IJPRP

Indian Journal of Pathology: Research and Practice 8(5) September - October 2019
DOI: http://dx.doi.org/10.21088/ijprp.2278.148X.8519.27

Original Research Article

Correlation Between Imprint Cytology and The Histopathology of Breast Lesions

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Received on 31.05.2019,

Accepted on 11.07.2019

Abstract

Background: imprint cytology is a rapid and an accurate way for diagnosis of lesion especially in developing countries in the intraoperative setting where the facility of frozen section is not available. It is very accurate in differentiating between benign and malignant lesions and helps the surgeon to decide the future course of the surgery. *Aims:* to compare the accuracy of intraoperative imprints made with that of the histopathology Kal sections in breast lesions. *Materials and methods:* study of 50 cases of breast lesions were done at a tertiary care center comprising of the complete spectrum ranging from benign to malignant region and the findings were correlated with histological findings. *Statistical methods:* sensitivity, positive predictive value, negative predictive value, and specificity was calculated. *Results:* Our study included 50 benign and malignant lesions of the breast. On imprint cytology 17 cases were positive for malignancy, 28 cases were negative for malignancy and 5 cases were suspicious for malignancy. No false positive case was reported. All 5 cases which were reported as suspicious for malignancy were reported malignant on histopathology done after surgical biopsy. In the present study diagnostic sensitivity and specificity of imprint cytology was 77.28%, 100% respectively. There were 0% cases of false positive and 10% case of false negative. The negative predictive value was 84.84% and the positive predictive value was 100%. *Conclusions:* intraoperative imprint cytology is a very accurate tool in differentiating between benign and malignant lesions and can be easily applied in resource-poor and developing countries where the facility of the frozen section may not be available.

Keywords: Activated partial thromboplastin time; Platelet count; Prothrombin time; Type II Diabetes mellitus; SMIMER hospital Surat

How to cite this article:

Neil Sharma, Manoj Sharma. Correlation Between Imprint Cytology and The Histopathology of Breast Lesions. Indian J Pathol Res Pract. 2019;8(5):690–696.

Introduction

Breast lumps are one of the commonest complaints encountered in surgical OPD and represent 20% of all malignancies among females.[1]

Breast cancer is one of the most common cancer globally accounting for 1.38 million cases in a year. It accounts for 15% of Cancer mortality is in the female. The number of cases of breast cancer has been increasing in recent times specifically in developing countries in Asia like India. India reports roughly 1 lakh new cases annually, these figures are taken from National Cancer Registry and the hospital-based tumor registry and they do not adequately sample the total population.[2]

Use of intraoperative imprint smears in a resource-poor country like India where frozen section facility is not available many times, imprint cytology provides a simple accurate rapid and cost-effective Diagnostic tool. The imprint allows the examination of individual cells yet preserves to some extent histological pattern of the imprinted tissue.

The accuracy of imprint has been increasing within an average accuracy of (92–94)% in past having reached (97–98) percent in recent years.[3]

Aims and objectives

To assess the efficacy of imprint cytology in detecting the benign and malignant lesions of breast intraoperatively and to calculate sensitivity, specificity, positive and negative predictive values.

Correlate the findings of imprint cytology with the histopathological findings of surgical biopsy.

Materials and Methods

The study was done from January 2015 to September 2016 at Mahatma Gandhi Medical College. The study was done on 50 patients who are operated during this period.

All type of lesions were included whether malignant or benign. The imprints were stained with MGG and HE whereas histopathology smears were stained with HE.

The imprint smears were categorized as benign, malignant and probably malignant.

Results

A total number of 50 patients were included in this study and consent was taken before a surgical biopsy in Mahatma Gandhi Medical College Jaipur

Our study included 50 benign and malignant lesions of the breast. On imprint cytology 17 cases were positive for malignancy, 28 cases were negative for malignancy and 5 cases were suspicious for malignancy. No false positive case was reported. All 5 cases which were reported as suspicious for malignancy were reported malignant on histopathology done after surgical biopsy.

All the cases which were negative for malignant cells on imprint cytology showed benign appearing ductal cells with acute inflammatory cells in the background. The nucleus of normal size, no hyperchromasia or nuclear pleomorphism was seen. There was no increase in the N:C ratio.

Fig. 1: The method of taking imprint from the specimen

All the malignant cases revealed loose clusters and isolated cells with large hyperchromatic nuclei and marked nuclear pleomorphism. There were enlarged nuclei with high N:C ratio confidentially ascertain

All the 5 suspicious cases on imprint cytology had low cellularity with a large amount of inflammation. Cells showed only mild pleomorphism and hyperchromasia, so we could not confidentially ascertain the malignancy. Out of these 5 suspicious cases, 3 cases were diagnosed as intraductal carcinoma and 1 was diagnosed as medullary carcinoma and 1 was diagnosed as intralobular carcinoma on histopathology.

In the present study 70% (n=35) cases were undergone lumpectomy while 30% (n=15) were undergone mastectomy.

In the study conducted majority of cases were diagnosed as Intraductal carcinoma i.e., 36% (n=18), followed by fibroadenoma i.e., 30% (n=15), fibrocystic disease i.e., 16% (n=08), phyllodes tumor i.e., 04% (n=2), intralobular carcinoma i.e., 04% (n=2), medullary carcinoma i.e., 04% (n=2), benign inflammatory lesion i.e., 02% (n=1), chronic mastitis i.e., 02% (n=1) and non residual tumor 02% (n=1).

In the study out of 50 cases with breast lesions, 28 were positive for benign lesions i.e., 56%, 17 were positive for malignancy i.e., 34% and 5 were suspicious for malignancy i.e., 10%

In the present study out of 50 cases, histologically 28 were benign i.e., 56% and 2 were malignant i.e., 44% whereas on imprint cytology 28 cases were benign i.e., 56%, 17 were malignant i.e., 34% and 5 cases i.e., 10% were suspicious for malignancy. No false positive case was reported.

Out of 50 cases including both benign and malignant lesions 17 cases were found to be positive on both histology and imprint cytology. 28 cases were found to be negative on both histology and imprint cytology. 5 cases were found to be suspicious imprint cytology and were considered as false negative. Though not a single case of false positive was found in the study conducted.

In the study conducted the sensitivity of imprint cytology was 77.28% and specificity was 100%. The negative predictive value was 84.84% and the positive predictive value was 100%.

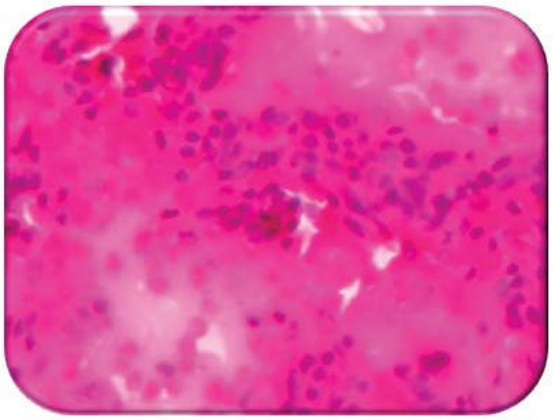

Fig. 2: Benign Cells arranged in sheets on important cytology suggestive of benign lesion (10x)

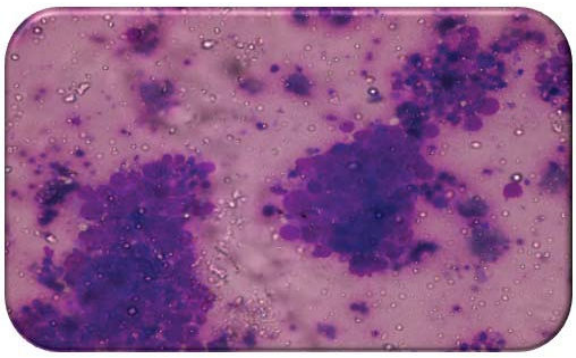

Fig. 3: Malignant cells with high N:C ratio suggestive of malignancy on imprint cytology (10x)

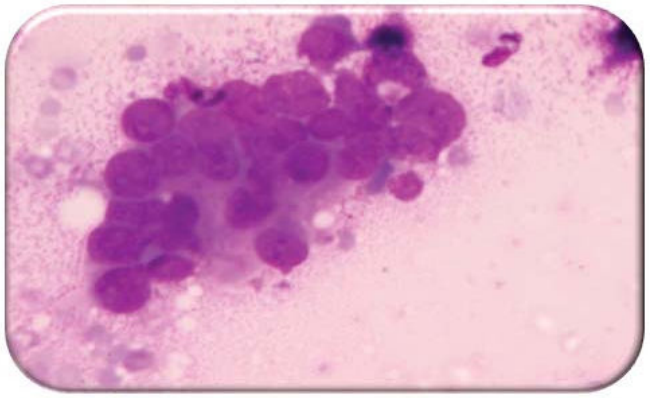

Fig. 4: Malignant cells with high N:C ratio suggestive of malignancy on imprint cytology (40x)

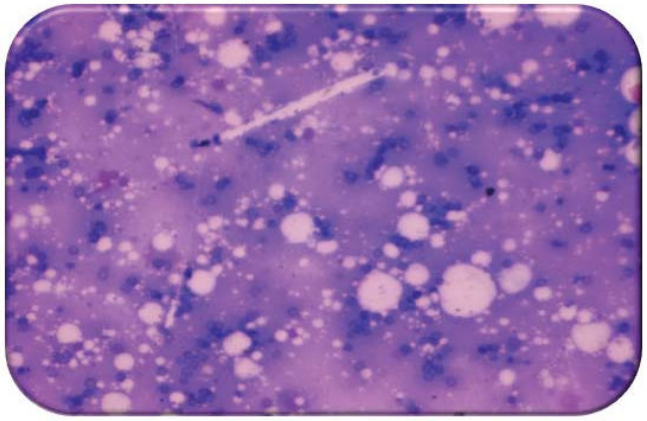

Fig. 5: Benign cells with adipose tissue on imprint cytology (10x)

Discussion

Lesions of the breast are commonly encountered in routine clinical practice. Even though FNAC, mammography, and ultrasonography are routinely used for diagnostic purposes in breast lesions, the distinction between the benign and malignant lesions cannot be made out in some of the cases.

In the present study imprint smears from breast specimens were collected for interpretation. Since histopathology is considered the gold standard for diagnosis, the imprint smears of 50 breast specimen samples were compared with it.

In the present study the maximum number of breast cases were seen between the age of 31 to 40 years that is a percentage of 26%, Whereas a study done by Gabriel E Njeze in the year 2014 on 165 breast cases, the maximum number of breast lesions were found between the age group of 21 to 30 years old i.e., 31% of the lesions.[4] Study done by Siddiqui *et al*. in the year 2003 on 3279 breast cases the maximum number of lesions were found between the age group of 40 to 49 years old.[5]

The present study shows that 54% of the lesions were present in the right breast whereas 44% of lesions were present in the left breast and 2% percent occurred in the bilateral breast. Whereas according to the study done by Dayanand V on 1285 breast cases in the year 2015 involvement of right breast was seen in 234 cases (53.9%), the left breast in 199 cases (45.9%) and both breasts in one case only making the present study comparable to the study done by Dayanand V *et al*.[6]

The study done by Gabriel E Njeze year 2014 on 165 breast cases found that 43.5% of the tumors occurred on the right side and 45% of the tumors occurred on the left side and 11.5% of the tumor was bilateral.[4] The number of lesions on the left breast is almost comparable with the present study and that with the bilateral breast is very much lower in the present study.

As per the present study, 70% of the cases were negative for any lymphadenopathy and 30% of cases were positive for lymphadenopathy. According to a study done by Dayanand V on 1285 breast cases in the year, 2015 (55.4%) cases had positive lymph nodes for metastatic deposits, and 188 cases (44.6%) had negative lymph nodes.[6] Whereas study done by Siddiqui in the year 2003 on 3279 breast cases showed that 40% of the cases for positive lymphadenopathy and 60% of the cases were negative for lymphadenopathy that's making it almost comparable to our present study.[5]

As per the present study number of lumpectomy, cases were 70% and the number of mastectomy cases was 30%. In a study done by Siddiqui in the year 2003 on 3279 breast cases, there were 775 (23.63%) mastectomy and 1060 (32.32%) lumpectomy specimens. In 1444 (43.36%) cases the specimens were labeled as breast tissue, which included core biopsies, tissue blocks for hormone receptor studies and prognostic markers.[5] A study done by Dayanand V on 1285 breast cases in the year 2015 found that Out of 1285 breast specimens there were 425 (33.07%) mastectomy and 860 (66.92%) lumpectomy specimens which is almost similar to present study conducted.[6]

In a study done by Xue F in the year, 2011 on 111 140 women 52% women had smoking habits whereas 48% didn't.[7] In the present study, it was found that 10% of the women had smoking habits and 90% of the women did not have smoking habits. This disturbance found between our study and the above studies may be due to the fact that the above studies are from the west where smoking is higher among women compared to that of the Indian women.

Study done Thonning Olesen P in 2008 on 79729 women found that 15% of the women were tobacco user whereas in our study it was found that 26% of the women were tobacco users, the higher incidence of tobacco use found in our study as compared to that of the above study is due to the fact that tobacco chewing is a common habit in India compared to West where smoking is a much more common habit and much more common way of consumption of tobacco.

A study done by Xue F in the year 2011 on 111 140 women found that 15% of women had a family history of breast cancer where is our study found that 22% of the women had a history of breast cancer.[7] Both the studies show that family history of breast cancer is of importance.

Table 1: Comparison of the distribution of Benign and Malignant Lesions Diagnosed by Imprint Cytology

Sl. No.	Study Group	Benign (%)	Malignant (%)	Suspicious (%)
1	Hiregoudar *et al.*[8]	50	50	0
2	Al-Rikabi *et al.*[9]	56	44	0
3	Present study	56	34	10

In the present study there were 56% cases of benign lesions and 34% cases of malignant lesions in imprint cytology whereas 10% cases were found to be suspicious The percentage of malignant lesions diagnosed by imprint cytology in the present study is lower than Hiregoudar *et al.*[8] and Al- Rikabi *et al.*[9] whereas The percentage of benign lesions diagnosed is comparable to Al- Rikabi *et al.* but higher than Hiregoudar et but both of the studies did not report any suspicious cases on imprint cytology (Table 1).

Table 2: Comparison of the distribution of Benign and Malignant Lesions Diagnosed by Histopathology

Sl. No.	Study group	Benign (%)	Malignant (%)
1	Dayanand V[6]	66.2	33.8
2	Abdul Rasheed[10]	77.7	22.3
3	Present study	56	44

In the present study, the total percentage of benign lesions were found to be 56% which is lower than that found by Dayanand V[6] and Abdul Rasheed[10] And the number of malignant lesions were found to be 44% which was higher than the found by Dayanand V[6] and Abdul Rasheed[10]. Cytology in various Breast Imprint Smear (Table 2).

Table 3: Comparison of Statistical Parameters of Imprint Cytology in Various Breast Imprint Smears

S. No.	Study Group	Year	No. of Cases	No. F. Pos	No. F. Neg	Sensitivity	Specificity
1	Rosa *et al.*[11]	1993	407	0 (0%)	7 (1.72%)	97.60%	99.40%
2	Veneti *et al.*[12]	1996	351	1 (0.28%)	5 (1.4%)	97.10%	99.40%
3	Scucchi *et al.*[13]	1997	1197	0 (0%)	9 (0.75%)	97.50%	100.00%
4	Albert *et al.*[14]	2000	173	3 (1.7%)	4 (2.3%)	96.50%	90.00%
5	Creager *et al.*[15]	2002	137	15	20	80.00%	85.00%
6	Khudier *et al.*[16]	2006	107	0 (0%)	1 (0.99%)	96.30%	100.00%
7	Present Study	2016	50	0 (0%)	05 (10%)	77.28%	100.00%

In the present study, diagnostic accuracy, sensitivity, specificity, false positive and false negative values were determined by comparing imprint cytological diagnosis with the final histopathological diagnosis.

In the present study diagnostic sensitivity and specificity of imprint cytology was 77.28%, 100% respectively. There were 0% cases of false positive and 10% case of false negative (Table 3).

Suspicious for malignancy on imprint cytology was found in [5] cases, three of them were Infiltrating duct carcinoma, one case of infiltrating lobular carcinoma, and one case of medullary carcinoma. There were no false positive cases in all imprints taking; a similar finding was seen by other investigators. This is probably because of the clear morphological features, adequate samples or results enhanced by using intraoperative cytology coupled with a gross examination of surgical specimens.

Three cases of invasive ductal carcinoma were considered as suspicious due to the paucity of cellular material, and the lack of definite malignant characteristics.

This difference may be due to a higher number of cases in the previous studies compared to the current study, this allows the pathologist to gain good experience and confidence in the technique, another reason is the use of scraping method with imprinting.

Conclusion

The incidence of breast cancer is rising in the world especially in developing countries such as India. The most prevalent cancer in the world today is breast cancer. In India it stands on second position after cervical carcinoma. Breast lesions which are more common in the females have gained increasing importance and attained global attention because of increasing mortality and morbidity caused by breast cancer. Early detection is the only way to lessen its impact on life especially in case of breast cancers as it is extremely common.

Breast cytology is generally considered to be a part of initial assessment of breast lesions. It is also used as an adjunct to frozen section in paraffin section histology to assist in reaching a diagnosis.

Imprint cytology is a rapid and inexpensive diagnostic procedure which is being used for the diagnosis of lesions at various sites in the body.

Preoperative diagnosis has many advantages and can be facilitated by exfoliative and non exfoliative cytology. Imprint cytology allows cytological techniques to be used for the examination of individual cells yet preserves to some extent the histological pattern of the imprinted tissue.

Imprint cytology is a simple, accurate, rapid & cost effective diagnostic tool. Imprints are prepared from fresh surgical specimens give excellent cytological clarity. To increase the diagnostic accuracy, the combined use of imprints and frozen sections are recommended. As a diagnostic method it lies between cytological smear techniques and routine histopathological sections.

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