

Original Article

DIAGNOSTIC ACCURACY OF TOUCH IMPRINTS IN NEOPLASTIC BREAST LESIONS TAKING HISTOPATHOLOGY AS GOLD STANDARD

Farhana Ali, Faiza Bashir, Athar Ali, Shazad Shafqat Qureshi and Samra Sameen

Objective: To determine the diagnostic accuracy of touch imprints for differentiation of benign and malignant breast neoplasms taking histopathology as gold standard.

Methods: The study was conducted in the Department of Histopathology, Services Institute of Medical Sciences, Lahore. Fresh mastectomy specimens of all patients undergoing elective surgeries were examined. Specimen was bisected and touch imprints were made. The results were confirmed with paraffin sections. The Histopathological examination acted as gold standard for evaluating diagnostic accuracy of touch imprints.

Results: Cytohistological correlation revealed a sensitivity of 96%, specificity of 95%, positive predictive value of 96%, negative predictive value of 95% and diagnostic accuracy of 96% for Touch imprints.

Conclusions: Touch imprint cytology is a very useful modality as it is less expensive, reliable, cost effective and less time consuming. The diagnostic accuracy of TIC is comparable with that of frozen section having diagnostic accuracy of 96%.

Keywords: Touch imprints (TI), Diagnostic Accuracy, Breast neoplasms, Histopathologic correlation.

Introduction

Pakistan has the highest rate of breast cancer for any Asian population accounting for 40,000 deaths per year. Approximately one in nine of Pakistani women will suffer from breast cancer at some point in their lives.¹ The disease is curable if diagnosed early.¹ In 2005, over 212,000 new cases of invasive breast cancer were diagnosed.² The incidence of in-situ and small (less than 1cm) carcinoma has significantly increased, from 2% prior to 1970 to 20% of mammographically detected cancer, due to increased use of screening mammography over the last 25 years.² FNAC has its own limitations in terms of sensitivity and specificity. Many a times FNAC leads to a diagnosis that is suspicious but not confirmatory. The frozen section biopsy requires specialized equipment, which may not be always available. Therefore as an alternative to frozen section technique, imprint smears from these tumors are taken and stained with H&E.³ Imprint cytology does not require any specialized equipment, is less time consuming and the disadvantages of freezing the tissue and serial sectioning are avoided.⁴ In addition to determine specific pathology, touch imprints are also useful for evaluating the status of sentinel lymph nodes and lumpectomy margins in breast cancer patients.^{1,5} Immediate diagnosis of breast lesion is also useful for alleviating patient anxiety. Many

patients prefer to receive their results on the same day as their tests. Touch imprints could be an answer to this problem.⁶ Because imprint smears sample the entire surface of the specimen, is less time consuming and avoids the issues of specimen loss and freezing artifacts.^{7,8}

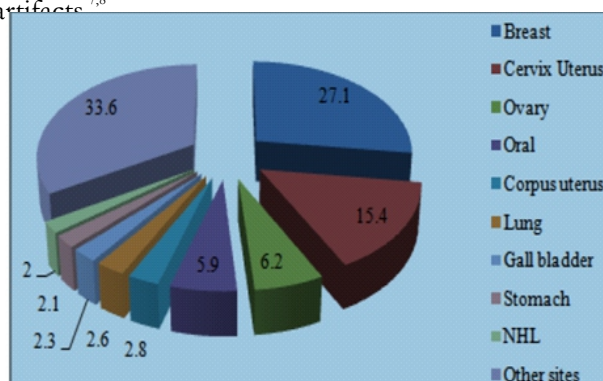


Fig-1: Incidence of various neoplasms in female, BREAST neoplasms are among the highest incidence.

Khanna reported a sensitivity of 98.4% and specificity of 100%; Scopa reported an accuracy rate of 94.3%.⁸ Shidham reported a strong favor for routine practice of imprint cytology during intra-operative consultation. Ku reported a sensitivity of 100%, sensitivity of 97.1% and a diagnostic accuracy of 97.7% for imprint cytology.^{8,9}

an alternative procedure to frozen section. Imprint cytology provide swift diagnosis to collect the data regarding the grade of the carcinoma for treatment decisions from a single procedure.¹⁰ In this study we determined the accuracy rate of touch imprints for differentiation of benign and malignant breast lesions.

Methods

This was a cross sectional study, conducted in Department of histopathology SIMS in collaboration with Surgery department of Services Hospital Lahore. Study was completed in 2 years (January 2014 to December 2015). 100 fresh tissue mastectomy specimens will be included for study received from surgical department of SIMS hospital, Lahore. Demographics of patients will be noted from the form. Specimen will be grossed; tumor was bisected to note the macroscopic features. Then the cut surface was pressed onto a clean glass slide and fixed in 95% methanol. Special emphasis was given to tumor bearing area. Rapid H&E staining was done. The imprints were interpreted by histopathologist and the results were confirmed by paraffin sections.

All the collected information will be entered into SPSS version 17. Age will be presented as mean±SD, gender will be presented as frequency and percentage. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of TI will be calculated by using 2x2 table taking histopathology as gold standard.

Results

From January 2014 to December 2015, 100 patients both male and female who underwent surgery for breast neoplasms were received for touch imprint cytology and histopathology.

Patient demographic is shown in **Table-1**, the mean age was 40 with maximum age of 78 and minimum age is 13. Among 100 patients 92 are female while 8 are male. Out of 100 cases 40(40%) cases were diagnosed as benign and 60 (60%) were diagnosed as malignant on histopathology as shown in **Table-2**.

The percentage and frequency of cases diagnosed as benign and malignant on TI were shown in **Table-3**.

On TIC out of 100 cases 39(39%) cases were diagnosed as benign while 60(60%) cases were diagnosed as malignant. 1(1%) case was unsatisfactory due to extensive adipose tissue was categorized in class-I in TIC, as C-I labeled as

Benign on TIC, which was later confirmed on histology as benign. So on TIC 40(40%) cases were diagnosed as benign.

On TIC 2 cases were found to be malignant which turned out benign on histopathology, and 2 cases were diagnosed as benign on TIC which confirmed malignant on histopathology. The overall diagnostic

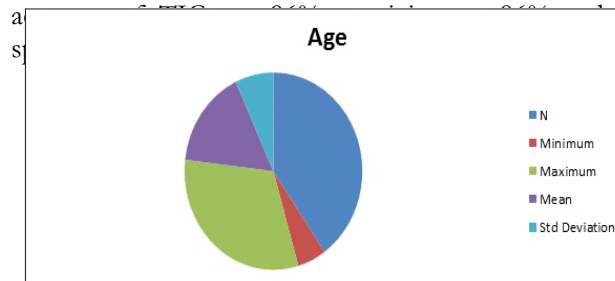


Fig-2: Age distribution.

	N	Minimum	Maximum	Mean	Std. Deviation
Age	100	13	78	40.20	17.326
Valid N	100				

Table-2: Histopathology diagnosis.

	Frequency	Percent	Valid Percent	Cumulative Percent
Benign	40	40.0	40.0	40.0
Malignant	60	60.0	60.0	100.0
Total	100	100.0	100.0	

Table-3: Touch imprint diagnosis.

	Frequency	Percent	Valid Percent	Cumulative Percent
Benign	40	40.0	40.0	40.0
Malignant	60	60.0	60.0	100.0
Total	100	100.0	100.0	

Table-4: Statistical analysis of all breast lesions.

Statistical Tests	No of Cases
Histological diagnosis	100
Touch imprint diagnosis	100
True positive (TP)	58
True negative (TN)	38
False positive (FP)	02
False Negative (FN)	02

Table-5: Sensitivity, specificity and diagnostic accuracy of TIC.

Sensitivity	96%
Specificity	95%
Positive predictive value (PPV)	196%
Negative Predictive Value (NPV)	95%
Accuracy	96%

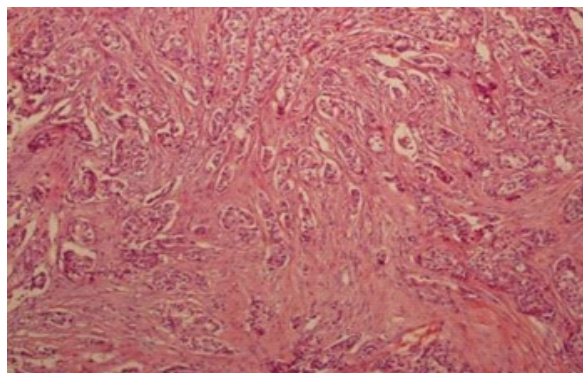


Fig-3: Infiltrating ductal carcinoma of breast H&E 40x.

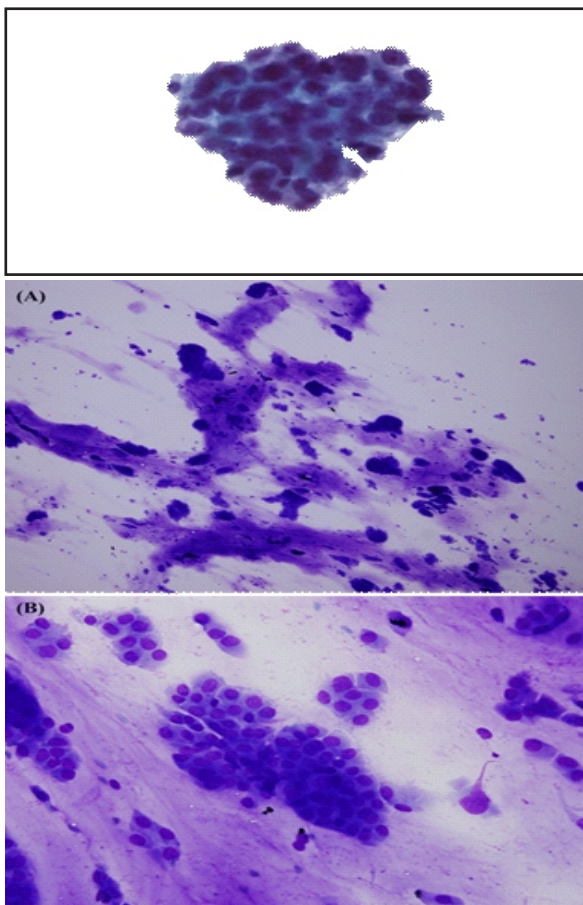


Fig-4: Touch Imprints of Ductal CA cells in female breast 40x.

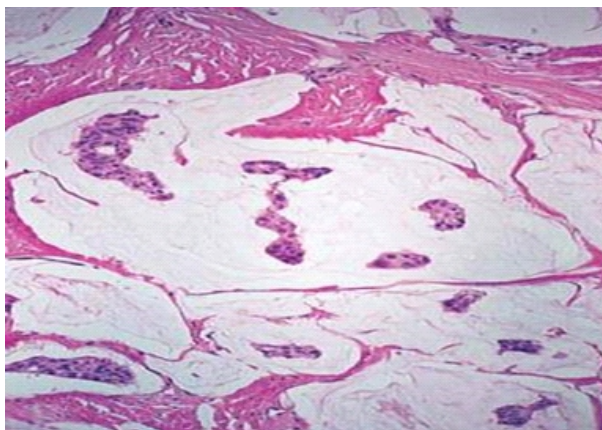


Fig-5: Touch imprints of ductal CA cells in female breast 40x.

Discussion

The study was conducted on 100 patients with breast neoplasms taking histopathology as gold standard. The rate of correct diagnosis of TIC is 96% which is higher than study conducted by Albert et al (95%)⁽⁴⁰⁾. The sensitivity of TIC is 96% and specificity is 95% which is again very encouraging and comparable to other international studies conducted by Scopa et al, Veneti et al etc.^{36/37} This is due to the better cellular details because of less drying artifacts that are major problem in frozen section. If I compare my results with that of frozen section according to different studies conducted in different parts of the world, the results are almost the same but in terms of expense. Imprint cytology does not require any specialized equipment, is less time consuming and the disadvantages of freezing the tissue and serial sectioning are avoided.⁸ In addition to determine specific pathology, touch imprints are also useful for evaluating the status of sentinel lymph nodes and lumpectomy margins in breast cancer patients.⁵ Immediate diagnosis of breast lesion is also useful for same day as their tests. Touch imprints could be an answer to this problem.⁶ because imprint smears sample the entire surface of the specimen, is less time consuming and avoids the issues of specimen loss and freezing artifacts.⁷

According to a study conducted by Khanna on touch imprints reported a sensitivity of 98.4% and specificity of 100%; Scopa reported an accuracy rate of 94.3%.⁸ Shidham reported a strong favor for routine practice of imprint cytology during intra-operative consultation. Zhang a Chinese pathologist reported a sensitivity of 80%, specificity of 87% and a diagnostic accuracy of 95% for imprint cytology.^{8,9}

In another

Study conducted by Kazuhiro and Takehiro in 2010, they reported sensitivity of 70% and specificity of 80% for touch imprints.¹¹

Touch imprint should be used for the assessment of at hand diagnosis of surgical margins, SLN and used as an alternative procedure to frozen section. Imprint cytology provide swift diagnosis to collect the data regarding the grade of the carcinoma for treatment decisions from a single procedure.³⁴

In my study there were 2 false positive result and that probably due to quality of touch imprints. There were only 2 false negative cases in my study one is that of Phylloides tumor and the other is invasive lobular carcinoma. Similar results found by Veneti et al,^{35,36} this is due to lack of clear cytological evidence of malignancy because of low cellularity or very small cells that could be easily missed on TIC. In case of Phylloides tumor which is a stromal neoplasm of breast, on TIC it appears to be large fibro adenoma. The final diagnosis was made on paraffin section. Similar results found in a study conducted by Ammar et al^{32,33}

The second false negative case was that of invasive lobular carcinoma which was missed on TIC due to scanty smear. This case strongly suggests that proper, careful and adequate sampling with correct

technique is essential to make proper diagnosis on TI. Similar results were found by Sohaibani et al.³⁴

In general when comparing the overall accuracy of TIC, it is not at all inferior to routine diagnostic procedures rather it should be used for at hand diagnosis of breast neoplasms with confidence.^{1,2} There is need to train pathologists for fully utilizing the effectiveness and usefulness of this simple but informative modality so that not only the expense load of Frozen section on patients could be alleviated but also minimize their anxiety level by giving them rapid, prompt and accurate diagnosis of disease.

Conclusion

Touch imprint cytology is a very useful modality as it is less expensive, reliable, cost effective and less time consuming. The diagnostic accuracy of TIC is comparable with that of frozen section. It's not only used for differentiation of benign and malignant lesions but can also be utilized for surgical resection margin clearance where its accuracy is higher than that of frozen section.

*Department of Pathology
SIMS/SHL,
www.esculapio.pk*

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Picture Quiz

- Q1: What machine is visible in the picture attached?
- Q2: What is it for?
- Q3: What are the major disadvantages of its use?
- Q4: Are there any legal implications of its use in Punjab?
- Q5: Can you name some of the health facilities in Punjab where such machines are installed?



See answer on page 103