

# HARMONIZING DIAGNOSTIC APPROACHES- A CORRELATION STUDY OF OVARIAN LESIONS THROUGH FROZEN AND PARAFFIN EMBEDDED SECTION.

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## Abstract

**Context:** Ovarian cancer is a significant global health concern due to its prevalence, severity, and impact on affected individuals and healthcare systems worldwide. Treatment modality for ovarian tumors are always varied. The study aims to identify and correlate the samples of different ovarian tumors obtained for frozen section with results of the same sample subjected to histopathology examination.

**Procedures and Techniques:** In this investigation, 92 cases of Cryosection histology with histopathological diagnosis was compared and analysed at a Tertiary Care teaching hospital, Chennai during May 2023 to March 2024.

**Results:** Pathologic histology and cryosection diagnoses of ovarian carcinoma were studied in a total of 92 cases. In 89 cases, the findings in frozen section were compatible with histopathology.

**Conclusion:** The frozen section is fast and reliable source of diagnosis. Among the 92 cases studied, 3 cases showed disagreement. The well-being of ovarian cancer patients is a crucial aspect of their overall care and management.

**Keywords:** Global health, Ovarian cancer, Frozen section, Histopathology examination, Non cancerous, Cancerous, Atypical, Sampling errors, accuracy.

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## INTRODUCTION

The third most important cause of mortality among women, causing 3.6% of deaths in India, with many cases being diagnosed at later stages, necessitating quick and fast interventions by surgeons to prevent faster progression of the disease is Ovarian Cancer [1]. Early detection of different benign and malignant ovarian tumors often allows for conservative management [1] [2]. Therefore, intraoperative frozen section (FS) analysis can help in a speedy diagnosis and surgical management [3].

FS analysis is a meticulous diagnostic tool, possessing a processing time of 15 to 20 minutes, helping surgeons to segregate ovarian tumors as non-cancerous, atypical, and cancerous, thereby improving reproductive outcomes[1] [4] and the overall well-being of a woman [5]. In contrast, the paraffin-embedded section (PES) method involves fixing the tissue specimen in formalin to preserve cellular architecture and then embedding it in paraffin wax. PES provides intricate morphological preservation and is considered the gold standard for histopathological diagnosis, but it requires a longer processing time, often ranging from 12 to 48 hours. Additionally, formalin fixation can mask antigenic sites, necessitating antigen retrieval techniques to unmask these sites for immunohistochemical analysis [6].

An immediate need for diagnostic information during surgery has led to FS playing a crucial role in guiding surgical decisions. However, discrepancies between FS and PES diagnoses can occur, impacting patient management and treatment decisions. Understanding the correlation between these two methods is essential to enhance diagnostic accuracy, optimize intraoperative decision-making, and improve patient outcomes [7].

Keeping this rationale in mind, the above study was performed inculcating the concepts as mentioned above [8].

#### PROCEDURES AND TECHNIQUES

The study was carried out in a Tertiary Care academic Hospital from May 2023 to March 2024.

Fresh tissue samples under optimal cooling temperature, tissue blocks were prepared on the cryostat. These blocks were then stained with hematoxylin-eosin for microscopic analysis and diagnosis was jotted down.

The non-frozen tissues were then sent to the histopathological lab where it is fixed in 10% formalin solution and processed for routine paraffin section followed by hematoxylin-eosin staining on the next day and further reporting and data collection was done [9].

#### RESULTS

Out of the 92 cases, frozen sections accurately diagnosed 79 cases as non cancerous, 5 cases as atypical and 8 cases as cancerous, with complete concordance in 89 cases (96.74%) and discordance in 3 cases (3.26%), all of which had an initial different but on histopathology correlation it became cancerous (Table 1).

In a total of 92 cases (n=92), 65 cases were epithelial tumors. Out of 79 cases that were diagnosed as non cancerous 39 were serous epithelial tumors, 4 out of 65 epithelial tumors were serous cancerous nature and 3 out of 65 epithelial belonging to mucinous tumors were atypical (Table 2).

Table 1. Association Between Intraoperative Frozen Section and Histopathology

		Frozen section specimen Findings			Total
		Non cancerous	Atypical	Cancerous	
Routine HPE diagnosis	Non cancerous	79	0	0	79
	Atypical	0	5	0	5
	Cancerous	0	3	5	8
Total		79	8	5	92

Table2. Routine HPE-Based Distribution of Ovarian Lesions in This Study

	Slow Growing	Atypical	Cancerous	Total	%
Surface Derived Tumors				65	70.65%
serous	39	2	4	45	48.91%
Mucinous	14	3	2	19	20.65%
Brenner	1			1	1.08%

Germ cell tumors				11	11.95%
Dysgerminoma			1	1	1.08%
Non cancerous cystic teratoma	9			9	9.78%
Cancerous mixed germ cell tumour			1	1	1.08%
sex cord-gonadal stromal tumors				4	4.34%
Ovarian fibromata	3			3	3.26%
Thecoma	1			1	1.08%
Others				12	13.04%
Hemorrhagic infarction	3			3	3.26%
Corpus luteum cyst	3			3	3.26%
Endometriotic cyst	3			3	3.26%
Functional ovarian cyst	1			1	1.08%
Tubo Ovarian abscess	2			2	2.17%

**Table 3: Hispathological and Frozen section analysis of 3 cases diagnosed with no concordance between FS and PES**

Frozen sections demonstrated high diagnostic accuracy for non cancerous and atypical lesions. Specifically, they achieved 100% sensitivity while diagnosing cancerous lesions and 96.66% specificity, while sensitivity was notably lower at 62.5% for diagnosing atypical tumors.

The test correctly identified all those who had disease, it was 62.5% for cancerous tumors. FS achieved 100% accuracy while diagnosing slow growing tumors and atypical ovarian tumors. [Table 4]

**Table 4: Diagnostic Efficiency of Frozen section**

Diagnostic parameters	Slow growing	Atypical	Cancerous
Positive cases correctly diagnosed (Sensitivity)	85.87%	62.5%	100%
Negative cases correctly diagnosed (Specificity)	100%	100%	96.66%
Positive predictive value	100%	100%	62.5%
Negative predictive value	100%	100%	96.66%
Accuracy	100%	100%	95.6%

**Table 5: Comparative Validity of Frozen Section in Multiple Investigations**

Research articles	Non-Cancerous	Atypical	Cancerous
This study	100%	100%	95.6%
Saphina P et al (2020)[8]	93.3%	—	—
Arshad NZM et al (2018)[9]	85.9%	91.3%	91.3%
Nili F et al (2017)[10]	98%	80.3%	67.2%
Rajanbabu A et al (2015)[11]	99%	81.8%	92.5%
Subbian et al (2013)[12]	90.4%	31.1%	91.5%

Research articles	Non-Cancerous	Atypical	Cancerous
Toneva F et al (2012)[13]	–	89.4%	–
Song T et al (2011)[14]	–	64.4%	–
Bige O et al (2011)[15]	97.1%	–	–
Gol et al (2003)[16]	98%	61%	88.7

**Table 6 :** Accuracy Metrics of Frozen Section in Clinical Research

Research articles	Non cancerous Sensitivity	Non cancerous Specificity	Atypical Sensitivity	Atypical Specificity	Cancerous Sensitivity	Cancerous Specificity
This study	85.87%	100%	62.5%	100%	100%	96.66%
Saphina P et al (2020) [8]	95%	100%	75%	94%	90%	97%
Arshad NZM et al (2018) [9]	95.6%	85.1%	76.2%	88.7%	69.2%	100%
Nili F et al (2017) [10]	97.9%	97.6%	91%	88.4%	67.2%	100%
Toneva F et al (2012) [13]	–	–	85.4%	100%	–	–
Rajanbabu A et al (2015) [11]	–	–	85.4%	100%	–	–
Subbian et al (2013) [12]	90.4%	82.6%	31.2%	94%	91.5%	98.2%
Bige O et al (2011) [15]	99.7%	97.6%	89.5%	85%	96.3%	99%
Song T et al (2011)[14]	–	–	82.1%	–	–	–
Gol et al (2003) [16]	–	–	85.4%	100%	–	–

## DISCUSSION:

Diagnosing ovarian tumors relies on integrating clinical assessments, radiological imaging, tumor markers, and cytological and histopathological examinations. Detecting early ovarian tumors poses challenges due to the absence of obvious clinical signs, and pre-operative diagnosis can be elusive when extraovarian spread is not apparent.

Non cancerous tumors like fibrothecomas can mimic malignancy by presenting with ascites, complicating clinical evaluation [1]. Surface epithelial ovarian tumors are classified as non cancerous, atypical, or cancerous based on criteria such as cellular atypia, structural complexity, mitotic activity, and stromal invasion. [15][16].

Surgical management varies: cystectomy suffices for non cancerous tumors, whereas optimal staging is recommended for atypical and cancerous tumor .Cryosection based analysis plays an indispensable role in enhancing the potential of a surgeon. particularly in scenarios where preserving fertility is a priority, such as in young patients, or when there is suspicion of malignancy, including atypical tumors . It also proves invaluable in cases of endometriosis, which can mimic malignancy and present diagnostic challenges due to potentially elevated markers and inconclusive radiological findings . [12] [16]

The primary purpose of conducting a cryosection analysis is to inform immediate therapeutic decisions during surgery. [10] [11] [16] [22]

However, there are acknowledged limitations, particularly noted in the diagnosis of benign and non-cancerous tumors of ovaries [9] [11] [13] [1]. In This investigation, three cases showed initial and final diagnosis variations [22].

Intraoperative cryo section analysis plays a pivotal role in guiding surgical management, especially in situations prioritizing fertility preservation, such as in young patients, or when there is suspicion of malignancy, including

atypical tumors . It also proves invaluable in diagnosing challenging cases like endometriosis, which can mimic malignancy and present diagnostic hurdles due to potentially elevated markers and inconclusive radiological findings. The aim of performing a cryosection analysis is to provide real-time guidance for surgical decisions [1] [23]. Few studies have shown that the cryogenicity of the specimen can change the true cytologic features and nature [1]. Studies done by Rajan et al [11], Nili F et al [10], Gol et al [16] showed accuracy of more than 95% in non-cancerous tumor similar to our study where the sensitivity for non cancerous tumor was 100%. This could be explained by the fact that the frozen section over some time has evolved drastically wherein high quality samples to diagnose are received. This study showed a specificity of 100% for the diagnosis of non-cancerous and atypical tumors similar to a study by Saphina et Al [8] where the specificity for non-cancerous tumor was 100%. However, there are acknowledged limitations, particularly noted in the diagnosis benign ovarian tumors, as documented in various studies . This study identified three of them which were in complete disagreement. The atypical category showed 62.5% sensitivity and 100% specificity in this investigational study which was similar to the study by Arshad NZM [9] et al and Subbian et Al [12] [1] where sensitivity ranged from 33 to 74%. This accuracy metrics compared with different studies can be seen in [Table5], [Table 6].

## CONCLUSION

Intraoperative frozen section diagnosis proves to be a valuable and generally accurate method for guiding surgical decisions in ovarian tumors. The rapid results provided by frozen section analysis contribute significantly to effective patient care and surgical management. Ongoing evaluation and correlation between frozen section and histopathological diagnoses are crucial for maintaining high standards of diagnostic accuracy and quality control in surgical pathology [17] [18]

In summary, while cryosection analysis is a meticulous and precise tool in intraoperative settings, vigilance and adherence to standardized protocols are essential to mitigate potential errors and ensure reliable diagnoses [19]. Regular review and feedback mechanisms can further enhance the diagnosis in clinical practice [1].

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