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Original Article

VALIDITY OF FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) IN DIAGNOSIS OF BREAST LUMPS IN UPPER EGYPT

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ABSTRACT

Introduction: A palpable breast lump is a common diagnostic problem both to the general practitioner and to the surgeon, which needs rapid definitive diagnosis at the busy outpatient clinic. Fine needle aspiration cytology (FNAC) has become the first choice for diagnosis after initial clinical evaluation.

Aim of the Work: This study was designed to investigate the validity of FNAC in the diagnosis of palpable breast lumps.

Subjects and Methods: SSeventy two patients were included in the study. FNAC, Tru cut needle biopsy (TCNB) and surgical biopsy specimens (SBS) were obtained from 72, 57 and 71 patients, respectively. The success rate, sensitivity and specificity of FNAC were compared to those of TCNB.

Results: FNAC can perfectly differentiate between benign and malignant breast lesions with no false positive results recorded. The success rate, sensitivity and specificity of FNAC were 76.1%, 93.4% and 78.3%, respectively compared to 89.5%, 86.1% and 100% of TCNB, respectively. The positive and negative predictive values were 97.8% and 88% for FNAC and 100% and 77% for TCNB respectively.

Conclusion: Compared to the TCNB, FNAC is an easy reliable diagnostic tool for breast lumps with a high success rate, sensitivity and specificity.

Keywords: FNAC, TCNB, breast lump.

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INTRODUCTION

Most diseases of the breast present as a palpable mass. Although most cases are benign, breast cancer is a leading cause of cancer deaths in women *(ACS, 2010)*.

A palpable breast lump is a common diagnostic problem to both general practitioner and surgeons. Surgical management of breast cancer patients requires first confirmation of the diagnosis by TCNB or open biopsy followed by mastectomy. Alternatively, the diagnosis can be established by frozen section, followed immediately by mastectomy. Such a process is worrying for the patient who is unsure whether she will recover from anesthesia with two breasts or one. Therefore a rapid method of definitive diagnosis of breast lumps at the outpatient clinic is needed. This method must be accurate, reproducible, acceptable to the patient and easily applicable in a busy outpatient clinic without too much preparation or expensive equipments.

In context, FNAC is an easy, rapid, economical and minimally traumatizing procedure that can be achieved in outpatient settings. It has high acceptance rate by both clinicians and patients and can be used for evaluation of multiple breast nodules. As a well-established method, FNAC can determine the nature of a breast lump it involves cytological evaluation of cells aspirated by a narrow caliber needle from solid breast lumps. Aspirates of benign breast lesions contain flat single-layered sheets of ductal epithelial cells, myoepithelial cells with a background of bare bipolar nuclei. The epithelial cells show good cohesion and appear equal in size with uniform rounded or oval nuclei. In cases of benign cystic lesions, apocrine metaplastic cells and macrophages or foam cells are common findings *(Trott, 1996; Howat and Coghill, 2003)*. Presence of myoepithelial cells in breast aspirates is a well-established important finding to diagnose benign lesions and to differentiate benign from malignant lesions *(Ramzy, 2001)*. In Contrary, the aspirates from malignant breast lesions usually show high cellularity with lack of cell-to-cell cohesion *(Howat*

and Coghill, 2003). Diagnosis of malignancy should also be raised if myoepithelial cells are absent with presence of atypical large pleomorphic epithelial cells *(Trott, 1996)*. Anisocytosis, nuclear moulding, hyperchromatism, increased nucleo-cytoplasmic ratio and irregular chromatin distribution are common cellular features in malignant aspirates. The cells are usually present as tissue fragments with cellular dys-cohesion but they can, occasionally form acini or ducts *(Ramzy, 2001)*.

Noteworthy, by using FNAC it is possible to avoid open breast biopsy in non-neoplastic lesions, in inoperable lesions, in cases of locally advanced breast cancer or in cases of tumour recurrence. FNAC can also offer a curative relief by cyst evacuation or abscess drainage. The disadvantages of FNAC include inability to distinguish between in situ and invasive breast carcinomas or to verify the histological subtype of invasive carcinoma *(Barbra, et al. 2009)*. The accuracy of FNAC decreases if the aspirated lesion is small in size, deeply seated within the breast substance or has cystic or necrotic nature. For these reasons, there has been a shift toward the use of TCNB with image guidance to avoid the decreased accuracy and high rates of inadequacy in FNAC *(Shannon et al. 2001)*. TCNB works through histological evaluation of tissue cores sampled by a wide caliber needle. It has the advantages of accurate diagnosis of neoplastic and non-neoplastic breast lesions, differentiation between in situ and invasive malignancy and proper histological subtyping and grading of malignant lesions. However, it needs special relatively expensive equipments and specific preparation in addition to the delayed reporting after histological processing and evaluation. Routine application of TCNB for diagnosis of suspected breast lump is not an applicable procedure in a busy outpatient clinic, both practically and financially, particularly if there is a shortage of resources.

Several researches have been conducted to compare the validity and accuracy of both FNAC and TCNB for evaluation of breast lumps. Different opinions with no consensus in their recommendations have been obtained. Generally, FNAC is enormously successful, with an overall diagnostic sensitivity ranging from 80% to 100%, with specificity approaching 100% in some literature *(Barbra et al. 2009)*. In separate studies the sensitivity, specificity and overall accuracy of FNAC were 92%, 83% and 88%, respectively *(Reinikainen et al. 1999)* and the accuracy in diagnosis of benign and malignant breast lesions was 97.3% and 97.7%, respectively *(Yu et al. 2000)*. Similarly, the accuracy of TCNB in evaluation of breast lumps varied greatly among different research groups. Caruso et al. *(1998)* reported that sensitivity, specificity and diagnostic efficacy of TCNB were 92%, 100% and 86%, respectively while in the series of *Gukas et al. (2000)*, the sensitivity of TCNB was 88.9%, the specificity was 96.8% and the overall accuracy was 93.5%. Studies that compared results of needle aspirates and needle biopsies for evaluation of the same breast lesions showed that the overall accuracy of FNAC and TCNB were 94% and 90%, respectively as obtained by *Scopa et al. (1996)* and 90% and 67%, respectively in another series *(Yong W. et al. 1999)*.

The majority of previous studies that evaluated accuracy of FNAC or TCNB compared their results separately to the definitive diagnosis obtained by open biopsies. Studies comparing the accuracy of FNAC and TCNB for diagnosis of the same breast lesion within the same patient population are relatively scarce.

AIM OF THE WORK

This study was designed mainly to evaluate the same breast lesions by both FNAC and TCNB and compare their results to the final diagnosis established by open SBS. The feasibility of FNAC in a busy outpatient surgery clinic without prior specific facilities was also investigated.

PATIENTS AND METHODS

Seventy four patients were called for the study, but two refused to participate and so only 72 patients were enrolled in this study. Out of the 72 patients, 71 were females and one was a male, with age range from19 to 80 years. All had attended to the outpatient Clinic of Surgery Department, Sohag University Hospital during the period from November 2002 to September 2003.

A spreadsheet for the data of clinical history and clinical examination was constructed. The documented data included age, main complaint, affected side, history of other associated symptoms and history of recurrence. It also included findings of clinical examination of the breast lumps as site, size, nipple retraction, skin dimpling, ulceration, peau d`orange appearance and enlarged axillary lymph nodes. The provisional clinical diagnosis was also considered.

Fine needle aspirates were obtained from all patients by a well-trained pathologist (Dr Ahmed R. H. Ahmed), while core needle biopsies were obtained only from 57 patients by a qualified surgeon. The commercially available and widely used 5ml syringes with 23-gauge needles (internal diameter is 0.6 mm) were used to get aspirates using the guidelines described by *Ariga et al. (2002)*. The

technique was described to the patient`s prior to aspiration. Briefly, the needle was inserted carefully into the lump with average of three passes was made for each case and the needle was directed at different angles while aspirating. The collected aspirates were fixed for 10 minutes in 95 % ethyl alcohol then stained by H&E.

The cytological interpretation was carried out by two independent pathologists, who are the first and second authors of this study. An aspirate was classified into one of four categories: definitive benign, definitive malignant, suspicious for malignancy and unsatisfactory aspirates.

Definite benign and definite malignant lesions were decided when the aspirate showed clear cytological features of benignity or malignancy, respectively. Suspicious cases are those in which, the cytological features were suggestive but did not completely fulfill the criteria for being malignant or due to overlap of the specific cytological criteria. The unsatisfactory reports indicate scanty or acellular aspirate (less than 5 clumps of epithelial cells) or poor preparation or artifacts (as drying) or excess blood or inflammatory cells obscuring the underlying lesion *(Trott, 1996; Ariga et al. 2002)*.

A disposable 14-gauge tru-cut needle (1 mm internal diameter) was used to obtain tissue cores from breast lesions according to the technique of *Browning (1990)*, which had been described to the patient`s prior to biopsy. Half centimeter incision of the skin was made under local anesthesia through which the tru-cut needle was inserted into the lump and two to three tissue cores were obtained from each patient. The tissue cores were fixed in neutral-buffered 10% formaldehyde, dehydrated as usual and subsequently embedded in paraffin. Sections of 5-micron thick were prepared and stained with H&E. The results of TCNB were classified into benign, malignant and tiny non-diagnostic specimens. SBS, either diagnostic (incisional) or curative (excisional) were then obtained from 71 patients for final diagnosis.

The sensitivity, specificity, positive predictive value, negative predictive value and success rate for both FNAC and TCNB were calculated by comparison of their results to the standard results of SBS. For statistical purposes, the malignant and suspicious cases were grouped together (positive group). This was done to assure a greater sensitivity as a suspicious lesion, like a malignant lesion, would most likely require subsequent histopathological confirmation in the form of a biopsy. Meanwhile, the unsatisfactory or inadequate samples were included in the benign cytology group (negative group) and the unsatisfactory tiny results of TNCB were included among benign group to calculate the most conservative specificity *(O`Neil et al. 1997 and Ariga et al. 2002)*.

Statistical Analysis:

The equations for the statistical analyses were mentioned below *(CEBM, 2012)*. The sensitivity was the true positive cases diagnosed by the evaluated technique expressed to the sum of true positive and false negative cases. The specificity was the true negative cases diagnosed by the evaluated technique expressed to the sum of true negative and false positive cases.

The positive predictive value refers to probability of lesions to be malignant when the FNAC or TCNB results are positive while negative predictive value refers to probability of lesions to be free of the disease when FNAC or TCNB are negative. The success rate was the percentage of benign and malignant cases diagnosed correctly by the evaluated method.

$$\text{Sensitivity} = \frac{\text{True positive}}{\text{True positive} + \text{False negative}}$$

$$\text{Specificity} = \frac{\text{True negative}}{\text{True negative} + \text{False positive}}$$

$$\text{Success rate} = \frac{\text{Total number of cases diagnosed correctly}}{\text{Total number of cases}}$$

$$\text{Positive predictive value} = \frac{\text{True positive}}{\text{True positive} + \text{False positive}}$$

$$\text{Negative predictive value} = \frac{\text{True negative}}{\text{True negative} + \text{False negative}}$$

RESULTS

Clinico-Pathological Features of The Investigated Cases: Out of the 72 aspirated patients, 71 were females and one was a male. The patients' ages ranged between 19 to 80 years with a mean age of 44.1 years.

It is generally observed that malignant tumors were more common among old ages compared to benign lesions that had tendency to occur among younger patients. Whereas the mean age of patients with benign breast lesions was 37.6 years, while the mean age of patients with malignant breast tumors was 47.7 years.

The main complain for all patients was breast lump with a mean size of 4.3 cm. Both right and left sides were comparably affected (51.4%, 48.6%, respectively). Breast lump is common in the retroareolar region and upper outer quadrant of the breast (29.2% and 26.4% respectively), but rare in the lower inner quadrant (4.2%). Some difficulties were experienced during FNAC sampling of certain cases, which included small-sized or deeply seated lumps and recurrent hard nodules.

Final diagnosis was stated by SBS in 71 cases. Case number 72 was a 20-years old female from whom FNAC was obtained but neither TCNB nor SBS was obtained as she left the hospital before obtaining either TCNB or SBS. Of the 71 lesions evaluated by SBS, 23 (32.4%) were benign and 48 (67.6) were malignant. Benign cases included 10 inflammatory lesions, 9 benign proliferative breast disease (BPBD) and 4 fibroadenomas. Malignant lesions included 43 invasive duct carcinomas, not otherwise specified (IDC NOS) and one case of each of ductal carcinoma in situ (DCIS), medullary carcinoma, mucoid carcinoma, lobular carcinoma and mixed ductal/lobular carcinoma (Table 1).

Table 1: Frequencies of the investigated cases bases on SBS.

Diagnosis	Number	%
Benign breast lesions	**23**	**32.4**
- Inflammatory	10	14.1
- BPBD	9	12.7
- Fibroadenoma	4	5.6
Malignant breast lesions	**48**	**67.6**
- Ductal carcinoma in situ	1	1.4
- IDC NOS	43	60.6
- Medullary carcinoma	1	1.4
- Mucoid carcinoma	1	1.4
- Lobular carcinoma	1	1.4
- Mixed ductal/lobular carcinoma	1	1.4

BPBD: Benign Proliferative Breast Diseases, IDC NOS: Invasive Duct Carcinoma, Not Otherwise Specified.

Malignant lesions are commonly associated with enlarged axillary lymph nodes and retracted nipple or skin dimpling (31% and 28.2%, respectively). These features may also be present in benign lesions. The two cases of chronic breast abscess were associated with retracted nipple, of which one was large in size and showed peau d`orange of the overlying skin. Ulcerations and bleeding per nipple were only limited to malignant tumors; 2/48 (4.2%) and 1/48 (2.1%), respectively.

Diagnosis of Breast Lumps by FNACs: Initially, 74 patients were called to participate in the study, of which two (2.7%) refused the technique, four (5.4%) accepted it with difficulty after describing its simplicity while 68/74 (91.9%) did not hesitate to participate.

Results of FNAC were Classified Into 4 Categories: Benign lesions (negative), malignant lesions (positive), suspicious for malignancy and unsatisfactory aspirate. Eighteen cases were identified by FNAC as benign lesions, of which 7 (7/18) were inflammatory, 7 (7/18) were BPBD and 4 (4/18) were fibroadenomas. Malignancy was reported in 36 cases, while suspicious for malignancy and unsatisfactory samples were reported in 11 and 7 cases, respectively (Table 2).

Table 2: Results of FNAC.

Diagnosis by FNAC	Number	%
Conclusive results	**54**	**75**
- Definite benign lesions	18	25
- Inflammatory	7	9.7
- BPBD	7	9.7
- Fibroadenoma	4	5.6
- Definite malignant lesions	36	50
Non-conclusive results	**18**	**25**
- Suspicious for malignancy	11	15.3
- Unsatisfactory samples	7	9.7

BPBD: Benign Proliferative Breast Disease, (N=72).

Cytological evaluation showed that FNAC can perfectly differentiate between benign and malignant breast lesions (Figures, 1A and 1B). When confronted to benign lesions, certain cytological features can be used to diagnose some benign breast lesions accurately as fibroadenoma (Figure 1A) and chronic breast abscess (Figure 1C). Some cytological features help to differentiate between ductal carcinoma and lobular carcinoma of the breast. Ductal carcinoma usually shows prominent cytological features of malignancy as marked dyscohesion, prominent pleomorphism, absent myoepithelial cells and occasionally mitosis (Figure 1D) while lobular carcinoma shows bland cellular features with cellular monotony and intra-cytoplasmic vacuolation (Figure 1E). Using FNAC alone, it is extremely difficult to differentiate between DCIS and IDC of the breast. One of our samples was diagnosed as IDC by FNAC (Figure 1F) was proved to be DCIS by surgical biopsy specimen. Necrosis and microscopic calcification that are required to suggest in situ component of the tumour are absent in our fine needle aspirates.

The results of FNAC for diagnosis of breast lumps were compared to results of SBS in 71 cases (Table 3). The success rate of FNAC for diagnosis of benign breast lesions was 18/23 (78.3%) and for diagnosis of malignant tumors was 36/48 (75%). The overall success rate of FNAC for diagnosis of benign and malignant lesions was 54/71 (76.1%). Malignant and suspicious cases were considered in the positive group while benign and inadequate cases were grouped together and considered as negative (see methodology). The calculated sensitivity and specificity of FNAC were 93.8 and 95.7, respectively. The positive predictive value was 97.8% and the negative predictive value was 88%.

Diagnosis of Breast Lumps by TCNB: TCNB was obtained only from 57 of our investigated patients. There were 14 lesions from which TCNB could not be obtained; of which excision rather than TCNB was preferred because of being small recurrent lumps (three cases), small clinically diagnosed fibroadenomas (three cases) and radical excision was done for an old male patient presented clinically by a mass destructing the nipple. TCNB was failed to be obtained from five small lesions of less than two cm size and it was not obtained from two chronic breast abscesses which were evacuated during the process of aspiration. Complete evacuation of these two lesions was done and a small biopsy of surgical material was obtained from each. In one case, the patient left the hospital before obtaining TCNB or SBS. Final diagnosis was obtained by TCNB in 51 out of 57 cases and the biopsies were tiny and inadequate in six cases. The results of TCNB were summarized in Table (4).

Using TCNB, specific diagnosis of benign breast lesions can be established. The best examples in our study are chronic breast abscess (Figure 2A) and fibroadenoma (Figure 2B). More importantly, malignant breast lesions such as invasive duct carcinoma (Figure 2C) and invasive lobular carcinoma (Figure 2D) can be accurately determined and also sub-classified. Moreover tumour grade can be determined and DCIS can be identified and differentiated from IDC by TCNB (Figure 2E). SBS confirms the diagnosis of both FNAC and TCNB, especially in invasive tumours (Figure 2F) and it has upper hand to evaluate heterogeneous tumours and tumours that have non-invasive and invasive component.

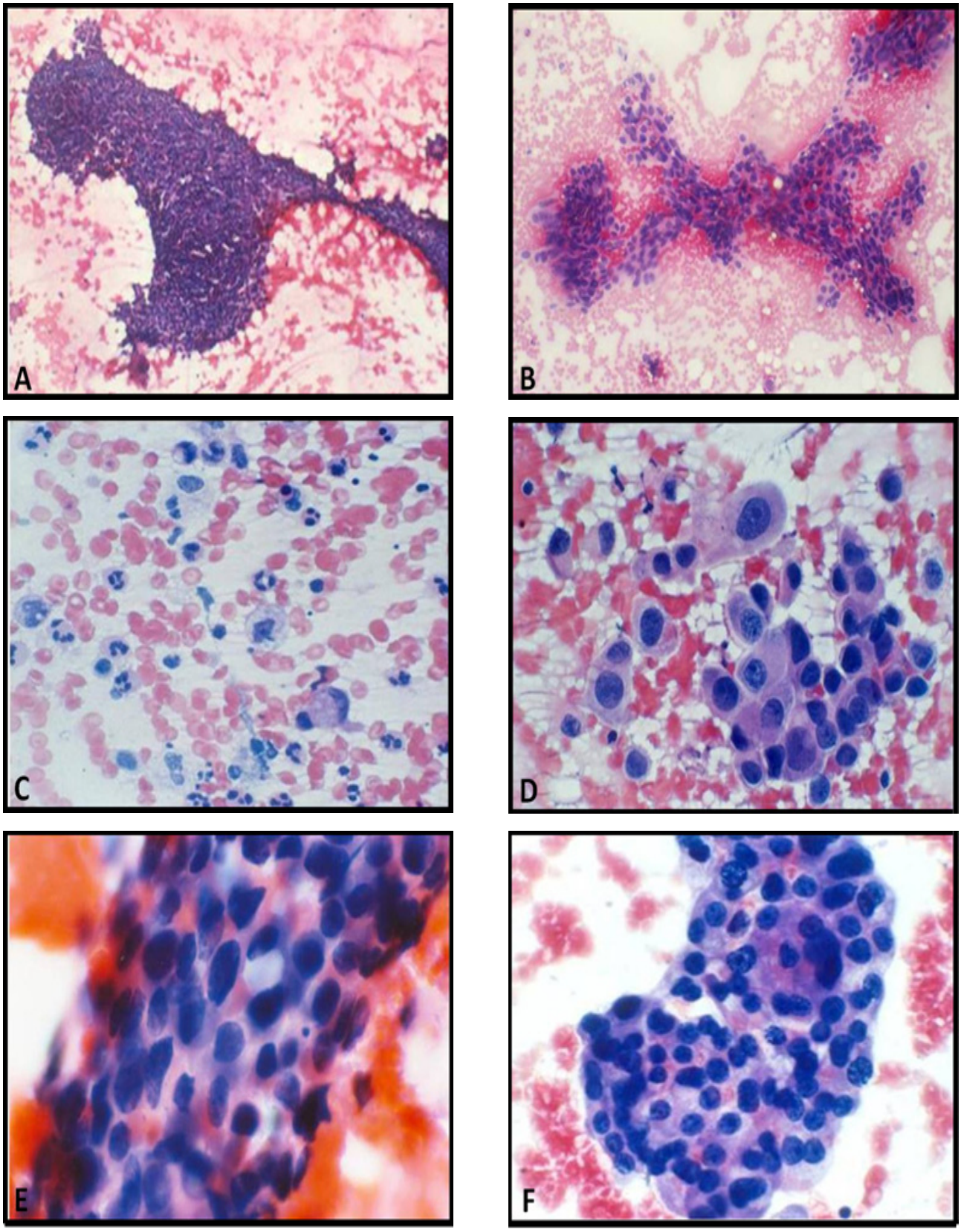

Figure 1: FNAC cytological features:

A; fibroadenoma showed marked cohesion of cells (H&E, x100),

B; ductal breast carcinoma shows loose cohesiveness and early dyscohesion of cells (H&E, x100),

C; chronic breast abscess shows acute and chronic inflammatory cells (polymorphs and macrophages, H&E, x400),

D; IDC shows marked cellular pleomorphism, hyperchromatism, increased N/C ratio and dyscohesion (H&E, x400),

E; ILC shows intracytoplasmic vacuoles (H&E, x1000),

F; ductal breast carcinoma shows cytological features of malignancy (H&E, x200).

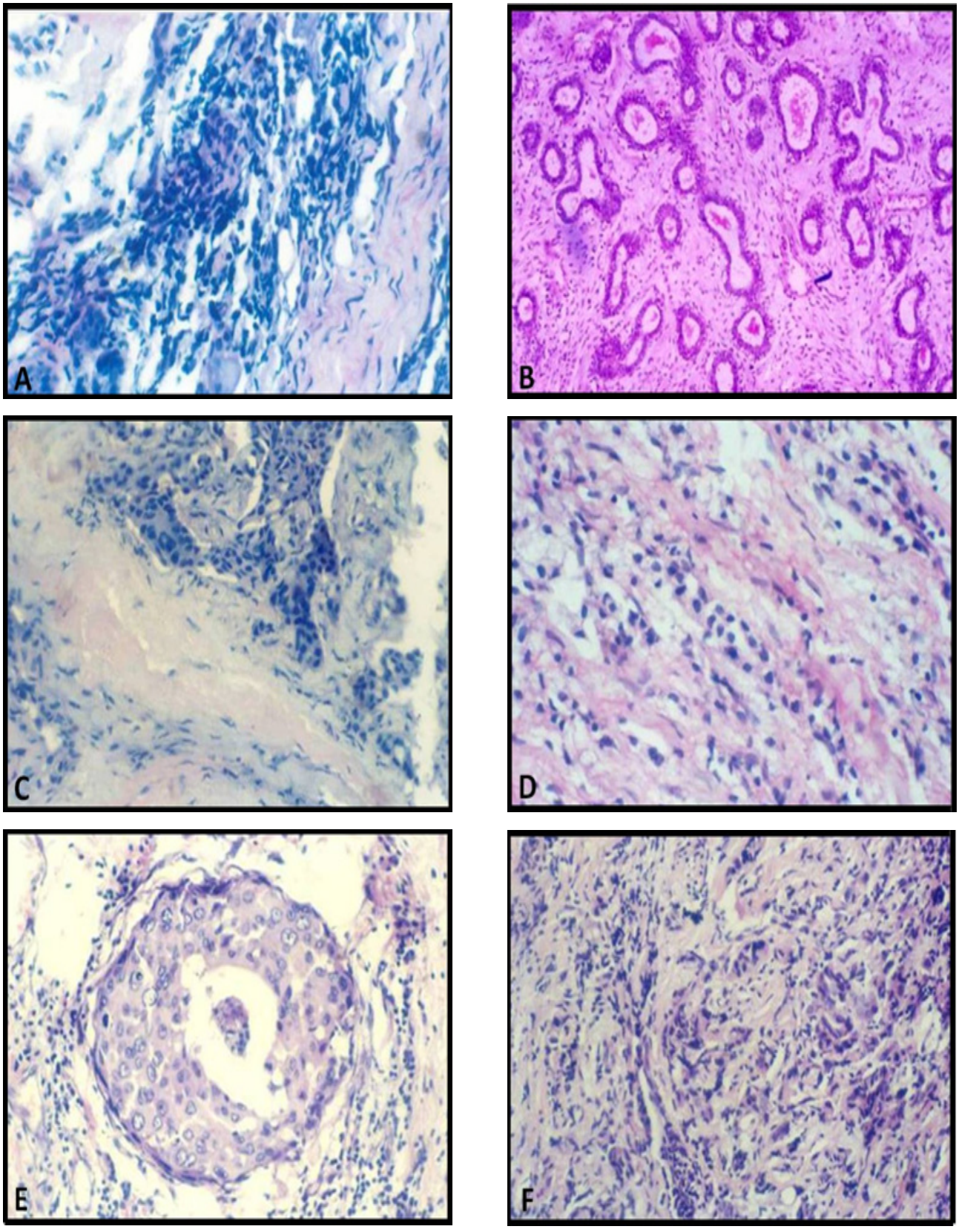

Figure 2: TCNB results of:
A; breast abscess (x400),
B; fibroadenoma (x400),
C; IDC (x400),
D; ILC (x400),
E; DCIS (x400) and
F; surgical biopsy specimen from IDC of the breast (x200)

The histological diagnosis of TCNB was compared to that of SBS, incision or excision biopsies in 57 cases. The total number of benign and malignant lesions diagnosed by TCNB was 51/57 with an overall success rate of 89.5% (Table 5). The number of benign lesions diagnosed by TCNB was 14/14 (100% success rate), while the number of diagnosed malignant lesions was 37/43 (86.1% success rate). The sensitivity of TCNB was 86.1% and the specificity was 100%. The positive and negative predictive values were 100% and 70%, respectively.

The sensitivity, specificity, success rate, positive and negative predictive value of FNAC were compared to that of TCNB (Table 6).

Table 3: Comparison of FNAC results to final diagnosis of SBS.

Results of FNAC	Results of SBS		Total
	Malignant lesion	Benign lesion	
Positive for malignancy	45 (TP)	1 (FP)	**46**
Negative for malignancy	3 (FN)	22 (TN)	**25**
Total	**48**	**23**	**71**

TP: true positive, FN: false negative, FP: false positive, TN: true negative, (N=71).

Table 4: Results of TCNB.

Diagnosis by TCNB	Number	%
Conclusive results	51	89.5
- Definite benign lesions	14	24.6
- Inflammatory	5	8.8
- Benign proliferative breast disease	8	14
- Fibroadenoma	1	1.8
- Definite malignant lesions	37	64.9
- DCIS	1	1.8
- IDC NOS	33	57.8
- Mucinous carcinoma	1	1.8
- Invasive lobular carcinoma	2	3.5
Non-conclusive tiny samples	6	10.5

DCIS: Ductal Carcinoma In Situ, IDC NOS: Invasive Duct Carcinoma Not Otherwise Specified, (N=57)

Table 5: Comparison of TCNB results to final diagnosis of SBS.

Results of TCNB	Results of SBS		Total
	Malignant lesion	Benign lesion	
Malignant lesion	37 (TP)	0 (FP)	**37**
Benign/tiny lesion	6 (FN)	14 (TN)	**20**
Total	**43**	**14**	**57**

TP: True Positive, FN: False Negative, FP: False Positive, TN: True Negative.

Table 6: Statistical data of FNAC and TCNB.

	FNAC	TCNB
Sensitivity	93.8%	86.1%
Specificity	95.7%	100%
Success rate		
- For benign lesions	78.3%	100%
- For malignant lesions	75.0%	86.1%
- Overall success rate	76.1%	89.5%
Positive predictive value	97.8%	100%
Negative predictive value	88%	70%

DISCUSSION

IIn this study, we investigated the validity of FNAC and TCNB for diagnosis of breast lump in the Outpatient Surgery Clinic and compared the results to the final diagnosis obtained by SBS. The frequencies of benign and malignant lesions in our study confirmed by SBS were 32.4% and 67.6%, respectively. This apparently implies that incidence of malignant breast lesions could be higher than benign ones which is contrary to the fact that most breast lesions are benign.

We observed that people who repeatedly attend the outpatient clinic are those with malignant or suspicious breast lesions. In addition, surgeons are more caring to the clinically malignant lesions compared to benign ones. Surgeons at the outpatient clinic mentioned that most patients refuse surgical procedures and did not come back when they know that the lump is clinically benign, especially if the lump is small in size, in contrast to patients with clinically suspected lumps who come repeatedly for further investigations and treatment. An important conclusion here is that surgeons need a rapid and less invasive technique that helps them to select malignant lesions and to confirm the nature of clinically benign lesions. This definitely will reduce the rate of clinically false negative diagnosis in a busy surgery clinic.

FNAC is a simple technique and is widely accepted by our patients. Only two out of 74 patients (2.7%) refused the technique. They were young ladies and afraid of repeated needling without anesthesia. This result is comparable with the study of *Browning (1990)* who found that 94% had no problem with this procedure and only 6% found the aspiration process to be very painful.

Our data showed that FNAC of breast lumps is a very useful method to diagnose breast mass with high sensitivity and specificity. We showed that 36/48 malignant breast lesions and 18/23 benign breast lesions were diagnosed correctly with success rates of 75% and 78.3%, respectively and an overall success rate of 76.1%. Worldwide, the review of *Chaiwun* and *Thorner (2007)* as well as the meta-analytic review of *Akçil et al. (2008)*, the sensitivity and specificity of FNAC in evaluation of breast masses ranged between 76% - 100% and 60% - 100, respectively and the accuracy ranged between 72% - 95%. In an Egyptian research *El-Ghorori et al. (1998)* found that the sensitivity, specificity and accuracy rate of FNAC for evaluation of breast lump were 86%, 83% and 84%, respectively. In our study, the sensitivity and specificity and accuracy rate of FNAC were 93.8%, 95.7 and 76.1% which are comparable to, if not higher than several other reports. It is worthy to mention that there are no false positive results among our reports as all lesions diagnosed as malignant by FNAC are proved by surgical biopsies.

The positive and negative predictive values in our study were 97.8% and 88%, respectively which means that a very small percentage (2.2%) of positive cases can be missed and a small percentage (12%) can be over-diagnosed as positive when the lump is benign. Our results are near to previous reports of 88.1% for positive predictive value and 93.9% for negative predictive value *Nguansangiam et al (2009)*.

Suspicious for malignancy had been reported in 11 cases (15.7%) in our needle aspirates among which seven gave scanty cellular material even with repeated needling, two showed excess red blood cells and scanty epithelial cells. One was a very anxious patient that refused repeated needling and the other was the patient who left the hospital before obtaining open biopsy. This rate was in line with previous reports in which the rate ranged between 4% and 17.7% *(Chaiwun et al. 2002)*. Our high rate of suspicious aspirates might be attributed to the high level of precaution of the pathologists who tended to give the primary cytological diagnosis of suspicious lesion when confronted with some atypical cellular features but without definite evidences of malignancy. Noteworthy, nine out of the eleven (9/11) suspicious cases (i.e., 81.8%)) were confirmed to be malignant by subsequent histopathology, higher than the reported by *Nguansangiam et al. (2009)*, where 71% of their suspicious lesions were malignant by surgical biopsies.

The unsatisfactory results in our fine needle aspirates were reported in seven cases (9.7%), of which four were diagnosed as benign lesions and three were confirmed to be malignant by SBS. The unsatisfactory samples could be due to small size of some lesions, fibrotic nature of others or may be due to insufficient experience to perform the aspiration. This could be certainly improved after proper training and practicing. Such unsatisfactory results reported here is in average if compared to previous studies, which showed enormously variable unsatisfactory rates ranged between 0.7% - 47% *(Kim et al. 2000; Chaiwun et al. 2002; Chaiwun and Thorner, 2007)*. Some articles referred to the small size as a limiting factor for success of FNAC *(Ellis et al. 1999)* and many authors recommended some measures to reduce the unsatisfactory rates as proper training of the physicians who perform the aspirates *(Day et al. 2008)* or the use of ultrasound guided FNAC especially for small-sized breast lumps *(Saravanja et al. 2005)*. It has been reported that success rate

of FNAC depends both on the palpability and size of the lesion. FNAC has average success rates of 75-90% for palpable and 34-58% for non-palpable breast lesions *(Willems et al. 2012)*.

TCNB was obtained from 57 cases in this study of which 14 were diagnosed as benign and 43 as malignant. The success rate was 100% and 86.1% for benign and malignant lesions, respectively with an overall success rate of 89.5%. Both benign and malignant lesions were histologically typified by TCNB (Table 4). The sensitivity and specificity reported in our study were 86.1 and 100%, respectively, consistent with the reported in previous literature; 90% sensitivity and 100% specificity *(Ballow and Sneige, 1996)* and 92% sensitivity and 100% specificity *(Caruso M et al. 1998)*. In his review Brenner et al. (2001), mentioned that the sensitivity, specificity and accuracy of TCNB often range between 91-92%, 98-100% and 96-97%, respectively. The rate of unsatisfactory tiny specimens of TCNB was 10.5% (6/57), which is really high rate if compared to other reports *(El-Ghorori et al. 1998)*. The six cases were confirmed to be malignant by SBS (five IDC, NOS and one medullary carcinoma), which means that all cases were among the false negative group (Table 5).

Comparative analysis of our results showed that FNAC is slightly better than TCNB regarding sensitivity (93.5% and 86.1%, respectively) and negative predictive value (88% and 70%, respectively). However, TCNB gave better specificity, overall accuracy and positive predictive value compared to FNAC (Table 6). The relatively low values of sensitivity, overall accuracy and negative predictive values of TCNB is due to the high range of tiny specimens that represented 10.5% of cases. Both specificity and negative predictive values were 100% for TCNB, which are very close to those of FNAC (95.8 and 97.8, respectively). Generally, the difference among both techniques is usually narrow or sometimes very minimal, implying that FNAC could be not only a helpful but also an alternative technique to TCNB. Although most previous researches reported that TCNB had better validity for evaluation of breast lumps compared to FNAC *(Bdour et al. 2008; Willems, 2012)*, others reported better diagnostic role for FNAC compared to TCNB *(Young et al. 1999)*. Besides, the clinical practice revealed that many Surgeons are reluctant to accept FNAC reports as basis for definitive diagnosis of breast lump *(Wang and Ducatman 1998)*.

The TCNB of palpable breast lesions can provide all the reliable histological information, compared to FNAC. It provides preoperative knowledge of the histological type, grade, in situ lesions and permits evaluation of some important therapeutic and prognostic parameters as hormone receptor status, proliferative activity, ploidy and expression of oncogenes and anti-oncogenes such as c-erbB-2 and p53 and so, TCNB will guide the surgeon as well as the oncologist to the ideal therapeutic strategy in cases of malignant breast lesions. Subsequently, TCNB has the upper hand compared to FNAC for overall evaluation of breast lumps.

In this study, we present a proof for some benefits of FNAC compared to TCNB that could be of great value for diagnosis of breast lump. The procedure of FNAC had been carried out in the outpatient surgery clinic without any instrumental pre-requirements. Our tools were only the widely-used 5-ml syringes in addition to the general antiseptic measures.

Our study revealed that FNAC is a very economic tool and can be applied in a short time especially in a crowded outpatient clinic. The cost-effect of FNAC is a very advantageous factor to screen large number of patients, particularly in our locality where the resources are limited. The cost-effect benefit alone can give a priority to FNAC especially if there is no big difference between FNAC and TCNB regarding sensitivity, specificity and success rate, which is the state in this study. If used routinely in our outpatient clinics, FNAC will definitely help selection of suspicious or malignant breast lesions and subsequent proceed to biopsy, either TCNB or open biopsy; for confirmation. Compared to TCNB, FNAC confers rapid processing and reporting of the samples (2 hours in average versus 2 days at least). FNAC is the sole method that can give the same day cytological evaluation for selection of suspicious and malignant breast lesions and it was widely accepted by the surgeons during our study.

In comparison to TCNB, FNAC is a less invasive technique with negligible complications and its contraindications are almost nonexistent. Moreover, FNAC can have therapeutic effect as experienced in two cases of breast abscesses in our study.

CONCLUSION

The cytological evaluation of cells aspirated from breast lump serves as a simple, rapid, economical, reliable and accurate initial diagnostic tool prior to surgical management.

Routine use of FNAC in outpatient clinics will help rapid screening of all clinically suspected cases and allow selection of patients for further investigations. It is an accurate method to differentiate between benign and malignant breast lesions. It is important to carefully consider the false negative and false positive rates of this technique.

The use of FNAC together with clinical and mammographic findings (triple diagnostic approach) can reduce the possibility of over-diagnosis or under-diagnosis and can be extremely helpful for the same day diagnosis of palpable breast lumps.

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ملخص البحث

صلاحية استخدام التحليل الخلوي بإبرة الرشف الدقيقة في تشخيص كتل الثدي في صعيد مصر

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الخلفية والاهداف: يعد تشخيص اورام الثدي مشكلة مشتركة للممارس العام والطبيب الجراح على حد سواء. ويعتبر الفحص السريري هو الخطوة الأولى لتقييم آفات الثدي المشتبه بها. ويتم تأكيد التشخيص بواسطة أخذ عينة بإبرة القطع الحقيقي أو خزعة مفتوحة ثم استئصال الثدي في وقت لاحق. أو بدلا من ذلك، يتم التشخيص بواسطة الحصول على عينة والتقطيع بالتجميد واستئصال الثدي على الفور بعد ذلك. وهناك حاجة إلى طريقة سريعة لتشخيص دقيق لكتل الثدي في العيادة الخارجية المزدحمة بالمرضى. وقد نمت شعبية استخدام العينات الخلوية المسحوبة بإبرة الرشف الدقيقة في الآونة الأخيرة، وأصبح الخيار الأول لتشخيص أورام الثدي الكتلية والكيسية وبعد التقييم السريري الأولي.
صممت هذه الدراسة لمعرفة مدى صحة او وضوح تشخيص كتل الثدي الخلوية بواسطة سحب عينة بإبرة الرشف الدقيقة.
المرضى والأساليب: أدرج في هذه الدراسة عدد ٧٢ من المرضى اللاتي كانت تشتكي من وجود كتلة بالثدي. وقد تم سحب العينات الخلوية بإبرة الرشف الدقيقة وأخذ عينة بإبرة القطع الحقيقي والخزعات الجراحية من ٧٢ و٥٧ و٧١ من المرضى على التوالي. و تم حساب معدل النجاح وحساسية ونوعية التشخيص باستخدام إبرة الرشف الدقيقة بالمقارنة مع تلك التي تم أخذها بإبرة القطع الحقيقي إوالخزعات الجراحية.
النتائج: يمكن التفريق السليم بين آفات الثدي الحميدة والخبيثة عن طريق سحب العينات الخلوية بإبرة الرشف الدقيقة مع عدم تسجيل أية نتائج إيجابية كاذبة. وكانت نسبة نجاح وحساسية ونوعية التشخيص باستخدام إبرة الرشف الدقيقة ٧٦,١ ٪، ٩٣,٤٪ و٧٨,٣٪ على التوالي مقارنة ب ٨٩,٥ ٪ و٨٦,١ ٪ و١٠٠٪ في حالة أخذ عينة بإبرة القطع الحقيقي على التوالي. وكانت القيم الإيجابية والسلبية التنبؤية ٩٧,٨٪ و ٨٨ ٪ في حالة استخدام إبرة الرشف الدقيقة و١٠٠٪ و٧٧٪ في حالة استخدام إبرة القطع الحقيقي على التوالي.
الخلاصة: من الممكن استخدام إبرة الرشف الدقيقة للتشخيص المبدئي لأورام الثدي والتي تعد أداة سهلة وموثوقة للتشخيص مع معدل نجاح وحساسية ونوعية عالية قابلة للمقارنة لأسلوب أكثر غزوا ومكلف نسبيا وهو استخدام إبرة القطع الحقيقي.