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MAMMOGRAPHY

WINNIECIADKHAR^{*1} AND JOSEPH BERNARD²

¹ *Department of Medical Imaging Technology Manipal College of Allied Health Sciences Manipal University, Manipal Karnataka, India*
² *Department of Medical Imaging Technology, A.J Hospital and Research Institute, Mangalore, Karnataka, India*

ABSTRACT

Breast cancer is one of the most increasing cancer, it originate mainly from the breast tissue commonly from inner lining of milk duct.or the lobules that supply the ducts with milk. While the overwhelming majority of human cases occur in women, male breast cancer can also occur Worldwide, breast cancer accounts for 22.9% of all cancers in women. In 2008, breast cancer caused 458,503 deaths worldwide (13.7% of cancer deaths in women) There were an estimated 12.7 million cancer cases around the world in 2008, of these 6.6 million cases were in men and 6.0 millions in women .This number is expected to increase to 21 million by 203.This article is to strive to raise awareness about accessibility to screening and to encourage more women to go for mammograms after the age of 40yrs. Educate the people about mammography and its procedure. The screening mammogram is one of the most effective tools available to detect breast cancer early.



WINNIECIADKHAR

Department of Medical Imaging Technology Manipal College of Allied Health Sciences Manipal University, Manipal Karnataka, India

INTRODUCTION

Breasts are modified sweat glands, primarily made up of fats and tissues. TDLU is the functional unit of breast. Mammography is the Radiological examination of the human breast using low energy x-rays to detect pathologies. It was first attempted in 1920s. (1) Later Robert

Egan 1950s demonstrated the technique using low Kvp and high mAs and direct film exposure. Wolf and Ruzicka in 1960s showed Xero-Mammography was superior to direct film exposure with better image quality and lower exposure dose (6).

INDICATIONS

- As screening procedure in asymptomatic women
- As a diagnostic procedure in symptomatic women with the following complaints,
 - Lump or hard knot or any thickening inside the breast.
 - Warmth and redness of the breast.
 - Change in size and shape of the breast.
 - Dimpling or puckering of the skin.
 - Nipple discharge.
 - Post-menopausal woman.
 - Post hysterectomy patient.
 - Gynaecomastia.

WHEN THE PROCEDURE SHOULD BE DONE?

'Ten day rule' was postulated by ICRP for woman of reproductive age. It states that "whenever possible, one should confine the radiological examination of the lower abdomen and pelvis to the 10-day interval following the onset of menstruation." (16) During this stage the breast are also not too tender, most appropriate for time for the radiological examination.

TYPES OF MAMMOGRAPHY

According to the American College of Radiology and The Breast Society Of Imaging, Mammography may be classified as:-

- SCREENING MAMMOGRAPHY:-
The main objective of screening mammography is to detect the disease at an early stage where prognosis is improved. Screening mammography should begin at age 40yrs for women with average-risk of breast cancer. Women at higher-risk should begin by age 30yrs, but no sooner than 25 years of age (3). Women at high risk include carriers of BRCA mutations. A BRCA mutation is a

mutation in either of the genes *BRCA1* and *BRCA2*. Harmful mutations in these genes produce a hereditary breast-ovarian cancer syndrome in affected families (3).

- DIAGNOSTIC MAMMOGRAPHY:-
It is an x-ray exam of the breast in a woman who either has a breast problem or has had a change or diagnosed abnormalities on her screening mammography. In diagnostic mammography additional views are taken for conformation of the diagnosis (8).

PATIENT PREPARATION

- Informed consent has to be taken both oral and written consent.
- Patient instructed to avoid :-
Deodorant / Talcum powder.
Lotions in breasts and under arms.
- Jewelry and clothing in the region of examination are removed (3).

PROJECTIONS

The different projections taken for mammography are subdivided as:-

- Routine view.
- Supplementary view.

ROUTINE VIEWS

Cranio caudal and medio lateral oblique views are the basic views obtained to detect any abnormalities in the breasts and to localize the lesion within the breast. The marker is placed on the outer aspect of the cassette for cranio caudal view and on the upper aspect for the medio lateral oblique view to enable accurate localization of abnormalities

CRANIO-CAUDAL VIEW

Positioning

The X- ray beam is perpendicular and the image receptor is parallel to the floor. Cassette holder is raised to the level of elevated infra-mammary fold. The breast is pulled on to the plate using both hands. Compression is applied using compression plates while pulling the lateral tissue into the field of view without displacing medial tissues avoiding skin folds. Nipple should be in profile. Pectoral muscle on the posterior edge of the breast must be demonstrated.

MEDIO-LATERAL OBLIQUE

Positioning

The x-ray tube is angled 45 degree and the image receptor should be parallel to the pectorals muscles. The technologist fingers are placed behind the pectoral muscles and pull it to bring maximum tissue into the field of view. The breast should be pulled away from chest wall (medially and anteriorly). Care has to be taken to apply compression in upper corner of the paddle just below the clavicle. The patient's hand is allowed to rest on the holder for patient comfort. The pectoral muscle will extend up to or below the nipple line (17).

LATERAL PROJECTION

Lateral projection can be of two types (a) Latero-medial (b) Medio-lateral, depending on

the side the image receptor is placed either laterally or medially.

Purposes

Taken to locate the exact site of a lesion and also to demonstrate gravity dependent materials.

Positioning

The x ray tube is rotated 90 degree either laterally or medially. The patient's sternum positioned against edge of Bucky. The neck is extended while chin is resting on top of the Bucky. Elbow is flexed to relax the Pectoralis muscles. Compression is applied while rotating the breast until it is in true lateral position. The infra-mammary fold should be open by pulling the abdominal tissue down (17).

SUPPLEMENTARY PROJECTIONS

There are a number of supplementary views which are meant for specific region of interest or specific lesion and diagnosis (17).

- Axillary view.
- Cranio-caudal extended view.
- Cleavage view.
- Tangential view.
- Rolled view.
- Spot Magnification view.
- Caudal-cranial view.
- Reverse Oblique view.
- Implant view.

AXILLARY PROJECTION

Purposes

It is mainly taken for post-mastectomy patient and also to demonstrate the entire axillary tail and most of the lateral part of the breast.

Positioning

The patient is turned to bring the axillary tail in contact with the Bucky and even the x-ray tube is rotated about 30 degree. The axillary aspect is pulled out and away from chest wall (7).

CRANIO-CAUDAEXTENDED PROJECTION

This projection is also known as the "Kleopatra's projection".

Purposes

It is taken for better diagnosing for the ROI in the lateral part of the breast and even in the axillary tail. It is also used to depict posterior lesion seen on MLO projections.

Positioning

It is almost same positioning as for Cranio-Caudal projection but a 5 degree angulation laterally of the x-ray tube is necessary in order to avoid the shoulder joint(7).

CLEAVAGE PROJECTION

This projection is also known as the "Valley projection".

Purposes

It is used for visualization of the deep lesions in the postero-medial aspect of the breast. It is also used to diagnose the portion of the breast tissue in the valley between the two breasts.

Positioning

The infra-mammary folds of both the breast are elevated and positioned on the imaging plate. The medial tissue of both the breast are pulled anteriorly in order to image the cleavage.

ROLLED PROJECTION

Purposes

It is mainly taken to separate the superimposed tissue to confirm the presence of any abnormality and better define a lesion. It is used to determine the location of a pathology diagnosed only on one standard view.

Positioning

The technologist places the hand on either side of the breast and rolls the tissue either medially or laterally.

Conditions

- If top of the breast is rolled medially, a lesion on top will move medially.
- If top of the breast is rolled laterally, a lesion in bottom will move medially.

Labeling

The image should be labeled with the orientation mentioned:-

- Cranio-Caudal RL (rolled laterally) indicates that the lesion is located inferiorly.

- Cranio-Caudal RM (rolled medially) indicates that the lesion is located superiorly (7).

SPOT –MAGNIFICATION PROJECTION

Purposes

It is used for diagnosing micro lesion. It makes use of the magnification technique only in the ROI.

Positioning

Positioning is same like any projection only differences is the application of a small compression device on the estimated ROI which is previously marked on the overlying skin.

TANGENTIAL PROJECTION

Purposes

It is used for diagnosis of superficial lesion. It is also taken to demonstrate the intradermal calcification and palpable lumps.

Implant Projection

Purposes

It is used for diagnosing the silicone implant breast. The standard projection taken is Cranio-Caudal and Medio-lateral projections. But care must be taken during positioning, the compression pressure must be adequate since excess pressure may rupture the implant inside the breast and cause further complication (17).

MALE MAMMOGRAPHY

Mammography is being performed with increasing frequency in men with breast symptoms including enlarged or painful breast tissue, fat necrosis, Lipoma, and epidermal inclusion cysts Gynecomastia etc. Gynecomastia and breast cancer are the two most important diseases of the male breast. The standard views taken are the normal routine views (11).

TECHNICAL REPORT

BI-RADS® is a quality assurance guide designed to standardize breast imaging reporting and Facilitate outcome monitoring. BI-RADS® serves as a comprehensive guide providing standardized breast imaging

terminology, report organization and assessment structure, as well as a classification system for mammography, ultrasound, and magnetic resonance imaging (MRI) of the breast. It contains a lexicon for standardized terminology (descriptors) for mammography, breast US and MRI, as well as Standard Reporting with Final Assessment Categories and guidelines for Follow-up and Outcome Monitoring. American College of Radiology

(ACR) developed Breast Imaging Reporting and Data system (BI-RADS)(2)

- Reason for examination
- Brief description of the composition of breast
- Significant findings
- Comparison of findings with previous examination
- Impression that includes an overall assessment and recommendation.(2)

Breast Imaging Reporting and Data System (BI-RADS®)(2)		
Category	Assessment	Follow-up Recommendations
0	Need Additional Imaging Evaluation and/or Prior Mammograms for Comparison	Additional imaging and/or prior images are needed before a final assessment can be assigned
1	Negative	Routine annual screening mammography (for women over age 40)
2	Benign Finding(s)	Routine annual screening mammography (for women over age 40)
3	Probably Benign Finding – Initial Short-Interval Follow-Up Suggested	Initial short-term follow up (usually 6-month) examination
4	Suspicious Abnormality – Biopsy Should Be Considered Optional subdivisions:* 4A: Finding needing intervention with a low suspicion for malignancy 4B: Lesions with an intermediate suspicion of malignancy 4C: Findings of moderate concern, but not classic for malignancy	Usually requires biopsy
5	Highly Suggestive of Malignancy – Appropriate Action Should Be Taken	Requires biopsy or surgical treatment
6	Known Biopsy-Proven Malignancy – Appropriate Action Should Be Taken	Category reserved for lesions identified on imaging study with biopsy proof of malignancy prior to definitive therapy

BENEFITS

The benefits of undergoing mammography are to detect small tumors and detect early staging of cancer and hence have better treatment option. It also detects small abnormal tissue growth confined to milk duct known as ductal carcinoma in situ which is not positively diagnosed in ultrasound and MRI modalities(8)

CONCLUSION

Breast cancer is a leading cause of premature death for women in their 40s, and mammographic screening significantly reduces

the risk of death due to breast cancer. Initial mammographic images themselves are not usually enough to determine the existence of

a benign or malignant disease with certainty. If a finding or spot seems suspicious, your radiologist may recommend further diagnostic studies. While mammography is the best screening tool for breast cancer available today, mammograms do not detect all breast cancers.

Also, a small portion of mammograms indicate that a cancer could possibly be present when it is not (called a false-positive result). Research is being done on the advancement of technology for early detection of breast cancer with low radiation dose

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