Role of Frozen Section in the Intra operative management of Ovarian Neoplasms and Comparing with Final Histopathological Diagnosis – A Prospective Study

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Abstract
Objectives: *To evaluate performance of frozen section in the intraoperative evaluation of ovarian tumors and deciding the extent of surgery.*
Design: *Two year prospective study*
Materials and Methods: *Study of 30 patients diagnosed with ovarian tumors needing surgery admitted to department of Obstetrics and Gynecology, Gandhi Hospital (tertiary referral hospital), Secunderabad from September 2009 to August 2011. Data on frozen section analysis compared with final diagnosis on Paraffin section.*
Results: *30 patients meeting the eligibility criteria were included in this study. Among them the frozen section diagnoses were benign in 20 (66.7%), border line in 5 (16.6%) and malignant in 5 (16.6%), where as final Histopathological diagnosis was benign in 19 (63.3%), borderline in 4(13.3%) and malignant in 7 (23.3%). Sensitivity for frozen section was 100% benign, 60% border line and 71.4% malignant. Whereas specificity was 90% benign 96% border line and 100% malignant. There were 4 cases with discordance, all of which were under diagnosed by frozen section. Overall accuracy of frozen section analysis was 90%.*
Conclusion: *Our data confirm that frozen section diagnosis is a reliable method for surgical management of patients with ovarian mass. The results can be used to avoid over treatment or under treatment of ovarian tumors. Mucinous borderline tumors constitute an important group causing diagnostic discrepancies. Hence a good communication established between clinicians and pathologists is necessary to obtain more accurate results and to minimize number of deferred cases.*

Introduction

Ovarian cancer continues to have the highest mortality of all Gynecological malignancies, and is the least able to be diagnosed at an early stage [1]. Ovarian carcinoma is the fifth most important cause of cancer death among women. Because of inadequate screening methods and the vague nature of the symptoms, patients present late in the course of the disease and the survival rate is poor.

Despite advances, novel approaches and the wide variety of different therapies, Surgery has been the corner stone in all treatment modalities for ovarian cancers.

In benign and borderline ovarian tumor, fertility conserving surgery is a preferred approach,

whereas, in malignant tumors, complete surgical staging that involves total hysterectomy, bilateral Salpingo-oophorectomy, partial Omentectomy and Retroperitoneal lymph node sampling should be done [2]. For borderline tumors, surgical staging should be performed but with a conservative approach and lymph node sampling may be omitted if the node is not grossly abnormal. Intra operative frozen section can help clinicians in making an appropriate decision on the surgical management of ovarian Neoplasms [3]. Hence the need for an intraoperative accurate diagnosis by procedure called FROZEN SECTION. Frozen section has become the vital part in diagnosing the neoplasm and in deciding the extent of the surgery before delayed Paraffin section report is made available.

Material and Methods

This prospective study was conducted in the department of Obstetrics and Gynecology, Gandhi Hospitals, Secunderabad, India during the period of September 2009 - July 2011. A case proforma was prepared for each patient and written consent was taken. History taking and examination of each patient was done and they were subjected to the necessary bio chemical and radiological investigations.

In our hospital we have frozen section service for suspected ovarian cancer cases. 30 cases which met the eligibility criteria of requiring surgery were included in this study. Clinically malignant ovarian tumors were excluded from the study.

After the frozen section diagnosis were reported, the ovarian specimens were fixed in 10% Formalin and sampled for routine histological sections. The histological diagnosis of ovarian lesions was based on the WHO classification [4].

Frozen section diagnoses were compared to the final histological diagnoses in each case, which were considered as the gold standard. Diagnostic parameters including accuracy, sensitivity, specificity, predictive values of Frozen section for the diagnosis were calculated. The cases with discordant diagnosis were reviewed in detail.

Results

Thirty patients with Ovarian masses undergoing surgery and Frozen section were included in this study. Demographic and Clinical data are reported as table below

Demographic and Clinical Data (n=30)

VARIABLES	N%
Age Range (Years)	13-65
Parity (N%)	
Nullipara	16 (53.3%)
Multipara	14 (46.6%)
Menopausal status (N%)	
Premenopausal	23 (76.6%)
Postmenopausal	7 (23.3%)

Frozen section revealed 66.7% Benign tumors, 16.6% Borderline tumors, 16.6% Malignant tumors, whereas, the final histopathological diagnosis was benign in 63.3%, borderline in 13.3% and Malignant in 23.3% cases. Sensitivity and Specificity for benign, borderline and malignant tumors are 100%, 60%, 71.4% and 90%,96%,100% respectively. The Negative predictive value (NPV) and Positive predictive value (PPV) for benign, borderline, malignant tumors are 100%,92.5%,92.5% and 95%,75%, 100% respectively.

Comparison between Frozen section and Final paraffin report

Frozen Diagnosis (Paraffin)	Final Diagnosis		
	Benign	Borderline	Malignant
Benign (n =20)	19	1	0
Borderline (n=5)	0	3	2
Malignant (n=5)	0	0	5
Total (n=30)	19	4	7

Out of 20 cases diagnosed as benign by frozen section, 19 cases turned out to be benign on final diagnosis.

- 1 borderline case was misdiagnosed as benign.
- 2 malignant tumors were misdiagnosed as borderline.
- 5 malignant cases diagnosed on frozen section were confirmed as malignant on final diagnosis.

Frozen section accuracy in individual type of tumors

	Benign	Borderline	Malignant
Sensitivity	100%	60%	71.4%
Specificity	90.9%	96%	100%
PPV	95%	75%	100%
NPV	100%	92.5%	92.5%

- The above table shows accuracy of frozen section in diagnosing various ovarian tumors intra operatively.
- Comparatively high sensitivity is noted in diagnosing benign and malignant tumors,
- Sensitivity of frozen section is low with borderline tumors.

Frozen section Vs Gold standard histopathology.

	HP Malignant + Borderline	HP Benign	Total
Frozen Section Malignant +Borderline	10	0	10
Frozen Section Benign	1	19	20
Total	11	19	30

In the above table borderline tumors were included with malignant tumors to assess the overall sensitivity.

The above table shows the accuracy of test over gold standard diagnosis.

Sensitivity of test = 90.9%

Specificity of test = 100%

Positive predictive value of test = 100%

Negative predictive value of test = 95%

Frozen section VS Histopathology report
Reports coinciding

SL No	Frozen Section Report	Histopathology Report
1	Simple Serous cyst	Simple Serous cyst
2	Chocolate cyst	Chocolate cyst
3	Ovarian Fibroma	Ovarian Fibroma
4	Papillary serous cystadenocarcinoma	Papillary serous cystadenocarcinoma
5	Granulomatous Inflammation	Granulomatous Inflammation
6	Dermoid cyst	Dermoid cyst

Reports differing

SL No	Frozen Section Report	Histopathology Report	Number of tumors
1	Borderline Mucinous cystadenoma	Mucinous cystadenocarcinoma	2
2	Benign serous cystadenoma	Borderline serous cystadenoma	1

Discussion

Present study is a prospective study in testing the accuracy of intra operative frozen section compared to histopathology in case of ovarian tumors to decide the extent of surgery.

This study is carried out at Gandhi hospital, a tertiary care hospital, selecting 30 patients admitted through gynaecology op.

As incidence of ovarian tumors is affecting almost all age groups, most of which are inconclusive on clinical assessment, this study has been carried out to help surgeons diagnose case before it is missed or lost for follow up.

Though it is adopted by many oncology centers, this study highlights' the importance of taking up frozen section in almost all tertiary centers where inflow of patients is maximum.

Correct intra operative histological assessment of an ovarian mass is crucial to select an appropriate surgical procedure to avoid under and over treatment of patients. The results of present study, show that frozen section analysis has a high overall accuracy for the diagnosis of ovarian Neoplasms that is around 90%.Most studies reported between 86 and 97% [5,6,7,8,9].This figure would obviously depend on the expertise of the pathologists, but the overall accuracy should be consistently less than 10% for this procedure to be useful in large tertiary centers dealing with ovarian Neoplasms.

Our study analysis done on 30 patients' shows that test fared well on all 4 conventional indices (sensitivity, specificity, and predictive values) in benign and malignant tumors.

Sensitivity for benign tumors in our study is 100%.sensitivity rates reported in the literature are 98 to 99% [10,11,12]. only 1 out 20 diagnosed as

benign on frozen section turned out to be borderline on final histopathology. In our study, inadequate and inappropriate tissue sampling due to huge tumors during operation was the reasons for the cases with benign frozen but borderline paraffin block results.

In our study on 30 patients**, sensitivity for malignant tumors was 71.4%**.A recently published meta analysis of 18 studies comparing frozen and histopath showed sensitivity for malignant tumors as 71 to 100% [13]. In our study 5 diagnosed as malignant on frozen turned out to be malignant. Frozen section missed 2 cases of malignancy among borderline, however they were early stage cancers. at our institute borderline tumors were treated like malignant.

In our study on 30 patients **sensitivity for borderline tumors was 60%.**studies report sensitivity between 0 to 88.7% [14,15,16,17,18]. 2 cases out 5 borderline diagnosed by frozen section, turned out to be malignant on histopathology. In a large borderline tumor there may be only a few foci of frank malignancy that may require large number of frozen section samples. The larger tumor size and multilocular pattern of mucinous tumors is reported to have a negative effect on the accuracy of frozen section diagnosis. Multivariate analysis found that the mucinous type was the only independent factor in the misdiagnosis of borderline Neoplasms.

Some authors have suggested that under diagnosis was due to sampling errors and they advised using greater number of frozen sections to minimize the under diagnosis of tumors, recommending one section per 10cms of mass. some recent studies have indicated that after sampling errors, the absence of an expert pathologist is responsible for the misdiagnosis of tumors [19,20,21]. In addition pathologists should be informed about tumor status, peritoneal implants and the contra lateral ovary.

Conclusion

Therefore with the above data we confirm that frozen section diagnosis is a reliable method for surgical management of patients with ovarian mass. The results can be used to avoid over treatment or under treatment of ovarian tumors and help in the management of the case.

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