The Role of Fine Needle Aspiration Cytology in Pre-Operative Diagnosis of Benign Breast Diseases: Optimize Curative relief

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*Abstract: Background: The diagnosis of breast lump is very important for achieving best result, it needs multi-disciplinary approach, it include triple assessment - Clinical, Radiological and Pathological examination is gold standard technique for diagnosis of breast diseases, the present study was analyze the effectiveness of FNAC in detecting breast diseases. FNAC of Breast Lump is basic and important, minimal invasive diagnostic tool pre-operatively for early and accurate diagnosis, & has ability to give rapid diagnostic information high correlation to that of frozen Section, hence it reduced need of frozen section biopsy meanwhile both aspirator and interpreter should be the same person with adequate sample. Cytological study carried out as per the worldwide accepted five tier system. Aims & objective: 1.To Asses Variant of Breast Lump. 2. To Asses Diagnostic Accuracy and Adequacy of Sample. 3. Cytological features of Smear. Material & Methods: This is a Prospective Study, from October 2016 to October 2018,(2 years) carried out at Tertiary care hospital and Ayush path Laboratory, Dhule Maharashtra, India. Inclusion Criteria: Young females with breast lump, age group ranges from 15 to 35 years. Exclusion Criteria: Male gynaecomastia, Females with age > 35years. Procedure: FNAC was performed after taking written informed consent with all aseptic precaution, patient were given proper position as it helps considerably for insertion of needle accurately without technical aids with 23-24 G Needle and plastic syringe, with multidirectional aspiration of Sample and adequacy was defined Results: This study including 85 cases and 91 breast lump requested for FNAC. Lump in breast is the commonest presentation, followed by Pain, Commonly reporting age group was 21-25years, seen in 29 cases (34.13%). Commonly observed lump size was 2-4 cm, 55 lump (60.43%), and Commonest site of breast lump is Upper Outer Quadrant in 34 cases (37.36%), maximum breast lump specified in C2 cytological category it is Benign specific Category 73 sample (80.21%) & highest diagnosed lump is Fibroadenoma 60 lump (69.78%). Conclusion:- Diagnosis of breast diseases by Triple assessment - clinical radiological and pathological examination is gold standard technique, FNAC is the least invasive diagnostic tool for benign breast diseases as a part of high diagnostic accuracy, less-time consuming, affordable, less patient discomfort, provision of multisampling therefore FNAC should be used as a routine method for determining the nature of breast lump.
Key words: Benign breast diseases, Fine Needle Aspiration Cytology (FNAC), Fibroadenoma*

I. Introduction

Fine Needle Aspiration Cytology (FNAC) is most important basic pathological investigation of benign breast diseases for screening of symptomatic patient preoperatively[1, 20]. Alteration in hormonal levels in females' cause's structural and functional changes in the breast during pregnancy, lactation and to a lesser extent throughout the menstrual cycle[3, 11] is physiological changes. For any pathology in the breast, diagnosis is performed by triple assessment Clinical, radiological and Pathological Examination is gold standard technique for preoperative evaluation of breast diseases[1, 3, and 5,14,17,18]. Breast is the dynamic structure in the females[3] hence it needs proper diagnosis with minimally invasive technique to relieve anxiety associated with nonmalignant condition of breast[1, 5, 17, and 22].

FNAC is used for both benign and malignant breast diseases as a part of high diagnostic accuracy, less pt discomfort, provision of multisampling and curative relief in most of cases[5, 18]. Do not need too much preparation for procedure; advantage of FNAC is the management of small tissue fragments permitting a repetitive evaluation of the chronological evolution in expression of tumoral biomarkers[5]. Some studies advocated that both aspirator and interpreter should be the same person[17]. Aspirated sample should be adequate[14]. In current practices, FNAC gives immediate diagnosis, saves time, cost effective[5], allowing one step definitive surgery, it reduces need of frozen section biopsy for diagnosis and unnecessary surgical excision[2]. FNAC has ability to give rapid information high correlation to that of frozen section[5]. There is high correlation with histopathological findings[3]. However FNAC has limitations in diagnosing few cases to distinguish between

some benign and borderline malignant lesion[14], to solve this problem guidelines laid down in 1992 by the National Health Service breast screening programme (NHSBSP) UK and were further modified in 1996 by the national cancer institute, Maryland, USA[15, 16]. Cytological categorization followed as per the Worldwide Accepted five tier systems.

C1- Unsatisfactory sample – Fat and fibrous tissue only, No cellular material, or bloody samples with poorly preserved cells.
C2- Benign Nonspecific – Smears of cells of non-neoplastic breast tissue. The number of cells required, varies between operators. Not possible to confirm that smear is representative, the responsibility stays entirely with the radiologist.
C2- Specific-Cyst, fibroadenoma, Intramammary lymph node.
C3- Atypical /Indeterminate-Diagnosis uncertain further investigation needed.
C4- Suspicious –Suggests malignancy, insufficient evidence for definitive management, histological confirmation needed
C5- Malignant-Unequivocal diagnosis can be used for definitive management if consistent with radiological findings and treatment protocols [2,14,15,16, 17, 20, 23]. (Table 1)[20]. This categorization helps the cytopathologist to diagnose accurately. Confident diagnosis can be made based on the quantity of the material aspirated[2, 14,17].

II. Material and Methods
This is a Prospective Study, from October 2016 to October 2018(2 year) study carried out in the Tertiary care hospital and Ayush Path laboratory, Dhule Maharashtra (India). **Material:** for the study comprised 85 patient, presenting with Breast lump, attaining in outpatient department & laboratory, after taking history it includes Age, marital status, patients background, duration of lump development & any changes with menstrual cycle, In Local examination look for its size, shape, number of lump and its location for provisional diagnosis. **Inclusion Criteria**: Young females with breast lump, age group ranges from 15 to 35 years. **Exclusion Criteria**: Male gynaecomastia, Females with age > 35years. **Procedure:** FNAC performed under all aseptic precautions with prior written and informed consent, during procedure patients co-operation is valuable[17]. After examination of breast in all quadrants, suitable position given to the patient for better exposure of lump then fixed with one hand, using 23-24 G needle placed inside the breast lump near vertical pathway for better application of depth as it defines lesion exactly and guide needle to a core portion of solid mass. 10cc plastic syringe allows proper vacuum after placing needle tip at target point. Multiple to and fro movements inside the lump carried out with maintaining the vacuum of syringe for multidirectional aspiration. Sample adequacy was defined by the cytopathologist, based on the Bethesda conference on breast cytology guidelines[15, 21]. Smear air dried and fixed with ethanol, stained with papanicolaou stain. Cytological findings made independently of radiological findings, it is based only on cytological and clinical findings. Demographic data collected includes age, size, site, clinical presentation and cytological findings. All data & results analyzed and calculated.

III. Result
This study includes only young female patients age ranged from 15 to 35 years with only benign conditions. FNAC was requested for 91 breast lump among 85 female cases, maximum reporting age group was 21-25 years, 29cases (34.13 %), followed by 15-20 year, 23 cases (27.06%). Then 26-30 year, 18 cases (21.17%), &lowest reporting age group was 30-35 years, 15 cases (17.64 %).

In present study Lump size varies from 2- 10cm among which most common size of lump was 2-4cm, 55 lump (60.43%), followed by size of 4- 6 cm, 27 lump (29.68%) then size of 6- 8 cm, 7 lump (7.69%) & 2 lump had of size>8cm (2.19%).

In present study out of 85cases, breast Lump found on right side of the breast in 45 cases (52.94%) & on left side of the breast in 34 cases (40.02%). Whereas bilaterally in 6 cases (7.05%).

In present study 91 breast Lump was found in all four quadrant of the breast, commonly seen in Upper Outer quadrant, 37 lump (40.65%) among which 22lump on right side of the breast & 15 on the left side of the breast. Followed by upper inner quadrant we found 25 lump (27.47%).Then in Lower outer quadrant19 lump (20.87%). Lowest number of lump found in lower inner quadrant 10 lump (10.98%), out of which 6 on right side of the breast & 4 on left side of the breast.

In present study most common clinical presentation was well defined breast lump seen in 58 cases (63.73%), Pain with breast discomfort seen in 49 cases (57.64%), cyclical mastalgia in 19 cases (20.87%). Nipple discharge in 6 cases (6.59%) & signs of inflammation seen in 5 cases (5.49%). (Fig. A, B, C)

In present study 91 breast lump requested for FNAC in which, 5 samples were inadequate hence excluded, only 86 FNAC of Breast lump were included in cytological analysis. Cytological categorization of breast lump smear analyzed as per Worldwide accepted five tier system, (Table 2)

In present study 91 FNAC was requested for Breast lump, diagnosis were confirmed with adequate samples, 86 FNAC samples were sufficient to confirmed the diagnosis in which fibroadenoma showed the highest diagnosed pathology in the breast, 60 lump (69.78%), followed by fibrocystic diseases with 8 sample (9.29%), then Mastitis in 5 samples (5.82%), Abscess in 4 sample (4.66%), Galactocele in 3 sample (3.48%), Duct ecstasies, Fat necrosis & Atypical in 2 sample (2.32%) each. (Table 3)

IV. FNAC

1. Galactocele: Shows benign ductal epithelial cells scattered singly along numerous foamy macrophages with soap bubble appearance, background shows dirty proteinaceous material (fig.1)

2. Fibrocystic disease: proliferative breast lesion with fibrocystic change : Smear shows benign ductal epithelial cells arranged in sheets, clusters and scattered singly.The individual cells having monomorphic nuclei having evenly distributed nuclear chromatin. Background with foamy histiocytes bare nuclei of benign type admixed with blood.(fig.2)

3. Fibroadenoma: Benign Proliferative breast lesion Fibroadenoma : Cellular smear studied how benign ductal epithelial cells arranged in sheets,clusters,scattered singly.background shows bare nuclei of benign type few foamy histiocytes admixed with blood. (fig.3)

4. Fat necrosis: shows acellular necrotic material with degenerated epithelial cells, globular necrotic material with few areas of fatty degeneration. (fig.4)

5. Fibroadenoma with Atypia: Cellular smear study showed ductal epithelial cells arranged in sheets, cluster or singly. Few of cluster shows mild atypia, anisonucleosis background is hemorrhagic. (fig.5)

6. Breast abscess: Cellular smear study showed few ductal epithelial cells arranged in sheets, cluster or singly along with numerous live and dead polymorphonuclear cells, foamy macrophages admixed with blood. (fig.6)

7. Duct ectasia: On aspiration thick clear serous fluid, act as therapeutic use, on cytology shows occasional dilated large duct with foamy histiocytes and secretions. some smaller duct shows mild to moderate ductal epithelial hyperplasia more than three layers.

V. Discussion

Martin and Ellis (1930) discovered the concept of needle aspiration for diagnosis of palpable breast lesion[12]

C Garber and Cure H stated that It is safe, quicker, accurate, cheap & easy to perform & is less invasive than core needle biopsy[5]. In our study, we have included 85 female patients, out of 85 cases maximum reporting age group was 21-25 years, 29 cases (34.13 %) followed by 15-20 year 23 cases (27.06%). Then 26-30 year 18 cases (21.17%), & lowest reporting age group was 30—35 years, 15pt (17.64 %). Similar findings seen in **Kazi and et al,** they were included 50 patient with age group ranging 12-60 maximum incidence of benign condition seen in 12 to 20 years 18 cases (36%) followed by 21-30year of 15 (30%) cases[1]. Bhuwaneshwar, Devajit et al reported very near to our finding that, the age of cases ranged from 12-67 years& maximum reported in the age group of 21-30 years 96 cases (30.5%) followed by 12-20 years, 85 cases (27%) & 31-40 years 83 cases (26.3%) out of 315 cases[18]. **Hussain[7] and Khemka[8]** et al studied 50 cases and they found that the majority of patients were in the age group of 31-40 years. **Khemka and et al** observed that benign lesion of breast were more commonly seen in younger age group 30-34 years[8]**. Aslam and et al** also observed the mean age of breast lesion was 25.18, SD +_ 11.73 with wide age range of 12- 74 years.[10] **Felecia cerrato and Brian** also observed like to our study that, Fibroadenomas (benign breast diseases) are the most common breast masses in the Adolescents[19]. In our study Lump size varies from 2 - 10cm and most common size found in between the 2-4cm of 55 lump (60.43%) followed by 4-6 cm of 27 lump (29.68%) then 6-8 cm of 7 lumps (7.69%) & 2 Lump had of size>8cm (2.19%).

Kazi and etal stated that small the size of lump most diagnosed as benign, where size of lump ranges 1-5 cm and 19 breast lump measures 2.1- 3 cm and 17 breast lump measured 1.1-2cm and 7 breast lump measured < 1 cm[1] . **Ballo M S and et al** studied 124 cases and reported similar to our study that, lump size range of 1-12cm, mean size was 4.4 cm & (73.8%) of the lumps with a larger size > 2cm. and (28.38%) with a size < 2 cm[6]. **Bhuwaneshwar and Devajit et al** reported near to our study, that 158 cases (50.15%) found with size of 2-5 cm[18]. In our study 91 breast lump found among 85cases, Right breast involvement is common for breast lump, 49 cases (57.64%) & on left breast 36 cases (42.35%). Whereas bilaterally breast lump found in 6 cases (7.05%). **Kazi and etal** also reported similar to our study that, out of 50 cases, 29 cases (58.00%) were in right breast and 21 cases (42%) were in left breast[1]. Like our study result, **Khemkha[8]** also find the same, out of 50 cases, he observed 29 (58%) in Right breast & 21 (42%) in left breast. Unlike our study, **Hussain[7]** reported Right breast lump in 23 cases (46%) & left breast lump in 27 cases (54%). **Bhuwaneshwar and Devajit et al,** reported that, side involvement showed mostly occurring in left side 71 cases(44.9%) followed by right side 64 cases (40.5%) & bilaterally 13 cases (8.2%)[18]. In our study out of 91 breast lump commonly found in Upper Outer quadrant 37 lumps (40.65%) among which, 22 on right breast, 15 on left breast. Followed by Upper inner

quadrant in which 25 lump (27.47%).Then Lower outer quadrant, 19 lumps (20.87%). Lowest frequency of breast lump found in lower inner quadrant, 10 lumps (10.98%), Out of which, 6 on right side, and 4 on left side of the breast. **Kazi and et al** also have same findings, Among all the four quadrant super lateral quadrant was the most common for breast lesion, 24 cases (48%) then lower outer quadrant 2(4%), then subareolar 11cases9(22%) then upper inner quadrant 10 cases(20%)[1] . **Hussain**[7] **& khamka**[8] also observed upper and outer quadrant as commonest site. **Zakhour and et al** also observed that the lesion occurred in the upper outer quadrant 40%. This was followed by lower outer quadrant in 23.3%, then upper inner quadrant 16.7%, and then both the lower inner and axillary tail at an equal incidence.[23] In present study, most common clinical presentation is well defined lump seen in 58 lumps (63.73%), pain with breast discomfort seen in 49 cases (57.64%) & cyclical mastalgia, seen in 19 cases (20.87%) nipple discharge in 6 cases (6.59%), signs of inflammation found in 5 cases (5.49%).**like our study Ballo MS and etal** observed that overall breast lump with pain was the most common presenting complaint accounting up to 46.5%)[6]. **Zakhour and** et al stated that Nipple discharge is one of the alarming complaints, this represents commonly a papillary lesion involving one of the major lactiferous duct.[23] In present study 91 FNAC was requested for Breast lump, diagnosis were confirmed with adequate samples, 86 FNAC samples were sufficient to confirmed the diagnosis in which, fibroadenoma showed the highest 60 lump (69.76%), fibrocystic diseases in 8 samples (10.38%), Mastitis in 5 sample (6.49%), Abscess in 4 sample (5.19%), Galactocele in 3 sample (3.89%) , Galactocele in 3 sample (3.48%), Duct ectasia in 2 cases (2.59%), Fat necrosis in 2(2.59%), & Atypical in 2 cases (2.59%) (table 3). Like our study **Kazi and et al** stated that inadequate samples were excluded and in findings the majority of cases being Fibroadenoma 17 cases (39.54%) followed by fibrocystic changes 27.9%, inflammatory mastitis 18%, Galactocele or lactational changes 9.3% and only one case was benign phyllodestumor[1]. Unlike our study **Jayaram and et al**[9] in their study of 745 fine needle aspiration and 35 nipple smear, broad categories of cytodiagnosis were as follows: Malignant: 95, suspicious or equivocal: 26, benign: 543, no proliferative lesion: 58 and inadequate: 58. **Bhuwaneshwar and devajit et al** also reported that, among the type of the lesions, fibroadenoma showed the highest 158 cases (50.1%) incidence followed by carcinoma 48 cases (15.2%) and benign proliferative lesions 23 cases (7.3%). Inflammatory lesions were abscess 15 (4.7%), chronic mastitis 5 (1.6%), Granulomatous mastitis 4 cases (1.3%) and fat necrosis 01 (0.3%). Cystic lesions included galactocele 2 cases (0.6%), benign cystic lesions 9 cases (2.9%) and fibrocystic diseases 5 cases (1.9%) [18]. **Mitra and Dey et al** reported that Fibroadenoma is the commonest benign tumor [14]. **Felecia cerrato and Brian et al** also observed like to our study that, Fibroadenomas are the most common breast masses in the Adolescents[19]. **Aslam et al** also documented fibroadenoma as the most common benign lesion (71.3%) in their study[10]. **Gunjan Gupta and et al** reported cytological diagnosis were Abscess 1, Granulomatous mastitis 1, Fibroadenoma 14, Epithelial hyperplasia 4, Simple cyst 3, Fibrocystic diseases, Ductal hyperplasia with atypia 1, Papilloma 11[13]. Tiwari and et al also observed fibroadenoma was the most common diagnosis.[22]

VI. Conclusion

From above study we concluded that by triple assessment clinical radiological and pathological examination is gold standard technique for diagnosis of benign breast diseases. FNAC is the least invasive diagnostic tool in current practice for diagnosis of benign breast diseases as a part of high diagnostic accuracy, less-time consuming, affordable, safe, less patient discomfort, provision of multisampling and curative relief in most of cases, It reduces need of frozen section biopsy. FNAC can help to take decision for surgery or conservative management, therefore FNAC should be used as a routine method for determining the nature of breast lump.

VII. Observation

Table 1: Cytology reporting categories

C 1	Inadequate
C 2	Benign
C 3	Atypical probably Benign
C 4	Suspicious of malignancy
C 5	Malignancy

From: Diagnostic cytopathology of the breast by Zakhour and wells[23]

Table 2: Cytological Categorization of aspirates

Cytological Category	Cytological Observation	Number of Patients	Percentage
C1	Inadequate : Fibrous tissue, blood	05	5.49%
C2	Benign Nonspecific	11	12.08%
C2	Benign Specific : Cyst, fibroadenoma	73	80,21%
C3	Atypical / Indeterminate	02	2.19%
C4	Suspicious of malignancy	00	00
C5	Malignancy (Not Included)	00	00

C2- Non- specific condition: Inflammatory and fat necrosis
C2- specific condition: fibroadenoma, all fibrocystic diseases, Galactocele, Ductectasia

Table-3: Out of 86 breast lump

Serial No.	Diagnosis	No. of Cases	Percentage
1	Fibroadenoma	60	69.78 %
2	Fibrocystic diseases	08	9.29 %
3	Mastitis	05	5.82 %
4	Abscess	04	4.66 %
5	Galactocele	03	3.48 %
6	Ductectasia	02	2.32 %
7	Atypical	02	2.32 %
8	Fat Necrosis	02	2.32 %

Fig.A: Lump In Breast   **Fig.B: Inflammatory Lesion**   **Fig.C: Nipple Discharge**
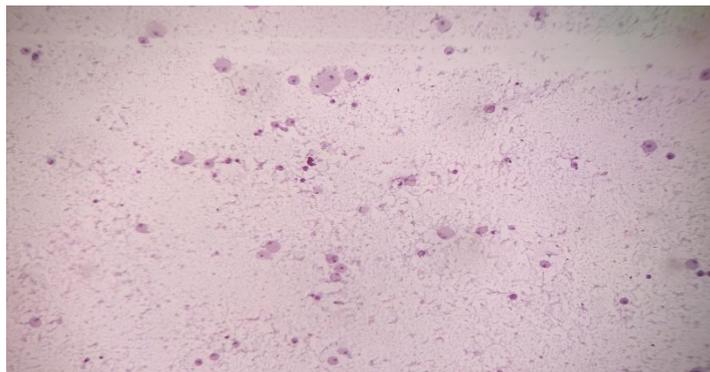
Fig.1: photomicrograph of (40X) Galactocele
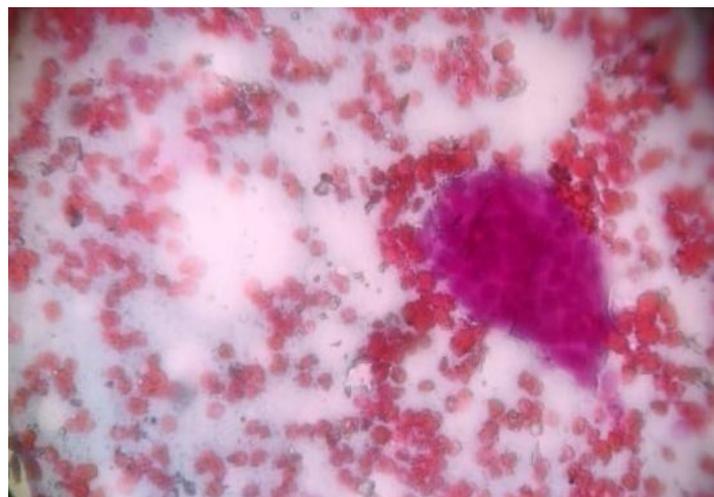
Fig.2: photomicrograph of (HP100x) proliferative breast lesion with fibrocystic change
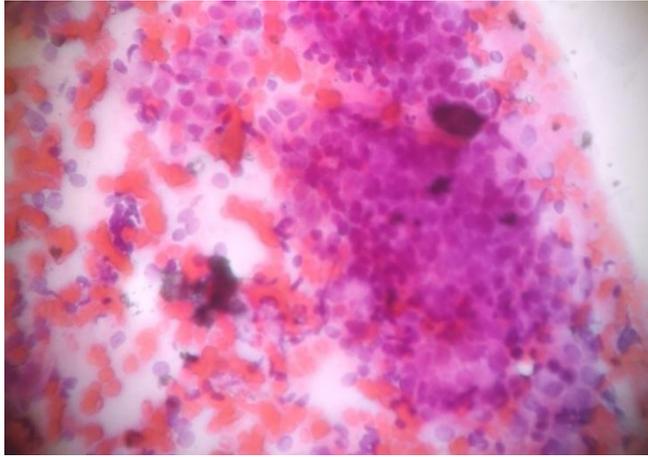
**Fig.3:** photomicrograph of (100x)Benign Proliferative breast lesion Fibroadenoma
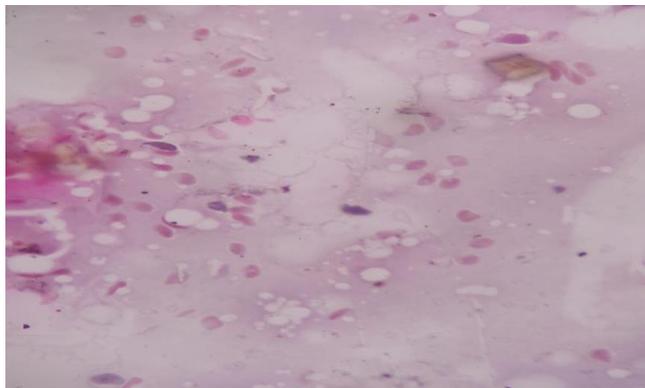
Fig.4: photomicrograph of Fat Necrosis
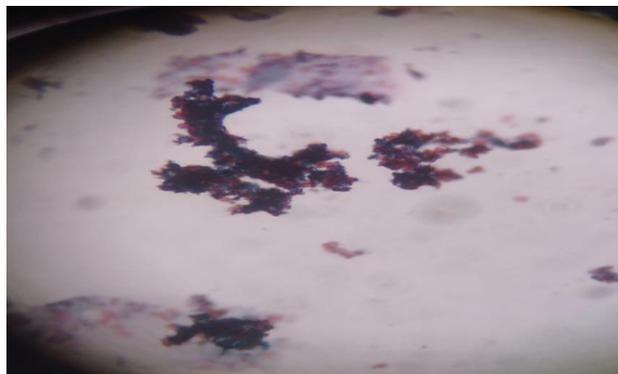
**Fig.5:** photomicrograph of Fibroadenoma with Mild atypia
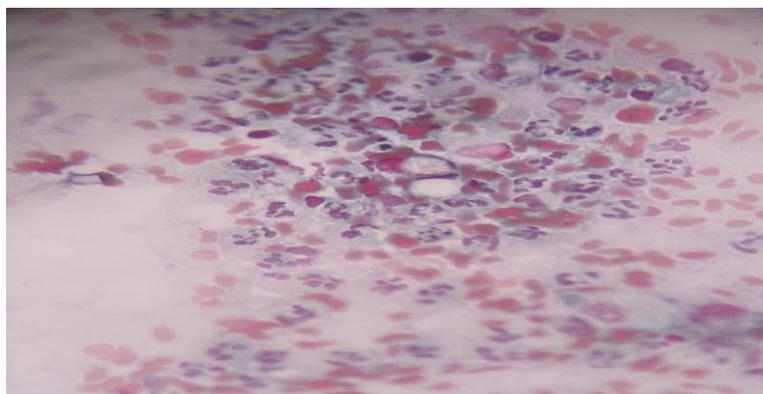
Fig.6: photomicrograph of Breast Abscess

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