



UTILITY OF TRUCUT BIOPSY IN DIAGNOSING PATHOLOGICAL LESIONS AT TERTIARY CARE CENTRE

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ABSTRACT

Introduction: Biopsy is a crucial initial diagnostic step for identification of pathological lesions. Although open biopsy is conventional gold standard for obtaining tissue samples for the histological diagnosis, advent of core needle or Tru-Cut biopsy (TCB) in new millennium has been developed as minimally invasive technique which can be easily performed under local anesthesia using CT, MRI or ultrasound. The accuracy of tru-cut biopsy varies between 76% and 99%. It is cost effective and less time consuming compared to open biopsy. This approach has privilege of accurate diagnosis compared to other invasive procedures for guiding the treatment options. Besides, tru-cut biopsy is a safe technique with a negligible complication rate ranging from 0% to 7.4% in recent studies. **Aims and Objectives:** Aim of the present study was to evaluate the accuracy of tru-cut biopsy with regard to distinguishing between benign and malignant lesions. **Materials and methods:** A cross sectional study is conducted for a period of 2 years on patients who had undergone tru-cut biopsy on suspected malignant lesions at various sites. A total of 214 cases were analysed and histomorphological features were evaluated and classified as benign and malignant. The paraffin blocks of tru-cut biopsies are used for IHC study which helps surgeons and oncologists for preoperative adjuvant therapy. **Results:** Overall 214 TCBs were analysed from various locations. A total of 158 cases (73.8%) were diagnosed as malignant and 30 cases (14%) were benign. Diagnostic accuracy for soft tissue lesions found to be low in this study. The diagnostic sensitivity and specificity was 92.5% and 98.6% respectively. **Conclusion:** The diagnosis of benign changes by TCB would reassure the patient about the absence of malignancy hence this study was undertaken to explore the role of tru-cut biopsy to arrive at a definitive diagnosis, needed for accurate management.

KEYWORDS : Diagnostic accuracy, trucut biopsy, immunohistochemistry

INTRODUCTION

Histopathological examination is most definitive method in diagnosing type, characteristic and prognosis of a pathological lesion.^[1] Biopsy is a crucial initial diagnostic step for the identification of pathological lesions.^[2] Various biopsy methods are currently applied in daily medical practice. These methods include Trucut biopsy, Fine needle aspiration biopsy (FNAB), excisional biopsy and incisional biopsy.^[3] The emergence of Tru-Cut biopsy (TCB) in the recent years has led plenty of surgeons to switch to TCB.^[3]

Trucut biopsy is increasingly replacing FNAC at many centers in developed countries, and this is mainly attributed to the inability of FNAC to distinguish carcinoma in-situ from invasive carcinoma.

The accuracy of tru-cut biopsy varies between 76% and 99%^[6] and is highly sensitive for primary, locally recurrent, or metastatic lesions in various anatomic locations. It can be done on out patient basis and supplies enough tissue for pathologists to establish a correct histological assessment. Cost-effectiveness, avoidance of diagnostic delays, low complication rates, and minimal invasiveness are advantages of tru-cut biopsy.

Potential disadvantages are decreased diagnostic accuracy and possible tumor sampling errors. Core needle biopsy not only provides primary histological diagnosis but also provide prognostic information such as grade and type of tumor, a predictive information which can influence initial therapeutic decision, especially in a case of planning of neo-adjuvant therapy.

In benign condition trucut biopsy avoids unnecessary surgery and it reduces the surgical burden and psychological stress to the patient.

The main aim and objective of the study is to evaluate the accuracy of tru-cut biopsy with regard to distinguishing

between benign and malignant lesions, usefulness of trucut biopsy in definitive diagnosis and to explore its role in preoperative management and its application in immunohistochemistry.

MATERIALS AND METHODS

Ethical approval was obtained from ethics and institutional review committee of the hospital with Approval no: **ASRAM BHR-EC/Approval No 31/2022.**

A cross sectional study was conducted for a period of 2 years on patients who had undergone trucut biopsy in suspected malignant lesions at various sites. In this study 214 cases were analysed and evaluated based on histomorphological findings. Trucut biopsy was performed using 18 gauge needle. 2 or 3 core biopsy specimens of 15–22 mm length were obtained through the same puncture wound in different directions. The tissue was immediately fixed in 10% neutral buffered formalin, processed, cut and stained with H&E in usual manner. Apart from histological examination by H&E, IHC studies were performed on these cores with a panel of markers.

In malignant breast cases, paraffin blocks were used for IHC where oncologists planned for Neo-Adjuvant Chemotherapy (NACT). IHC was done on 4 μ m thickness sections from paraffin blocks of TCB/CNB for ER, PR, Her 2/neu, Ki-67. Routine IHC staining procedures were followed, such as antigen retrieval, endogenous enzyme block, staining with primary antibody, Horse Radish Peroxidase (HRP) polymers conjugated with secondary antibodies.

Finally sections were washed and chromogen was added. Then sections were counterstained by haematoxylin, dehydrated and mounted for analysis. For each row of staining, a positive and negative control slide was also prepared. Semi-quantitative Allred scoring system were used to interpret ER, PR staining which takes into consideration of both the proportion (PS) and intensity (IS) of nuclear staining.

RESULTS

During 2-year study period, total 214 cases were analyzed and evaluated based on histomorphological examination from different locations.

The age range was from 26 to 88 years. A total of 98 (45.7%) TCBs were performed in breast lesions, among which, 86(40%) cases were diagnosed as malignant neoplasms, out of which majority 71(33%) fall in category of invasive ductal carcinoma-NST, 8 invasive lobular carcinoma,4 mucinous carcinoma,3 papillary carcinoma. Non malignant lesions were 12 out of which 4 atypical ductal hyperplasia, 8 fibrocystic disease. No inconclusive or no false positive biopsies reported in this series. Mucinous carcinomas and papillary carcinoma were confirmed on mastectomyspecimens.

Out of 36 prostatic lesions, microscopic examination revealed adenocarcinoma in 19 cases out of 36.Prostatic intraepithelial neoplasia in 8 cases followed by benign prostatic hyperplasia in 4 cases, and inadequate biopsy in 5 cases.The Gleason score was 5-7 in 7 patients, 2-4 in 4 cases, and 8-10 in 8 cases. The highest PSA level was in Gleason's score of 8-10. Thus, the PSA levels are more in patients with high Gleason grade.

From lesions identified in 28 patients on transthoracic lung biopsy of whom 20 (71.5%) were diagnostic and 8 (28.6%) are inconclusive. At the final diagnosis, 18 biopsy results (64%) demonstrated malignancy of which majority,7(25%) cases were diagnosed as metastatic carcinoma followed by 5 cases of squamous cell carcinoma (17%),2 were adenocarcinoma ,3 cases were small cell carcinoma ,1 case was suspicious for malignant mesothelioma.

Out of total 214 cases 27 cases were from soft tissue mass from various locations. 20 cases concluded final diagnosis and seven cases were given descriptive diagnosis and advised IHC. Trucut biopsy came out to be positive for malignancy in 11 cases, and 9 cases were benign. 1 case was reported as vascular neoplasm in trucut biopsy, and the final diagnosis in large specimen was given as epithelioid haemangioma. Final pathological diagnosis of the resected tissues was correlated and showed diagnostic sensitivity of 95.3% and specificity was 90.9% in our study. The results of trucut biopsy and final diagnosis in soft tissue lesions are shown in Table 1.

Table 1: Comparison of results of trucut biopsy and final pathological diagnosis in soft tissue lesions

No of cases	Trucut biopsy	Resection pathological diagnosis
2	Small blue round cell tumour	Ewings sarcoma, Rhabdomyosarcoma
4	Myxoid neoplasm	Myxofibrosarcoma, Low grade fibromyxoid sarcoma, Myxoid liposarcoma, Aggressive fibromatosis
1	Leiomyosarcoma	Leiomyosarcoma
2	Malignant lymphoma	Diffuse large B cell lymphoma, Hodgkin's lymphoma
2	Undifferentiated carcinomas	Undifferentiated pleomorphic sarcoma, Liposarcoma (well differentiated)
3	Benign spindle cell neoplasm	Schwannoma(2) ,Nodular fasciitis
1	Granular cell tumour	Granular cell tumour
5	Benign neoplasms	Giant cell tendon sheath tumour, Fibrolipoma, Epithelioid hemangioma, Glomus tumor

Twenty five cases with suspected malignant tumours of head and neck lesions were enrolled in this study out of which 16 cases were concluded as malignant on trucut biopsy, 3 are benign and 6 are inconclusive.

The spectrum of malignant tumours diagnosed on trucut biopsy in this study are 8 cases are metastatic carcinoma in lymph nodes. Over 90% of neck metastases comprises squamous cell carcinoma, 3 cases were malignant lymphomas, 2 undifferentiated carcinomas, 2 are skeletal muscle tumours, 1 case is Castleman's disease.

Table no 2: Summary of total malignant and benign lesions diagnosed on trucut in this study

Sl .no	Diagnostic group	Malignant	Benign	Inconclusive	Total
1	BREAST	86	12	0	98
2	PROSTATE	27	4	5	36
3	LUNG	18	2	8	28
4	HEAD AND NECK	16	3	6	25
5	SOFT TISSUE MASS	11	9	7	27
	Total	158	30	26	214

In this study overall diagnostic sensitivity of the technique was 92.5% and specificity was 98.6% respectively, and diagnostic accuracy was 98%.

DISCUSSION

Tru-cut biopsy is an accurate and safe method for evaluation of neoplastic proliferation in different locations.⁽⁴⁾Successful pre-operative diagnosis of pathologic lesions is of great importance when considering the treatment and prognosis of disease.⁽¹⁾ Outcome of study shows that Trucut biopsy is most useful and effective in the diagnosis of malignant masses, in which the sensitivity and accuracy of the technique is high.

Breast cancer still represents the leading tumor among women and the incidence of the disease is rising all over the world.⁽²⁾ Breast cancer is a heterogeneous disease with varied morphological appearances, molecular features, behavior, and response to therapy.⁽²⁾The outcomes of this study show that TCB is a proper, confident and secure procedure to diagnose carcinoma in participants with breast lesions. There were no inconclusive results observed in this series giving a specificity of 100% and sensitivity of 96%.

Table no 3: Comparison with studies conducted to determine the utility of TCB in the diagnosis of breast lesions

Authors	Year (N)	Sensitivity	Specificity	Diagnostic accuracy
• Ahmed et al (15)	2010 (80)	94.64%	91.3%	94.8
• Lacambra et al (14)	2011 (464)	96%	99%	-
• Husain and Rikabi (12)	2011 (275)	98.1%	100%	99.3%
• Altıntas and Bayrak	2019 (472)	95.4%	100%	97.8%
• Present study	2023(98)	96%	100%	98.3%

86 cases reported as Invasive carcinomas are morphologically subdivided according to their growth patterns and degree of differentiation .Although tumor type provides useful prognostic information, the majority (33%) of breast cancers have no special type of characteristics (that is interpreted as invasive ductal carcinoma of no special type, or NST). Present study also observed that mucinous, lobular, papillary carcinoma were reported accurately on TCB, thus precise pathological diagnosis provided better managements. Management of breast cancer relies on histological grade , one of the prognostic factor for breast cancer carried out by using , modification of the Scarff -Bloom-Richardson grading system, also known as the Nottingham

Grading System (NGS)⁽¹⁾, recommended by WHO.

After evaluation of results, by decision of oncologist and surgeons few cases subjected to IHC for ER,PR,Her2 and Ki-67 status, helped in deciding appropriate therapy for breast ductal carcinoma. Semi-quantitative Allred scoring system was used to interpret results.

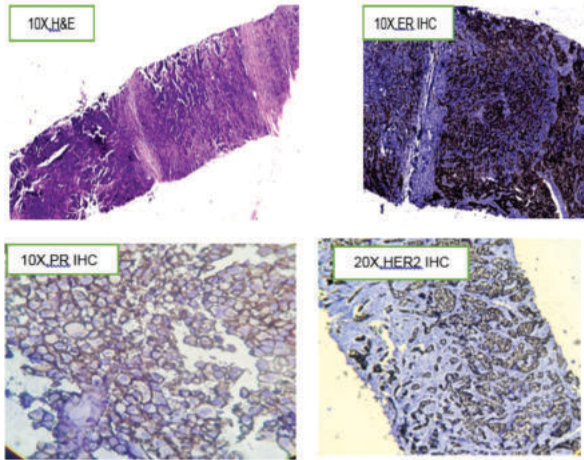


FIG1:A) Invasive duct carcinoma, grade 1 (B,C) Nuclear staining of ER,PR in cancer cells (IHC, 10X); D) Intense, complete circumferential membrane staining of Her-2/neu in almost all the cancer cells (IHC, 40X)

Prostate carcinoma is predominantly a disease of elderly men with more than 75% of new cases being diagnosed in men older than 65 years.

Adenocarcinoma was the predominant histological type in our study as it represented 100% of histological types. Only about 5 cases were inadequate because of small size of biopsy specimen. 8 cases of prostatic intraepithelial neoplasia were of low grade, have more chances of progression to prostate cancer. Histological grading done based on Gleason score.

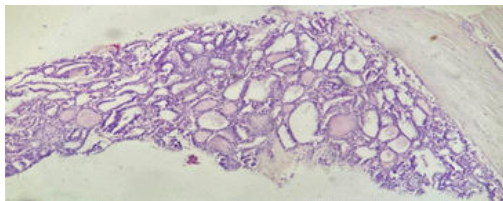


FIG3:Metastatic deposit of carcinoma of thyroid in 64 years male patient in lesion near 4th rib in scanner view.

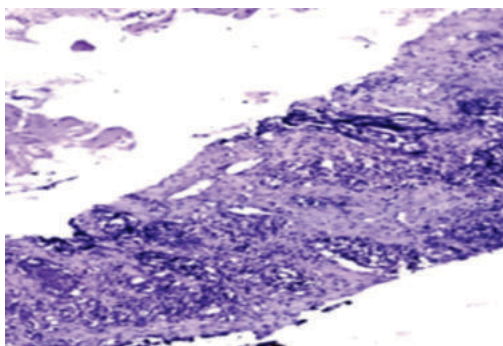


FIG2-Adenocarcinoma of prostate showing tumour arranged in poorly formed fused glands separated by desmoplastic stroma in 10X view.

Trucut biopsy is preferred approach in lung lesions because the tissue obtained is enough for diagnosis of different types of lung cancer with differentiation between primary and

metastatic malignancies.⁽⁶⁾ Special advantage of trucut biopsy includes detection of those tumor types such as small cell carcinoma, lymphomas more appropriately treated by chemotherapy rather than surgery. Major disadvantage is large cell carcinomas can't be ruled out due to small sample size. In present study most of lung lesion shows metastatic deposits.

Neck metastases present mostly as firm, solid masses, but a distinct subset of metastatic nodes present as cystic masses frequently related to thyroid carcinoma followed by SCC and malignant melanoma⁽⁴⁾. Goldenberg et al.⁽⁷⁾ observed that certain SCCs of the tonsil are more likely to produce cystic metastases. Today, it is concluded that so-called "Branchiogenic carcinomas" represent cystic alteration. In present study 90% of neck metastasis are SSC and one case was metastatic deposit from thyroid in elderly male patient and was positive for TTF1 on IHC.

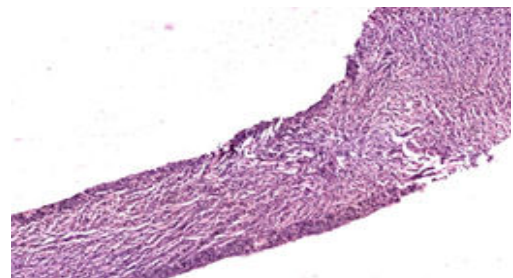


FIG4:A case of leiomyosarcoma diagnosed on trucut biopsy.

The diagnostic accuracy of tru-cut biopsy in diagnosing soft tissue lesion in this study observed to be low. Distinguishing between benign and malignant tumors came out to be difficult in few cases in this study. Because of the presence of heterogeneous features of the soft tissue tumors and particularly the small size of the biopsy samples, diagnosis of such lesions are reported in large category groups, such as malignant myxoid neoplasm or spindle cell tumor. For evaluation of heterogeneous areas, the total excision specimen should be imperative for an adequate identification of the malignancy potential. When an open biopsy or resection of tumor was subsequently performed, the histological diagnosis was compared for accuracy with diagnosis of needle biopsy.⁽⁷⁾ IHC staining was used for the differential diagnosis of these lesions.

Results of this study concluded that majority lesions are found to be malignant which helped both clinician and patient for surgical approach and neoadjuvant chemotherapy. The use of TCB also lessens the propensity of complicated surgical procedures and minimizes patient stress.

Limitation

To ensure that the biopsy is taken from the appropriate place, skilled surgeons are required. A TCB might not be beneficial, besides in tumours with large areas of bleeding and necrosis. The tissue collected by TCB might not be representative of the tumour in small sized tumours or tumors with extensive fibrosis, or it might be necessary to repeat TCB.

CONCLUSION

Trucut biopsy was evaluated as a very cheap and helpful method since it is practical to perform on outpatient basis. It causes minimum trauma to the tissue, detects the metastasis risk of malignant lesions and permits early radio and chemotherapy applications in neoplastic lesions. The trucut biopsy allows access to the deeper sections of a tumor and is a novel technique for the examination of deeper structures. The most important advantage of TCB is that IHC can successfully be done on TCB paraffin blocks.

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