Research Article

Clinico-pathological study on role of frozen section in ovarian lesions at a tertiary care hospital in south India

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Abstract

Background: Ovarian neoplasms are an important cause of morbidity and mortality in women. Frozen section (FS) is an integral component in the assessment of ovarian neoplasms at laparoscopy or laparotomy. This study was undertaken to study and correlate FS with permanent histopathological sections in ovarian lesions. **Materials and Methods:** Intra-operative FS performed for ovarian lesion was analyzed prospectively and retrospectively in 45 patients who underwent surgery at our institution from January 2009 to July 2013.This was compared with the final histopathologic diagnosis on permanent paraffin sections. **Results:** Among 45 cases of ovarian lesions, the final histopathological diagnosis showed 31 benign tumors, 5 borderline tumors and 9 malignant tumors. The FS diagnosis correlated with the final histopathology in 43 cases (95.5%) and was discordant in 2 cases (4.4%). The overall sensitivity, specificity, positive predictive value and negative predictive value of FS was 97.2%, 88.8%, 97.2% and 88.8% respectively. The sensitivity of FS diagnosis for benign, borderline and malignant lesions was 96.7%, 100% and 88.8%; respectively and the specificities were 92.8%, 100% and 97.2% respectively. **Conclusion:** Intraoperative FS has high accuracy in the diagnosis of suspected ovarian neoplasms. It is a valuable tool to guide the surgical management of these patients and should be routinely used in all major oncology centres.

Keywords: Ovarian lesions, Frozen section, Histopathological correlation.

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INTRODUCTION

The Frozen section (FS) is a quick diagnostic procedure for evaluating a tissue before proceeding to major radical surgery.[1] In oncological practice the traditional role of intraoperative FS diagnosis is to determine whether sampled tissues are benign or malignant.[2] FS has been intraoperatively used in gynaecology for ovarian tumors to ensure that proper surgical staging is carried out and also to ascertain microscopic diagnosis prior to performing definitive surgery to prevent over-treatment or under-treatment of patients with ovarian masses.[3] Due to the deep location of adnexa, it is relatively inaccessible for fine needle aspiration cytology (FNAC), except under image guidance. In such a context intra-operative imprint cytology/ FS is relatively safe and beneficial for the patient and the surgeon.[4] Epithelial neoplasms of ovaries are an important cause of morbidity and mortality in women. Three main categories of ovarian neoplasms are benign, borderline and malignant and they differ with respect to their biologic charecteristics, management and prognosis. Tumors of 'borderline malignancy' have a good long-term outcome even after conservative surgery. Whereas benign and borderline tumors can be treated adequately with conservative surgery. Malignant epithelial neoplasms of the ovary usually require extensive surgery with total abdominal hysterectomy, bilateral salphingo-oophorectomy and omenectomy along with pelvic and retro-peritoneal lymphadenectomy and also require sampling from many peritoneal sites. Preoperative imaging and tumor markers have only limited value in differentiating between these tumor

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categories. Intraoperative FS diagnosis of ovarian tumors is extensively used in making this distinction and also to decide the surgical course.[5]

MATERIALS AND METHODS

Present study was conducted at our institution included prospective and retrospective cases and records of 45 patients. All the ovarian neoplasms who were subjected to FS diagnosis were included in the study. The FS diagnosis was then correlated with the final histopathological diagnosis, which is the gold standard. Ovarian lesions with infective etiology were excluded from the study. During Intraoperative consultation, the fresh specimen was evaluated grossly for the confirmation of size, consistency, as well as external (vegetations and breach) and internal vegetations. One to three sections were taken by attending pathologist from the representative areas of the lesion, including solid areas, vegetations and cyst walls. The tissue is frozen in a cryostat (-20°C) and 4µ sections were prepared and stained with rapid Haematoxylin and Eosin stain. The slides were observed under the light microscope by one or more pathologists. After formalin fixation, further representative sections (at least 1 section per 1 cm of tumor) were taken for paraffin embedding and routine hematoxylin and eosin (HandE) staining. The precise diagnosis was made after detailed microscopic examination of all the slides. Diagnosis was made according to the criteria in standard pathology textbooks for diagnosis of ovarian neoplasms. For histological typing of tumors, the WHO propositions were followed. The reports of frozen and permanent section were evaluated according for the status of benignancy and malignancy and the histological type of the lesions. The results of frozen and permanent section were classified into three groups: benign, borderline and malignant. The ovarian lesions are also further classified as surface epithelial, germ cell, sex cord-stromal tumors and other lesions. The average time taken in the entire procedure, TAT (Turn around time) was approximately 20-25 minutes. FS examination was compared to the final paraffin section diagnosis.

STATISTICAL ANALYSIS

All the data was analysed on the basis of age distribution, presence of bilateral or unilateral lesions and different histologic types of ovarian tumors such as surface epithelial, germ cell, sex cord and other benign cysts. Sensitivity, specificity, positive predictive values and negative predictive values of benign, borderline and malignant lesion on frozen section was compared with permanent section and was analysed.

RESULTS

Intra-operative FS analysis was carried out for 45 cases of ovarian lesion; the FS findings were compared with the diagnoses made from permanent histopathological sections. The age range varied from 14 to 73 years. Among the 45 cases, on final histopathological diagnosis 31 were benign tumors, 5 were borderline tumors and 9 were malignant tumors. 23 cases had bilateral disease, whereas 22 had unilateral disease. In bilateral ovarian tumor, 5 cases were malignant by FS diagnosis and 4 cases were malignant by permanent section diagnosis. In unilateral ovarian tumor, 4 cases were malignant on FS and also on permanent section.

Table 1: Microscopic categories of ovarian lesion

Type	Fs diagnosis		Histopathological Diagnosis	
	Number	Percentage	Number	Percentage
Epithelial	27	60%	27	60%
Germ cell	5	11.1%	5	11.1%
Sex cord	3	6.6%	2	4.4%
Others	10	22.2%	11	24.4%
TOTAL	**45**	**100%**	**45**	**100%**

The different tumors encountered and its histological types (Table I): most common being Surface epithelial tumors 27 (60%), followed by germ cell tumors 5 (11.1%) and sex cord-stromal tumors 2 (4.4%). The other lesions noted were 11 (24.4%) in permanent section diagnosis, included benign lesion and 1 case of metastasis to ovary i.e., Krukenberg s tumor. The other benign cysts were follicular cyst, haemorrhagic cyst, corpus luteal cyst, leiomyoma, simple benign cyst, endometriotic cyst. Among surface epithelial tumors, serous cystadenoma was the most commonly encountered tumor whereas rare lesion like primary choriocarcinoma was also encountered. Surface epithelial tumors seen in the study were serous cystadenoma, mucinous cystadenoma, borderline mucinous tumor, endometrioid carcinoma, transitional cell carcinoma and serous cystadenofibroma. Mature cystic teratoma, mixed germ cell tumor and primary choriocarcinoma were the germ cell tumor encountered. Whereas granulosa cell tumor and cystic fibroma were the sex cord-stromal tumors found in this study.

Table 2: Ovarian lesion based on grading

Feature	Fs diagnosis		Histopathological Diagnosis	
	Number	Percentage	Number	Percentage
Benign	31	69%	31	69%
Borderline	5	11%	5	11%
Malignant	9	20%	9	20%
TOTAL	**45**	**100%**	**45**	**100%**

Overall, 69% (31) of cases were benign (Table II), 11% (5) of cases were borderline and 20% (9) were malignant

lesions on both FS and permanent section diagnosis. The accuracy of FS diagnosis for borderline ovarian tumor was 100%, whereas for benign and malignant tumors was 95.5%. The sensitivity of FS diagnosis was 97.2%. The specificity of frozen sections was 88.8% in the present study. The positive predictive value was 97.2% and the negative predictive value was 88.8%. FS had a high (100%) sensitivity, specificity, positive and negative predictive values for borderline ovarian tumors. However, it had slightly low sensitivity, specificity, positive and negative predictive values for both benign and malignant tumors compared to borderline ovarian tumors which was 100%

DISCUSSION

Intraoperative FS diagnosis is being used more frequently for management of many conditions because of its improved diagnostic accuracy.[6] Precise intra operative histological examination of ovarian lesions is of key importance in the selection of the most suitable operative procedure. It allows the operation to be performed to an appropriate extent, avoiding under or over treatment.[7] Imaging studies and serum level determination of tumor markers in patients with ovarian neoplasms have its own limitations for the recognition of malignancy.[6] The frozen section technique is a useful and convenient method for prompt diagnosis, which enables surgeons to decide the next appropriate therapeutic steps.[8] Houck *et al*[4,7] reviewed 140 borderline ovarian tumors including 80 serous, 47 mucinous, 11 mixed and 2 endometrioid types. The median age for all patients was 52.3 years. The overall mean diameter was 13.7 cm (1-70cm); 10.2 cm for serous and 20.1 cm for mucinous tumors. In 60% of cases, FS diagnoses agreed with permanent diagnoses. Over diagnosis was reported in 10.7% and 29.3% of cases were under diagnosed. Tumor types other than serous ($P<0.001$), tumors larger than 20 cm ($P=0.039$), and tumors confined to the ovaries ($P=0.009$) were more likely to be under diagnosed in univariate analysis. When all variables were included in a multiple regression model, only histology was a significant predictor of under diagnosis. The positive predictive value (PPV) for borderline ovarian tumors by FS was 89.3%.[9] Stewart *et al*[10] found that FS had a greater sensitivity than intraoperative cytology in the diagnosis of malignant ovarian lesions (97% vs 93%, respectively), although the specificity of both techniques for a malignant diagnosis was 100%.[10] Wang *et al*[11] studied 299 samples of ovarian tissues and found that of the 299 samples on final diagnosis, 75 were malignant, 23 were borderline, and 201 were benign. There were 287 cases (96%) in the compatible group, 9 cases (3%) in the incompatible group, and 3 cases (1%) in the uncertain group. The sensitivity for malignant ovarian tumor and borderline malignancy was 92% (69/75) and 78.3% (18/23), respectively. The specificity for ovarian non benign lesion was 99.5% (200/201). Of the 9 incompatible ovarian frozen section diagnoses, 6 were false negatives and 3 were under estimated ; interpretational errors were found in 5 cases and sampling errors in 4 cases. The 3 uncertain ovarian frozen section results were due to technical limitations.[11] In our review, 69% of tumors were benign, 11% borderline and 20% malignant. The sensitivity of frozen section diagnosis for benign, borderline and malignant lesions was 96.7%, 100% and 88.8%; and the specificities were 92.8%, 100% and 97.2% respectively. There was one false- positive and one false –negative result. This agrees with data from Khoddami *et al*[5] in which the sensitivity of FS diagnosis for benign, borderline, and malignant lesions was 99.3%, 100% and 94.9%; and the specificities were 100%, 98.9% and 99.3%, respectively. The high sensitivity and specificity of borderline ovarian tumors in our study compared to the literature could be due to the small number of cases in our cases. The causes of diagnostic discrepancy in various studies included sampling error, misinterpretation by pathologist, and suboptimal slide preparation. With increase in the size of ovarian lesions, a decrease in the sensitivity of frozen section was observed; taking additional number of sections for amass larger than 10cm may reduce the error in large tumor, to some extent.[6] Our discrepant cases were as follows, first case was malignant sex cord tumor (krukenbergtumor), given as benign sex cord tumor (fibrothecoma) by frozen section. Second one was a malignant serous epithelial tumor (papillary cystadenocarcinoma) was proved to be benign serous tumor (cystadenofibroma) of the ovary by paraffin sections. The reason for discordance in 1st case is : In cases where the signet – ring cells are sparse, the stroma of krukenbergtumor may mimic fibroma or fibrothecoma on frozen sections, as seen in studt by Ilvanet *et al*. In the second case, psammoma bodies were noted, these are more frequently found in serous papillary carcinoma, which lead to the misdiagnosis. Occasionally these can be seen in benign conditions also.

CONCLUSION

Intraoperative frozen section has high accuracy in the diagnosis of suspected ovarian neoplasms. It is a valuable tool to guide the surgical management of these patients and should be routinely used in all major oncology centres along with good clinical correlation.

REFERENCES

1. Spencer LT, Bancroft JD. Microtomy: Paraffin and frozen. In: Bancroft JD, editor. Theory and practice of

histological techniques. Chapter 7.6thed.Churchill Livingstone Elsevier. Philadelphia. 2008; 98 – 103.
2. Quinlivan JA, Petersen RW, Nicklin JL. Accuracy of frozen section for the operative management of endometrial cancer.Br J ObstetGynaecol.2001; 108:798-803.
3. Wasinghon P, Suthippintawong C, Tuipae S. The accuracy of intraoperative frozen sections in the diagnosis of ovarian tumors.J Med Assoc Thai.2008 ;91 (12) :1791-5.
4. Dey S, Misra V, Singh PA, Mishra S, Sharma N. Role of intraoperative imprint cytology in diagnosis of suspected ovarian neoplasms.Asian Pacific J Cancer Prev.2010 ; 11:1389-1391.
5. Maheshwari A, Gupta S, Kane S, Kulkarni Y, Goyal BK, Tongaonkar HB. Accuracy of intraoperative frozen section in the diagnosis of ovarian neoplasms: experience at a tertiary oncology center.World J Surg Oncol.2006; 4:12.
6. Khoddami M, Ghavam P**.** Diagnostic Accuracy of Frozen Section in Ovarian Tumors: A 12-Year Review**.** Iranian Journal of Pathology.2012;7 (2), 112 – 120.
7. Gorisek B, Stare MR, KrajncI. Accuracy of intra-operative frozen section analysis of ovarian tumours. J Intl Med Research. 2009; 37:1173-1178.
8. Hwang TS, Ham EK, Kim CW, Chi JG, Park SH. An evaluation of frozen section biopsy ic 4434 cases. J Korean Med Science. 1987 ; 2 (4) ;239-245.
9. Houck K, Najmosama N, Linda D, Yuchiao C *et.al*. Borderlinetumors of the ovary: Correlation of frozen section and permanent histopathologic diagnosis. Obstretrics and Gynecology. 2000; 95 (6): 839-843.
10. Stewart CJR, Brennan BA, Koay E, Naran A, Ruba S. Value of cytology in the intraoperative assessment of ovarian tumors – A review of 402 cases and comparison with frozen section diagnosis.Cancer cytopathol.2010; 118 :127-36.
11. Wang KG, Chen AC, Wang TY, Yang YC, Su TH. Accuracy of frozen section diagnosis in gynecology. Gynecologic oncology. 1998; 70:105-110.
12. Ghaemmaghami F, Behnamfer F, Ensani F. Intraoperative frozen sections for assessment of female cancers. Asian Pacific J Cancer Prev. 2007; 8: 635-639.
13. Kim JH, Kim TJ, Park YG, Lee SH, lee CW, Song MJ *et.al*. Clinical analysis of intra-operative frozen section proven borderline tumors of the ovary. J GynecolOncol. 2009. 20 (3): 176-180.

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