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Assessment of accuracy of fine needle aspiration cytology (FNAC) in benign and malignant breast lesions in Bihar region patients

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Abstract
Fine-needle aspiration cytology (FNAC) is a well-established method for the diagnosis of breast lesions. It has the advantages of being highly accurate in experienced hands, cost effective, and useful for small lesions not eligible for Core needle biopsy (CNB). Its limitations are the lack of experienced cytologists in many institutions, the inability to reliably distinguish invasive from in situ carcinoma and the difficulty in precisely evaluating cytologic and morphologic features in breast aspirates with the histological classification system used as the "gold standard", particularly in benign lesions. Hence the present study was planned to evaluate the Accuracy of fine needle aspiration cytology in benign and malignant breast lesion.
The present study was planned in Department of Pathology, Jawaharlal Nehru Medical College, Bhagalpur from march 2018 to February 2019. Total 30 cases of the breast lesions undergone the Fine needle aspiration cytology (FNAC) were included in the present study. Clinical examination of patients was performed and record of findings was made. Consent was taken in each case after explaining the procedure of FNA to the patient. FNA was performed by the technique described by Orell *et al*.
In experienced hands, Fine needle aspiration cytology could be still considered the first method to evaluate breast lesions being less invasive. The accuracy of FNAC approaches that of histopathology in providing unequivocal diagnosis in breast lesions. It is highly useful in screening large population as it is simple, rapid, cost effective and reliable Fine needle aspiration cytology procedure is safe, atraumatic and repeatable. This can be carried out in outpatient department and better treatment can be outlined prior to surgical intervention.

Keywords: aspiration, breast, cytology, fine needle

Introduction
A breast mass, also known as a breast lump, is a localized swellings that feel different from the surrounding tissue [1]. Breast pain, nipple discharge, or skin changes may be present [1]. Concerning findings include masses that are hard, do not move easily, are of an irregular shape, or are firmly attached to surrounding tissue [2]. Causes include fibrocystic change, fibroadenomas, breast infection, galactoceles, and breast cancer [1]. Breast cancer makes up about 10% of breast masses [1]. Diagnosis is typically by examination, medical imaging, and tissue biopsy [2]. Tissue biopsy is often by fine needle aspiration biopsy [3]. Repeated examination may be required [2].
Treatment depends on the underlying cause [1]. It may vary from simple pain medication to surgical removal [1]. Some causes may resolve without treatment [4]. Breast masses are relatively common [2]. It is the most common breast complaint with the women's concern generally being that of cancer [5, 6]. A breast cyst is a non-cancerous, fluid-filled sac in the breast. They generally feel smooth or rubbery under the skin and can be quite painful or cause no pain at all. Cysts are caused by the hormones that control the menstrual cycle and are rare in women older than 50 [8].
A sebaceous cyst is a non-cancerous, closed sac or cyst below the skin that is caused by plugged ducts at the site of a hair follicle. Hormone stimulation or injury may cause them to enlarge but if no symptoms are present, medical treatment is not required [8]. Breast abscesses are non-cancerous pockets of infection within the breast. They can be quite painful and cause the skin over the breast to turn red or feel hot or solid. Abscesses of the breast are most common in women who are breast-feeding [8].
Adenomas are non-cancerous abnormal growths of the glandular tissue in the breast. The most common form of these growths, fibroadenomas, occur most frequently in women between the ages of 15 and 30 and in women of African descent. They usually feel round and firm and have smooth borders. Adenomas are not related to breast cancer [8]. Intraductal papillomas are wart-like growths in the ducts of the breast. These lumps are usually felt just under the nipple and can cause a bloody discharge from the nipple. Women close to menopause may have only one growth, while younger women are more likely to have multiple growths in one or both breasts [8]. Breast cancer usually feels like a hard or firm lump that is generally irregular in shape and may feel like it is attached to skin or tissue deep inside the breast. Breast cancer is rarely painful and can occur anywhere in the breast or nipple [8].
Fat necrosis is a condition in which the normal fat cells of the breast become round lumps. Symptoms can include pain, firmness, redness, and/or bruising. Fat necrosis usually goes away without treatment but can form permanent scar tissue that may show up as an abnormality on a mammogram [8]. A lipoma is a non-cancerous lump of fatty tissue that is soft to the touch, usually movable, and is generally painless [8].
Breast lumps are often discovered during a breast self-examination or during a routine check-up. Upon noticing an unusual lump in the breast the best course of action is to schedule an examination with a physician who can best

diagnose the type of breast lump and strategy for treatment. People should make sure that the medical records of any breast-related illnesses are retained [9], as this facilitates diagnosis in case of recurrence or follow-up.

The first noticeable symptom of breast cancer is typically a lump that feels different from the rest of the breast tissue. More than 80% of breast cancer cases are discovered when the woman feels a lump [10]. The earliest breast cancers are detected by a mammogram [11, 12]. Lumps found in lymph nodes located in the armpits[10] can also indicate breast cancer.

Indications of breast cancer other than a lump may include thickening different from the other breast tissue, one breast becoming larger or lower, a nipple changing position or shape or becoming inverted, skin puckering or dimpling, a rash on or around a nipple, discharge from nipple/s, constant pain in part of the breast or armpit, and swelling beneath the armpit or around the collarbone [13]. Pain ("mastodynia") is an unreliable tool in determining the presence or absence of breast cancer, but may be indicative of other breast health issues [10, 11, 14].

Another symptom complex of breast cancer is Paget's disease of the breast. This syndrome presents as skin changes resembling eczema, such as redness, discoloration, or mild flaking of the nipple skin. As Paget's disease of the breast advances, symptoms may include tingling, itching, increased sensitivity, burning, and pain. There may also be discharge from the nipple. Approximately half of women diagnosed with Paget's disease of the breast also have a lump in the breast [15, 16].

Inflammatory Breast Cancer presents with similar effects. Inflammatory Breast Cancer is a rare (only seen in less than 5% of breast cancer diagnosis) yet aggressive form of breast cancer characterized by the swollen, red areas formed on the top of the Breast. The visual effects of Inflammatory Breast Cancer is a result of a blockage of lymph vessels by cancer cells. This type of breast cancer is seen in more commonly diagnosed in younger ages, obese women, and African American women. As inflammatory breast cancer does not present as a lump there can sometimes be a delay in diagnosis [17].

In rare cases, what initially appears as a fibroadenoma (hard, movable non-cancerous lump) could in fact be a phyllodes tumor. Phyllodes tumors are formed within the stroma (connective tissue) of the breast and contain glandular as well as stromal tissue. Phyllodes tumors are not staged in the usual sense; they are classified on the basis of their appearance under the microscope as benign, borderline, or malignant [18].

Malignant tumors can result in metastatic tumors-secondary tumors (originating from the primary tumor) that spread beyond the site of origination. The symptoms caused by metastatic breast cancer will depend on the location of metastasis. Common sites of metastasis include bone, liver, lung, and brain [19]. When cancer has reached such an invasive state, it is categorized as a stage 4 cancer, cancers of this state are oftentimes fatal [20]. Common symptoms of stage 4 cancer include unexplained weight loss, bone and joint pain, jaundice, and also neurological symptoms. These symptoms are called non-specific symptoms because they could be manifestations of many other illnesses [21].

Most symptoms of breast disorders, including most lumps, do not turn out to represent underlying breast cancer. Fewer than 20% of lumps, for example, are cancerous [22], and benign breast diseases such as mastitis and fibroadenoma of the breast are more common causes of breast disorder symptoms [23].

In India, as per the National Cancer registry programme, all the urban cancer registries except Ahmedabad i.e. Bangalore, Chennai, Mumbai, Nagpur, Pune and Delhi recorded an increase in the incidence of cancer breast over the last decade [24]. Most diseases of the breast present as palpable masses or nipple discharge. Although most breast lesions are benign, in view of the high prevalence of carcinoma breast, the investigation of palpable breast lumps utilizes a multidisciplinary approach that centres around the 'triple test', analyzing clinical and radiologic findings in conjunction with the pathologic features to diagnose the lesion and determine the best treatment plan for the patient [25].

Fine needle aspiration cytology (FNAC) is an established procedure and has been used for more than four decades for the diagnosis of palpable breast masses [26, 27]. The advantages of FNAC include simplicity, accuracy, low morbidity, minimal patient discomfort, relatively low cost and immediate availability as an office procedure without anaesthesia. Prompt diagnosis relieves patient's anxiety and allows time to plan definitive treatment. Many benign conditions can be diagnosed accurately and surgery avoided, also the need for frozen section diagnosis is reduced [28].

Fine-needle aspiration cytology (FNAC) is a well-established method for the diagnosis of breast lesions. It has the advantages of being highly accurate in experienced hands, cost effective, and useful for small lesions not eligible for Core needle biopsy (CNB) [29]. Its limitations are the lack of experienced cytologists in many institutions, the inability to reliably distinguish invasive from in situ carcinoma and the difficulty in precisely evaluating cytologic and morphologic features in breast aspirates with the histological classification system used as the "gold standard", particularly in benign lesions [30, 31].

Hence the present study was planned to evaluate the Accuracy of fine needle aspiration cytology in benign and malignant breast lesion.

Methodology

The present study was planned in Department of Pathology, Jawaharlal Nehru Medical College, Bhagalpur from March 2018 to February 2019. Total 30 cases of the breast lesions undergone the Fine needle aspiration cytology (FNAC) were included in the present study.

Clinical examination of patients was performed and record of findings was made. Consent was taken in each case after explaining the procedure of FNA to the patient. FNA was performed by the technique described by Orell *et al*. 9 Smears prepared were air dried and stained with Giemsa stain. The slides were reviewed. Subsequent histopathological examination of the excised breast lumps or mastectomy specimens was also done in each case. Cytohistological correlation was done. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of FNAC in diagnosing breast lesions was calculated

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

Inclusion Criteria: All breast lesions cases which we received during the study period. The cases should have complete clinical detail.

Exclusion criteria: All cases which were post chemotherapy were excluded.

Results & Discussion

Analysis of the cytological reports in various series confirms the very high diagnostic accuracy of fine needle aspiration cytology. The accuracy of the diagnosis in patients with malignant breast disease is in the range of 85 to 90% in most of the series. High proportion of unsatisfactory samples (48%) with doctors who performed FNAC occasionally was reported in previous studies [32].

There are various modalities available for the diagnosis of breast masses include imaging studies, namely, ultrasonography (USG), diagnostic and digital mammography, magnetic resonance imaging (MRI), and tissue-based studies such as FNAC and core needle biopsy (CNB) and excisional biopsy [33, 35]. However, each method has its own advantages and limitations. Many countries have now adopted triple approach which comprised clinical breast examination, imaging (mammography and/or ultrasound) with FNAC as the first-line pathological investigation in both screening and in symptomatic patients [35].

Table 1: Age Distribution for Cases

Age (years)	Benign	Malignant	Total
11-20	3	0	3
21-30	4	0	4
31-40	5	6	11
41-50	0	4	4
51-60	-	3	3
61-70	-	3	3
>71	-	2	2
Total	12	18	30

Table 2: Size of the tumor in benign and malignant lesions

Size (cms)	Benign	Malignant
Less than 5 cms	7	4
5-10 cms	5	13
More than 10 cms	0	1
Total	12	18

Table 3: Diagnosis of breast lump lesions (Fine needle aspiration cytology).

Diagnosis	No. Patients with Prediction
Benign	24(False negative-2)
Suspicious	3 (Malignancy Confirmed with HP)
Malignant	33 (False Positive-0)
Total	60

Early screening and diagnosis of breast lesions help in timely prevention and management of breast pathologies. The most common age group in our study was 31-40 years. Similar observations were reported by Farkhanda and co-authors, Chandanwale *et al* [36, 37]. However Haque *et al* reported 30-40 years as most common age group [38]. In present study, left breast and outer upper quadrant were more commonly involved as compared to right breast.

However, Chandanwale *et al* reported more common involvement of right breast [39]. Out of 175 cases of FNAC, 89% lesions were benign and 11% were reported as malignant. This finding corroborates with other studies in literature as well [39, 40]. However Bdour M *et al* had reported much higher incidence of carcinomas (41%) [41]. Benign lesions were significantly more associated with younger age groups as compared to malignant lesions which were more common in patients older than 40 years of age. Similar pattern of findings were observed by various authors [39].

The major limitation of FNAC is its inability to diagnose some benign or borderline breast lesions and their distinction from the malignant lesions. As for example, preneoplastic lesions such as atypical ductal hyperplasia or in-situ changes cannot be confidently picked up by FNAC, and its distinction from an invasive malignancy is also very difficult. Similarly, benign lesions inducing extensive sclerosis, such as sclerosing adenosis, have long been considered to be the graveyard of cytopathologists. Another major limitation is the highly variable range of sensitivity and diagnostic accuracy of FNA smears depending on the experience of the cytopathologist. A variable and sometimes high rate of false negativity due to sampling error or error of interpretation have also prompted many clinicians to raise fingers against the efficiency of FNAC.

However, despite advances in biopsy devices and techniques, false-negative diagnoses still remain unavoidable and may delay the diagnosis and treatment of breast cancer. The most common reasons for false negative diagnosis are represented by technical or sampling errors, failure to recognize or act on radiologic histological discordance, and the lack of imaging follow up after a benign biopsy result. Technical difficulties (poor lesion or needle visualization, especially after the

Conclusion

In experienced hands, Fine needle aspiration cytology could be still considered the first method to evaluate breast lesions being less invasive. The accuracy of FNAC approaches that of histopathology in providing unequivocal diagnosis in breast lesions. It is highly useful in screening large population as it is simple, rapid, cost effective and reliable Fine needle aspiration cytology procedure is safe, atraumatic and repeatable. This can be carried out in outpatient department and better treatment can be outlined prior to surgical intervention.

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