

The role of touch imprint cytology in diagnosis of breast lump

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Abstract- Introduction: Touch-imprint-cytology (TIC) of the trucut biopsy specimen is a novel technique which aids in the rapid diagnosis of breast lumps by cytological analysis. It does not require any additional procedure, and at the same time preserving the core tissue for histopathological-examination. This study was done to detect the breast lump pathology by TIC.

Aims & Objectives: To assess the ability of TIC to correctly predict the diagnosis of a lesion as well to see sensitivity and specificity when compared to the Histopathological-examination of the same done using trucut biopsy of breast lump.

Materials & Methods: This study was done at PDU medical college and hospital, Rajkot, Gujarat for duration of 2 years over 50 patients including the age group of 15-75years presented with a breast lump and who give consent for Trucut biopsy for diagnosis and excluding patients with inconclusive reports.

Results: Out of 50 cases, 29 were true positive malignant with 2 false negative benign findings and 18 true negative benign with 1 false positive malignant finding shown on TIC of breast lump. Compared with Histopathological-examination finding, Sensitivity of TIC was 93.55%, Specificity of TIC was 94.74%. Positive-Predictive-value of TIC was 96.67% whereas Negative-Predictive-Value was 90%. Overall accuracy was 94%.

Conclusion: Touch Imprint Cytology of trucut biopsy is a rapid, reliable and accurate method for early cytological diagnosis of symptomatic breast lesions.

Index Terms- Touch-Imprint-Cytology (TIC), Breast Lump.

I. INTRODUCTION

Breast cancer is the most common cancer among women worldwide ⁽¹⁾. Incidence of breast cancer has increased worldwide 0.5% annually, but annual increase in Asia-Pacific countries is about 3-4% ⁽²⁾. Mortality and morbidity due to breast cancer are more in developing countries.

Breast cancer is the most common site of malignancy in Indian women in urban areas, while cervical cancer is still the most

common site of malignancy in rural areas ⁽⁵⁾. The projected number of cases for breast cancer in India in the year 2020 is 179,790 and this will constitute about 10% of all cancers ⁽⁶⁾.

Education of the public about the fundamental facts of cancer and self-examination of the breast represents an important factor in the early detection of breast disease.

Triple approach has achieved the highest level of diagnostic accuracy in which the results of clinical examination, imaging (mammography) and fine needle aspiration cytology and/or trucut biopsy are combined. Interestingly diagnostic accuracy of comparable levels have been achieved with impalpable lesions in which, clinical examination is not much contributory.

Tissue sampling in such patients done by means of a FNAC or a trucut biopsy. Trucut biopsy is able to give histological diagnosis as well as detail information about tumor type, grade, lympho-vascular invasion, and receptors status. Its results correlate almost 100% with final histopathology report. It permits the eventual use of preoperative adjuvant therapy, too. However, a trucut biopsy report takes approximately 5-7days which can create anxiety for the patient and relatives with the fear of malignancy.

Touch imprint cytology (TIC) of trucut biopsy specimen is novel technique which can be done even in underdeveloped infrastructure and by deficient trained technician. It aids the rapid diagnosis of symptomatic breast lesions from the trucut biopsy specimen by cytological analysis. It does not add any morbidity to the patient as it does not require any additional procedure on the patient, at same time preserving the core tissue for histopathological examination and ER/PR/Her2 neu receptor status assessment at a minimal cost. Touch imprint cytology is said to accurately predict the final histology in 96.7% of cases, with a sensitivity of 96.2% and a specificity of 100% in previous study done by Klevesath MB, Godwin RJ, Bannon R et al ⁽¹⁰⁾. This study was to estimate the role of touch imprint cytology in detection of breast lump pathology in our local context.

II. MATERIALS & METHODS

A Hospital based descriptive study was conducted on 50 patients presented with breast lump and undergoing Trucut biopsy for the same in the department of General Surgery, PDU Medical College & Hospital during 2 years of study period. Including Women in the age group of 15-75 years presenting with a breast lump and who give consent to be part of the study. Excluding all women with inconclusive Trucut biopsy or Touch Imprint Cytology results and patient's who do not give consent for study. Collected data of studied population analyzed to find sensitivity, specificity, positive predictive value, negative predictive value and the accuracy.

Procedure of Trucut biopsy for TIC & Histopathology

The area around the intended Trucut biopsy site and the needle track anaesthetised with 0.5% lignocaine with adrenaline and the area painted with povidone iodine.

14-gauge Trucut needle introduced into the lump after making a small stab incision on the skin and the Trucut gun fired. The tissue core obtained in the needle is pressed on to a glass slide and transferred immediately to a fixative solution containing isopropyl alcohol and later to cytopathology lab for analysis. The tissue core obtained by Trucut biopsy while same procedure above are transferred to formalin solution and send for routine histopathological examination(HPE), too. (Fig.1 to 6 showing TIC procedure) (Fig. 7 shows Histopathology specimen)



Fig.1: Local Anaesthesia at lump site



Fig.2: Incision over lump site



Fig.3: Trucut biopsy by trucut gun



Fig.4: Preparation of TIC slide from biopsy



Fig.5: Fixation of slide in Isopropyl Alcohol



Fig.6: Trucut biopsy specimen for TIC (prepared slide)

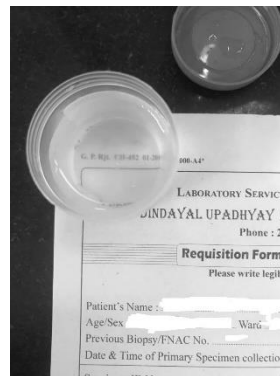


Fig.7: Trucut biopsy specimen for HPE

III. RESULTS

Sample Characteristics:

Most common age group having **breast lump** in sample population

studied was between **41-50 years (28%)**.

Mean age: 48 years.

Most common age group having **breast malignancy** had age between **66-75 years (29%)**

Post-menopausal - 32 (64%)

Pre-menopausal- 18 (36%)

In Table 1 Distribution of pre & post menopausal women with malignant & benign status for same group has been mentioned.

Table 1: Distribution according to pre-menopausal and post-menopausal women's of the study

Parameter	Benign	Malignant	Total	Percentage
pre-menopausal	12	6	18	36
post-menopausal	7	25	32	64
Total	19	31	50	100

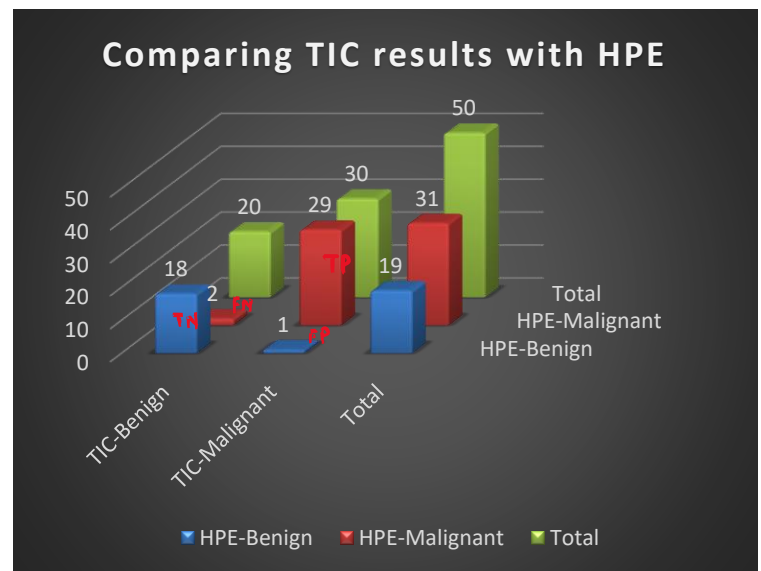
- Most common side of breast involved in sample population studied had lump in the right side of the breast (52%).
- Most common quadrant involved in studied population is Upper outer quadrant (68%) followed by Upper inner quadrant (38%) followed by Lower outer quadrant (30%).
- Majority of the patients had duration of disease for 1-3 months (50%)
- 68% of studied population had palpable lymph node with breast lump.

Comparison of Trucut biopsy results of breast lump:

Out of 19 **benign** cases as per HPE, 18 were correctly found benign (true negative-TN) with 1 false positive(FP) malignant finding on TIC.

Whereas

Out of 31 **malignant** cases as per HPE, 29 were correctly found malignant (true positive-TP) with 2 false negative(FN) benign findings on TIC.



Graph:1 Comparing HPE with TIC results.

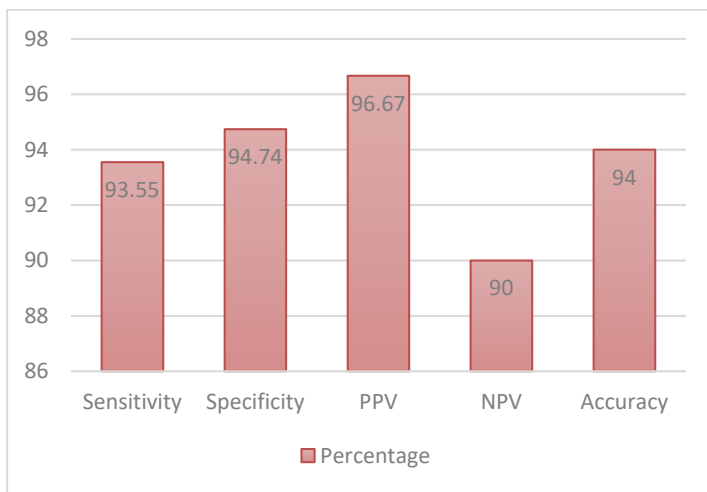
Compared with HPE finding,

Sensitivity of TIC was 93.55%

Specificity of TIC was 94.74%.

Positive Predictive Value (PPV) of TIC was 96.67% whereas Negative Predictive Value (NPV) was 90%.

Overall accuracy was 94%.



Graph 2: Sensitivity, specificity, PPV, NPV, Overall accuracy of TIC

IV. DISCUSSION

Breast cancer is the most common cancer among women worldwide. There were 2,088,849 new cases of breast cancer worldwide leading to 626,679 deaths in 2018 ⁽¹⁾. Incidence of

breast cancer is the highest in the USA and western Europe and lowest in Africa and Asia. Incidence of breast cancer is increasing and the rate of increase is higher in the developing countries. Incidence of breast cancer has increased worldwide 0.5% annually, but annual increase in Asia-Pacific countries is about 3-4% ⁽²⁾. Rapid increase in incidence in developing countries may reflect the socioeconomic changes like delayed marriage and child birth, fewer number of children, increasing obesity and awareness. Breast cancer occurs earlier in Indian women and patients usually present with advance stage of disease. Mortality and morbidity due to breast cancer are more in developing countries. Global disability adjusted life years in 2017 was 17,708,600 with highest contribution from middle income countries ⁽³⁾. Mortality by breast cancer is twofold higher in South Asian countries than in western countries ⁽⁴⁾.

It has been proven in various studies that early diagnosis of breast malignancy favorably leads to the good prognosis.

Among the cases studied 62% female came out with malignancy positive, possibly due to our institution being tertiary referral hospital. Among these many patients were having locally advanced carcinoma breast and needed neoadjuvant Chemo/Radiotherapy.

In Table 2 Various studies' comparison between TIC & HPE results has been shown.

Table 2: Comparing malignant or benign breast lump cases by Touch imprint cytology compared with HPE in various studies

Study	HPE		TIC	
	Malignant	Benign	Malignant	Benign
Klevesath MB et al, 2005 ⁽¹⁰⁾	82.81%	17.19%	80.46%	19.54%
Hiregoudar AD et al, 2006 ⁽¹¹⁾	47.5%	52.5%	52.5%	47.5%
Sivaprasad S et al, 2017 ⁽⁷⁾	85.19%	14.81%	79.62%	20.37%
Present study	62%	38%	60%	40%

In present study Out of 19 benign cases as per Histopathological Examination, 18 were correctly found benign with 1 false positive malignant finding on TIC. Whereas out of 31 malignant cases as per Histopathological Examination, 29 were correctly found malignant with 2 false negative benign findings on TIC.

So, Touch imprint cytology of the trucut biopsy specimen as a diagnostic investigation in breast lump has shown sensitivity of 93.55%, specificity of 94.74%, PPV 96.67%, NPV 90% and overall accuracy 94% in our study. In Table 3 Comparison of different studies showing sensitivity, specificity, PPV, NPV & Accuracy of TIC has been mentioned.

Table:3 Comparison of different study showing Sensitivity, Specificity, PPV, NPV & Accuracy of TIC of breast lump.

Study	Sensitivity	Specificity	PPV	NPV	Accuracy
KU NN et al, 1991 ⁽¹²⁾	100%	97.1%	-	-	97.7%
Khanna AR et al, 1991 ⁽¹³⁾	98.4%	100%	-	-	-
Veneti S et al, 1996 ⁽¹⁴⁾	97.1%	99.4%	-	-	-

Klimberg VS et al, 1999 ⁽¹⁵⁾	99.12%	98.34%	-	-	-
Klevesath MB et al, 2005 ⁽¹⁰⁾	96.2%	100%	-	-	-
Kulkarni D et al, 2009 ⁽⁸⁾	97.7%	94.2%	93.1%	98.1%	95.5%
Abhijit D et al, 2009 ⁽¹¹⁾	95.24%	100%	100%	95%	-
Kehl S et al, 2014 ⁽⁹⁾	99%	100%	100%	94%	99%
Sivaprasad S et al, 2017 ⁽⁷⁾	91.3%	87.5%	97.6%	73.5%	90.7%
Present study	93.55%	94.74%	96.67%	90%	94%

V. CONCLUSION

Touch Imprint Cytology of trucut biopsy is a rapid, reliable and accurate method for early cytological diagnosis of symptomatic breast lesions. As well preserving tissue for further HPE & ER, PR status can double confirming diagnosis at low cost.

It's quick result help surgeon in deciding further surgical management or preoperative neoadjuvant chemo/radio therapy.

It can also be helpful to reduce patient anxiety in waiting for HPE report and an increase in diagnostic performance.

To conclude TIC of trucut biopsy is a sensitive method of detecting malignancies in breast tumors.

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