Original Research Article

Clinical Outcomes of Mammographic and Ultrasonographic Techniques for Study of Palpable Breast Lesions with Cyto Histopathological Correlation

Ravi Kumar*

[1]Assistant professor, Department of Radio Diagnosis, Netaji Subhas Medical college& Hospital, Bihta, Patna, Bihar, India

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Abstract

Palpable breast masses, either self-detected or identified by clinical examination is common. Although most detected masses are benign, every woman presenting with breast mass should be evaluated to exclude or establish the diagnosis of cancer. Over 100,000 new breast cancer patients are diagnosed annually in India and according to WHO an estimated 70218 women died due to breast cancer. Early detection of breast cancer in order to improve the cancer outcome and survival remains the keystone of breast cancer control. The established management of palpable breast masses includes triple assessment, which includes clinical examination, imaging and fine needle aspiration cytology .Fine needle aspiration cytology is a relatively simple, reliable, atraumatic, economical and complication free technique for the evaluation of mass lesions. Fine needle aspiration cytology of a breast lump is an accepted and established method to determine the nature of a breast lump. Sonomammography is the widely accepted and cost effective modality used for breast cancer screening in clinically suspected lesion. Though a definitive diagnosis is possible with imaging, for all the lesions histopathology study is proven essential for confirming the diagnosis.

The present study was planned in Department of Radio Diagnosis, Netaji Subhas Medical college& Hospital. Total 25 cases of the females diagnosed with the clinically palpable mass were enrolled in the present study. Ultrasound examination of the breast masses was done by an expert Sonologist in the department of radio diagnosis.The transducer was gently applied and both longitudinal and transverse scans were taken.

Present study confirms the higher combined sensitivity, specificity and accuracy for ultrasonography and fine needle aspiration cytology for detection of breast masses including malignancies. USG is better in cystic lesion ectasia, inflammatory lesion and dense breast evaluation, whereas cytology is better in detection of malignancy. The triple assessment is an accurate, simple and cost-effective method for the evaluation of breast cancer and can be applied.

Keywords: Optic, glaucoma, intraocular pressure.

Introduction

A breast mass, also known as a breast lump, is a localized swellings that feel different from the surrounding tissue. Breast pain, nipple discharge, or skin changes may be present. Concerning findings include masses that are hard, do not move easily, are of an irregular shape, or are firmly attached to surrounding tissue. Causes include fibrocystic change, fibroadenomas, breast infection, galactoceles, and breast cancer. Breast cancer makes up about 10% of breast masses. Diagnosis is typically by examination, medical imaging, and tissue biopsy. Tissue biopsy is often by fine needle aspiration biopsy. Repeated examination may be required. Treatment depends on the underlying cause. It may vary from simple pain medication to surgical removal. Some causes may resolve without treatment. Breast masses are relatively common. It is the most common breast complaint with the women's concern generally being that of cancer. [1]

A breast cyst is a non-cancerous, fluid-filled sac in the breast. They generally feel smooth or rubbery under the skin and can be quite painful or cause no pain at all. Cysts are caused by the hormones that control the menstrual cycle and are rare in women older than 50. A sebaceous cyst is a non-cancerous, closed sac or cyst below the skin that is caused by plugged ducts at the site of a hair follicle. Hormone stimulation or injury may cause them to enlarge but if no symptoms are present, medical treatment is not required. Breast abscesses are non-cancerous pockets of infection within the breast. They can be quite painful and cause the skin over the breast to turn red or feel hot or solid. Abscesses of the breast are most common in women who are breast-feeding. [2]

Adenomas are non-cancerous abnormal growths of the glandular tissue in the breast. The most common form of these growths, fibroadenomas, occur most frequently in women between the ages of 15 and 30 and in women of African descent. They usually feel round and firm and have smooth borders. Adenomas are not related to breast cancer. Intraductalpapillomas are wart-like growths in the ducts of the breast. These lumps are usually felt just under the nipple and can cause a bloody discharge from the nipple. Women close to menopause may have only one growth, while younger women are more likely to have multiple growths in one or both breasts. Breast cancer usually feels like a hard or firm lump that is generally irregular in shape and may feel like it is attached to skin or tissue deep inside the breast. Breast cancer is rarely painful and can occur anywhere in the breast or nipple. Fat necrosis is a condition in which the normal fat cells of the breast become round lumps. Symptoms can include pain, firmness, redness, and/or bruising. Fat necrosis usually goes away without treatment but can form permanent scar tissue that may show up as an abnormality on a mammogram. A lipoma is a non-cancerous lump of fatty tissue that is soft to the touch, usually movable, and is generally painless. [3] Breast hematomas and seromas may be visible as a local swelling of the breast. Seromas are a common complication of breast surgery.

*Correspondence
Dr. Ravi Kumar
Assistant professor, Department of Radio Diagnosis, Netaji Subhas Medical college& Hospital, Bihta, Patna, Bihar, India.
E-mail: drravikumar06@gmail.com

Hematomas can also occur after breast surgery or breast injury or, more rarely, they can occur spontaneously in patients with coagulopathy.

Breast masses are broadly classified as benign or malignant. Common causes of benign breast lesions include fibrocystic disease, fibroadenoma(see the image below),intraductal papilloma, and abscess. Malignant breast disease encompasses many histologic types that include, but are not limited to, in situ ductal or lobular carcinoma, infiltrating ductal or lobular carcinoma, and inflammatory carcinoma. The main concern of many women presenting with a breast mass is the likelihood of cancer. Reassuringly, most breast masses are benign.

The mammary glands arise from a caudal section of the ectodermal tissue known as the "milk lines," which extend along the anterior surface of the developing fetus from the axilla to the groin. During puberty, pituitary and ovarian hormonal influences stimulate female breast enlargement, primarily owing to accumulation of adipocytes. Each breast contains approximately 15-25 glandular units know as breast lobules, which are demarcated by Cooper ligaments. Each lobule is composed of a tubuloalveolar gland and adipose tissue. Each lobule drains into the lactiferous duct, which subsequently empties onto the surface of the nipple. Multiple lactiferous ducts converge to form one ampulla, which traverses the nipple to open at the apex. [4]

Below the nipple surface, lactiferous ducts form large dilations called lactiferous sinuses, which act as milk reservoirs during lactation. [5] When the lactiferous duct lining undergoes epidermalization, keratin production may cause plugging of the duct, resulting in abscess formation. [4] This may explain the high recurrence rate (an estimated 39%-50%) of breast abscesses in patients treated with standard incision and drainage, as this technique does not address the basic mechanism by which breast abscesses are thought to occur.

Postpartum mastitis is a localized cellulitis caused by bacterial invasion through an irritated or fissured nipple. It typically occurs after the second postpartum week and may be precipitated by milk stasis. There is usually a history of a cracked nipple or skin abrasion or failure to clean nipples after breastfeeding. Sleeping position may also affect the progression of mastitis to breast abscess. [10] Staphylococcus aureus is the most common organism responsible, but Staphylococcus epidermidis and streptococci are occasionally isolated. Drainage of milk from the affected segment should be encouraged and is best achieved by continued breastfeeding or use of a breast pump. [6]

Nonlactating infections may be divided into central (periareolar) and peripheral breast lesions. Periareolar infections consist of active inflammation around nondilatedsubareolar breast ducts—a condition termed periductal mastitis. Peripheral nonlactating breast abscesses are less common than periareolar abscesses and are often associated with an underlying condition such as diabetes, rheumatoid arthritis, steroid treatment, granulomatous lobular mastitis, trauma, and smoking. [7] Primary skin infections of the breast (cellulitis or abscess) most commonly affect the skin of the lower half of the breast and often recur in women who are overweight, have large breasts, or have poor personal hygiene.

Breast masses can involve any of the tissues that make up the breast, including overlying skin, ducts, lobules, and connective tissues. Fibrocystic disease, the most common breast mass in women, is found in 60%-90% of breasts during routine autopsy. Fibroadenoma, the most common benign tumor, typically affects women aged 30 years or younger and accounts for 91% of all solid breast masses in females younger than 19 years. Infiltrating ductal carcinoma is the most common malignant tumor; however, inflammatory carcinoma is the most aggressive and carries the worst prognosis. Mammary Paget disease, or adenocarcinoma of the nipple epidermis, is relatively rare but may be misdiagnosed as a benign dermatosis if care is not taken. [8]

Ultrasonography is used to distinguish solid from cystic structures and to direct needle aspiration for abscess drainage. Simple cysts are seen on sonograms as round or oval with sharply defined margins and posterior acoustic enhancement. Complex cysts are characterized by a significant solid component, septations, lobulations, varied wall thickness, and the presence of internal debris. Abscesses usually appear as ill-defined masses with central hypoechoic areas and may display internal septations, debris, posterior enhancement, eccentrically thickened walls, and increased Doppler flow in the walls and surrounding tissue with lack of internal color Doppler flow. [9]

Breast abscesses may be drained with incision and drainage (versus ultrasound-guided needle aspiration and irrigation). Historically, incision and drainage was considered the standard of care for abscesses. Although this method has a lower reoccurrence rate, it is more invasive than needle aspiration and frequently results in scarring with structural damage and poor cosmetic outcomes. Fine-needle aspiration should be considered first-line therapy for abscesses smaller than 5 cm owing to its lower risks, followed by incision and drainage if recurrence occurs. Surgical excision may be required for infected or obstructed lactiferous ducts and provides a lower rate of recurrence for nonpuerperal abscess and mastitis. [10]

Ultrasound-guided needle aspirations are more successful on abscesses smaller than 3 cm and on puerperal abscesses. Loculations are associated with failure of resolution with aspiration, regardless of abscess volume. Nonpuerperal abscesses have a higher rate of recurrence and often require multiple drainage attempts. Regardless of the underlying organism, the need for repeat aspiration is common in patients treated with aspiration versus incision and drainage. In a US cohort of 54 abscess cases treated with needle-guided aspiration, the median number of drainage procedures was 2 (interquartile range, 1.0-4.0), with 24% requiring 5 or more drainage procedures. [11]

Vacuum-assisted biopsy is a viable option for the management of lactational breast abscesses and has been associated with a shorter healing time than simple needle aspiration. Furthermore, percutaneous catheter drainage may be considered for larger abscesses.

Palpable breast masses, either self-detected or identified by clinical examination is common. Although most detected masses are benign, every woman presenting with breast mass should be evaluated to exclude or establish the diagnosis of cancer. Over 100,000 new breast cancer patients are diagnosed annually in India and according to WHO an estimated 70218 women [12] died due to breast cancer. Early detection of breast cancer in order to improve the cancer outcome and survival remains the keystone of breast cancer control. The established management of palpable breast masses includes triple assessment, which includes clinical examination, imaging and fine needle aspiration cytology .Fine needle aspiration cytology is a relatively simple, reliable, atraumatic, economical and complication free technique for the evaluation of mass lesions. Fine needle aspiration cytology of a breast lump is an accepted and established method to determine the nature of a breast lump. Sonomammography is the widely accepted and cost effective modality used for breast cancer screening in clinically suspected lesion. Though a definitive diagnosis is possible with imaging, for all the lesions histopathology study is proven essential for confirming the diagnosis.

Methodology

The present study was planned in Department of Radio Diagnosis, Netaji Subhas Medical College and Hospital,Bihta, Patna, Bihar, for 4 months.Total 25 cases of the females diagnosed with the clinically palpable mass were enrolled in the present study. Ultrasound examination of the breast masses was done by an expert Sonologist in the department of radio diagnosis.The transducer was gently applied and both longitudinal and transverse scans were taken.

Fine needle aspiration cytology was aseptically taken from the lesion using 23 G needle and 5 ml syringe. Cellular material was aspirated into a syringe and expelled onto slides. Four to six slides were

prepared for each patient. A small or medium-sized drop of aspirate was put near the labelled end of a slide that was placed on a table. A second slide was used to spread the aspirated material along the specimen slide.All the smears were wet fixed in alcohol and stained with Hematoxylin and Eosin (H&E).

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

Inclusion Criteria: women's with breast lesions detected on clinical examination/ self-breast examination

Exclusion Criteria: Ulcerated and fungating breast growth, Pregnant women, moribund patients and proven cases of malignancy and male patients.

Results & Discussion

Breast cancer is one of the most prevalent cancers in the world among women. FNAC of breast lumps is an accepted and established method for determining the natures of breast lumps with a high degree of accuracy. Application of Fine Needle Aspiration for the diagnosis of palpable breast masses was first introduced by Martin and Ellis in 1930. [13] Ultrasound is also useful in guiding FNAC or biopsies and more reliable in evaluation of dense breasts. The purpose of this present study was to determine the value of fine needle aspiration cytology and ultrasonography in the diagnosis of breast carcinoma and to compare the result of FNAC and Ultra sonography with histological diagnosis to assess its accuracy. Early screening and diagnosis of breast lesions and categorization into different groups of breast pathology can be helpful in accurate management of the breast lesions. SonoMammography is an essential component in the pre-operative assessment of breast cancer. It serves to characterize and determine the extent of the mass and to evaluate the breasts for clinically occult lesions.

Table 1: Basic Data

Characteristics	No. of Cases
Duration of lump	
• < 2 months	18
• 2-18 months	6
• >18 months	1
Pain	5
Discharge	2
Fever	1
Weight loss	0
Family history	1

Table 2: Characteristics of breast mass

Characteristics	No. of Cases
Site of lesion	
• Upper outer quadrant	22
• Upper inner	1
• Lower outer quadrants	1
• Lower inner	0
• Retroaerolar	1
Laterality	
• Unilateral	24
• Bilateral	1
Multiplicity	
• Single	24
• Multiple	1

Table 3: Comparison of Mammography and USG

	Cytology	Mammography Alone	USG Alone	Combined
Fibrocystic disease	12	11	9	11
Infection	2	1	1	1
Fibroadenoma	3	1	1	2
Cyst	2	1	1	1
Carcinoma	5	3	2	5
Lipoma	1	1	1	1
Total	25	18	15	21

FNAC is not only useful in diagnosis and further planning of treatment without need for biopsy, but also helpful in prognostication of the tumour and knowing the hormone receptor status.19 Breast biopsy should be reserved for diagnostically challenging cases and when the evaluation of the invasiveness is mandatory in cases such as in papillary neoplasms. [14] The gold standard test used in our study was the histopathological report which is valid, reproducible and has been accepted as the gold standard internationally. For a good study, the reference test against which the diagnostic test in evaluation is compared should be gold standard. [15]

We observed rare cases of epidermal cyst on cytology later on histopathology confirmed the diagnosis. The main feature of epidermal cyst was nucleated and anucleated squamous cells along with few ductal epithelial cells. Epidermal cyst of breast is uncommon benign lesion. In the literature only few cases have been reported. It presents as breast lump mainly in peri-alveolar region

and needs to be differentiated from other breast lesions.[16],[17] Later on those diagnosed as fibrocystic disease and sclerosingadenosis on histopathology. On cytology smears shows slight loss of cohesiveness of ductal epithelial cell clusters with mild nuclear atypia suggestive of suspicious of malignancy but subsequent histopathological examination revealing features of benign lesion. Similarly diagnosis of sclerosingadenosis is very difficult on cytology due to high cellularity, microacinar patterns of epithelial cells and mild pleomorphism. To minimize the false positive cases cytohistopathological correlation is needed.

Cytohistological discrepancies frequently encountered are inherent to FNAC of breast masses. [18] There is some inconclusive evidence in literature indicating that such discrepancies could be due to histological staging and type of carcinoma. [19] These discrepancies can be overcome and sensitivity of FNAC further enhanced by using techniques, such as ultra sound guided FNA biopsy. [20-22] This would ensure that the aspirator hits the target area. All clinically or cytologically highly suspicious lesions need to be resolved ultimately with excisional biopsy or frozen section. [22]

False positive diagnosis is always interpretation errors. [23] They are highly undesirable, but in large volume institutions, they will occur from time to time in the process of evaluation of rare lesion, diagnostic pitfalls and look alike such as some fibroadenomas with myoepithelial hyperplasia, complex sclerosing lesions and sclerosingadenosis. False positive diagnosis should be avoided because mastectomy or other treatments may in certain centres be performed based entirely on FNA cytologic findings. [24] False positive case can be diagnosed as suspicious for malignancy on cytology which further underwent simple mastectomy and histopathologically was diagnosed as sclerosingadenosis. Sclerosingadenosis cannot be clearly distinguished cytologically. [25] Epithelial aggregates in smears may show an obvious microacinar pattern giving rise to differential diagnostic problem, particularly with tubular carcinoma. [26] Apocrine metaplasia occurring in areas of adenosis can look extremely worrying and may be the cause of false positive diagnosis. [27] Apart from high accuracy rate of FNAC, this technique is quite attractive because of rapidity of execution and interpretation, its low cost and low rate of morbidity.

Apart from the high accuracy rate of fine needle aspiration cytology, this technique is quite attractive because of its rapidity of execution and interpretation. Some have raised questions about the possible dangers of cell implantation from the needle aspiration. These rare reports have largely resulted from the use of larger cutting needle (18 gauze) rather than fine needles (22 gauze). With this fine needle technique, there is essentially no danger of implantation with breast aspiration. [28] Franzen and Zajicek in a review of 3479 consecutive breast aspirates found no evidence of seeding along the needle tract. [29] This is not surprising as the needle tract is invariably removed with definitive surgery.

Conclusion

Present study confirms the higher combined sensitivity, specificity and accuracy for ultrasonography and fine needle aspiration cytology for detection of breast masses including malignancies. USG is better in cystic lesion ectasia, inflammatory lesion and dense breast evaluation, whereas cytology is better in detection of malignancy. The triple assessment is an accurate, simple and cost-effective method for the evaluation of breast cancer and can be applied.

References

1. Hindle, William H. Breast Care: A Clinical Guidebook for Women's Primary Health Care Providers. Springer Science & Business Media, 2012, 12p. ISBN 9781461221449.
2. WebMD: Breast Lump Overview.
3. Kasales CJ, Han B, Smith JS Jr, Chetlen AL, Kaneda HJ, Shereef S. Nonpuerperal mastitis and subareolar abscess of the breast. AJR Am J Roentgenol. 2014; 202(2):W133-9.
4. Kaneda HJ, Mack J, Kasales CJ, Schetter S. Pediatric and adolescent breast masses: a review of pathophysiology, imaging, diagnosis, and treatment. AJR Am J Roentgenol. 2013; 200(2):W204-12.
5. Whitaker-Worth DL, Carlone V, Susser WS et al. Dermatologic diseases of the breast and nipple. J Am AcadDermatol. 2000; 43(5 Pt 1):733-51; quiz 752-4.
6. Dixon JM. Breast infection. BMJ. 2013; 347:f3291.
7. Sheybani F, Sarvghad M, Naderi HR, Gharib M. Treatment for and clinical characteristics of granulomatous mastitis. Obstet Gynecol. 2015; 125 (4):801-7.
8. Ooi PS, Draman N, Yusoff SSM, Zain WZW, Ganasagaran D, Chua HH. Mammary Paget's Disease of the Nipple: Relatively Common but Still Unknown to Many. Korean Journal of Family Medicine, 2018. kjfm.17.0143.
9. Muttarak M, Chaiwun B. Imaging of giant breast masses with pathological correlation. Singapore Med J. 2004; 45(3):132-9.
10. Ozseker B, Ozcan UA, Rasa K, Cizmeli OM. Treatment of breast abscesses with ultrasound-guided aspiration and irrigation in the emergency setting. EmergRadiol. 2008; 15(2):105-8.
11. Branch-Elliman W, Lee GM, Golen TH, Gold HS, Baldini LM, Wright SB. Health and economic burden of post-partum Staphylococcus aureus breast abscess. PLoS ONE. 2013; 8(9):e73155.
12. Rashmi Bawa et al. Breast Cancer In India. Int J Med Res Prof.2015;1(2);27-31.
13. Martin HE, Ellis EB. Biopsy by needle puncture and aspiration. Ann Surg. 1930;92:169–18.
14. Moschetta M, Telegrafo M, Carluccio DA, Jablonska JP, Rella L, Serio G et al. Comparison between fine needle aspiration cytology (FNAC) and core needle biopsy (CNB) in the diagnosis of breast lesions. G Chir. 2014; 35:171-6.
15. TakhellambamYS, Lourembam SS, Sapam OS, Kshetrimayum RS, Thoujam BS, Khan T. Comparison of Ultrasonography and Fine Needle Aspiration Cytology in the Diagnosis of Malignant Breast Lesions. Journal of Clinical and Diagnostic Research. 2013; 7:2847-50.
16. Lam SY, Kasthoori JJ, Mun KS, Rahmat K. Epidermal inclusion cyst of the breast: a rare benign entity. Singapore Med J. 2010;51:e191-194.
17. Taira N, Aogi K, Ohsumi S, Takashima S, Kawamura S, Nishimura R. Epidermal inclusion cyst of the breast. Breast Cancer. 2007;14:434-437.
18. Layfield LJ, Dodd LG. Cytologically low grade malignancies: an important interpretative pitfall responsible for false negative diagnosis in fine–needle aspiration of the breast. DiagnCytopathol. 1996;15(3):250-259.
19. Al-Mulhim AS, Sultan M, Al –Mulhim FM, Al-Wehedy A, Ali AM, Al-Suwaigh A, Al-Dahfiri S, Baymen O. Accuracy of the triple test in the diagnosis of palpable breast masses in Saudi females. Ann Saudi Med. 2003;23(3-4):158-161.
20. Nguansangiam S, Jesdapatarakul S, Tangjitgamol S. Accuracy of FNAC from breast masses in Thailand. Asian J Cancer Prev. 2009; 10(4):623-6.
21. Hatada T, Ishii H, Ishii S, Okada K, Fujiwara Y, Yamamura T. Diagnostic value of ultra sound guided fine needle aspiration biopsy, core - needle biopsy and evaluation of combined use in the diagnosis of Breast lesions. J Am CollSurg. 2000;190(3):299-303.
22. Ariga R, Bloom K, Reddy VB, Kluskens L, Francescatti D, Dowlat. K, Siziopikou P, Gattuso P. Fine Needle aspiration of clinically suspicious palpable breast masses with histopathologic correlation. Am J Surg. 2002; 184(5):410-413.
23. Nemenqani D, Yaqoob N. Fine needle aspiration cytology of inflammatory breast lesions. Journal of the Pakistan Medical Association. 2009;59(3):167–170.

24. Das DK, Sodhani P, Kashyap V, Parkash S, Pant JN, Bhatnagar P. Inflammatory lesions of the breast: Diagnosis by fine needle aspiration. Cytopathology. 1992; 3(5):281-289.
25. Bardales RH, Stanley MW. Benign spindle and inflammatory lesions of the breast: diagnosis by fine- needle aspiration. Diagnostic Cytopathology. 1995;12(2):126–130.
26. Guray M, Sahin AA. Benign breast diseases: classification, diagnosis, and management. Oncologist. 2006;11(5):435-49.
27. Lee KC, Chan JK, Gwi E. Tubular adenosis of the breast: a distinctive benign lesion mimicking invasive carcinoma. Am J SurgPathol. 1996;20(1):46-54.
28. Michael Shabot. Aspiration Cytology is Superior to Tru-cut Needle Biopsy in Establishing the Diagnosis of Clinically Suspicious Breast Masses. Annals of Surgery, 1982; 196:122-126.
29. Franzen S, Zajoak J. Aspiration biopsy in diagnosis of palpable lesions of the breast. ActaRadiol. 1968; 7: 241-262.

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