



**Research Article**

**HISTOPATHOLOGICAL SPECTRUM OF GERM CELL TUMORS OF THE OVARY:  
A 6 YEAR STUDY IN A TERTIARY CARE HOSPITAL**

**Sheema Sheikh., Salma Gull., Misbah Rashid and Ruby Reshi**

Department of Pathology GMC Srinagar

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**ABSTRACT**

In Indian population, Germ cell tumors comprise approximately 30% of all primary ovarian neoplasms and occur much less frequently than epithelial tumors. Mature teratomas represent >90% of neoplasms in this category among benign tumors while dysgerminoma though rare, is the most common malignant germ cell neoplasm. Our study aimed at studying the histopathological pattern and age distribution of various germ cell tumors that were received in our department over a period of 6 years.

**Key words:**

Germ cell tumors, ovary, mature cystic teratoma, dysgerminoma, malignant mixed germ cell tumor.

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**INTRODUCTION**

Germ cell tumors comprise approximately 30% of all primary ovarian neoplasms. Of these, 95% are benign and only 3-4% are malignant. The vast majority are mature teratomas representing >90% of neoplasms in this category<sup>1,2</sup>. Germ cell tumors of the ovary form a group of neoplasms comprised of many individual and mixed entities. Approximately 10% of the tumors show more than one tumor type, dysgerminoma and yolk sac tumor being the most common combination. The pluripotential nature of primordial germ cells explains the wide range of morphology and cell differentiation seen in this group<sup>3,4</sup>. Germ cell tumors comprise slightly more than half of ovarian tumors occurring in the first two decades of life and upto one third in this group are malignant<sup>5, 6</sup>. Among the primitive germ cell tumors, Dysgerminoma, is the most common malignant germ cell tumor of the ovary in adults accounting for 1~5% of all primitive (nonteratomatous) germ cell tumors and for 1% of all ovarian malignancies<sup>7, 8</sup>. Most cases of dysgerminoma (~80%) are diagnosed during early adulthood (second to third decades, median age 22 years)<sup>9</sup>. Yolk sac tumor is the second most common malignant germ cell tumor among children and young females following dysgerminoma, representing approximately 20% of malignant ovarian germ cell neoplasms.<sup>10,11</sup> Other primitive germ cell tumors are rare and include Embryonal carcinoma (3%), choriocarcinoma (<1%).

**MATERIALS AND METHODS**

All cases of histopathologically proven germ cell tumors of the ovary on record at Pathology department of Government Medical College Srinagar from October 2014 to October 2020 (Five years and 10 months), were included in the study. We excluded functional cysts and other non neoplastic ovarian pathologies while collecting the data. All tissues were fixed in 10% buffered formalin, processed routinely, and embedded in paraffin. The 5-mm sections were stained with hematoxylin-eosin stain. All known clinical data, operative procedures, gross and histopathologic findings available of each case, were recorded from files at the department of Pathology. Data were described in median, range, number and percentage.

**RESULTS**

Between January 2015 and October 2020, 957 cases of ovarian neoplasms were diagnosed in the Pathology department at our hospital. Of 957 cases, 242 (25%) were diagnosed as germ cell tumors and of these, 234 (96.7%) cases were found to be teratomas and only eight (3.3%) cases were diagnosed as other germ cell tumors. Patient age ranged from 13 to 70 years, with a median age of 30 years. The median age of benign cases was 30 years and that of malignant cases was 22 years. More than 85% cases were under 40 years of age and 4% cases were postmenopausal. Both ovaries were involved in 10 cases (4.3%), the left ovary in 52.7% and the right ovary in 43% of patients. The size of the tumors varied from 5 to 28 cm.

Of 234 cases of teratoma, there were 229 cases of benign mature teratoma (either solid or cystic), one case of mature

\*Corresponding author: **Sheema Sheikh**

Department of Pathology GMC Srinagar

monodermal teratoma, one case each of squamous cell carcinoma and leiomyosarcoma in mature teratoma and two cases of immature teratoma, 1 case in grade I and 1 case in grade II.

Grossly, on cut section, in most of cases (96%), the tumors were typically cystic filled with yellow sebum mixed with hair and few solid areas. Dermoid protuberance was noted in 170 cases (70%). Some of the tumors had undergone torsion and were hemorrhagic and infarcted on cut section. Torsion was found in 16 cases (6%) of mature teratoma and presented with clinical picture of acute abdomen. There were two cases of malignant transformation with pathology of squamous cell carcinoma and leiomyosarcoma in mature cystic teratomas.

4 cases of mature cystic teratoma (Fig.1) were associated with other ovarian tumors, either in the same ovary or in the contralateral ovary. There were 2 cases of mucinous cystadenoma in the contralateral ovary, 1 case of serous cystadenoma in contralateral ovary and 1 case of yolk sac tumor in the same ovary.

There were eight cases of malignant germ cell tumor - one case of yolk sac tumor, four cases of dysgerminoma and three cases of Mixed germ cell tumors.

Dysgerminoma belonged to the cases in the age range of 13-23 years. One of the cases showed bilateral involvement. The size varied from 8-15 cm. Grossly the tumors were mostly solid and lobulated with fleshy tan-white cut surface. Microscopically, composed of sheets or nests of uniform cells with clear or eosinophilic cytoplasm and distinct cell membranes, separated by fibrous septae containing lymphocytes. (Figure 2)

Malignant Mixed Germ cell tumors comprised of Dysgerminoma and yolk sac tumor in two out of three cases with 30% Dysgerminoma, 70% yolk sac tumor (Fig.3) in one of them belonging to a 45 year old female and >90% Dysgerminoma and 10% yolk sac tumor in another belonging to a 15 year old female. The third case of Mixed germ cell tumor, belonging to a 20 year old female, comprised of Embryonal cell carcinoma (60%), Choriocarcinoma (30%) and yolk sac tumor (10%). (Fig.4)

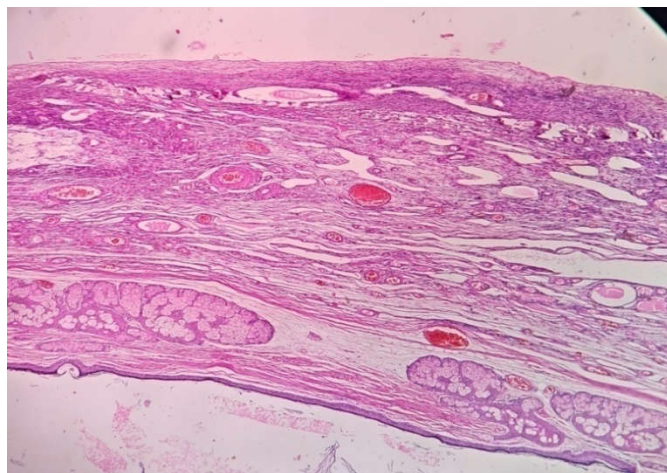


Fig 1 Mature Cystic Teratoma

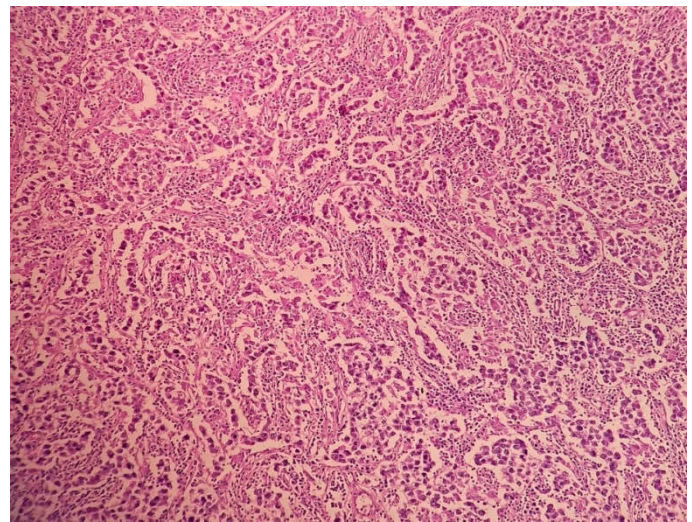


Fig 2 Dysgerminoma

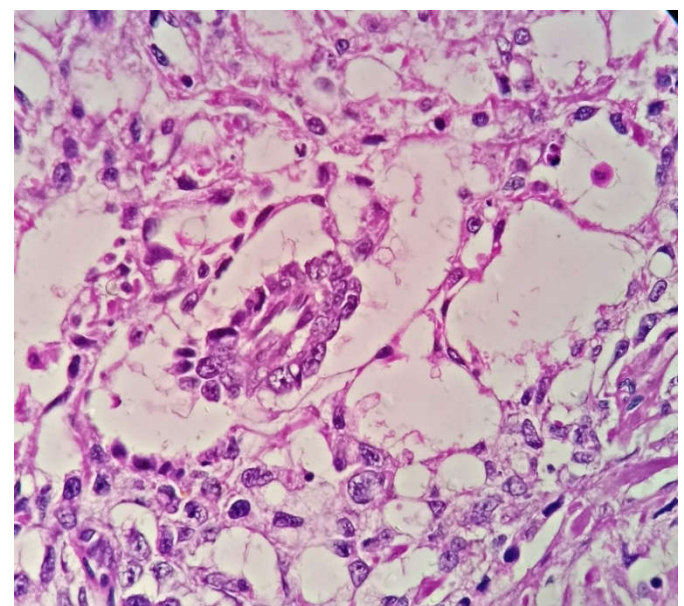


Fig 3 Yolk sac tumor

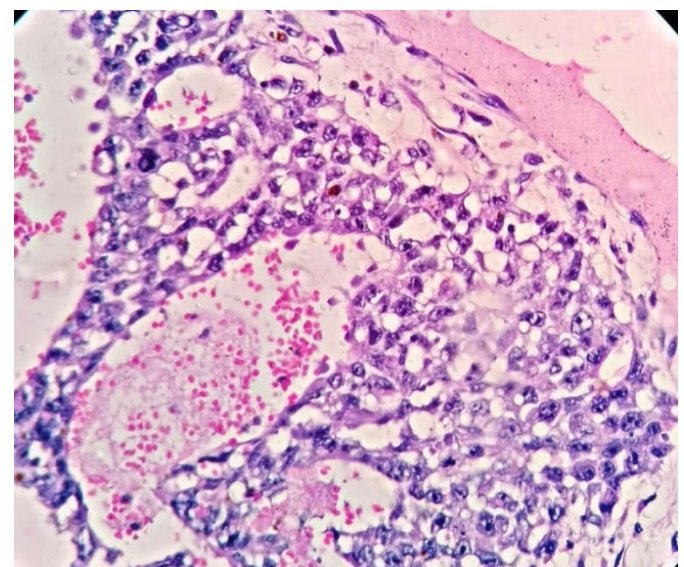


Fig 4 Embryonal Carcinoma

## DISCUSSION

Germ cell tumors of the ovary has comparatively low incidence in India than epithelial tumors. In contrast, Germ

cell neoplasms occur more frequently than epithelial tumors in Oriental and African people<sup>12</sup>, although it has been suggested that this is perhaps only a reflection of the comparatively low incidence of common epithelial tumors in these ethnic groups. The age distribution of germ cell tumors may at least partially explain the great difference in their incidence among different countries, as they may show a wide variation in the average age of the population.<sup>13</sup> However, there is a definite racial predisposition for germ cell tumors. The germ cell tumors predominate in black people, comprising 52%, as opposed to 19% in Indian people. The Indian distribution is similar to that of American and European groups.<sup>14</sup>

Germ cell tumors comprise approximately 30% of all primary ovarian neoplasms. Of these, 95% are benign and only 3-4% are malignant. The vast majority are mature teratomas representing >90% of neoplasms in this category<sup>1, 2</sup> The prevalence of germ cell tumors of the ovary in our study is 25% (242/975) and the prevalence of mature cystic teratoma is 24.5% (234/957). Out of 242 cases, 230 (95%) cases were benign and only 11 (4.5%) cases were malignant.

Benign cystic teratoma of the ovary usually occurs in young women, with peak incidence between 20 and 40 years of age<sup>15</sup>. The mean age and distribution found in this series are consistent with other reports.<sup>16,17,18</sup> The reported rate for bilateral cystic teratoma is 8-15%<sup>16-18</sup> In our study, bilateral ovaries were involved in 4.3% of cases which is less in comparison to other studies.

Mature cystic teratomas are often asymptomatic<sup>15,16</sup> When symptoms are present, the two common presenting symptoms are abdominal pain or palpable abdominal mass.<sup>4,5,14,16</sup> Our study confirmed this characteristic. Torsion is the most common complication associated with benign cystic teratoma. The reported rate of torsion is between 3 and 16%.<sup>3,5,12,14,17</sup> In our study, the torsion rate was seen in 16 cases (6%), which is consistent with other studies. The other complications noted were spontaneous rupture of cyst and malignant transformation (squamous cell carcinoma and leiomyosarcoma each in one case). The frequency of development of malignancy in mature teratomas ranges from 0.8 to 5%, with an average of 1.4%.<sup>14</sup> Squamous cell carcinomas account for 90-97% of malignant neoplasms developing in mature teratomas.<sup>19</sup>

The term 'struma ovarii' is applied to teratomas which contain thyroid tissue as the unique or predominant component. In our study, the only monodermal teratoma was struma ovarii.

Findings of benign cystic teratoma in one ovary and benign surface epithelial tumor or malignant germ cell tumor in the same ovary or in the contralateral ovary may be incidental as found in 4 cases in our study. There were 2 cases of mucinous cystadenoma in the contralateral ovary, 1 case of serous cystadenoma in contralateral ovary and 1 case of yolk sac tumor in the same ovary.

A combination of two or more types of germ cell tumor account for only 8 to 20% of all malignant germ cell tumors of the ovary.<sup>21</sup> In our study, there were 3 cases of Malignant Mixed Germ cell tumors comprised of Dysgerminoma and yolk sac tumor in two out of three cases and Embryonal cell carcinoma, Choriocarcinoma and yolk sac tumor in the third case.

Oophorectomy is an acceptable mode of treatment when cystectomy is technically impossible, if cystectomy is followed

by uncontrolled hemorrhage, or when presentation of ovarian function is no longer a concern. In our study, conservative surgery was performed more frequently than radical surgery and patients were mostly of reproductive age in the conservative group.

In summary, mature cystic teratoma is the most common type of germ cell tumor and accounts for 95% of all ovarian germ cell neoplasms. They occur during the reproductive years, but may occur in the postmenopausal period or in childhood. The surgical treatment of mature cystic teratoma should be directed according to age, desire for future fertility and presence of concomitant pelvic pathology rather than the size or the bilaterality status.

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