ORIGINAL ARTICLE

Mature cystic teratomas: Relationship between histopathological contents and clinical features

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Abstract

Aims: The aim of this study was to evaluate the relationship between pathological findings and clinical features in patients with ovarian mature cystic teratomas (MCTs).

Materials and Methods: We reviewed and compared the demographic and clinical features of 32 patients confirmed pathologically as having MCT at a university hospital from 2009 to 2014, with MCT contents such as skin, hair, sebum, and cartilage.

Results: The mean age of the patients was 33.7 ± 13.4 years. The mean tumor diameter was 7.1 ± 3.3 cm (range: 2-15 cm). The mean serum CA-19.9 level was 37.5 ± 79.5 IU/ml and the mean serum CA-125 level was 29.1 ± 33.0 IU/ml. The postmenopausal and pregnancy status rates of participants were 18.8, and 15.6%, respectively. The mean age, postmenopausal and pregnancy status, tumor size, symptoms related to MCT and laterality of the tumor did not differ among the patients according to the MCT contents.

Conclusions: Our findings suggest no relationship between the clinical features and histopathological contents of MCTs.

Key words: Histopathological contents, mature cystic teratoma, ovarian, tumor

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Introduction

Mature cystic teratoma (MCT) constitutes 10-20% of all ovarian tumors and is the most frequent germ cell tumor of the ovary.[1] Teratomas may occur at any age, but the peak sincidence is at 20-40 years of age.[2] Malignant transformation occurs in 1-2% of patients as squamous cell carcinomas.[3] Teratomas can occur extragonadal tissues such as lung, mesenter and omentum.[4-6] The detection rate of tumor markers is low, although high levels of CA-19.9 are common in MCT cases.[7] MCTs are composed of endodermal, mesodermal and ectodermal derivatives.[8] Some clinical situations can be associated with the composition of MCT, such as a stromal carcinoid ovarian tumor, which should be considered as a differential diagnosis in female patients who present with an abdominal mass that is associated with constipation and hirsutism.[9] Patients complain of abdominal pain and distension secondary to a pelvic mass, but there may also be bowel or bladder symptoms in cases of locally advanced disease. In addition, teratomas, which include thyroid tissue, may be related with thyroid dysfunction.[10,11] The purpose of this study was to assess the relationships between the composition and clinical features of MCT.

Materials and Methods

This study was approved by the faculty Ethics Committee of the University Hospital. We reviewed 32 patients who underwent surgery for an ovarian mass diagnosed as MCT after pathological evaluation at a university

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hospital from 2009 to 2014. Demographic features, such as age, number of pregnancies, menopausal status, pregnancy status, preoperative clinical features, levels of tumor markers (CA-19.9 and CA-12.5), side of the tumor, ultrasonography findings, type of surgery, and histopathology were obtained from the patients' records. Preoperative clinical features were described according to the patients' complaints such as acute pelvic pain, chronic pelvic pain, constipation, diarrhea, female infertility and hyperthyroid symptoms. MCT contents were divided into the following nine groups: Skin, hair, nerve, sebum, muscle, bone, cartilage, thyroid and respiratory tissues. Hence, nine study groups were created based on the histopathological results (contents of MCTs). The demographic, clinical, and laboratory features were compared among these nine groups.

All data were analyzed using PASW Statistics (PASW, ver. 18.0, Chicago, IL, USA). Categorical variables were reported as means ± standard deviation and *n* (%). Differences between the groups were assessed using a Chi-square test, Fisher's exact test and Mann–Whitney U-test for categorical variables, and Student's *t*-test for continuous variables. $P < 0.05$ was considered to indicate statistical significance.

Results

The mean age of the patients was 33.7 ± 13.4 years (range: 14-68 years), and tumor incidence was highest (53.1%) among patients aged 20-40. The postmenopausal and pregnancy status rates of participants were 18.8 and 15.6%, respectively. However, 75% of participants have at least one history of labor, 25% of them do not have any history of labors. The mean diameter of the tumors was 7.1 ± 3.3 cm (range: 2-15 cm). The bilaterality rate was 6.2% ($n = 2$), while the tumors occurred in the right and left ovaries in 56.3% ($n = 18$) and 37.5% ($n = 12$), of the patients respectively. Chronic pelvic pain was the most common symptom (53.1%), and laparotomy was the most common operation performed (65.6%). The preoperative detection rate of MCT by ultrasound evaluation was 52%, and high levels of CA-19.9 and CA-125 were detected in only four patients. There was no correlation between tumor size and tumor marker levels (CA-19.9: Rho = 0.247; $P = 0.293$/CA-125: Rho = –0.091; $P = 0.674$). The prevalence rates of MCT contents were as follows: Skin (25%), hair (78.1%), nerve (34.4%), sebum (71.9%), muscle (21.9%), bone (18.8%), cartilage (34.4%), thyroid (18.8) and respiratory tissue (28.1%).

There was no relationship between thyroid-stimulating hormone (TSH) levels and the presence of thyroid tissue in MCTs as the TSH level was in the normal range in MCT cases that included thyroid tissue. There were no relationships between MCT contents and demographic and clinical properties including age, nulliparity, postmenopausal status, pregnancy status, symptoms, tumor size, laterality and tumor marker levels [Tables 1 and 2].

Discussion

Mature cystic teratomas often occur in individuals of reproductive age between the age range of 20-40 years, which is in agreement with the finding in our study.[12] The incidence of pregnancy in MCT cases is 0.1-2%, and when detected in pregnancy or in patients who require

Table 1: Demographics and clinical features according to MCT contents

Features	Skin	Hair	Nerve	Sebum	Muscle	Bone	Cartilage	Thyroid	Respiratory
Age*	28.1±13.0	34.6±14.3	34.9±15.1	32.6±12.7	33.7±12.1	41.1±11.2	33.4±14.4	30.6±9.7	31.4±10.5
Nulliparity ^	3 (37.5)	6 (24.0)	2 (18.1)	6 (26.0)	1 (14.2)	1 (16.6)	2 (18.1)	3 (50)	2 (22.2)
Postmenopause ^	1 (12.5)	6 (24.0)	2 (18.1)	4 (17.3)	1 (14.2)	1 (16.6)	2 (18.1)	1 (16.6)	1 (11.1)
Pregnancy ^	0	5 (20.0)	0	2 (8.6)	0	0	1 (9.0)	0	0
Tumor size*	8.0±3.7	7.4±3.2	8.0±3.1	7.4±3.0	8.7±2.5	7.8±3.4	8.0±3.3	6.0±3.2	8.6±3.1
Complaints ^									
CPP	6 (75.0)	12 (48.0)	5 (45.5)	12 (52.2)	3 (42.9)	3 (50)	6 (54.5)	5 (83.3)	5 (55.6)
Inciden	2 (25.0)	7 (28.0)	6 (54.5)	8 (34.8)	4 (57.1)	3 (50)	4 (34.4)	1 (16.7)	4 (44.4)
APP	0	1 (4.0)	0	1 (4.3)	0	0	0	0	0
Intra-op	0	5 (20.0)	0	2 (8.7)	0	0	1 (9.1)	0	0
Laterality ^									
Right	4 (57.1)	14 (56.0)	6 (545.5)	12 (52.1)	3 (43.0)	3 (50.0)	5 (45.5)	2 (33.3)	4 (44.5)
Left	3 (42.8)	10 (40.0)	3 (27.2)	9 (39.1)	2 (28.5)	2 (33.3)	5 (45.5)	3 (50.0)	4 (44.5)
Bilateral	1 (14.1)	1 (4.0)	2 (18.3)	2 (8.8)	2 (28.5)	1 (16.7)	1 (9)	1 (16.7)	1 (11)
High tm marker ^									
CA-19.9	2 (28.5)	3 (20.0)	3 (37.5)	3 (18.6)	2 (33.3)	1 (33.3)	2 (25.0)	1 (20.0)	2 (28.85)
CA-125	3 (60.0)	2 (50.0)	4 (66.6)	4 (66.6)	3 (60.0)	1 (33.3)	2 (50.0)	1 (50.0)	2 (50.0)

*Data are reported as means±SD; ^Data are reported as *n* (%). APP=Acute pelvic pain from torsion, CPP=Chronic pelvic pain, Inciden=Found incidentally during ultrasound evaluation for another reason, Intra-op=Found intra-operatively during operation for another reason, SD=Standard deviation, MCT=Mature cystic teratomas. *P* value are given in table 2

Table 2: Distribution of χ^2 or OR, 95% CI and *P* values of each demographic and clinical features of cases according to MCTs contents

Features	Skin	Hair	Nerve	Sebum	Muscle	Bone	Cartilage	Thyroid	Respiratory
Age									
OR (95% CI)	7.5 (−4.1-19.2)	−4.1 (−14.5-6.3)	−1.7 (−12.9-9.5)	3.8 (−8.8-16.6)	0.08 (−11.7-11.9)	−0.9 (−2.1-2.9)	0.4 (−10.3-11.2)	3.8 (−6.8-14.5)	3.2 (−6.4-12.9)
P	0.185	0.411	0.752	0.523	0.988	0.122	0.924	0.447	0.492
Nullipar									
χ^2	0.889	0.061	0.416	0.052	0.549	0.274	0.416	2.462	0.052
P	0.346	0.805	0.519	0.820	0.459	0.601	0.519	0.117	0.820
Postmenopause									
χ^2	0.274	2.068	0.004	0.099	0.117	0.021	0.004	0.021	0.480
P	0.601	0.150	0.952	0.753	0.732	0.885	0.952	0.885	0.489
Pregnancy									
χ^2	1.975	1.659	3.104	2.978	1.659	1.368	0.543	1.368	2.319
P	0.160	0.198	0.078	0.084	0.198	0.242	0.461	0.242	0.128
Complaints									
χ^2	2.998	2.246	7.489	4.207	4.540	2.655	1.393	2.998	3.547
P	0.392	0.523	0.058	0.240	0.209	0.448	0.707	0.392	0.315
Tumor size									
OR (95% CI)	−1.1 (−4.4-2.0)	−1.4 (−4.7-1.8)	−1.4 (−3.9-1.0)	−1.1 (−4.3-2.1)	−2.0 (−4.6-0.5)	−0.8 (−4.5-2.8)	−1.3 (−3.9-1.2)	1.3 (−2.0-4.8)	−2.1 (−4.8-0.5)
P	0.446	0.350	0.231	0.476	0.110	0.595	0.292	0.382	0.107
Laterality									
χ^2	0.741	1.117	4.294	1.082	7.619	1.368	0.847	2.279	0.945
P	0.690	0.572	0.117	0.582	0.086	0.505	0.655	0.320	0.624
High CA-19.9									
χ^2	0.495	0.000	2.552	0.078	0.952	0.392	0.208	0.000	0.495
P	0.482	1.000	0.110	0.780	0.329	0.531	0.648	1.000	0.482
High CA-125									
χ^2	0.600	1.500	2.667	2.667	0.533	3.000	1.500	6.000	1.500
P	0.439	0.221	0.102	0.102	0.465	0.083	0.221	0.067	0.221

95% CI=95% confidence intervals, χ^2=Chi-square, OR=Odds ratio, MCT=Mature cystic teratomas

surgery, MCTs can be successfully removed in the second trimester.[13-15] In our series of patients (32 cases), 16.8% of cases were seen during pregnancy, all of which underwent cesarean section. This rate was high because as our clinical setting is a tertiary health, and so receives referrals of pregnancies complicated with adnexal masses.

Chronic pelvic pain was the most common symptom in patients evaluated in our study, which is similar to previous reports, in which pelvic pain was reported as the most common symptom in 53-67% of MCT patients.[16,17] Ultrasonography is a diagnostic tool commonly used for MCT diagnosis, and has a detection rate of 58-60%.[13,18] In our study, the preoperative detection rate of MCT by ultrasound was found as 52%. This finding is consistent with the literature. Because of the variable cystic content, a radiologically heterogeneous appearance is obtained; with intense fat content causing hypoechoic areas and bones and teeth causing hyperechogenic areas.[19,20]

Mature cystic teratomas originate from all three germ layers, so the symptoms of these tumors vary according to their tissue type. A struma ovarii is an unusual type of mature teratoma consisting of thyroid epithelium, and hyperthyroidism develops in about 5-15% of such cases.[21] Six of our cases contained thyroid tissue in the MCT. However, there was no difference in thyroid hormone levels between MCTs containing thyroid tissue and those that did not; furthermore, TSH levels were within normal limits in MCT cases containing thyroid tissue. Hyperthyroidism may occur in about 10% of cases with struma ovarii. In addition, the findings of Hashimoto's and Graves' disease in an MCT are very rare phenomenon, and few cases reported in the literature.[22-24] However, there are asymptomatic cases with struma ovarii in the literature.[25,26]

The most important limitation of this study is to have restricted the number of cases. On the other hand, we could not evaluate the relationship between recurrence rate and contents of MCTs because the study covers the patients who have follow-up in last 5 years.

Several studies have reported that CA-19.9 is elevated in 39-59% of MCT cases.[7,27] CA-19.9 expression has been

verified by immunohistochemistry in the bronchial mucosa and glands of MCT and is secreted into the cystic cavity of the lesion. The mechanism of elevated CA-19.9 in MCT is principally leakage from the cystic cavity into the bloodstream.[28] In our study, 28.1% of the cases included bronchial tissue elements; however, there was no statistically significant difference in CA-19.9 level between cases that did and did not contain bronchial tissue.

Conclusions

We found no statistically significant relationship between MCT tissue type and the demographic, clinical and laboratory findings of patients. A study of a larger number of patients is necessary to fully investigate this potential relationship.

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