ISSN 2073-9990 East Cent. Afr. J. surg. (Online)

Comparision of Fine Needle Aspiration Cytology and Fine Needle Sampling without Aspiration in Diagnosis of Palpable Breast Lumps in Mulago Hospital.

O.N. Alema, A.M Gakwaya, D.Wamala
Endocrine and Breast Unit, Mulago Hospital.
Correspondence to: Alema onira Nelson, E-mail: nelsonalema@yahoo.com

Background: Open biopsy of the breast used to be the main traditional method of diagnosis of breast lumps. Fine Needle Aspiration Cytology (FNAC) was later introduced which depends on suction and thus yields hemorrhagic material for cytological study.This study was undertaken to find out if there is a difference in diagnostic accuracy in using Fine Needle Aspiration Cytology and Fine Needle Sample (FNS) without aspiration in the diagnosis of palpable breast lumps.

Methods: This was a cross-sectional study of women with palpable breast masses of 2cm and above in the widest diameter by ultrasound. Patients were subjected to FNS, FNAC and excision biopsy of the lump or mastectomy where appropriate. Cytodiagnosis of all the cases was compared to the histodiagnoses of the biopsies to establish the sensitivity, specificity and diagnostic accuracy.

Results: Some 85 patients had FNS, FNAC and excision biopsy/ mastectomy done. The findings demonstrated that both FNS and FNAC have the same sensitivity of 83.3%, specificity of 100% and diagnostic accuracy of 98.7% in the diagnosis of palpable breast lumps. FNS had good quality smears in 88.2% of the patients as compared to FNAC smears which was 58.8%of the patients.FNS smears were adequate in 95.3% of the patients as compared to FNAC smears which was adequate in 90.6% of the patients.

Conclusion: There was no difference in the diagnostic accuracy of FNS and FNAC in the diagnosis of palpable breast lumps. These findings may suggest that it is probably the adequacy of the cells harvested rather than the quality of the cells harvested which determines the difference in the diagnostic accuracy of the two techniques.

Introduction

Open biopsy of the breast used to be the main traditional method of diagnosis of breast lumps[1]. This was traumatic and done under anaesthesia and subsequently Fine Needle Biopsy (FNB) was introduced by Guthrie in the United States to diagnose cancer [2], which was later popularized by Martin and Ellis[3].FNB is the most accurate, cost effective and simplest screening test for the rapid diagnosis of breast lumps and it has become widely acceptable as the initial test with varying degrees of sensitivities[4,5].

The techniques of FNB are Fine Needle Aspiration (FNA) and Fine Needle Sampling (FNS) without aspiration. Both techniques are all cytological studies. FNAC technique depends on suction and thus yields hemorrhagic material for cytological study; is painful, many times it is traumatic and results in haematoma formation. Patients are apprehensive because of the needle mounted on the syringe unlike FNS. This therefore affects the diagnostic accuracy and adequacy of FNAC[6,7, 8, 9.] FNS on the other hand provides greater ease of sampling with better control of the hand, a good perception of the lesion, more precise entry into the mass and patients are much less apprehensive when no syringe is used and the smears obtained are without much blood in the background, hence better cellularity and with much less artefacts[7,8,9].This therefore is thought to improves both the diagnostic adequacy and accuracy FNS. FNS has been performed on various masses (Ear Nose and Throat lymph node and, thyroid lesions) with good diagnostic accuracy of 95.7%, 95.3 % and, 90%, respectively. However for breast masses no adequate studies have been documented as regards the use of FNS.

The purpose of this study was to determine if there is a difference in diagnostic accuracy in using FNS and FNAC in patients with palpable breast lumps undergoing breast biopsy in Mulago Hospital

Patients and Methods

The study was a Cross-sectional study carried out at Mulago National Referral Hospital between October 2008 to January 2009 which included women of 16years and above with palpable breast mass of 2cm and above (in the widest diameter by ultrasound) and excluded patients who are very sick- (ASA III and above) and males. Informed consent was obtained from eligible patients who accepted to be included in the study. Once consented**,** details of the patient's particulars including name, age, sex, hospital identification number and laboratory number were entered in the laboratory register. Ultrasound of the breast mass was done by the same radiologist to determine the size of the breast lesion in centimetres and nature of the lesion. Those with lump sizes less than 2cm in the widest diameter were excluded. All the patients who qualified were blinded to which technique will be performed on each. A total of 20 numbers were generated and packed in different envelopes. Each envelope picked was replaced for the next patient so that every patient had the same chance.

Equipment used included glass slides, cover slips, antiseptic, disposable gloves, fixatives (absolute ethyl-alcohol, modified Wright stain or Rapi-diff quick), French gauge 23 hypodermic needles, 10mls syringes, swabs, Papanicolaou stain, biopsy register and diamond pencil for labelling slides. The biopsies were carried out on patients lying supine on a couch. Slides were labelled with the patients' laboratory number using a diamond pencil on one end. An initial A for FNS specimens, B for FNAC specimens were also indicated on the slides.

FNAC technique.

The biopsies were performed by the principal investigator. After gloving, the skin overlying the breast lump was cleansed with antiseptic– 95% ethyl alcohol in a swab. The location of the lesion to be biopsed was determined by palpation. The lesion was immobilized with the non dominant hand between the thumb and index finger. The fine needle which is already attached to a syringe was inserted into the lesion and later a vacuum created. The needle was moved back and forth within the tumour several times. The biopsy manoeuvre was terminated when fluid appeared in the hub**.** The needle was then removed and the sample expressed on the clean dry labelled slide.

FNS Technique

The FNS was performed using still the fine needle, by first immobilizing the swelling with the non dominant hand and then inserting the needle without a syringe attached, followed by movement of the needle within the swelling back and forth several times**.** The biopsy manoeuvre was terminated when fluid appeared in the hub. The needle was withdrawn and a syringe filled with air was then attached to it and the material expressed on clean dry labelled slides.

Smear preparation and staining.

The samples were expressed on the slides labelled with the patient's laboratory number. Material was spread on the slide by placing a second slide over the aspirated material and gently pulling apart. Slide was immediately fixed by 95% ethanol and stained with papanicolaou stain while the second slide was air dried and stained with a Romanowosky stain. The slides were then covered with cover slips and examined by the cytopathologist. The principal investigator collected the slides and re-labelled them with generated numbers from 101 to 300 which covered the laboratory numbers with their initials of A for FNS and B for FNAC. Each generated number corresponded to the patients laboratory number and this was only known to the Principal investigator. Therefore the cytopathologist was blinded to the biopsy technique used. The slides were then presented to the cytopathologist to be examined. All smears were evaluated by the same cytopathologist. Cytology results for both techniques were reported as; good or poor for smear quality, adequate or inadequate for smear results and inadequate, benign, atypical, suspicious of malignancy and malignant for

cytological diagnosis. These results were recorded on another register. The Principal investigator then recorded the results under their respective biopsy techniques (FNS or FNAC). Excision biopsy was the gold standard. Aseptic technique was observed and under local anaesthesia, the breast lumps were excised for histology after FNS and FNAC results by the Principal investigator. In case of cancer, mastectomy was performed by the Principal investigator and whole sample sent for histology. The histology results were reported as benign or malignant and these results were then recorded. Data was collected using questionnaires and analyzed using Epi info 6, STATA statistical package and presented informs of tables. Statistical data analysis was performed with Chi^2 test, where appropriate. Statistical significance was determined at $P<0.05$. Based on the numbers of True Positives (TP's), False Positives (FP's), True Negative (TN's) and False Positives (FP's), the diagnostic accuracy of both FNS and FNAC were computed.

The study was approved by the Department of Surgery, Ethical Research Committee Mulago National Referral and Teaching Hospital and the Faculty of Medicine Research and Ethics Committee. Informed, written consent from patients, parents/guardian was obtained.

Results

A total of 85 patients who had FNS, FNAC and Excision biopsy or Mastectomy (where appropriate) were studied during the period of October 2008 and January 2009. The majority (53%) of the patients were aged 16-19 years, of this 86% were nulliparous, mean age at menarche was 14 years.

Table 1. Study population characteristics

Characteristics	Number	%
Total	**85**	**100**
Age (years)		
16-19	**45**	**53**
20-29	33	39
30-53	7	8
Marital status		
Never married	**74**	**87.1**
Married	8	9.4
Divorced	3	3.5
Parity		
Nulliparous	**73**	**85.9**
One or more	12	14.1
Age at Menarche (years)		
Mean (SD)	**14**	**1.5**
<15	58	68.2
15+	27	31.8
Tribe		
Ganda	**49**	**57.7**
Other	36	42.3

Majority had never married (87.1%) and Ganda comprised 57.7% of the total patients under study.

Table 2. Association Between Histology and Lump Characteristics

Characteristics	Malignant /Total (%)	p-value
Lump size (widest diameter, cm)		
2-5	3/58 (5.2)	
>5	3/27 (11.1)	0.246
Lump side		
Left	2/40 (5.0)	
Right	4/45 (8.9)	0.485
Lump location		
Upper outer quadrant	6/49 (12.2)	
Other quadrant	0 /36 (0.0)	0.029
Lump Tenderness		
Yes	¾ (75)	
No	3/81 (3.7)	<0.0001
Lump Margin		
Regular	2/79 (2.5)	
Irregular	4/6 (66.7)	<0.0001
Lump Mobility		
Mobile	4/82 (4.9)	<0.0001
Immobile	2/3 (66.7)	

Table 3. Distribution of FNS and FNAC cytology diagnosis by Histology (N=75)

	Histology				Total
	Benign		Malignant		
	Number	(%)	Number	(%)	
	69	(92)	6	(8)	75
FNS					
Benign	69	(98.6)	1	(1.4)	70
Malignant	0	(0)	5	(100)	5
FNAC					
Benign	69	(98.6)	1	(1.4)	70
Malignant	0	(0)	5	(100)	5

The two tests, FNS and FNAC, had the same sensitivity, specificity and diagnostic accuracy of 83.3%, 100% and 98.7% respectively. FNS had good quality smears in 75 (88.2%) of patients as compared to FNAC which had in 50 (58.8%).FNS smears were adequate in 81 (95.3%) of the patients as compared to FNAC which had 77 (90.6%) of adequacy

Table 4. Diagnostic properties of FNS and FNAC as compared to histology

Properties	**Biopsy Techniques, %**	
	FNS	**FNAC**
Sensitivity	83.3	83.3
Specificity	100	100
Positive Predictive Value (PPV)	100	100
Negative Predictive Value (NPV)	98.6	98.6
Diagnostic Accuracy	98.7	98.7
Diagnostic Error	1.33	1.33

Table 5. Smear Characteristics by Biopsy Technique

	FNS		**FNAC**		**p-value**
	Number	**(%)**	**N**	**(%)**	
Total	85	(100)	85	(100)	
Quality					
Good	**75**	**(88.2)**	**50**	**(58.8)**	
Poor	10	(11.8)	35	(41.2)	<0.001
Adequacy					
Adequate	**81**	**(95.3)**	**77**	**(90.6)**	0.1490
Inadequate	4	(4.7)	8	(9.4)	

.Discussion

Study population characteristics

The study population characteristics in this study did not show any significant variations with data from other studies[5,10].However one study by Fleming N.T et al[11] showed a peak age of 30-34years and predilection to race. Majority of the population in the current study is young and not married yet and may be because they have good health seeking behavior. Since the study was done in Buganda, that may explained why Ganda comprised the majority of the patients in this study. No study in Uganda has described tribal predilection to breast lumps.

Association between Histology and Lump Characteristics.

Lump size.

A study done by Jombwe et al[12] in Kampla and Franzens S et al[13] showed statistical significance between the size of breast lumps and FNB outcomes. In this study this was not the case. The findings in this study may be attributed to the small sample size. However the indeterminate results were still got from breast lumps of 2-5 cm in the widest diameter.

Lump location.

The location of breast lumps and their distribution vary greatly among patients. However in this study, the majority of the breast lumps were found in the upper outer quadrant, and all the malignant lumps were found in this quadrant which was statistically significant (p-value = 0.029).These findings are in support of data from other studies [1, 14, 15.] This may be because most of the breast tissue is in the outer quadrant. However one study [12] found that most cancers were beneath the nipple and this is not unusual.

Lump Tenderness, Margin and Mobility.

The breast lump tenderness, irregularity of the margins and immobility may give you a clue of what type of lump one is dealing with. The current study demonstrated a clinical correlation of these clinical findings with malignancy with p- values = < 0.001. Findings were similar to study by Jombwe et al[12] However, usually most malignant lumps are non tender, but if there is inflammation they may become tender and also because of the adhesions from the inflammation, the lump margins are irregular and are fixed to the surrounding tissues as it is in this case.

Sensitivity, Specificity and Accuracy of FNS and FNAC.

This study demonstrated a significantly higher diagnostic accuracy (98.7%) of both FNS and FNAC as compared to the diagnostic accuracy of 70.4% for FNS and 86% for FNAC reported by Raghuveer et al[6] Also similar findings were obtained by Dey at el [16], Kumarasinghe et al[9]. However Jombwe et al [12] and Frable et al[17] found the FNAC diagnostic accuracy of 98.1% and 94.4% respectively. Rajasekhar et al[18] who compared the FNS and FNAC for lymph nodes, found the diagnostic accuracy of FNS to be 95.3% greater than FNAC. These differences may be attributed to the fact that the previous studies[6,9,16] had results of subanalysis. The previous studies [6,9,16] seem to agree that FNS is better for cancers than FNAC due to associated fibrous stroma in the benign lesions which require aspiration, but in this study it was not the case. Therefore the current study demonstrated high diagnostic accuracy of FNS consistently with other studies irrespective of whether it is breast lumps or other superficial masses.

The false negative rate of 1.43% is acceptable compared to other studies[5, 12] ranging from 1.7-19% and also a low diagnostic error of 1.33% as supported by previous data from Jombwe et al [12], whose diagnostic error was 1.90% for FNAC.

Distribution of Smear Characteristics with Biopsy Techniques.

In this study, we found that, FNS had good quality smears (smear cells which are not obscured by blood) as compared to FNAC. Bhattacharya S et al[7], Misra M et al[8] , Kumarasinghe MP et at[9] had similar findings with ours, but we also found that, the adequacy of cells (moderate or abundant epithelial cell clusters) in both FNS and FNAC was the same. This was in contrast to the findings in some other studies[7,8,16] which found that FNS had more adequate cells harvested than FNAC. These findings may suggest that it is probably the adequacy of the cells harvested rather than the quality of the cells harvested which determines the difference in the diagnostic accuracy of the two techniques. This could explain why FNS and FNAC in this study had the same diagnostic accuracies since the difference in the adequacy of cells harvested was not statistically significant. This therefore disproves the statement that because FNS has better quality of cells, it is expected to have higher diagnostic accuracy than FNAC. Also the fact that in the studies above [7, 8, 9], it is not clear if the cytopathologist was blinded or not which could have caused bias in assessment, but it was not the case in this study. Therefore this probably suggests that the findings in this study may not be by chance.

Conclusions

- There is no difference in the diagnostic accuracy of FNS and FNAC in the diagnosis of palpable breast lumps.

- Both FNS and FNAC have the same sensitivity and specificity in the diagnosis of palpable breast lumps.
- Although FNS had good quality smears as compared to FNAC, there is no difference in adequacy of smears provided by both FNS and FNAC.

Study Limitations

1. The population of patients seen in Mulago Hospital may not be representative of the general population.
2. Use of only one senior cytopathologist to analyses the biopsy results which otherwise would be done by two senior cytopathologists to compare results.
3. Study was time bound hence the period was short which could not allow large sample size to be collected.

Recommendations

- FNS is an accurate diagnostic tool in the management of palpable breast lumps and may be employed over FNAC.
- Further research is needed as regards the patients' acceptability and discomfort of FNS without aspiration and FNAC in the diagnosis of palpable breast lumps.
- There is need to carry out the same research with a large sample size so as to generalize the research findings.

References

1. Leis HP Jr, The diagnosis of breast cancer (1977), cancer journal for clinicians, 27(4):209.
2. Guthrie C.P; Gland puncture as a diagnostic measure (1921), Bulletin of John Hopkins hospital, vol xxxii, p. 266.
3. Martin H.E, Ellis EB, Biopsy by needle puncture and aspiration (1930), Ann 92:169-81.
4. Zajicek J, Aspiration biopsy cytology (1974), aspiration in clinical cytology, Acta Cytol; 18:192-7. 16.
5. Kodwavawalla M T.D, Gate, D, Aspiration cytology in the diagnosis of breast lumps. Proceedings ASEA 6, 195-198
6. Raghuveer CV, Leekha I, Pai MR, Adhikari P, Fine needle aspiration vs fine needle sampling without sampling in the diagnosis of superficial masses (2002), A prospective study of 200 cases. Indian J Med Sci 2002;56:431-9.
7. Bhattacharya S, Raghuveer CV, Adhiakri P. FNAC diagnosis of tuberculosis-an eight years study at Mangalore (1998), Indian J, Med Sci 1998;52:498-506.
8. Misra M, Chawla SC, Bandyopadhyay SP. Fine Needle Capillary Sampling (Non Aspiration Technique) Vs Conventional FNAC in Cytological Diagnosis (2001),Cytology; 18:25-30.
9. Kumarasinghe MP, Sheriffedeen AH. Fine Needle Sampling without aspiration (1995),Pathology 1995;27:330-332.
10. Balyejjusa J S. the pattern of Breast disease in Mulago Hospital,(1991) Med. Dissertation, Makerere University.
11. Fleming N.T, Armstrong B.K , Sheiner H.J. The comparative epidemiology of benign breast lumps and breast cancer in Western Australia.(1982),Int J Cancer 1982; 30: 147-52
12. Jombwe J. The use of fine needle aspiration biopsy in the diagnosis of palpable breast masses (2002), dissertation. MMED Surg.
13. Franzens S, Zajicek J. Aspiration biopsy in diagnosis of palpable lesions of the breast. Critical review of 3479 consecutive biopsies (1968), Acta Radiol Therapy Physic 1968, 7:241-262.
14. Pearson J. B. Carcinoma of the breast (1963),Prog. Clinical cancer 1963; 17:24
15. Ojara, EA.Cancer of the breast in Mulago Hospital (1976), MMED Dissertation Makerere University.

16. Dey P, Ray R. comparison of fine needle sampling by capillary action and fine needle aspiration (1993) Cytopathology 1993; 4:299-303
17. Frable W.J. Needle aspiration of the breast cancer (1984), 3: 671-676.
18. Rajasekhar A, Sund copar C, Chowdhary T, Charanpal M, Ratnakar KS. Diagnostic utility of sampling without aspiration; a prospective study (1991), Diagnostic cytopathology 7:473-476.