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Original Research Article

Cytomorphological Spectrum of Palpable Benign Breast Lesions with Histopathological Correlation

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Abstract

Background: Breast lump is fairly common complaint in females for which patient seeks medical advice and becomes anxious about the diagnosis. Quick diagnosis by Fine needle aspiration cytology (FNAC) relieves patient's anxiety and assists in their pre-operative management and overall treatment. *Aims:* To study the cytomorphological spectrum of benign breast lesions in correlation with histological appearances to evaluate the utility of FNAC in the diagnosis of palpable breast lesions. *Materials and Methods:* A 1.5 years prospective analysis of the data was carried out on 200 patients of breast lump in the Department of Pathology, Mandya Institute of Medical Sciences, Mandya from January 2016 to June 2017. Fine needle aspiration cytology (FNAC) was done and smears were stained with Hematoxyllin and Eosin and May-Grunwald-Giemsa stains. *Results:* Out of 200 cases 160 cases were benign,38 cases were malignant and 2 cases were inadequate. Among 160 cases maximum cases were of fibroadenoma (62 cases) followed by fibrocystic change (44 cases), gynaecomastia (17 cases), benign epithelial hyperplasia (14 cases), acute mastitis (6 cases), chronic mastitis (4 cases), epidermal cyst (3 cases), subareolar abscess, galactocele and granulomatous mastitis each 2 cases and 1 each case of breast cyst, lipoma, benign spindle cell lesion, benign phyllodes tumor. Histopathological correlation was available in 58 cases and maximum cases were obtained for fibroadenoma followed by fibrocystic change. *Conclusion:* FNAC of the breast lump is an easily performed outpatient diagnostic method for determining the nature of the breast mass. It is safe, painless, needs no anesthesia. The lumps can be aspirated in the outpatient department, with requiring only a few materials such as syringe, needle and glass slides and fixatives. It can be repeated if necessary.

Keywords: FNAC; breast lesions; HPE.

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Introduction

Lesions of the breast are among the most common health problems in females. They primarily present with pain, palpable mass, nipple discharge or structural abnormalities in the form of calcifications, opacities etc on imaging studies.[1]

The incidence of breast cancer in recent decades has increased worldwide, mainly due to improvements in screening and diagnosis, as well as to changes in the lifestyle and habits of women.[2]

A method of definitive diagnosis of the breast lesions is therefore needed in order to reassure the patient and to offer best possible treatment.[3]

Fine needle aspiration cytology (FNAC) is a technique which is routinely done on palpable lesions such as superficial growth of the skin, subcutis, soft tissues and various organs of body like thyroid, breast, salivary glands and lymph nodes. It is relatively simple, reliable, economical and complication free procedure, and can be easily repeated if aspirate is inadequate. With radiological techniques like ultrasound and computed tomography, material can be obtained through transthoracic and transperitoneal approaches from deep seated lesions.[4]

The main purpose of FNAC of breast lesions is in investigation of any palpable breast lump and to avoid unnecessary surgery. The advantages are-it is safe, accurate, and rapid technique. It does not require elaborate tissue processing and is therefore less expensive method of diagnosis. It does not require anesthesia or hospitalization, and takes only a few minutes to perform and diagnose thus alleviating the anxiety of the patient or allowing the patient to participate in the choice of therapies. FNA can be done on palpable lesions either solid or cystic, or deep seated non palpable lesions with the help of ultrasound and mammography. For best results, it should be done by a skilled trained pathologist who can obtain the patient's history directly from the patient.[5] It allows a number of ancillary studies such as hormone receptor analysis, flow cytometry and molecular diagnostic studies.[6]

The present study is making an effort to provide an insight into the array of benign breast lesions.

National Cancer Institute (NCI) proposed five diagnostic categories for breast lesions on fine needle aspiration cytology in 1996, namely:

- Unsatisfactory (C1)
- Benign (C2)
- Atypical/ Indeterminate /Benign probably atypical (C3)
- Suspicious, favor malignancy (C4)
- Malignant (C5)

Materials and Methods

In the present prospective study, fine needle aspiration was done on the clinically palpable breast lumps, referred from MIMS hospital to the Department of Cytopathology, Mandya Institute of Medical Sciences. The study was conducted for a period of 1.5 years from January 2016 to June 2017. A total of 200 cases were included in this study. All patients presenting to the cytopathology laboratory, Department of Pathology, MIMS, Mandya during the study period with breast lesions, irrespective of age and sex, are included in the study.

The FNAC procedure was explained to the patient in their vernacular language. A written consent was taken before performing the FNAC. Data regarding the age of the patient, site of involvement, size of lesion and relevant clinical history were recorded. The lump was localized by palpation and was fixed with the thumb and index finger of the left hand. The site of FNA was cleaned with a sterile swab. FNA was done using a 22 to 23 gauge needle and 10 ml disposable syringe mounted on Franzen's handle. No local anaesthesia was used for any of the patients. The needle was inserted into the lesions & negative pressure was applied by withdrawing the syringe plunger. For each lesion 2–4 passes were made in to and fro manner. Material was aspirated into the hub of the needle, negative pressure was released before exiting the lesion, needle was detached from the syringe, air was taken into the plunger and the aspirated material in the needle was expelled onto the glass slides. On an average 4 smears were prepared on clean and dry glass slides. Few smears were kept for wet fixation in a coplin jar containing methanol and few slides were air dried. Wet fixed smears were stained with Haematoxylin and Eosin stain and air dried smears were stained with Leishman's stain. Histopathological examination of the available biopsies from the study was done. The biopsy specimens were fixed in 10% formalin for 24 hours and then grossed. The gross and cut section findings were noted. Several bits were taken from appropriate sites for processing and paraffin embedding. From each block, sections were cut at 4–5 microns thickness and stained with Hematoxyllin & Eosin stain for histopathological examination under light microscope.

Results

The present study includes fine needle aspirates (FNAs) from the palpable breast lesions of 200 cases spread over a period 1.5 years from January 2016 to June 2017 at the Department of Pathology, Mandya Institute of Medical Sciences, Mandya. Out of 200 cases of breast FNACs evaluated, histopathological correlation are available for 88 cases and statistical tests were used to interpret the results. The age ranged from 12–88 years with a mean age of 35.46 years.

Out of 200 cases, 198 cases the aspirates were adequate and 2 were inadequate for interpretation.

Out of 198 cases, 160 cases were benign, 38 cases were malignant for evaluation.

Out of 160 benign cases, maximum number of cases were in the age group of 21 to 30 years followed by 31 to 40 years. Only two cases were found to be in age group of 61 to 70 years (Table 1).

Table 1: Age distribution of Benign breast lesions

	Frequency	Percent
10–20	31	19.4
21–30	57	35.6
31–40	40	25.0
41–50	21	13.1
51–60	6	3.8
61–70	2	1.3
71–80	3	1.9
Total	**160**	**100.0**

Out of 160 benign cases, 75 lumps were located on right side of breast & 73 lumps were located on left side. Twelve cases showed bilateral involvement. Among 160 benign cases, 62 cases were located in upper inner quadrant followed by 35 cases in upper outer quadrant, 28 cases located in lower inner quadrant, 21 cases in subareolar region, 9 cases in lower outer quadrant and 4 cases were diffuse, involving all quadrants of breast. One case was located in both upper outer and upper inner quadrants (Table 2).

Table 2: Quadrant wise distribution of Benign breast lesions

	Frequency	Percent
Diffuse	4	2.5
L/I	28	17.5
L/O	9	5.6
Subareolar	21	13.1
U/I	62	38.8
U/O	35	21.9
U/O&U/I	1	0.6
Total	**160**	**100.0**

Among 160 cases maximum cases were of fibroadenoma (62 cases) followed by fibrocystic change (44 cases), gynaecomastia (17 cases), benign epithelial hyperplasia (14 cases), acute mastitis (6 cases), chronic mastitis (4 cases), epidermal cyst (3 cases), subareolar abscess, galactocele and granulomatous mastitis each 2 cases and 1 each case of breast cyst, lipoma, benign spindle cell lesion, benign phyllodes tumor (Table 3).

Table 3: Spectrum of Benign breast lesions

C2–Acute mastitis	**6**	**3.0**
C2–Chronic mastitis	4	2.0
C2–Granulomatous mastitis	2	1.0
C2–Fibrocystic change	44	22
C2–Fibroadenoma	62	31
C2–Phyllodes tumor	1	0.5
C2–Benign epithelial hyperplasia	14	8.7
C2–Benign spindle cell lesion	1	0.6
C2–Epidermal cyst	3	1.8
C2–Subareolar abscess	2	1
C2–Lipoma	1	0.5
C2–Galactocele	2	1
C2–Breast cyst	1	0.5
C2–Gynaecomastia	17	8.5
Total	**160**	**100**

			Cytological_diagnosis (58 cases)							
			C2-BEH	**C2-Benign Phyllodes tumour**	**C2-Epidermal cyst**	**C2-Fibroadenoma**	**C2-FCC**	**C2-Granulomatous mastitis**	**C2–Gynaecomastia**	**Total**
Histopathological Diagnosis	BEH	Count	1	0	0	0	0	0	0	1
		%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%
	Benign Phyllodes tumour	Count	0	1	0	0	0	0	0	1
		%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%
	Epidermal cyst	Count	0	0	2	0	0	0	0	2
		%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	3.4%
	Fibroadenoma	Count	0	0	0	46	0	0	0	46
		%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	79.3%

			Cytological_diagnosis (58 cases)							
			C2-BEH	C2-Benign Phyllodes tumour	C2-Epidermal cyst	C2-Fibroadenoma	C2-FCC	C2-Granulomatous mastitis	C2–Gynaecomastia	Total
	FCC	Count	0	0	0	0	4	0	0	4
		%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	6.9%
	Granulomatous mastitis	Count	0	0	0	0	0	1	0	1
		%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	1.7%
	Gynaecomastia	Count	0	0	0	0	0	0	3	3
		%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%	5.1%
		Count	1	1	2	46	4	1	3	58
Total		%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Acute Mastitis

Six cases presented with history of lump in the breast associated with pain and tenderness and local rise of temperature. The aspirate yielded purulent material. Cytological smears were cellular and showed sheets of neutrophils, degenerated neutrophils, macrophages with a few benign ductal epithelial cells and fibrous tissue fragments. A cytological diagnosis of Acute Suppurative Mastitis was made (Fig. 1).

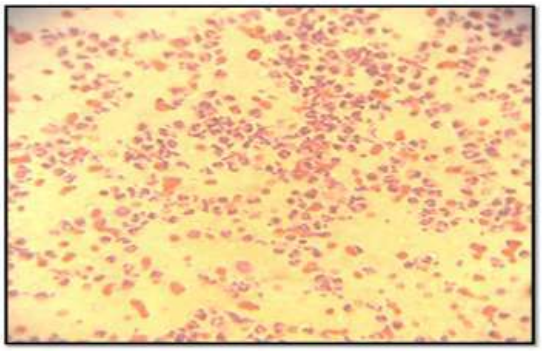

Fig. 1: Acute mastitis-FNAC smear showing sheets of polymorphs, few lymphocytes & macrophages H&E (10X).

Chronic Mastitis

Four cases were diagnosed cytologically as Chronic Mastitis. Smears showed sheets of inflammatory cells predominantly lymphocytes with few plasma cells, neutrophils, macrophages and stromal fragments. Benign ductal epithelial cells were seen in tiny clusters. A cytological diagnosis of Chronic Mastitis was given (Fig. 2).

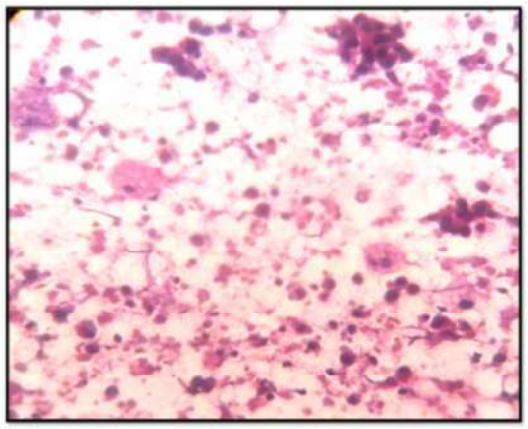

Fig. 2: Chronic Mastitis. FNAC smear showing few clusters of ductal epithelial cells along with many foamy macrophages, lymphocytes & plasma cells.MGG(40X)

Subareolar Abscess

Two cases were diagnosed cytologically as Subareolar Abscess. Cytologically smears scattered nucleated & anucleated squames along with sheets of polymorphs, few lymphocytes & macrophages (Fig. 3).

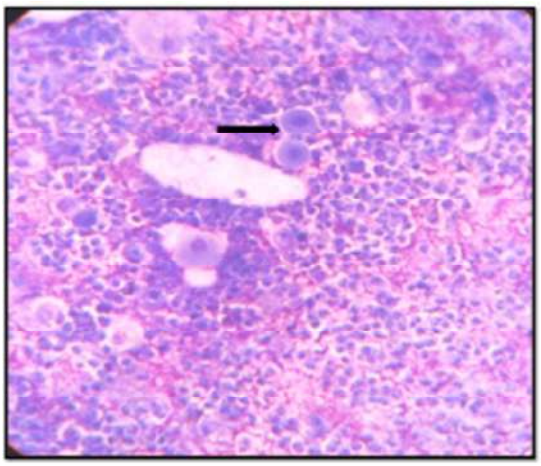

Fig. 3: Subareolar Abscess-FNAC smear showing scattered nucleated (arrow) & anucleated squames along with sheets of polymorphs, few lymphocytes & macrophages MGG (40X).

Granulomatous Mastitis

Two cases were diagnosed cytologically as Granulomatous Mastitis. Cytologically, the smears showed epithelioid cells, lymphocytes, plasma cells and giant cells along with few benign ductal epithelial cells. (Figs. 4a & 4b). One case underwent biopsy and was dignosed as granulomatous mastitis on histopathology.

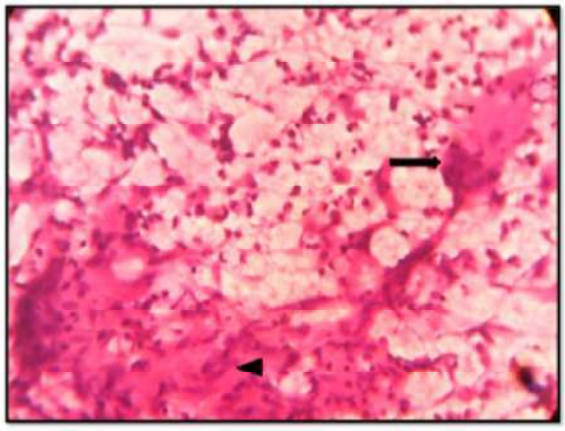

Fig. 4: Granulomatous Mastitis FNAC smear showing epithelioid cell clusters (arrow head), lymphocytes, plasma cells and Langhan's giant cell (arrow) H&E (40X).

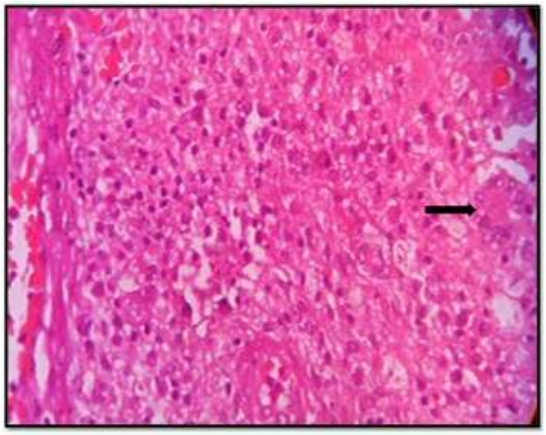

Fig. 4b: Granulomatous Mastitis Histopathology section showing loose aggregates of epithelioid cells along with sheets of lymphocytes & occasional Langhan's giant cell (arrow) H&E (40X).

Fibroadenoma

Sixty two cases were diagnosed cytologically as Fibroadenoma. Smears were cellular and showed bimodal population of cohesive clusters of benign ductal epithelial cells and myoepithelial cells arranged in antler horn like branching pattern and monolayered sheets against a background of bare benign nuclei and fibromyxoid stroma (Figs. 5a, 5b & 5c). Out of 62 cases of fibroadenoma, 46 cases underwent surgical excision and were available for histopathological examination. They showed Focal areas showed apocrine change, confirming a diagnosis of fibroadenoma. All the 46 cases correlated well with FNAC diagnosis.

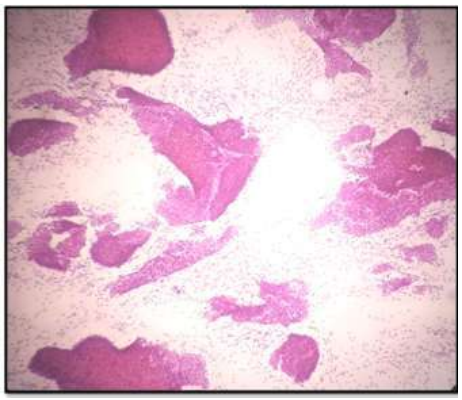

Fig. 5a: Fibroadenoma FNAC smear showing bimodal population of benign ductal epithelial cells and bare nuclei H&E (10X)

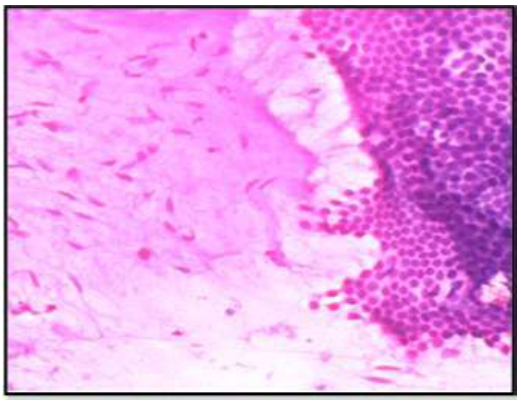

Fig. 5b: Fibroadenoma. FNAC smear showing cohesive monolayered sheets of benign ductal epithelial cells and fibromyxoid stroma H&E (40X).

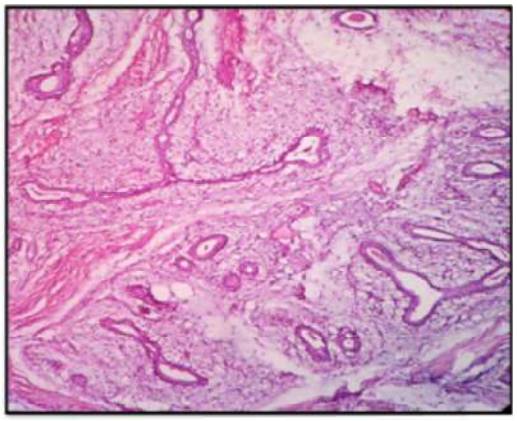

Fig. 5c: Fibroadenoma Histopathology section showing intracanalicular and pericanalicular pattern H&E (40X).

Fibrocystic disease

Forty four cases were diagnosed cytologically as Fibrocystic Disease. Cytologically the smears were moderately to highly cellular showing clusters of benign ductal epithelial cells arranged mainly in sheets against the background of few bare benign nuclei and cyst macrophages (Figs. 6a & 6b).

Out of 44 cases cytologically diagnosed as fibrocystic change, 4 cases were followed by excision biopsy and the histopathological diagnosis proved to be fibrocystic disease in all the 4 cases.

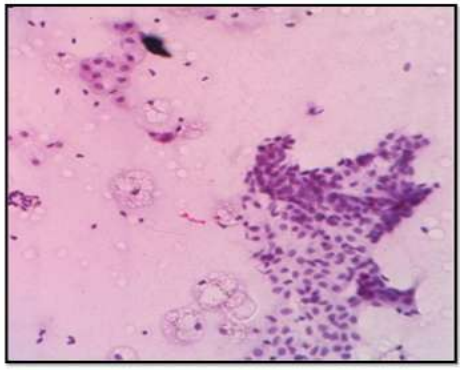

Fig. 6a: Fibrocystic Change. FNAC smear showing sheets of ductal epithelial cells, apocrine cells and foamy macrophages H&E (40X).

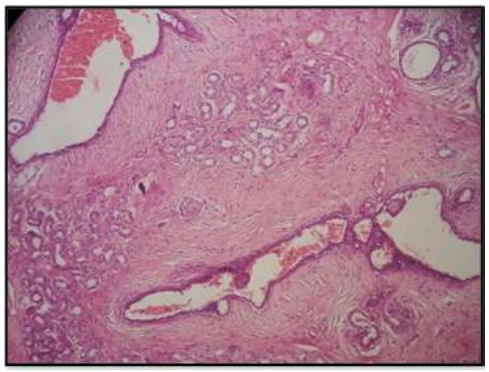

Fig. 6b: Fibrocystic Change. Histopathology section showing fibrosis, cystic change of ducts & adenosis H&E (10X).

Benign phyllodes tumor

One case was diagnosed cytologically as Benign Phyllodes Tumor.

Cytologically, the smears were highly cellular, predominant cell being sheets and clusters of stromal fragments composed of spindle shaped cells along with few benign ductal epithelial cells against the background of spindle cells with intact cytoplasm. Cellular features of malignancy were not seen. A diagnosis of Benign Phyllodes Tumor was given on cytology (Figs. 7a, b & c). It underwent surgical excision. The cut section of gross specimen showed an irregular grey white tumor. Histopathology section showed a cellular tumor with predominant stromal proliferation composed of spindle cells with elongated vesicular nuclei showing no significant mitotic activity. The FNAC diagnosis of benign phyllodes tumor correlated with histopathological diagnosis.

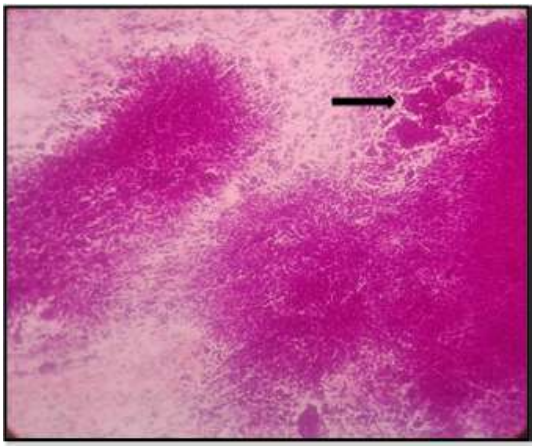

Fig. 7a: Benign Phyllodes Tumor. FNAC smear show large cellular stromal fragments and few cohesive sheets of ductal epithelial cells (arrow) H&E (X10).

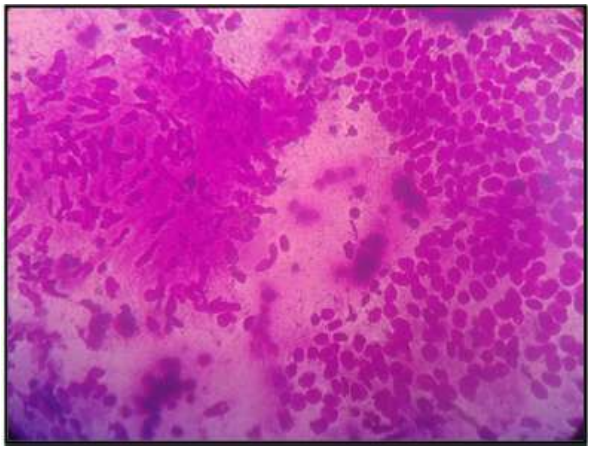

Fig. 7b: Benign Phyllodes Tumor FNAC smear show dispersed epithelial cells & stromal cells with spindly nuclei H&E (X40).

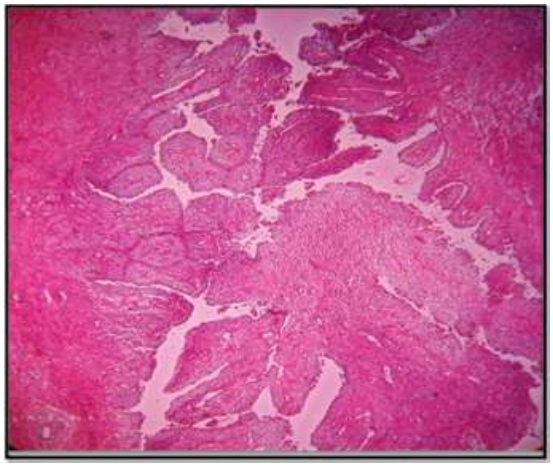

Fig. 7c: Benign Phyllodes Tumor Histopathology section showing leaf like architectural pattern of stromal tissue lined by ductal epithelial cells H&E (X 40).

Benign Epithelial Hyperplasia

Fourteen cases were diagnosed cytologically as Benign Epithelial Hyperplasia.

The smears on cytology were highly cellular and showed large sheets of cohesive benign ductal epithelial cells. Few clusters showed streaming pattern and focal crowding of nuclei against the background of few bare nuclei (Fig. 8). Out of 14 cases, surgery was performed in 1 case and the diagnosis of epithelial hyperplasia was confirmed histopathologically.

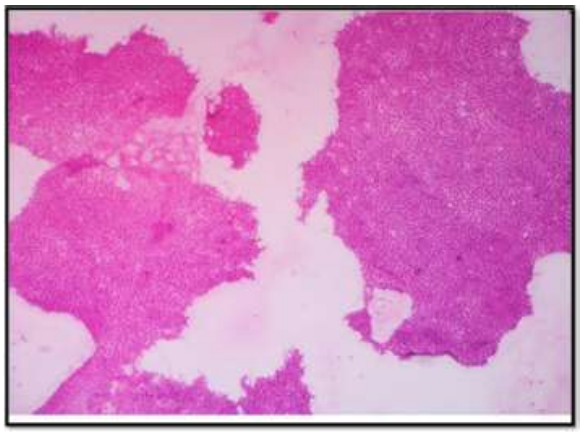

Fig. 8: Benign Epithelial Hyperplasia FNAC smear showing monolayered sheets of benign ductal epithelial cells H&E (X10).

Benign spindle cell lesion

One case was diagnosed cytologically as benign spindle cell lesion.

Cytological smears showed small sheets and fascicles of benign spindle cells with a single oval bland nucleus having fine chromatin network and moderate eosinophilic cytoplasm. Background shows small fragments of connective tissue matrix. Histological correlation was not available for this lesion.

Epidermal cyst

Three cases were diagnosed cytologically as Epidermal Cyst

Smears showed numerous anucleated squames in a background showing granular debris. (Fig. 9a & 9b). Two cases underwent surgery and were diagnosed as epidermal cyst on histopathology.

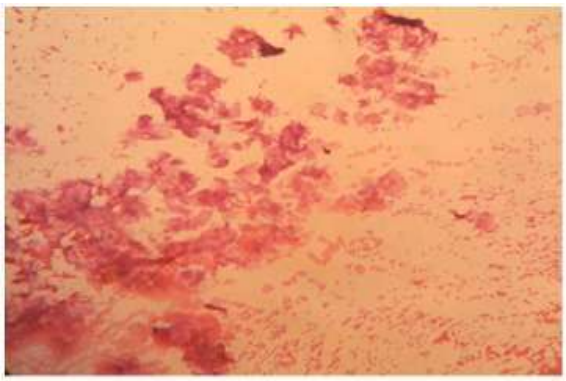

Fig. 9a: Epidermal Cyst: FNAC smear showing sheets of keratinised anucleate squames H&E (10X)

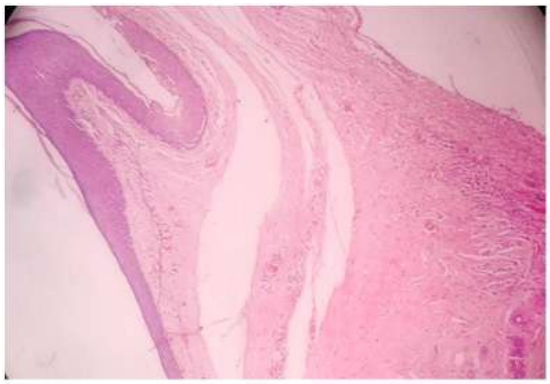

Fig. 9b: Epidermal Cyst: Histopathology section showing breast tissue and a cyst lined by stratified squamous epithelium covered with keratin flakes H&E (10X).

Epidermal Cyst: FNAC smear showing sheets of keratinised anucleate squames. H&E (10X)

Epidermal Cyst: Histopathology section showing breast tissue and a cyst lined by stratified squamous epithelium covered with keratin flakes. H&E (10X)

Lipoma

One case was diagnosed cytologically as Lipoma. Smears showed fragments of adipose tissue. Histological correlation was not available for this lesion.

Galactocele

Two cases were diagnosed cytologically as Galactocele.

Smears showed scattered foamy macrophages and few sheets of epithelial cells with apocrine change. Histological correlation was not available for these lesions.

Breast cyst

One case was diagnosed cytologically as Breast Cyst. The aspirate was straw colored opalescent fluid. Sediment smears showed vacuolated mononuclear foam cells and various numbers of benign ductal cells occurring singly and in small clusters. Histological correlation was not available for this lesion.

Gynecomastia

Seventeen cases of lump in male breast were diagnosed cytologically as Gynecomastia.

Smears showed moderate cellularity and showed epithelial cells in monolayered sheets and single bare bipolar nuclei in the background. Three cases underwent excision and was diagnosed as gynecomastia on histopathology.

Discussion

Fine-needle aspiration cytology is widely used in the diagnosis of breast cancer because it is an excellent, safe, and cost-effective diagnostic procedure. FNAC of the breast can reduce the number of open breast biopsies.[7]

The present study is to assess cytomorphological features of benign breast lesions by FNAC.

Our study included 200 cases with palpable breast lumps in which cytomorphological features of breast lesions were studied in detail and the cytological results were subsequently compared with that of histopathology in available cases.

Out of 200 cases, 198 cases the aspirates were adequate and 2 were inadequate for interpretation.

Day *et al*.,[8] Nguansangjam *et al*.,[9] Rosa *et al*.[10] and Bukhari *et al*.[7] have also noted unsatisfactory aspirates in their study while, Shazia Aslam[36] has not noted any unsatisfactory aspirate.

In the present study, 2 aspirates were found to be unsatisfactory, thus constituting 1% of total cases as compared to other studies. Repeat aspirations would have yielded positive results but patients did not agree for repeat aspiration.

The main causes for inadequate smears may be due to nature of lesion, lack of technical experience in performing FNA, preparation, and fixation of smears.[11] It was reported that the nature of the lesion was the most common cause of inadequacy of FNAC, accounting for 68% of the inadequate aspirates, followed by the experience of the aspirator that accounted for 32% of the inadequacy rate.[12]

Benign lesions (160) were the bulk of breast FNAC diagnosis accounting for 80%. These findings were similar to the findings of Rosa *et al*.[10] Bukhari *et al*.[7]

Feichter *et al*.[13] and Day *et al*.[8] (77.5%). While Ishikawa *et al*.[14] showed a lower percentage.

Majority of benign lesions were common in age group of 21 to 30 years followed by 31 to 40 years. This finding is similar to the study done by Bukhari *et al*.,[7] Rahman *et al*.,[15] Singh A[20] while study done by Khemka A[19] showed slight higher age group.

In our study we found 6 cases of acute suppurative mastitis, 2 cases of granulomatous mastitis and 4 cases of chronic mastitis, while other studies showed higher incidence. In the study done by Bukhari *et al*.[7] and Rahman *et al*.[15] they reported 20% and 21.15% of inflammatory lesions respectively which involved more number of granulomatous mastitis. There was 1 case of breast cyst which on aspiration yielded serous fluid and microscopy revealed histiocytes, lymphocytes and occasional ductal epithelial cells. The findings were similar to the study done by Rahman *et al*.[15]

Fibroadenoma was the most common lesion in our study accounting for 38.8% which was also common in studies done by Rahman *et al*.,[15] Tiwari *et al*.,[16] and Singh A.[20] Bukhari *et al*[7] and Pradhan and Dhakal[16] showed only 16% and 8% of fibroadenoma cases respectively. Our study showed much lower rate of fibroadenoma when compared to the study of Singh A,[20] which may be explained by their smaller sample size. Fibroadenoma was found to be common in age group of 21 to 40 years in our study. Similar findings were noted in study of Bukhari *et al*.[7] while Rahman *et al*.[15] and Singh A[20] showed fibroadenoma occurring in comparably younger age group. Fibrocystic disease (FCD) is the second most common benign breast lesion in our study and we found 44 (27.5%) cases common in age group of 21 to 30 years. Similar findings were found in the study of Rahman *et al*.[15] with an incidence of 11.81% and most of the cases are within age group of 21-30 years. In the study done by Kumar [18] fibrocystic disease comprised of 41.2% and most of the cases were within age group of 31–40 years. The incidence of FCD was also found to be higher (58%) in other study done by Singh A[20].

Conclusion

Fine needle aspiration cytology is an efficient, rapid, inexpensive, safe and reliable diagnostic method. It causes minimum morbidity with very less complications and has excellent patient acceptance.

It helps to take the decision for the mode of surgery. Despite of its few limitations, FNAC has got high levels of diagnostic accuracy when performed by experienced pathologist. Benign conditions of breast can be diagnosed easily on FNA if done accurately.

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