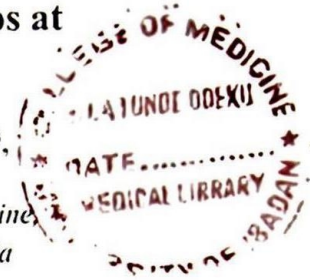# Diagnostic accuracy of tru-cut biopsy of breast lumps at University College Hospital, Ibadan.

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A Salami[1], MA Ajani[1], TO Ogundiran[2] and MO Obajimi[2]
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Abstract

Background: Tru-cut needle biopsies form an integral part of Triple assessment of breast cancer and include clinical assessment, mammography and core needle biopsy. No study has been done to evaluate the validity of the procedure in our environment. This study was done to evaluate the validity of core needle biopsies in our centre.

Method: A retrospective study of patients with tru-cut needle biopsies of breast lumps and follow-up excisional biopsy or mastectomy done in the Department of Surgery, University College Hospital, Ibadan over a ten year period was done. Fifty one patients who fulfilled the inclusion criteria had their records obtained from the Department of Pathology. The diagnosis was classified into benign and malignant with the excisional biopsy or mastectomy diagnosis used as the gold standard. The sensitivity, specificity and accuracy were calculated and kappa was also done to evaluate the degree of agreement.

Results: A total of 51 cases were included in this study. The average age of the patients was 47±13years with a range from 19 to 81years. Thirty of the biopsies (59%) had a definitive diagnosis of malignancy while twenty one (41%) were benign. The overall sensitivity, specificity and accuracy were 86%, 71% and 80.4% respectively. The specificity of malignant biopsies was 68% while benign was 35%. The level of agreement for malignant biopsies was higher than benign biopsies with a kappa of 0.39 for malignant diagnosis as against 0.29 for benign.

Conclusion: Tru-cut needle biopsies have a comparable sensitivity and specificity to excisional biopsies. Diagnostic accuracy can be further enhanced with the adoption of image guided biopsies.

Keywords: *Tru-cut, biopsy, breast lumps, mastectomy.*

Résumé

Contexte: Les biopsies à l'aiguille 'Tru-cut' font partie intégrale de la Triple évaluation du cancer de sein et comprennent l'évaluation clinique, la mammographie et biopsie à l'aiguille centrale. Aucune étude n'a été effectuée pour évaluer la validité de la procédure dans notre environnement. Cette étude a été réalisée pour évaluer la validité des biopsies à l'aiguille centrale dans notre centre.

Méthode: Une étude rétrospective de patients avec biopsies à l'aiguille 'Tru-cut' de masses de sein et suivi de biopsie chirurgicale ou mastectomie fait dans le département de chirurgie, Centre Hospitalier Universitaire, Ibadan sur une période de dix ans a été faite. Cinquante et un patients qui répondaient aux critères d'inclusion ont eu leurs dossiers obtenus auprès du Département de pathologie. Le diagnostic a été classé en diagnostic bénigne et maligne avec biopsie chirurgicale ou mastectomie utilisé comme étalon d'or. La sensibilité, la spécificité et la précision ont été calculées et kappa a également été fait pour évaluer le degré d'accord.

Résultats: Un total de 51 cas ont été inclus dans cette étude. L'âge moyen des patients était de 47 ± 13 ans avec un rang de 19 à 81 ans. Trente des biopsies (59%) avaient un diagnostic définitif de tumeur maligne tandis que vingt et un (41%) étaient bénignes. La sensibilité totale, spécificité et précision étaient de 86%, 71% et 80,4% respectivement. La spécificité de tumeurs malignes était de 68%, tandis que 35% était bénigne. Le niveau d'accord pour les biopsies malignes était plus élevé que celui des biopsies bénignes avec un kappa de 0,39 pour le diagnostic maligne contre 0,29 pour bénigne.

Conclusion: Les biopsies à l'aiguille 'Tru-cut' ont une sensibilité et spécificité comparable aux celles des biopsies chirurgicales. La précision du diagnostic peut être encore améliorée avec l'adoption de biopsies guidées par image.

Mots-clés: *'Tru-cut', Biopsie, Tumeur de sein, Mastectomie.*

Introduction

Breast cancer is the most common female malignancy worldwide and although often regarded as a systemic disease, studies have shown that early detection still gives better outcome [1]. In the management of suspected breast cancer a

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multidisciplinary approach is essential and many diagnostic tools are needed [2]. With the advent of the Triple assessment procedure, detection of early breast cancer has achieved greater accuracy and also reduced morbidity in patients with reduction in the need for open biopsy [3,4]. The triple test is advocated principally for the evaluation of palpable breast lumps and includes clinical assessment, mammography or ultrasonography and Fine Needle Aspiration (FNA) [3,5].

Although FNAC is cheap, rapid and accurate, studies show that histological diagnosis using core biopsy is more sensitive and specific [6-8]. The latter combines the benefits of diagnosing benign lesions, assessing invasion, grading of cancer as well as determining the histological subtypes of the tumour [6-8]. Furthermore, in spite of the widespread use of cytological smears for diagnosis of breast cancer lesions, many surgeons are still reluctant to accept the cytological report as the only criterion for performing definitive surgery [9,10].

It is believed that tissue specimens still provide a level of certainty for diagnosis of malignancy which is greater than that obtained with FNAC, and that a definitive diagnosis required for guiding surgical resolution of infiltrating breast cancer can be achieved preoperatively only by tru-cut biopsy or open biopsy during surgery [9-11].

In the experienced hand, tru-cut needle biopsy provides a suitable sized tissue mass for assessment of both cytomorphology and architecture for diagnostic and prognostic purposes. It shows variable ranges of sensitivity, specificity and accuracy.

In a study done in early 1980s in New York, tru-cut needle biopsy showed overall sensitivity of 89% in diagnosing breast cancer, and 94% in masses more than 2.5 cm, while the overall specificity was 100% [12].

There has been no previous study of the validity of tru-cut biopsy in our centre. Given the importance of accurate histological diagnosis in the evaluation of patients with breast diseases and in guiding of surgical approach, we therefore decided to embark on this validity study.

Materials and methods

A retrospective study of tru-cut biopsy procedures done either in the Surgical Outpatient Clinic or in the Ultrasound Suite of the department of radiology over a period of ten years from 2001 to 2010 at the University College Hospital, Ibadan was conducted. The archival records of patients who had tru-cut biopsy of the breast which was subsequently followed by an excisional biopsy or a mastectomy were obtained from the records of the department of pathology of the hospital. A total of 120 requests for tru-cut biopsy histology were received in the Department of Pathology during the study period. Fifty six of these patients had a follow up excisional biopsy or mastectomy. Patients' age, tru-cut biopsy, excisional biopsy and mastectomy diagnosis were obtained from the archival records of the department of pathology, of the hospital. The diagnoses were classified into benign or malignant categories. The open surgical biopsy and mastectomy results were used as the gold standard for the evaluation of the diagnostic accuracy of the tru-cut biopsy. The specificity, sensitivity and accuracy of the tru-cut biopsy diagnosis were calculated and compared with the excisional biopsy. The kappa value (K) was calculated to determine the degree of agreement between diagnosis obtained following a tru-cut biopsy and those of either open surgical biopsy or mastectomy. The data obtained were analyzed using SPSS version 20 statistical software.

All aspects of this study complied with the Helsinki declaration of the 52nd WMA general assembly of October 2000.

Result

The histological diagnoses of all 56 cases that had either open surgical biopsy or mastectomy samples processed in the Department of Pathology of the hospital were compared with the diagnosis earlier obtained following tru-cut biopsy for the same patient. All of the patients were females and their average age was 47 ± 13 years, with a range from 19 to 81 years.

Five (8.9%) of these open surgical biopsy/ mastectomy specimens were found not to have adequate tumour tissue for definitive diagnosis by histology and were excluded from further comparative analysis in the study. Fifty-nine percent (30) of the biopsies had a definitive diagnosis of malignancy while forty-one percent (21) were benign. Twenty-six of the malignant tumours were reported as invasive ductal carcinoma; two were diagnosed as mucinous carcinoma and two were malignant mesenchymal tumours (fig 1). There was positive concordance between the tru-cut needle biopsy report and the excisional biopsy/mastectomy for the mucinous carcinomas but only one of the mesenchymal tumours was correctly diagnosed using the tru-cut biopsy sample (fig 2). The second mesenchymal tumour and the papillary carcinoma were initially reported as invasive ductal carcinoma.
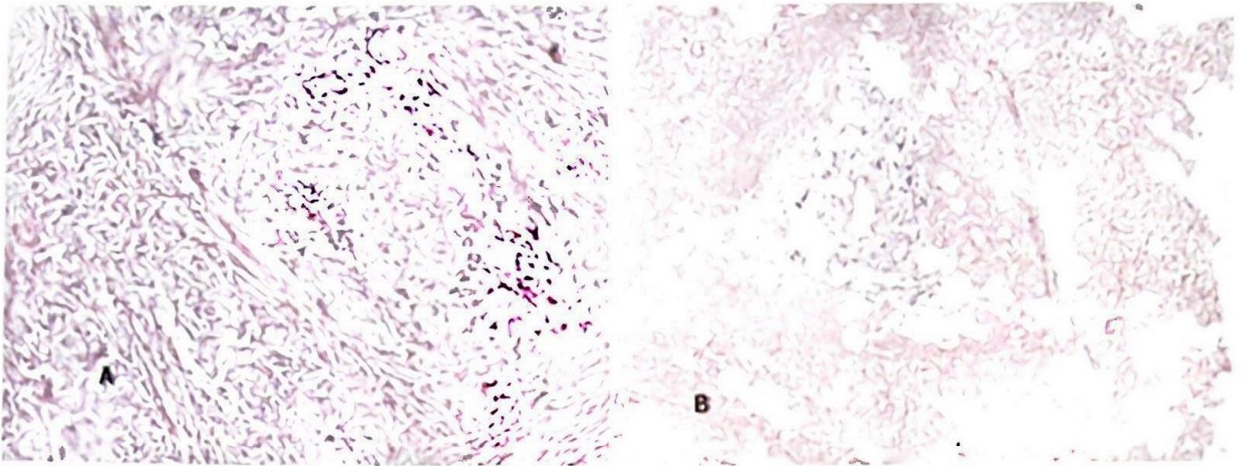
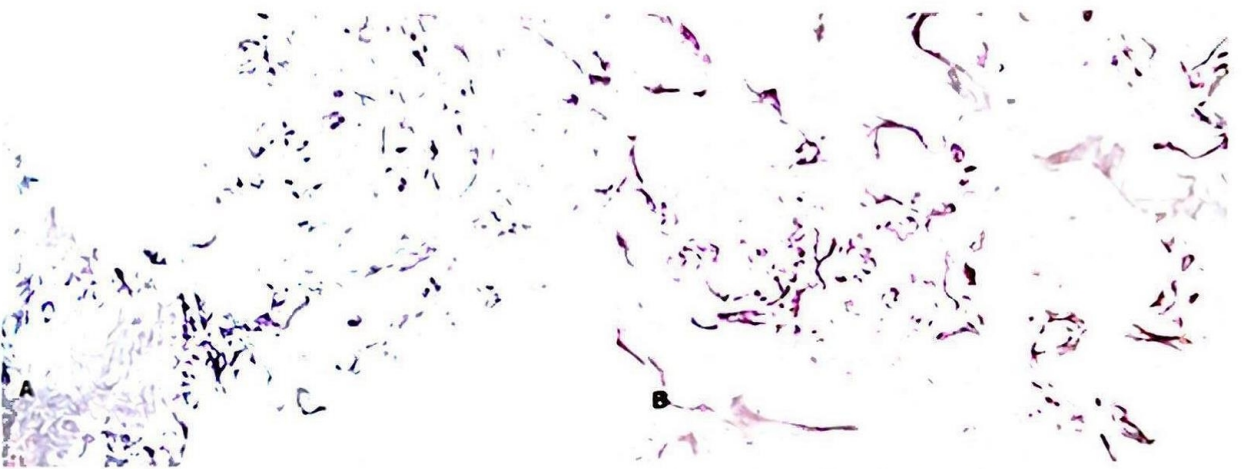Fig. 1: Photomicrograph of concordant trucut (A) and excisional (B) biopsies of invasive ductal carcinoma

Fig. 2: Photomicrograph of concordant trucut (A) and excisional (B) breast biopsy of mucinous carcinoma

Table 1: Malignant biopsies with a different initial diagnosis on trucut biopsy

Trucut Biopsy	Excisional Biopsy
Invasive Papilliary Carcinoma	Invasive Ductal Carcinoma
Normal Breast Tissue	Invasive Ductal Carcinoma
Invasive Ductal Carcinoma	Malignant Phyllodes Tumour
Normal	Invasive Ductal Carcinoma
Acute On Chronic Inflammation	Invasive Ductal Carcinoma
Normal Breast Tissue	Invasive Ductal Carcinoma

Four of the tru-cut needle biopsies were marked as suspicious and all were later confirmed with open surgical biopsy to be invasive ductal carcinoma. One of the tru-cut biopsies was initially diagnosed as a papillary carcinoma but was confirmed with excisional biopsy as an invasive ductal carcinoma (table 1).

Five of the patients had an initial diagnosis of inflammatory lesions on tru-cut biopsy but definitive diagnosis of invasive ductal carcinoma were confirmed for four and fibrocystic changes for one of them (fig 3).

Fibroadenoma and fibrocystic changes accounted for three each of the benign cases that had good agreement while sclerosing adenosis, stromal fibrosis, duct ectasia and benign phyllodes tumour accounted for a case each (fig 4). Fibroadenomatoid hyperplasia accounted for three of the cases that were discordant with two initially reported as invasive ductal carcinoma on tru-cut biopsy while the third was reported as fibrocystic changes (table 2). Diagnosis was concordant for two of the three cases of fat necrosis while the third one was reported as malignant on tru-cut biopsy.
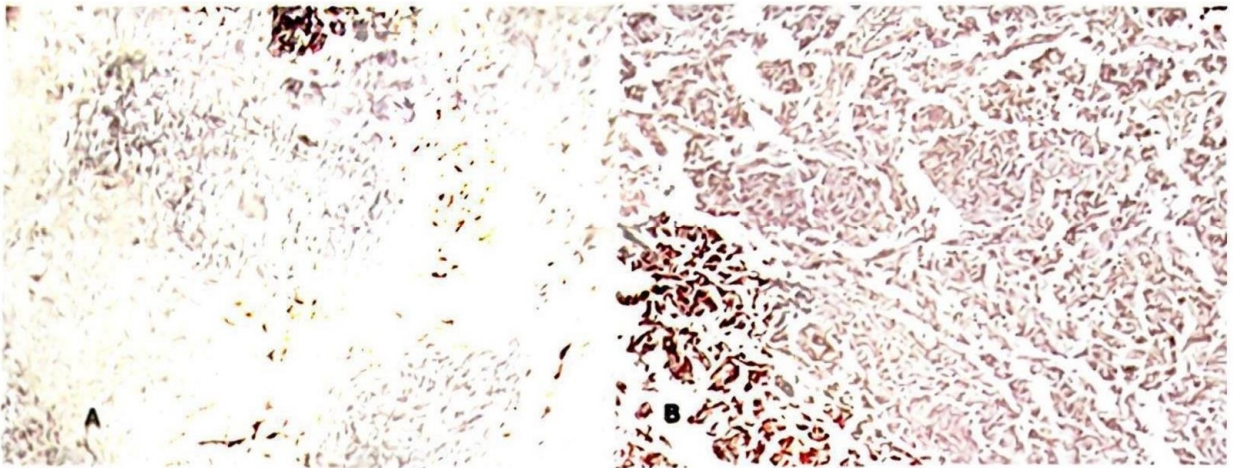
Fig. 3: Photomicrograph showing the trucut breast biopsy which was diagnosed as chronic granulomatous inflammation (A) and the excisional biopsy which showed invasive ductal carcinoma (B)
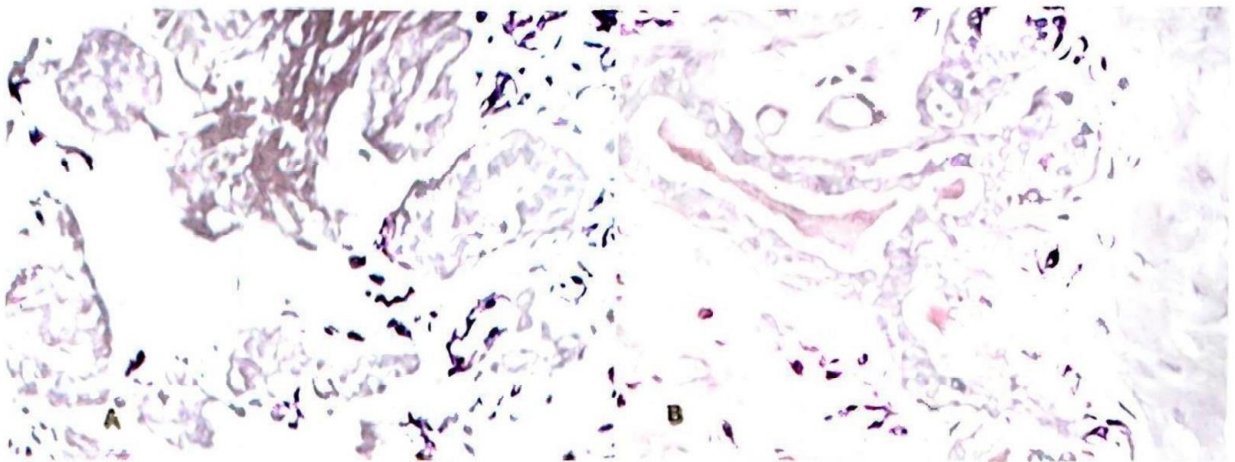

Fig. 4: Photomicrograph of trucut and excisional breast biopsies of a fibroadenoma

Table 2: Benign biopsies with a different initial diagnosis on trucut biopsy

Trucut Biopsies	Excisional Biopsies
Invasive Ductal Carcinoma	Fat Necrosis
Invasive Ductal Carcinoma	Normal Breast Tissue
Atypical Ductal Hyperplasia	Fibroadenomatoid Hyperplasia
Invasive Ductal Carcinoma	Fibroadenomatoid Hyperplasia
Invasive Ductal Carcinoma	Fibroadenomatoid Hyperplasia
Invasive Ductal Carcinoma	Foreign Body Granuloma
Invasive Ductal Carcinoma	Fibrofatty Tissue
Atypical Ductal Hyperplasia	Fibroadenoma

The overall degree of agreement (kappa value) between tru-cut biopsy diagnosis and the final diagnosis obtained after excisional biopsy or mastectomy is 0.6, which is consistent with a moderate level of agreement. The level of agreement for malignant biopsies (kappa = 0.39) is higher than that of benign (kappa = 0.29) tru-cut biopsies although both show fair agreement.

The overall sensitivity of tru-cut biopsies in this study is 86% while the specificity is 71%. The overall positive predictive and negative predictive. values are 81.25% and 79% respectively. However the specificity of malignant tru-cut biopsies is 68% while that of benign biopsies is 35%.

Discussion

In a review of the literature by Nguyen *et al*, tru-cut needle biopsy was shown to have almost the same level of accuracy as excisional biopsies [13]. This was further confirmed by Elvecrog *et al* in a study of one hundred women with palpable masses [14]. Several other studies have also shown the high sensitivity and specificity of tru-cut needle biopsies and their usefulness in the management of breast tumours [15,16]. The sensitivity of tru-cut biopsies seen in these various studies range from 85% to 99% while their specificity ranged from 85.5% to 100% [13,15-18]. This is quite in agreement with the findings in this study.

This study showed a higher level of agreement between the diagnosis in tru-cut and excisional biopsies of malignant lesions as compared with benign cases. The misdiagnosed cases in the two classes of lesions may be attributable to poor sampling or misclassification of the lesion [19-20]. The higher rate in benign lesions may also be due to the fact that this group has a morphological appearance closer to normal tissues. The poor sampling can be remarkably reduced by the use of image guided tru-cut biopsies [7,8].

The tru-cut needle biopsy technique is relatively simple and less traumatic compared to open biopsy and confers less expense on the patient with the added cosmetic advantage [13,16,21]. Tru-cut needle biopsy usually preserves the architecture of the malignancy and is a true reflection of the tumour and comparable with what is seen in the open biopsy [18,21]. Further ancillary tests can therefore be carried out to characterize the neoplasm. It has also been argued that the use of tru-cut needle biopsies can reduce the need for excisional biopsies in cases which are benign and do not require excision [22]. One of the advantages conferred by tru-cut biopsies is a reduction in the rate of inconclusive samples which occurs more commonly in fine needle aspiration cytology [16].

The level of expertise in the technique of using tru-cut needle biopsies has a significant impact on the yield of tru-cut biopsy [12, 16]. Some of the erroneously diagnosed results seen in our study may be due to the needle not being appropriately sited during the biopsy which further makes a case for image guided biopsies. Some tumours are known to evoke an inflammatory response from the host tissue and although this is a good prognostic sign, it may cause confusion in the interpretation of the biopsy result if the needle is sited at the edge where only inflammatory cells are seen [23-26]. This may account for some of the false negative cases seen in this study. Woodcock *et al* have recommended the correlation of clinical and radiological findings with histological findings in cases of tru-cut biopsies that are suspected to be false negative [19].

Four of the biopsies which were initially regarded as suspicious in the tru-cut biopsies were all confirmed as malignant in the excisional biopsies similar to what was seen by Woodcock *et al* [18]. Although dysplastic cells were seen in these cases it was not possible to confirm malignancy based on the absence of convincing features of malignancy and care also had to be exercised to avoid mis-diagnosis of crushed cells as malignant. One of the false positive cases in the cancer patients was seen in a patient who underwent mastectomy following an initial diagnostic open surgical biopsy procedure. The mastectomy specimen showed no residual tumour, most possibly due to the fact that the tumour had been largely removed during the open biopsy procedure and or by the neo-adjuvant chemotherapy. According to a joint task force of the American Colleges of Surgeons, Radiologists and Pathologists, such cases with no residual tumour on the excisional biopsy should be considered true positive [21].

In conclusion tru-cut needle biopsy has comparable sensitivity and specificity to excisional biopsy. It has a better chance of reducing unnecessary surgical procedures while at the same time giving most of the information required by the surgeon for further management of patients. The use of image guided tru-cut needle biopsies in the assessment of palpable breast lesions should be encouraged.

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