IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 2 Ver. 13 February. (2018), PP 31-40
www.iosrjournals.org

Diagnostic Utlilty of FNAC in breast lesions and its correlation with histopathology

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Abstract
Background- *A palpable breast lump is a common diagnostic problem to both general practitioners and surgeons. FNAC is a valuable tool and it's advantage is to provide rapid accurate diagnosis, cost-effective, excellent patient acceptance and minimal or no morbidity. Based on the result of FNAC, further treatment can be plannned in most cases without proceeding for biopsy.*
Aim*- Evaluate FNAC in different type of breast lesions and to compare the result with histomorphological study in the available follow-up and assess the accuracy of FNAC of breast.*
Material And Methods- *The present study was conducted in Pathology Department of Hi-Tech Medical College from August 2014 to July 2017. During the study period, 382 patients who presented with palpable breast lump were included in the study and FNAC was performed. A total of 206 cases were followed up for histoppathology.*
Result*- FNAC of 305 benign and 77 malignant cases were studied. Fibroadenoma followed by fibrocytic disease were most common in benign breast lesions and invasive ductal carcinoma, NOS was most common among malignant breast lesions. Cyto-histological correlation was done in 206 cases- 129 benign and 77 malignant of which 2 benign cases were found to be false negative. Accuracy was found to be 99.02%. A detailed comparative analyses with other authors' study was done.*
Conclusion*- FNAC plays a main role to provide rapid and accurate diagnosis in OPD itself so that definite management decisions can be made straightaway. Diagnostic errors with subsequent inappropriate clinical decisions can be best avoided if clinician use the Triple diagnostic procedure of clinical examination, mammography and FNAC which increase the accuracy for diagnosis of breast carcinomas.*
Keywords*- Breast, FNAC,*

Date of Submission: 10-02-2018 Date of acceptance: 26-02-2018

I. Introduction

Fine needle aspiration (FNA) biopsy of breast was first used in the 1930s by Martin & Ellis and by Stewart at Memorial Hospital [1,2,3], followed in the late 1940s and early 1950s by Adair & Godwin[4,5]. A palpable breast lump is a common diagnostic problem to both general practitioners and surgeons[6]. FNAC is a valuable tool and can be used to evaluate all palpable and nonpalpable mammographically evident breast lesions[7] .

The advantage of FNAC is to provide rapid accurate diagnosis, cost-effective, excellent patient acceptance and minimal or no morbidity[8]. FNAC of breast have average sensitivity of 87% (range of 72.99%), specificity of 98-100%, negative predictive value of 87-99%, and the efficiency of 89-99% [9,10,11]. False positive rates in the literature are reported to approximately 4%[10]. The combination of palpation, mammography and FNAC (Triple test) has been found to considerably increase the diagnostic accuracy in the breast lesion [12].

The present study is to evaluate the FNAC in different type of breast lesions and to compare the result with histomorphological study in the available follow-up and assess the accuracy of FNAC of breast.

II. Material And Methods

The present study was conducted in Pathology Department of Hi-Tech Medical College from August 2014 to July 2017. During the study period, 382 FNAC were performed from 366 females and 16 males. FNA was carried out using 10cc syringe and 23 gauge needle from proper site under manual guidance and aseptic precautions without local anaesthesia. Smears were immediately wet fixed for Pap and H&E and air dried for Diff Quick and then stained.

Among 382 cases subjected to FNAC, 206 were followed for biopsy. In histolopathology, gross findings were noted and multiple serial sections were taken for processing, blocks made and 4-5 µm thick sections were cut and stained with H&E stain. Selective cases were subjected to immunohistochemistry when required to confirm the diagnosis.

III. Observations And Result

Out of 382 cases subjected to FNAC, 305 were reported as benign breast lesions and 77 as carcinomas of breast. Among the 305 benign breast lesions, fibroadenomas account for 137 cases, 81 fibrocystic disease, 8 galactocele, 6 granulomatous lesion, 3 benign phyllodes, 9 ductal hyperplasia, 6 acute nonspecific mastitis, 4 fat necrosis, 2 epidermal cyst, 16 breast abscesses, 16 gynecomastia and benign breast lesions without a specific diagnosis in 16 cases. Among the 77 malignant breast lesions, ductal carcinomas accounted for 71 cases, 4 lobular carcinomas and 2 metaplastic carcinoma.

Out of 305 benign breast lesions, biopsy was done in 129 cases and all malignant lesions were biopsied. The cyto- histological correlation of benign and malignant lesion are depicted in Tables 1,2 and 3.

	Histology						
Cytology	Fibroade -noma	Fibrocystic Disease	Granulo -matous	Phyllodes	Duct papilloma	Gyeneco -mastia	Total
Fibroadenoma	84	2					86
Fibrocystic disease	2	24					26
Granulomatous disease			4				4
Benign phyllodes				3			3
Benign breast lesion		2	1		1		4
Gynecomastia						4	4
Total	86	28	5	3	1	4	127

Table 1 Cyto-histological correlation of benign lesion

	Histology							
Cytology	Invasive Ductal Ca NOS	Tubular Ca	Medullary Ca	Mucinous Ca	Lobular Ca	Tubulo- Lobular Ca	Meta -plastic Ca	Total
Ductal Ca	67	2	1	1				71
Lobular Ca					3	1		4
Metaplastic							2	2
Total	67	2	1	1	3	1	2	77

Table 2 Cyto-histological correlation of malignant lesions

	Histological diagnosis		Total
Cytological diagnosis	Benign breast lesions	Malignant breast lesions	
Benign breast lesions	127	2	129
Malignant breast lesions	00	77	77
Total	127	79	206

Table 3 Cyto-histological correlation of all breast lesions

Out of 129 cases reported in FNAC as benign, 2 were found to be malignant. First, ductal hyperplasia in cytology was diagnosed as invasive ductal carcinoma, NOS in histology. Another case reported as galactocele in cytology was found to be metaplastic carcinoma. Analysis of the results of present study is shown in Table 4 and Table 5.

True Positives (TP)	77
False Positives (FP)	00
True Negatives (TN)	127
False Negatives (FN)	2

Table 4 Analysis of results

Sensitivity = TP/ TP+FN *100 = 77/79*100	97.46 %
Specificity = TN/ TN+FP*100 = 127/127*100	100 %
Positive Predictive Value = TP/ TP+FP*100 = 77/77*100	100 %
Negative Predictive Value = TN/ TN+FP*100 = 127/127*100	100 %
Accuracy Rate = TP+TN/ TP+TN+FP+FN*100 = 204/206*100	99.02 %
False Positive Rate = FP/ FP+TN*100 = 0/127*100	0 %
False Negative Rate = FN/ TP+TN*100 = 2/204*100	0.98%

Table 5 Analysis of results

IV. Discussion

In our study, age of patients ranged from 8-85 years with male to female ratio of 1:23. The oldest case was diagnosed (85 years) as invasive ductal carcinoma, NOS and the youngest (8 years) was juveline fibroadenoma. Similar age group was observed in other studies [13,14,15,16].

In the present study, fibroadenoma was the most commonly diagnosed entity in benign breast lesions. (N = 137, 45%) followed by fibrocystic disease (N = 81, 27%). In males, gynecomastia was the common lesion. This finding correlated with other authors [16,17,18,19].

Among malignant lesions, infiltrating ductal carcinoma was the most common, which correlated with many authors [16,17,18,19,20]. The incidence of benign lesions in the present study were similar to the observations made by Y. D. Choi et al [29], Rocha et al [31] and Ashwin et al[30] whereas the incidence of malignant cases were in comparison with the observation of Ishita Pant et al [17] as depicted in Table 6.

Comparative analyses of cytological diagnoses of benign and malignant breast lesions in our present study with studies done by other authors are tabulated in Table 7and Table 8.

The sensitivity of 97.46% in our present study is comparable to that obtained by Chavda[21] (95.2%), Willis[22] (90%), Suen[23] (95%) and Ritu[24] (96.5%) shown in Table 9.

In the present study, the positive predictive value was 100% with no false positive and false negative rate was 0.97 % which was comparable to Chavda J[21] (PPV=100%, FP=0, FN=1.5%) shown in Table 9. In the present study, there was no false positive giving specificity of 100% and positive predictive value of 100% which is comparable with Chavda J[21], Ritu[24], Silverman[8], Wollenberg[25], Barrow[26], Tiwari[27] shown in Table 9. Thus false positive diagnoses is relatively rare in breast FNA if the interpretation are made by experienced pathologists.

Author name	Rocha[31] (1997)	IshitaPant[17] (2003)	Y D Choi[29] (2004)	Ashwin[30] (2015)	Present study
Period	4 years	1 year	4 years	2 years	3 years
Breast Lesions					
Benign	641 (76.58%)	85 (68%)	981 (75.64%)	319 (77.24%)	305 (79.84%)
Malignant	99 (11.83%)	25 (20%)	182 (14.03%)	76 (18.4%)	77 (20.15%)

Table 6 Comparative Analysis of Breast lesions

Cytological diagnosis	Sreenivas[32] (1989) N = 222		Rocha [31] (1997) N = 837		Pinto[16] (2004) N = 582		Ashwin[30] (2015) N = 413		Present study N = 382	
	no	%	no	%	no	%	no	%	no	%
Fibroadenoma	69	31.08	177	21.15	166	28.52	128	30.99	137	35.86
Fibrocystic disease	-	-	285	34.05	23	3.95	91	22.03	81	21.20
Galactocele	5	2.25	-	-	-	-	14	3.40	8	2.09
Granulomatous lesion	2	0.9	-	-	2	0.34	6	1.46	6	1.57
Benign phyllodes	-	-	-	-	5	0.86	3	0.73	3	0.78
Ductal hyperplasia	-	-	-	-	-	-	-	-	9	2.35
Acute non-specific mastitis	-	-	-	-	-	-	7	1.69	6	1.57
Microfilaria	3	1.35	-	-	-	-	1	0.24	1	0.26
Fat necrosis	1	0.45	-	-	-	-	3	0.73	4	1.05
Epidermal cyst	-	-	-	-	-	-	7	1.69	2	0.52
Breast abscess	17	7.66	58	6.93	12	2.06	27	6.54	6	1.57
Gynecomastia	1	0.45	26	3.11	13	2.24	9	2.18	16	4.18
Benign breast lesion	-	-	-	-	-	-	6	1.45	16	4.18
Duct ectasia	-	-	-	-	-	-	3	0.73	-	-
Acessory breast tissue	-	-	-	-	-	-	12	2.91	-	-
Intramammary lymph node	-	-	-	-	-	-	1	0.24	-	-
Duct papilloma	-	-	-	-	-	-	2	0.48	-	-
Total	98	44.14	546	65.24	221	37.96	319	77.24	305	79.22

Table 7 Comparative Analysis of Benign Breast lesions

Cytological Diagnosis	Ishita Pant[17] (2003) N = 125		Pinto[16] (2004) N = 582		Ashwin[30] (2015) N = 413		Present study N = 382	
	No	%	No	%	No	%	No	%
IDC, NOS	20	16	167	28.69	69	16.71	67	17.54
Tubular Ca	-	-	-	-	-	-	2	0.52
Medullary	-	-	-	-	-	-	1	0.26
Mucinous	2	1.6	3	0.52	3	0.73	1	0.26
Classical lobular	-	-	1	0.17	1	0.24	3	0.79
Tubulolobular	-	-	-	-	-	-	1	0.26

Metaplastic	-	-	-	-	-	-	2	0.52
Paget's	2	1.6	-	-	1	0.24	-	-
Inflammatory Ca	1	0.8	-	-	-	-	-	-
Recurrent Ca	-	-	-	-	2	0.48	-	-
Total	25	20	171	29.38	76	18.40	77	20.16

Table 8 Comparative Analysis of Malignant Breast lesions

Study	No of FNAC	Sensitivity	Specificity	PPV	NPV	Accuracy %
Silvermann[11] (1989)	80	96	100	100	98	99
Sampat[28] (1997)	1120	96	100	100	89.50	97
Rocha[29] (1997)	837	93.8	98.21	92.70	-	97.40
Y D Choi[29] (2004)	1297	77.7	99.2	98.4	88	91.1
Pinto[16] (2004)	1582	97.8	100	100	98.6	99.1
Ashwin[30] (2015)	413	96.97	100	100	98.63	99.05
Present study	382	97.46	100	100	100	99.02

Table 9 Comparative Analysis of Breast lesions by different authors

V. Conclusion

The present study concludes that FNAC of breast is valuable diagnostic tool and plays main role to provide rapid and accurate diagnosis in OPD itself so that definite management decisions can be made straightaway. FNAC enables us to differentiate benign from malignant lesions with high sensitivity, specificity and diagnostic accuracy.

Diagnostic errors with subsequent inappropriate clinical decisions can be best avoided if clinician use the Triple diagnostic procedure of clinical examination, mammography and FNAC which increase the accuracy for diagnosis of breast carcinomas.

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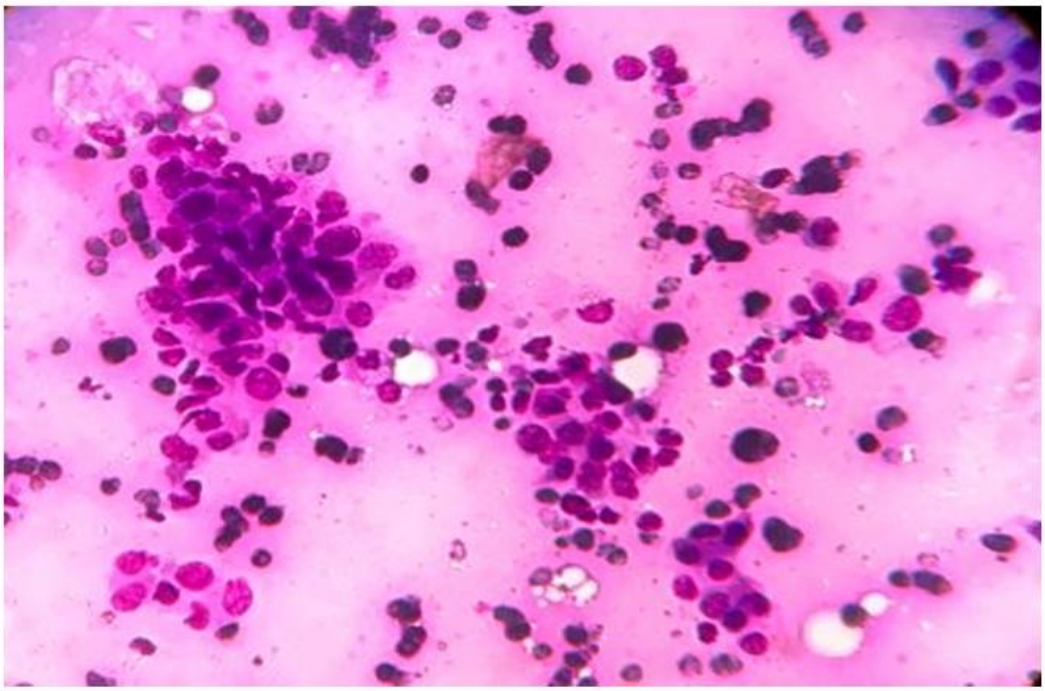

Figure 1: Cytology of invasive ductal carcinoma NOS

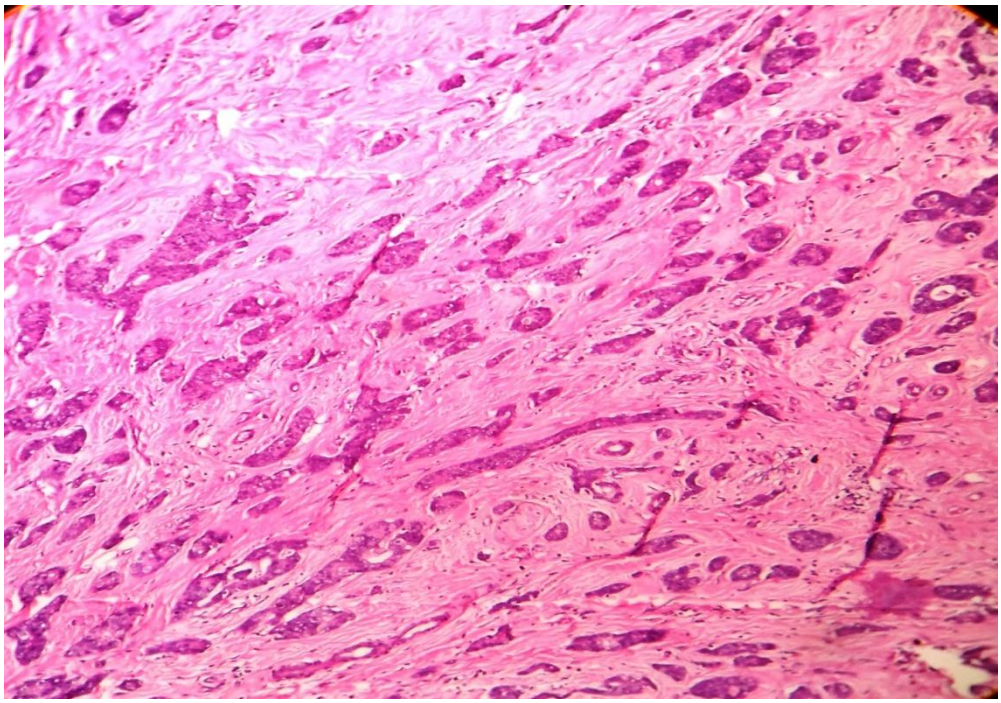

Figure 2 Histomorphology of invasive ductal carcinoma NOS

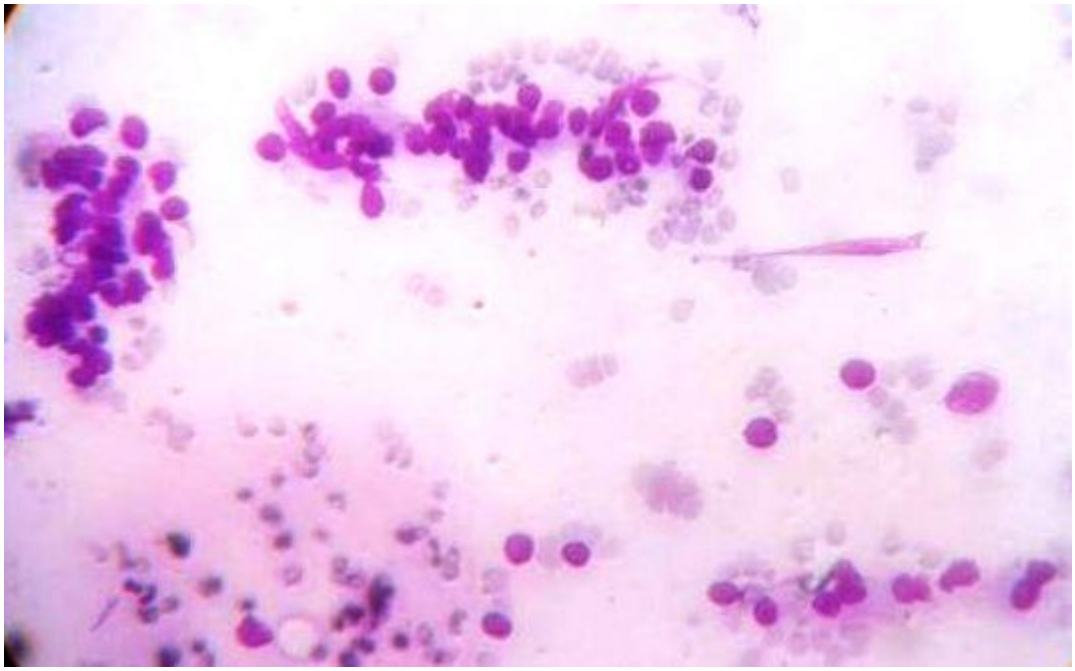

Figure 3 Cytology of a case of lobular carcinoma

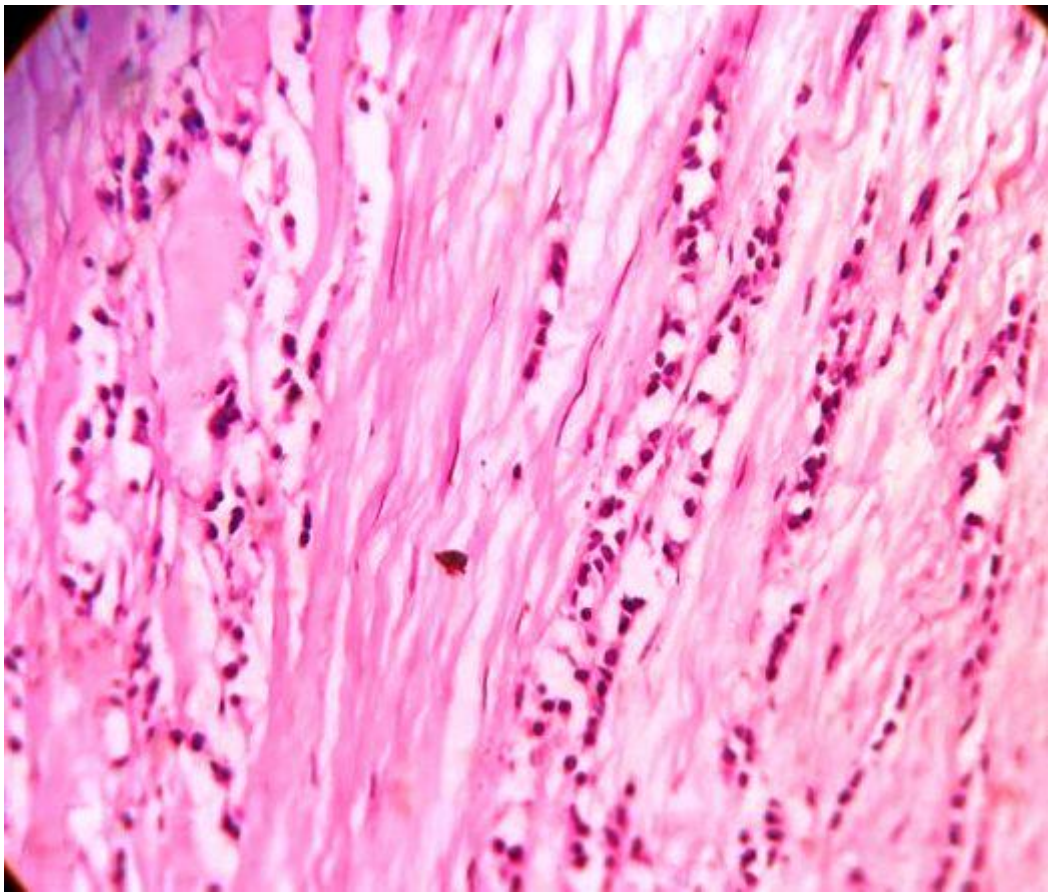

Figure 4 Histomorphology of lobular carcinoma

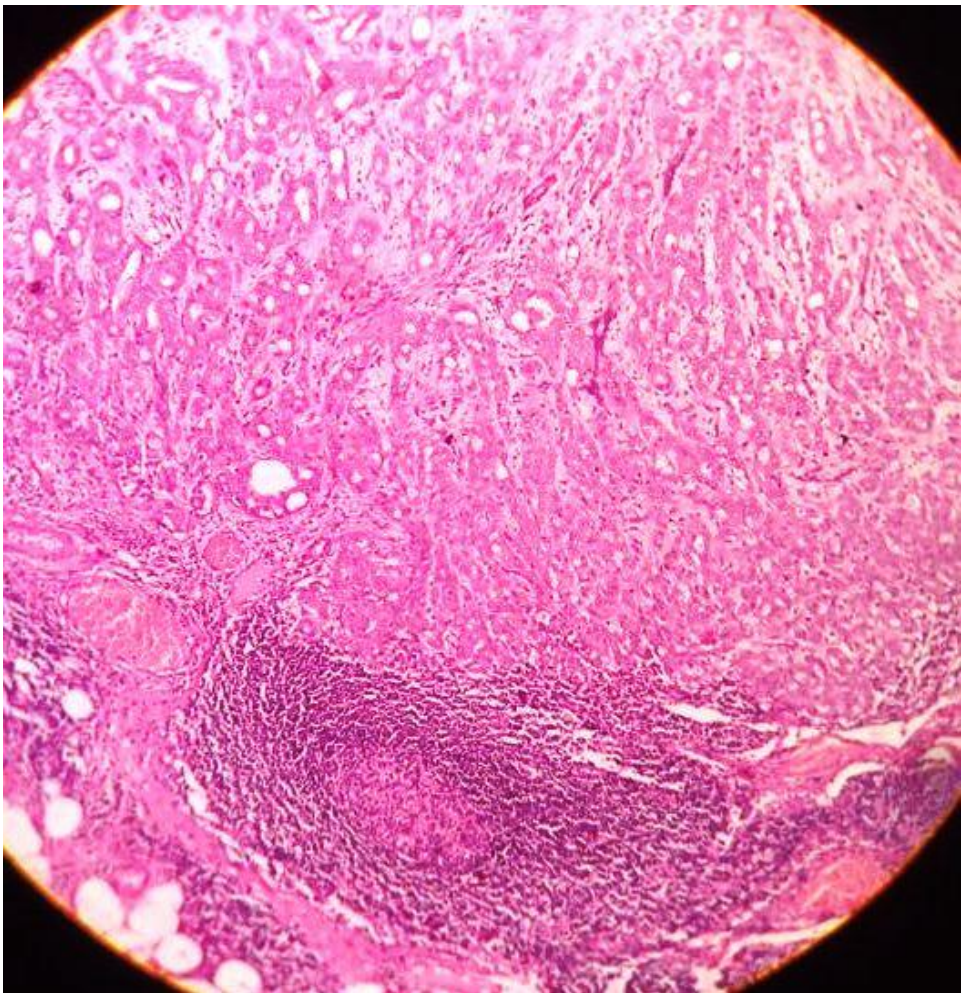

Figure 5 Lymph node showing metastasis

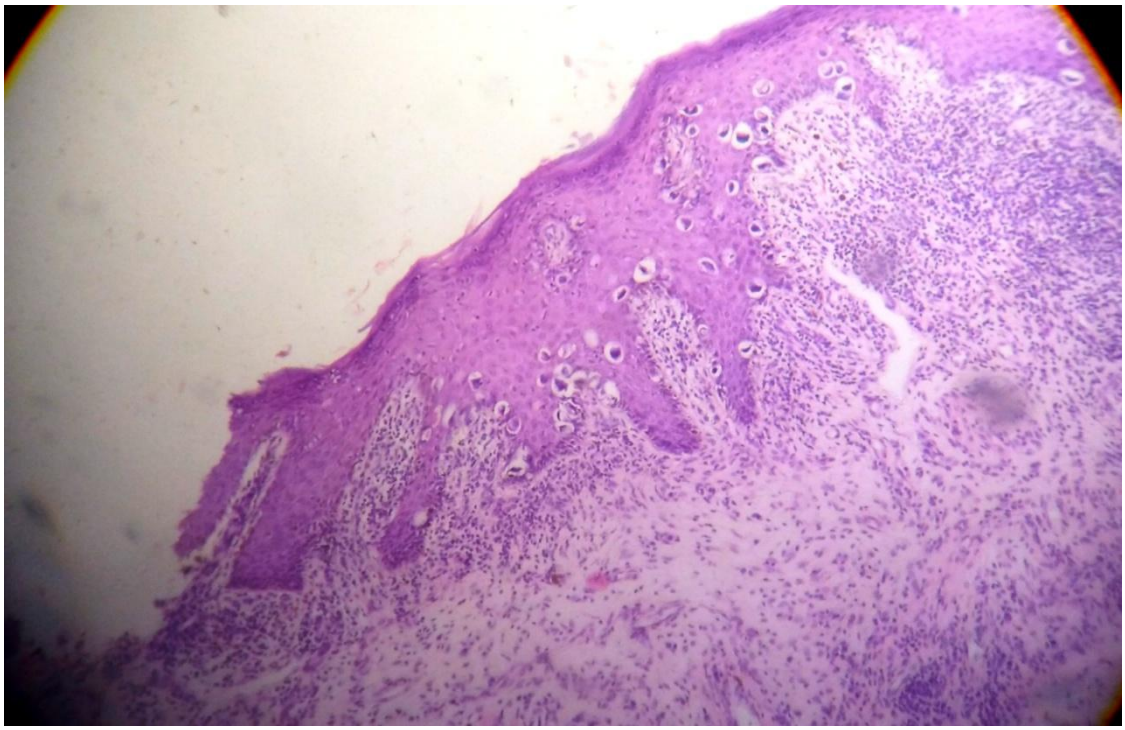

Figure 6 Paget's disease in breast

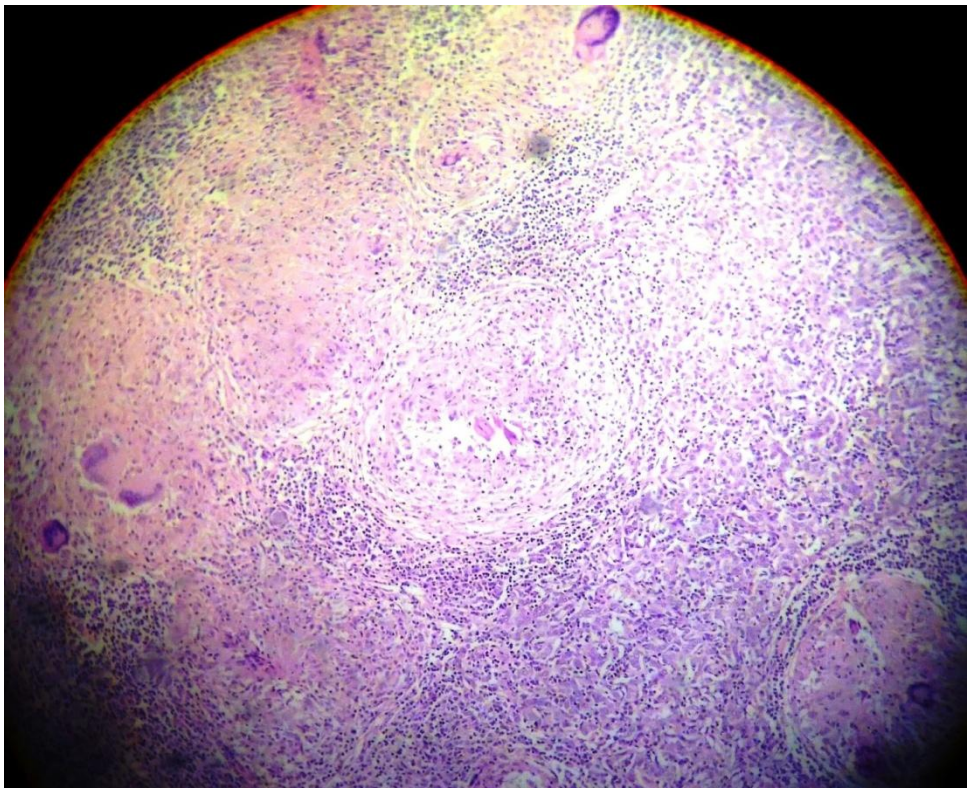

Figure 7 Granulomatous disease in breast

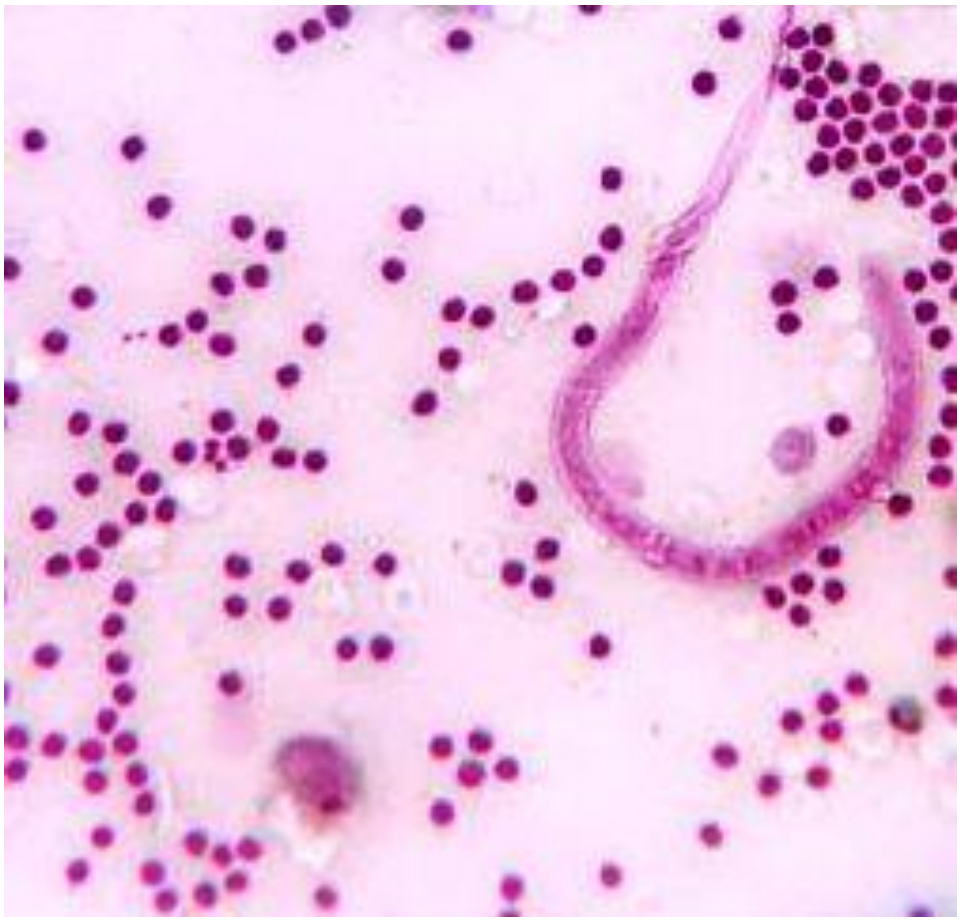

Figure 8 Microfilaria in breast

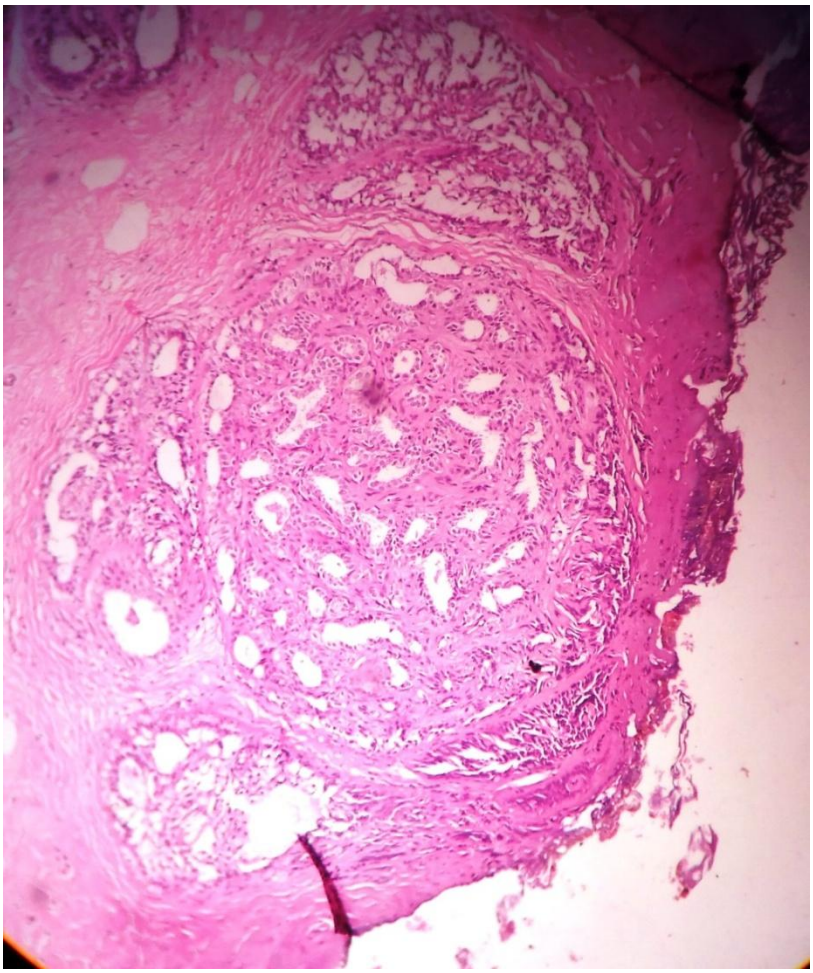

Figure 9 Atypical ductal hyperplasia

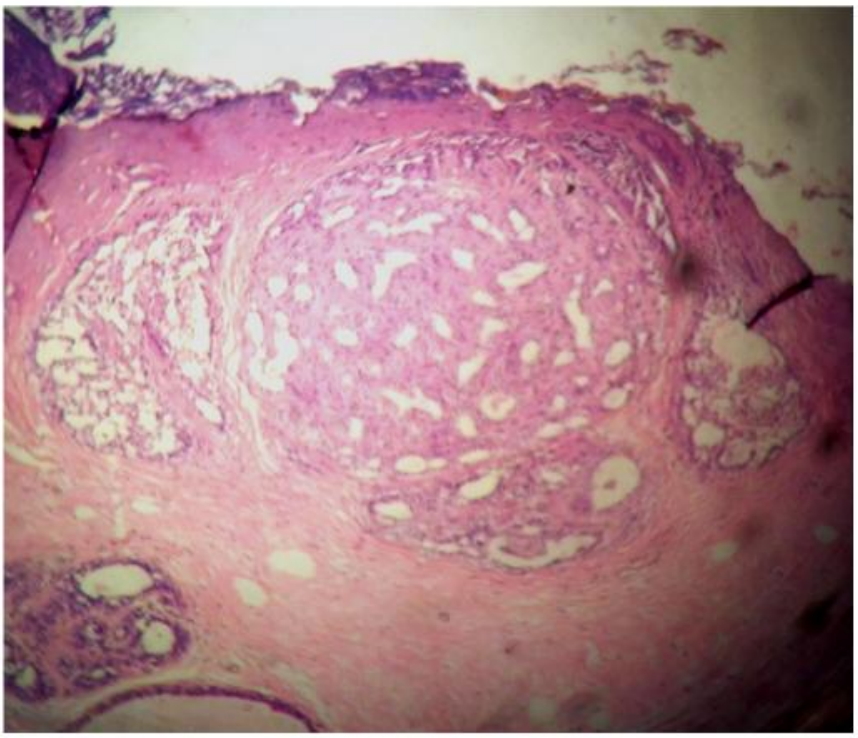

Figure 10 Usual ductal hyperplasia

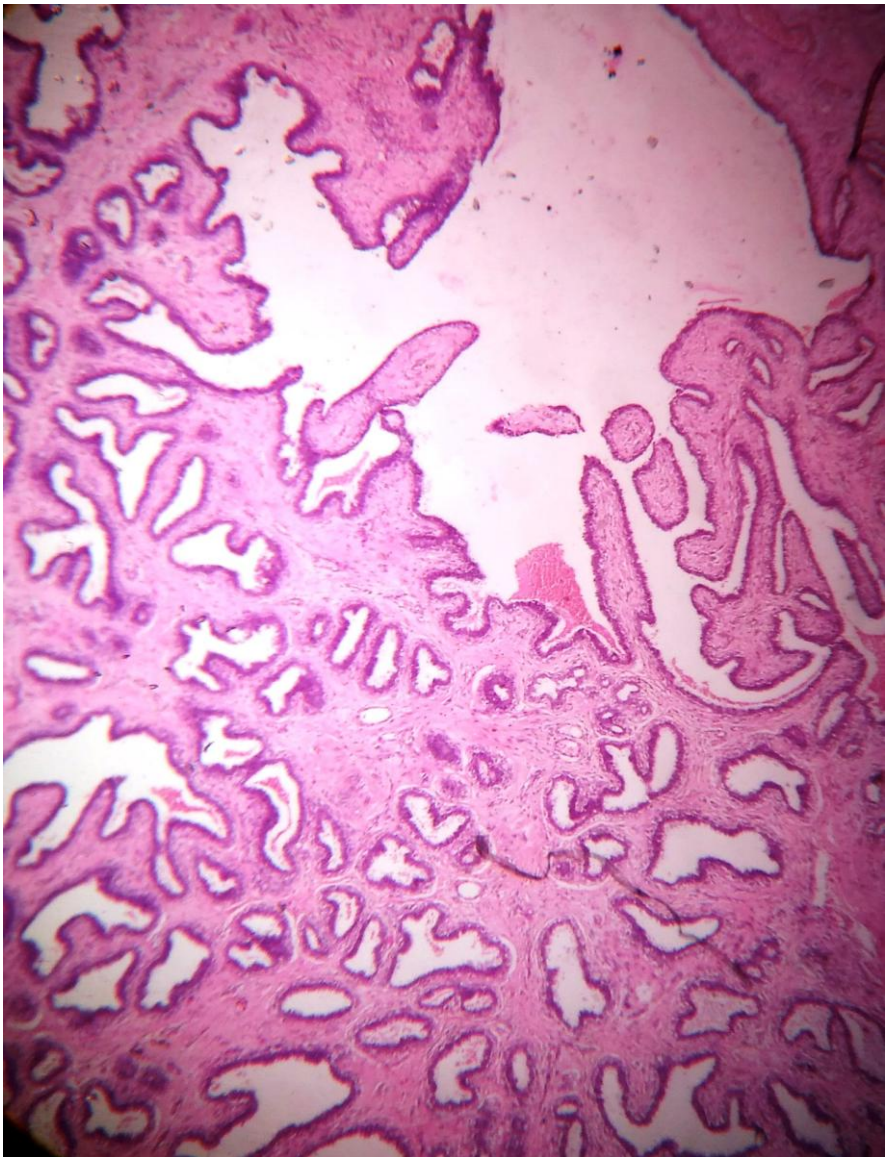

Figure 11 Ductal papilloma in breast

Dr. Tapaswini Bhuyan "Diagnostic Utlilty of FNAC in breast lesions and its correlation with histopathology".". "IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), Volume 17, Issue 2 (2018), PP 31-40.