Research Article

Pattern of palpable breast lesions on fine needle aspiration cytology: a retrospective and prospective analysis of 1,000 cases

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Abstract

Background: In both developed and developing countries, breast lumps comprise a considerable amount of surgical cases in women.

Objective: To look the frequency distribution of various breast lesions on fine needle aspiration (FNA).

Materials and Methods: The 1,000 patients who presented with palpable breast lump, age group including 16–60 years and both sexes, were included in the study. Frequency distribution of various breast lesions with respect to age and sex was studied.

Result: The majority [98% (*N* = 980)] of patients were female subjects and rest [2% (*N* = 20)] male subjects. With reference to the age, maximum [66.6% (*N* = 666)] patients were between second and third decades and rest [33.4% (*N* = 334)] in fourth and fifth decades. Benign breast lesions contributed to majority of the cases [57.3% (*N* = 573)], malignant breast lesions to 26.8% (*N* = 268) of the cases, and the inflammatory lesions to 15.9% (*N* = 159) of the cases. Of the 268 (26.8%) malignant breast lesions, 38% (*N* = 102) of cases were aged between 41 and 50 years, 33% (*N* = 88) of cases 51–60 years, and 29% (*N* = 78) of cases 31–40 years. In malignant breast lumps, majority are duct carcinoma NOS (*N* = 229), while in benign breast disease, fibroadenoma are found to be the commonest one. Cytology grading of malignant lesion showed maximum cases with grade II, followed by grades I and III.

Conclusion: With experienced hands, fine needle aspiration (FNA) cytology is a safe, cost-effective, and reliable technique for preoperative evaluation of palpable breast lumps. FNA features are more informative when combined with clinical and radiological findings. Fibroadenoma forms the major bulk of benign breast lesions, followed by duct carcinoma. Epithelioid cells when seen in inflammatory breast FNA smears, tuberculosis must be ruled out. In India, breast carcinoma is noted in younger patients when compared with western countries. Grading of breast carcinomas must be done on FNA smears for selecting the neoadjuvant therapy. Clinical breast examination and mammography screening in female subjects should be encouraged in developing countries from the third decade onward for early detection of breast carcinoma.

KEY WORDS: Breast lesion, cytology, grading, fibroadenoma

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Introduction

In both developed and developing countries, breast lumps comprise a considerable amount of surgical cases in women. In outpatient departments, breast lump is one of the commonest presentations; majority of them are in women and benign. Differentiating benign lumps from malignant preoperatively for definite treatment is necessary.[1,2] In majority of the cases, a confirmatory investigation using microscope is carried out after clinical examination. Earlier, invasive methods were used

for this purpose; for example, an excision biopsy as an inpatient, under anesthesia. If the result becomes positive, the conclusive operative treatment is performed a few days later. The thus-acquired final sample would then be sent for histopathology examination again, for the estimation of other parameters. Therefore, it involves repeated admissions to hospital in majority of the cases and more than one surgery, in addition to its social and physical inconveniences. Any postponement in obtaining the result of the histopathology examination gets added to the anguishes of the patient. Fine needle aspiration cytology (FNAC) is a minimally invasive technique commonly used in breast, thyroid, and lymph nodes in neoplastic and nonneoplastic diseases. The effectiveness of the study can be maximized with the help of a radiologist. This is an easy, quick-to-perform, outpatient, and virtually painless procedure, the use of which continues to increase worldwide, especially in developing countries. It is widely accepted as a reliable technique and has been proved to be a significant patient-friendly procedure for the preoperative evaluation of palpable breast lumps.[3–9] Hence, this study was undertaken to see the pattern of palpable breast lesions on FNA after confirmation by final histopathology report. The scope of FNA has now increased to classifying the subtypes of benign, malignant lesions, and residual disease in order to plan the treatment protocol and the subsequent follow-up.[10,11] This study is proposed to study the frequency distribution of different lesions of the palpable breast lumps.

Materials and Methods

In the period of 3 years, we retrospectively and prospectively analyzed the data of 1,000 patients who presented with a palpable breast lump. Patient's data were retrieved from the archives of the Department of Pathology, MGM Medical College, Indore, Madhya Pradesh, India.

Medical records of these patients were reviewed and detailed clinical history, physical examination, and mammography/ultrasonography (USG) findings were noted.

Eligibility criteria for patients: 1,000 female patients attending the surgical outpatient department of our hospital were selected keeping in mind the criteria mentioned as follows:

A. Inclusion criteria:
   a. Age between 16 and 60 years.
   b. Palpable breast lump of variable size.
B. Exclusion criteria:
   a. Patient not giving written informed consent.

All the patients underwent FNA in cytology clinic after prior written consent. FNA was done with standard technique and aseptic precautions by using 10-mL disposable syringe and 22-23 gauge needles. Two to three dry clean slides were used for preparing the smears. Material was smeared on glass slides, and all the slides were labeled with a glass pencil. Then, all the smears were fixed with 95% alcohol. The slides were stained with Geimsa and Papanicolaou stains. If the smaple obtained was not satisfactory, then a repeat aspiration was done. In case of more than one swelling, aspiration was done from each swelling. Diagnosis of each lump was based on the physical examination, FNA, and/or mammography and/or USG features. Cytology grading of breast carcinomas was done by using Robinson's grading system based on six cytomorphology features, namely: cell dissociation, cell size, cell uniformity, nucleoli nuclear margins, and chromatin pattern. Carcinomas were graded into grades I–III.

Results

Of the 1000 patients, with the age group including 16–60 years and both sexes, majority [98% (*N* = 980)] of the patients were female subjects and rest [2% (*N* = 20)] male subjects. With reference to the age, maximum [66.6% (*N* = 666)] patients were between second and third decades and rest [33.4% (*N* = 334)] in fourth and fifth decades. Benign breast lesions contributed to majority of the cases [57.3% (*N* = 573)], malignant breast lesions to 26.8% (*N* = 268) of the cases, and the inflammatory lesions to 15.9% (*N* = 159) of the cases. Of the 268 (26.8%) malignant breast lesions, 38% (*N* = 102) of cases were aged between 41 and 50 years, 33% (*N* = 88) of cases 51–60 years, and 29% (*N* = 78) of cases 31–40 years. In malignant breast lumps, majority are duct carcinoma NOS (*N* = 229), while in benign breast disease, fibroadenoma are found to be the commonest one. Cytology grading of malignant lesion showed maximum cases with grade II, followed by grades I and III [Table 1].

Discussion

FNA is extensively acknowledged as a trustworthy technique in the initial examination of the palpable breast lumps. It is simple, safe, cost-effective, minimally invasive, rapid, and as sensitive as biopsy.[3,4,8] The chief objective of FNA is to distinguish benign lesions from malignant lesions in order to plan the treatment protocol and uneventful follow-up.[10–12]

In our study, the age of the patients ranged from 16 to 60 years, with male to female ratio of 1:9.8. Similar age group was observed in studies done in Asian countries.[13,14] Higher age group in studies of western countries was attributed to higher life expectancy.[15] Of the 1,000 patients studied, maximum patients [57.3% (*N* = 573)] showed benign lesions. Malignant lesions were found in 26.8% (*N* = 268). It has been emphasized in the past that majority of the lesions in breast are benign [Table 2].[1,16–20]

Fibroadenoma was the most frequently (*N* = 438) diagnosed lesion on FNA with maximum (*N* = 435) patients between 16 and 30 years. Conclusive FNA diagnosis was achieved in patients based on the diagnostic triad of cellular smears: bimodal pattern, numerous single bare bipolar nuclei, and fragments of fibromyxoid stroma. The lack of any element of the diagnostic triad and low cellularity are the general

Table 1: Frequency of FNA diagnosis of 1,000 breast lesions in various age groups

	Breast lesions	Age (years)					Total ? (%)
		16–20	21–30	31–40	41–50	51–60	
Inflammatory diseases (*n* = 159)	Acute mastitis	3	26	8	14	16	98 (9.8)
	Chronic granulomatous mastitis	4	7	9	16	13	49 (4.9)
	Tubercular mastitis	1	4	3	2	2	12 (1.2)
Benign lesion (*n* = 573)	Fibroadenoma	108	327	3	—	—	438 (4.38)
	Lactating adenoma	4	26	6	—	—	36 (3.6)
	Fibrocystic change	—	5	19	10	—	34 (3.4)
	Fibroadenosis	12	17	1	—	—	30 (3.0)
	Gynecomastia		5	6	1		12 (1.2)
	Galactocele	1	2	3			6 (0.6)
	Benign phyllodes		2	1			3 (0.3)
	Organized hematoma	2	2	1			5 (0.5)
Malignant lesion (*n* = 268)	Duct carcinoma			7	110	112	229 (2.29)
	Mucinous carcinoma				2	2	4 (0.4)
	Papillary carcinoma				1	2	3 (0.3)
	Medullary carcinoma				1	1	2 (0.2)
	Lobular carcinoma				3	11	14 (1.4)
	Metastasis				1	15	16 (1.6)
	Total						1,000

Table 2: Type and frequency of mastitis on FNA in various age groups

Type of mastitis	Age (years)					*N*
	16–20	21–30	31–40	41–50	51–60	
Acute/abscesses	3	26	8	14	16	98
Tuberculous	1	4	3	2	2	12
Granulomatous	4	7	9	16	13	49
Total						159

χ^2 test: $p = 0.643$, nonsignificant.

Table 3: Frequency of 268 malignant lesions on FNAC

Type of malignant lesion	FNA diagnosis
Infiltrating duct carcinoma	229
Mucinous carcinoma	4
Medullary carcinoma	2
Infiltrating lobular carcinoma	14
Papillary carcinoma	3
Metastasis of squamous cell carcinoma	16
Total	268

reasons of drawbacks in proper diagnosis of fibroadenoma.[21] Appropriate analysis in such cases was attained by associating FNA features with clinical and radiological features.

Fibrocystic change (*N* = 34) was the second most common benign lesion observed, with maximum patients (*N* = 24) between 21 and 40 years. Although it involves the action of hormones for its development, the precise pathogenesis remains unclear.[21] The clinical and mammography findings must also be applied to analyse the cytology samples. Few of these lesions pretend carcinoma clinically, radiologically, and microscopically.[22] Majority (90%) of the changes in fibrocysts were nonproliferative in nature and FNA smears revealed several macrophages and apocrine cells inclusive or non-inclusive of very few chronic inflammatory cells. Compared with the general population, proliferative fibrocystic change with or without atypia poses relative risk of developing carcinoma.[23] Mastitis was seen in 15.9% (*N* = 159) of the patients with maximum (*N* = 37) patients between 21 and 30 years. Acute mastitis/abscesses, which is also known as puerperal or lactational mastitis, was seen in 61.6% (*N* = 98) of the patients, with maximum (*N* = 26) between 21 and 30 years. Early diagnosis and management is of value.[23–25] Tuberculous mastitis is relatively rare with reported incidence varying from 3% to 4.5% in developing countries such as India.[26] Few reports, including our dealing with cytomorphologic features, have been published in the past.[27] Clinical and radiological features

are not diagnostic, and easily can be confused with breast cancer or pyogenic abscess. FNA diagnosis was based on the presence of epithelioid cells, caseous necrosis with or without acid-fast bacilli (AFB), or positive AFB culture. Gynecomastia accounted in 2.09% (*N* = 12) of the patients, with maximum (*N* = 6) patients between 31 and 40 years and 5 patients between 21 and 30 years. Gynecomastia in young age is related to hormonal pubertal changes, whereas in later years, it may be caused by hormonally active tumors, cirrhosis, or medications.[28] Similar observations were made in our study.

Galactocele accounted for (*N* = 6) patients, and all the patients were lactating. Cytological appearance of benign phyllodes many times overlaps with fibroadenoma. Clinical, mammography, and ultrasound examinations have little diagnostic value except larger size (>3 cm), and increase in size are suggestive of phyllodes.[29] We came across three cases of benign phyllodes in our study. In these cases, definitive diagnosis was given based on the predominance of stromal components over epithelial, fragments of highly cellular myxoid stroma, and numerous single spindle-shaped bare nuclei. Nuclear atypia and mitotic figures were absent. On the basis of strong clinical suspicion including larger size, FNA diagnosis was suggested. Subsequently, histopathology examination confirmed the diagnosis. Breast cancer is the second most common cancer among Indian female subjects, next only to cervical cancer. One of the arguments for replacement of FNA by core needle biopsy in some western countries is the high error rate owing to lack of experienced cytopathologists. But, in experienced hands, FNA is a highly accurate diagnostic procedure with sensitivity and specificity over 95% for palpable breast lesions.[30,31] It may be more sensitive [97% vs. 90%] for core needle biopsy in the diagnosis of palpable breast cancers.[32] With advancement in the field of mammography, neo-adjuvant therapy, and breast conservation surgery in breast carcinoma, cytology grading can be used for selection of neoadjuvant therapy. It allows the assessment of tumors without any surgical intervention so that the morbidity associated with overtreatment of low-grade tumors can be avoided.[10,33] Although reduction in the risk of breast carcinoma among lactated premenopausal women has been documented,[34] 27 patients were between 31 and 40 years, lactated, and multiparous. Reports from western world state that breast cancer in women occur predominantly in fifth and sixth decades patients.[35] Of the 268 malignant lesions, most common diagnosis was infiltrating duct carcinoma (*N* = 229), followed by medullary carcinoma (*N* = 2) and mucinous carcinoma, infiltrating lobular carcinoma, sarcomatoid carcinoma, invasive papillary carcinoma, and secretory carcinoma with one case each [Table 3].

Lobular carcinoma is an important source of false-negative diagnosis in breast FNA and could not be subtyped because of absence of specific features such as nuclear moldingand of intracytoplasmic lumina/vacuoles. Diagnosis of metaplastic carcinoma could not be done because FNA smears predominantly contain malignant ductal epithelial cells with few spindle cells. Invasive papillary carcinoma showed occasional small necrotic papillary formations in FNA smears. Infracted papilla may closely mimic carcinoma. Owing to overlapping of the cytomorphologic features between some benign and malignant lesions, rarely reports can be found in English literature.[36] In remaining malignant lesions, we did not face any difficulty in subtyping the lesion on FNA. Repeat aspiration and image guidance definitely reduced the rate of inadequate aspiration.

Conclusion

Benign breast lesions constitute a majority of breast lumps in surgical cases and mainly occur in second and third decades. Fibroadenoma form the major bulk of benign breast lesions, followed by duct carcinoma. Epithelioid cells when seen in inflammatory breast FNA smears, tuberculosis must be ruled out. Grading of breast carcinomas must be done on FNA smears for selecting neoadjuvant therapy.

FNA is a safe, cost-effective, and reliable technique for the preoperative evaluation of palpable breast lumps. FNA features are more informative when combined with physical and radiology features. Grading of malignant lesions on cytology smears must be done for selecting neoadjuvant therapy. Malignant lesions, although are more common in fourth and fifth decades, substantial number of cases occurs in third decade. Clinical breast examination and mammography screening should be encouraged in female subjects from the third decade onward for the early detection of breast carcinoma.

References

1. Vaidyanathan L, Barnard K, Elnicki DM. Benign breast disease: When to treat, when to reassure, when to refer. Cleve Clin J Med 2002;69:425–32.
2. Guray M, Sahin AA. Benign breast diseases: Classification, diagnosis, and management. Oncologist 2006;11:435–49.
3. Chaiwun B, Settakorn J, Ya-In C, Wisedmongkol W, Rangdaeng S, Thorner P. Effectiveness of fine-needle aspiration cytology of breast: analysis of 2375 cases from northern Thailand. Diagn Cytopathol 2002;26:201–5.
4. Nguansangiam S, Jesdapatarakul S, Tangjitgamol S. Accuracy of fine needle aspiration cytology from breast masses in Thailand. Asian Pac J Cancer Prev 2009;10:623–6.
5. Cobb CJ, Raza AS. Obituary: “Alas poor FNA of breast—We knew thee well!” Diagn Cytopathol 2005;32:1–4.
6. Orell SR, Miliauskas J. Fine needle biopsy cytology of breast lesion: a review of interpretative difficulties. Adv Anat Pathol 2005;12:233–45.
7. Zagorianakou P, Fiaccavento S, Zagorianakou N, Makrydimas G, Stefanou D, Agnatis NJ. FNAC: its role, limitations and perspective in the preoperative diagnosis of breast cancer. Eur J Gynaecol Oncol 2005;26:143–9.
8. Kalhan S, Dubey S, Sharma S, Dudani S, Preeti, Dixit M. Significance of nuclear morphometry in breast masses. J Cytol 2010;27:16–21.
9. Muddegowda PH, Lingegowda JB, Krupad R, Konapur PG, Shivarudrappa A, Subramaniam P. The value of systematic

pattern analysis in FNAC of breast lesions: 225 cases with cyto-histological correlation. J Cytol 2011;28:13–9.
10. Bhargava V, Jain M, Agarwal K, Thomas S, Singh S. Critical appraisal of cytological nuclear grading in carcinoma of breast and its correlation with ER/PR expression. J Cytol 2008;25: 58–61.
11. Joshi A, Maimoon S. Limitations of fine needle aspiration cytology in subtyping breast malignancies—a report of three cases. J Cytol 2007;24:203–6.
12. Kaufman Z, Shpitz B, Shapiro M, Runa R, Lew S, Dinbar A. Triple approach in the diagnosis of dominant breast masses: Combined physical examination, mammography and fine needle aspiration. J Surg Oncol 1994;56:254–7.
13. Kumar R. A clinicopathologic study of breast lumps in Bhairahwa, Nepal. Asian Pac J Cancer Prev 2010;11:855–8.
14. Ahmed HG, Ali AS, Almobarak AO. Utility of fine-needle aspiration as a diagnostic technique in breast lumps. Diagn Cytopathol 2009;37:881–4.
15. Dennison G, Anand R, Makar SH, Pain JA. A perspective study of the use of fine needle aspiration cytology and core biopsy in the diagnosis of breast cancer. Breast J 2003;9:491–3.
16. Caleffi M, Filho DD, Borghetti K, Graudenz M, Littrup PJ, Freeman-Gibb LA, et al. Cryoablation of benign breast tumors: evolution of technique and technology. Breast 2004;13:397–407.
17. Okoth C, Galukande M, Jombwe J, Wamala D. Benign proliferative breast diseases among female patients at a sub Saharan African tertiary hospital: A cross sectional study. BMC Surg 2013;13:9.
18. Rosa M, Mohammadi A, Masood S. The value of fine needle aspiration biopsy in the diagnosis and prognostic assessment of palpable breast lesion. Diagn Cytopathol 2012;40:26–34.
19. Day C, Moatamed N, Fimbres AM, Salami N, Lim S, Apple SK. A retrospective study of the diagnostic accuracy of fine needle aspiration for breast lesions and implications for future use. Diagn Cytopathol 2008;36:855–60.
20. Rahman MZ, Islams S. Fine needle aspiration cytology of palpable breast lump: a study of 1778 cases. Surgery 2013;S12:001.
21. Rosai J. *Rosai and Ackerman's Surgical Pathology*, 9th edn. Vol. 2. Missouri, MI: Elsevier Publishers, 2004. p. 1779.
22. Marshall LM, Hunter DJ, Connolly JL, Schnitt SJ, Byrne C, London SJ, et al. Risk of breast cancer associated with atypical hyperplasia of lobular and ductal types. Cancer Epidemiol Biomarkers Prev 1997;6:297–301.
23. Foxman B, D'Arcy H, Gillespie B, Bobo JK, Schwartz K. Lactation mastitis: occurrence and medical management among 946 breast feeding women in the United States. Am J Epidemiol 2002;155:103–14.
24. Michie C, Lockie F, Lynn W. The challenge of mastitis. Arch Dis Child 2003;88:818–21.
25. Dener C, Inam A. Breast abscesses in lactating women. World J Surg 2003;27:130–3.
26. Shinde SR, Chandawarkar RY, Deshmukh SP. Tuberculosis of the breast masquerading as carcinoma: a study of 100 patients. World J Surg 1995;19:379–81.
27. Chandanwale SS, Buch AC, Gore CR, Ramanpreet KC, Jadhav P. Fine needle aspiration cytology in breast tuberculosis: diagnostic difficulties—study of eleven cases. Indian J Tuberc 2012;59:162–7.
28. Coen P, Kulin H, Ballantine T, Zaino R, Frauenhoffer E, Boal D, et al. An aromatase-producing sex-cord tumour resulting in prepubertal gynaecomastia. N Engl J Med 1991;324:317–22.
29. Krishnamurthy S, Ashfaq R, Shin HJ, Sneige N. Distinction of phyllodes tumor from fibroadenoma. A reappraisal of an old problem. Cancer 2000;90:342–9.
30. Chaiwn B, Thorner P. Fine needle aspiration for evaluation of breast masses. Curr Opin Obstet Gynecol 2007;19:48–55.
31. Ariga R, Bloom K, Reddy VB, Kluskens L, Francescatti D, Dowlat K, et al. Fine needle aspiration of clinically suspicious palpable breast masses with histopathologic correlation. Am J Surg 2002;184:410–3.
32. Ballo MS, Sneige N. Can core needle biopsy replace fine needle aspiration cytology in the diagnosis of palpable breast carcinoma. A comparative study of 124 women. Cancer 1996;78:773–7.
33. Taniguchi E, Yang Q, Tang W, Nakamura Y, Shan L, Nakamura M, et al. Cytologic grading of invasive breast carcinoma. Correlation with clinicopathologic variables and predictive value of nodal metastasis. Acta Cytol 2000;44:587–91.
34. Newcomb PA, Storer BE, Longnecker MP, Mittendorf R, Greenberg ER, Clapp RW, et al. Lactation and reduced risk of premenopausal breast cancer. N Engl J Med 1994;330:81–7.
35. Anderson WF, Chatterjee N, Ersheller WB, Brawley OW. Estrogen receptor breast cancer phenotypes in the Surveillance, Epidemiology and End Results data base. Breast Cancer Res Treat 2002;76:27–36.
36. Krausz T, Jenkins D, Grontoff O, Pollock DJ, Azzopardi JG. Secretory carcinoma of the breast in adults: emphasis is on late recurrence and metastasis. Histopathology 1989;14:25–36.

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