Frozen Section-A Short Review

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Abstract

Frozen section is a specimen of tissue that has been quick-frozen, cut by microtome, and stained immediately for rapid diagnosis of possible malignant lesions. A specimen processed in this manner is not satisfactory for detailed study of the cells, but it is valuable because it is quick and gives the surgeon immediate information regarding the malignancy of a piece of tissue. Frozen section plays an important role in the management of surgical patients yet it must be used prudently to avoid the indiscriminate usage of this important technique. As it is subjected to many limitations compared to the paraffin embedded tissue sections, this review highlights the important concepts and principle of intra-operative frozen section consultation as well as discussing the limitations of this technique.

Key word: *frozen section, tissue, Microtome.*

Introduction

The technique of frozen section was first introduced by the pathologist, William H.Welch, in 1891. In 1920s, the technique became popular and was used for intra operative consultation.[1] The main purpose of frozen section is to provide rapid diagnosis to guide the surgeon in per operative decision making. The indications of frozen section are identification of tissue, to establish that sufficient diagnostic tissue has been obtained; identification of lymph node metastasis and to obtain a tissue diagnosis to detect the nature of the lesion.[2,3]

Frozen section is regarded the most definitive form of consultation because it employs the microscopic examination of tissue as designated by the surgeon which is important to conduct an operation already underway. The distribution of requests for frozen sections related to specific organ systems is institution driven based on the staffing of surgical specialists and patient referral patterns

Frozen Section

Frozen Section may be one of the most important difficult procedure performed by the pathologist during his practice. The pathologist has to arrive at a correct decision in a shorter duration based on his experience and the knowledge of his specialty and clinical medicine.

The key instrument for Cryo section is the cryostat, which is a microtome inside a freezer. The microtome can be compared to a very accurate "deli" slicer, capable of slicing sections as thin as 1 micro metre. The usual histology slice is cut at 5 to 10 mm. The surgical specimen is placed on a metal tissue disc which is then secured in a chuck and frozen rapidly to about −20 to -30 °C. The specimen is embedded in a gel like medium consisting of poly ethylene glycol and polyvinyl alcohol. At this temperature, most tissues become rock-hard. Usually a lower temperature is required for fat or lipid rich tissue. Each tissue has a preferred temperature for processing. Subsequently it is cut frozen with the microtome portion of the cryostat, the section is picked up on a glass slide and stained usually with hematoxylin and eosin, the H&E stain.

Techniques of Frozen Technique

1.Gross examination- The pathologist records all gross expressions, i.e., size, adhesions, weight, similar to the recording of microscopic features.

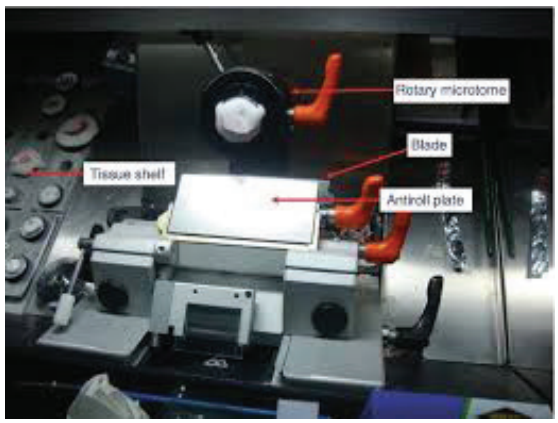
2- Embedding the tissue:

The selected piece of tissue is then placed on a metallic holder and must be oriented a certain way so that the future section will reveal proper spatial relationships,

this orientation depends on the question being asked. Sometimes orientation is not important; at other times it is of paramount importance. The tissue is embedded in OCT mounting medium and is then placed either in cooled 2-methyl butane or the cryostat machine where it is properly frozen.

3. Cryostat:

The machine, which cuts the tissue, is the cryostat. Certain things should be routinely checked in the operation of this machine:



a) Rotary microtome

a) Temperature:

The temperature should be at -20°F . Tissues with a large fat component, -40°F is optimal. This temperature is critical for optimal sectioning. If too high, i.e., -10°F and the tissue will not stay frozen and firm and will not cut crisp. If itstoo cold, i.e., -50°F and the tissue will crumble and become powder. The Ideal tissue should cut like butter, smooth and in one piece.

b) Blade sharpness and angle:

The blade should be sharp and should be changed approximately once every 2 weeks. A dull blade cuts dull. Blade angle is also important.

. There is an optimal angle between blade and tissue:

•Too steep an angle and the tissue will crumble like it was too cold.

•Too shallow, then two things will happen. The section will alternately skip and not cut and then it will cut, but too thick.

5. Staining:

Once the tissue is on the slide it can be either air-dried or fixed in methanol. This depends on which staining procedure will be used. There are several stains available in the frozen section room. The choice of stain depends on what the pathologist is trying to demonstrate. The resident should practice all the stains and gain experience with their use.

b)Embedding and cutting of the tissue sections

Advantages of frozen section biopsy:

1- The surgeon is able to obtain an additional sample if more tissue is needed to make an accurate diagnosis, avoiding a second operation.

2-If the tissue is determined to be cancerous and is amenable to surgery, the mass can be removed at that time.

3-If the tissue is determined to be benign (not cancerous), then the mass may not always need to be removed and the surgery can end.

4-The frozen section biopsy can help ensure that the mass being removed is the intended tissue for removal.

5-It can help ensure that the entire mass and its surrounding borders are removed.

6-It allows for the collection of proper tissue samples for further scientific research.

7-The surgeon and pathologist are able to collaborate to care for the patient.[4]

Conclusion

The frozen section is an accurate and reliable

method. It is used for tumor resection margins, metastasis of lymph nodes, and tissue recognition. Macroscopic examination, accurate sampling by pathologist, avoiding technical errors in sectioning and staining, a interpersonal coordination with the operating surgeon can reduce the limitation and provide rapid, reliable and cost effective details necessary for rapid diagnosis and on table patient management. Continuous monitoring should be performed in every pathology department, to recognize the reasons of errors and to reduce them and improve frozen section turn-around time.[5]

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