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Ovarian mature teratoma: a ten year experience in our institution

G. Jalencas, E. González Bosquet, L. Guirado, M. Fernandez Arias, B. Ruiz de Gauna, L. Fiores, M.D. Gómez Roig, J. Callejo

Hospital Sant Joan de Déu Barcelona, Esplugues de Llobregat, Barcelona (Spain)

Summary

Purpose of investigation: To describe the surgical management and diagnoses of mature ovarian teratomas and ovarian strumas in the present centre. *Materials and Methods:* Descriptive retrospective analysis of cases of mature ovarian teratoma at the present university-associated hospital over ten years. *Results:* The mean age was 29 years and in 17 patients the diagnosis was made during other surgery. When surgery was planned, the approach was 80.2% laparoscopic and 16.1% laparotomic. In the laparoscopy group more cases had been diagnosed previously as dermoid cyst by ultrasound and fewer days of hospital admission. In the laparotomy group the authors found higher ultrasound size and the size in the gross pathology description. With regards to treatment, 45.3% of cases underwent ovariectomy and 49.3% a cystectomy. Comparing these two groups, the authors found larger pelvic mass size in the group of ovariectomies. Healthy ovarian tissue in the removed specimen was found more frequently in the ovariectomies group (29.1%) but also in some cystectomies (7.5%). *Conclusions:* The surgical treatment of the ovarian mature teratoma in the present center was directed on the basis of ultrasound diagnosis, ultrasound tumor size, and the existence of associated gynecologic pathology. The authors strongly recommend a laparoscopic approach and a cystectomy in order to preserve fertility especially in young women.

Key words: Mature ovarian teratoma; Ovarian dermoid cyst; Ovarian masses; Surgical approach; Benign ovarian masses.

Introduction

Ovarian mature teratomas or dermoid cysts are some of the more frequent benign ovarian tumors representing 15% to 20% [1]. Teratomas can occur at any age but the incidence is highest from 20 to 40 years of age [2], with a low rate of malignant transformation [3]. Dermoid cysts arise from pluripotent stem cells with elements of the three germ layers [4, 5], the pathogenesis is thought to be related to a genetic factor [6] and one of the current hypotheses is the parthenogenetic origin of it [7]. The diagnosis of ovarian teratoma is commonly made by ultrasound with a high sensitivity and positive predictive value [8, 9]. The common treatment of this condition is the cystectomy with a laparoscopic approach [10, 11]. The authors retrospectively analyzed trends in management at the present institution over a period of ten years.

Materials and Methods

The authors retrospectively selected cases from the histological reports of mature ovarian teratoma operated on at the Hospital Sant Joan de Deu from 2001 to the beginning of 2011. They found 160 cases with a histological diagnosis of mature teratoma after surgery. They collected epidemiologic data and outcome and compared the group of patients with a laparoscopic surgical approach against the patients with laparotomy surgical approach. They also compared the surgical techniques: cystectomy versus ovariectomy.

The analysis was performed with SPSS version 20. Groups were compared using student *t*-test, non-parametric Mann-Whitney U test and chi square, each with a significance level of $p < 0.05$.

Results

Age range was between four and 69 years with a median and mean of 29 and 29.4 years, respectively. (Figure 1). Taking the gynecologic history into account, 100 patients (62.5%) were nulliparous while 60 patients (37.5%) had one or more children, 157 cases (98.1%) had no cancer history, two patients had a history of breast cancer, and one case of endometrial cancer. Whereas 131 (81.9%) had no previous abdominal surgery, 29 cases (18.1%), had at least one previous abdominal surgery and 17 women (6.2%) had at least one previous ovarian surgery from other causes than ovarian mature teratoma.

Diagnosis

First stage diagnoses were made in the clinic, 21 patients (13%) had pain or menstrual disturbances, and 41 cases (25.6%) had complaints of abdominal mass or swelling sensation; on the other hand 83 cases (51.9%) had no symptoms and the pelvic mass was diagnosed during a routine pelvic examination or in abdominal surgery performed for other reasons. In the remaining cases, this variable was not mentioned in the reports.

The diagnosis of ovarian teratoma was highly suspected by pelvic ultrasound in 93 cases (58.1%); another seven cases (4.3%) were reported to have a complex ovarian mass and 40 cases (26.3%) were thought to have a benign ovarian condition other than teratoma. Out of these 140 cases,

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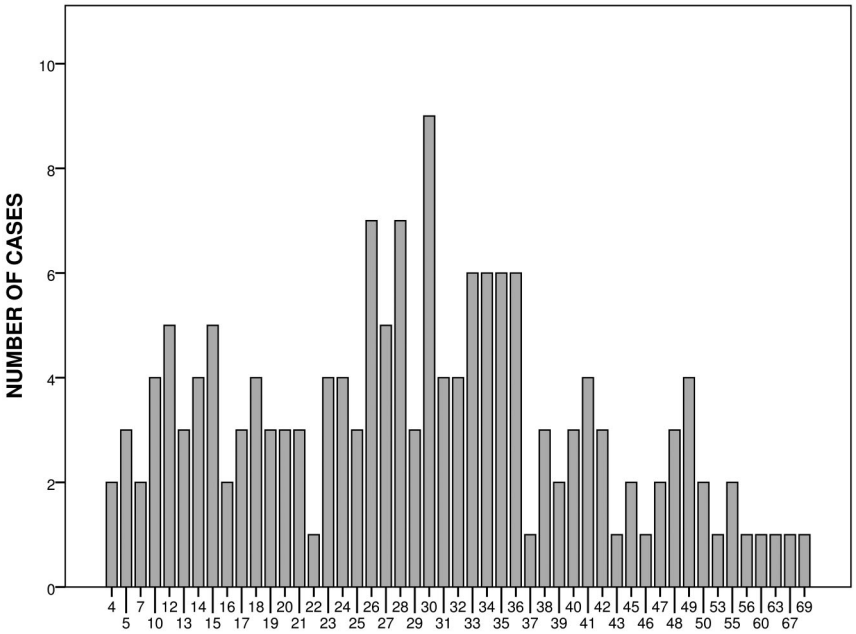

Figure 1. — Age range of the patients.

24 (25%) required a complimentary computerized tomography (CT) and nine (5.6%) a magnetic resonance imaging (MRI). There were another two cases that the authors diagnosed by CT without having had a previous pelvic ultrasound. There were 17 cases (10.6%) that were a coincidental finding during abdominal surgery, 15 in a cesarean section and two during an appendectomy.

Surgical approach

Laparoscopic approach was used in 114 cases (80.2%) and laparotomy in 23 cases (16.1%). In six other cases (3.75%) laparoscopy was converted to laparotomy. These numbers were made from a total of 143 cases, as the authors ruled out the dermoid cysts that were found as part of other surgeries. Laparoscopy and laparotomy groups were homogeneous for age, parity, and surgical history with no significant differences (Table 1).

There was no significant difference in the clinical symptomatology between the two groups: 42 women (36.8%) had pain or swelling in the group of laparoscopies and eight women (34.7%) in the group of laparotomies (Chi square, $p = 0.85$).

Dermoid cyst was suspected by ultrasound more frequently in the laparoscopy group (75 women or 65.7%) than in the laparotomy group (nine women or 39%) with significant differences (Chi-square, $p = 0.01$).

In seven women where the ultrasound was suspected to be malignant, three of the cases required additional medical imaging procedures such as CT or MRI. In four women the approach was laparoscopic and in two women laparotomic (two had associated gynecological pathology); the remaining case was begun with a laparoscopy and converted to laparotomy, and neither of them confirmed malignancy in the posterior histological analysis.

Table 1. — *Characteristics and surgical approach.*

	Laparoscopy	Laparotomy	*p*
Clinic	42 (36.8%)	8 (34.7%)	0.85
Dermoid cyst suspected in ultrasound	75 (65.7%)	9 (39%)	0.01
Sonographic suspicion of malignancy	4 (3.5%)	3 (8.7%)	0.26
Hospitalization days	2.88	5.97	0.00
Ultrasound size (mm)	65.8	96	0.00
Macroscopic size (mm)	56.1	78.5	0.01
Ovarian torsion	7 (6.1%)	4 (17.4%)	0.07
Gynecological pathology	12 (10.5%)	12 (52.1%)	0.00
Serious complications	2 (6.9%)	3 (10.3%)	0.76

The group with the laparoscopic approach had a mean of 2.88 days of hospital admission (one to ten days). The group with the laparotomies had a mean of 5.97 days of hospital admission (three to 12 days); the two groups did not follow a normal distribution and the authors found significant differences between them (Mann-Whitney U, $p = 0.00$).

On the one hand the mean size measured by ultrasound in the laparoscopy group was 65.8, with a non-normal distribution; on the other hand the size measured by ultrasound in the laparotomies followed a normal distribution with a mean of 96.0 mm, the non-parametric test for comparison of means found significant differences between those two groups (Mann-Whitney U, $p = 0.00$) (Figure 2). Also there were differences between the two groups with regards to the size measured in the gross pathologic description, laparoscopies (mean of 56.08 mm) and laparotomies (mean of 78.53 mm). Aside from these there was less associated gynecological

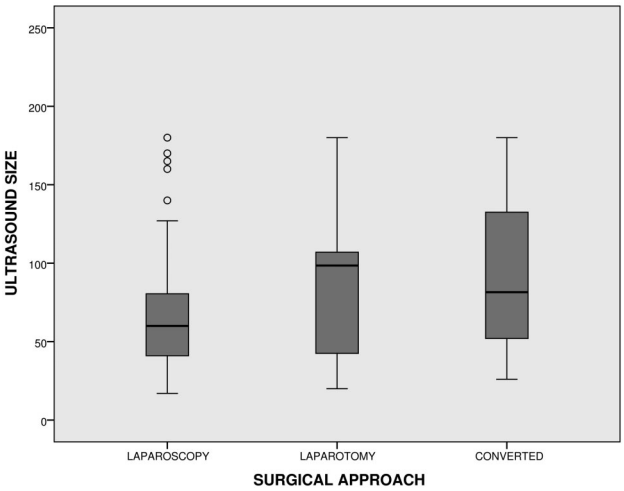

Figure 2. — Ultrasound size and surgical approach.

Table 2. — *Type of surgery (one patient was lost for this variable).*

	Cases	Percentage
Ovariectomy	73	45.6%
Cystectomy	79	49.3%
Ovarian mass resection	7	4.4%
Total	159	99.3%

Table 3. — *Characteristics and type of surgery.*

	Cystectomy	Ovariectomy	*p*
Age (years - mean)	28.9	29.7	0.70
Parity (nulliparous)	51 (64.5%)	46 (58.3%)	0.51
Ultrasound size (mm)	63.66	83.36	0.02
Macroscopic size (mm)	55.44	87.75	0.00
Healthy ovarian tissue in surgical specimen	6 cases (7.59%)	21 cases (29.16%)	0.00

pathology in the group with laparoscopies (12 cases or 10.5%) than in the group with laparotomies (12 cases or 52.1%), finding significant differences between those groups (Chi square, $p = 0.00$).

There were also seven cases of ovarian torsion in the group of laparoscopies (6.1%) and four patients in the group of laparotomies (17.4%), with no significant differences between them (Chi square, $p = 0.07$). One case of ovarian torsion was in the group of the laparoscopy converted to a laparotomy.

There were nine major complications in total (5.7%), five (4.3%) in the laparoscopic group and three (13%) in the laparotomies group, and no differences were found between them (Chi-square, $p = 0.76$). These complications were hemorrhages, hemoperitoneum, abdominal wall hematoma, and abdominal bound herniation. The remaining case with a complication was approached by laparoscopy and converted to laparotomy (Table 1).

Ovarian torsions

The authors had 12 cases with ovarian torsions associated with mature ovarian teratoma; sonographic size of torsioned cysts had a mean of 92 mm and a median of 100 mm and sonographic size of cysts that were non-torted had a mean of 72.3 mm and a median of 60 mm - both with a non-normal distribution and statistical differences (Mann Whitney U, $p = 0.01$). Also the means of the size of the gross pathological description between torted (103.8 mm) and non-torted cysts (66.9 mm) were statistically different (Mann-Whitney U, $p = 0.00$).

Type of surgery

Surgical techniques used were in 79 cases (49.3%) a cystectomy and in 73 cases (45.6%) an ovariectomy (Table 2). Comparing the mean age of the women in the group of ovariectomies (mean age of 29.7, SD: 13.6) with the cystectomies (mean age of 28.9, SD: 12.3), both groups followed a normal distribution and no statistically significant differences were found (*t*-test, $p = 0.70$).

Six women in the ovariectomy group had a hysterectomy and ovarian removal; all were indicated by coexisting uterine pathology such as uterine fibroids. Their mean age was 46.8 years with a median of 49 without following a normal distribution.

A cystectomy was performed in 79 women of which 51 (64.5%) had not had children and 28 (35.4%) had one or more children. An ovariectomy was performed in 73 women, of which 46 (58.3%) had not had children and 26 patients (36.1%) had one or more children. The variables surgery and parity were independent and were distributed equally regardless of the other variable (Chi square, $p = 0.51$).

The authors compared the ultrasound size in the group of ovariectomies (mean size of 83.3 mm, SD: 47.4, and normal distribution) with the ultrasound size in the group of cystectomies (mean of 63.6 mm and median of 60 mm, and non-normal distribution), and there were statistically significant differences (Mann-Whitney U, $p = 0.02$). The same analysis for macroscopic size revealed significant differences between the two groups (Mann-Whitney U, $p = 0.00$), with a mean macroscopic size of 87.7 mm in the women with ovariectomies and a mean macroscopic size of 55.4 mm in the group of cystectomies; both followed a non-normal distribution.

In the histological analysis of surgical specimens, 158 were diagnosed as ovarian mature teratomas and two as ovarian strumas without finding malignancy in any of them.

In most of the cases, ovariectomies were performed assuming that the dermoid cysts were so large that there was no healthy ovarian tissue remaining and also cystectomies were performed in order to preserve as much healthy ovarian tissue as possible . Nevertheless, in 29 women, healthy ovarian tissue was found on histological examination, 21

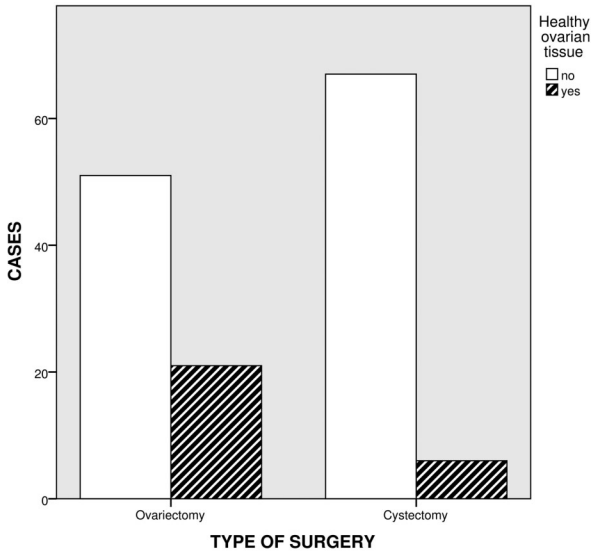

Figure 3. — Healthy ovarian tissue in the surgical specimen according to type of surgery.

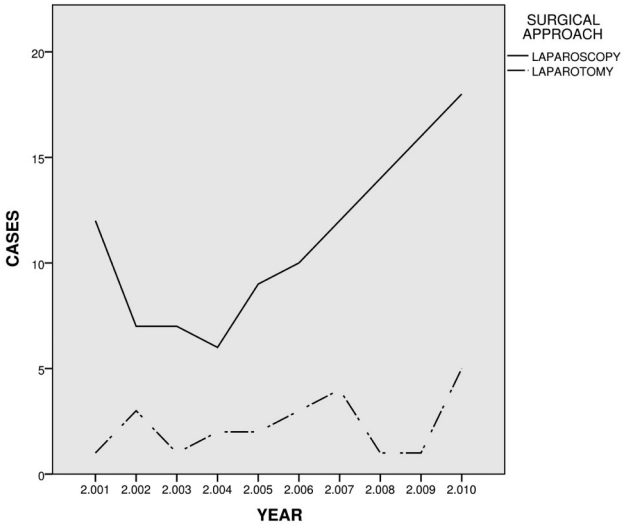

Figure 4. — Evolution over time.

of those cases (29.16%) in the group of the ovariectomies and six cases (7.59%) in the group of the cystectomies. The remaining cases were in the group of ovarian mass resection. (Table 3 and Figure 3).

The mean age of women where healthy ovarian tissue was found was 27.73 (SD: 12.67) and the mean age of women where not healthy ovarian tissue was found was 30.11 (SD: 13.10); both had a normal distribution and no significant differences were found (*t*-test, $p = 0.55$).

Discussion

In the present study the range of the women's ages was between four and 69 years, with a mean of 29, which is consistent with most of the literature [9, 12, 13]. Regarding the clinical diagnosis, different series found an asymptomatic tumors rate ranging from 21.1% to 77% [3, 12, 13]. As reported in the present case study, 51.9% women were without any symptoms and 38.6% women had pain or abdominal swelling.

Diagnosis was made by ultrasound except in 17 cases in which dermoid cyst was coincidentally diagnosed during other surgery and few cases diagnosed at first instance by CT. In the present study the ultrasound sensibility was 58.1% which differs from some literature where the ultrasound sensibilities for dermoid cyst ranged from 85% to 93% [8, 11]. Although the present authors had taken into account characteristic ultrasound features such as shadowing echodensity and regional bright echoes, their low sensibility could have been due to a mistaken diagnosis as ovarian endometrioma which is known to mimic the ultrasound appearance of dermoid cyst [8].

As at many other institutions the laparoscopic approach was in most cases mandatory, but that continues to change from the late nineties where abdominal open surgery was recommended to avoid spillage [3]. Nowadays some institutions still recommend the abdominal approach in those cases where giant teratomas of more than ten to15 cm are suspected, in order to prevent spillage and to have better management in case of malignancy [12, 13]. On the other hand other groups did not find cases of granulomatous peritonitis after spillage where copious lavage of the abdominal cavity was made [14] and most of them avoided spillage when an endobag was used and meticulous surgical technique took place [15-17], hence they recommend the laparoscopic approach despite the size of the mass.

Although the present authors did not report in their cases studied rupture or spillage of cysts, they used the laparoscopic approach more frequently and have also noticed the increasing tendency in the number of laparoscopy in recent years in the present center (Figure 4).

In the present case study the authors had a more frequent laparoscopic approach but the sizes of the mass suspected by ultrasound were larger in diameter in the group of patients that had open abdominal surgery. Also the existence of additional gynecological pathology was also more common in the laparotomy approach. When a dermoid cyst was suspected by clinic and ultrasound features, the laparoscopic approach was more often selected. Nevertheless, no differences were made in the approach if the authors suspected a complex ovarian mass by ultrasound. They also realized that the laparoscopic group had better results in terms of days of admission as data reported [13,17] but did not find any differences in terms of postoperative complications.

The present authors found 12 women with torted cysts, a 7.5% of the total cases which is a little higher than in the lit-

erature where the rate was 4.9% [3]. Most of them were managed laparoscopically as literature recommends [18].

In other reports the decision of cystectomy or ovariectomy is related to age, gravity, and parity [3] but in the present study the authors saw no differences in terms of age and parity.

The parameters that suggest whether to have conservative surgery or not were the larger diameter of the mass assessed by ultrasound or by gross pathologic description and they were significantly larger in the group where an ovariectomy was performed.

The authors had no malignant result in the present case study, but others revealed rates of malignancy from 1.4% to 1.52% [3, 12], however those had larger sample groups and most of the malignant transformation cases were found in women with a median age of 50 years with a mean diameter of 92 mm.

Zupi *et al.* [11] describe in their report how in 55 cystectomies with the laparoscopic approach they found a functional ovarian volume greater than 1.5 cm^3 in the ultrasound performed three to six months after the surgery, even if in the first ultrasound no surrounding ovarian tissue had been detected. These are consistent with the fact that a 29.16% of the present patients had healthy ovarian tissue in the retrieved ovarian mass. This is important for young patients for whom preservation of reproductive capacity is the first priority. The authors also had some adolescents or infant patients, in their cases according to other cases reported [19] in which it is possible to be less aggressive in surgery using a laparoscopic approach.

Conclusion

Analyzing the present case study and comparing it with other case reports made previously, the authors can conclude that teratomas are more frequently associated with young women for which conservative procedures are recommended. The laparoscopic approach is thought to be safer and a cystectomy is preferred rather than removing the complete ovary in order to preserve as much ovarian tissue as possible.

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Address reprint requests to:
J. G. JALENCAS GIMENEZ, M.D.
Hospital Sant Joan de Déu Barcelona
Passeig Sant Joan de Déu, 2.
08950 Esplugues de Llobregat, Barcelona (Spain)
e-mail: gjalencas@hsjdbcn.org