Research Article

Utility of touch imprint cytology as an adjunct to core needle biopsy of breast lump

Amit Kumar Adhya* and Ranjan Mohanty

Hemalata Cancer Hospitals and research Centre, Bhubaneswar, Odisha, India

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Corresponding Authors Email: drnabarunkarmakar@gmail.com
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ABSTRACT

Background: Touch imprint cytology is an easy and rapid method of evaluation of cancers. It can be utilized as a rapid intraoperative method and on site evaluation of biopsy specimen. **Aim:** to evaluate the efficacy of touch imprint cytology in assessment of adequacy of needle core biopsy of breast lumps its diagnostic accuracy for malignancy. **Material and methods:** A total of 160 cases of core needle biopsies of breast lump were studied. In each case touch imprint were made and a cytological diagnosis was offered on site. The results were correlated with the final biopsy diagnosis. **Results:** Adequate and satisfactory material on touch imprint was obtained in 154 (96.3%) cases.A total of 132 (82.5 %) cases were diagnosed as malignant and 21 (13.1 %) cases were diagnosed as benign on touch imprint cytology. Three cases (1.9%) were inconclusive, as the cells were obscured with inflammatory cells or there were crush artefacts. Overall sensitivity of TIC was 98.3 %, specificity was 70.3 %, positive predictive value was 93.8 %, negative predictive value was 90.4 % and accuracy was 90.2%. In 135 (88.2%) cases, a specific diagnosis regarding the exact histological subtype of the breast lesion could be provided. **Conclusions:** Touch imprint cytology of core needle biopsy specimens of breast lump yields adequate and satisfactory diagnostic material. It can be used routinely at the site of biopsy to evaluate the adequacy of material obtained during core needle biopsy. Touch imprints gives rapid and fairly accurate diagnosis of malignancy and subtyping of tumor is also possible.

Key words: breast lump, core needle biopsy, touch imprint cytology, accuracy

INTRODUCTION

Evaluation of breast lumps includes clinical examination, mammography and tissue diagnosis. There are various methods of tissue diagnosis such as fine needle aspiration cytology or core needle biopsy. Fine needle aspiration cytology is easy perform and yields satisfactory results. However in cases where FNAC is unsatisfactory or the diagnosis is not clear, needle core biopsy of breast lumps is required. Needle core biopsy may be done with or without radiological guidance. The adequacy of the biopsy cannot be assessed during the procedure by visual inspection only. Many researchers have utilized the method of touch imprint cytology to evaluate the cellular adequacy of needle biopsy. [1, 2] Touch imprint cytology is a very simple method of transferring the cells from the tissue core to the slides and evaluating the stained preparation of the same under light microscope. Touch imprint cytology has also been used for diagnosis of cancers of various sites [1, 2], evaluation of sentinel lymph node biopsy [3] an intraoperative procedure and post mortem studies [4]. In this study we intend to evaluate the efficacy of touch imprint cytology in assessment of adequacy of needle core biopsy of breast lumps and to assess its diagnostic accuracy for the presence of malignancy.

MATERIALS AND METHODS

The study was conducted in the department of pathology, Hemalata Cancer institute and research Centre, during the period of December 2008-october 2016. The study was conducted after obtaining informed consent from all patients and after ethical clearance from local governing body. We received 160 core needle biopsies of breast lumps. The biopsies were done in cases where

FNAC yielded an equivocal result or mammographic and FNAC results were not correlating or in locally advanced breast cancers for study of prognostic markers by immunohistochemistry was required.

In all the cases, touch imprints were obtained by gently pressing the fresh unfixed tissue to clean glass slides. At least four imprint smears were made in each case avoiding blood and mucus. Two of the smears were air dried and two were immediately fixed in isopropyl alcohol for 15-20 minutes. The air dried smears were stained with May Grunewald Geimsa stain and the alcohol fixed smears were stained with Hematoxyline and Eosin by the standard methods.

The tissue was then put in formalin and submitted for routine histopathological study. All the slides were assessed for quality of preparation and degree of diagnostic accuracy by comparing them with their corresponding histopathological sections.

A point score was used for quality assessment as follows:

0-suboptimal cellularity or distorted morphology where no opinion was possible

1-At least 2 clusters of 10 cells each and well preserved cell morphology where a definite opinion was possible.

Diagnostic accuracy score of TIC:

0- incorrect diagnosis

1- correct diagnosis with respect to benign and malignant but specific histological sub typing not done

2- correct and specific diagnosis given regarding histological subtype

Each of the cases was assigned a score based on the specimen adequacy and diagnostic accuracy for statistical analysis.

A diagnosis of malignancy on TIC was considered as true positive if the final diagnosis on biopsy evaluation was positive for malignancy. Similarly a diagnosis of benign lesion on TIC was considered true negative if the final diagnosis was benign on biopsy. A diagnosis of malignancy given on TIC if found to be benign on biopsy then it was considered as false positive. A diagnosis of benign lesion on TIC if found to be malignant on biopsy was considered to be false negative. Based on these findings, the overall sensitivity, specificity, positive predictive value, negative predictive value and accuracy of TIC diagnosis were evaluated.

RESULTS

A total of 160 cases of breast lump were studied. The age of the patients ranged from 26 to 73 years with a mean of 54 yrs. Adequate and satisfactory material on touch imprint were obtained in 154 (96.3%) cases. The 4 cases where inadequate material was obtained was reported as “inadequate for opinion”. Repeat biopsies were obtained from the lesion which was found to be adequate. The various diagnosis offered on touch imprint cytology are shown in table 1.

Table 1: list of all the diagnosis given on touch imprint cytology

Diagnosis given of TIC	number of cases	%age
Invasive Breast Carcinoma	**99**	**61.9**
Mucinous Carcinoma	**7**	**4.4**
Lobular Carcinoma	**8**	**5.0**
Fibroadenoma	**7**	**4.4**
Fibroadenosis	**14**	**8.8**
Suspicious Of Malignancy	**12**	**7.5**
Inconclusive	**3**	**1.9**
Inadequate For Reporting	**4**	**2.5**
Positive For Malignancy(Exact Categorization Not Given)	**6**	**3.8**
Total	**160**	**100.0**

A total of 132 (82.5 %) cases were diagnosed as malignant and 21 (13.1 %) cases were diagnosed as benign on touch imprint cytology. Three cases (1.9%) were inconclusive, as the cells were obscured with inflammatory cells or there were crush artefacts. These four cases were also excluded from the final statistical analysis. Also the cases where repeat biopsy was required (n=4) were also excluded from the analysis of diagnostic accuracy. Out of the rest 153 cases, we found a total of 122 (79.7 %) true positive diagnosis, 19 (12.4 %) true negative diagnosis, 10 (6 %) false positive and 2 (1.3 %) false negative cases. [Table 2]. Overall sensitivity of TIC was 98.3 %, specificity was 70.3 %, positive predictive value was 93.8 %, negative predictive value was 90.4 % and accuracy was 90.2%.

In 135 (88.2%) cases, a specific diagnosis regarding the exact histological subtype of the breast lesion could be provided which were later confirmed on biopsy to be correct.

Table 2: table showing the comparison of TIC diagnosis and final biopsy diagnosis

Diagnosis given on touch imprint cytology		Final diagnosis on biopsy	
		malignant	benign
Malignant	132	122	10
Benign	21	2	19
Total	153	124	29

Table 3: Comparison of present study with previous studies

Authors	Year of study	No. of cases	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)
Green et. al. [10]	2001	96	92.3	98	96	96.5	96.2
Klevesath et. al. [2]	2005	128	96.2	100	-	-	96.7
Masood et. al. [11]	2011	437	95	96	91	97	95
Kehl et. al. [9]	2014	158	99	100	100	94	99
Kubik et. al. [1]	2015	252	96	74	92	87	91
Schulz et. al. [13]	2016	173	77.5	95.9	97.8	65.5	82.8
Our study	2016	160	98.3	70.3	93.8	90.4	92.2

PPV: Positive predictive value, NPV: Negative predictive value

DISCUSSION

Touch imprint cytology for diagnosis of cancer was first described by Dudgeon and Patrick in 1927. [5]Since then it has been used by many investigators to evaluate sentinel node in breast cancer [3], mucosal cut margins in oral cancer [6] and as an adjunct to intraoperative frozen section [7].

Touch imprint cytology is a very cheap and rapid method of evaluation of biopsy material and has proven to be fairly accurate for diagnosis of cancer. Kubiket. al [1] has studied the utility of touch imprint cytology as an adjunct to core needle biopsies of tumors of various sites such as lungs, liver, prostate and found a diagnostic accuracy of 91 %. Another similar study by Moghadamfalahi et.al. [8] has also shown a very high sensitivity, specificity and diagnostic accuracy of touch imprint cytology of CT guided core biopsies obtained from various sites such as liver, lungs and soft tissue masses.

In the present study we evaluated 160 cases of breast lumps. Touch imprint cytology was obtained in each case which was stained with MGG-Geimsa stain and Hematoxyline and Eosin stain. These two stains complement each other as MGG-Geimsa brings out the cytoplasmic character of cells whereas alcohol fixation in H and E stain brings out the nuclear character better. In four cases the imprint did not show any cells and thus were inadequate. Immediately the core needle biopsy was repeated and satisfactory material was obtained. Thus TIC evaluation performed on site helped to assess the adequacy of core biopsy and prevented delay in diagnosis due to inadequate material on biopsy.

Adequate material was obtained in rest of the cases. In 135 (88.2%) cases an exact diagnosis regarding histological subtype such as Invasive breast carcinoma, mucinous carcinoma, lobular carcinoma, fibro adenoma and benign breast disease could be provided. In 6 (3.2%) cases a diagnosis of malignancy was given but the exact sub categorization could not be made. These cases were found to be poorly differentiated invasive breast carcinoma (n=4), undifferentiated sarcoma (n=1) and 1 case of non-Hodgkin Lymphoma of breast.

In the present study we found 10 false positive cases and 2 false negative cases. Final biopsy evaluation of the false positive cases showed atypical ductal hyperplasia (n=3), High grade ductal carcinoma in situ (n=3), inflammatory epithelial atypia nearby abscess site (n=2) and proliferative breast disease (n=2). The 2 false negative cases showed small foci of invasive carcinoma within mostly desmoplasticstroma on biopsy. In 12 (7.8%) cases a conclusive opinion regarding malignancy could not be given on TIC and were reported as suspicious of malignancy. They showed mild to moderate nuclear atypia however there was no conclusive evidence of invasion. Ten of these cases were found to be malignant on subsequent biopsy evaluation.

In the present study the sensitivity of TIC was found to be 98.3% which is similar to the previous studies of Kehlet. al [9] and Klevesath et. al. [2]. The specificity was found to be 70.3 % which is lower

than the previous studies by Green et. al [10] and Masood et. al. [11]. However the positive predictive value of 93.8 % and negative predictive values of 90.4 % of TIC found in our study indicate that it can be used as an adjunct to core needle biopsy of breast lesions in routine practice. Moreover the overall diagnostic accuracy of 92.2 % of TIC in breast lesion makes it highly acceptable as a tool for diagnosis of breast lumps. The diagnostic accuracy is similar to the findings of previous investigators. [Table 3]

In 12 (7.5%) cases a diagnosis of suspicious of malignancy was given on TIC. Ten of these cases were found to be malignant on subsequent biopsy evaluation. This is similar to the overall suspicious rate of 5.5 % reported by Qureshi et. al. [12]This is a limitation of cytological evaluation.

In conclusion, the present study showed that touch imprint cytology of core needle biopsy specimens of breast lump yields adequate and satisfactory diagnostic material. It can be used routinely at the site of biopsy to evaluate the adequacy of material obtained during core needle biopsy, thereby ensuring timely diagnosis and preventing the need for repeat biopsy later on. Touch imprints gives rapid and fairly accurate diagnosis of malignancy and subtyping of tumor is also possible. Hence patient can be immediately counselled and prepared for further management without the need to wait for days to obtain tissue diagnosis of biopsy material.

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