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A Study of FNAC Yield in Breast FNAC's Performed by Clinicians: An Enumeration Of 100 FNAC's Performed by Clinicians Over A 3 Year Period.

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ABSTRACT

Worldwide, breast cancer is the most-common invasive cancer in women. FNAC is a reliable tool for breast cancer screening in breast clinics. The complete sensitivity of FNAC in the diagnosis of breast cancer in 90-95 % in most series. A cytopathology department should aim at a sensitivity of not less than 95 % & this can be achieved by increasing experience. A retrospective study was carried out on breast FNAC's received from a breast clinic in Chennai from the year 2019 till October 2022. All the FNAC's received were performed by clinicians. A total 100 patient FNAC's of ages between 21 & 71 years were studied. Smears made from aspirated material were sent to the laboratory for analysis. All of the aspirates were from females. There were more benign lesions (C2) as compared to malignant lesions (C5) or lesions suspicious of malignancy (C4). There were a significant number of patients for whom a diagnosis could not be offered (29). Though the FNAC procedure may be perceived as 'simple' there are subtle nuances such as needle gauge, fixation artefact & smearing technique that can affect the cellular yield. Inadequate FNAC's compromise on patient safety as the patient might ignore a needed intervention because he or she was requested to repeat the procedure again.

Keywords: Breast cancer, breast cancer screening, FNAC, patient safety.

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INTRODUCTION

Worldwide, breast cancer is the most-common invasive cancer in women. The most common cancer in Indian women is cancer of the breast with age adjusted rate as high as 25.8 per 100,000 & mortality 12.7 per 100,000 women. The age adjusted incidence was found to be highest in cities such as Delhi (41 per 100,000) followed by Chennai (37.9 per 100,000) & Trivandrum (33.7 per 100,000) [2].

Breast FNAC is an important screening tool employed by health care personnel for the screening of breast cancer. The 'triple approach', described in literature combines clinical, radiological & pathological means to diagnose the breast disease [1].

MATERIAL AND METHODS

FNAC's received between January 2019 & October 2022 were 100 in number. All the FNAC's were performed by clinicians. The group of clinicians included radiologists & gynecologists. A total 100 patient FNAC's of ages between 21 & 71 years were studied. Smears made from aspirated material were sent to the laboratory for analysis. All of the aspirates were from females**.** All the FNAC' s received in the laboratory were reported in accordance with guidance on breast cytology reporting issued by the Royal College of pathologists in 2016. A reviewed version of the same guidelines was issued in 2021.However there were no changes made by the college in the reporting categories of FNAC's [1].

Air dried smears were stained with Giemsa stain and wet smears were stained with PAP stain. All lesions categorized as C4 & C5 were signed off by 2 pathologists after a consensus decision on morphology was made. Qualified & trained pathologists reported the slides in accordance with the guidelines issued by the RCP.

The various lesions that were reported during the study period were studied retrospectively & analyzed.

EXPERIMENTAL

The FNACs were analysed in the Department of Cytopathology, Apollo Diagnostics, Chennai, Tamil Nadu, India.

RESULTS

Total FNAC's studied – 100

Out of the total 100 cases, the final cytological report was given as per the RCP guidelines and had C1 in 29 (29 %) cases (Fig C1), C2 in 50 (50 %) cases (Fig C2I), C3 in 1 (1%) case (Fig C3), C4 in 09 (9%) cases (FigC4) and C5 in 11 (11%) cases (FigC5). Among C2 lesions, 60% (30) cases were fibroadenoma followed by 20% (10) cases of benign breast disease, inflammatory lesion 10% (05) cases, fibrocystic disease in 6% (03) cases and mastitis 4% (02) cases (Fig C2II).

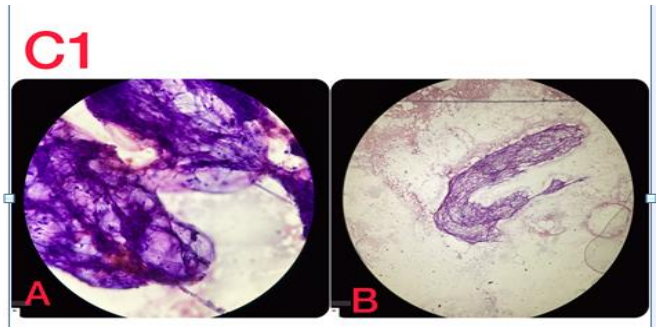

Figure C1, Inadequate for opinion: Image A: High power view of adipocytic cluster. Image B: Showing an adipocytic fragment on low power. Both these FNAC's did not show any ductal cells & were categorized C1.

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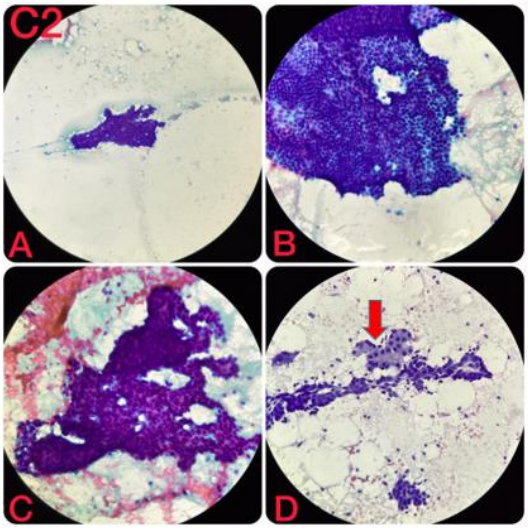

Figure C2 I, benign: Image A: Low power view of branching ductal cluster. Image B: High power view of the same cluster showing a 'honeycomb' pattern of ductal cells rimmed by myoepithelial cells. This is characteristic of fibroadenoma. Image C: The ductal cells show mild overlapping & distinct 'holes'. However, there is no nuclear atypia, which is a defining feature of atypical ductal hyperplasia. The overlapping of nuclei is due to improper spreading of the cells on the slide Image D: The ductal cells (red arrow) show apocrine metaplasia which can be encountered in lactating breast or as an incidental finding in benign breast disease.

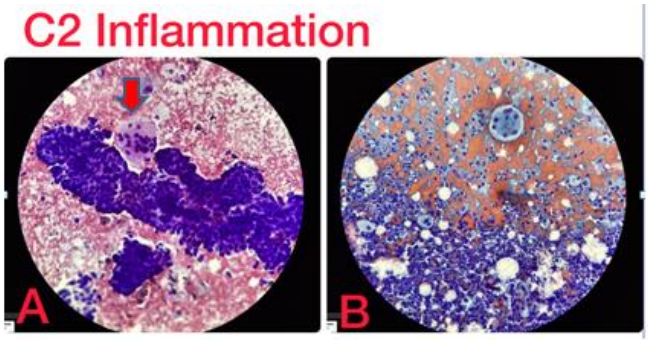

Figure C2 II, inflammation: Image A: High power view of a giant cell (red arrow) along with a ductal cluster. Note that the ductal cells show reactive changes & the same should not be interpreted as atypia. Image B: High power view of the same aspirate showing giant cell & plenty of polymorphs along with acute inflammatory debris.

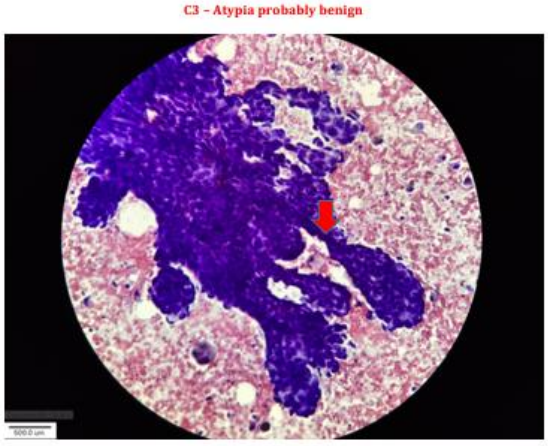

Figure C3, atypia probably benign: Image: High power view of a papillary lesion showing finger like papillae. Myoepithelial cells are noted rimming the papillae (red arrow).

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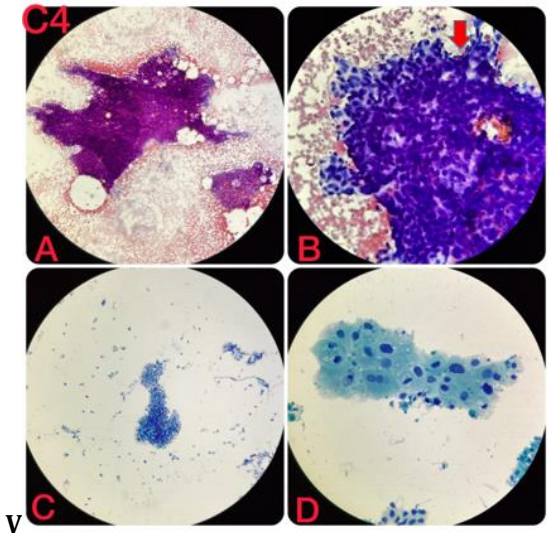

Figure C4, Suspicious of malignancy: Image A: Low power view of an infiltrating atypical ductal cluster infiltrating fat. Image B: High power view of the same cluster showing an atypical ductal cell rimmed by occasional myoepithelial cells (red arrow). FNAC cannot conclusively distinguish between ductal carcinoma & carcinoma in situ. Presence of occasional myoepithelial cell warrants for a core biopsy or frozen section to rule out carcinoma in situ Image C: The ductal cells show mild pleomorphism, loss of polarity & hyperchromasia. However, there is no nuclear atypia, which is a defining feature of atypical ductal hyperplasia. Image D: High power view of the same cluster showing a atypical ductal cells with atypical nuclear features. However squamous metaplasia of the lactiferous ducts (SMOLD) cannot be ruled out & a biopsy is warranted.

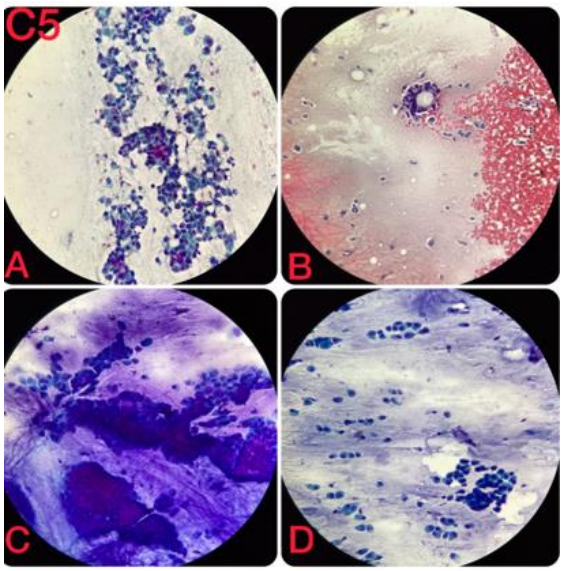

Figure C5, malignant: Image A: Low power view of infiltrating atypical ductal clusters. Overtly malignant cells lose cohesiveness & tend to 'fall off' Image B: High power view of another focus in the same aspirate showing a cluster of ductal cells infiltrating & encircling fat. Image C: The ductal cells show marked pleomorphism, loss of polarity & hyperchromasia. Image D: High power view of an aspirate showing ductal cells in cords bearing semblance to the 'Indian file pattern' described in lobular carcinoma. Biopsy is warranted for further categorization.

DISCUSSION

FNAC is a reliable tool in the screening of breast cancer in the hands of experienced cytopathologist's [3]. Lack of knowledge of which needle gauge to use for breast FNAC & incorrect technique could result in poor cellular yield.

The RCP issued guidelines for the non-operative screening of breast cancer in 2016.The same was reviewed & released gain in 2021.These guidelines have been established after extensive studies are comparable with other international guidelines such as Bethesda.

The guideline issued by the RCP categorizes the various breast lesions from C1 to C5.

The guideline does not specify the number of cells or ductal clusters required to categorize the lesion, however hypocellular lesions without any ductal cells are designated C1.

In our study 29 of the 100 FNAC's reported were categorized are C1, i.e. inadequate for opinion.

Aspirate with features such as poor preservation, hypo cellularity, only hemorrhage or adipose tissue in the smears were reported as inadequate.

The incidence of a high proportion of 'inadequate' cases could be attributed to skill of personnel performing FNAC & poor technique. In the setting of a breast clinic it should be stressed that personnel involved in performing the procedure of FNAC require expertise & training to perform the procedure. In our study all of the FNAC's reported were performed by clinicians. A high proportion of inadequate cellular yield compromises on patient safety & reiterates the importance of training to perform FNAC's.

Though anatomically the breast is just a modified sweat gland the myriad of lesions encountered in the breast are diverse to say the least. In our study 50 of the 100 FNAC's reported were categorized are C2, i.e. Benign. This finding reiterates the fact that benign breast disease is most common pathology encountered in breast [4].

Of the benign lesions encountered fibroadenoma were the commonest. Branching ductal clusters in a 'honeycomb' like pattern, the presence of myoepithelial cells & bare nuclei is characteristic of fibroadenomas. Areas of ductal hyperplasia can be present in fibroadenomas & the same can be appreciated by the way of increased cellularity in the lesion. The presence or absence of myoepithelial cells help distinguish benign breast lesions from ductal hyperplasia's & in situ carcinomas. However, the common 'yardstick' of myoepithelial cells cannot be applied for all lesions. Microglandular adenosis, though a benign lesion notoriously lacks myoepithelial cells.

Hyperplasia of the ducts in breast can take 2 forms; usual ductal hyperplasia & atypical ductal hyperplasia. It is important to distinguish between usual ductal hyperplasia (UDH) & atypical ductal hyperplasia (ADH) as the latter may be present in lesions which harbor low grade DCIS [6, 7].

The cytomorphology of atypical ductal hyperplasia is characterized by nuclear overlapping, nuclear atypia & the presence of distinct 'holes', suggestive of a cribriform pattern. Poor spreading technique also can simulate atypical ductal hyperplasia, however the absence of nuclear atypia & presence of cohesive sheets with benign morphology in the same cluster serve as clues in differentiating ADH from UDH. Presence of myoepithelial cells is not a feature of DCIS, & myoepithelial cells are more likely to be found in ADH. It should be emphasized that there is considerable morphological overlap between ADH & low-grade DCIS. Irrespective of whether myoepithelial cells are present or not, such atypical lesions where there is considerable overlap should be categorized as C3 & be biopsied to put any doubts to rest [5, 6].

In our study we did not encounter any aspirate with overtly atypical features. The image illustrated C in the panel C2 shows nuclear overlapping in 'parts' of the image & this feature is not present throughout the image. A portion of the image shows the 'honeycomb' pattern of benign ductal cells. Such artefactual overlapping should not be interpreted as C3.

Mastitis can present as a breast swelling & can be aspirated. In such instances the aspirated is therapeutic as well as diagnostic. History of the swelling reducing or disappearing after aspiration can be elicited.

The RCP guideline does not distinguish between 'benign' tumors & inflammatory conditions. Mastitis is also categorized as C2. Given is an example of acute breast abscess with polymorph predominant inflammation.

Several papillary lesions of the breast such as papilloma, papilloma with atypia, micro papillary DCIS noninvasive intracystic papilloma & low grade invasive papillary carcinoma are described in literature. A pseudo papillary pattern in duct carcinoma is also described. Cytological atypia also is often present to a variable degree in smears from papillary lesions. Clinical information on location may help narrow down the diagnosis as many a papillary lesion is encountered in the sub-areolar region [7, 8].

We encountered one papillary lesion in the study. The lesion was categorized as C3 as per the RCP guideline. The RCP guideline also designates phyllode's tumor as C3. We did not encounter the cytomorphology of phyllode's tumour in our study.

In our study 9 patients out of 100 were given reports as 'suspicious of malignancy'. The RCP guideline mentions that lesions that don't have overt features of malignancy are to be categorized as C4. Tubular carcinoma can present with regular nuclei than fibroadenomas. Also, in situ lesion may possess myoepithelial cells & can be mistaken for benign lesions in if the degree of atypia is minimal [9, 10].

Low cellularity can cause indecision & the pathologist may not be comfortable in declaring a lesion C5 without 100 % proof of malignancy being present. In such instances the category C4 is put to use. We encountered lesions in which the report could not be signed off as C5 or malignant. Advice of the necessity for core biopsy was given in these cases. Aspirates with poor cellularity & inconclusive features were designated C4. Examples of the same are illustrated above.

Cytomorphology of ductal carcinoma of the breast with obvious features such as marked atypia, nuclear pleomorphism & loss of polarity can be designated as C5. It is should be borne in mind that ductal carcinoma on Histopathological examination is termed non special type (NST) & several special types are described. One of the clues that the microscopists can rely on is infiltration of fat by malignant cells [11, 12].

Microscopists can choose to only mention the category of the lesion & not shed light on the finer details because of the limitations of FNAC.

The complete sensitivity of FNAC in the diagnosis of breast cancer is 90 – 95 % in most series. A cytopathology department should aim at a sensitivity of not less than 95 % & this can be achieved by increasing experience. The sensitivity of our study was on the lower side, i.e. 71 %. The reason for the same being the number of cases wherein an opinion was not possible. This could be attributed to the procedure being performed by 'inexperienced' hands. Though the FNAC procedure may be perceived as 'simple' there are subtle nuances such as needle gauge, fixation artefact & smearing technique that can affect the cellular yield. FNAC like any medical procedure is a skill that can be honed with practice, perseverance, attention to detail & should not be taken lightly [3].

Inadequate FNAC's compromise on patient safety as the patient might ignore a needed intervention because he or she was requested to repeat the procedure again.

The 'triple approach' has the best sensitivity rates when it comes to detection of breast cancer. The diagnostic accuracy is close to 100% when all three modalities favour a benign or malignant diagnosis [15].

Immunohistochemistry of ER, PR & HER2/ Neu can be done on core biopsies & can predict response to therapy.

More studies involving greater sample size is necessary.

CONCLUSION

The role of FNAC in a breast clinic setting is indispensable in the screening of breast cancer & hence should be advocated [12-14].

FNAC is a reliable tool for breast cancer screening in breast clinics. However, the training of personnel in the FNAC procedure per se is of utmost importance to avoid instances of poor cellular yield which can impact patient safety.

List of abbreviations

FNAC – Fine needle aspiration cytology
RCP - The Royal College of pathologists
ADH – Atypical ductal hyperplasia
UDH – Usual ductal hyperplasia
DCIS – Ductal carcinoma in situ

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