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Research Article

CLINICOPATHOLOGICAL STUDY OF OVARIAN NEOPLASMS – AN INSTITUTIONAL PERSPECTIVE

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ABSTRACT

Objective: The objective of the study was to know the frequency and histomorphological patterns of ovarian neoplasms concerning age.

Methods: A 2-year retrospective study was done in the pathology department, GITAM Institute of Medical Sciences and Research. Data were retrieved from laboratory records, H & E slides of ovarian biopsies of diagnosed neoplasms were screened.

Results: During the study period, 70 ovarian neoplasms were reported. Ovarian tumors were categorized according to the WHO classification. In this study surface, epithelial tumors were most common at 87.14% followed by germ cell tumors at 11.42% and sex cord-stromal tumors at 1.42%. Serous cystadenoma was the most common benign surface epithelial tumor.

Conclusion: Histopathology is the gold standard for diagnosing ovarian neoplasms. Newer diagnostic techniques such as immunohistochemistry and morphometric analysis help decide management and prognosis.

Keywords: Ovarian neoplasm, Benign borderline, Malignant.

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INTRODUCTION

Ovarian cancer seems to be the most deadly gynecologic malignancy, and it is diagnosed late in the disease's clinical path due to a lack of early signs and screening protocols. It is the seventh most common cancer diagnosis, with a global prevalence rate of 6.3/100,000 women. With an age-standardized incidence rate of 10.9% [1]. Most patients (75%) have advanced-stage tumors, with a dismal 5-year survival rate of only 30%. Data suggest that reproductive factors play a role in the development of ovarian cancer. Increased parity and the use of oral contraceptives have been identified as protective factors [2]. The onset of menarche and the onset of menopause are also major risk factors. Compared to serous carcinoma, pregnancy seems to be more protective for endometrioid and clear cell carcinoma [3]. Higher socioeconomic status is linked to a higher risk of ovarian cancer and lower fertility. Hormone replacement therapy and the risk of ovarian cancer have been linked in many recent meta-analyses, with odds ratios ranging from 1.1 to 1.3 [4]. Only non-mucinous tumors are protected by enhanced parity and the use of oral contraceptives. However, as previously mentioned, data on ovarian mucinous carcinomas early to the mid-to-late-1990s are inadequate. A high portion of ovarian mucinous carcinomas that appeared to be predominant is now known to be metastatic. Hysterectomy, tubal ligation, and bilateral salpingo-oophorectomy are surgically mediated protective factors. While both can prevent the passage of endometrial tissue through retrograde menstruation, which is one of the proposed mechanisms for developing endometriosis, and endometriosis is a precursor of some ovarian cancers, the mechanism for risk reduction with a hysterectomy and tubal ligation is unclear. Ovarian tumors may have a variety of histologies, ranging from mild to serious. In these cases, an early and accurate diagnosis of malignant lesions will go a long way toward ensuring the best possible outcome. Popular symptoms misdiagnosed as gastrointestinal disorders include abdominal pain, bloating, gas, nausea, and urinary urgency [5,6].

The ability of ovarian tumors to undergo peritoneal metastasis in the absence of invasive development in the ovary is one of their distinguishing features [7]. This has given rise to the idea of borderline tumors, which have strict histologic parameters and are unaffected by their metastatic peritoneal equivalent. Since our country lacks a well-established cancer registry, it is impossible to assess evolving patterns in ovarian tumors. The risk of death in the presence of comorbid conditions is 30–40% higher than those without such requirements. Accordingly, on average, younger women with invasive ovarian cancer do have a more favorable stage distribution and other prognostically favorable features and thus a better prognosis, even when stratified by stage.

Symptoms may not appear until the tumor has progressed to an advanced stage in many cases. According to the Surveillance, Epidemiology, and End Results Program Registry and other research, 10-year survival for all ovarian cancer is around 30–40% [8]. Since signs are ambiguous and insidious, ovarian tumors are sometimes difficult to identify before they are advanced in stage or scale. Women with high-grade serous carcinoma have a poor long-term survival rate, which is also associated with fully resected disease (no residual disease/tumor) [9,10].

This study aimed to come up with different clinical presentations and age distribution patterns of ovarian neoplasms, the histomorphological features of ovarian neoplasms, and the incidence of benign and malignant ovarian neoplasms.

METHODS

The current research retrospectively analyzed 70 cases of ovarian tumors surgically removed between January 2018 and December 2020. The study included all patients with a preliminary diagnosis of ovarian tumors requiring surgical treatment during this time. The research involved 70 cases, with 62 of them being benign and requiring oophorectomy, and the remaining eight requiring complete abdominal hysterectomy.

The specimens were received at the Department of Pathology, GITAM Institute of Medical Sciences and Research, Visakhapatnam.

Institutional Ethics Committee approval: A proposal regarding the study's aims and objectives was submitted to the institutional ethics committee, GITAM Deemed to be University, Visakhapatnam, and permission was obtained from the Institutional Ethics Committee regarding data collection.

Representative sections were stained with hematoxylin and eosin stains after gross inspection. Senior histopathologists investigated the cases and identified them according to the most recent WHO guidelines.

RESULTS

In this study, 70 ovarian neoplasms were reported, and among that benign tumors, 66 (94%) were reported to be high comparatively than borderline and malignant tumors (Fig. 1). Fig. 2 represents the age-wise distribution of ovarian tumor cases. The maximum number of patients reported benign ovarian tumors in the age group of 21–45 years 53 (75.71%) followed by 46–55 years 11 (15.71%). One case (1.42%) of the malignant ovarian tumor was reported in 46–55 years and >66 years.

Based on the findings of the present study, ovarian tumors were classified according to the WHO classification into surface epithelial 61 (87.14%), germ cell tumors 8 (11.42%), and sex cord-stromal tumors 1 (1.42%) (Table 1). Table 2 shows the incidence rate of ovarian tumors of the current study.

Surface epithelial tumors were again classified into benign surface epithelial tumors 57 (81.4%), borderline 2 (2.85%), and malignant 2 (2.85%). Serous cystadenoma was the most common 39 (55.71%) followed by mucinous cystadenoma 12 (17.14%) (Table 2).

The majority of serious cystadenoma were seen in the 21–45 years age group followed by 46–55 years. The majority of mucinous cystadenoma was seen in 21–45 years. Serous and mucinous cystadenocarcinoma was reported in the age group of 46–55 years and 56–65 years (Table 3). In this study, all the germ cell tumors were seen in the 21–45 years age group, and they were all mature cystic teratoma (Fig. 3). Fig. 4 represents the HE staining slides showing the different histological types of the tumor.

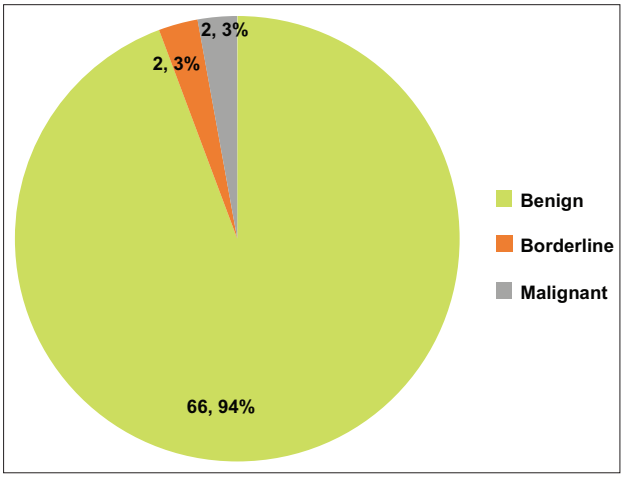

Fig. 1: Type of ovarian tumors

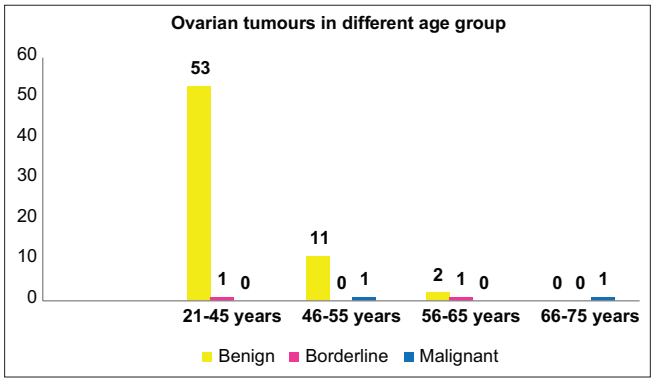

Fig. 2: Age-wise distribution of ovarian tumors

DISCUSSION

Ovarian cancer is the sixth most common cancer in women and the seventh leading cause of death from cancer worldwide. Ovarian tumors are categorized as surface epithelial tumors, germ cell tumors, sex cord-stromal tumors, and metastatic tumors based on morphological characteristics. Type I tumors are low-grade, indolent neoplasms that develop from well-defined precursor lesions (atypical proliferative [borderline] tumors and endometriosis) and typically present as large Stage I neoplasms. Low-grade serous (invasive micropapillary serous carcinoma), low-grade endometrioid, mucinous, and tentatively clear cell carcinomas are all included in this category. Somatic mutations in genes encoding protein kinases such as KRAS, BRAF, PIK3CA, and ERBB2, as well as other signaling molecules such as PTEN and CTNNB1, are common in Type I tumors (b-catenin). Atypical proliferative or borderline serous and mucinous tumors originate from cystadenomas,

Table 1: Cell of origin and histological type of the tumor

Tumor type	Number	Percentage
Surface epithelial tumors		
Benign Brenner tumor with benign mucinous cystadenoma	01	1.42
Borderline papillary serous cystadenoma	01	1.42
Mucinous cystadenoma of borderline malignancy	01	1.42
Mucinous cystadenoma	12	17.14
Mucinous cystadenoma carcinoma	01	1.42
Seromucinous cystadenoma	02	2.85
Serous cystadenocarcinoma	01	1.42
Serous cystadenofibroma	02	2.85
Papillary serous cystadenofibroma	01	1.42
Serous cystadenoma	15	21.42
Papillary serous cystadenoma	06	8.57
Simple serous cystadenoma	18	25.71
Total	61	87.14
Germ cell tumors		
Mature cystic teratoma	08	11.42
Sex cord-stromal tumors		
Fibrothecoma	01	1.42

Table 2: Incidence of various ovarian tumors

Type of tumor	Incidence	Percentage
Benign Brenner tumor with benign mucinous cystadenoma	01	1.42
Borderline papillary serous cystadenoma	01	1.42
Fibrothecoma	01	1.42
Borderline mucinous cystadenoma	01	1.42
Mature cystic teratoma	08	11.42
Mucinous cystadenoma	12	17.14
Mucinous cystadenoma carcinoma	01	1.42
Seromucinous cystadenoma	02	2.85
Serous cystadenocarcinoma	01	1.42
Serous cystadenofibroma	03	4.28
Serous cystadenoma	39	55.71
Total	70	

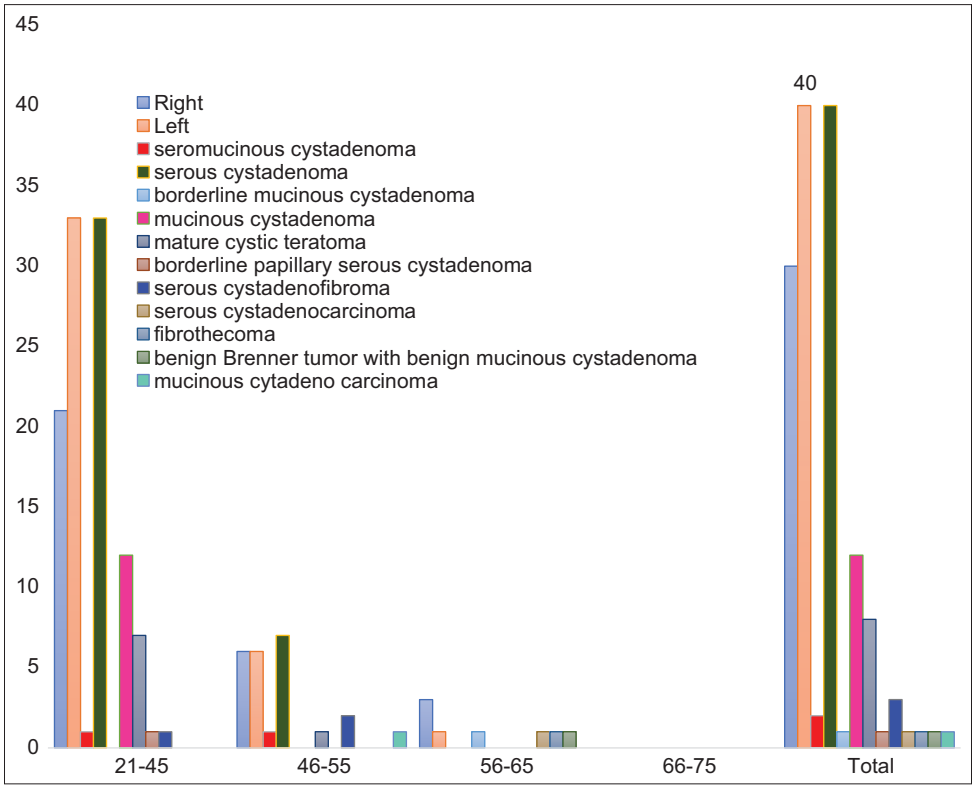

Fig. 3: Age-wise and affected ovary position-wise distribution of cases

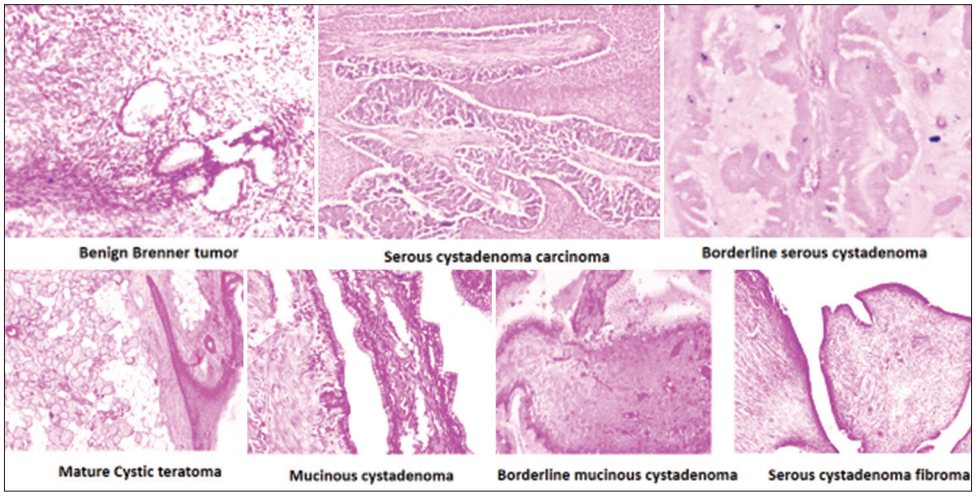

Fig. 4: Ovarian tumors

while atypical proliferative endometrioid and clear cell tumors are thought to arise from endometriosis, usually endometriotic cysts (endometriomas) [11].

Type II tumors, the vast majority of which are high-grade serous carcinomas, are aggressive, high-grade neoplasms from the start; they were once thought to occur "*de novo*." However, recent evidence suggests that high-grade serous carcinomas are caused by intraepithelial carcinomas, the majority of which are found in the tubal fimbriae. TP53 mutations are found in more than 75% of Type II carcinomas. Both ovarian neoplasms, include granulosa cells, fibroblasts, theca cells (and their luteinized derivatives), Sertoli cells, and Leydig cells, singly or in various combinations, and varying degrees of differentiation, are classified as sex cord-stromal tumors. About 8% of all ovarian tumors are sex cord-stromal tumors, with fibromas accounting for almost half of the instances [11].

Germ cell tumors are histologically distinct tumor forms originating from the embryonic gonad's primitive germ cells. Germ cell tumors are the second most common form of ovarian neoplasm after surface epithelial-stromal tumors, accounting for around 20% of all ovarian neoplasms. These tumors include dysgerminoma, teratomas, and yolk sac tumors (endodermal sinus tumor, embryonal carcinoma, etc., are among these tumors) [11].

This prospective study was done for 2 years in which 70 tumors were reported; of these benign were 94%, borderline were 3%, and malignant were 3%. These findings were from the previous studies conducted by Ranjana *et al.* [12]. In their study, the incidence rate of benign tumors was 91.5%, Prakash *et al.* [13] reported 96.8%, and Vinitha *et al.* [14] reported 91.1%.

In the present study, borderline ovarian tumors were 2.85% and found to be similar to the results shown by the earlier researchers.

Table 3: Age-wise and affected ovary position-wise distribution of ovarian tumor cases

Age (years)	Number of tumors												
	Right	Left	Seromucinous cystadenoma	Serous cystadenoma	Borderline mucinous cystadenoma	Mucinous cystadenoma	Mature cystic teratoma	Borderline papillary serous cystadenoma	Serous cysta denofibroma	Serous cysta denocarcinoma	Fibrothecoma	Benign Brenner tumor with benign mucinous cystadenoma	Mucinous cystadenoma carcinoma
21–45	21	33	1	33	0	12	7	1	1	0	0	0	0
46–55	6	6	1	7	0	0	1	0	2	0	0	0	1
56–65	3	1	0	0	1	0	0	0	0	1	1	1	0
66–75	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	30	40	2	40	1	12	8	1	3	1	1	1	1

Chi-square test: $P > 0.05$ (insignificant)

The analysis performed by Garg *et al*. [15] reported 1.2% borderline in their study, Vinitha *et al*. [14] showed 1.8% borderline tumors, and Hardik *et al*. [16] in their study found borderline tumors to be 3.57%. In another study done by Pilli *et al.* [17] found 2.8% were borderline tumors which coincides to the results of the present study 2.85%.

The current study found that the incidence rate of malignant tumors was 2.85%, according to the findings of Vinitha *et al*. [14] showed 7.1% of malignant tumors, Ranjana *et al*. [12] reported 8.5%.

In general, the mean age group for ovarian tumors is 63 years, with 80% of the tumors occurring after 45 years of age. However, our study shows that the mean age of 39.52 years was significantly affected by ovarian tumors. The age of study subjects ranged from 21 to 75 years in the current study which coincides to the study done by Manoja *et al*. [18] and Mankar and Jain [19], who reported the age of the patients ranged from 14 to 76 years. A similar age group was reported by Garg *et al.* [20], Kanpurwala *et al*. [21], and Modepalli and Venugopal [22]. The most common tumor overall was benign serous cystadenoma (55.17%) followed by benign mucinous cystadenoma (17.14%) and mature teratoma (11.42%). Studies done by Garg *et al*. [20], Patil *et al*. [23], and Modepalli and Venugopal [22] had similar findings. However, in Mankar and Jain [19], mucinous cystadenoma (32.69%) was the most common tumor. The most common malignant tumor reported in this study was serous carcinoma (1.42%) and mucinous carcinoma (1.42%). This finding correlated well with the investigations of various authors [20-25].

CONCLUSION

The distribution, clinical, and pathological details of ovarian tumors in a tertiary care hospital in Andhra Pradesh are described in this report. According to the WHO classification, surface epithelial and germ cell tumors were the most common types of ovarian tumors in our research. The most common benign surface epithelial tumor was benign serous cystadenoma, which accounted for 55.17% of the cases. The most common form of germ cell tumor was mature cystic teratoma. Only 2% of ovarian tumors were malignant, with serous and mucinous carcinoma being the most common. While the histopathological examination is still the gold standard for diagnosing most primary ovarian tumors, newer techniques such as immunohistochemistry, morphometric analysis, and flow cytometric ploidy status analysis can help resolve complex, perplexing cases predict prognosis.

AUTHORS' CONTRIBUTIONS

The main author of the study VG had performed the work and wrote the manuscript's first draft. Author PC collected the literature. Author SS corrected the first draft of the manuscript.

CONFLICTS OF INTEREST

The authors declared no conflicts of interest.

SOURCE OF FUNDING

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ETHICS CLEARANCE

A proposal regarding the study's aims and objectives was submitted to the institutional ethics committee, GITAM Deemed to be University, Visakhapatnam, and permission was obtained from the Institutional Ethics Committee regarding data collection.

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