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Histopathological and Immunohistochemical Correlation of Neoplastic and Non - Neoplastic Lesions of the Ovary: A 1 Year Study in Tertiary Care Hospital

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Abstract: ***Background: The study aimed to comprehensively investigate ovarian lesions through a combined approach of histopathological and immunohistochemical analyses over a one-year period in a tertiary care hospital setting. Ovarian lesions present a spectrum of pathological entities ranging from neoplastic to non-neoplastic conditions, necessitating accurate diagnosis for effective management. Histopathological examination remains the cornerstone for diagnosis, while immunohistochemistry provides valuable adjunctive information, particularly in challenging cases. Aims and Objectives: 1) To analyse the frequency of ovarian lesions. 2) To study histopathology and immunohistochemistry in various ovarian lesion. 3) To provide diagnosis for further management of patient. 4) To use IHC markers in typing and sub typing of malignant ovarian lesions. Methods: A retrospective study was carried out for a period of 12 months. Relevant data collected. Formalin fixed biopsies were processed and stained with H&E stain. Special stain and immunohistochemistry were applied if required. Results: A study of 50 cases was done among which 28 were non neoplastic ovarian lesions and 22 were neoplastic ovarian lesions.Histopathological examination categorised lesions into neoplastic and non-neoplastic categories. Neoplastic lesions included benign, borderline, and malignant tumours, while non-neoplastic lesions encompassed inflammatory and functional cysts. Immunohistochemical staining provided additional diagnostic information, aiding in the characterisation and sub-classification of lesions. Conclusion: The combined approach of histopathological and immunohistochemical analysis proved valuable in accurately diagnosing ovarian lesions, guiding further management strategies. The findings highlight the importance of integrating multiple diagnostic modalities for comprehensive evaluation and optimal patient care in the management of ovarian pathology.***

Keywords: Ovarian biopsy and specimen, histopathological examination, immunohistochemistry

1. Introduction

The study aimed to assess the frequency of ovarian lesions, investigate the histopathological and immunohistochemical characteristics of these lesions, provide accurate diagnosis for patient management, and utilise immunohistochemical (IHC) markers for typing and sub typing malignant ovarian lesions.

Over a one-year period at a tertiary care hospital, a retrospective analysis was conducted on ovarian specimens obtained from surgical procedures. Histopathological examination categorised lesions into neoplastic and non-neoplastic entities, while IHC staining provided additional molecular insights.

The study revealed a diverse spectrum of ovarian lesions, including benign, borderline, and malignant neoplasms, as well as non-neoplastic conditions such as inflammatory and functional cysts. IHC markers aided in sub classifying malignant lesions, guiding treatment decisions and prognostication.

The findings underscored the importance of integrated diagnostic approaches in accurately characterising ovarian pathology. By combining histopathological evaluation with IHC analysis, clinicians could effectively diagnose and manage ovarian lesions, thereby improving patient outcomes and therapeutic strategies.

Diagnosing ovarian lesions present several challenges like histopathological diversity, overlap of morphological features, stage and grade assessment, metastatic vs. primary tumors, limited sampling and size of the biopsy.

Benefits of combining histopathology and immunohistochemistry can improve diagnostic accuracy in which IHC adds molecular dimension, allowing for identification of specific antigens that are characteristic of certain tumors types or subtypes. IHC can also help in differentiation of tumor types and identification of subtypes, distinguishing primary from metastatic lesions, prognostication and therapeutic implications, detecting minimal residual disease and clarifying borderline cases.

By integrating histopathology and IHC, pathologists can achieve a more precise and comprehensive understanding of ovarian lesions, leading to better patient outcomes through accurate diagnosis, appropriate treatment, and effective management strategies.

Aims and Objectives

- To analyse the frequency of ovarian lesions.
- To study histopathology and immunohistochemistry in various ovarian lesion.
- To provide diagnosis for further management of patient.
- To use IHC markers in typing and sub typing of malignant ovarian lesions.

2. Methods and Material

- Type of the study: Retrospective study
- Location: histopathology section, department of Pathology, Shree M P shah government medical college, Jamnagar.
- Duration of study: 1st June 2022 to 31st May 2023(12 months).
- No. Of cases: 50
- Processing: After grossing and passing of fixed specimen, they were processed in histokinette machine, paraffin blocks were prepared and tissue were taken on glass slides. And were stained with H&E stain. Special stain and immunohistochemistry (IHC) were applied if required.
- On the basis of histological diversity (include a mix of epithelial, stromal and germ cell), clinical diversity (age, stage, clinical presentation), confirmed diagnosis patient were selected.
- And accordingly specified IHC markers were applied like

Epithelial tumors	Serous tumor	WT1 PAX8 CA125 p5
	Mucinous tumors	Ck7 Ck20 CEA
	Endometrioid CA	ER PR PAX8
Germ cell tumors	Dysgerminoma	PLAP OCT4 c-KIT
	Yolk sac tumor	AFP SALL4 Glypican-3
	Teratoma	Depending upon differentiation
Sex-cord stromal tumors	Granulosa cell tumor	Inhibin calretinin FOXL2
	Sertoli cell tumor	Inhibin calretinin
	Thecoma- Fibroma	Inhibin calretinin

Inclusion Criteria

1) Ovarian specimens obtained from patients who underwent surgical procedures at the tertiary care hospital during the study period (June 1st, 2022, to May 31st, 2023).
2) Specimens diagnosed with both neoplastic and non-neoplastic lesions of the ovary.
3) All age groups and clinical presentations were included to ensure a comprehensive representation of ovarian pathology encountered in clinical practice.
4) Availability of complete clinical and pathological data for each case, including patient demographics, clinical history, and imaging findings.

Exclusion Criteria

1) Ovarian specimens with inadequate tissue for histopathological and immunohistochemical analysis.
2) Specimens from patients with incomplete clinical or pathological data, where essential information necessary for accurate diagnosis and analysis was missing.
3) Cases where the primary lesion originated outside the ovary but involved the ovary secondarily, as the focus of the study was on primary ovarian lesions.

3. Result

Non-Neoplastic Lesion	Number of Cases	Percentage
1.Functional Cysts	**20**	**71.4%**
- Follicular Cysts	10	35.7%
- Corpus Luteal Cysts	10	35.7%
2.Inflammatory Conditions	**8**	**28.6%**
- Pelvic Inflammatory Disease	4	14.3%
-Endometriosis	4	14.3%
Total cases	28	100%

Neoplastic Lesion	Number of Cases	Percentage
Benign Tumors	**8**	**36.30%**
- Serous Cystadenoma	3	13.60%
- Mucinous Cystadenoma	2	9.10%
- Mature Cystic Teratoma	3	13.60%
Borderline Tumors	**4**	**18.20%**
- Serous Borderline Tumor	2	9.10%
- Mucinous Borderline Tumor	2	9.10%
Malignant Tumors	**2**	**9%**
- Serous Carcinoma	0	0
-Mucinous Carcinoma	1	4.50%
-Endometrioid Carcinoma	1	4.50%
Sex cord stromal tumors	**1**	**4.50%**
Granulosa cell tumor	1	4.50%
Germ cell tumors	**7**	**31.70%**
Mature teratoma	2	9.10%
Dysgerminoma	1	4.50%
Yolk sac tumor	1	4.50%
Mixed germ cell tumor	3	13.60%
Total cases	**22**	**100%**

Tumor Type	**Positive IHC markers**
Surface Epithelial Tumors,	
Serous Tumors	**PAX-8, WT-1, ER/PR, P53**
Serous Cystadenoma	+, +, +/-, -
Serous Cystadenocarcinoma	+, +, +/-, +
Mucinous Tumors	**PAX-8, CK-7, CK-20, CDx2**
- Mucinous Cystadenoma	+ (focal), +, + (focal), + (focal)
- Mucinous Cystadenocarcinoma	+, +, +, + (focal)
Sex Cord-Stromal Tumors	**Inhibin, WT1, Calretinin, Melan-A, EMA**
Granulosa Cell Tumor	+, +, +, +, -
Germ Cell Tumors	**AFP, OCT-4, Glypican-3, EMA**
Mature Teratoma	+, +, +, -
Dysgerminoma	-, +, -, -
Yolk Sac Tumor	+, -, +, -
Mixed Germ Cell Tumor	+, +, +, -

Comparative Study

Lesions	Kreuzer et al.	Martinez-Onsurbe et al.	Present Study
Functional Cysts	65.4%	71%	71.4%
Inflammatory Conditions	22.6%	24.1%	28.6%

Lesions	Bhuvanesh et al.	Pilli et al.	Present Study
Surface Epithelial,	78.7%	70.9%	63.5%
Sex Cord-Stromal	7.14%	6.7%	4.5%
Germ Cell	10.85%	21.2%	31.7%

4. Discussion

- Due to similar clinical presentations there is confusion in the diagnosis of non-neoplastic and neoplastic lesions of ovary although it is diagnosed as a mass or cystic lesion on ultrasonography and hence removed prophylactically in routine oophorectomies and hysterectomies.
- Grossly, it was found in our study that benign tumours were cystic as compared to malignant, which were solid in consistency followed by partly cystic and partly solid which were mostly in malignant tumour which is in accordance with other studies
- Histomorphological study of tumour is still today a gold standard method.
- IHC markers are crucial for the differential diagnosis of ovarian lesions, especially in distinguishing between neoplastic and non neoplastic lesions.
- Here's a summary of how IHC aids in this.

Differentiating epithelial tumors:
WT1 and PAX8 are commonly used to confirm ovarian origin, while CK7, CK20, and CEA help differentiate serous, mucinous, and other epithelial types.

Identifying germ cell tumor:
OCT3/4 and c-kit are specific for dysgerminomas, while AFP and gylican-3 are indicative of yolk sac tumors.

Classifying sex cord stromal tumors:
Inhibin, calretinin, and SF-1 are key markers for Granulosa cell and sertoli-leydig cell tumors.

5. Conclusion

Ovarian carcinomas are a heterogeneous group of diseases with specific histologic, molecular, and clinicopathologic features. In conclusion, the combination of histopathological and immunohistochemical analysis offers a robust approach to the diagnosis and characterisation of neoplastic and non-neoplastic lesions of the ovary. This integrated approach enhances diagnostic accuracy, provides valuable prognostic information, and may guide therapeutic decisions, ultimately improving patient care in the management of ovarian pathology.

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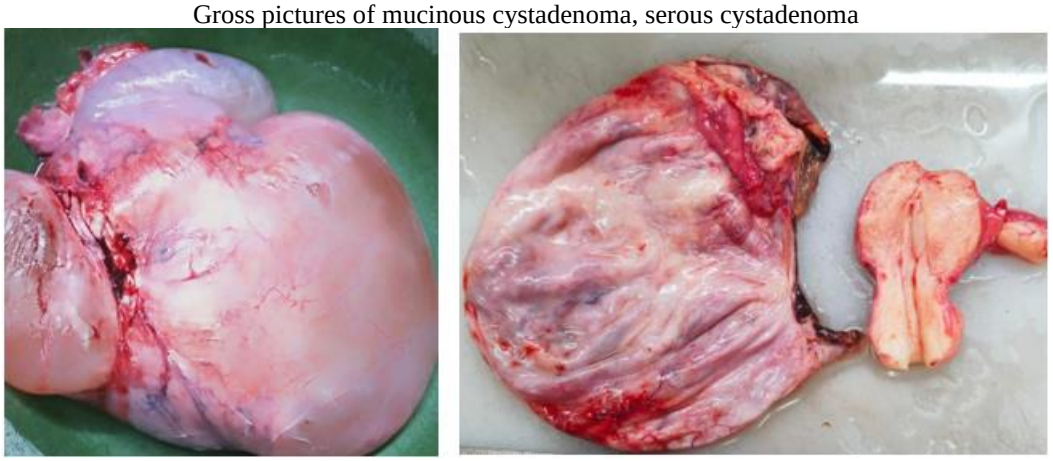
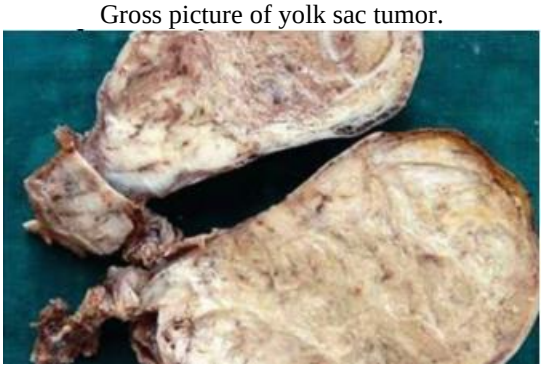
Images:

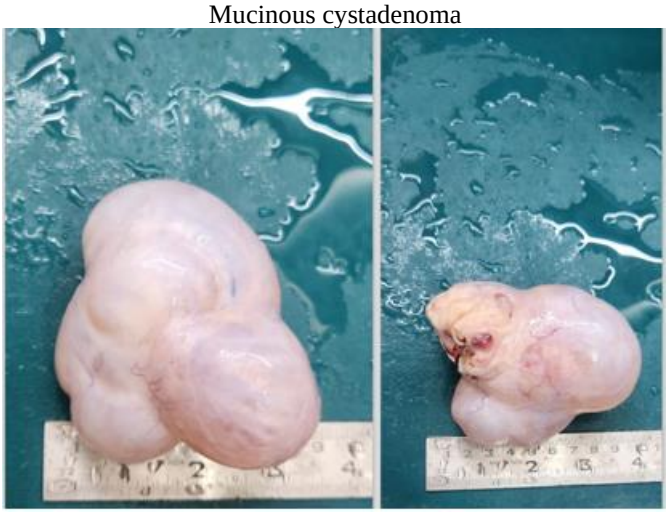
Gross pictures of mucinous cystadenoma, serous cystadenoma



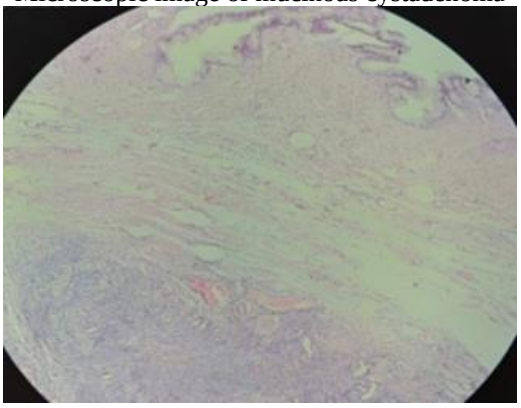
Gross picture of yolk sac tumor.



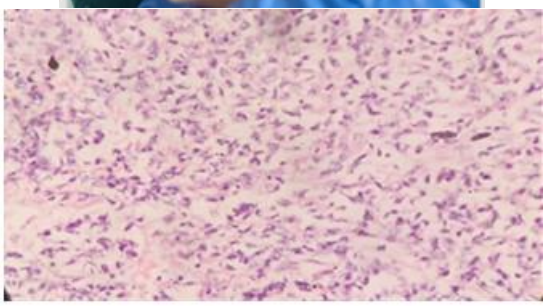
Mucinous cystadenoma



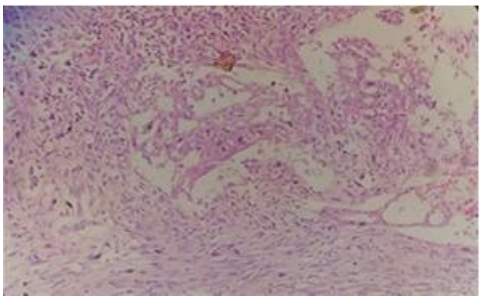
Microscopic image of mucinous cystadenoma



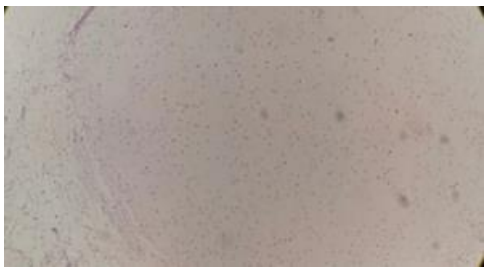
Gross photo of mature cystic teratoma



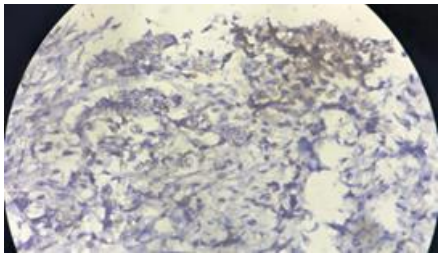
Mixed germ cell tumor
Embryonal component.



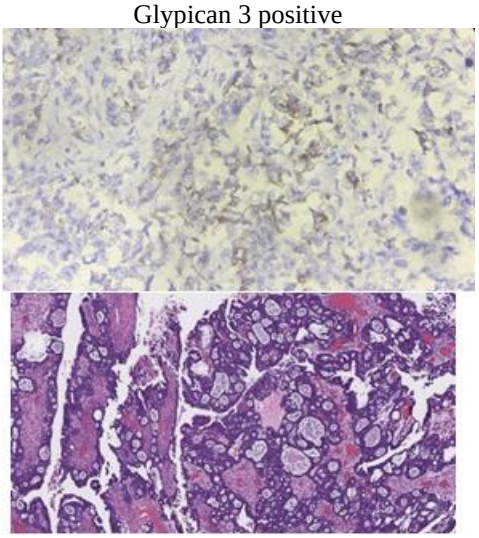
Yolk sac component
Teratoma component



AFP positive



Glypican 3 positive



Serous borderline tumor