

## ORIGINAL RESEARCH

## Evaluating diagnostic accuracy of Ovarian instant frozen sections compared to delayed paraffin embedded permanent sections

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Date Received: April, 2018

Date Accepted: May, 2019

Online Publication: August 15, 2019

### Abstract

**Introduction:** Frozen section is mainly performed to determine malignancy, so it is of fundamental importance to evaluate the diagnostic accuracy of frozen sections performed for each group of tissues in order to reduce false diagnoses, unnecessary surgeries and following unwanted complications. This study is conducted to evaluate the diagnostic accuracy of frozen section performed on ovary tissue compared to permanent sections.

**Materials and Methods:** In this retrospective study, we evaluate frozen sections performed at Taleghani hospital pathology department in five years and their results were compared with permanent sections' results to calculate sensitivity, specificity, negative predictive value and positive predictive value. In cases which results were discordant, we check for probable reasons.

**Results:** 83 species were evaluated from patients with a mean age of 42.9 years; the smallest was 19 and the oldest was 86 years old (Std. dev: 12.84). 75 cases of frozen sections were benign (90.4%) and 8 cases were malignant. 73 cases of permanent sections were benign (88%) and 10 cases were malignant (12%). Sensitivity, specificity, positive predictive value and negative predictive value rates were 66%, 100%, 100% and 96.55% respectively.

**Conclusions:** This study shows the importance of cooperation between pathologist and surgeons that they can prevent unnecessary surgeries. In our study the only cases of discordancy were borderline tumors and the diagnostic accuracy for all other species were perfect.

**Keywords:** Frozen section, Permanent section, Concordance, Discordance, Intraoperative consultation

## Introduction

William H Welch was the first who applied the frozen section as intra-operative consultation at the last years of the previous century at John Hopkins University. Wilson and McCarty modified frozen section later in 1905 at mayo clinic (1,2).

Importance of frozen section is when surgeons need pathologic information of patient's specimen urgently and while the patient is still under anesthesia and on the operating room table and surgeons are not able to wait at least two days for permanent (paraffin) section to be fixed and ready. The result of frozen sections will be delivered to surgeons by phone or hospital intercoms to decide about continuing the surgery, type of surgery or extent of surgery (3). It is evident that how much frozen section is effective on surgeon's decisions and it shows pathologist's vital impact on surgeries that have specimens for intra-operative consultation (4-7).

Frozen section is requested by surgeons for various intents like assessment of tissue type, assessment of margins, assessment of lymph nodes metastasis, sufficiency of specimens for histology and assessment of malignity or generally in other words mainly to manage patients in the operating room. Frozen section should never be used to satisfy surgeons curiosity, compensation for diagnostic faults before surgery or a way to give information earlier to patients (3,4,8).

Diagnostic accuracy of frozen section is dependent to the anatomical site of specimens so it is of fundamental importance to evaluate the diagnostic accuracy of frozen sections in different anatomical sites to know in which type of tissues frozen sections are more reliable and should be used (9).

Evaluating diagnostic accuracy of frozen sections could be used to decrease faults by knowing their origins. In recent studies, the diagnostic accuracy of frozen sections reaches great levels but the most frequent reason for discordancy between frozen and permanent section is still false negative diagnoses that can lead to difficulties for patients (4,7,10). False positive diagnoses lead to unnecessary surgeries and some probable complications afterwards (11); all of these can be attributed to the importance of continuous evaluation of diagnostic accuracy of frozen sections and

efforts to make it better that could decrease unwanted surgeries (4,10).

## Materials and Methods

In this study, we retrospectively evaluate all frozen sections performed on ovarian specimens at Taleghani general hospital during a four year period. Frozen sections' results were extracted from patients' files and were all imported to Microsoft Excel software. We compare frozen sections' results with permanent sections as the gold standard to calculate diagnostic accuracy. Data were analyzed by IBM SPSS statistics 25 and sensitivity and specificity were calculated by MedCalc software. Reasons for requesting frozen sections by surgeons were also studied; at the final step, we check for origins of faults and discrepancies between results to decrease them in future.

## Results

We evaluated 83 ovarian specimens performed at Taleghani Hospital between 2014 and 2018. The mean age for patients was 42.9; the youngest one was 19 years old, and the oldest was 86 years old (STD dev: 12.84)(Figure1).

Out of 83 frozen sections, 8 were malignant (9.6%), and 75 were benign (90.4%). Out of 83 permanent sections 10 were malignant (12%), and 73 were benign (88%).

In evaluation concordance between frozen sections and permanent sections, 60 cases were concordant (2.74%), 2 were discordant (2.74%), and in 21 cases the final results were deferred to evaluating the permanent section. Both two discordant cases were borderline ovarian tumors and were due to pathologist diagnostic fault.

In assessing reasons for requesting frozen sections by surgeons 11 cases were requested for assessment of margins (13.3%), 53 cases for definite histology diagnosis (63.85%), 17 cases evaluating malignity (20.5%) and 2 were for diagnosing tissue type (2.4%). In our study sensitivity, specificity, positive predictive value and negative predictive value were: 66.66%, 100%, 100% and 96.55% respectively.

## Discussion

This study shows the result of cooperation between surgeons and pathologists. To have a

more reliable test for patients who are on the operating room and need a prompt diagnosis, pathologists should prepare specimens accurately and evaluate specimens carefully to avoid false diagnoses. It is of fundamental importance for pathology centers or hospitals to evaluate their diagnostic accuracy and find origins of faults, and by eliminating them reach a better diagnostic accuracy. In our study, both two discordant cases were borderline ovarian tumors. Since we have few numbers of malignant cases, these two discordant cases make a sharp decline in sensitivity of frozen sections in our study but, if we ignore these two cases in our calculation all rates reaches 100% that shows perfect diagnostic accuracy for frozen sections in ovarian specimen compared to Permanent sections as the gold standard.

#### **Conclusion**

Specificity of frozen sections in our study is calculated 100% that shows frozen section could diagnose all benign or negative specimens and having a 100% positive

predictive value means that no patient with a positive or malignant frozen section has a negative or benign permanent section. Both two discordant cases were due to pathologist's error so that diagnostic accuracy could be promoted further by more care by pathologists. In recent studies with a similar subject, the discordance rate differs from 2.4% to 12.5%. In our study, the discordance rate was 2.4 that is in the lowest point of the domain (12-18).

#### **Acknowledgment**

This study was based on a thesis for fulfilment of a Master of Public Health (M.P.H) degree at the School of Public Health and safety, Shahid Beheshti University of Medical Sciences, Tehran, Iran. We would also like to thank Pathology department staff helping us collecting data. The authors declare that there is no conflict of interests in this paper.

#### **Conflict of interest**

Authors declare no conflict of interest.

**References:**

1. Shrestha S, Lee MC, Dhakal H, Pun CB, Pradhan M, Basyal [1] R et al. Comparative study of frozen section diagnoses with histopathology. *Postgraduate medical journal of NAMS*. 2009; 9(2):1-5.
2. Özdamar S, Bahadır B, Ekem T, Kertis G, Gün B, Numanoğlu G. Frozen section experience with emphasis on reasons for discordance. *Turk J Cancer* 2006;36(4):157- 61.
3. Patil P, Shukla S, Bhake A, Hiwale K. Accuracy of frozen section analysis in correlation with surgical pathology diagnosis. *Int J Res Med Sci* 2015; 3:399-404.
4. Silva RDP, Souto LRM, Matsushita GM, Matsushita MM. Diagnostic accuracy of frozen section tests for surgical diseases. *Rev Col Bras Cir*. 2011; 38(3).
5. Gal AA. The centennial anniversary of the frozen section technique at the Mayo Clinic. *Arch Pathol Lab Med* 2005; 129(12):1532-35.
6. Sienko A, Allen TC, Zander DS, Cagle PT. Frozen section of lung specimens. *Arch Pathol Lab Med* 2005; 129(12):1602-9.
7. Ferreiro JA, Myers JL, Bostwick DG. Accuracy of frozen section diagnosis in surgical pathology: review of a 1-year experience with 24,880 cases at Mayo Clinic Rochester. *Mayo Clin Proc* 1995; 70(12):1137-41.
8. Makay O, Icoz G, Gurcu B, Ertan Y, Tuncyurek M, Akyildiz M, et al. The ongoing debate in thyroid surgery: should frozen section analysis be omitted? *Endocr J* 2007; 54(3):385-90.
9. Ahmad Z, Barakzai MA, Idrees R, Bhurgri Y. Correlation of intraoperative frozen section consultation with the final diagnosis at a referral center in Karachi, Pakistan. *Indian J Pathol Microbiol* 2008; 51(4):469-73.
10. Raab SS, Tworek JA, Souers R, Zarbo RJ. The value of monitoring frozen section-permanent section correlation data over time. *Arch Pathol Lab Med* 2006; 130(3):337-42.
11. Niu Y, Fu XL, Yu Y, Wang PP, Cao XC. Intra-operative frozen section diagnosis of breast lesions: a retrospective analysis of 13,243 Chinese patients. *Chin Med J* 2007; 120(8):630-5.
12. Mahe E, Ara S, Bishara M, Kurian A, Tauqir S, Ursani N, et al. Intraoperative pathology consultation: error, cause and impact. *Can J Surg* 2013 Jun;56(3):E13-8.
13. Gephardt GN, Zarbo RJ. Interinstitutional comparison of frozen section consultations. A college of American pathologists Q-Probes study of 90,538 cases in 461 institutions. *Arch Pathol Lab Med*. 1996 Sep; 120(9):804-9.
14. Geramizadeh B, Larijani TR, Owji S-M, Attaran SY, Torabinejad S, Aslani FS, et al. Accuracy of intra-operative frozen section consultation in south of Iran during four years. *Indian J Pathol Microbiol*. 2010; 53(3):414.
15. Abbasi F, Yekta Z, Aryan A. Accuracy of frozen sections. *Irn Jml of path*.2012; 1:3-8.
16. White VA, Trotter MJ. Intraoperative consultation/final diagnosis correlation:relationship to tissue type and pathologic process. *Arch Pathol Lab Med* 2006. 2008 Jan; 132(1):29-36.
17. Khoo JJ. An audit of intraoperative frozen section in Johor. *The Med jml of Malaysia*. 2004Mar; 59(1):50-5.
18. Novis DA, Gephardt GN, Zarbo RJ. Interinstitutional comparison of frozen section consultation in small hospitals: a college of American pathologists Q-Probes study of 18,532 frozen section consultation diagnoses in 233 small hospitals. *Arch Pathol Lab Med* 2006. 1996 Dec; 120(12):1087-93.