



COMPARATIVE STUDY OF INTRAOPERATIVE FROZEN SECTION AND PARAFFIN SECTION IN TUMORS AND TUMOR LIKE LESIONS AT A TERTIARY CARE HOSPITAL IN SOUTH KERALA

Pathology

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ABSTRACT

INTRODUCTION: Frozen section (FS) is a rapid technique that helps the surgeon in the management of the patient. It contributes in the intraoperative diagnosis of tumors, status of margins, lymph node assessment, organ identification and disease extension. Frozen section can be used alone or as an adjunct to intraoperative cytology techniques such as fluid cytology, imprint cytology and squash smear cytology to increase the accuracy and reliability of intraoperative diagnosis. The objective of this study is to compare the FS diagnosis with the final histopathological diagnosis to assess the accuracy of this technique.

METHODS: This is a prospective hospital-based study of 70 patients with pre-operative diagnosis of suspected malignancy and who underwent surgery during the study period of two years. The frozen section diagnosis was compared with histopathology which is gold standard.

RESULTS: Among the 70 cases included in the study, 40 were malignant, 19 were benign, 8 were inflammatory lesions and 3 were normal by FS diagnosis. The diagnostic accuracy of intraoperative frozen section, to differentiate the lesions as malignant, benign, inflammatory and normal were comparable to majority of the cases with the gold standard - formalin fixed paraffin section. The present study yielded high sensitivity, specificity, positive predictive value and negative predictive value of 97.6%, 98.1%, 94.7% and 96.7% respectively. The overall accuracy was 98.6% with false negative rate of 2.4% and no false positive cases. The causes for false negative diagnosis were due to sampling error.

CONCLUSION: Intra operative frozen section method is very much beneficial for rapid diagnosis and in providing guidance for patient management. This technique can be of great value to the surgeon when carried out keeping in mind all of its limitations.

KEYWORDS

Frozen section, Paraffin section, Diagnostic accuracy.

Frozen section (FS) is a prominent point of intersection between surgeons and pathologists. It is regarded as the most definitive but not the sole form of intraoperative consultation. It plays an important role in tissue triage, diagnosis, and intraoperative management. Intraoperative consultation guides immediate surgical management to establish nature and type of lesion, confirm presence of malignancy, assess status of surgical margins and ensuring sufficient sampling of lesional tissue.⁽¹⁾ FS is a multistep process and therefore prone to errors at any one step or a combination of steps during the procedure. FS diagnosis in patient care depends on the successful communication by the surgeon and the pathologist. The objective of the present study was to compare the intra-operative frozen section diagnosis in the study group with the final histopathologic diagnosis on paraffin sections and to assess the accuracy of the diagnosis with respect to various anatomical sites of the lesions.

MATERIALS AND METHODS

This is a two-year prospective hospital-based study performed at the Department of Pathology wherein 70 surgically removed specimens from patients who underwent surgery in various surgical departments for suspicious malignancy along with intra-operative frozen section testing. All patients with neoplasms or suspicious for a malignancy who underwent frozen section diagnosis were included for the study. After taking an informed consent for intraoperative frozen section, the sections were taken from the surgical specimen and interpreted using light microscopy. Subsequently, the intra-operative frozen sections were compared with the permanent paraffin fixed tissue. The frozen sectioning was done on cryostat (Leica Biosystems Cml860 /CM1860UV). The cryostat was set at a temperature range between -18°C to -24°C depending on the type of tissue being cut. Sections were cut at 4-5µm thickness and were immediately put into 95% isopropyl alcohol and stained with Haematoxylin and Eosin (H&E) stain. The stained FS slides were viewed under the light microscope by 2 pathologists. The cases were then classified as benign, malignant, inflammatory or normal. The report was then immediately conveyed to the operating surgeon through the telephone. The rest of the tissue from FS/specimen received for histopathology was fixed overnight in 10% buffered formalin. Grossing was done and adequate sections from representative area

was taken. The sections were then paraffin embedded and stained by H&E. The FS diagnosis and the paraffin section reports were then reviewed by two pathologists. The results were categorized into two groups: concordant and discordant. Data analysis was done using SPSS 20. The sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were calculated.

RESULTS

FS was performed on a total of 70 specimens for a period of two years at our institute. Majority of the cases (n=18, 26%) occurred in the age interval of 51-60 years followed by that in 41-50 years and 61-70 years (n=15, 21%). The least number of cases occurred in the age interval of 11-20 years and 21-30 years (n=2, 3%). The mean age of presentation was 54 years. Out of the 70 cases studied, 48 patients were females and 22 patients were males, giving a male to female ratio of 1:2.1. In this study, majority of the intraoperative FS consultation were from Breast – 22 cases (31%), GIT – 14 cases (20%), FGS – 12 cases (17%), Thyroid – 7 cases (10%), Lymph node – 6 cases (9%), ENT – 5 cases (7%) and CNS- 4 cases (6%) respectively. The most common indication of FS were categorization and verification of neoplasm in 39 cases (56%) followed by assessment of tumor margins in 24 cases (34%). In 4 cases (6%) FS was done for lymph node status only and in 3 cases (4%) FS was done for verification of nature of neoplasm, margin assessment and lymph node status collectively. In this study, the diagnosis of malignancy was established in 40 cases (57%), of which two were lymphoma and one was sarcoma. Nineteen cases (27%) were reported as benign cases. Eight cases (12%) showed inflammation i.e., chronic, acute and granulomatous. Three cases (4%) were normal. Out of 70 cases, the diagnosis of 69 cases were concordant with both FS and paraffin section. Only 1 case showed a discordance. It was a case of ovarian cyst of a 40-year-old female which was reported as benign mucinous cystadenoma (Figure 1) on FS but the paraffin section confirmed it to be malignant mucinous cystadenocarcinoma (Figure 2). The present study yielded high sensitivity, specificity, positive predictive value and negative predictive value of 97.6%, 98.1%, 94.7% and 96.7% respectively. The overall accuracy over 2 years was 98.6% with false negative rate of 2.4%. There were no false positive cases in this study.

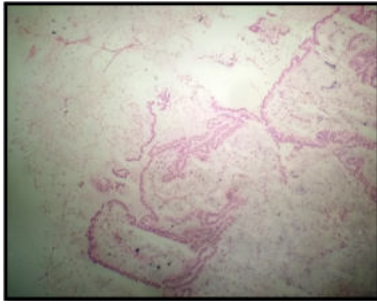


Figure 1: Photomicrograph of frozen section - Diagnosed as Benign mucinous cystadenoma showing cyst wall lined by tall columnar cells with basal nuclei and abundant intracellular mucin (H&E 10x)

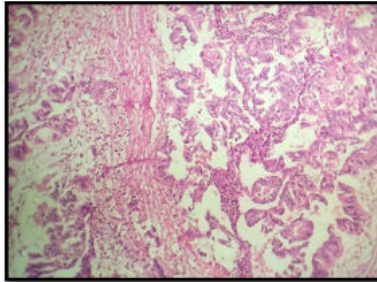


Figure 2: Photomicrograph of Paraffin section - Diagnosed as Malignant mucinous cystadenocarcinoma ovary showing another area where there was stratification, atypia, greater complexity of glands and stromal invasion (H&E 10x)

DISCUSSION

Frozen sectioning is a multistep process starting from the surgical resection of the lesion to the preparation of slides and their microscopic examination, followed by communication of FS diagnosis to surgeon and processing the remaining specimen for further workup. The quality of FS slides plays an important role in frozen section diagnoses. The most commonly encountered limitation in the present study was technical errors such as bloated cell morphology, freezing artefacts and poor sections followed by sampling error. In fatty, oedematous and inflamed tissues the nuclear details and cellular outline were not well delineated. Because of which, the overall histological quality and morphology of FS was inferior to that of paraffin section.

In the present study, the major indication for FS was for the verification and categorization of neoplasms 39 cases (56%), a further 27 cases (38%) and 7 cases (10%) were sent to assess the margin and lymph node status. This is in concordance with similar studies done by Patil P et al⁽⁵⁾, Ahmad Z et al⁽⁹⁾ and White et al⁽⁴⁾. In our study, the total number of benign and malignant cases are 19 (27%) and 40 (57%) cases respectively. The studies by Shrestha et al⁽⁵⁾ and Chandramouleeswari et al⁽⁶⁾ found the percentage of benign and malignant cases as 31%, 69% and 31%, 57% respectively, which is comparable to the present study. In our study, the percentage of concordant and discordant cases were 98.5% and 1.4%. Likewise, the studies by Chandramouleeswari et al⁽⁶⁾ Ahmad Z et al⁽⁹⁾ and Hatami H et al⁽⁷⁾ reported an almost similar discordant percentage of 2%, 2.9% and 2% respectively. In the present study only 1 case was reported as false negative (2.4%). The reason for this was sampling error. Our study showed a much higher accuracy rate (98.6%) which was comparable with studies by Nakazawa et al⁽⁸⁾, Ackerman et al⁽⁹⁾ and Mostafa G et al⁽¹⁰⁾ in which the diagnostic accuracies were 98.6%, 98% and 99.3% respectively.

CONCLUSION

This study reinforces the importance of integration between FS and PS, by the test results provided by FS, when evaluated in a systematic and periodic fashion. Hence, FS can be reliably used for treatment guidance and management alone, or in combination with intraoperative cytology to further improve the diagnostic accuracy.

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