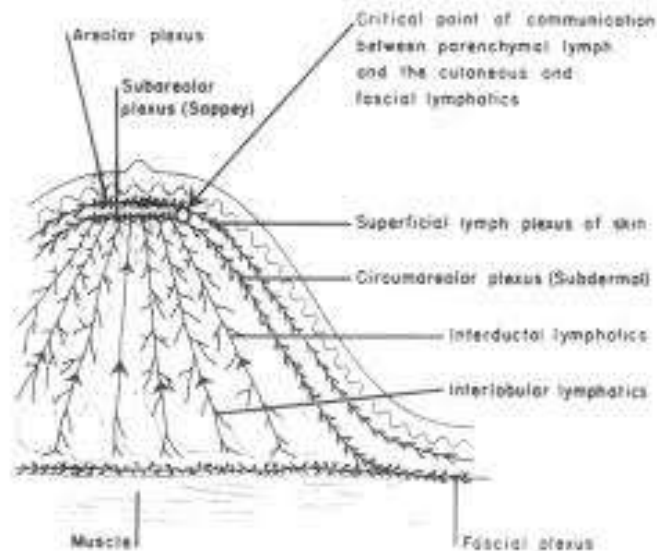


Fig 9; Intramammary lymphatic drainage

2. The vessels draining the glandular tissue and the overlying skin of the Central part of the gland pass directly into the subareolar plexus, an interconnecting network of vessels located beneath the areola.

2. The rich lymphatic plexus lie upon the deep surface of the breast to communicate with minute vessels that parallel the deep fascia underlying the breast.

Both axillary and parasternal nodes receive lymph from all quadrants of breast. Efferent lymph vessels from breast pass around the lateral edge of pectoralis major muscle and pierce the clavipectoral fascia, Ending in the external mammary group of nodes. Some may travel directly to subscapular group few pass directly to subclavicular group. Axillary nodes receive more than 75% of lymph drainage from breast.

CARCINOMA BREAST:

More than 40000 women die of breast cancer disease every year world wide. Incidence of breast cancer in women is 26% among all other cancers. Death due to breast cancer has significantly been reduced in recent years due to increasing awareness among female population and advances in screening protocols and management. Breast cancer is a systemic disease. Hence Surgery alone is not sufficient for disease cure. Radiotherapy, Chemotherapy and Hormonal therapy are included in the treatment stream.

Risk Factors:

Increased exposure to estrogen is responsible for the increased cancer risk.

Estrogen exposure is increased in

- Early menarche
- Nulli parity
- Late menopause
- Obesity
- Alcohol consumption
- Food in take with high fat content

other risk factors are Radiation Exposure like patients who received mantle radiation therapy for Hodgkin's Lymphoma radiation exposure during adolescence, increases the risk many fold.

Mutations in breast Cancer susceptibility genes BRCA1 and BRCA2 has 45% and 35% incidence of Carcinoma breast respectively. Other mutation which has high risk for developing cancer as P53, STK11/LKB1, PTEN, MSH2/MLH1, ATM gene mutations.

Course of the disease:

When the Cancer grows, there will be a desmoplastic reaction and direct infiltration of tumour in the cooper's ligament which is shortened and produce skin retraction. When subdermal lymphatics are involved, Characteristic Peaud' orange appearance develops with continued growth, Cancer invades skin and ulceration occurs. Sometimes satellite nodules appear. As the size of primary tumour increases, some are shed into cellular space and carried by the lymphatics to regional nodes. When growth increases in the nodes, it undergoes extra capsular invasion to infiltrate adjacent nodes and form a conglomerate mass. Distant metastasis starts occurring anytime after the primary tumour exceeds 0.5 cm in diameter which corresponds to 27th doubling.

Distant metastasis is the most common cause of death after 10 years of diagnosis & treatment. Common sites of involvement of metastasis according to the frequency are

1. Bone
2. Lung
3. Pleura
4. Soft tissues
5. Liver

TNM STAGING OF CARCINOMA BREAST (AJCC 8 GUIDELINES)

TNM class	Criteria
T0	No evidence of primary tumor
T1a	Carcinoma in situ
T1	< or = 2 cm
T1m1c	microinvasion .1 cm or less
T1a	>.1 to .5 cm
T1b	>.5 to 1 cm
T1c	>1 to 2 cm
T2	>2 to 5 cm
T3	>5cm
T4	Any size tumor with direct extension to : a) Chest wall or b) skin
T4a	Chest wall, not including pectoralis muscle
T4b	Skin edema, ulceration, satellite skin nodule
T4c	4a and 4b
T4d	Inflammatory carcinoma
Nx	Regional lymph nodes cannot be removed
N0	No regional lymph node metastasis
N1	Metastasis to movable ipsilateral axillary lymph nodes
N2	Metastases in ipsilateral axillary lymph nodes fixed or matted (N2a) or met. only in clinically apparent ipsilateral mammary nodes without clinically evident axillary lymph nodes. (N2b)
N3	Metastases in ipsilateral infraclavicular lymph nodes (N3a) or clinically apparent ipsilateral internal mammary lymph nodes (N3b) or ipsilateral supraclavicular lymph nodes (N3c)
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

Sub categories of the T4 classification, using P factors (pathology)

Sometimes the **T classification** is modified by what might be called “*P factors*“, which refer to clinical observations made by a pathologist examining lymph node tissue, using a microscope. “*P*” indicates ‘*proved*‘ by **pathology**.

P classification	Criteria
PNx	Regional lymph nodes cannot be assessed, No regional l. node metastasis histologically, Metastasis in 1-3 axillary lymph nodes
pN1mi	Micrometastasis > 0.2 mm to < 2 mm
pN1a	Metastasis > 0.2 mm + at least one node > 2 mm
pN1b	Metastasis in internal mammary l. nodes detected by SLN
pN1c	Metastasis in 1-3 axill. + internal mammary l. nodes by SLN
pN2	Metastases in 4-9 ipsilateral lymph nodes
pN2a	Metastases in 4-9 axillary + at least one > 2 mm
pN2b	Metastasis in clinically apparent internal mammary l. nodes without axillary lymph nodes metastasis
pN3a	Metastases in 10 or more ipsilateral axillary lymph nodes or ipsilateral infraclavicular
pN3b	Clinically apparent internal mammary l. nodes with 1 or more axillary l. nodes or more than 3 axillary lymph nodes with microscopic met. in internal mammary lymph nodes
pN3c	Ipsilateral supraclavicular l. nodes

CLINICAL STAGES OF BREAST CANCER BASED ON TNM GROUPING

Based on of *T*, *N*, and *M* criteria, the following stages, ranging for **zero to IV**, have been identified for breast cancer. Breast cancer stages basically describe the ‘*extent*’ of the breast cancer, and naturally have **implications** for [treatment strategies](#).

Breast cancer stages	Classification criteria based on TNM
Stage 0	Tis, N0, M0
Stage I	T1, N0, M0
Stage IIA	T0, N1, M0 or T1, N1, M0 or T2, N0, M0
Stage IIB	T2, N1, M0 or T3, N0, M0
Stage IIIA	T0, N2, M0 or T1, N2, M0 or T2, N2, M0 or T3, N1, M0 or T3, N2, M0
Stage IIIB	T4, N0, M0 or T4, N1, M0 or T4, N2, M0
Stage IIIC	any T, N3, M0
Stage IV	any T, any N, M1

Histopathology of breast Cancer:

If the Cancer does not invade the basement membrane, it is called carcinoma insitu. They are of two types.

DCIS (Ductal Carcinoma insitu)

LCIS (Lobular Carcinoma insitu)

LCIS is most commonly observed in breast tissues that contain microcalcifications. They originate from terminal duct lobular units. Develop only in female breast. Characteristic Cellular features are

Cytoplasmic mucoid globules and neighbourhood

Calcification LCIS is a marker of increased risk of Invasive breast cancer.(either Invasive lobular or Invasive ductal carcinoma) rather than anatomical precursor as seen in DCIS. DCIS is characterised by proliferation of epithelium that lines the minor ducts. They are again subclassified into

- 1) Papillary growth pattern
- 2) Cribriform growth pattern
- 3) Solid growth pattern

with increasing tumour necrosis, they are grade according to seniority as

Comedo – high grade

Intermediate- Intermediate grade

Non comedo – Low grade

Invasive Carcinoma:

Most of them are ductal Carcinomas 10% have special histologic types
. 80% are described as Invasive ductal Carcinoma no specific type(NOS)

Foot – Stewart classification of Invasive breast Cancer

- 1) Paget's disease of nipple
- 2) Invasive ductal carcinoma
- 3) Medullary carcinoma
- 4) Mucinous carcinoma
- 5) Papillary carcinoma
- 6) Tubular carcinoma
- 7) Invasive lobular carcinoma
- 8) Adenoid cystic carcinoma
- 9) Squamous cell carcinoma
- 10) Apocrine carcinoma

Staging of Breast Cancer: (TNM staging)

(schematic)

including 'P' staging of nodes.

Diagnosis of breast Cancer:

Clinically one should elicit the signs and symptoms of breast cancer. Viz,

- Breast enlargement or asymmetry
- Nipple changes(retraction, discharge)
- Ulceration of skin over breast

- Musculo skeletal discomfort
- Palpable breast mass and its site, extent & morphology
- Axillary adenopathy
- Bone tenderness
- Dyspnoea, cough with hemoptysis.

Investigation required for diagnosis are

- 1) Complete blood count, platelet count
- 2) Liver function test
- 3) Chest radiograph
- 4) Bilateral diagnostic mammograms ultrasonogram(for all stages)
- 5) FNAC (for all stages)
- 6) Trucut biopsy/ Incisional biopsy/Excisional biopsy
- 7) Hormone receptor status
- 8) HER-2/neu expression status.
- 9) Bone Scan (for stage III, IV)
- 10) Abdominal CT scan or USG or MRI (for stage III, IV disease)

Specific mammographic features that suggest a diagnosis of breast cancer include a solid mass with or without stellate features, asymmetric thickening of breast tissues. Clustered micro calcifications.

Screening for Breast Cancer:

Normal risk women above 20 years of age should have a breast examination every 3 years. After 40 years, breast examination should be done annually along with a yearly mammogram.

Management plan for Breast Cancer:

In situ breast cancer:

LCIS – observation

- Chemo prevention
- Bilateral mastectomy

Local or wide local excision of LCIS is not useful due to its multifocality and multicentricity.

DCIS:

Lesion <4cm and involving only one quadrant – Lumpectomy and Radiation therapy

Lesion >4cm or – mastectomy involving more than 1 quadrant

Adjuvant therapy with Tamoxifen is highly useful in both DCIS and LCIS, After Lumpectomy, Radiation is not necessary for DCIS patients who fall into the following category.

- unicentric lesion
- Low to intermediate grade
- DCIS < 2.5 cm
- negative margin \geq 3mm

Early invasive Breast Cancer:

Treatment options are

- 1) Breast conserving surgery
- 2) Mastectomy with axillary staging and radiotherapy
 - Radiation can be avoided in early-stage breast cancer patients who are
 - > 70 yrs of age
 - > T₁ NO, E_R positive cancer
 - Axillary partial Breast irradiation (ABPI) involves low dose-short course radiotherapy of twice daily for 5 days to limit the area of radiation to primary tumour bed with a margin of normal breast tissue.

Eligible candidates are:

- age \geq 60 yrs
- unifocal
- T₁
- E_R positive disease
- No lymphovascular invasion
- Negative margin \geq 2mm

Contra Indication to Breast Conserving surgery:

- Prior radiation to breast or chest wall
- BRCA mutation

- Persistently positive surgical margins after Re-excision
- multicentric disease
- Scleroderma/Lupus Erythematosus.

Nipple areolar sparing mastectomy=for patients who are not planned for post operation.

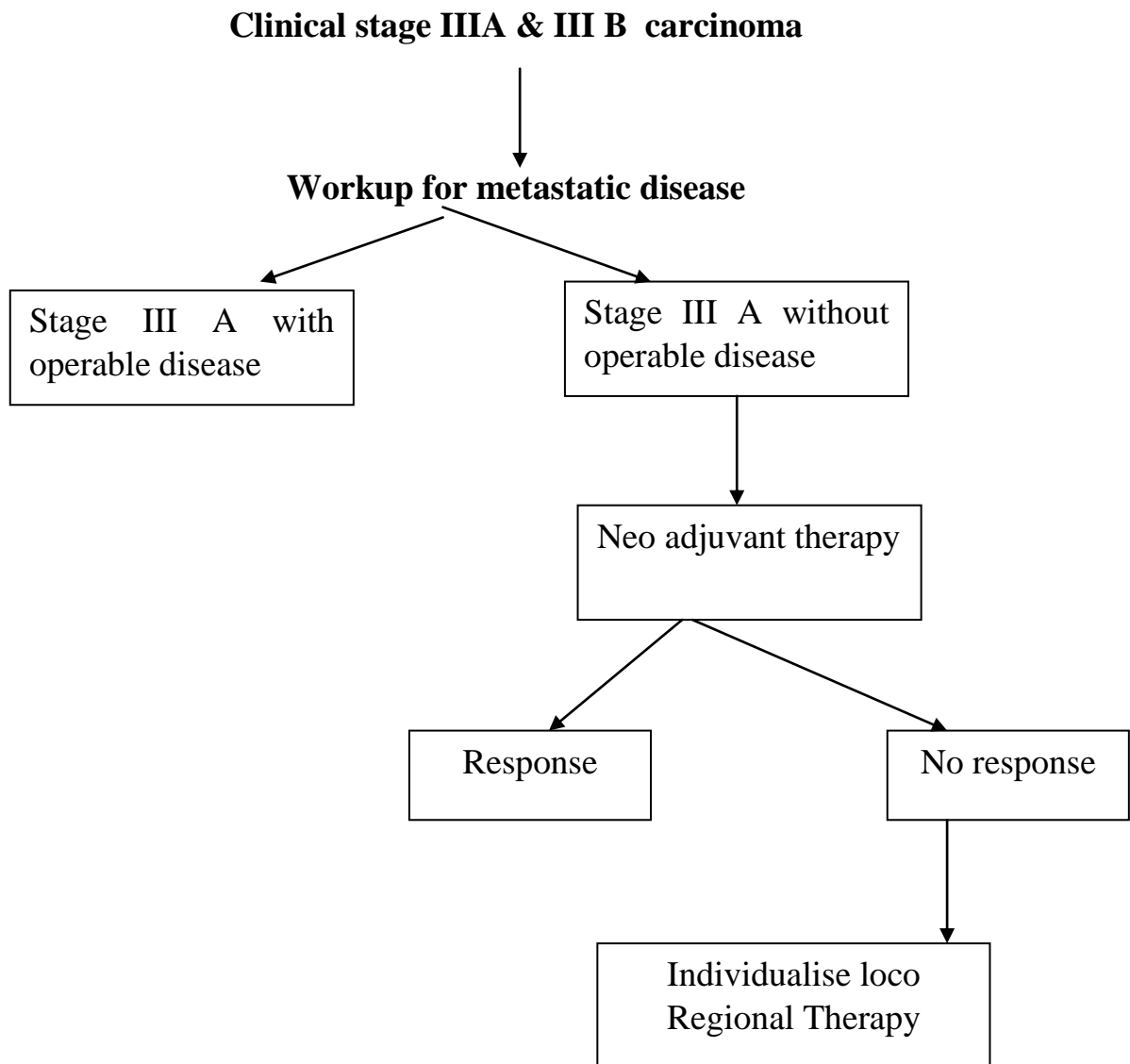
Radiotherapy is also another option. Immediate reconstruction can be performed using implants or autologous tissue flaps.

Adjacent chemotherapy in Early breast cancer:

- node positive cancers
- > 1cm tumour
- patients with node negative cancers and size >0.5 cm who have adverse prognostic features like
- blood vessel or lymph vessel invasion
- high nuclear grade
- high histologic grade
- HER 2/neu over expression
- Negative hormone preceptor status.

Locally Advanced Breast Cancer:

Surgery should be integrated with radiotherapy and chemotherapy. LABC includes stage III A or III B. Cancers most of these patients already have distant metastasis. Algorithm for management of LABC is as follows



Distant metastasis (Stage IV)

Treatment is not curative.

Treatment is individualised based on

- 1) ER/PR status
- 2) presence of bone metastasis
- 3) Presence of metastasis to brain, lung, pleura pericardium, biliary tree, ureter, spinal cord

Endocrine therapy is preferred in E_R positive disease Bisphosphonates are added in bone metastasis. Systemic chemotherapy is preferred in E_R negative, hormone Refractory, Visceral crisis.

Women who undergo resection of primary tumour have improved survival over those who did not have surgical therapy.

Management of Loco Regional recurrence:

Separated into 2 groups.

1. Those who have done mastectomy
2. Those who have done Lumpectomy.

In the former, surgical resection of the Loco regional recurrence is done. Chemotherapy and anti estrogen therapy are added. Adjuvant Radiotherapy is given if no previous radiation was done. In the latter, mastectomy should be done. Chemotherapy and anti estrogen therapy are added.

Surgical techniques employed in management of breast cancer:

They are

- 1) Breast conserving surgery
- 2) mastectomy
- 3) chest wall reconstruction
- 4) Sentinel lymph node dissection
- 5) Excisional biopsy with needle localisation.

Breast conserving surgery:

It involves resection of primary breast cancer with a margin of normal appearing breast tissue along with adjuvant radiation therapy and assessment of regional lymph node status.

Before excising the primary tumour, Sentinel lymph node dissection is performed. After excising the tumour, margin clearance should be assessed. A Negative margin of >2 mm is required. If margin clearance is less than 2 mm, re-excision should be done to avoid recurrence. If clear margins are not obtained even after re excision, mastectomy is required.

Women with DCIS only require excision and adjuvant radiotherapy
SLND is not required.

Mastectomy:

They are different kinds of mastectomy.

- 1) Simple (total) mastectomy:

Removal of all breast tissue, nipple-areola complex and skin involved in the proposed incision area.

2) Skin sparing mastectomy:

Removal of all breast tissue, nipple-areola complex and scars from prior biopsy procedures.

3) Extended Simple mastectomy:

Removal of all breast tissue, nipple-areola complex, skin and level I axillary Lymph nodes.

4) Modified Radical (Mastectomy):

- Patey's mastectomy: Removal of all breast tissue, nipple-areolar complex necessary skin and level I,II & III nodes. Pectoralis minor is removed and level III axillary dissection is done.
- Scanlon modification: It is similar to Patey's mastectomy but for pectoralis minor which is not removed, rather divided.
- Auchincloss modification: Removal of all breast tissue, nipple-areola complex necessary skin and level I &II nodes.

5) Halsted radical mastectomy:

Removal of all breast tissue, nipple-areola complex pectoralis major and minor, level I,II & III axillary lymph nodes.

6) Nipple areolar sparing mastectomy:

Done for tumour located more than 2-3 cm from the border of the areola.

Chest Wall reconstruction:

Goal: Wound closure and breast reconstruction.

The various methods available are

- 1) Skin grafting for closing the raw area
- 2) Silicone breast implants
- 3) Tissue Expanders
- 4) Myocutaneous flaps
 - Lattismus dorsi myocutaneous flaps
 - Pectoralis major mycutaneous flaps
 - Transverse rectus abdominis mycutaneous flaps
- 5) Free tissue transfers:
 - Superior gluteal Artery Perforator (SGA_p) flap.
 - Inferior Gluteal artery perforator flap(IGA_p)
 - Deep Inferior Epigastric Artery perforator flap (DIE_p)
 - Superficial Inferior Epigastric Artery Perforator flap (SIE_p)
- 6) Opposite breast considerations:
 1. Reduction mammoplasty
 2. Augmentation mammoplasty
 3. Prophylactic mastectomy.
- 7) Nipple Reconstruction:

Sentinel lymph node dissection:

Done for those who are clinically node negative by physical examination and imaging studies.

Combination of intraoperative gamma probed detection of radioactive colloid and intraoperative visualisation of blue dye (isosulfur blue dye or methylene blue) is more accurate for identification of SLN_s than use of either agent alone.

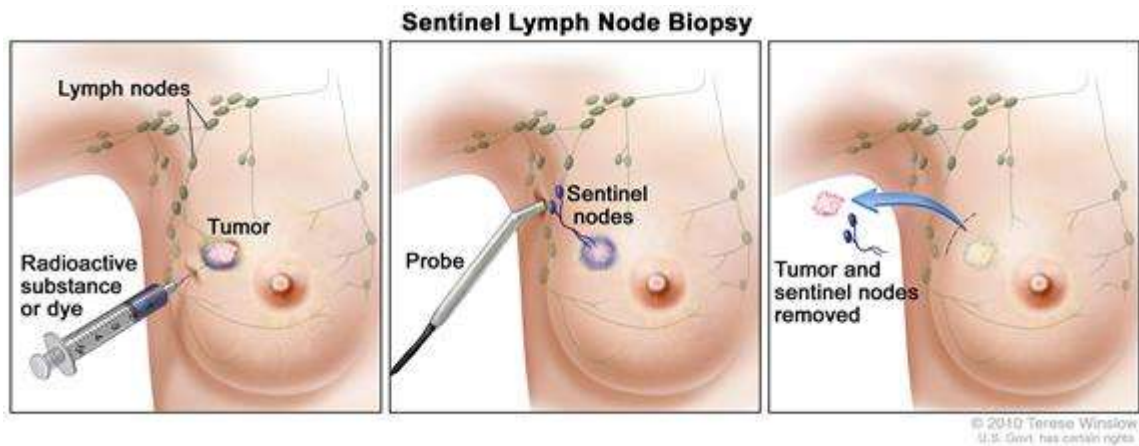
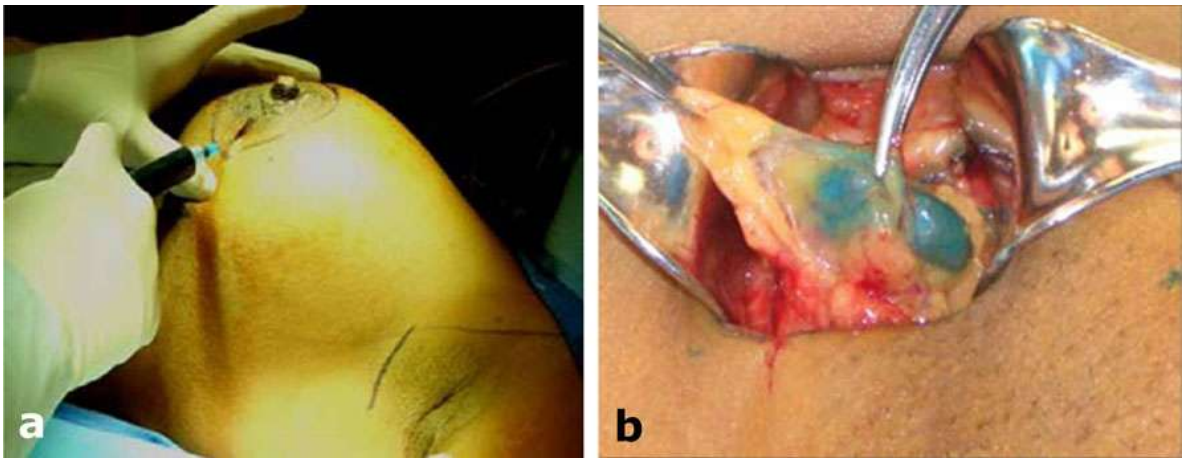


Fig 10; Technique of sentinel lymph node dissection

Procedure:

- 1) with a 25 guage needle, 0-5 mCi of 0.2 μm technetium 99 m-labelled sulfur colloid is injected on the day of surgery sub dermally or in sub areolar region.
- 2) Later in operating room, methylene blue is injected subcutaneously, a volume of 3 to 5 ml.
- 3) A hand held Gamma counter is used to identify the location of SLN.
- 4) A 3 to 4 cm incision which is curved transverse incision is lower axilla just below the hairline. Incision deepened and dissection of subcutaneous tissues done until we identify the blue lymphatic channels and nodes.
- 5) Before SLN is removed, we must wait for 10 second in vivo radio activity count and after removal, wait for 10 seconds ex vivo radioactivity count.
- 6) It is not necessary to remove greater than 4 SLNS for staging because studies have found that 98% of all positive Sentinel nodes will be recovered in four nodes.

Excisional biopsy with needle localisation:

Procedure:

- 1) Circumareolar incision is preferred. If not possible, incision is placed along the larger lines.

For lower quadrant lesion, radial incision can also be made. Radial incision are not recommended in upper half.

2) After excision, X-Ray of the specimen should be done to check margin clearance.

3) Surgical defect is closed using 3-0 absorbable sutures.

4) For very small tumours, needle localisation of the tumour is done using mammography with the help of a localisation wire or radio labelled seed that can be detected intraoperatively with a handheld Probe.

MODIFIED RADICAL MASTECTOMY:

Auschn class modification of MRM is the most commonly done mastectomy worldwide in a view that level III nodes are very rarely involved.

Procedure:

1. Under General anaesthesia, patient in supine position. Rolled towels are placed underneath the scapular region of involved side for elevation of ipsilateral hemithorax.
2. Ipsilateral breast, neck, shoulder and hemithorax are prepped down to the operating table.
3. Arm should be placed perpendicular to the operating field.
4. Elliptical incision of breast includes skin, nipple-areolar complex, skin margins should lie 1 to 2 cm from the cephalad and caudal extents of the cancer.

5. Boundaries of dissection in MRM include
 - a) Anterior margin of latissimus dorsi muscle laterally.
 - b) midline of sternum medially.
 - c) Subclavious muscle superiorly.
 - d) Caudal extension 3 to 4 cm inferior to inflammatory fold.
6. Skin flaps raised superiorly and inferiorly flaps thickness should be atleast 7 mm skin flap should include skin and tela subcutanea.
7. Following the development of skin flaps, breast tissue is Elecated from pectoralis major and serratus anterior muscle mediolaterally in a plane parallel to muscle fibre direction.
8. While dissecting, care should be taken to ligate the perforator vessels from lateral thoracic and anterior intercostals vessels. Surgeon should also be aware of lateral neurovascular bundle which contain the medial pectoral nerve.
9. After mastectomy, axillary dissection is proceeded in continuous fashion.
10. Extent of axillary dissection: Laterally upto the angular vein which is a tributary of thoracodorsal vein medially upto the Halstead ligament superiorly upto the axillary vein.
11. Axillary veins is related anterior and inferior to the brachial plexus and axillary artery dissection should skeletonise anterior and ventral surface of vein.

12. Posterior limit of Dissection is visualisation of head of teres major muscle laterally and subscapularis muscle medially.
13. Medial dissection should achieve removal of Central and interpectoral (rotter's) nodes.
14. After axillary dissection, surgical bed is irrigated with sterile water or saline.
15. Closed suction drains either in axilla alone or both in the axilla and chest wall should be kept before closure.
16. Wound is closed in 2 layers – one for subcutaneous tissues and another for skin.

Post MRM care:

- 1) Involved arm should be immobilised for initial 24 to 48 hours.
- 2) Range of motion arm exercises should commence after 24 to 48 hours.
- 3) Dressing should be opened after 48 hours and changed.
- 4) Drain should be kept in place until the volume decreases to ≤ 30 ml/day for 2 days continuously. Generally removed on postoperative days 5 to 7.
- 5) Range of motion exercises should be stopped until 24 hours after drain removal.
- 6) Use of IV cannula, blood pressure cuff, IV injections should be strictly avoid in the ipsilateral arm.

Anatomical Complication of MRM:

A. Vascular Injury:

- First and Second perforating vessels are so large that they should be properly ligated.
- Axillary vein if torn, is repaired. Ligation may cause chronic edema.

B. Nerve Injury:

1. Intercosto brachial Nerve- Numbness of medial aspect of ipsilateral upper arm.
2. Long thoracic Nerve- Winged scapula deformity.
3. Medial and lateral – pectoralis muscles atrophy thoracic nerves
4. Thoracodorsal Nerve- Internal rotation and abduction of shoulders is weakened.

Post operative complications of MRM

- Thrombosis of axillary vein
- Seroma
- Lymphedema
- Shoulder dysfunction
- Flap necrosis/infection
- Axillary hyperesthesia
- Winged scapula
- Numbness one medial aspect of upper arm.

- Pectoralis muscles atrophy
- Weakening of internal rotation and abduction of shoulder.

Non Surgical Breast Cancer therapies

1. Radiotherapy
2. Chemotherapy
3. Hormonal therapy

Radiotherapy:-

- ❖ Radiation is used for all stages of breast cancer with a few exceptions as mentioned above in the management of DCIS.
- ❖ Aim of radiotherapy is to prevent the locoregional recurrence of the disease.
- ❖ Patient who are at increased risk of locoregional recurrence are
 - Surgical margins positive
 - Involvement of 4 or more nodes
 - Multifocal disease
 - women < 35 years of age.
- ❖ Radiotherapy should be given to chest wall in all cases. Whereas axillary radiation is given to selected patients.
- ❖ Types of radiotherapy are
 - External beam radiotherapy
 - Brachytherapy
 - Intensity modulated Radiotherapy.

- ❖ Recently Axillary Partial Breast Irradiation (APBI) is an option for carefully selected patients with DCIS and early breast cancer.
- ❖ External beam Radiotherapy is given for a total dose of 5000 cGy units. 200 cGy units daily for 5 days a week for 6 weeks.
- ❖ Most commonly Radiotherapy for LABC should involve chest wall and subclavicular region.
- ❖ Concurrent radiotherapy to the axilla poses increased risk for lymphedema. So, axillary shield can be used to isolate axilla from radiation.
- ❖ Axillary Radiation is Indicated in:
 1. 4 or more nodes positive
 2. Extranodal spread
 3. Axillary status not known/not assessed properly.

Chemotherapy:

- 1) Neoadjuvant Chemotherapy for LABC
- 2) Adjuvant chemotherapy for all cancers.

Adjuvant Chemotherapy is little or no benefit to women with

- negative nodes
- cancers ≤ 0.5 cm

Women with negative nodes and cancers 0.6-1 cm are divided into those with a low risk of recurrence and high risk of recurrence.

Those with high risk for recurrence

- blood vessel or lymph vessel invasion
- high nuclear grade
- HER2/neu over expression
- negative hormone receptor states.

Adjuvant chemotherapy regimens for breast cancer:

HER2/neu negative (Non Trastuzumab containing regimens)	Her-2/neu positive (Trastuzumab containing regimens)
FAC/CAF	AC/T+ (Concurrent to trastuzumab (T=Paclitaxel)
FEC/CEF	Docetaxel + Trastuzumab -> FEC
AC or EC	TCH (Docetaxel) Carboplatin, trastuzumab)
TAC	AC-> Docetaxel+Trastuzumab
A-> CMF	
E-> CMF	
CMF	
ACX4	
A-> T->C	
FEC-> T	
TC	

Hormonal Therapy:

Neo adjuvant Endocrine Therapy: Has been shown to shrink tumours, enabling breast conserving surgery in women with hormone receptor-positive disease.

Tamoxifen: Adjuvant therapy with tamoxifen for 5 years 10 mg BID or 20 mg OD. Long term risk of tamoxifen use is endometrial cancer.

Ormeloxifene is used nowadays which has better outcomes compared to tamoxifen.

Aromatase Inhibitors: In postmenopausal women, aromatase inhibitors are used as a secondary agent after 1 to 2 years of adjuvant tamoxifen therapy or as a first line therapy. Letrozole and Anastrozole have shown fewer local and distant recurrences.

For post-menopausal women with a prior aromatase inhibitor exposure recommended second line therapy are pure anti- Estrogen like Fulvestrant (500 mg dose)

In premenopausal patients with stage IV cancer, either tamoxifen or oophorectomy are equivalent options.

Ablative Endocrine therapy:

Oophorectomy

adrenalectomy

hypophysectomy

These are used to treat metastatic breast cancer.

Anti Her-2/neu Therapy:

Drugs used are

- Trastuzumab
- Lapatinib (dual tyrosine kinase inhibitor)
- Pertuzumab

COMPLICATIONS RELATED TO TREATMENT OF BREAST CANCER

SEROMA



Fig 11; Seroma following MRM

Seroma most frequently occurs following mastectomy and axillary surgery seroma is defined as serous fluid collection under the skin flaps or in the axillary dead space following mastectomy and/or axillary dissection. There is no single defined etiology for the formation of seroma. The causation hypothesis is multifactorial. The incidence of seroma varies worldwide between 3% and 85%. It is now considered by many as a side effect of surgery, rather than a complication because they occur inevitably in several patients who had undergone excellent axillary clearance. Seroma precludes early drain removal and delayed wound healing. As a result adjuvant radiotherapy and/or chemotherapy is delayed. There is also an

increased risk of longstanding seroma, a reoperation is necessary. It is hypothesized that seroma is an exudatory product of acute inflammation in the wound bed following surgical trauma. This is due to the fibronolytic activity in serum and lymph. Seroma is derived from lymph which is supported is derived from lymph which is supported by the evidence of low serum fibrinogen levels in Seroma compared to the fibrinogen levels in lymph.

The factors leading to the formation of Seroma and the methods adapted to reduce the incidence are as follows.

1. Surgical factors:

(a) Techniques

There are a wide variety of surgical option in carcinoma breast from Hallstead's radical mastectomy to breast conserving surgery. The more radical the surgery is, more is the incidence of Seroma. Preservation or removal of pectoralis fascia has not effect on the Seroma formation. Immediate breasts reconstruction following when compared to delayed reconstruction. This is supported by several studies like in lymphedema, the number of lymph nodes removed during axillary clearance is proportional to the incidence of Seroma. Purushotam et al demonstrated that Sentinel lymph node biopsy

has much less incidence of Seroma formation compared to conventional axillary dissection.



Fig 12; Seroma on post op day 6

(b) Surgical devices:

In order to reduce the blood loss and operating time, many devices have been introduced to perform surgery, utilising various types of energy. They are as follows.

1. Electro cautery
2. Laser Scalpel
3. argon diathermy
4. ultrasonic scalpel
5. ultrasonic scissors
6. vessel sealing systems

When compared to scalped dissection, use of electro cautery is associated with increased risk of Seroma Formation. Ultrasonic Scissors resulted in reduced Seroma formation Harmonic Scapel is associated with reduced incidence of Seroma compared to either electrocautery or Scalped dissection. There was no difference in the incidence while compared Conventional Surgical Scalpel to bipolar vessel sealing system in some studies while Vessel sealing system showed better results in other.

(c) Obliteration of dead space:

(i) Mechanical:

Following surgery, dead space is created in wound bed and axilla, many techniques had evolved since 1950's to reduce the dead space and thereby seroma formation. In 1951, Orr used tension sutures tied over the rubber tubing bolsters to tack flaps to the chest wall. Many other techniques like suturing of flaps with subcutaneous tissue, avoiding use of axillary drain following breast conservation therapy and obliterating axillary dead space by muscle approximation have been tried. Lower incidence of seroma is observed in patient groups in whom skin flaps are sutured to underlying muscle compared to conventional skin closure. The use of mechanical compression or pressure garments did not reduce the drain volume or seroma. Other techniques tried are ligation of lymphatics.

(ii) Chemical:

Substances applied to the wound bed to reduce Seroma formation are

- a) Fibrin glue
- b) light activated fibrin sealant
- c) Transdermal Photo polymerised adhesive.

There are known to inhibit fibrinolytic activity which are used based on the hypothesis that Fibrinolytic activity in Serum and lymph contributes to Seroma formation. Fibrinogen and thrombin concentration in the fibrin sealant are proportional to the reduction in Seroma formation. Human studies regarding the same hypothesis are not fully established get.

Sclerosants are also tried to reduce Seroma formation. In animal models the following sclerosants are tried.

1. marine mussel protein
2. Corynebacterium parrum

In humans,

1. Talc
2. Hypertonic Saline
3. Tetracycline

Among these, tetracycline have showed promising results. But the problem with else of tetracycline is pain. Alternative to this, Erythromycin have also been implicated.

Somatostatin receptors have been discovered in lymphatic tissue. Although the mechanism is not known, somatostatin is thought to reduce Seroma formation. Octreotide, a somatostatin analogue, 20 times more potent than somatostatin itself, has been studied in axillary lymph node dissection to reduce the duration and volume of lymphorrhea. But large scale trials are still required.

(d) **Shoulder function and Physiotherapy:**

It is necessary to mobilise the shoulder following mastectomy. Some advocate shoulder mobilisation exercises very early while others advocate late. Too early shoulder mobilisation leads to increased incidence of Seroma formation. This fact is supported by 12 randomised control trials out of which 6 are included in meta analysis. Temporary immobilisation of shoulder using cuff and collar or sling has been tried to reduce Seroma but was not found to be beneficial. Thus delayed physiotherapy may reduce Seroma formation at the expense of mild short term shoulder dysfunction but without long term restriction of movement another issue with delayed mobilisation is the risk of lymph edema in the affected arm.

DRAINS:

They are used to let out the collection in dead space. There are many kinds of drainage viz.

- 1) Corrugated wound drainage
- 2) Non suction closed drainage

3) Closed suction drainage

Among these, closed suction drainage have showed benefits in the early wound healing and is also associated with lower incidence of wound infection, necrosis and breakdown. Bourke et al conducted a study where he found no difference between using corrugated wound drainage and closed suction drainage whitfield and Ransbury conducted a study comparing closed suction drainage and closed siphon drainage. They also found no statistically significant difference. While comparing the results of high vacuum versus low vacuum suction drainage, Seroma drainage and post operative stay was in low vacuum suction drainage group. Whereas the results were opposite in a study conducted by Heurn and brink. High vacuum drains had a higher incidence of Leakage around the drain. There is therefore, no strong evidence available to recommend high or low pressure suction drain to reduce Seroma.

Early discharge with drain insitu versus late discharge:

Patients can be discharged safely with drains insitu but with adequate education and coordination with outpatient facilities. The effect of discharging the patient at different postoperative days have been studied by many early discharge with drain insitu did not have any adverse outcomes. Holcombe et al reported a lower Seroma rate in the early discharge with drain insitu group (18%), compared to standard treatment group (34%) and a reduction in median hospital stay of 5 days. This was also supported by Orr et

al who reported a low Seroma rate of 11% when he discharged the patients at an average of 2.9 days. Despite, the concerns expressed in the early discharge group of patients include

- Personal care
- bed posture
- dressing themselves
- fatigue
- loneliness
- pain
- worries about the wound & arm

Although early discharge with drain insitu has shown positive results when done at a mean post operative period of 3 days, discharging the patient after mastectomy within a day or two had adverse outcomes.

Early drain removal versus late drain removal:-

There are several criterias for drain removal such as removing when drain volume is less than 250 ml for first three consequitions postoperative days or drainage decreases to a volume of 20 to 50 ml in the preceding 24 hours. 48 hours following surgery, 74% of volume of Seroma has been drained usually. In a study conducted by Somer's et al with 108 patients who underwent level I & II axillary node dissection and drain removed on the end of First postoperative day regardless of drain volume and the patients are discharged no significant difference was observed related to drainage volume

at the time of drain removal, subsequent mean number of aspirations and time to resolution of Seromas. In a randomized trial conducted in 100 patients by parikh et al, who underwent mastectomy with axillary clearance to drain removal at either 3 or 6 days postoperatively, more Seroma fluid was collected in the group whose drain was left in the near numbers of aspirations required, wound complication or sepsis in a randomised study of 84 patients conducted by In wang et al, comparing drain removal on postoperative day 5 versus drain removal after volume of drainage reduced to 20 ml over 2 consecutive days. Fii et al compared drains removed at 48 hours to a 'standard' removal group where he found no significant difference in Seroma frequency observed. Thus there appears to be good evidence in favour of early drain removal compared to standard or late drain removal.

Drainage versus no drainage:

When comparing the use of drain with no usage of drain in patients who undergone mastectomy and axillary dissection, closed suction drainage group showed better results in terms of Seroma formative and median hospital stay length. Cameron et al studied 40 patients who received axillary drainage and 20 who did not. The results shows a higher rate of seroma formation in the in drained group (45% vs 10%)

Jeffery et al reported safe axillary dissection without drainage after breast conserving surgery. But those patients required frequent Seroma aspiration. All Seroma resolved clinically within 1 month or within 4 months

on ultrasound examination. Siegel et al had also supported no drainage following axillary dissections. From these observations, it is concluded that use of drainage compared to no drainage following axillary dissection and mastectomy had little difference in the length of hospital stay but no drainage group had significantly higher incidence of repeated Seroma aspirations postoperatively. Thus, the use of drain is beneficial.

Single drains versus two drains:

Some surgeons would prefer use of single closed suction drain in the axilla alone, while some preferred using 2 drains, one in the axilla and another in the chestwall. In two drains system, the suction drainage tubes are connected to a single reservoir, studies shows that there is no significant differences in the benefits of keeping two drains compared to single drains kept in the axilla.

Patient factors:

It has been studied that, surgical technique related factors have played a major role in the Seroma formation compared to patient related factors. Yet, some of the patient related factors have been analysed in the role of seroma formation.

- Body weight and Body mass index
- Hormonic receptor status
- Axillary nodal status
- Size of the tumour

- lymph node positivity
- Histologic grade of the tumour
- presence of anemia ‘
- Diabetes mellitus
- smoking
- Breast size
- location of tumour

Among these, Body weight and Body mass index have a significant role in the incidence of post operative Seroma formation. Patient with BMI >29 have increased incidence of seroma compared to patients whose BMI is 25 or less. Size of the tumour although not statistically significant, has role in the increased incidence of Seroma formation and they are directly proportional. Other factors which are found to play some role in Seroma formation are lymph node positivity and breast size, while others factors like Hormone receptor staus, histologic grade of the tumour, presence of anemia, diabetes mellitus, smoking and location of tumour has no role in the Seroma formation.

Summary of methods to prevent or reduce the occurrence of postoperative Seroma formation:

- 1) Closure of dead space:
 - axillary padding after axillary clearance using aponeurotic tissue.
 - suturing of skin flap with chest wall.

2) Drainage:

Single or double closed suction drainage system with high vacuum

3) Early drain removal:

4) Delayed shoulder mobilisation

5) Use of sclerosants like:

- Fibrin glue
- Thrombin spray

6) Surgical devices:

- Ultrasonic scalpel
- harmonic scalpel
- Bipolar vessel sealing systems.

None of the above methods, have been studied to the a single significant Seroma formation. It is a combination of the above measured which showed promising results in reducing Seroma formation. Further large scale studies are required to elucidate the exact pathogenesis of Seroma and best preoperative interventional measures to reduce the incidence of the same



Fig 13; Seroma post op day 12

CHRONIC SEROMA

Although seroma usually vanishes within a few weeks, some patients may require repeated aspirations even for a period of months. Prolonged accumulation of postmastectomy seroma and repeated aspirations predisposes to sepsis, wound-related complications and may delay discharge of the patient. Also there is a chance of organising of the seroma into a fibrous encapsulated type. There are no studies to date describing the surgical treatment of fibrous encapsulated seromas after axillary clearance. Filling the dead space with skin/muscle flap harvesting is an ideal technique to combat seroma formation.

Given the large burden that this is causing to patients and the varying chance of success, an important role is dedicated to preventing seroma formation. The rate of chronic seroma is underestimated and generates high

rates of local discomfort, and limitations in shoulder function, especially in axillary seroma. In the literature, some refer to treating persisting seroma by reinserting drains, talcage or surgical intervention and application of the quilting technique. Since the seroma pocket is covered with fibrous tissue, these techniques are inadequate in chronic seroma. Collaboration with a reconstructive surgeon therefore seems favourable in order to remove the fibrous capsule and close the dead space with a latissimus dorsi flap.

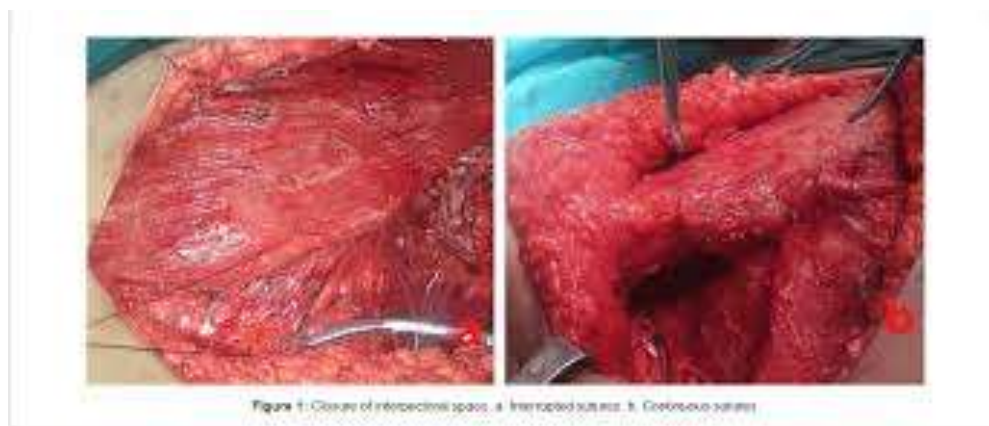


Fig 14; Axilla showing pocket of chronic seroma



Fig 15; This is an image of an excised specimen of chronic fibrous seroma mimicking a breast implant

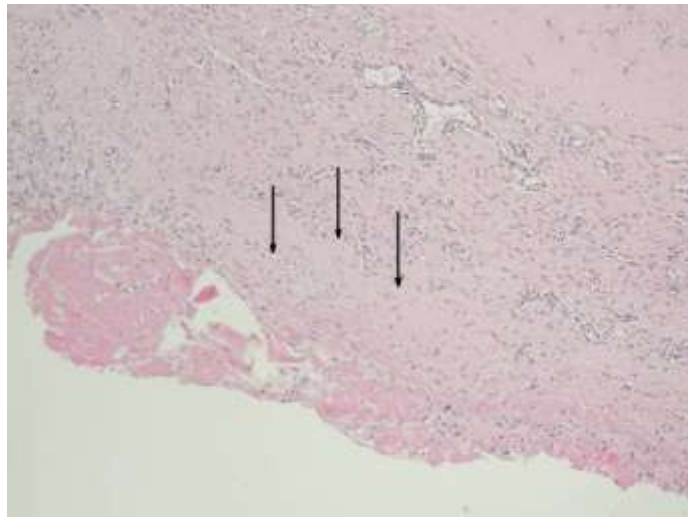


Fig 16;HPE image of chronic seroma the seroma wall stained with hematoxylin/eosin under 100× magnification. Arrows indicate seroma capsule composed of fibrous tissue with eosinophilic hyaline degeneration of collagen and weak inflammatory, predominantly lymphocytic, infiltration. No epithelium was present on the inner surface of the seroma capsule.

Even though there was no sign of vascular endothelium on the seroma wall and vessel supplying the superior end of seromatous reservoir, we considered that formation of such chronic seroma may have twofold etiology, both inflammatory and lymphatic. A similar case of fibrous encapsulated seroma following radical mastectomy, resistant to conservative treatment which finally required surgical resection .

Thus ,in cases of prolonged seromatous effusion with confirmed formation of thick walled reservoir the operation with resection and closure of supplying regional lymph vessels may be the best treatment, if possible preceded by lymphoscintigraphy.

LYMPHEDEMA



Fig 17;;lymphedema in left upper limb after 6 months following axillary treatment

Lymphedema is defined as a condition characterised by persistent accumulation of protein rich fluid in the affected area due to an interruption or obstruction of the lymphatic vessels.

The severity of lymphedema is measure by a grading system with three levels based on an objective criteria.

Grade-I

Pitting occurs upon application of pressure and edema reverses with limb elevation.

Grade-II

Edema becomes more pronounced, harder and no longer pits under pressure.

Grade – III

Swelling worsens and skin changes occur. These skin changes can include severe thickening with huge skin folds.

Areas affected by lymphedema in Breast cancer survivors include the hand, arm, breast and trunk. Lymphedema in the ipsilateral exerting a greatest impact on women's women lives after breast cancer. In addition, Breast cancer treatment is a multimodal treatment which involves surgery, radiotherapy, chemotherapy and hormonal therapy. Axillary lymph node dissection and/or external beam radiotherapy represent an important component in the treatment of a great majority of invasive breast cancer. Arm lymphedema represents one of the most important late reactions after axillary lymph node dissection. Lymphedema leads to reduction of functional ability of the limb, pain and infection. In can also cause cellulitis, Erysipelas, Imphegnitis and occasionally lymphngiosarcoma. There are two types of arm lymphedema acute-Transitory and develops after surgery chronic-develops years after breast cancer treatment.

Even if the axillary lymph node dissection does not influence the breast cancer patient's survival, the axillary lymph node status represents one of the most important prognostic factors.

Arm lymphedema represents the increase of arm volume 10% (2cm) which occurs in the first 3 months after surgical treatment.

Incidence of Lymphedema:

The reported incidence of lymphedema in women treated with surgery and radiation ranges from 6% to 89%. The wide variation in the incidence is due to

- 1) difficulties in measurement
- 2) problems with diagnosis
- 3) different kinds of institution protocol.



Fig 18;lymphedema right upper limb 5 months following axillary treatment

Measurement of lymphedema:

Currently, the more commonly accepted objective criterion for lymphedema, are arm circumference ≥ 2 cm when compared to the normal arm. Sequential circumferential arm and hand measurement has been the method used frequently. Other criteria like increase in the arm volume of 200ml or more compared to the control arm. Volume of the arm is measured by single frequency bioelectrical impedance device. This device produces easily interpretable values measuring the changes in the extracellular fluid when compared to unaffected contralateral upper extremity. Bioimpedance spectroscopy or infrared Perometry are standard devices used pre and post operatively for objective measurement of lymphedema.

Diagnosis of lymphedema:

Patients notice the change in arm characteristics. They experience changes in fit of jewelry or clothing, changes in skin (appear either shiny or tight, having fewer creases and feeling stiff or taut) and changes in the range of motion of elbow, wrist or fingers. The sensation of increased interstitial pressure generally precedes a measurable increase in size. The amount of interstitial fluid volume increases 50-100% before edema is notable clinically.

Impact of Lymphedema:-

The impact lymphedema are on the following grounds.

- Functional abilities

- occupational roles
- psychosocial
- cognitive and
- financial aspects

The heaviness of arm makes women difficult to wear clothing, completion of household chores. Visibility of altered body image will produce social anxiety and serves as a constant reminder of the presence of cancer. Lifestyle changes include wearing of compression bandages.

RISK FACTORS FOR THE OCCURRENCE OF LYMPHEDEMA:

Many retrospective studies have reported risk factors for lymphedema. they are as follows:

- Axillary node dissection (ALND),
- mastectomy,
- obesity
- radiation
- infection
- ipsilateral upper extremity injury

These are the most influential causes of damage or disruption to the lymphatic system and thus lymphedema. However, the magnitude of association between breast cancer treatment factors and lymphedema is inconsistent across studies.

Tsai et al reviewed 98 studies conducted in the United States and Canada through January 2008 for lymphedema risk factors. The authors report a significantly increased risk for lymphedema in women undergoing **mastectomy compared with lumpectomy** (risk ratio [RR], 1.42; 95% confidence interval [CI], 1.15–1.76), **ALND compared with no dissection** (RR, 3.47; CI, 2.34–5.15), **ALND compared with sentinel lymph node biopsy (SLNB)** (RR, 3.07; CI, 2.20–4.29), **radiation therapy vs no radiation therapy** (RR, 1.92; CI, 1.61–2.28), and **positive vs negative axillary lymph nodes** (RR, 1.54; CI, 1.32–1.80). While this meta-analysis demonstrates a comprehensive, contemporary review of lymphedema risk factors, the heterogeneity of the data must be considered, as 11 different definitions for lymphedema were used and follow-up ranged between 1 month and 30 years.

EXTENT OF AXILLARY SURGERY

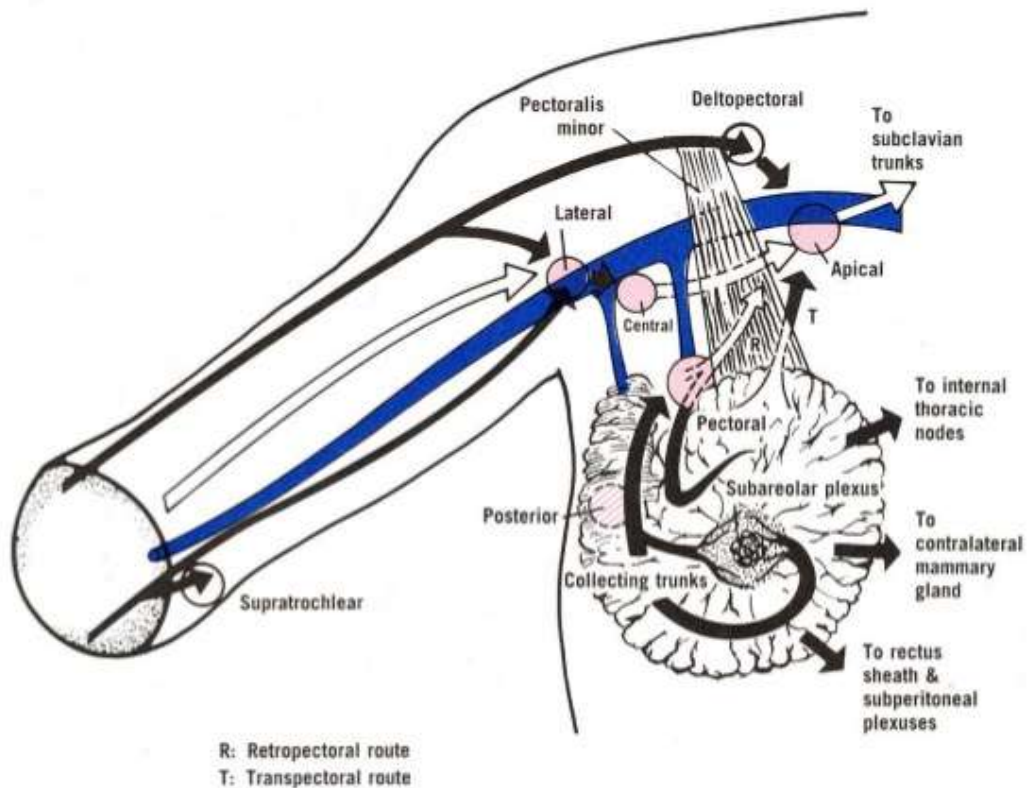


Fig 19; Common nodes that drain both upper limb and breast

Though the most intuitively obvious risk factor for lymphedema is the number of nodes removed, the relationship between the number of lymph nodes removed and the risk of lymphedema remains unresolved. Several retrospective studies have shown that the number of nodes removed and the risk of lymphedema do not correlate. Others find an increasing risk of lymphedema as more nodes are removed. Despite various lengths of follow-up, from 6 to 60 months, the prospective trials vetting SLNB as the standard of care for axillary staging demonstrate significantly reduced rates of lymphedema after SLNB (0 to 7%) compared with ALND (12% to 16%).

These studies certainly support the concept that the risk of lymphedema is proportional to the **extent of axillary surgery**. Importantly, though, they also confirm that even with SLNB a small but clear risk of lymphedema remains. A recent study by Goldberg et al suggests that **it is not the number of lymph nodes removed but instead the degree of dissection and disruption of the lymphatic system that results in lymphedema**. The authors reviewed 600 women having SLNB with a median follow-up of 5 years and found an overall incidence of lymphedema of 5%. When stratifying the data according to the number of nodes removed, they found no significant association between the mean, median, or range of number of nodes excised and lymphedema ($P = .93$). Furthermore, the authors completed a subset analysis of the women having more than 10 lymph nodes removed at SLNB. None of these women developed lymphedema. Interestingly, when these SLNB patients having > 10 nodes removed were compared with a separate group of women having 10 to 17 nodes removed at ALND, 11% of the ALND patients had measured lymphedema ($P = .04$). The fact that women having more than 10 nodes removed during SLNB did not develop lymphedema but women with the same number of nodes removed after ALND did reaffirms that the relationship between the nodes removed and lymphedema is complex. Perhaps it is the relative magnitude of lymphatic destruction and individual patient ability to form collateral lymphatic channels, rather than the number of nodes removed, that influences lymphedema risk. For example, **a patient**

with many nodes removed at SLNB and no finding of lymphedema may have more lymphatic collaterals and therefore will have suffered relatively less lymphatic disruption despite a larger than “normal” number of SLNs removed. On the other hand, women having ALND and a relatively small number of total nodes excised may have suffered an overall greater degree of lymphatic disruption and therefore develop lymphedema. Unfortunately, the number of nodes within each patient’s nodal basin and the patient’s ability to protect or form new lymphatic collaterals during or after treatments is unknown. Therefore, simply the number of nodes removed may be insufficient to determine lymphedema risk.

EFFECT OF RADIATION

If, however, the degree of lymphatic disruption or damage is the key driver of lymphedema risk, then it is plausible that radiation can also act primarily or synergistically to influence lymphedema risk. Axillary radiation alone is not without complications, as these patients can have a 2- to 4.5-fold increase in the risk of lymphedema. A recent meta-analysis by Shah and Vicini finds lymphedema in 9% to 65% of patients after lumpectomy alone (no nodal surgery) and regional nodal radiation and in 58% to 65% of women after mastectomy alone and regional nodal radiation. Additionally, **the synergistic effect of surgery and radiation is well documented to result in**

a **3.5- to 10-fold higher risk of lymphedema when compared with surgery alone.**

EFFECT OF CHEMOTHERAPY

Finally, accumulating data suggest that chemotherapy may also affect lymphatic destruction. Norman et al found **anthracycline-based chemotherapy regimens** increase the risk of lymphedema. Their prospective review of 631 breast cancer survivors followed for 5 years found an elevated hazard ratio (HR) of 1.46 (95% CI, 1.04–2.04) for lymphedema among breast cancer patients receiving anthracycline-based chemotherapy vs no chemotherapy. This risk persisted after stratifying for stage at diagnosis or number of positive nodes. Furthermore, the authors concluded that treatment combinations involving ALND or chemotherapy resulted in approximately four- to five-fold increases in the HRs for lymphedema (HR, 4.16 [95% CI, 1.32–12.45]for SLNB/chemotherapy/no radiation)compared with no treatment. While further validation of this finding is needed, the concept that chemotherapy independently influences lymphedema risk demonstrates that this risk can be affected not only by locally directed therapies but also by systemic ones.

Changes in Surgical Management

Changes in the surgical management of the axilla have been instrumental in reducing axillary morbidity, especially lymphedema. **SLNB is now the standard of care for axillary staging,** as its accuracy, low false-

negative rate, and low rate of axillary recurrence . Current research to further minimize morbidity from axillary surgery focuses on reducing the need for completion axillary dissection in the setting of a positive axillary node.

The American College of Surgeons (ACOSOG) Z0011 trial published in early 2011 documents the first prospective randomized data showing that at a median of 6 years follow-up, SLNB alone does not result in inferior survival in women with T1 or T2 tumors and one or two positive sentinel nodes who received breast conservation surgery, chemotherapy and/or hormonal therapy, and whole breast radiation therapy. In the study, more than 70% of the women with a positive SLNB had no additional positive nodes, suggesting that in select cases SLNB can be both diagnostic and therapeutic.

As a result it is possible that radiation tangents were adjusted higher in node-positive women who were randomized to the SLNB-only arm. If standard radiation tangents cover approximately 30% to 50% of the level I and 25% of the level II axillary nodes, then **adjusting the tangents “higher”** has the intention of covering more nodes than standard. These data are important from the perspective of morbidity, as an adjustment in the tangents may result in increased rates of axillary morbidity above what is seen with standard whole breast tangents and SLNB alone. The radiation ports are currently being evaluated retrospectively. An additional prospective trial, ACOSOG Z1071, is evaluating the validity, accuracy, and false-negative rate

of SLNB after neoadjuvant chemotherapy in women who present with node-positive disease at diagnosis. The investigators hypothesize that SLNB after neoadjuvant chemotherapy will appropriately and reliably stage the axilla and therefore allow elimination of ALND in women converted by neoadjuvant chemotherapy from node-positive to node-negative status.

METHODS OF RISK-REDUCTION

As long as axillary surgery and/or radiation remain pillars of breast cancer treatment, lymphedema will remain a potential complication. Risk-reduction practices to further prevent lymphedema after axillary surgery have long been advised. It is here that many of the myths regarding lymphedema risk and prevention arise. **The National Lymphedema Network, founded in 1988**, seeks to educate and guide patients and healthcare providers about lymphedema and risk-reduction practices for those at risk for and affected by the disorder. The organization publishes guidelines on risk-reducing behaviors and seeks to answer the question of whether behavioral modifications can further limit or reduce lymphedema. The NLN's risk-reduction guidelines were updated in 2011 and continue to carry a disclaimer stating that "there is little evidence-based literature regarding many of these practices, the majority of the recommendations must at this time be based on the knowledge of pathophysiology and decades of clinical experience by experts in the field."

The primary goal of the risk-reducing measures is to prevent overload of the lymphatic system by limiting activities that may increase lymphatic flow, local blood flow, or metabolic waste products in the at-risk or affected limb. Although Boccardo et al documented that increased education and awareness can reduce the incidence of lymphedema, it is also possible that increased education can influence patient anxiety. One study reviewed factors affecting patients' intention to avoid strenuous activity by following 175 women for a median of 10 months after axillary surgery. The authors found women given advice on arm care and those with perceived vulnerability regarding, and fear of, lymphedema were more likely to avoid using their arm. Several additional inconsistencies exist regarding risk-reduction behaviors. First, standardized advice does not meet the needs of all patients, especially given that the recommendations do not always differentiate between at-risk and affected individuals. Second, there is inconsistent application of the practices across disease sites. Third, there is still debate over what constitutes a risk-reducing practice. Patients recognize these controversies, given that they frequently receive inadequate or conflicting advice regarding arm care.

Despite these inconsistencies, breast cancer survivors have adopted many of the existing lymphedema risk-reducing practices. A prospective study of nearly 1000 breast cancer survivors found that patients having ALND practice a mean of 5.1 risk-reducing behaviors, while those having

SLNB follow 4.3. Although this difference was statistically significant ($P < .0001$), one could argue that it is not clinically significant. For example, more than 98% of women who have undergone ALND avoid blood pressures, intravenous catheter placement, and needle sticks in the ipsilateral arm, while more than 80% of SLNB patients do the same without documented benefit and theoretically less risk than those having ALND. Examination of the recommended risk-reducing behaviors reveals few objective data for or against each measure.. An in-depth review of the role of compression garments when flying, and of IV placement, needle sticks, blood pressures, and exercise, follows.

COMPRESSION GARMENTS

The physiologic theory supporting **the role of compression garments during air travel** stems from the low cabin pressure that exists during flight, which causes a decrease in extracellular fluid pressure. This pressure decrease facilitates escape of fluid and proteins from the lymphatic vasculature, resulting in lymphedema. A literature review finds only a single retrospective survey-based study of patients with lymphedema published more than 15 years ago, in which 27 of 490 (5.5%) patients surveyed link the onset or worsening of their lymphedema to an airplane flight. The authors of this study cited lowered cabin pressure as the cause but do note the lack of direct evidence. Based on this report and its suggested physiologic premise,

at-risk and affected patients are recommended to wear a compression garment, to help regulate the extracellular pressure and support the lymphatic musculature maintaining lymphatic flow. Limited contemporary data, however, do not appear to support these findings or the use of compression garments. Graham et al retrospectively surveyed 287 at-risk survivors regarding air travel. Overall, 50% of them traveled a mean of five flights, and of this group 86% practiced precautionary behaviors consisting of routine use of compression garments with or without other behaviors. The authors observed no difference in lymphedema rates between fliers and nonfliers ($P = .42$), but interestingly they found the practice of precautionary behaviors to be associated with an increased risk of lymphedema (OR, 6.2; 95% CI, 1.2–20.8; $P < .04$) among those flying. Furthermore, when analyzed independently, the use of compression garments appeared not to correlate with other suspected lymphedema risk factors, including nodal disease, number of nodes removed, or radiation. They concluded that garments were not necessary and might be counterproductive. Kilbreath et al drew similar conclusions after they prospectively evaluated 72 women preflight and 6 weeks after planned international or transcontinental air travel. Bioimpedance analysis in one study found no difference in extracellular fluid content between baseline and follow-up, regardless of flight distance or compression garment use. Despite their short follow-up and the fact that the women

followed were athletes (which may have a protective effect), the authors concluded that air travel did not cause lymphedema.

IV CATHETERS AND NEEDLE STICKS

Another long-supported myth regarding prevention of lymphedema is **the avoidance of IV catheters or needle sticks**. The theory behind this practice arises from the possible risk of infection produced by accidental and nonaccidental skin punctures and is less concerned with the actual puncture itself. Infection will cause an intense inflammatory response, altering the extremity fluid homeostasis. Despite the longevity of this landmark recommendation, a review of the literature finds only one article supporting the practice. Clark et al prospectively followed 188 women for lymphedema and measured them at baseline, 6 months, and 3 years after axillary surgery. At 3 years, patients were also questioned about skin punctures. Overall, 39 (21%) had lymphedema at 3 years.[35] Among other risk factors, univariate analysis found skin puncture for IV catheter insertion, venipuncture for blood draw, or finger stick for blood glucose testing were associated with a significant increased risk for lymphedema, with a risk ratio of 2.44 (95% CI, 1.33–4.47). These data should be interpreted cautiously; 18 of 188 (9.5%) reported remembering any type of skin puncture, and of these 18 women only 8 had lymphedema at the 3-year follow-up. Patients with lymphedema may be more likely to recall previous skin puncture than those without symptoms.

Hand surgery ipsilateral to the side of prior axillary surgery could be considered a severe form of skin puncture, lending relevance to the IV and venipuncture question. A small number of studies in the hand surgery literature address this occurrence. Dawson et al reported on 15 women undergoing carpal tunnel release ipsilateral to the side of prior axillary dissection; none had a post-hand surgery infection, new onset of lymphedema, or worsening of existing lymphedema symptoms. In a second series, Hershko and Stahl retrospectively reviewed all hand surgeries performed between 1983 and 2002 and identified only 25 women with 1-year follow-up, of whom 4 had lymphedema at the time of hand surgery and 21 did not. Lymphedema was determined by patient perception only and noted to be worse after surgery in 2 women, each of whom had pre-existing lymphedema. The authors noted no progression or new symptoms in the remaining 23 women. Interestingly, they did not use preoperative antibiotics on any patient, performed 24 of 25 surgeries under local anesthesia, and used a tourniquet in all cases. Gharbaoui et al surveyed the members of the American Society for Surgery of the Hand. Among the 606 surgeons returning the surveys, more than 95% said they have willingly performed hand surgery on patients with a history of ipsilateral lymphadenectomy, radiation, or both. Surgeon willingness to operate decreases if lymphedema is present but remains quite high at 85%. Overall, 94% and 74% of surgeons routinely use tourniquets in women without and with lymphedema, respectively. Surgeon recollection identified fewer complications of infection, lymphedema, or

delayed wound healing among patients without lymphedema (3% vs 23%). These three studies offer marginal data and anecdotal reports at best about the safety of ipsilateral skin puncture as they are all retrospective with small numbers, are fraught with recall bias, and lack any objective measurements. Despite this, each study calls for re-evaluation of the skin puncture guidelines as they relate to lymphedema risk.

BLOOD PRESSURE CUFFS

Perhaps the authors should also conclude that re-evaluation of the **ipsilateral blood pressure** guidelines is warranted, as their data demonstrated a clear willingness to use tourniquets with minimal reported morbidity. No documented studies to date have reviewed the recommendation to avoid ipsilateral blood pressure measurements. Clearly, these conclusions must be interpreted with caution, and further study is warranted.

While the recommendations to wear compression garments while flying, and to avoid IV sticks, venipuncture, and blood pressures are made with good intention and based on sound physiologic principles, few rigorous data support them. Unfortunately, though, without good scientific data supporting or refuting these practices, both clinicians and patients are still faced with the clinical dilemma of whether or not they should encourage or disregard these behaviors.

EXERCISE

Finally, **exercise** has historically been discouraged for breast cancer survivors, based on the belief that it would increase metabolic waste and extracellular fluid accumulation in the extremity, causing lymphedema. Over the last 5 years, the recommendation to avoid exercise has been challenged. Aside from recommended flexibility and remedial exercises used to reduce arm swelling and promote mobility during lymphedema treatment, exercise consists of resistance exercises (weight lifting), aerobic exercise, or a combination of both. Robust data support the value of resistance exercise in both at-risk and affected women. In fact, five of six randomized controlled trials (RCTs) published between 2006 and 2010 found weight lifting to be associated with minimal risk of developing or exacerbating lymphedema. The largest study with the longest follow-up is **the physical activity and lymphedema trial (PAL)** that followed 141 women with breast cancer–related lymphedema. Patients were randomized to either weight training while wearing a compression sleeve, which was supervised twice weekly, or to a control group who were asked not to alter their exercise level. At 1-year follow-up, the authors found no increase in lymphedema in the intervention group and, further, found fewer and less severe lymphedema exacerbations in the weight training group. The follow-up study evaluating weight training in at-risk survivors also found no difference in lymphedema rates between the two groups but interestingly found that among women with more than five

nodes removed, those in the weight training group were significantly less likely to develop lymphedema than those in the control group (7% vs 22%, $P = .003$).[41]

Based on these data, the NLN now supports the safety of resistance exercises in a controlled manner, starting with small weights, low repetition, and gradual progression. In general, compression garments should be worn during exercise in women with lymphedema and considered on an individual basis for women at risk for lymphedema.

Conclusions

As long as evaluation and treatment of the axilla are necessary, lymphedema will continue to be a potential morbidity. It is hoped that the move towards personalized medicine, by individualizing surgery, radiation, and chemotherapy regimens, will help to reduce the incidence of treatment morbidities, including lymphedema. Until the risk of lymphedema is eliminated, however, risk-reduction practices will remain a consideration for all breast cancer survivors. Clinicians should recognize that patients are not at equal risk for lymphedema and that data do not support a standardized approach nor allow for complete disregard of risk-reduction behaviors. Exercise in a monitored fashion is likely to be safe in all survivors, and the recommendation not to exercise appears to be the only myth surrounding lymphedema that has been scientifically disproven.

METHODOLOGY OF STUDY

Study design: prospective observational study.

Sample size :83

Source of data

- Patients reporting at Tirunelveli medical college hospital in the department of general surgery,surgical oncology ,medical oncology and radiation oncology for management of carcinoma breast are monitored from the day of diagnosis through surgery and chemotherapy until completion of radiotherapy(for indicated cases).
- Study period :18 months(September 2017 to march 2019)

INCLUSION CRITERIA

- 1 .Patients diagnosed with carcinoma breast and planned for surgery.
2. Patients who had undergone surgery for carcinoma breast,now attending the hospital for chemotherapy and radiotherapy.

EXCLUSION CRITERIA

1. Patients who have locoregional recurrence.
2. Patients who have stage 3B and stage 4 disease.
3. Patients who have seroma or lymphedema due to causes other than axillary treatment of breast cancer like previous irradiation,vascular disorder of upper limb.
4. Patients who did not come for follow up .

DATA ENTRY

- The following data are collected from the patients

-Age

-BMI

-Mid-arm circumference

- Patients are subjected to clinical examination to assess the stage of the disease. Patients are followed for a period of 12 months and the following data are observed and entered.
- Type of surgery undergone
- Extent of axillary clearance
- Details of the drains placed in the surgical wound
- Post operative physiotherapy
- Histopathology Report obtained to study the number of nodes harvested during surgery.
- Presence of post operative seroma.
- Details of radiotherapy given
- Mid arm circumference every 3 months.

Presence of lymphedema and its time of occurrence.

DATA ANALYSIS AND DISCUSSION

1.ASSOCIATION BETWEEN AGE AND SEROMA

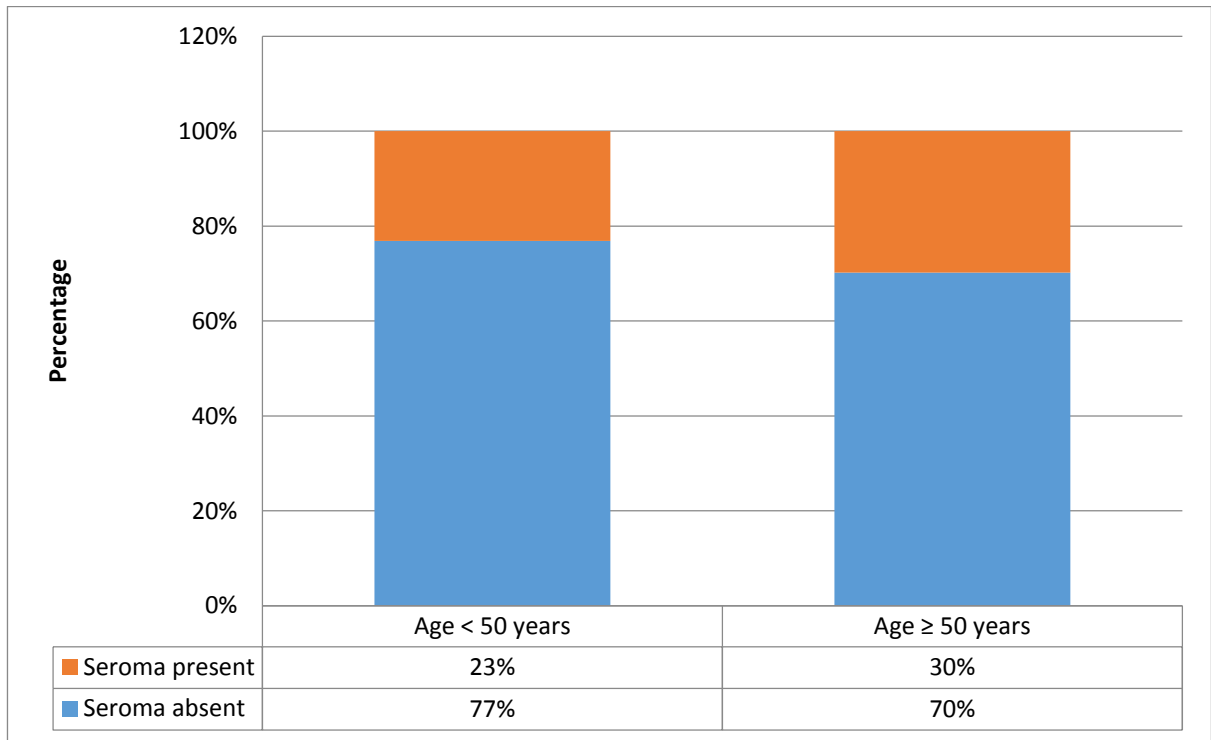


Fig 19; Association between age and seroma

2.ASSOCIATION BETWEEN BMI AND SEROMA

BMI	Seroma absent (n=60), n (%)	Seroma present (n=23), n (%)	Total	Relative risk (95% C.I)	P value
BMI<30	53 (86.89)	8 (13.11)	61 (100)	1.00	< 0.001
BMI≥30	7 (31.82)	15(68.18)	22 (100)	5.2 (2.6 – 10.5)	
TOTAL	60 (72.29)	23(27.71)	83 (100)		

3.ASSOCIATION BETWEEN SIZE OF THE TUMOR AND SEROMA

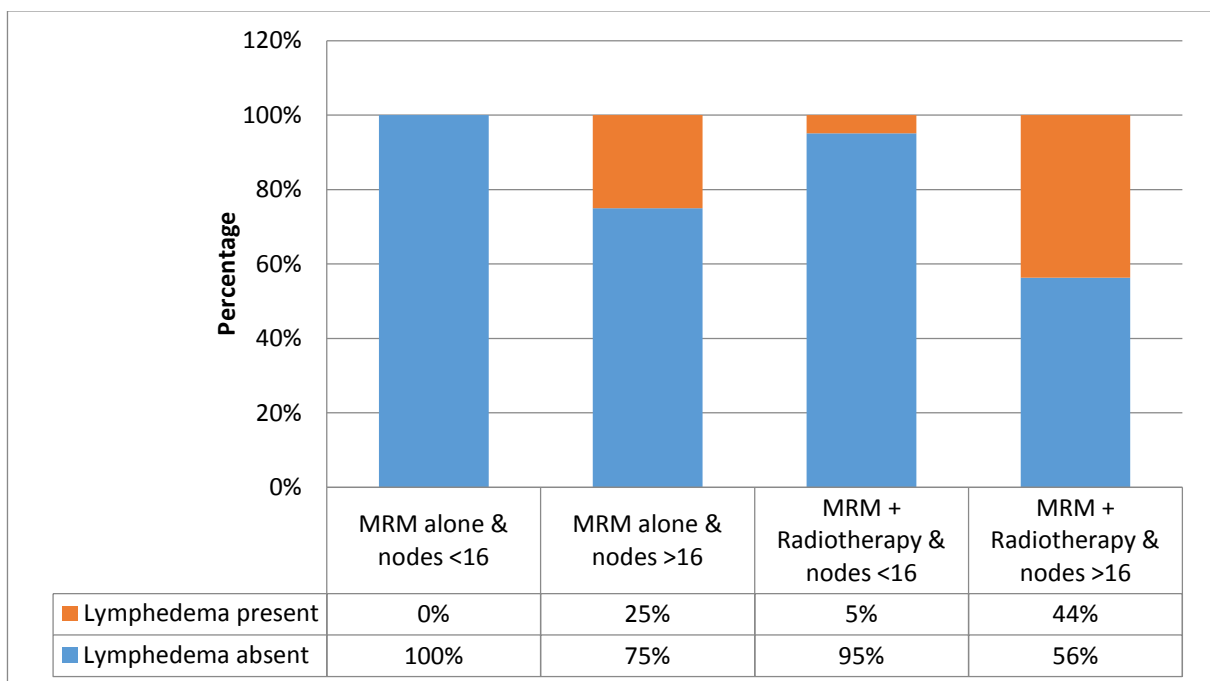
SIZE OF THE TUMOR	Seroma absent (n=60), n (%)	Seroma present (n=23), n (%)	Total	Relative risk (95% C.I)	P value
≤5CM	39(82.98)	8(17.02)	47 (100)	1.00	0.018
>5CM	21(58.33)	15(41.67)	36 (100)	2.4 (1.2 – 5.1)	
TOTAL	60(72.29)	23(27.71)	83 (100)		

4.ASSOCIATION BETWEEN NUMBER OF NODES ISOLATED DURING AXILLARY DISSECTION AND SEROMA

NUMBER OF NODES	Seroma absent (n=60), n (%)	Seroma present (n=23), n (%)	Total	Relative risk (95% C.I)	P value
<16	56 (86.15)	9 (13.85)	65 (100)	1.00	<0.001
>16	4 (22.22)	14 (77.78)	18 (100)	5.6 (2.9 – 10.8)	
TOTAL	60 (72.29)	23 (27.71)	83 (100)		

1. INCIDENCE OF LYMPHEDEMA IN VARIOUS MODES OF AXILLARY TREATMENT

TYPE OF TREATMENT	Lymphedema absent (n=72), n (%)	Lymphedema present (n=11), n (%)	Total	RR (95% C.I)	P value
MRM(<16 NODES)	2 (100)	0 (0)	2 (100)	-	
MRM(>16 NODES)	3 (75)	1(25)	4 (100)	1.00	
MRM (<16 NODES)+RADIOTHERAPY	58 (95.1)	3 (4.9)	61 (100)	0.2 (0.03 – 1.5)	0.115
MRM(>16 NODES)+RADIOTHERAPY	9 (56.5)	7 (43.5)	16 (100)	1.7 (0.3 – 10.4)	0.539
TOTAL	72 (86.8)	11(13.2)	83 (100)		

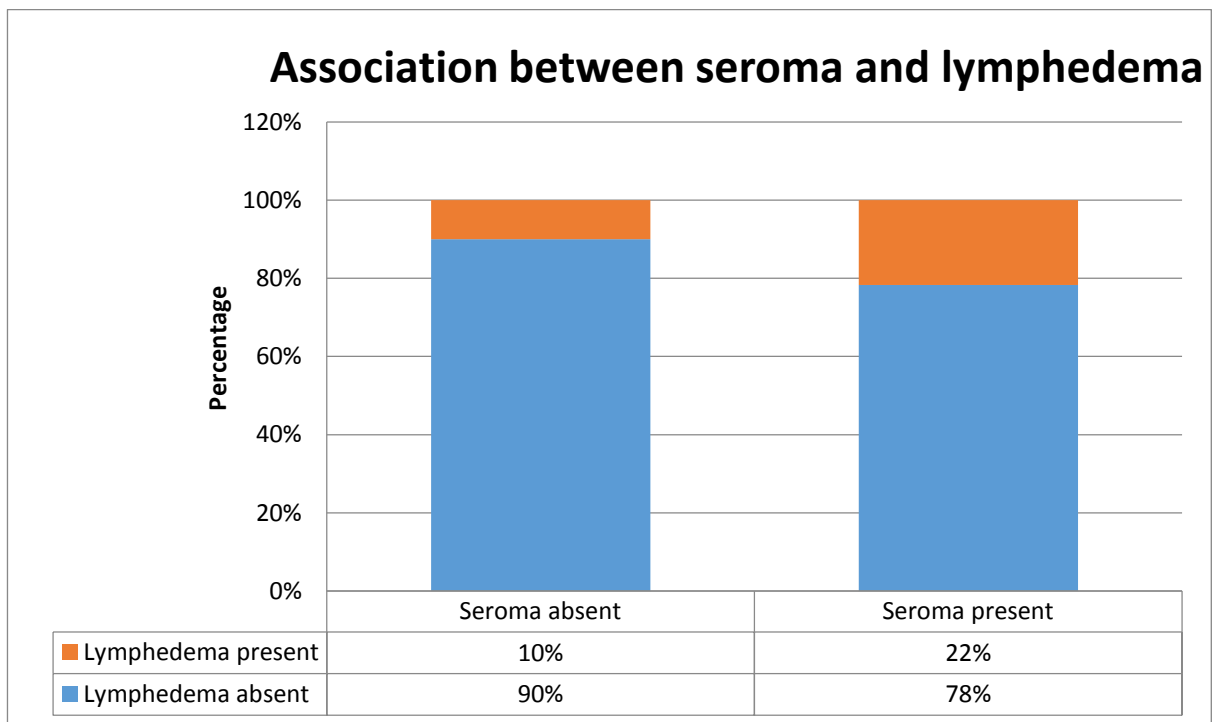


2.ASSOCIATION BETWEEN BMI AND LYMPHEDEMA

BMI	Lymphedema absent (n=72), n (%)	Lymphedema present (n=11), n (%)	Total	Relative Risk (95% C.I)	P value
<30	56 (91.80)	5 (8.20)	61 (100)	1.00	0.029
≥30	16 (72.73)	6 (27.27)	22 (100)	3.3 (1.1 – 9.8)	
TOTAL	72 (86.75)	11 (13.25)	83 (100)		

3.ASSOCIATION BETWEEN PREVIOUS POSTOPERATIVE SEROMA AND LYMPHEDEMA

SEROMA	Lymphedema absent (n=72), n (%)	Lymphedema present (n=11), n (%)	Total	Relative Risk (95% C.I)	P value
Absent	54 (90.00)	6 (10.00)	60 (100)	1.00	0.161
Present	18 (78.26)	5 (21.74)	23 (100)	2.1 (0.7 – 6.4)	
TOTAL	72 (86.75)	11(13.25)	83 (100)		



DISCUSSION

- Among 83 patients,23 developed seroma,an incidence of **27.71%**.
- Among 83 patients,11 patients developed lymphedema ,a cumulative incidence of **13.25%** at the end of 12 months.
- Among 57 patients who are above 50 years of age,17 developed seroma.Among 26 patients who are below 50 years of age ,6 patients developed seroma.There is a slight increase in the incidence of seroma in patients above 50 years.
- 22 out of 83 patients were obese.15 out of 23 patients who developed seroma had BMI more than 29 which was statistically significant.
- Among 83 patients,47 had tumour size less than or equal to 5cm.36 had tumor size more than 5cm.Among 36 pts,15(out of 23 positive cases) developed seroma which was statistically significant.
- Less than 16 nodes are harvested during axillary dissection in 65 out of 83 patients.More than 16 nodes are harvested in 18 out of 83 patients.Among the 18 patients,14 developed seroma which was statistically significant.
- Among the 11 patients who developed lymphedema,7 had undergone modified radical mastectomy harvesting more than 16 nodes along with concurrent radiotherapy.3 had undergone modified radical

mastectomy harvesting less than 16 nodes along with concurrent radiotherapy.

- 1 patient had undergone only modified radical mastectomy harvesting more than 16 nodes

RESULTS OF THE STUDY

Increased incidence of seroma is observed in

- 1.Age >50 years.
- 2.Bmi>29
- 3.Size of tumor>5cms.
- 4.More than 16 nodes excised during axillary dissection

Increased risk of lymphedema is observed in

1. patients who Underwent concurrent axillary dissection harvesting more than 16 nodes and axillary radiotherapy.
2. Obesity
3. Patients who developed Seroma formation after surgery

CONCLUSION

Although the diagnosis and treatment modalities have been constantly improving, the incidence of carcinoma breast is rising in the horizon. This is not only due to the increase in the detection rates but also due to the increase in disease burden per se. The reason for the latter is attributed to environmental and genetic components. Numerous upcoming studies begin explaining the role of new mutations and other possible etiology which have not been ever mentioned before in literature.

There is a constant debate in formulating a standard protocol for management of ca breast at different stages. Some resort to less aggressive therapy like breast conservation, isolated chest wall RT, sentinel lymph node dissection. While others still promote radical therapies for complete clearance. As the treatment become more aggressive, more is the incidence of adverse effects. Significant among them are seroma and lymphedema. With an intention to explore the possibilities of how to prevent the occurrence and the ways of managing them efficiently, I have studied the incidence of seroma and lymphedema following axillary treatment of breast cancer in patients admitted in Tirunelveli Medical College Hospital.

The results of my study are

Increased incidence of seroma is observed in

- age more than 50 years
- BMI More than 29
- size of tumor more than 5cms
- more than 16 nodes excised during axillary dissection..

Increased incidence of lymphedema is observed in

- patients who underwent concurrent axillary dissection harvesting more than 16nodes along with axillary radiotherapy.
- patients who developed seroma formation after surgery.
- BMI more than 29.

Considering the results of my study I have arrived at a conclusion that some of the risk factors entailed in the causation can be eliminated to decrease the incidence of seroma and lymphedema. notable interventions which showed promising results are

Universal standardised periodic breast cancer screening for early detection and management.

- Conservative breast surgery.
- Sentinel lymph node dissection.
- Tailoring radiotherapy to indicated cases and only at required fields.
- Adequate and comprehensive nodal isolation during histopathological examination.

- Use of high pressure tube suction drains post surgery ,use of fibrin gluee,suturing of skin flap with chest wall muscles to reduce the dead space,axillary padding etc to reduce the incidence of seroma.
- Avoiding use of blood pressure cuffs ,IV cannula ,iv drug administration in the ipsilateral arm,selecting patients for RT and weight reduction practices to reduce the incidence of lymphedema.

A definitive explanation regarding the etiology and methods of prevention to reduce the incidence of seroma and lymphedema is not well defined.further research is still required to provide better outcomes regarding the treatment protocols in order to improve the quality of life of patients .’

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PROFORMA

Name :
 Age : Sex :
 IP.No :
 Diagnosis and Stage :
 Side of limb involved :
 Previous H/o irradiation :
 Previous H/o vascular disease of limb:
 BMI:
 Mid upper arm circumference
 Surgery done:
 Primary
 Details of axillary clearance
 Type of drain used
 Drain volume
 Immediate post op period:

POD	1.	2.	3.	4.	5.	6.	7.
Amount of Drain Collected (ml)							

Block in drainage tube: (Suction drain) :
 Post op physiotherapy :
 No of nodes isolated in HPE :
 SEROMA :
 Post op day of occurrence of seroma :
 Radiotherapy :
 Dose of irradiation :
 Fraction of irradiation :
 Type of radiotherapy :
 LYMPHEDEMA :
 Post treatment BMI :
 Post treatment mid upper arm circumference :

**நோயாளிகளுக்கு அறிவிப்பு மற்றும் ஒப்புதல் படிவம்
(மருத்துவ ஆய்வில் பங்கேற்பதற்கு)**

ஆய்வு செய்யப்படும் தலைப்பு:

பங்கு பெறுவரின் பெயர்:

பங்கு பெறுவரின் வயது:

		பங்கு பெறுவர் இதனை குறிக்கவும் ✓
1.	நான் மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்களை படித்து புரிந்து கொண்டேன். என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டுள்ளது என அறிந்து கொண்டேன்.	<input type="checkbox"/>
2.	நான் இவ்வாய்வில் தன்னிச்சையாக தான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும், எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.	<input type="checkbox"/>
3.	இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்து மேலும் ஆய்வு மேற்காள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன்.	<input type="checkbox"/>
4.	இந்த ஆய்வின் மூலம் கிடைக்கும் தகவலையோ, முடிவையோ பயன்படுத்திக் கொள்ள மறுக்க மாட்டேன்.	<input type="checkbox"/>
5.	இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக் கொள்கிறேன் எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின் படி நடந்து கொள்வதுடன், ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிக்கிறேன். என் உடல் நலம் பாதிக்கப்பட்டாலோ, அல்லது எதிர்பாராத, வழக்கத்திற்கு மாறான நோய்குறி தென்பட்டாலோ உடனே இதை மருத்துவ அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன்.	<input type="checkbox"/>

பங்கேற்பவரின் கையொப்பம் / இடம்

கட்டைவிரல் ரேகை

பங்கேற்பவரின் பெயர் மற்றும் விலாசம்

ஆய்வாளரின் கையொப்பம் / இடம்

ஆய்வாளரின் பெயர்

மையம்

கல்வியறிவு இல்லாதவற்கு (கைரேகை வைத்தவர்களுக்கு) இது அவசியம் தேவை

சாட்சியின் கையொப்பம் / இடம்

பெயர் மற்றும் விலாசம்

ABBREVIATIONS FOR MASTERCHART

T stage	-	Tumor Stage
T Stage	-	
2	-	T1b
3	-	T1c
4	-	T2
5	-	T3
N stage	-	Nodal Stage
m stage	-	Metastasis
RT	-	Radiotherapy
MRM	-	Modified Radical Mastectomy
BMI	-	Body Mass Index
MUAC	-	Mid Upper arm Circumference

hos pno	name	age	tstage	nstage	mstage	irradiation	vascular disease	BMI	MUAC	surgery	Surgery type	Axial clearance level	drain type	drain volume (ml)	day 2	day 3	day 4	day 5	day 6	day 7	drain working/not	post op physiotherapy	no of nodes harvested	seroma	post op day of onset	radiotherapy	radio dose (Cgy)	RT fraction (cycles/wk)	type of RT	LYMPH EDEMA	LYMPH EDEMA ONSET (months after rx)	POST treatment BMI	posttreat _muac	
42001	Pichamma l	56	3	2	0	no	no	19	30	YES	MRM	2	both chest wall and axilla	35	20	10	10	10			yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		19	29	
41026	Lakshmi	52	4	2	0	no	no	20	35	YES	MRM	2	both chest wall and axilla	30	20	10	10				yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		19	32	
20182	Pechithai	56	5	0	0	no	no	21	40	YES	MRM	2	both chest wall and axilla	35	25	15	10	15	10	10	yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		20	32	
32108	Subbulakshmi	67	5	0	0	no	no	21	34	YES	MRM	2	both chest wall and axilla	45	25	20	10	10			yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		20	32	
48210	karupayee	68	5	1	0	no	no	20	32	YES	MRM	2	both chest wall and axilla	30	30	15	10	10			yes	properly given	10	no		yes	5000	25	EBRT without axill shield	0		19	30	
42102	Subbuthai	44	4	0	0	no	no	35	49	YES	MRM	2	both chest wall and axilla	50	45	25	15	10	10		yes	properly given	19	no		no			YES	4	34	55		
31276	Mydeen fathima	69	5	0	0	no	no	21	35	YES	MRM	2	both chest wall and axilla	45	25	20	10	10			yes	properly given	10	no		yes	5000	25	EBRT without axill shield	0		21	35	
30127	Pakiyathai	47	5	0	0	no	no	22	31	YES	MRM	2	both chest wall and axilla	38	30	15	10	10			yes	properly given	11	no		yes	5000	25	EBRT without axill shield	0		21	32	
21026	maragatham	70	5	1	0	no	no	23	35	YES	MRM	2	both chest wall and axilla	50	30	10	10	10			yes	properly given	14	no		yes	5000	25	EBRT without axill shield	0		22	32	
18962	Lakshmi	39	4	2	0	no	no	34	50	YES	MRM	2	both chest wall and axilla	50	45	40	30	30	30	20		yes	properly given	22	yes	3	yes	5000	25	EBRT without axill shield	0		30	45
17989	Kaliamma l	56	4	1	0	no	no	23	37	YES	MRM	2	both chest wall and axilla	25	20	10	12	10			yes	properly given	9	no		yes	5000	25	EBRT without axill shield	0		21	30	
10007	pechiyam mal	57	4	2	0	no	no	22	32	YES	MRM	2	both chest wall and axilla	35	20	20	10	10			yes	properly given	11	no		yes	5000	25	EBRT without axill shield	0		20	33	
9098	murugavalli	42	5	1	0	no	no	30	44	YES	MRM	2	both chest wall and axilla	30	20	20	10	10			yes	properly given	21	yes	5	yes	5000	25	EBRT without axill shield	0		28	40	
8107	Lakshmi	58	5	1	0	no	no	29	43	YES	MRM	2	both chest wall and axilla	50	45	40	30	25	20	20		yes	properly given	20	yes	3	yes	5000	25	EBRT without axill shield	0		25	33
6786	mehar Nisha	52	4	1	0	no	no	22	35	YES	MRM	2	both chest wall and axilla	20	20	10	10				yes	properly given	11	no		yes	5000	25	EBRT without axill shield	0		21	30	

5894	Akhila	54	5	1	0	no	no	25	40	YES	MRM	2	both chest wall and axilla	45	40	30	10	10	10	yes	properly given	19	yes	3	yes	5000	25	EBRT without axill shield	0		23	35	
4896	seethalakshmi	57	5	0	0	no	no	24	37	YES	MRM	2	both chest wall and axilla	40	40	30	30	30	20	20	yes	properly given	16	yes	4	yes	5000	25	EBRT without axill shield	0		24	37
4012	Lakshmi	53	5	1	0	no	no	22	36	YES	MRM	2	both chest wall and axilla	50	20	10	10	10	10	yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		21	32	
3194	Kaderbath	54	5	0	0	no	no	23	35	YES	MRM	2	both chest wall and axilla	60	50	50	40	40	30	20	yes	properly given	17	yes	5	yes	5000	25	EBRT without axill shield	0		23	32
3019	Mageswari	52	5	0	0	no	no	25	36	YES	MRM	2	both chest wall and axilla	50	30	10	10	10		yes	properly given	14	no		yes	5000	25	EBRT without axill shield	0		24	35	
2887	Esakkiyammal	50	5	0	0	no	no	26	37	YES	MRM	2	both chest wall and axilla	35	30	20	10	10		yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		24	32	
2017	Fathima	46	4	1	0	no	no	27	34	YES	MRM	2	both chest wall and axilla	40	30	10	10	10		yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		25	32	
1827	Jeyapooranam	47	3	1	0	no	no	28	30	YES	MRM	2	both chest wall and axilla	40	30	10	10	10		yes	properly given	13	no		yes	5000	25	EBRT without axill shield	0		28	32	
1529	Thuirumalivadivu	53	6	2	0	no	no	26	38	YES	MRM	2	both chest wall and axilla	30	30	10	10	10		yes	properly given	22	no		yes	5000	25	EBRT without axill shield	YES	10	25	40	
1026	Manimegalai	60	4	2	0	no	no	31	48	YES	MRM	2	both chest wall and axilla	30	20	20	10	10		yes	properly given	12	yes	5	yes	5000	25	EBRT without axill shield	0		29	40	
69921	Kumari	49	4	1	0	no	no	27	40	YES	MRM	2	both chest wall and axilla	30	30	20	20	15	10		yes	properly given	10	no		yes	5000	25	EBRT without axill shield	0		25	35
68268	Arumugahammal	48	4	2	0	no	no	22	38	YES	MRM	2	both chest wall and axilla	40	20	10	10			yes	properly given	11	no		yes	5000	25	EBRT without axill shield	0		21	30	
67834	Seethalakshmi	61	4	1	0	no	no	21	35	YES	MRM	2	both chest wall and axilla	35	30	10	10			yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		20	32	
67829	Marimmal	61	4	1	0	no	no	32	48	YES	MRM	2	both chest wall and axilla	60	55	50	40	40	30	30	yes	properly given	22	yes	3	yes	5000	25	EBRT without axill shield	0		30	42
69921	Lakshmi kantha	62	4	2	0	no	no	24	32	YES	MRM	2	both chest wall and axilla	35	25	20	10			yes	properly given	13	no		yes	5000	25	EBRT without axill shield	0		23	31	
68102	Mary	58	5	1	0	no	no	29	44	YES	MRM	2	both chest wall and axilla	50	40	40	30	30	20	20	yes	properly given	18	yes	4	yes	5000	25	EBRT without axill shield	0		25	40
67777	Saudammal	56	3	2	0	no	no	23	29	YES	MRM	2	both chest wall and axilla	40	20	10	10	10		yes	properly given	13	no		yes	5000	25	EBRT without axill shield	0		23	28	
65210	Pichamma	56	5	1	0	no	no	30	40	YES	MRM	2	both chest wall and axilla	50	40	40	30	20	20	28	yes	properly given	20	yes	5	yes	5000	25	EBRT without axill shield	0		28	35

63626	Premavathy	53	3	2	0	no	no	22	32	YES	MRM	2	both chest wall and axilla	30	20	10	10			yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		20	31	
60926	Devi	53	4	2	0	no	no	21	31	YES	MRM	2	both chest wall and axilla	35	10	10			yes	properly given	16	no		yes	5000	25	EBRT without axill shield	0		20	31		
60125	Pattammal	54	5	2	0	no	no	31	49	YES	MRM	2	both chest wall and axilla	40	30	20	20	10		yes	properly given	14	no		yes	5000	25	EBRT without axill shield	YES	8	31	55	
59216	Fathima	45	5	0	0	no	no	26	38	YES	MRM	2	both chest wall and axilla	40	30	20	10	10		yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		25	35	
59127	Kaliamma	39	4	1	0	no	no	21	33	YES	MRM	2	both chest wall and axilla	30	10	10	10			yes	properly given	14	no		yes	5000	25	EBRT without axill shield	0		21	30	
58001	Janaki	48	4	1	0	no	no	23	35	YES	MRM	2	both chest wall and axilla	30	30	10	10	10		yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		23	32	
57856	Esakkiyammal	61	4	1	0	no	no	24	35	YES	MRM	2	both chest wall and axilla	45	30	20	10			yes	properly given	10	no		yes	5000	25	EBRT without axill shield	0		24	31	
56698	Roobini	45	5	1	0	no	no	31	39	YES	MRM	2	both chest wall and axilla	50	50	40	40	35	35	30	yes	properly given	19	yes	4	yes	5000	25	EBRT without axill shield	0		30	35
56252	Leelavathi	58	4	0	0	no	no	26	35	YES	MRM	2	both chest wall and axilla	40	30	10	10			yes	properly given	10	no		no			0		25	31		
54555	Sabana	50	5	0	0	no	no	25	32	YES	MRM	2	both chest wall and axilla	30	30	20	20	10		yes	properly given	11	no		yes	5000	25	EBRT without axill shield	0		24	30	
54102	Savariammal	73	5	0	0	no	no	32	49	YES	MRM	2	both chest wall and axilla	50	40	40	30	30	20	20	yes	properly given	17	yes	4	yes	5000	25	EBRT without axill shield	0		30	40
53916	Pichamma	48	5	0	0	no	no	24	33	YES	MRM	2	both chest wall and axilla	50	40	40	30	20	10	10	yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		22	30
52610	Mariammal	43	4	2	0	no	no	22	32	YES	MRM	2	both chest wall and axilla	40	20	20	10	10		yes	properly given	9	no		yes	5000	25	EBRT without axill shield	0		21	32	
51368	Kaliyammal	32	4	1	0	no	no	33	44	YES	MRM	2	both chest wall and axilla	30	28	20	10	10	10		yes	properly given	16	yes	4	yes	5000	25	EBRT without axill shield	0		32	38
51112	Padma	45	4	1	0	no	no	23	37	YES	MRM	2	both chest wall and axilla	35	30	10	10	10		yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		22	35	
49926	Pattammal	41	4	1	0	no	no	27	35	YES	MRM	2	both chest wall and axilla	38	30	20	10	18	10		yes	properly given	7	no		yes	5000	25	EBRT without axill shield	0		27	35
48563	Vanajamuthuselvi	42	4	1	0	no	no	26	31	YES	MRM	2	both chest wall and axilla	35	34	32	10	10	10		yes	properly given	8	no		yes	5000	25	EBRT without axill shield	0		25	30
48928	Manimegalai	38	5	1	0	no	no	32	45	YES	MRM	2	both chest wall and axilla	40	20	20	10			yes	properly given	18	yes	5	yes	5000	25	EBRT without axill shield	YES	8	31	50	

48136	Jamalbeevi	56	4	1	0	no	no	21	33	YES	MRM	2	both chest wall and axilla	30	20	20	20	10		yes	properly given	11	no		yes	5000	25	EBRT without axill shield	0		19	32	
47282	Mariammal	55	4	1	0	no	no	38	54	YES	MRM	2	both chest wall and axilla	50	45	45	40	20	20	10	yes	properly given	12	yes	4	yes	5000	25	EBRT without axill shield	YES	7	37	60
47182	Shobana	55	5	0	0	no	no	28	35	YES	MRM	2	both chest wall and axilla	45	35	10	10	10		yes	properly given	14	no		yes	5000	25	EBRT without axill shield	0		27	35	
46232	Shalini	54	5	0	0	no	no	19	32	YES	MRM	2	both chest wall and axilla	35	30	20	10	10		yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		19	30	
45019	Beerbath	52	4	1	0	no	no	20	33	YES	MRM	2	both chest wall and axilla	30	30	10	10			yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		20	33	
44210	Kaliamma	56	4	0	0	no	no	30	52	YES	MRM	2	both chest wall and axilla	50	50	40	40	30	30	20	yes	properly given	21	yes	4	no			YES	5	30	58	
43156	Mydeenbanu	56	4	1	0	no	no	30	39	YES	MRM	2	both chest wall and axilla	40	20	20	10	10		yes	properly given	10	no		yes	5000	25	EBRT without axill shield	0		28	35	
42554	Esakkiyammal	57	5	0	0	no	no	35	50	YES	MRM	2	both chest wall and axilla	30	30	10	10			yes	properly given	13	no		yes	5000	25	EBRT without axill shield	0		34	46	
42063	Soundarya	40	5	0	0	no	no	31	45	YES	MRM	2	both chest wall and axilla	50	50	40	40	30	20	20	yes	properly given	15	yes	4	no			0		30	42	
41926	Mariammal	51	4	0	0	no	no	31	44	YES	MRM	2	both chest wall and axilla	30	30	10	10			yes	properly given	11	no		no			YES	6	31	48		
41028	Gowri	50	4	1	0	no	no	28	37	YES	MRM	2	both chest wall and axilla	30	30	20	20	10		yes	properly given	17	no		yes	5000	25	EBRT without axill shield	0		28	35	
39984	Geetha	52	5	1	0	no	no	32	47	YES	MRM	2	both chest wall and axilla	50	50	40	35	30	20	20	yes	properly given	12	yes	3	yes	5000	25	EBRT without axill shield	YES	5	29	52
37108	Beerbath	62	4	1	0	no	no	30	46	YES	MRM	2	both chest wall and axilla	35	30	30	20	10		yes	properly given	20	no		yes	5000	25	EBRT without axill shield	YES	7	30	50	
38196	Renukadevi	58	4	1	0	no	no	28	38	YES	MRM	2	both chest wall and axilla	40	30	30	20	10	10	10	yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		25	34
38107	Safreenbanu	71	2	2	0	no	no	27	37	YES	MRM	2	both chest wall and axilla	30	30	20	10	10		yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0		25	34	
37002	Indhumadhi	65	5	1	0	no	no	31	43	YES	MRM	2	both chest wall and axilla	50	50	40	30	30	30	20	yes	properly given	14	yes	4	yes	5000	25	EBRT without axill shield	0		30	42
36986	Charulatha	70	3	2	0	no	no	26	37	YES	MRM	2	both chest wall and axilla	25	25	20	10			yes	properly given	11	yes		yes	5000	25	EBRT without axill shield	0		25	35	
35876	Valarmathi	62	4	0	0	no	no	25	32	YES	MRM	2	both chest wall and axilla	35	35	30	20	10		yes	properly given	9	no		no			0		25	32		

35190	Kumari	64	5	1	0	no	no	32	44	YES	MRM	2	both chest wall and axilla	60	40	20	10	10		yes	properly given	13	yes	4	yes	5000	25	EBRT without axill shield	0		32	42	
34100	Pattammal	60	5	0	0	no	no	29	39	YES	MRM	2	both chest wall and axilla	60	50	40	30	20	20	20	yes	properly given	12	yes	4	yes	5000	25	EBRT without axill shield	0		28	35
34999	Kaliyammal	56	4	2	0	no	no	22	34	YES	MRM	2	both chest wall and axilla	50	30	20	10	10		yes	properly given	10	no		yes	5000	25	EBRT without axill shield	0		22	35	
34190	Durgadevi	54	4	2	0	no	no	23	37	YES	MRM	2	both chest wall and axilla	40	30	20	10	10		yes	properly given	14	no		yes	5000	25	EBRT without axill shield	0		22	35	
32019	Deviga	52	5	1	0	no	no	24	38	YES	MRM	2	both chest wall and axilla	50	45	20	10	10		yes	properly given	15	no		yes	5000	25	EBRT without axill shield	0		23	37	
31963	Kuppammal	55	4	1	0	no	no	27	36	YES	MRM	2	both chest wall and axilla	50	50	40	40	30	20	20	yes	properly given	17	yes	4	yes	5000	25	EBRT without axill shield	YES	5	26	40
31263	Rani	56	5	0	0	no	no	28	37	YES	MRM	2	both chest wall and axilla	30	30	20	10			yes	properly given	10	no		yes	5000	25	EBRT without axill shield	0		25	37	
30001	Palaniyamma	49	4	1	0	no	no	26	33	YES	MRM	2	both chest wall and axilla	30	20	20	10	10		yes	properly given	14	no		yes	5000	25	EBRT without axill shield	0		24	30	
29016	Esakkiymmal	52	4	1	0	no	no	24	34	YES	MRM	2	both chest wall and axilla	60	50	50	45	40	30	20	yes	properly given	19	yes	3	yes	5000	25	EBRT without axill shield	0		21	30
28190	Jemima	47	4	1	0	no	no	25	36	YES	MRM	2	both chest wall and axilla	40	30	20	20	10		yes	properly given	9	no		yes	5000	25	EBRT without axill shield	0		23	30	
28800	Christy	42	4	1	0	no	no	21	35	YES	MRM	2	both chest wall and axilla	35	30	20	20	10	10		yes	properly given	14	no		yes	5000	25	EBRT without axill shield	0		20	33
26721	Mydeenbanu	55	5	0	0	no	no	31	41	YES	MRM	2	both chest wall and axilla	30	25	20	10			yes	properly given	16	no		yes	5000	25	EBRT without axill shield	YES	6	30	44	
25190	Kaliyammal	55	5	0	0	no	no	23	33	YES	MRM	2	both chest wall and axilla	20	10	10				yes	properly given	13	no		yes	5000	25	EBRT without axill shield			21	31	
24635	Ulagamal	56	4	1	0	no	no	24	34	YES	MRM	2	both chest wall and axilla	30	20	10				yes	properly given	12	no		yes	5000	25	EBRT without axill shield	0			32	