

# Teratomas of the ovary: a clinico-pathological evaluation of 87 patients from one institution during a 10-year period

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## Summary

**Aim:** To present the classification and diagnostic problems encountered between teratomas and other ovarian tumors as well as with other benign entities diagnosed and treated in our institution.

**Methods:** We analysed retrospectively the clinical and pathological characteristics of 87 teratomas examined in our hospital during the last ten years.

**Results:** Teratomas constituted 5% of all ovarian tumors. The age range was from 11-69 years old (median: 35). The most frequent symptom was lower abdominal pain in 68% of patients. A pelvic mass was noted in 3% of cases. A pregnancy was present in 3% of patients. In ten cases the tumors were bilateral. Tumor size ranged from 1-16 cm in diameter (median: 7.17 cm). The treatment consisted of cystectomy in 66% of the cases, oophorectomy in 23% or hysterectomy with both adnexa in 11% of cases. Fifty-seven cases presented with a histological diagnosis of mature teratoma, biphasic or triphasic type, three cases with monodermal teratoma, ten cases with ovarian neoplasms of mixed type, 15 cases with epidermal cysts, and two cases with benign cysts. Malignant changes within the teratomas were seen in 5% cases.

**Conclusion:** Teratomas are common ovarian tumors at any age, especially during the reproductive age, with a low rate of complications and malignant transformation. The treatment should be based on patient age, fertility status, tumor size, the cystic or solid nature of the tumor and bilaterality.

**Key words:** Teratomas; Ovary; Epidermal cyst; Treatment; Classification.

## Introduction

Teratoma is one of the most common ovarian tumors, arising from a single germ cell after the first meiotic division, according to recent studies [1]. These germ cell tumors are usually classified into three groups: immature, mature, and monodermal teratomas, with distinct clinical and pathological characteristics. According to the recent World Health Organization (WHO) classification of ovarian tumors [2], the current classification of teratomas is as follows:

### *Teratomas - biphasic or triphasic*

- immature,
- mature: solid, cystic (dermoid cyst), retiform.

### *Teratomas - monodermal and somatic-type associated with dermoid cysts*

- teratomas associated with thyroid tumors (struma ovarii), carcinoids, neuroectodermal tumors, melanocytic tumors, tumors of skin appendages, tumors of retinal anlage, and others.

We analyzed retrospectively the clinical and pathological characteristics of 87 teratomas examined in the pathology laboratory during the last ten years and attempted a new classification according to WHO criteria and comment on the management and treatment fol-

lowed. The classification and diagnostic problems encountered between teratomas and other ovarian tumors as well as with other benign entities are discussed.

## Materials and Methods

Our study is retrospective and consists of 87 patients diagnosed with teratomas of the ovary and treated in our hospital during the last ten years (1994-2003).

Data concerning clinical history, symptoms, gross and microscopical characteristics of the tumors as well as the therapeutic procedures, were obtained from the 2nd Gynecological-Obstetrics Clinic charts and the Pathology Registry. In selected cases re-evaluation of histological sections stained with hematoxylin-eosin was performed.

## Results

### *Clinical Data*

Teratomas constituted 5% (87/1,680) of all ovarian tumors diagnosed and treated at our institution during the last ten years.

The age range was from 17-69 years old with a median age 35.12 years. The majority of patients (78%) were 17-45 years old (median: 29.77 years). Nineteen patients (21.83%) were 46-69 years old (median: 54.26 years). Two patients were referred from a pediatric clinic for investigation of an ovarian mass and were 11 and 12 years old.

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The most frequent symptom was lower abdominal pain in 59/87 patients (67.81%). Thirty patients (34.48%) presented no symptoms or complaints and the diagnosis was made during a routine pelvic examination. A pelvic mass was noted in two of 87 cases (2.29%). A pregnancy was present in three of 87 patients (3.44%) and the tumor was diagnosed during cesarean section in two patients (2.29%) and during an operation for an ectopic pregnancy in one patient (1.14%). None of these patients had complications related to the tumor.

Right-sided tumors (49/87) (56.32%) outnumbered left-sided tumors, and in ten cases (11.49%) the tumors were bilateral. Tumor size ranged from 1-16 cm in diameter with a median of 7.17 cm.

Treatment consisted of cystectomy in 57/87 of the cases (65.51%), oophorectomy in 20/87 (22.98%) or hysterectomy with both adnexa in ten cases (11.49%). Two hysterectomies (2/10) were performed because of a pre-operative diagnosis of a large pelvic mass of indeterminate nature. The remaining patients underwent hysterectomy secondary to coexisting uterine pathology (myoma uteri, etc.). Cystectomy was performed for younger patients. There was no recurrence in the same ovary after cystectomy.

Complications related to the tumor were noted in eight patients (9%) – torsion in five patients (5.74%), rupture in two patients (2.29%) and infection in one patient (1.14%).

#### *Pathological data*

A total of 57 cases presented the histopathological features of biphasic or triphasic mature teratoma of the ovary. The two youngest patients presented mature (cystic) teratomas.

Monodermal teratomas (struma ovarii) were seen in three patients without any remarkable clinical signs.

In ten cases microscopic examination revealed a mixed type ovarian neoplasm. In five of the ten cases, the larger component was a mature cystic biphasic (teratomatous and epithelial) or triphasic teratoma and the lesser component presented the morphology of a common epithelial tumor, of mucinous cystadenoma type (4 cases) borderline mucinous tumor (2 cases), serous cystadenoma (one case), Brenner tumor (2 cases), and cystadenofibroma (one case).

Fifteen cases were of special interest because microscopic examination revealed an epidermal cyst lined by stratified squamous epithelium without the presence of skin appendages or other mesodermal or endodermal elements. The cysts were re-classified as a subtype of the epithelial ovarian tumors [2] and not as dermoid cysts of germ cell origin.

In two cases microscopic examination of the ovary concomitant to the mature teratomas showed the presence of benign cysts of endometrioid and serous type.

Malignant changes within the teratomas was seen in four cases (4.59%). Squamous cell carcinoma that developed within a mature cystic teratoma was seen in two patients, 50 and 66 years old. Two patients, 18 and 22

years old, presented immature neural elements in solid teratomas and were classified as immature (malignant + teratomas grade 1). All malignant tumors were unilateral tumors, solid in consistency and measuring 10-13 cm. No extension outside the ovary or evidence of distant metastasis was found during the investigation. These patients were referred to the Oncology Department and are well two to four years after diagnosis.

#### **Discussion**

Teratomas make up almost 20% of all ovarian neoplasms and they are unilateral in 88% of all cases [1, 2]. Benign cystic teratomas have been seen in all age groups, with the peak incidence in the third and fourth decades. The mean age at the time of diagnosis is 37.5 years [3]. In our study the mean patient age was 35.1 years and the youngest patients were 11-12 years old. The majority (78%) had been diagnosed and treated between the ages of 17-45 years, which is consistent with other reports [3]. Hence, teratomas occur most commonly during the reproductive years, but unlike other germ cell tumors of the ovary they may be encountered at any age.

Teratomas are often discovered as an incidental finding during a routine physical examination. These tumors are asymptomatic with a rate ranging from 6 to 65% [1,3]. In our study less than half of the patients were asymptomatic (34.48%). Teratomas provoke symptoms related to the size (pain, urinary and gastrointestinal complaints) and menstrual irregularities [3, 4]. Occasionally they are accompanied by autoimmune hemolytic anemia [5], but the most frequent symptom in about half the cases is lower abdominal pain [3]. In our study most of the patients (67.81%) complained of abdominal pain or vague abdominal discomfort.

The incidence of teratomas associated with pregnancy is reported to be 0.8-13% [3]. In our study the incidence was 3.4% and none of the patients with normal pregnancies had complications related to the tumor, while the patient with an ectopic pregnancy underwent salpingo-oophorectomy. The majority of the reported teratomas (60%) measured 5 to 10 cm in greatest diameter and only 10% were larger than 15 cm [3, 4]. In our study 78% of the tumors measured 5 to 10 cm and six cases were more than 10 cm, the largest measuring 16 cm.

During the re-evaluation of these tumors, classification problems were encountered with the cases of mixed pattern – teratomatous and epithelial, as well as between mature cystic teratomas (dermoid cysts) and epidermoid cysts. Ten cases in our study were mixed ovarian tumors, of germ cell and epithelial origin. It should be noted that especially mucinous tumors are considered by certain authors to be the expression of mucinous differentiation of a germ cell tumor [1]. In our cases the diameter of the epithelial elements ranged from 3-6 cm and were considered to be independent tumors. One case presented the morphology of a borderline mucinous tumor and the patient is under follow-up without any sign of recurrence during a 4-year period.

The recent classification of ovarian tumors separated pure epidermoid from dermoid cysts. Epidermoid cysts, classified as epithelial in origin, are lined by stratified squamous epithelium, without evidence of mesodermal or endodermal tissue. They are very rare in the ovary in contrast to the common dermoid cysts. In the 1979 WHO classification of ovarian tumors, epidermoid cysts were included under germ cell tumors, as teratomas of mono-dermal and highly specialized types. In the recent WHO classification of ovarian tumors (2003) epidermoid cysts are under the umbrella of benign surface epithelial-stromal tumors of the ovary and are considered to arise from squamous metaplasia of epithelial elements. However the possibility of a germ cell origin cannot be excluded and epidermoid cysts are easily misdiagnosed as teratomas unless the pathologist is alert to recent modifications of the classification system.

Thyroid tissue is reported in 5-20% of teratomas. In our study three cases (3.4%) of struma ovarii were observed without any special clinical symptoms.

The most common malignant change reported in ovarian teratomas is the development of squamous cell carcinoma, which accounts for approximately 80% of the total [6, 7], followed in incidence by carcinoid tumors and adenocarcinoma [8]. Malignant changes have been observed mainly in women in the fifth and sixth decades, as in our cases as well, with a mean age of 55.2 years [7]. Age, tumor size and the clinical stage are important diagnostic factors [3,4]. In general, malignant epithelial tumors arising in teratomas are managed as common ovarian carcinomas. The common gross feature between teratomas with malignant transformation and immature teratomas is the unilaterality, the solid consistency of the tumors and the large size.

Operative video-laparoscopy came into use in the last few years in our institution. In our cases the majority of the tumors had been managed with this method and only six tumors that measured more than 10 cm presented difficulties in the excision endoscopically. In the surgical treatment, age, fertility status, status of the contralateral ovary, and presence or not of pelvic pathology were taken under consideration. Cystectomy was favored for younger patients in order to preserve as much ovarian tissue as possible.

Bilateral teratomas are uncommon. The reported rate is 8 to 15% [1] and in our series it was about 10%. In any case we suggest that in the presence of a unilateral teratoma, careful inspection and palpation of the contralateral ovary should be performed.

In conclusion, teratomas are common ovarian tumors at any age, especially during the reproductive years, with a low rate of complications and malignant transformation. The treatment should be based on patient age, fertility status, tumor size, the cystic or solid nature of the tumor and the bilaterality. Age, size and consistency of the tumor are the most important diagnostic signs in the differential diagnosis between benign and malignant tumors.

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