

Accuracy of Frozen Section Biopsy in the Diagnosis of Ovarian Malignancy : An Institutional Experience

Ismat Sultana^{1*} Mohammad Azizul Haque² Nasrin Sultana³
Nazmin Sultana⁴ Badrun Nessa⁵

Abstract

Background : Women with early-stage ovarian cancer need surgical staging, which entails taking samples from areas within the abdominal cavity and retroperitoneal lymph nodes for further treatment. The frozen section is an essential and beneficial adjunct in the intraoperative diagnosis of ovarian tumors. The study aimed to evaluate the diagnostic accuracy of frozen section biopsy in malignant lesions among ovarian masses.

Materials and methods: This was a cross sectional study. Thirty cases of ovarian masses from the patients who underwent laparotomy for ovarian masses at the Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from March 2014 to August 2014 were included in the study. Surgical specimens were first processed for frozen section reporting, then processed routinely for final paraffin section histopathology evaluation. Results of frozen and paraffin sections were categorized as benign and malignant, and the accuracy of the frozen section was determined.

Result: The mean age was found to be 35.6±12.4 years, with a range from 14 to 70 years. Frozen section biopsy for evaluation of ovarian masses, true positive was in 6 cases and no false, one false negative and true negative in 23 cases identified by histopathology. Frozen section biopsy has a sensitivity of 85.7%, specificity of 100.0%, accuracy of 96.7%, a positive predictive value of 100.0%, and a negative predictive value of 95.8% in the evaluation of malignant ovarian masses.

Conclusion: The present study confirms that frozen section diagnosis is a reliable method for the surgical management of patients with ovarian masses.

1. Medical Officer
Chittagong Medical College Hospital, Chattogram.
2. Assistant Professor of Anaesthesiology & ICU
Chittagong Medical College, Chattogram.
3. Associate Professor of Pathology
Chattogram International Medical College, Chattogram.
4. RS of Obstetrics & Gynaecology
Chattogram International Medical College, Chattogram.
5. Lecturer of Anatomy
Chittagong Medical College, Chattogram.

***Correspondence:** Dr. Ismat Sultana
Cell : 01819 28 91 79
E-mail: dr.ismatsultana@gmail.com

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Introduction

Ovarian cancer is the leading cause of death in women diagnosed with gynecological cancers. It is also the fifth most frequent cause of death in women.¹ Most cases are diagnosed at an advanced stage, leading to poor outcomes of this disease.² Benign, borderline, and malignant lesions have been identified within the same surgical specimen. However, the frequency and speed of the evolution from dysplasia into cancer remain unknown.³

Frozen sections have dramatically impacted the care of gynecological patients and have become indispensable in diagnosing malignancy. It also helps determine the staging and the appropriate surgical technique for each case.⁴ In ovarian cancer, surgery usually involves total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, and pelvic and para-aortic lymphadenectomy. In borderline tumors, a fertility-sparing approach can be used, particularly in patients who desire fertility preservation.⁵

The reliability of frozen-section diagnosis of ovarian tumors is critical in selecting the appropriate surgical procedure and provides essential information about patient prognosis.⁶ Correct intraoperative histopathologic diagnosis is crucial in assessing a proper surgical plan and preventing under- and overtreatment of patients. If ovarian tumors can be accurately diagnosed in the operating room, surgeons can give patients the option of fertility-preserving surgery when possible.³ This study aimed to determine whether frozen section evaluation of ovarian tumors can be used to establish a histopathologic diagnosis and guide the surgeon to perform the appropriate surgical procedure in our setting.

Materials and methods

This cross-sectional study included 30 cases of suspected ovarian masses from the patients who underwent laparotomy for ovarian masses at the Department of Obstetrics and Gynaecology,

BSMMU, Dhaka, Bangladesh, from March 2014 to August 2014. The study protocol was approved by the ethical committee of BSMMU, and written informed consent was obtained from each patient. Patients with clinical features suggestive of ovarian mass and ultrasonographic findings suggestive of ovarian mass were included in the study. Patients with non-ovarian lower abdominal groups (Per-ovarian cyst, para tubal cyst, etc) and patients refusing to do surgery were excluded from the study.

A case record form noted data regarding age, provisional diagnosis based on clinical features, standard biochemical tests, and sonographic evaluation. Frozen section blocks were prepared after gross examination of the specimens, including tumor size, capsular integrity, and presence of solid and cystic areas. The number of blocks ranged from one to five, with an average of two. Two to four slides were prepared from each block and stained with hematoxylin and eosin stains. One-touch preparation was also made. After reporting the frozen section, the tissue was routinely processed for paraffin blocks. The reports of frozen and paraffin sections were divided into benign and malignant. The sensitivity, specificity, positive predictive, and negative predictive values were determined for malignant cases by two × two tables considering final paraffin section diagnosis as the gold standard. Med Calc's Diagnostic test evaluation online calculator was used for the calculation.

Results

The mean age was 35.6±12.4 years, ranging from 14 to 70 years. Tubo ovarian cyst/mass was the provisional diagnosis in the majority (40.0%) of the cases, followed by suspected malignant ovarian tumor (30%), suspected benign ovarian tumors (20%), bilateral ovarian cyst/tumor (6.7%), and twisted ovarian cyst/tumor (3.3%). Most of the patients (70%) had normal CA-125 (≤35 IU/ml) and 9 patients (30.0%) had raised CA-125 (>35 IU/ml). On ultrasonographic evaluation, most of the patients (36.7%) had adnexal mass followed by ovarian cyst/ tumor (26.7%), solid ovarian mass (26.7%), bilateral ovarian tumor solid and/ cystic (6.7%), and ovarian thick-walled cyst/mass (3.3%) (Table I).

Table I Age distribution and socio-demographic status of the study population (n=30)

Variables	Frequency	Percentage
Age, years		
14-20	4	13.3
21-30	9	30.0
31-40	5	16.7
41-50	8	26.7
51-70	4	13.3
Mean±SD	35.6±12.4	
Range	14-70	
Provisional diagnosis		
Tubo ovarian cyst/mass	12	40.0
Malignant ovarian tumor	9	30.0
Benign ovarian tumor	6	20.0
Bilateral ovarian cyst/tumor	2	6.7
Twisted ovarian cyst/tumor	1	3.3
CA 125 (u/ml)		
Normal (≤35)	21	70
High (>35)	9	30
Ultrasonographic findings		
Adnexal mass	11	36.7
Ovarian cyst/tumor	8	26.7
Ovarian solid mass	8	26.7
Bilateral ovarian tumor solid and cystic	2	6.7
Ovarian thick-walled cyst/mass	1	3.3

It was found that more than three fourth of the patients (80.0%) cases were benign, and 6 (20%) of the cases were malignant in frozen section findings. In the final paraffin section, histopathological examination, 23 (76.7%) cases were revealed as benign, and the rest of the 7 (23.3%) patients were malignant (Table II). The results showed strong agreement between the two diagnoses, $k = 0.90$, $p < 0.05$.

Table II Comparison of frozen section biopsy report and paraffin section histopathological diagnosis for ovarian neoplasms (n=30)

Frozen section	Histopathological diagnosis		Total	Statistics
	Malignant	Benign		
Malignant	6	0	6	Agreement=96.7% kappa= 0.90
Benign	1	23	24	
Total	7	23	30	

Table III shows that the overall accuracy for malignant tumors is 96.67%. The sensitivity and specificity were 85.71% and 100.00%, respectively.

Table III Sensitivity, specificity, Positive Predictive value (PPV) Negative Predictive Value (NPV) and accuracy of the frozen section for ovarian neoplasms

Statistic	Value	95% Confidence interval
Sensitivity	85.71%	42.13% to 99.64%
Specificity	100.00%	85.18% to 100.00%
Positive Predictive Value	100.00%	--
Negative Predictive Value	95.83%	78.93% to 99.30%
Accuracy	96.67%	82.78% to 99.92%

Discussion

Frozen section evaluation of ovarian tumors is beneficial to individualize surgical intervention, conserve fertility when needed, and avoid overtreatment. By frozen section evaluation of ovarian masses in this current series, it was observed that 6 cases were malignant, out of which true positive was 6 cases, and no false-positive claims were evaluated by histopathology. In our study, the false-positive rate was 0%. In the literature, the false-positive rate is lower than the false-negative rate; reported false-positive rates to range from 2.2 to 10.7%, and false-negative rates range from 5.4 to 29.3%.^{7,8}

A total of 24 cases were benign that were evaluated by frozen section, among them 1 case of false-negative and 23 cases of true negative identified by histopathology. The frozen section detected 73.8% of patients as benign, 20.2% as malignant, and 6.0% as suspicious. In subsequent histopathological findings, 77.4% of cases were confirmed as mild, 20.2% as malignant, and only 2.4% of cases as borderline. The validity of the frozen section as a histopathological diagnosis in the evaluation of malignant lesions and ovarian masses patients in this study was observed with a sensitivity of 85.7%, specificity of 100.0%, an accuracy of 96.7%, a PPV of 100.0%, and NPV 95.8%.

The accuracy of the frozen section for ovarian tumors varies among different institutions. Subbian et al., in a study involving 135 cases of ovarian tumors, found an overall accuracy of 84.2%. They found the lowest sensitivity for borderline tumors (31.2%), especially in the mucinous category.⁹ On the other hand, Suprasert et al., in a review of 112 cases, revealed a sensitivity of 100, 84, and 92% for benign, borderline, and malignant tumors.¹⁰ In another retrospective review of 282 cases, sensitivities of the frozen section for benign, borderline and

malignant tumors were 97.5, 95.8, and 95.6%, and corresponding specificities were 97.5, 97.6, and 100%, respectively. They found the lowest positive predictive value in the borderline group (79.3%), all of them with mucinous type epithelium as described by other authors.¹¹

Limitations

The present study was conducted in a small sample selected from a single hospital in Bangladesh which might question the validity of the results.

Conclusion

In conclusion, we found high sensitivity and specificity of the frozen section for diagnosing ovarian tumors and determining their malignant potential.

Recommendation

Based on the study findings, the frozen section biopsy could be recommended when the preoperative diagnosis is not definite to govern the extent of surgical resection. Nevertheless, considering the limitations of the present study, a further multicenter study with a higher number of cases is desirable.

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Contributions

IS-Conception, data collection, data analysis, drafting & final approval.

MAH-Design, interpretation of data, critical revision & final approval.

NS-Data collection, drafting & final approval.

NS-Data analysis, critical revision & final approval.

BN-Interpretation of data, critical revision & final approval.

Disclosure

All the authors declared no competing interest.

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