ORIGINAL RESEARCH PAPER

General Surgery

VALUE OF MAMMOGRAPHY IN DIAGNOSIS OF BREAST LESIONS

KEY WORDS: Breastlesions ,benign Lesions,malignant Lesions, Mammography ,FNAC

Dr.Brijesh U. Patil. Associate Proferssor,Department of Surgery. Smt.Kashibai Navale Medical College & General Hospital,Narhe Pune-411041.

Dr.Viraj C. Shinde* Associate Proferssor,Department.of Surgery.Smt.Kashibai Navale Medical College & General Hospital,Narhe Pune-411041. *Corresponding Author

ABSTRACT

INTRODUCTION Mammography is a primary breast imaging technology for earlier detection of breast diseases.The detection of a lump in the breast is a common occurrence in all women. Investigation of women with a breast lump or suspicious change in breast texture starts with a clinical history, physical examination and mammography. Mammography detects 85% of breast cancers.In this study, we will be dealing with mammography in those women with breast complaints and/or palpable abnormality.

MATERIALS & METHODS In this study of 50 cases, women having symptoms and signs of breast disease, including pain, nipple retraction and/or discharge, lump were studied in the period between January 2017- January 2018.

RESULTS Clinical examination gave the impression of benign disease in 72% cases and malignancy in 28% cases. The clinical findings and histopathological diagnosis correlated correctly in 91 % of cases.Mammographic examination showed benign lumps in 63% cases, malignant suspicious in 5% cases and malignant in 32% cases. The mammographic findings and histopathological diagnosis was correlated correctly in 97% cases.

CONCLUSION Mammography is helpful for the follow up of benign breast lesions. Mammography is also helpful in the follow up of surgical or adiotherapic treatment of the same and contralateral breast. Mammography forms a baseline provision in asymptomatic women for further comparison and should be a part of the diagnostic work up for metastatic carcinoma of unknown origin.

INTRODUCTION

Mammography is a primary breast imaging technology for earlier detection of breast diseases. The development of mammography began in 1913, when Salomon correlated the clinical, pathologic and roentgenographic features of breast tumors[1]. In 1929, Warron[2] was able to show an 85 - 95 percent diagnostic accuracy of this method. New impetus was provided in 1960 by Egan who developed improved images using a high milliamperage, low voltage technique and resulted in widespread adoption of mammography as an adjunct to physical examination

The detection of a lump in the breast is a common occurrence in all women. Investigation of women with a breast lump or suspicious change in breast texture starts with a clinical history, physical examination mammography & FNAC.

Breast is an important and popular site for fine needle aspiration cytology. There is an increasing tendency to confirm the diagnosis of the breast cancer at first consultation by some form of needle biopsytechnique. This allows better investigation and wiser preoperative discussion than was possible when excision biopsy and frozen section confirmed the clinical diagnosis [4].

Mammography detects 85% of breast cancers.At present, the indications of mammography can be broadly divided into:

1. Screening of asymptomatic women and those at high risk for breast cancer.
2. Diagnostic in women having complaints related to the breast or a palpable abnormality.

This included -

- Evaluation of an indeterminate palpable lump of uncertain nature (benign or malignant).
- Evaluation of an indeterminate mass that cannot be considered a dominant nodule, especially when multiple cysts or other vague masses are present and the indication for biopsy is uncertain.
- Evaluation of the contralateral breast in a patient with documented breast cancer.
- In a patient of breast cancer, to evaluate the size and extent of tumor, the presence or absence of multi focal invasive disease and / or DCIS in that breast.
- Work up of metastatic adenocarcinoma from an unknown primary.

In this study, we dealt with mammography in those women with breast complaints and/or palpable abnormality.

To conclude the breast lesion as benign or malignant from the physical examination alone is difficult, as the signs and symptoms of malignancy can mimic those of benign lesions and pose the most important threat to continued well being[4]. In such situations, mammography has a unique role and non-invasiveness in detecting breast cancer, that too at a much earlier stage than other non-invasive methods. Even in a symptomatic woman with a palpable lesion, mammography can still be important as it may prove the clinical diagnosis to be wrong. Not only can it confirm the clinical diagnosis, but it can also show an impalpable lesion in the same or opposite breast. This is important especially when a conservative surgical approach is being considered.

AIMS AND AIMS OBJECTIVES

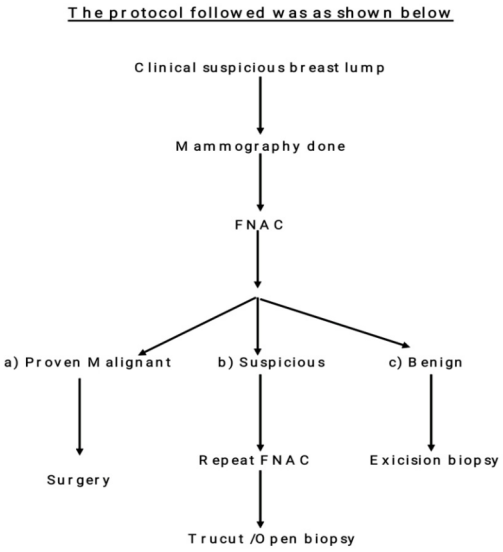
1. To study the value of Mammography as a non-invasive technique in the differentiation of breast lesions into benign, borderline or malignant.
2. To study the degree of correlation between clinical, mammographic and FNAC / histopathologic findings of breast lesions.
3. To study the variation in the presentation of breast diseases.

MATERIALS AND METHODS

This Study was conducted in an Rural Medical College & Hospital from January 2017 to January 2018, after the approval by our Institute's Ethics Committee.The data was collected in association with our Radiology & Pathology Departments..A written and informed consent was obtained from all the included patients.

In this study of 50 cases, women having symptoms and signs of breast disease, including pain, nipple retraction and/or discharge, lump were studied in the period between The low dose film screening mammographic examination was carried out at our hospital.

The findings of clinical and mammographic examination along with the final histopathological diagnosis and appropriate future plan were noted as per the following protocol:



OBSERVATIONS AND ANALYSIS

1. Age Profile

Age Group	No. Of Patients	Percentage
21-30	10	20
31-40	25	50
41-50	10	20
>51	5	10
Total	50	100

2. Hormonal Status

Status	No. Of Patients	Percentage
Premenopausal	41	82
Postmenopausal	9	18
Total	50	100

3. Site of Lump

Site	No. Of Patients	Percentage
UOQ	41	82
LOQ	6	12
UIQ	2	4
LIQ	0	0
Subareolar	1	2

4) Presenting Complaint

	No. Of Patients	Percentage
Lump	46	92
Nipple discharge	1	2
Nipple retraction	1	2
Pain	2	4
Total	50	100

5) Mammographic findings of various lesions

Mammographic Findings	Fibroeystic disease	Fibroadenoma	Lipoma	Carcinoma
Architectural Distortion	1	-	-	7
Hyperdense with smooth border	6	17	-	7
Spiculation	1	-	-	3
Hyperdense with irregular border	5	1	-	10
Micro-calcification	-	-	-	1
Macro-calcification	-	2	-	-
Skin thickening	-	-	-	2
Skin retraction	-	-	-	1
Nipple & areola changes	-	-	-	2
Ductal prominence	2	-	-	2
Increased vascularity	-	-	-	2
Peritumoral halo	-	1	-	3
Axillary nodes	-	-	-	10
Other breast Changes--Normal	10 2	1 17	2	- 18

The above table shows that architectural distortion of parenchyma was seen in 16% cases, out of which 7 were malignant and 1 were of fibrocystic diseases.

A hyperdense lesion with regular borders was seen in all 17 cases of fibroadenomas, 7 cases of carcinoma and also in 6 cases of fibrocystic disease. A hyperdense lesion with irregular border was seen in 16 cases, 10 out of which were malignant, 1 were fibroadenomas and 5 were of fibrocystic disease.

A hypodense smooth lesion was noted in all 2 cases of lipomas. Spiculations were seen in 3 cases of malignancy and 1 case of fibrocystic disease. Microcalcification was seen in only 1 case,which was malignant, while macrocalcification was seen in 2 cases of fibroadenomas.

Skin thickening was seen in 2 cases, which were malignant and so was skin retraction, seen in 1 case of malignancy. Nipple and areolar changes were seen in 2 cases which turned out to have subareolar malignant lumps.

Ductal prominence was seen in 2 cases of malignancy and 1 cases of fibrocystic disease. Relatively increased vascularity was noted in 2 cases, which were carcinomas. A peritumoral halo was seen in 4 cases, out of which 3 were malignant while 1 were fibroadenomas.

Mammographically demonstrable axillary nodes were present in 10 cases, which were malignant. Out of these 10 cases, 7 had clinically palpable nodes.

The opposite breast was mammographically normal in 78% patients. Out of the remaining 22 %, there was diffuse nodularity of the other breast in 10 cases of fibrocystic disease, while 1 patient of fibroadenoma turned out to have another similar asymptomatic lesion in the opposite breast.

6) Correlation of Clinical, Mammographic and Histopathological findings

Impression	Clinical	Mammography	Histopathology
Benign	36	31	32
Malignant suspicious	0	2	0
Malignant	14	17	18

Suspicious malignant masses tend to be hard or firm with indistinct, irregular borders and may be attached to skin or deep fascia. Benign masses are usually more mobile and have well demarcated borders. The use of clinical examination alone to identify presence of malignancy is correct in 60-85% cases, but the greatest difficulty in distinguishing benign from malignant lesions occurs in young women, and use of other studies to confirm the clinical diagnosis of a breast mass is essential[5,6].

The mammographic impression of benign lesions made in 31 cases proved histopathologically benign in 30 cases and malignant in 1 case. Clinically, all 31 cases looked benign.

Out of 2 mammographically suspicious lesions, 1 turned out to be histopathologically malignant, while 1 was benign. Clinically all both of these patients seemed to have benign disease.

All 17 cases with mammographic evidence of malignancy were proven to be histopathologically malignant.

14 cases diagnosed as clinically and mammographically malignant turned out to be histopathologically malignant.

In 3 cases, histopathological diagnosis did not correlate with the mammographic findings; out of these, 1 cases were benign and 2 were malignant.

In 4 cases, histopathological diagnosis did not correlate with the clinical impression; all were malignant histopathologically while benign clinically.

In 5 cases, the clinical diagnosis did not match the mammographic appearance; these cases seemed clinically benign but mammographically suspicious of malignancy. Ultimately 4 out of these 5 cases were proven malignant on histopathology.

In the 32 cases diagnosed clinically as benign, the clinical diagnosis of fibroadenoma was considered in 25 cases. They had soft discrete lumps, which were mobile, and mammographic findings were that of a hyperdense lesion with smooth border in 34%, hyperdense lesion with irregular border in 6%, macrocalcifications were present in 4% and a peritumoral halo was present in 2% cases.

The clinical diagnosis of fibroadenosis/fibrocystic disease was made in 10 cases. They had soft to firm masses with ill-defined borders. Mammographic findings were that of a hyperdense lesion with irregular borders in 10%, hyperdense lesion with regular border in 3%, ductal prominence in 2% and hypodense smooth lesion in 3% cases.

In 5 cases the clinical diagnosis of benign disease was proved wrong histopathologically. 1 out of theseere ductal carcinoma in situ, 1 was invasive lobular carcinoma,2 ere invasive ductal carcinomas and 1 was colloid carcinoma. The clinical diagnosis in these cases was fibroadenoma in 2cases and fibrocystic disease in 3cases. All these lumps were soft to firm, less than 2 cm in size, mobile with no axillary nodes. On mammography, out of these 5cases, 3had mammographic suspicion of malignancy in the form of architectural distortion (1case), spiculated lesion (1case), and microcalcification (1 case). The other 2cases had benign mammographies.

DISCUSSION

Successful cancer treatment relies on a combination of clinical examinations, imaging studies, and pathologic evaluations. The triple test score (TTS) which includes physical examination, mammography, and fine needle aspiration cytology, is the most popular score to evaluate patients with palpable breast lumps. It is not only increases the reliability of clinicians but also increases the sensitivity and specificity of the diagnostic evaluation and detects patients with breast cancer with an overall greater accuracy[7,8]
'

Benign lesions of the breast are a fairly common occurrence. Out of all benign lesions, fibroadenoma followed by fibrocystic disease account for the majority of cases.

Benign breast diseases are more commonly seen in young pre-menopausal women (20-40 years).

In this study, 64% of the patients had benign lesions, and most of them were in the age group of 20-40 years.

By contrast, the incidence of malignancy increases after the age of 40 years as was shown in this study where 15 out of 18 patients (83.3%) above the age of 40 years were found to have malignancy.

These results correlate well with a study conducted in Emory University Hospital where 88% of patients above the age of 40 years were found to have malignancy.

Clammesen19also noted an increase in incidence of breast malignancy between 35-50 years of age.

Our mammography results were also consistent with as mentioned in the literature [20,21]

Suman Kharkwal. et al[22] (2014) done a study on Triple Test in Carcinoma Breast. In the study of total 100 cases, 60 cases were benign and 40 cases were of malignant breast disease. The age of patients with carcinoma breast in the series varied from 35 years to 70 years. The highest incidence of malignancy noted was 30% in 41-50 years age group (4th decade) followed by 27.5% in 51-60 years age group (5thdecade).

The sensitivity of clinical examination was found to be 75%, specificity was 83.3%, positive predictive value (PPV) of 75% and diagnostic accuracy of 80%. The sensitivity, specificity, positive predictive value and diagnostic accuracy of mammography was calculated and was found to be 94.9% , 90% , 86% and 92% respectively. The sensitivity, specificity, positive predictive value and diagnostic accuracy of FNAC was 94.7%, 98.3%, 97.3% and 96.6% respectively. Out of 100 cases triple test was concordant (all three test either benign or malignant) in 80 cases, all the benign cases detected by triple test were benign on final biopsy i.e. 100% specificity and 100% negative predictive value. And they concluded that TT is an accurate and least invasive diagnostic test based on which definitive treatment can be initiated. As was seen in this study, infertility and nulliparity are associated with a higher probability (30-70%) for developing breast cancer as compared to the probability for parous women of the same age9. Early menarche and late menopause also increases the risk of breast cancer.

Kalache10 and Lipnick11 and colleagues have reported conflicting results regarding the effect of prolonged use of oral contraceptives on breast malignancy. In this study, there was history of prolonged use of oral contraceptives in 6women, 2 out of whom were found to have malignancy.

A large majority of breast diseases were found to be localised in the upper outer quadrant owing to the relatively large amount of glandular tissue in this sector.

In this study, in a majority of benign cases, the mammographic appearance was that of a hyperdense lesion with regular borders. However, this appearance was also noted in 7cases of malignancy, but these also had associated changes such as architectural distortion and/or ductal prominence and/or spiculation and/or axillary lymphadenopathy.

On the other hand, 10 malignant lesions were hyperdense with irregular borders and 7 had parenchymal architectural distortioll. liowever an irregular border on mammography was also seen in 5 cases and architectural distortion in 1 cases of fibrocystic disease.

Used alone, clinical examination had a false negative rate of 9% while mammography had a false negative rate of 1%.

In a representative sample of literature, the sensitivity rates (true positive) for mammography ranging from 65-99% have been reported[12]. The mean true positive rate in these studies was 84%. The false positive rates were reported to range from 1 % to a high of 48% with a mean of 9%.

Using clinical examination alone, 92.9% of the lesions were evaluated as malignant or suspicious with a false negative rate of 7.1% and mammography showed 94.9% of lesions as malignant or suspicious and its false negative rate was 5.1% by Erhan[13].

David Setton10 had clinical accuracy in diagnosis of breast cancer to the order of 88% and radiological accuracy of 97%, but by combining both modalities, an accuracy of 97% may be achieved.

The overall accuracy of mammography is considerably high than that of physical examination. When women are screened by both modalities, 90 - 95% cancers are seen on mammography while only 50 - 60% are palpable on physical examination[14].

Sensitivity of mammography is as high as 98% in women over the age of 50 years with fatty breasts, 84% in women with dense breast tissue and as low as 69% in women under 50 years of age with a family history of breast cancer[15].

Women using HRT receive a stastically significantly larger radiation dose from routine breast screening than other women.However this effect is small and only occurs during the period of HRT use[16].

Breast density exerts a significant difference. Mammography can detect 95 - 100% cancers in fatty breasts, 90% of cancers in breasts of intermediate glandularity, and only 80% of cancers in the extremely glandular breast. In these dense breasts, sensitivity rates of physical examination and mammography are similar, since accuracy of one modality is defined in relation to the other.

Lesion depth below the skin surface also influences relative detection rates; deep lesions are more often non-palpable.

Breast size is also significant. Clinical accuracy decreases with increasing breast size due to increased frequency of deep lesions in large breasts. Although mammography is more reliable than physical examination for large and intermediate breasts, it may in general be no more accurate than physical examination for small breasts. This may be related to tumor depth as well as greater glandularity of small breasts[17].In patients with familial history of breast cancer caution is exercised[18].

SUMMARY

The findings of 50 cases of the present study can be summarised as follows:

1. The benign breast lesions were more common in the age group of 20 - 40 years while malignant breast lesions in the age group of 40 years and above.
2. Malignant breast lesions were seen in 2 out of 5 nulliparous women, one of whom was only 26 years old and one, who was 50 years old had history of prolonged use or hormonal medications for infertility.
3. Although no relation with early menarche could be studied, it was observed that late menopause was more commonly associated with malignancy.
4. Family history of breast cancer was positive in 3 patients and 2out of these were found to be positive for malignancy.
5. The histopathological diagnosis of benign lesions was made in 64% cases while malignancy was detected in 36% cases.
6. Clinical examination gave the impression of benign disease in 72% cases and malignancy in 28% cases. The clinical findings and histopathological diagnosis correlated correctly in 91 % of cases.
7. Mammographic examination showed benign lumps in 63% cases, malignant suspicious in 5% cases and malignant in 32% cases. The mammographic findings and histopathological diagnosis was correlated correctly in 97% cases.
8. The overall correlation of clinical and mammographic findings with the histopathological diagnosis was in 88% cases, out of which 32were benign and 12 were malignant.

CONCLUSIONS

1. Benign breast diseases are more common in young pre-menopausal women while malignancy is more common in older pre-menopausal and post-menopausal women.
2. Mammography should be done after the age of35 years, when it is more reliable and may act as a baseline for future comparison, which is associated with higher incidence of malignancy.
3. Mammography should not be considered as a substitute for biopsy, but rather as an adjunctive technique to clinical examination to evaluate signs and/or symptoms of benign and malignant breast diseases such as pain, nipple discharge, mass, skin and nipple abnormalities.
4. In mass lesions, mammography helps to deter the surgical procedure to be carried out, type of anesthesia used as well as detection of non-palpable multicentric carcinoma in the same and opposite breast. With skin and nipple changes, discharges and abnormalities, mammography is helpful to supply necessary information about the etiological factor. In vague symptoms, a negative mammogram affords considerable assurance to the patient and clinician.
5. Mammography is helpful for the follow up of benign breast lesions, especially after aspiration of cystic lesions, which is associated with chances of developing malignant disease in later decades. Mammography is also helpful in the follow up of surgical or adiotherapic treatment of the same and contralateral breast. Mammography forms a baseline provision in asymptomatic women for further comparison and should be a part of the diagnostic work up for metastatic carcinoma of unknown origin.

REFERENCES

1. Donegan W L, Sprat J S (eds) Cancer of the breast. W.B. Saunders, Philadelphia, (1988) P 146.
2. Warron SL,Roentgenologic study of breast.Am.J.of Roentgenology(1930) 24:113.
3. Yaffe, M.J.; Jong, R.A. Adjunctive ultrasonography in breast cancer screening. Lancet 2016, 387, 313–314
4. Haagensen C D, Diseases of the breast. W. B. Saunders, Philadelphia, (1971) P 501.
5. Layfield L J, Glasgow B J, Cramer H : Fine needle aspiration in management of breast masses. Pathol Annu (1989)24: 23.
6. Shabot M M, Goldberg I M, Schick P et at : Aspiration cytology is superior to Tru cut. needle biopsy in establishing diagnosis of clinically suspect breast masses. Ann Surg(1982)196:122.
7. Jan M., Mattoo J.A., Salroo N.A. & Ahangar S. (2010) Indian Journal of Surgery, 72(2), 97-103.
8. Singh N.G., Kapila K., Dawar R. & Verma K. (2011) Acta Cytologica, 47(5), 739-743.
9. Principles of Surgery, Schwartz, 7th ed., P 555 – 556
10. Kalache A, McPherson K, et al : Oral contraceptives and breast cancer. Br.J.Hosp Med(1983)30: 278.
11. Lipnick RJ, Buring JE, Hennekens CH et al. Oral contraceptives and breast cancer. A prospective cohort study. JAMA. 1986;255(1):58–61
12. Moscowitz M Screening for breast cancer: How effective are our tests? CA 33: (1983)P 26
13. Erhan Y, Eidem A, Akildiz M, Kapkac S, Aidemir N, Ozdenir M R, Yilmaz O, Ozbal, Yildriz Erhan Diagnostic reliability of a combined approach of physical examination, mammography and fine needle aspiration biopsy in patients with breast cancer, Br. J. Surg(1993). Vol 80, 178-19
14. Beahrs OH, Shapiro S, Smart CR Report of the working group to review the Nationai Cancer Institute - American Cancer Society. Breast cancer detection demonstration project. JNCI (1979) 62 : P 640 – 709.
15. Kerlikowske K, Grady D, Barclay J et at : Effect of age, breast density and family history on the sensitivity of first screening mammography. JAMA(1996)276: 33 - 38.
16. G J Heyes, A J Mill, M W Charles. British Journal Of Radiology;79(2006) 195-200.
17. Feig SA , The Breast in : Grainger R G, Allison D J (eds) Diagnostic Radiology. Churchill Livingstone, New York, (1986)P 1631-1659.
18. C J Whitaker, C M Kelly, K.Faulkner, E C Stamp.British Journal Of Radiology 79(2006),597-602
19. Clammesen J, Measurement of levels of health, WHO Reg. Publ. Euro Sr. No.7, (1979) P 199.
20. Bukhari M.H. & Akhtar Z.M. (2009) Diagnostic Cytopathology, 37(6), 416-424.
21. Nederend J., Duijm L.E., Louwman M.W., Coebergh J.W., Rou-men R.M., Lohle P.N., Roukema J.A., Rutten M.J., van Steen-bergen L.N., Ernst M.F., Jansen F.H., Plaisier M.L., Hooijen M.J. & Voogd A.C. (2014) European Journal of Cancer, 50(1), 31-39
22. Kharkwal S, Sameer, Mukherjee A. Triple Test in Carcinoma Breast. Journal of Clinical and Diagnostic Research : JCDR. 2014;8(10):NC09-NC11. doi:10.7860/JCDR/2014/9237.4971.