

## Research Article

# Clinical, Diagnostic and Anatomical Aspects of Mature Cystic Teratomas

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## Abstract

The aim of this study was to analyze the clinical and anatomic aspects of cystic teratomas of the ovary, characteristics of patients with MCTs and the management trends in a multi-center study. A retrospective, descriptive study of 180 patients diagnosed and treated for MCTs, between January 2005 and December 2012. Cases' age, cyst diameter, operation procedure, preoperative Ca 125 and Ca 19-9 values were recorded. The mean age was 37.4±12.1 years old. The most frequent symptom was abdominal pain (48.8%) though in a high percentage of the cases (51.2%) the patients were asymptomatic. The mean size of tumors was 7.9±3.6 cm. The mean cyst diameter for patients undergoing cystectomy was 6.7±3.1 cm; for oophorectomy, 9.1±3.3 cm; and for hysterectomy, 9.28 ± 4.1 cm. Of the cases, 11.2% were bilateral. The most frequently used diagnostic procedure was transvaginal ultrasound with a correct diagnostic rate of 58.3%. Only 17.2% of the cases underwent laparoscopy. The most frequent surgical method was unilateral cystectomy (60.1%). The ovarian function was preserved in 74.8% of the patients. The mean value for Ca 19-9 was 158.3 (13-854), while the mean value of Ca 125 was 22.6 (1-291). Mature cystic teratomas are the most frequently observed masses in the reproductive era and require preservation of fertility during treatment. In first stage diagnosis TVUSG is cheap, easily available and is still the first diagnostic modality. As tumor size increases, an increase in CA-125 and CEA 19-9 levels is observed.

## Introduction

Mature Cystic Teratomas (MCT's) are a frequently observed type of ovarian neoplasm, frequently identified during the reproductive era and comprising 5-25% of ovarian tumors in this group. It is an ovarian germ cell tumor. Typically MCT's include all three embryonic germ layers. The incidence of MCT is 1.2-14.2 cases per 100,000 people per year. The research on the use of multiple tumor markers shows variable results. The involvement of all three germ layers makes identification easier by ultrasonography or during surgery. Generally it is seen in a single ovary. Ninety-nine percent of Teratomas are benign and peak between the ages of 30-40. Neoplastic transformation is very rare and this malignant transformation begins in epithelial elements. The most frequently observed malignant transformation is squamous cell carcinoma [1-3].

Currently Teratomas are easily diagnosed in the early stages. Transvaginal ultrasound, especially, is the most important diagnostic tool. Again, CT or MRI can provide important contributions. Transvaginal ultrasonography has a high sensitivity for identification of ovarian neoplasm. The ultrasound appearance of dermoid cysts is pathognomonic linked to fat particles. The mass appears as non-homogeneous masses with hypo echoic and hyper echoic areas or as homogeneously hyperechoic regular capsules [4].

In this study patients with diagnosis of ovarian desmoids cyst and treated with laparotomy or laparoscopy were examined retrospectively. After the operation ultrasonography reports from cases with diagnosis of MCT were compared to research the diagnostic strength of ultrasonography. In addition, all cases were analyzed in terms of patient profile, tumor markers and operation technique.

## Materials and Methods

One hundred and eighty MCT cases, with pathologic diagnosis, treated between 2005 and 2012 at the obstetrics and gynecology clinics in a university hospital and an education-research hospital were retrospectively studied. The study analyzed patient profiles, tumor markers, surgical intervention type and technique. After the operation the pathologic diagnosis and TVUSG diagnosis of patients before the operation were compared and the success rate of TVUSG as a diagnostic was examined. In addition, the presence of correlations between sonographic tumor size, patient age, CA-125 and CA-19-9 were investigated. The operation carried out on the patient was determined with reference to age, parity, cyst size and ultrasonographic properties (hyperechoic involvement, etc.), previous surgical history, fertility of the patient, presence of extra pathologies and the patient's choice. During the operation all masses were frozen-sectioned. The necessary permissions were received for the study from Canakkale Onsekiz Mart University ethics committee.

## Statistical analysis

All continuous variables were expressed as mean ± standard deviation. All measurements were evaluated with Kolmogorov-Smirnov test and comparisons between two groups were performed by means of the Mann-Whitney U test. Additionally Spearman's rho correlation test was performed for correlation. All statistical studies were carried out with the SPSS program (version 19.0, SPSS, Chicago, Illinois, USA). P values <0.05 were accepted as statistically significant.

## Results

The average age of 180 MCT patients was 37.4±12.1 (17-57).

MCT's were most frequently observed in the age range 35-45. The most frequent symptom was abdominal pain in 48.8% of cases though 51.2% of patients were asymptomatic. The correct diagnosis rate of TVUSG was 58.3%. Tumor masses were on the left ovary in 42.5% of cases, on the right ovary in 46.3% and bilateral in 11.2% of cases. The average size of tumors was  $79.4 \pm 36.2$  mm. The average tumor size in patients who underwent cystectomy (n: 108) was  $6.7 \pm 3.1$  cm, in oophorectomy patients (n: 32) it was  $9.1 \pm 3.3$  cm and in hysterectomy patients (n: 40) it was  $9.28 \pm 4.1$  cm. The size of the tumors in the cystectomy group were significantly different to the sizes in the oophorectomy and hysterectomy groups ( $p < 0.05$ ). Of the patients 17.2% were treated laparoscopically. The most frequently chosen surgical method was unilateral cystectomy (60.1%) and this was statistically significant ( $p < 0.05$ ). The ovarian function was preserved in 74.8% of the patients. The mean value for CA 19-9 was 158.3 (13-854) and the mean value of CA 125 was 22.6 (1- 291). When the correlation between tumor size, age, CA-19-9 and CA-125 were examined only moderate statistically significant correlations were found between size and CA-19-9 ( $r: 0.511$ ,  $p: 0.01$ ), and size and CA-125 ( $r: 0.455$ ,  $p: 0.03$ ). In other words as tumor diameter increased increases in CA-125 and CA-19-9 values were observed.

One case was identified in the 7th week of pregnancy. The patient was in pain due to semi-torsion in addition to mass pressure (right ovary  $140 \times 98$  mm). The patient was given a unilateral oophorectomy with a Pfannenstiel incision. After treatment there was no complication observed during pregnancy and at term a live birth was achieved with cesarean. There was no malignant transformation in our case group.

## Discussion

Mature Cystic Teratoma (MCT) is the most frequently observed tumor in ovaries of reproductive-age women. It is frequently observed in the group between 20-40 years of age [5,6]. One of the largest case groups in the literature, the average age in our series was 37.4 and the most frequently observed age range was 30-40 (59.5%). In the literature the rate of bilateral MCT's is given as between 8-15% [1,2,7,8]. In our series this rate was 11.2% and is in accordance with the literature. MCT's are frequently reported to be asymptomatic in the literature. In symptomatic cases the most frequent complaint is abdominal pain [2,4,8]. In our series, the most frequent symptom was abdominal pain and this rate was 48.2%. The incidence of MCT's during pregnancy in the literature is about 0.1% [1,2,8]. In our series this rate was in accordance with the literature. However our case was different from the general literature (second trimester) in being diagnosed in the first trimester and was treated with laparotomic surgery due to pelvic pain. After the operation no complications were encountered and the fetus was born without problems at term.

For MCT diagnosis on ultrasonography when the ovary on the affected side is not observed, a careful look will identify the mass due to a definite acrogenic line between intestinal loops with acoustic shadowing of hyperechogenic and heterogenic echo structures in surrounding tissue. Linked to lack of transmission of sound waves within the occasionally scattered dense tissue, acoustic shadowing is visible. In some the internal tissue of sac or hair-like ectoderm may cause thin lines of linear echogenicity. In the literature the rate of ultrasound diagnosis of MCT is 50-60% [9,10]. In this study the

TVUSG method was used. In cases with postoperative diagnosis of MCT, histopathology and TVUSG scans were retrospectively compared. The correct diagnostic rate of TVUSG was 58.3%. This rate is in accordance with the literature [4,9,10]. Though MCT diagnosis may need supporting verification by computerized tomography and magnetic resonance imaging, when the cheap and easily accessible nature of TVUSG is considered it will not be replaced as an initial diagnostic tool. Malign transformation of MCTs is very rare. The average frequency is 1-2%. Squamous carcinoma is the most common malignancy [3,11,12]. Patients' age and tumor size are the most important risk factors for malignant transformation [11,13]. In our series no case with malignant transformation characteristics was observed. However for the literature to provide clear data, large series reviews or meta-analyses need to be published.

In the past though oophorectomy or cyst inoculation with laparotomy was more frequently used [1,2], recently treatment of dermoid cysts with laparoscopy as a minimally invasive approach has been used [14]. In our series during operations the average size of MCT was 8 cm. The tumor diameter in the cystectomy group was statistically significantly different than the tumor size in the oophorectomy and hysterectomy groups. Of the cases 17.2% were treated laparoscopically. The most frequently chosen surgical method was unilateral cystectomy (60.1%) and this choice was significantly different to other methods. In MCT cases protecting fertility after the performed or chosen surgical procedure is an important concern. The ovarian function in our series was preserved in 74.8% of the patients.

During the diagnosis tumor markers are generally used to evaluate ovarian tumors. There are studies researching the diagnostic value of tumor markers for ovarian MCTs. Chen et al. [15] reported that combined detection of tumor markers, especially CA 125 and CA 153, and AFP might be helpful for differential diagnosis of ovarian MCT and immature Teratomas. Ito [16] found that CA 19-9 was secreted by MCTs. Ozgur et al. reported that tumor marker levels and torsion risks were not related with tumor diameter. They recommended this may be a consequence of the benign nature of their cases, but diameter is a valuable predictive parameter for malignant cases [8]. In our study, we researched whether there is a correlation between tumor diameter, age and tumor markers (CEA 125 and CA 19-9). There was a moderate correlation, statistically speaking, between tumor size and CA 19-9 ( $r: 0.511$ ,  $p: 0.01$ ) and CA-125 ( $r: 0.455$ ,  $p: 0.03$ ). In other words as tumor diameter increases there is an increase observed in CA-125 and CA 19-9 levels. As far as we are aware apart from this study there is no data available on this topic in the literature. In future large-series studies cut-off values for tumor markers and tumor size will be researched.

## Conclusion

Mature cystic Teratomas are the masses most frequently observed in the reproductive era and require preservation of fertility during treatment. As a first-stage diagnostic modality TVUSG is cheap, easily accessible and will remain the initial diagnostic modality. As tumor size increases, CA-125 and CEA 19-9 levels are observed to increase.

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