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# Diagnostic efficacy of Frozen Section and Scrape cytology in intraoperative diagnosis of breast and ovarian Neoplasms

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## ABSTRACT

**Abstract** - Scrape cytology is a great tool to optimize intraoperative diagnosis along with frozen section examination.
Frozen section requires costly equipment, skilled technicians and a rather long learning curve against scrape cytology where all this is not a requirement.
In centres with unavailability of frozen section facility, scrape cytology alone can be a very cost effective, easy and quick tool for intraoperative diagnosis.
This paper focuses on the lesions of breast and ovary occurring in female population where early diagnosis can aid in optimal surgical management.

**Keywords:** Scrape , Frozen, Breast, Ovary

## INTRODUCTION

Gynaecological neoplasms are among the most common cancers in female population worldwide, including India[1] .
Various new advances have been made to diagnose gynaecological pathologies which include scrape cytology and frozen sections in addition to the gold standard histopathological techniques.[1]
Frozen sections are used in gynaecological practices mostly to help in differentiating between benign and malignant diseases.[1]
This stands true for breast neoplasms also.
A composite techniques of frozen section and scrape cytology can aid in in time diagnosis of breast lesions, sentinel node for metastasis and also margin status in breast preservation surgeries, which can prevent multiple and extensive surgeries.
Imprints and scrapes prepared from fresh surgical specimens give much better cytological clarity compared to Fine needle aspiration cytology as they are taken from the exact lesion seen during grossing and does not alter the utility of the specimen for subsequent Frozen section or histopathological examination.[2]
The frozen section method was standardized in 1905 by Dr. Louis B Wilson. It provides the information on the depth of infiltration of tumour. It is less time consuming but is limited by its cost, special instruments the need for qualified technical staff and the freezing like artefacts.[2]
Unavailability of expensive frozen sectioning equipment and qualified technical staff in every regional and peripheral rural hospitals makes scrape cytology a better alternative during intraoperative procedures wherever necessary.
It also decreases the burden of tertiary care centres and facilitates early diagnosis and prevents unnecessary surgical procedures.
A comparative diagnostic evaluation is needed to establish the utility of scrape cytology vis-a-vis frozen sections.[3]
In this study we will compare the efficacy of scrape cytology to frozen section and their accuracy with histopathology as gold standard.

## MATERIALS AND METHODS

This was a prospective observational study of all the frozen section specimens of breast and ovary that came to Department of Pathology, MGM medical college and hospital, Chhatrapati sambhajinagar.

A total of 40 cases, studied over a span of eight months from June 2023 to January 2024, were included in the study after clearance from Institutional Ethical Committee.

- The specimens were properly labelled, and their detailed gross examination was done.
- Slides were made by lightly scraping or brushing cells from freshly cut surface of the surgically removed specimens followed by rapid H&E and Rapid Pap staining.
- Then sections of 5 mm thickness were taken for frozen sections
- Separate diagnosis was made on scrape cytology and frozen section by pathologists for diagnosis.
- Category-based analysis was done to differentiate between benign or malignant lesions, and a definitive diagnosis was made wherever possible.
- The tissue sections were further processed for paraffin block preparation, which then underwent embedding, cutting and hematoxylin and eosin staining and studied under the microscope.

The data was compiled, and statistical analysis was done.

The present study was further compared with other similar studies.

## INCLUSION CRITERIA

All gynecological and breast surgical specimens with clinical or radiological suspicion of neoplasia sent for frozen section to Department of Pathology, MGM Medical college and hospital were included in the study.

## EXCLUSION CRITERIA

All specimens other than ovarian and breast specimens including lymph nodes and renal neoplasm that came for frozen section examination.

Specimens that underwent neoadjuvant therapy will be excluded from the study.

## RESULTS

Ovary:

Scrape Diagnosis Method: The Scrape Diagnosis method demonstrates excellent sensitivity and specificity, both at 100.0%. This indicates that the Scrape Diagnosis method is highly accurate in both correctly identifying cases where ovarian conditions are present and correctly excluding cases where they are absent.

Frozen Section Method: While the Frozen Section method also shows high specificity at 100.0%, its sensitivity is notably lower at 66.67%. This suggests that while the Frozen Section method is reliable in ruling out cases where ovarian conditions are absent, it may miss a significant proportion of true positive cases, potentially leading to false-negative results.

Breast:

Scrape Diagnosis Method: Similar to the Ovary, the Scrape Diagnosis method exhibits excellent sensitivity at 100.0%, indicating its ability to accurately detect breast conditions when they are present. However, its specificity, though still high at 88.89%, is slightly lower compared to the Ovary, suggesting a slightly higher rate of false positives.

Frozen Section Method: The Frozen Section method shows identical sensitivity and specificity values to the Scrape Diagnosis method for diagnosing breast conditions, both at 100.0% and 88.89%, respectively. This suggests that the Frozen Section method performs comparably well to the Scrape Diagnosis method in accurately identifying both positive and negative cases.

| **Category on Histopathology** | **Ovary** | **Breast** | **Total no. of cases** | **Percentage** |
|---|---|---|---|---|
| Benign | 14 | 9 | 23 | 57.5 |
| Malignant | 3 | 14 | 17 | 42.5 |

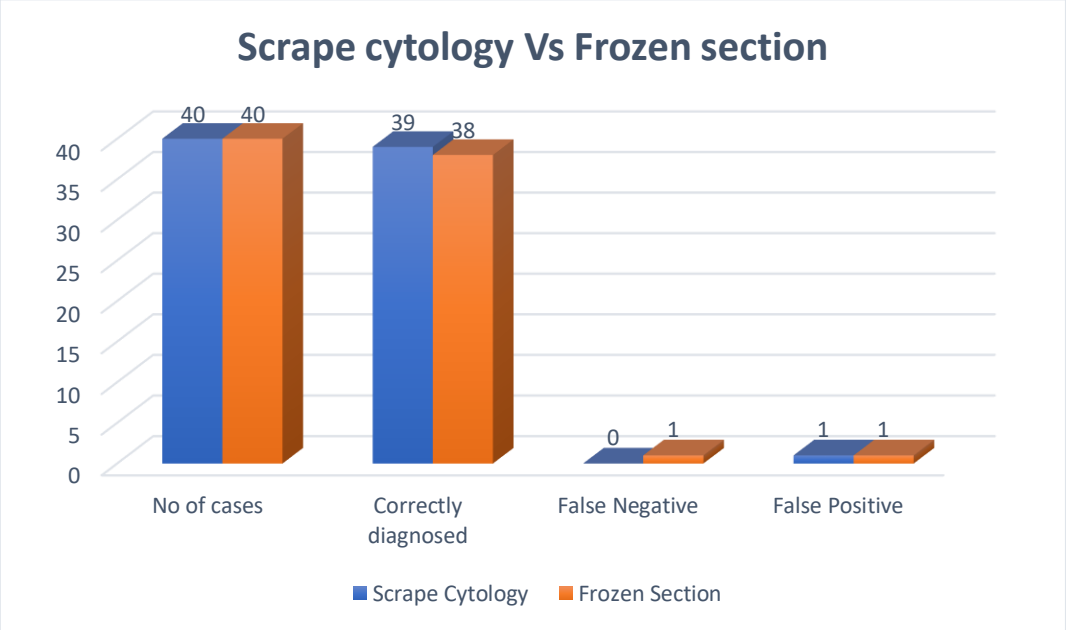
| | | | | |
|---|---|---|---|---|
| **Total** | 17 | 23 | 40 | 100 |

Scrape

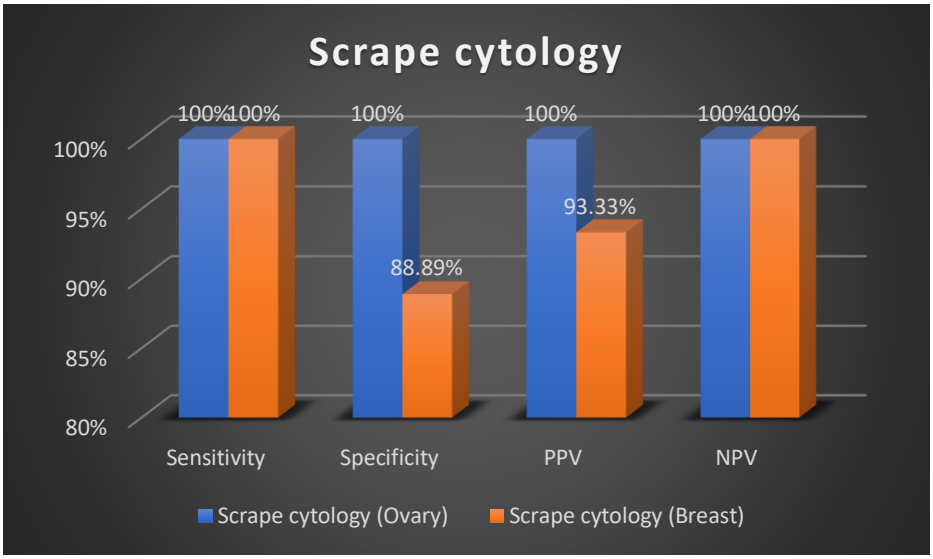
| Organs | No of cases | Correctly diagnosed | False Negative | False positive | Accuracy |
|---|---|---|---|---|---|
| Ovary | 17 | 17 | 0 | 0 | 100% |
| Breast | 23 | 22 | 0 | 1 | 95.65% |
| | 40 | 39 | 0 | 1 | 97.5% |

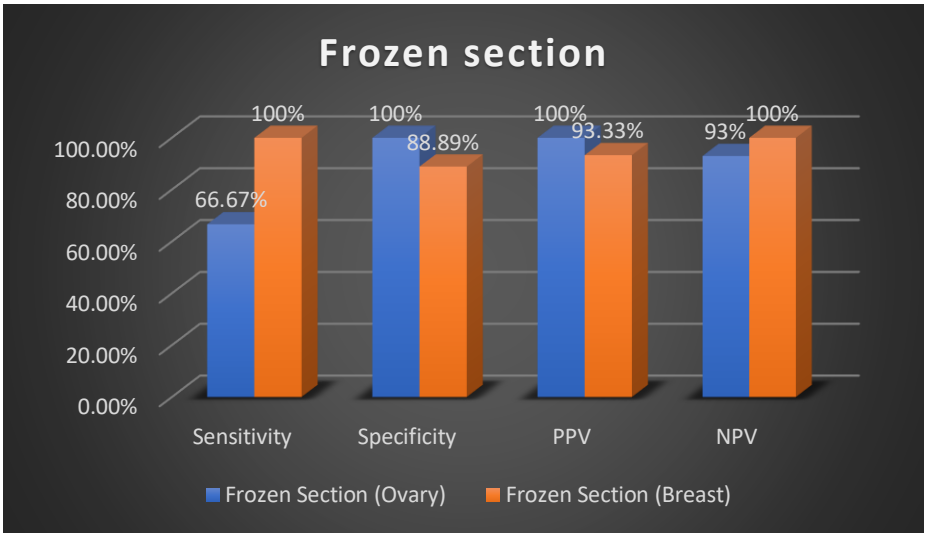
Frozen

| Organs | No of cases | Correctly diagnosed | False Negative | False positive | Accuracy |
|---|---|---|---|---|---|
| Ovary | 17 | 16 | 1 | 0 | 94.11% |
| Breast | 23 | 22 | 0 | 1 | 95.65% |
| | 40 | 38 | 1 | 1 | 95% |




| Variable | Sensitivity | Specificity | PPV | NPV |
|---|---|---|---|---|
| Scrape cytology (Ovary) | 100% | 100% | 100% | 100% |
| Scrape cytology (Breast) | 100% | 88.89% | 93.33% | 100% |
| Frozen Section (Ovary) | 66.67% | 100% | 100% | 93% |
| Frozen Section (Breast) | 100% | 88.89% | 93.33% | 100% |



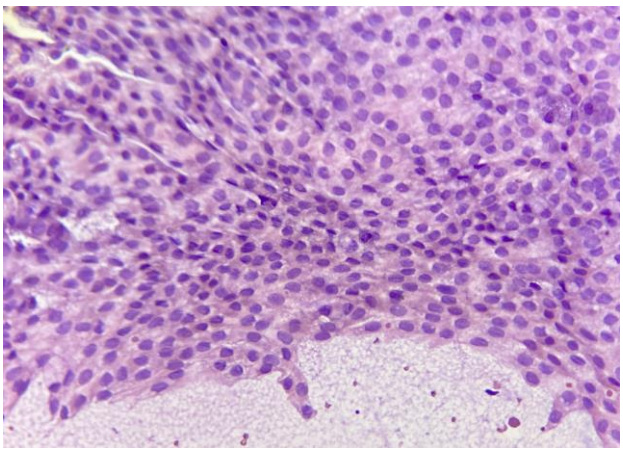



Fig. 1 : Scrape cytology of Mucinous cystadenoma of ovary (Papanicolaou x40)

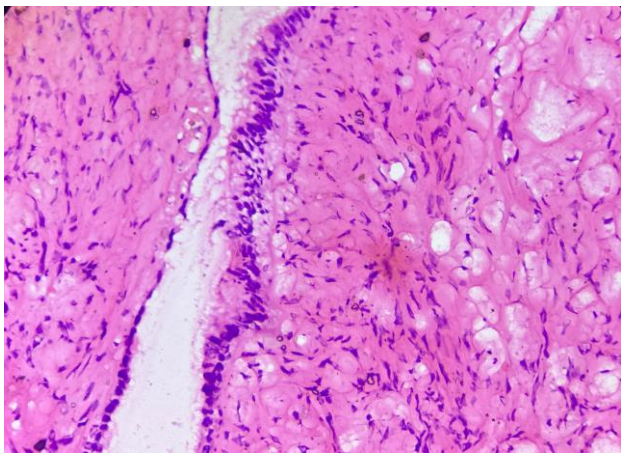


Fig. 2 : Frozen section of Serous cystadenofibroma of ovary (H&E x40)

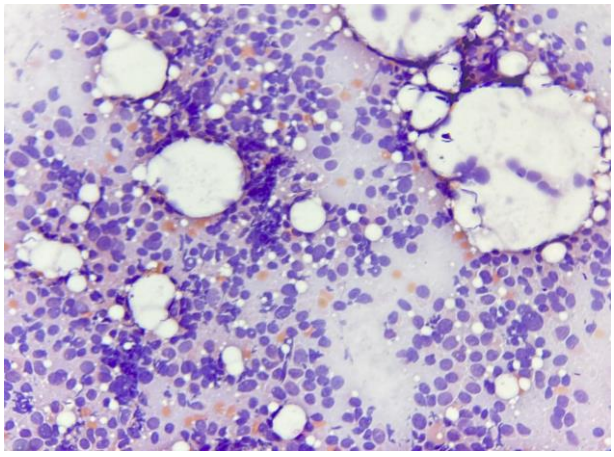


Fig. 3 : Scrape cytology of Invasive breast carcinoma (Papanicolaou x40)

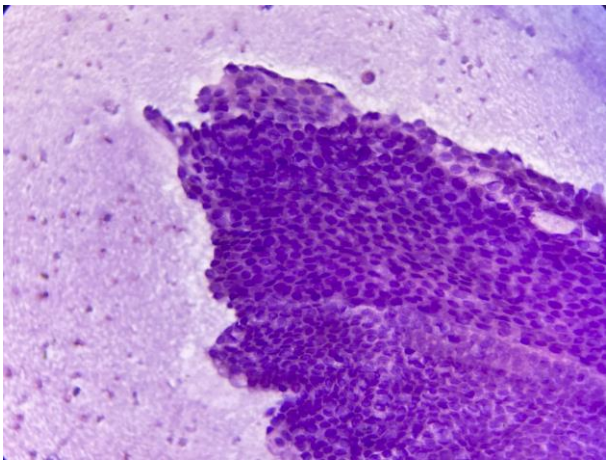


Fig. 4 : Scrape cytology of Benign Phyllodes (Papanicolaou x40)

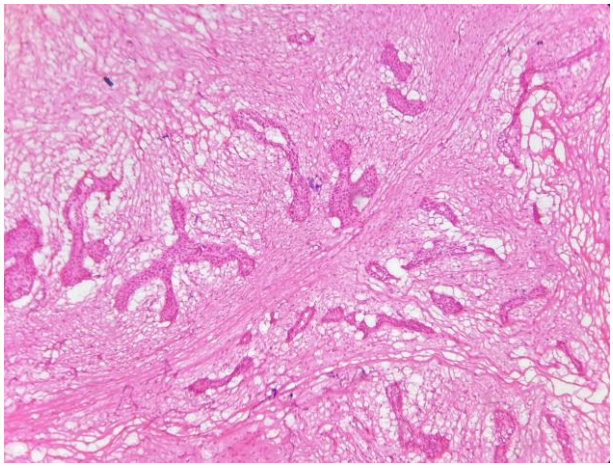


Fig. 5 : Frozen section of Benign Phyllodes (H&E x20)

**DISCUSSION**

History of frozen section method dates back to 1905, whereas usage of cytology for rapid diagnosis can be traced back to 1927 with names of Leonard Dudgeon and Vincent Patrick associated with it. [4,6]

Scrape cytology is a modification of imprint cytology with better diagnostic accuracy. As scraping before preparing a smear, yields more material for proper diagnosis. [3]
Also, relevant clinical data and gross examination gives valuable information which aids the diagnosis of lesion with cytology smears and frozen sections.

This study was undertaken to know the efficacy of scrape cytology comparable to frozen section method.

In our study, we analysed 40 cases with the scrape cytology and frozen section of breast and ovarian neoplasms sent for frozen section.
Here, 38 cases could be diagnosed correctly in category of benign vs malignant.
A case of Granulosa cell tumour was misdiagnosed on frozen section as fibrothecoma and as an epithelial malignancy on scrape cytology.
This could be due to lack of characteristic morphological features on scrape and frozen as are seen on histopathology, and can be overcome with more experience in sampling and interpretation of scrape preparation technique.

Sachin S kolte et al studied the role of scrape of cytology in intraoperative diagnosis of tumour.75 surgically removed specimens from various organs and system were studied and they found it 93.7% accurate to differentiate into benign and malignant. Accuracy in breast neoplasms was about 97.5% in that study.[6]

Rao et al also studied role of scrape cytology in ovarian neoplasms. It showed accuracy of 92% which was satisfactory.[3]

Swati Bharadwaj et al did the study on comparative diagnostic accuracy of frozen section and scrape cytology in ovarian neoplasm and concluded that even with some pitfalls and limitations, scrape cytology is still an acceptable, rapid alternative in centers where resources are limited and it can aid surgical management.[4]

The main advantage of scrape cytology is utilization of the technique in resource-poor centres with a lesser turnaround time than the frozen section. [4] It also gives remarkably accurate diagnosis with a 100% sensitivity and high predictive values for determining true positive cases in benign vs malignant comparison.
Surapan khunamornpong et al studied about the potential of scrape cytology in ovarian neoplasms and found it simple, rapid and inexpensive adjunctive technique that should be used in intraoperative procedures.[8]

Pitfalls of scrape cytology lies in evaluation of borderline cases and in evaluating resection margins, where frozen section becomes pertinent.

| Author | No of case | Accuracy of scrape cytology |
|---|---|---|
| **Present study** | 40 | 97.5% |
| **Shaleeni, et al [3]** | 50 | 92% |
| **Bharadwaj, et al [4]** | 60 | 96% |
| **Sidham, et al [5]** | 249 | 98.4% |
| **Sachin et al [6]** | 75 | 97.3% |
| **Dudgeon et al [7]** | 200 | 95.5% |

## CONCLUSION

**Scrape cytology** can be useful adjunct to frozen section for tumour diagnosis or as an only method for rapid diagnosis where frozen section technique is not available.

In conclusion, scrape cytology is less time consuming, doesn't require special instruments or setup or special skills and may provide the surgeon and pathologists a quick in-sight into the type of lesion in question.

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