

Laparoscopic Approach to Ovarian Dermoid Cysts

E. Târcoveanu, A. Vasilescu, Șt. Georgescu, N. Dănilă, C. Bradea, C. Lupașcu, E. Cotea, F. Crumpei,
D. Vintilă, R. Moțoc-Vieriu, G. Dimofte

First Surgical Clinic, „St. Spiridon” Hospital Iași, Romania
”Gr. T. Popa” University of Medicine and Pharmacy Iași, Romania

Rezumat

Abordul laparoscopic al chisturilor dermoide ovariene

Introducere: Chisturile ovariene dermoide (teratoame chistice mature), sunt tumori benigne cu celule germinale și cele mai frecvente tumori ovariene la femeile de vârstă fertilă. Scopul acestui studiu a fost de a analiza abordul laparoscopic în aceste tumori.

Material și metodă: Am efectuat un studiu prospectiv între 2006 – 2010, ce a inclus 38 de teratoame chistice mature, tratate fie prin abord laparoscopic sau clasic. Toate datele preoperatorii și postoperatorii au fost incluse într-o bază de date MS Access și analizate statistic cu SPSS v. 17 pentru Windows.

Rezultate: Grupul de studiu a fost împărțit în 2 subgrupuri în funcție de abord: laparoscopic (25 cazuri) și clasic (13 cazuri). Vârsta medie a pacienților a fost de 40,34 ani (interval 19-74): 36,92, pentru grupul laparoscopic și semnificativ mai mare 46,21 ani pentru grupul open. Doisprezece cazuri au fost internate în urgență, fie pentru complicații (ruptură sau torsiune de teratom), în 11 cazuri sau asocierii cu apendicita acută într-un caz. Urgența nu a influențat alegerea abordului open sau laparoscopic. Doar 29 din cele 38 de cazuri au avut determinat preoperator CA 125. CA 19-9 a fost efectuat în 27 de cazuri, în 21 de cazuri (78%) fiind valori crescute. Chisturile de peste 10 cm, prezintă valori mai mari ale CA 19-9. Diametrul mediu al chisturilor a fost de 11,29 cm (2-27 cm):

13,93 cm diametru mediu al chisturilor operate clasic de 9,75 cm pentru abordul laparoscopic. Pentru abordul laparoscopic în cazul chisturilor mai mari de 10 cm este necesar aspirarea conținutului. Spitalizarea medie a fost de 4,05 zile (2-6 zile) pentru lotul laparoscopic, semnificativ mai mică decât în lotul clasic, 6,96 zile (5-16 zile).

Concluzii: Abordul laparoscopic al tumorilor chistice ovariene dermoide este o procedură sigură și eficientă. Rata complicațiilor nu este mai mare decât în abordul clasic dar oferă o spitalizare mai scurtă, o recuperare rapidă și foarte important, permite un tratament conservator, mai ales la femeile aflate în premenopauză și care doresc o sarcină.

Cuvinte cheie: chist ovarian dermoid, teratom matur chistic, laparoscopie, tumori benigne ovariene

Abstract

Introduction: Ovarian dermoid cysts (mature cystic teratomas) are a benign type of germ cell tumours and the most common ovarian neoplasms in women of fertile age. The aim of this study was to analyze the safety of the laparoscopic approach in ovarian dermoid cysts.

Methods: We performed a prospective study between 2006 and 2010 including 38 mature cystic teratomas treated either laparoscopically or by open access. All preoperative and postoperative data were included in an MS Access database and statistically analysed with SPSS v. 17 for Windows.

Results: The study group was divided into 2 subgroups according to the approach: laparoscopic (25 cases – 2 conversions) and classic (13 cases). The mean age of the patients was 40.34 years (range 19-74): 36.92 years for laparoscopic group and significantly higher 46.21 years for

Corresponding author: Alin Vasilescu, MD, PhD
First Surgical Clinic, „St. Spiridon” Hospital
Independenței Street, No 1, 700111, Iași
Romania
E-mail: vasilescu.alin@gmail.com

open approach group. Twelve cases were admitted as emergencies either because of complications (torsion or rupture of the teratoma) (11 cases) or associated with acute appendicitis (one case). The latter did not influence the decision for open or laparoscopic approach. Only 29 out of 38 cases had preoperative measurement of CA 125. CA 19-9 was performed in 27 cases and elevated levels were found in 21 cases (78%). Cysts over 10 cm presented higher values of CA 19-9. The mean cysts diameter was 11.29 cm (range 2-27 cm): 13.93 cm mean cyst diameter for open approach vs 9.75 cm for laparoscopic approach. The specimen removal required aspiration of the content for cysts bigger than 10 cm in laparoscopic approach. Mean hospital stay was 4.05 days (range 2-6 days) for the laparoscopic group, significantly lower when compared with the open approach group: 6.96 days (range 5-16 days).

Conclusions: Laparoscopic management of ovarian dermoid tumours is a safe and efficient procedure. It does not increase complications rate in comparison with the open approach, offering a shorter hospital stay, a quick recovery and very important, it allows a conservative treatment, especially in premenopausal women who want to be pregnant.

Key words: ovarian dermoid cyst, mature cystic teratoma, laparoscopy, ovarian benign tumour

Introduction

Cystic ovarian pathology is common in all stages of woman's biological life, with major implications for social life, reproductive potential and survival. Ovarian teratomas are classified as mature (dermoid cyst) or immature type. Dermoid cysts represent a type of germ cell tumour composed of well-differentiated tissues derived from three germ cell layers: endoderm, mesoderm and ectoderm. Germ cell tumours represent 25 - 30% of all ovarian neoplasms. Mature cystic teratomas are a benign type of germ cell tumours and the most common ovarian neoplasms in women of fertility age, these tumours represent more than 70% of benign tumors in women under the age of 30 years (1). Less than 1% of dermoid cysts are malignant (2,3). These are usually asymptomatic and are discovered often incidentally on clinical examination or medical imaging. Experienced laparoscopic surgeons should consider laparoscopy as an alternative to laparotomy in the management of ovarian dermoid cysts (4).

The aim of this study was to analyze the safety of laparoscopic approach in ovarian dermoid cysts.

Methods

We performed a prospective study between January 1st, 2006 to December 31st, 2010 that included 38 dermoid ovarian tumors, with histological confirmation. The series included also emergency cases as well as incidental findings for other

laparoscopic procedures. Patients with incomplete diagnostic workup or those who refused surgery were excluded from the study series.

All significant data were stored in an MS Access database. Statistical analysis was performed using SPSS v. 17 for Windows (Statistical Package for the Social Sciences, Chicago, Illinois). Differences between subgroups were tested using parametric or non-parametric tests: Student t test, χ^2 test, Fisher exact test and ANOVA with a significance level of 0.05.

Results

The study group was divided into 2 subgroups according to the approach: laparoscopic (25 cases) and classic (13 cases). The mean age of the patients was 40.34 years (range 19-74): 36.92 ± 2.98 years SEM (range 19-74 years) for laparoscopic group and significantly higher 46.21 ± 3.03 years SEM (range 29-71) for open approach group ($p=0.04$, t Student). Majority of patients belong to the third and fourth decades (52.6%), while 44.7% were older than 40 years and only one patient younger than 20 years.

In all cases symptoms were nonspecific: abdominal pain, abdominal fullness, nausea and vomiting, with only five cases in whom an abdominal mass was diagnosed on palpation. Twelve cases presented as acute abdominal emergencies: one case incidentally diagnosed with teratoma associated with acute appendicitis and 11 cases (29%) presented for complications of the ovarian mass: torsion (8 cases) and intraperitoneal rupture (3 cases). Such complications were more common in patients younger than 40 years of age. A significant proportion were asymptomatic and were diagnosed during routine ultrasonic abdominal evaluation (8 cases), during laparoscopic exploration for unrelated pathology (1 case) or during open hysterectomy (1 case).

Preoperative evaluation included ultrasound scan in all cases and CT scan in 21 cases. In all our cases ultrasound scan was highly suggestive of ovarian dermoid cyst (Fig. 1). Radioopaque foreign bodies (teeth) were found on abdominal X-Rays in 6 cases (Fig. 2). In 29 of the 38 cases preoperative measurement of CA-125 were performed demonstrating normal values in all cases. In 27 cases we also evaluated CA19-9 levels, with results above normal levels in 21 cases (78%). In our series cysts larger than 10 cm in diameter presented higher values of CA 19-9 ($72 \pm 7,99$ UI/mL SEM) comparative with smaller cysts ($32,89 \pm 3,07$ UI/mL SEM) ($p < 0.001$, t ANOVA).

The teratomas were located in 13 cases in the left ovary (8 in laparoscopic group), in 17 cases in right ovary (12 in laparoscopic group) and in 8 cases (21%) there were bilateral tumors (7 in laparoscopic group). Bilateral tumors did not represent a contraindication for laparoscopic approach. We did not find a statistically significant association between location, age and type of approach.

Laparoscopic approach was used mainly in patients under 40 years, 18 cases (85.7%) compared to only 9 cases (52.9%) in patients over 40 years of age. This shows a preference for laparoscopic approach in adolescent and premenopausal

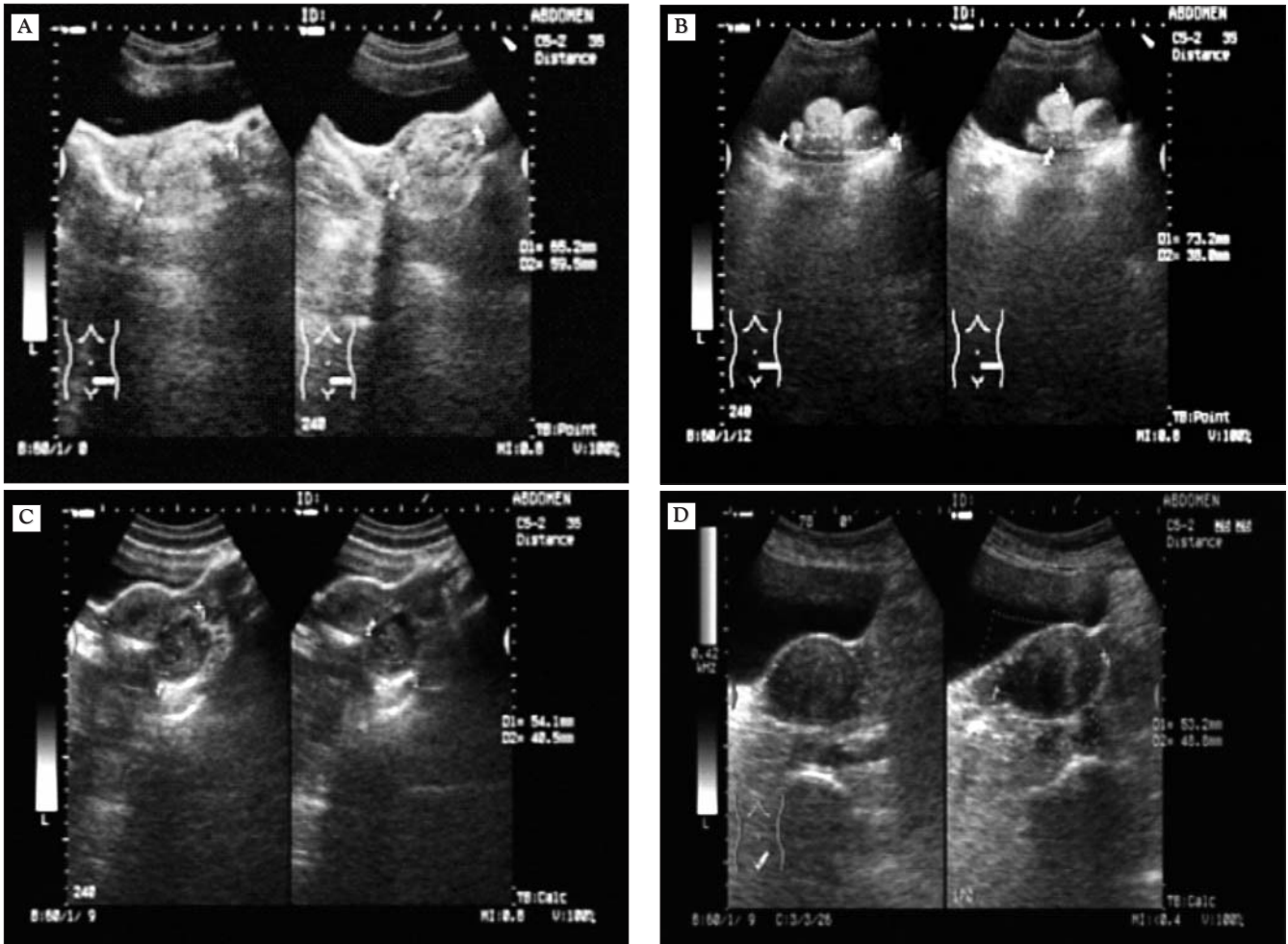


Figure 1. *Ultrasound aspects of ovarian dermoid cyst. (A) Left ovarian mass intense echogenic, homogenous, well circumscribed by 55/59 mm with posterior acoustic attenuation; (B) In hypogastrium and left, fluid mass containing inhomogeneous image by 73/38 mm with posterior acoustic shadow. (C,D) Left ovarian cystic mass well circumscribed, without Doppler signal, with multiple floating balls.*

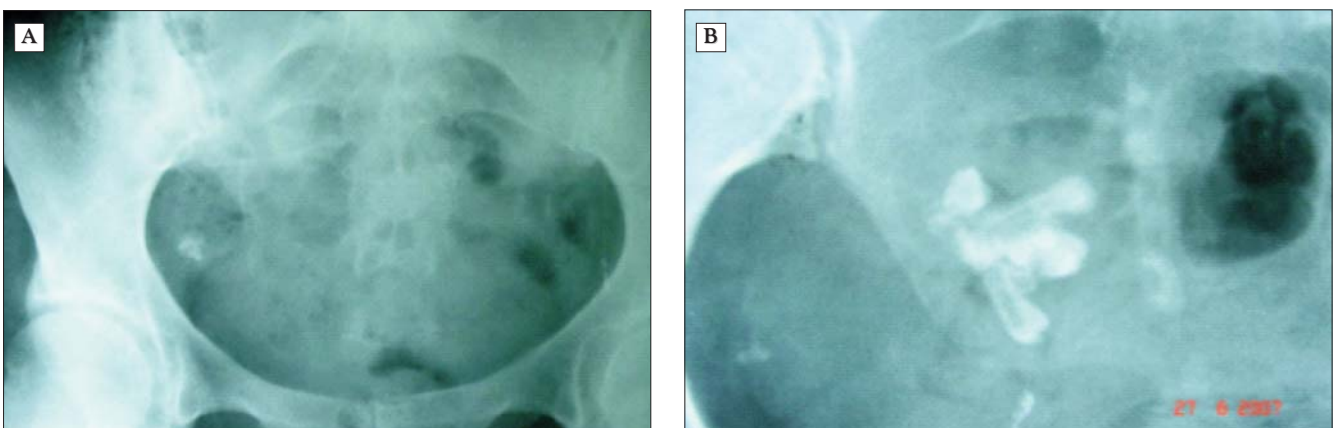


Figure 2. *Abdominal X-Rays found radio-opaque foreign bodies (teeth) located on topography of left ovary*

women, because of the advantages of minimally invasive approach. In women over 40 years, among other factors, the choice of approach depended mostly on surgeons experience

in laparoscopy and surgeons preferences. Emergency status did not influence the choice of approach: 6 cases laparoscopic, 5 cases open. The surgical procedure ranged from cystectomy (1

case) to salpingo-oophorectomy in 10 cases which might have influenced the type of approach. There were 2 conversions due to associated lesions which could not be managed in laparoscopic environment.

In 18 cases we performed associated procedures: 6 cases in open access group, 12 cases in laparoscopic group. In 6 cases the ovarian tumour was associated with leiomyomas of the uterus. In two cases a laparoscopic procedure was chosen: in one cases total hysterectomy with bilateral salpingo-oophorectomy and in one case laparoscopic myomectomy and right salpingo-oophorectomy. All other cases were managed with total hysterectomy with bilateral salpingo-oophorectomy by open approach. Other procedures associated during open approach were: umbilical hernia or inguinal hernia repair, and appendectomy for acute gangrenous appendicitis with localized peritonitis. In laparoscopic approach associated procedures included cholecystectomy for acute cholecystitis (2 cases), appendectomy for acute appendicitis (2 cases), gastric wedge resections for gastric stromal tumor (1 case) and viscerolysis for postoperative adhesions (4 cases, 2 required conversion).

In most cases with laparoscopic approach we preferred the open technique for pneumoperitoneum, because medium or large size of ovarian cysts were frequent and precluded a safe close technique. After thorough inspection of the abdominal cavity the adnexal mass surface was evaluated and the exact location of the ovarian tumor was identified. In three cases, exact localization was demonstrated by laparoscopic ultrasonography as the procedure was conservative in intent. Tumors smaller the 10 cm were removed intact using an endobag. To facilitate extraction the cysts were aspirated inside the bag to prevent spillage into the peritoneal cavity. Tumors larger then 10 cm were first aspirated by insertion of the aspirator canula under laparoscopic view. The capsule of the cyst was dissected from the surrounding normal ovarian tissue and extracted from the abdomen with an endobag (Fig. 4). For patients past the age of fertility we performed salpingo-oophorectomy. Specimen were removed using the right or left trocar incisions (20 cases), transvaginal (1 case) or a small Phannestiel incision (1 case). At the end of intervention all cases with even minimal spillage of cyst's content were subject

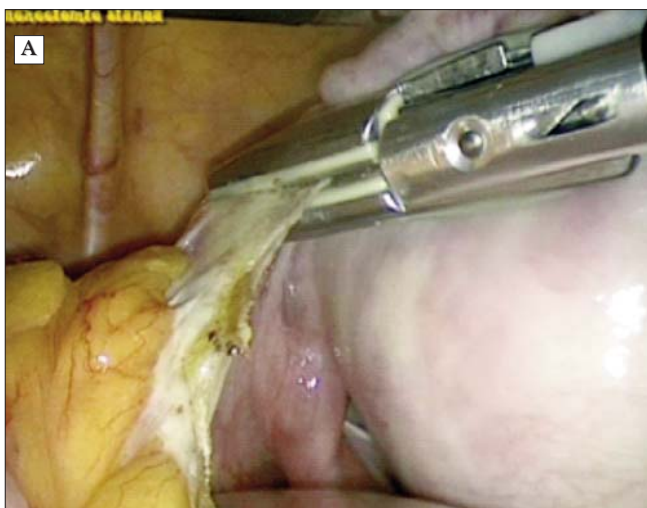


Figure 3. Laparoscopic left adnexectomy for dermoid cyst of ovary – intraoperative view

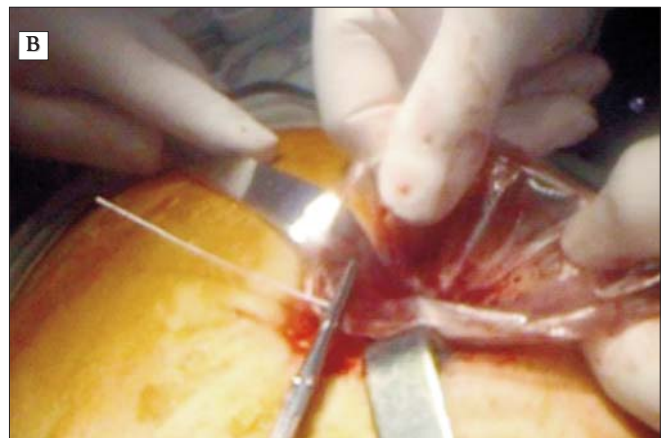


Figure 4. Retrieval of dermoid cyst in a endobag – intraoperative view

to abundant peritoneal lavage (4-6 liters of lactated Ringer solution) in order to prevent chemical peritonitis, granulomas or extensive adhesions. The mean operative time was $33,81 \pm 4,12$ SEM minutes (range 20-90 minutes) for cases in which we performed laparoscopic ovarian cystectomy or laparoscopic salpingo-oophorectomy. For total hysterectomy with bilateral salpingo-oophorectomy the mean operative time was 125 minutes and 160 minutes respectively. For laparoscopic myomectomy and unilateral salpingo-oophorectomy mean operative time was 110 minutes.

There was no postoperative morbidity or mortality in the laparoscopic group. In the group with open approach there was one case of parietal hematoma which prolonged hospitalization. Mean hospital stay was 4.05 ± 0.25 days (range 2-6 days) for the laparoscopic group, significantly shorter than the open approach group, 6.96 ± 0.75 days (range 5-16 days) ($p=0.027$, ANOVA test). Hospital stay for cases requiring conversion was 8 and respectively 9 days. There were no correlations between operative time or modality of specimen removal and hospital stay ($p>0.05$, test ANOVA).

All specimens were reported as benign cystic teratomas on pathological examination (Fig. 5). There were no recurrences in the study group. All six patients who expressed a desire for future pregnancies were operated laparoscopically and two pregnancies were documented with normal development.

Discussions

Dermoid cysts are the most common germ cell tumours. The tumor arises from multipotent cells of the ovary and develop into ectodermal, mesodermal and endodermal structures. Genetic pathways have been proposed in the pathogenesis of ovarian dermoid cysts (5) but familial teratomas are exceedingly rare, and only few cases have been reported in literature (6).

The incidence of dermoid tumors is peaking between 20 and 40 years of age, as was the case in our study. In post-menopausal women the ovarian dermoid cyst comes second after simple ovarian cysts as much as all adnexal tumors are concerned (7). Mature cystic teratomas can be bilateral in up to 15% of cases (8). In our series the tumours were bilateral in 8 cases (21%) which is significantly higher then reported. The incidence of ovarian tumours in pregnancy is very rare, under 0.1% and tend to present with bilateral involvement (9). Parasitic ovarian dermoid cysts are unusual extragonadal mature cystic teratomas with the most common site being the omentum in the Douglas pouch (10,11) followed by inguinal hernia sac (12). Possible causes include auto-amputation of the ovarian dermoid cyst or a primary tumor developed from displaced germ cells or ectopic ovarian tissue developed in the omentum (13).

The ovarian dermoid cysts were reported in association



Figure 5. Pathological examination, macroscopic appearance - are found hair and teeth

with fertility treatments and most of them are diagnosed during the cesarean delivery. The cysts which are diagnosed during pregnancy should be managed conservatively using ultrasound follow-up (14).

Ovarian dermoid cysts are often asymptomatic, most of them discovered incidentally during pelvic ultrasound scan or during pelvic inspection during laparoscopy or laparotomy performed for another pathology (15). Up to 85% from all patients describe vague symptoms which include abdominal pain, fullness, constipation, vomiting, nausea and palpable abdominal mass (1,2). Sometimes, ovarian dermoid cysts may present with small bowel obstruction (16) or mimicking acute appendicitis (infected ovarian dermoid cyst) (17). The most frequent complication of ovarian dermoid cyst is torsion which happens more often on the left side, while right side or bilateral tumor torsion are rarely reported. In our series 21% of patients (8 cases) presented with torsion, which is higher than previously reported (18). A more difficult situation is generated by the intraperitoneal rupture of dermoid cysts, with chemical peritonitis. Rupture may be spontaneous, mimicking advanced ovarian malignancy, or it can be iatrogenic (19,20). Chemical peritonitis secondary to dermoid cyst rupture can develop into sclerosing encapsulating peritonitis (21). In our series we found 3 cases (7.89%) of spontaneous ruptured teratomas which posed no significant diagnostic difficulties. Rare complications include infection of the cyst (22,23), penetration in the urinary bladder (24), or rectal fistula formation, not always related to malignant degeneration of the cyst (25). Benign cystic teratomas can exceptionally produce active hormones and ovarian dermoid cyst with Leydig Cells may cause virilizing syndrome, mostly in postmenopausal women (26).

Dermoid cysts are unusually associated with endometriosis of the ovary (27) and paratubal cyst, a rare hamartomatous disorder (28). In our series we encountered a right dermoid ovarian cyst associated with gastric stromal tumor, both managed during the same laparoscopic session, for which we performed right ovariectomy and wedge gastric resection.

Malignant transformation in an ovarian dermoid cyst occurs in 1 to 2% of cases (29). Squamous cell carcinoma is the most common type of malignant transformation in mature cystic teratoma (30-32), and it is usually unilateral (33). Squamous cell carcinoma may be associated with other malignant tumors such as osteosarcoma (34). Other less frequent malignant degeneration include: sebaceous carcinoma (35), carcinoid tumor (36), malignant melanoma (37), carcinosarcoma, atypical choroid plexus papilloma and papillary thyroid carcinoma (38). The risk factors for malignant degeneration are: old age, large tumours, increased growth rate and high levels of tumor markers (CA 125, CA 19-9, CEA, SCCA) (39). Rupture of a dermoid cyst of the ovary resulting in chemical peritonitis is very rare and may be associated with malignant transformation (40).

Medical imaging is essential in precise diagnosis but often preoperative diagnosis is not conclusive, especially when malignancy is questionable (41). Ovarian dermoid cysts are suggested when a fat containing cystic tumor is identified on

imaging. Most of them can be diagnosed by transabdominal ultrasonography (US), transvaginal US, computed tomography (CT) or magnetic resonance imaging (MRI) (42). An abdominal plain X-Ray may show calcified density images compatible with the teeth, suggesting the possibility of a benign teratoma (43). The typical ultrasonic aspect consists of a complex echostructure, with internal hyperechoic inclusions, solid/liquid interface reflections and posterior acoustic shadow (Rokitansky protuberance) that masks the posterior part of the tumour. The presence of a fat-fluid it may also be identified as cystic mass with multiple floating balls. The sebum mixed with hair creates an intense echogenic nonhomogeneous image with fine echogenic bands (44), while bony structures present with typical hyperechoic elements with posterior shadow. Characteristic findings on CT include a fat-containing mass, which contains a mixture of fat, hair, debris, and fluid. With diagnostic significance are calcifications, including teeth and bone (45). Magnetic resonance imaging is a method of choice in the diagnosis of ovarian pathology in children and adolescents. The presence of fat and bony structures are usually necessary for a definitive diagnosis (46). Distinguishing benign versus malignant tumors can be tricky in the preoperative assessment. PET/CT has resulted in a significant improvement in diagnostic accuracy (47), usually in association with elevated serum levels of CA 19-9 (48), but also combined high levels of CA125, CA15-3 and AFP, may be helpful in distinguishing between mature and immature teratomas (49).

The classic treatment for benign ovarian dermoid included cystectomy and oophorectomy using an open approach. Gradually, laparoscopic cystectomy took over due to lower complications rate with similar rates of safety and efficacy. Laparoscopic approach is a major indication in young women (50) but also has major advantages in premenopausal women as incidence of recurrence is lower and future pregnancies more likely (51). Major advantages of laparoscopic approach include improved magnification, less intraoperative blood loss, less postoperative pain, shorter hospital stay, lower postoperative morbidity, shorter recovery time and not least better cosmetic result (52). The major risk associated with surgical removal of ovarian dermoid cysts is spillage followed by the possibility of chemical peritonitis (11). Early recognition and prompt treatment by a second laparoscopy allows for removal of the remaining cyst content and abundant peritoneal lavage (53). The risk of granulomatous peritonitis can be minimized by routine intraoperative use of endoscopic retrieval bags (54). In the situation of suspicious lesions they should be biopsied for frozen section and free fluid in the peritoneal cavity should be sent for cytological examination. Laparotomy is preferred for large or bilateral teratomas and in cases where malignant degeneration is suspected (2).

There are also several important references in Romanian surgical literature on this pathology (55-57).

Conclusions

Laparoscopic management of ovarian dermoid tumours is a

safe and efficient procedure. It does not increase complications in comparison to the open approach, offering a shorter hospital stay, a quick recovery and very important, allows for a conservative treatment, especially in premenopausal women who desire a pregnancy. The risk of postoperative complication can be minimized by using an endobag for operative specimen retrieval in order to prevent a intraperitoneal spillage of cyst content.

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