

Study of intra operative frozen sections in an Oncopathology department

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Abstract: Intraoperative consultation with the Pathologist is required in oncological surgeries in deciding about the margin status, nodal deposits and sometimes to establish the primary diagnosis. This is done with the use of Cryostat, commonly known as Frozen section where tissue is frozen in a refrigerated chamber and sections are cut and stained and reports can be communicated to the surgeon within 20 minutes of receiving the specimen. In our study we have analysed retrospectively such material received during a period of one year in the Oncopathology Department and the results are compared to permanent sections prepared using conventional methods to look for any discrepancy. The study also included the type of tissue received for frozen section and the various types of reports requested during a surgical procedure.

Key words: Frozen section, sentinel nodes, margins, metastatic deposits

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I. INTRODUCTION

Frozen sections or Cryosections are very useful in a surgical oncology department because intraoperative tissue diagnosis can be given within 20 minutes of receiving the tissue sample.^[1] The technique involves cutting thin sections of the received sample in a microtome kept inside a freezing chamber (CRYOSTAT) which is maintained at -20 to -30°C and staining the sections in Haematoxylin and Eosin stain and studying the slide preferably in a side room near the Operation Theater. Frozen section is regarded as the most definitive form of intraoperative consultation as it involves the microscopic examination of tissue designated by the surgeon as important.^[1]

The common indications for frozen sections^[2] are as follows

-to make an intraoperative decision regarding further surgery during the procedure, like in a malignant ovarian tumour.^[1]

-Assess margins to rule out tumor infiltration

-to assess the adequacy of diagnostic tissue like in a bone biopsy

-Lymph nodal status including sentinel node assessment.

In many of the oncological surgeries when there is possibility of nodal metastasis, the surgical procedure may be modified accordingly. Hence frozen section is frequently used to assess the nodal status in many cases including oropharyngeal carcinoma, upper GI carcinomas, Carcinoma Penis, Ovarian tumors etc.

Another common practice is to examine the margin status to assess the presence or absence of tumor infiltration in the margin to decide on the adequacy of resection.

A sentinel node biopsy is the most frequently asked report in a frozen section during breast surgeries. A sentinel node is the first lymph node in a drainage basin to receive lymphatic fluid and metastatic deposits are first anticipated in this site.^[3] It is identified by injection of radioactive colloid and blue dye into the primary breast biopsy site. The affected nodes are then removed for study. It helps to decide about the extent of surgery in patients with positive nodes.

In Gynaecological surgeries the commonly received specimens are ovaries and uterine specimens and margins from vulvectomy specimens^[4]. In ovaries and uterus the frozen section diagnosis may direct the surgeon to perform or defer lymph node dissection and other staging procedures.

In surgeries of malignancies of oropharyngeal region, mucosal lesions are sent for frozen section diagnosis for immediate evaluation of the specimen, to ensure adequacy of resection or proceeding with an immediate wider resection or to help in deciding on neck dissection. It is also helpful in deciding if additional tissue must be excised if the margin is involved.

The most common specimen sent for frozen section is lymph nodes for identification of nodal metastasis as it may help to initiate the performance of a nodal dissection and its extension.

II. Materials And Methods

This is a retrospective study of all frozen sections done in the Oncopathology Department of the cancer center in Govt Royapettah hospital attached to Govt. Kilpauk Medical College, Chennai. The study was carried out with all the frozen sections done during a period of one year with the total number of 99 cases in the Oncopathology Department.

The principal aim of the study was to analyse and categorise the type of specimen sent for frozen sections and their indications in connection with the operative procedure. The secondary aim was to compare the frozen section reports with Permanent histopathological sections using the conventional technique and analyse the sensitivity and specificity of the frozen section biopsy.

Our specimens included various organs and tissues like sentinel node biopsies in Breast carcinomas, Status of margins in oral malignancies to decide the extent of the excision, Ovarian cysts to rule out any malignant component, Peritoneal deposits to decide on staging and treatment plan, in some bone tumors to inform the surgeon about the representative biopsy tissue and tissue bits from breast lumps to rule out malignancy and decide on the type of surgery.

Frozen tissues were cut in to thin sections and stained with Haematoxylin and Eosin staining procedure and reports conveyed to the operating team.

These reports were compared with permanent histopathology reports using conventional procedure and the accuracy of frozen section diagnosis was analysed.

III. Observation And Results

In the 99 cases studied the distribution of the cases(Fig 1) is tabled here(**Table 1**):

| S.No. | Tissue/Organ | Total No. |
|-------|--|-----------|
| 1 | Lymph Nodes | 47 |
| 2 | Ovary | 17 |
| 3 | Margins from various malignant growths | 10 |
| 4 | Suspected metastatic nodules from various organs/sites | 8 |
| 5 | Breast | 7 |
| 6 | Lesions from Oropharynx | 3 |
| 7 | Soft tissue swelling | 2 |
| 8 | Bone tumors | 2 |
| 9 | Pancreas | 1 |
| 10 | Thyroid | 1 |
| 11 | Lung | 1 |

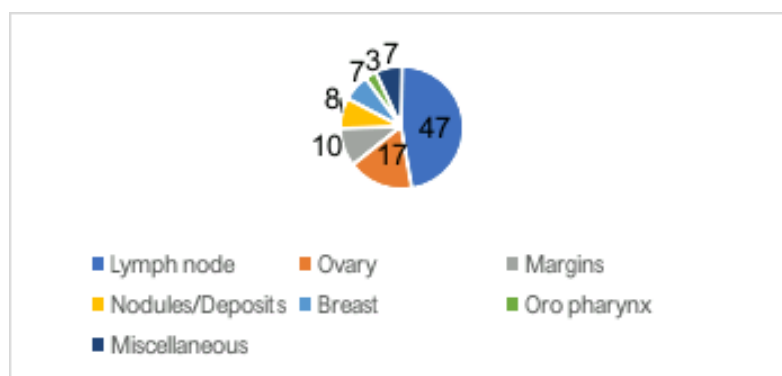


Fig1 : Distribution of cases

Lymph Node

We received a total of 47 lymph nodes for frozen section study which included sentinel nodes, lymph nodes found in the drainage area of various organs with malignant growths like oropharynx, ovary, esophagus and stomach including perigastric nodes, peripancreatic nodes and pelvic nodes.

Out of these 47 cases, 36 cases were reported as having Reactive hyperplasia only (Fig 3). 8 cases were found to have metastatic deposits (Fig 2) and one case was reported as Lymphoproliferative disorder which was later reported in the permanent sections as Non Hodgkins lymphoma. One case was reported as Caseating granulomatous lymphadenitis.

There was one false-positive report of metastatic deposit which was found to be reactive node in the permanent sections. Another was a false-negative one which was reported as reactive hyperplasia but permanent sections revealed adenocarcinomatous deposit. The false -negative report may be due to failure to freeze the entire node or to cut more than one level for histologic evaluation.^[5]

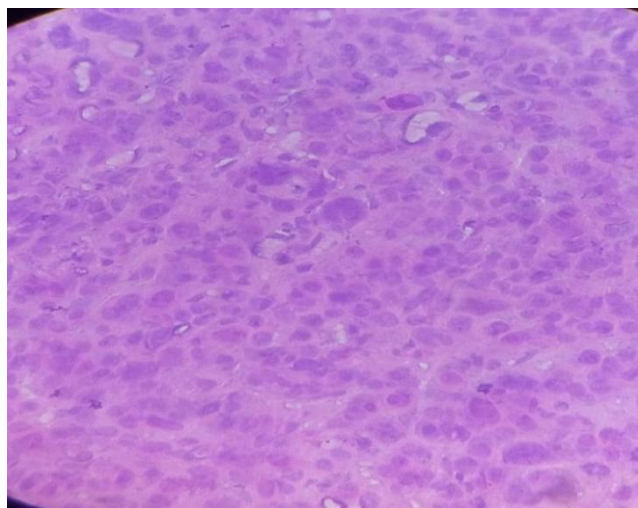


Fig 2 Squamous cell carcinoma deposits in cervical node in a case of oral malignancy

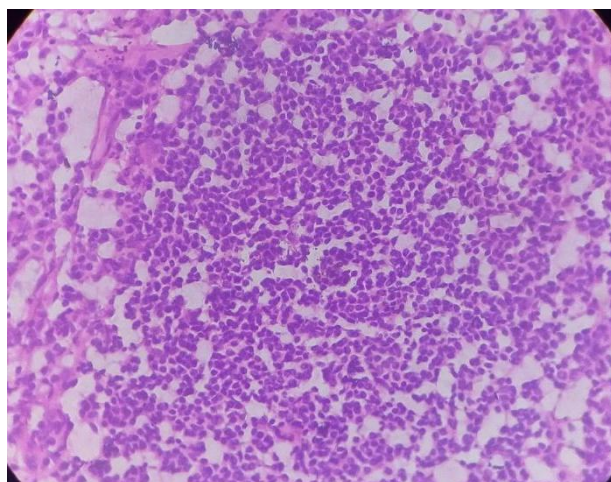


Fig 3 Reactive follicular hyperplasia in a node

Ovary

We received 17 cases of ovarian lesions which included cystic swellings and cystic and solid ovarian tumors. 14 of these cases were found to be Benign lesions ranging from Serous cystadenoma and Mucinous cystadenoma. One case was reported as Malignant, a case of Papillary Serous Cystadenocarcinoma. One case was reported as inconclusive which was reported as a Benign Mucinous cystadenoma in permanent section. One false positive case was reported as Serous Papillary Cystadenofibroma.

Margins

Evaluation of margins in resections is requested frequently. Designation of a close margin is tumor within 5mm of the inked surgical margin.^[6] In oral cavity and oropharynx a 10 mm margin is considered more appropriate^[7]. Biopsy material from surgical margins were received in 10 cases which included margins from composite resection in oral malignancies, proximal resected margin from a case of below knee amputation, margins from pelvic wall in a pelvic exenteration and proximal urethral margin in amputation of penis.

Out of these, 9 cases were reported as Negative margins implying no tumor infiltration and one case was found to contain tumor infiltration in a pelvic wall biopsy in a case of carcinoma cervix.

Intra operative diagnostic biopsies

In some cases when a clinically malignant lesion could not be diagnosed preoperatively using closed methods, an intra operative open biopsy of the lesion may be required. In such circumstances biopsy material is sent for frozen section to establish the malignancy, to plan the surgery or the representative nature of the lesion is decided by frozen section when further surgery is deferred. We have received material from 10 such cases which included oral growths, thyroid, soft tissue swellings from arm and retroperitoneum, lung, pancreas and bone tumors. Out of these 10 cases 2 cases were reported as malignant lesions, one Squamous cell carcinoma of maxillary antrum and another as Osteosarcoma of Right femur. One case was reported as benign lesion, Neurofibroma of right arm. 2 cases were reported as inconclusive which were reported as Squamous cell carcinoma of lower alveolus and Schwannoma of retroperitoneum in permanent sections. One tongue lesion was reported as moderate dysplastic change which was confirmed by permanent section. 2 cases were reported as negative for malignancy, one lung biopsy and a bone biopsy. One case was reported as Hashimoto's thyroiditis. All these were confirmed by permanent sections.

In our study the false negative diagnosis of tumor was found to be 1.01 % as compared to the 67.8 % in Zarbo et al study.^[8] We also found the false positive diagnosis to be 2.02 as compared to 11% in the above study though our sample size is smaller.

Table 2: Distribution of results (Fig 4)

| S.No | Tissue/Organ | Total Number Reported | Positive for Malignancy | Negative for Malignancy | False Positive | False Negative | Inconclusive |
|------|--------------|-----------------------|-------------------------|-------------------------|----------------|----------------|--------------|
| 1 | Lymph Nodes | 47 | 9 | 36 | 1 | 1 | 0 |
| 2 | Ovary | 17 | 1 | 14 | 1 | 0 | 1 |
| 3 | Margins | 10 | 1 | 9 | 0 | 0 | 0 |
| 4 | Deposits | 8 | 4 | 4 | 0 | 0 | 0 |
| 5 | Breast | 7 | 2 | 4 | 0 | 0 | 1 |
| 6 | Oropharynx | 3 | 1 | 2 | 0 | 0 | 0 |
| 7 | Soft Tissue | 2 | 1 | 0 | 0 | 0 | 1 |
| 8 | Bone | 2 | 1 | 1 | 0 | 0 | 0 |
| 9 | Pancreas | 1 | 0 | 1 | 0 | 0 | 0 |
| 10 | Thyroid | 1 | 0 | 1 | 0 | 0 | 0 |
| 11 | Lung | 1 | 0 | 1 | 0 | 0 | 0 |

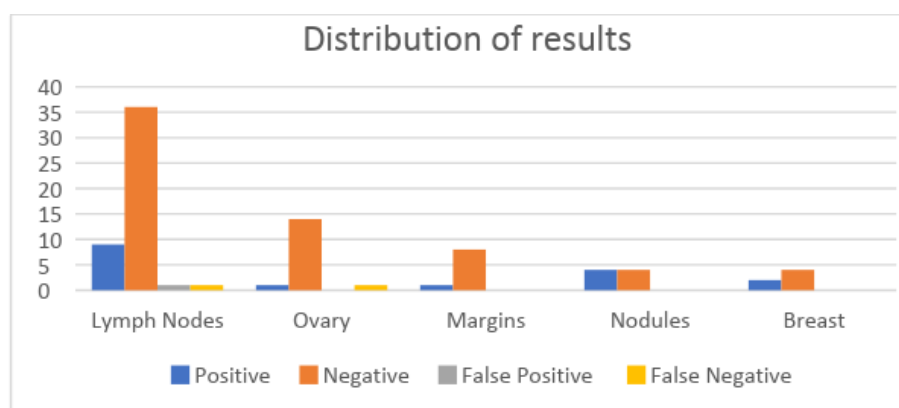


Fig 4 Distribution of results

IV. Discussion

In our study we have found that the commonest request for frozen section is for lymph nodal status including sentinel nodes (Fig 4 & Table 2). This is followed by ovarian lesions and margin status during surgical removal of tumors. We found request for an intraoperative diagnosis is very uncommon.

The request for identification of nodal metastasis in sentinel nodes in a patient with an invasive breast cancer is very useful in the decision making about the extent of the nodal dissection. The sentinel node biopsy allows for the preservation of function without compromising the necessary staging information^[9]. Patients with a positive sentinel node would require either a complete axillary dissection or radiation of the axilla.

In ovarian lesions the frozen section diagnosis helps the surgeon to perform lymph node dissection and other staging procedures when malignancy is confirmed.

Frozen sections are very useful in Head and neck malignancies as it is used for tumor diagnosis, nodal status and margin status depending on the type of lesion.

Intraoperative immediate specimen evaluation helps to decide adequacy of resection, and to justify proceeding to an immediate wide resection and it also helps in deciding about neck dissection. Margin status evaluation is very essential in these cases as a positive margin indicating tumor infiltration makes the surgeon to plan for additional tissue excision. Approximately 75% of patients with surgical margins with tumor infiltration will either develop local recurrence or demonstrate residual disease upon reoperation.^[10]

In breast lesions which were inconclusive in fine needle aspiration cytology, frozen section is mandatory to plan and decide about the type and extent of surgery. It also helps to defer and avoid unwanted surgery in non-malignant conditions.

If patients who have already undergone major surgeries, develop any suspicious nodules in the vicinity of primary tumor, a frozen section helps to plan additional modalities of treatment including Chemotherapy and Radiotherapy.

V. Conclusion

We found frozen section diagnosis a valuable and reliable procedure in oncological surgeries in reducing unwanted surgeries and better treatment planning. The commonest request is for nodal status in breast and oropharyngeal malignancies followed by primary tissue diagnosis of Ovarian lesions and breast lesions. The False positive and false negative reports are mostly due to inadequate history and technical difficulties which can be minimized with better communication with the surgical team and improving quality control methods. Frozen section is now an integral part of Oncological surgeries and it reduces the delay in planning the treatment protocol. With good clinical details and Surgeon-Pathologist interaction the sensitivity of the procedure can be improved and will help the patient immensely.

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