

Laparoscopic treatment of ovarian dermoid cysts

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Summary

Dermoid cysts are the most common germ cell tumors of the ovary in women of reproductive age. We report 67 cases of patients with dermoid cysts (mean age, 31.31 years) originating from the ovary treated from 1994 to 2006 at the Obstetrics and Gynecology Department of Aschaffenburg Hospital-Clinic in Germany. Most patients (60) underwent cyst removal. In two patients salpingo-oophorectomy was performed and in five partial oophorectomy was performed. Additional surgery ensuing laparotomy was never necessary. None of the patients had long-term postoperative complications. Two patients were at nine and 15 weeks of gestation and postoperatively were well following termination of pregnancy. In a group of 43 women, who desired pregnancy, 37 pregnancies resulted. The overall intrauterine pregnancy rate was 83.7%; one patient had an ectopic pregnancy (2.32%). To receive more information on this disease, treatment should be performed according to international protocols.

Key words: Dermoid cyst; Surgical; Postoperative treatment; Follow-up.

Introduction

Mature cystic teratomas (dermoid cysts), which arise from the germinal cells of the ovary, are one of the most common germ cell tumors in women. Ovarian cystic teratomas are the most common (95%) germ cell neoplasms. Germ cell tumors make up 15% to 20% of all ovarian tumors whereas dermoid cysts account for 21.8% of all ovarian tumors [1]. Teratomas comprise a number of histologic types of tumors, all of which contain mature or immature tissues of germ cell (pluripotential) origin. Benign or mature cystic teratomas (MCT), also known as dermoid cysts, are composed of mature tissues which can contain elements of all three germ cell layers. Typically they contain mature tissues of ectodermal (skin, brain), mesodermal (muscle, fat), and endodermal (mucinous or ciliated epithelium) origin. In monodermal teratomas, one of these tissue types (e.g., thyroid tissue in struma ovarii, neuroectodermal tissue in carcinoid tumor) predominates. Benign ovarian tumors affect all age groups, while malignant tumors are more frequent among elderly women [2]. Dermoid cysts are recognized as one of the most common tumors in women during the reproductive years [3]. The period of maximum incidence of these tumors is between 30 and 40 years of age [4, 5]. In approximately 10-15% of cases, the tumors present on both sides [6]. Several primordials can appear in one single ovary. Benign cystic teratomas are the most frequent ovarian tumors discovered during pregnancy (24-40%) [7]. Ninety-nine percent of teratomas are benign malignant transformations which occur in approximately 1% of cases [8-10]. Squamous cell carcinoma is the most

commonly associated malignancy, though any constituent can undergo malignant change giving rise to a variety of tumors [8, 11]. Adenocarcinoma and the carcinoid form are much less frequent [12]. The tumors often grow slowly and cause minimal symptoms until very large, or there are complications as dermoid cysts. Usually dermoid cysts are slow-growing, even in premenopausal women. They are usually asymptomatic until they reach considerable size. The clinical course of dermoid cysts of the ovary is asymptomatic, and torsion or spontaneous rupture (followed by acute chemical peritonitis) only occurs in 16% and 3-7% of patients, respectively [13]. Diagnosis is based on clinical examination and ultrasonographic indications, confirmed by radiological evidence of solid cystic residues in the ovaries [14]. Ovarian dermoid cysts are relatively frequent ovarian lesions that can be easily diagnosed by transvaginal ultrasonography. Endovaginal ultrasound with Doppler enhancement is the best imaging technique to establish the nature of cysts and to distinguish cysts suspicious for malignancy which require more invasive investigation. MRI and endovaginal sonograms appear to be useful tools in the preoperative selection for this surgery. Tumor markers are definitely indicated for postmenopausal patients whereas they appear less useful in young patients. With adequate preoperative selection, both conservative and minimally invasive surgery can be applied with a clear benefit for the patient. Pelvic laparoscopy is the surgical approach of choice for the treatment of non-functional benign ovarian cysts. Dermoid cysts are benign tumors affecting young patients that can derive benefits from conservative and minimally invasive surgery. Conservative treatment to shell out the cyst and preserve functional ovarian tissue should be reserved for women desirous of future preg-

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nancies. The surgical management of germ cell tumors of the ovary is based on the premise of preserving fertility. Ovarian germ cell tumors occur in young women in whom fertility preservation is of great concern. In the recent years, transvaginal sonographic diagnosis of ovarian dermoid cysts together with the laparoscopic approach have greatly improved the treatment of this benign lesion. Cystectomies with preservation of the ovarian remnant should be the routine surgical treatment of benign cystic teratomas. Laparoscopic surgery has almost totally replaced laparotomy in the management of benign adnexal conditions. We retrospectively reviewed the outcome of laparoscopic surgery for ovarian dermoid cysts, complications, and postoperative follow-up.

Materials and Methods

The charts of 67 patients who underwent laparoscopic removal of dermoid cysts from March 1994 until October 2006 at the Department of Obstetrics and Gynecology of Aschaffenburg Hospital-Clinic in Germany were reviewed retrospectively. All the patients had preoperative CA-125 antigen evaluation and transvaginal sonography with Doppler assessment of the ovarian pathology. Transvaginal sonography was carried out by one of the investigators using a 5-6.5 MHz transducer. Reliability of the recordings was usually confirmed by a single trained clinician and in difficult cases a second opinion was sought from one of the consultants involved in the study. The sonographic characteristics as well as the expected histological diagnosis were evaluated preoperatively. An inhomogeneous mass with irregular hypoechoic and hyperechoic areas with posterior shadowing not separated by septa, or a homogeneous hyperechoic mass with a regular capsule and posterior shadowing was categorized as a typical dermoid cyst [15]. This diagnosis was compared with the histopathological diagnosis. All the women with tumors less than 12 cm in diameter qualified for laparoscopic management. Laparoscopy was conducted under general anesthesia. Peritoneal fluid from the pouch of Douglas and pelvic washing fluid were examined. In all cases, surgery was performed by puncture of the ovarian tumor followed by removal of the bulge of the cyst, in such a way as to avoid spillage of cyst fluid into the abdominal cavity. The abdominal cavity was abundantly flushed during the procedure and before closure. The cysts were aspirated to reduce spillage and removed via a laparoscopic salvage bag inserted in a 10-mm trocar. Salpingo-oophorectomy and partial oophorectomy were performed in two and five cases respectively, by using scissors and cautery during laparoscopy. The women undergoing salpingo-oophorectomy were postmenopausal while the other five who had partial oophorectomy were perimenopausal. Enucleation of the dermoids cysts in toto with preservation of the ovary was the set therapeutic goal for younger women in 60 cases. In ten cases (5 having partial oophorectomy and 5 with cystectomy) the wound in the ovary was closed with repair sutures, initially using PDS 4/0 and later on either PDS 2/0 or 4/0. After satisfactory hemostasis in 40 cases the ovarian bed was not sutured. Cephalosporine (1 g) was given intravenously as a prophylactic antibiotic in the operating room and repeated at 8-h intervals in three doses.

The size of the tumor, patient's age, gestational age at the time of surgery, pregnancy-rate, pregnancy outcome, duration of the operation, hospital stay, intra- and postoperative complications following a laparoscopic approach were evaluated.

Results

A total of 67 women with ovarian tumors were included consecutively and treated laparoscopically. The characteristics of patients are presented in Table 1. The mean age of patients was 31.31 years (± 6.99 ; range 15-44). Among the 67 patients, 51 were multiparous and 16 nulliparous.

Table 1. — *Characterics of patients.*

Age	Mean 31.31 years (\pm 6.99; range 15-44)	
Parity	51 multiparous, 16 nulliparous	
Previous laparotomy	22	
<i>Clinical symptoms</i>		
Asymptomatic	32	47.76%
Chronic pain	21	31.34%
Acute symptoms	14	20.89%
<i>Acute symptoms</i>		
Acute pain	10	71.44%
Vaginal bleeding	3	21.44%
Ovarian cyst torsion	1	7.12%

Twenty-two women had a history of previous laparotomy for various causes. Routine assay of CA-125 was normal (< 35 U/ml) in all patients, confirming that the ovarian tumors were benign. In all study women a preoperative diagnosis with the help of transvaginal ultrasonography was that of teratoma. The correlation of preoperative sonographic imaging and intraoperative macroscopic assessment was evaluated. Preoperative transvaginal sonography led to the correct laparoscopic diagnosis in 59 (88.05%) cases. In the remaining 12% of operated patients diagnosis of an ovarian tumor was made after the results of the intraoperative frozen section. The sonographic appearance of tumor size > 5 cm was observed in 58 (86.56%). Mean cyst diameter size was 9.24 cm (± 2.68 ; range 4.5-14.2). Thirty-two patients (48.1%) were asymptomatic. In these cases the cysts were discovered by chance during gynecological and/or ultrasonographic examination.

Twenty-one patients sought medical advice because of chronic pelvic pain (23.8% = 16 cases) or menstrual irregularity (7.4% = 5). Acute symptoms were the indication in 14 (20.89%). Clinical presentations were abdominal pain and frequent swelling in ten cases (71.44%), abnormal vaginal bleeding in three (21.44%), and ovarian torsion in one (7.12%).

Two patients (2/14 = 14.28%) presented acute symptoms and had their surgical intervention performed during the first and second trimester of pregnancy in the 9th and 15th week, respectively. The immediate postoperative course was uncomplicated. No miscarriages occurred. Postoperatively they seemed to do surprisingly well following termination of pregnancy.

Dermoid cyst enucleation was the most commonly applied procedure, while total salpingo-oophorectomy and partial oophorectomy were the least frequent. Tumors 10-12 cm in size were the most frequently torsioned. Patient age and size of cyst did not differ between those with left and right lesions.

Surgery included cystectomy (89.55%), total (2.98%) or partial oophorectomy (7.46%). In 60 cases there were cystectomies performed sparing fragments of healthy ovarian tissue, in two cases salpingo-oophorectomies and in five partial oophorectomies were carried out. The whole gonad was removed in two postmenopausal patients (2.98%) generally because of total loss of functional ovarian tissue surrounding the cyst. In five cases partial oophorectomies were performed because the cyst borders with the rest of the ovarian tissue were indistinct due to the infections that these women had mentioned in their history.

Dermoid cysts were bilateral in 4.6% of cases, and associated with cysts of other histotypes homolaterally in 5.1% and contralaterally in 11.7%. Associated cysts were of a functional nature (89.2%), endometriotic (4.5%), serous cystadenomas (5.3%), and mucinous cystadenoma (1%). Unilateral cysts occurred more frequently in the right ovary (52.8%) than in the left. The surgical parameters in our study patients are shown in Table 2. The mean duration of the operation was 53.48 min (± 20.61 ; range 35-120 min). Mean blood loss was 53.13 ml (± 23.84 ; range 22-110 ml). The total number of days in hospital excluding the period of preoperative examination (generally 1 day) was 2.54 days (± 1.02 ; range 1-4).

Table 2. — *Surgical parameters in women operated on for dermoid cysts by laparoscopy.*

Cyst diameter	Mean 9.24 cm (± 2.68 ; range 4.5-14.2)
Duration of the operation	Mean 53.48 (± 20.61 ; range 35-120)
Blood loss	Mean 53.13 (± 23.84 ; range 22-110)
Duration of hospital stay	Mean 2.54 days (± 1.02 ; range 1-4)
<i>Intraoperative complications</i>	
Injury of superior epigastric artery	2
Injury of inferior epigastric artery	2
<i>Postoperative complications</i>	
Temperature above 38°C	3
Wound infection in umbilicus	1

Cytological examination of the peritoneal fluid recovered from the Douglas cavity and presurgical wash-out with saline solution were negative for tumors.

All the extracted material was submitted for a prefinal histopathological examination frozen section at the time of surgery. The final histological diagnosis of mature ovarian cystic teratoma was received a few days postoperatively and confirmed in 100% of cases. All removed lesions histologically appeared as benign cystic ovarian teratomas without any signs of malignancy. During cyst extraction, minimal spillage occurred in 32.5% of the cases and none developed chemical peritonitis.

Postoperative complications included two cases of excessive bleeding from the extended incision, and one case of wound infection in the umbilicus. The two patients had an inferior epigastric artery injury during insertion of the 10-mm trocar in the right lower abdomen. The bleeding was controlled with bipolar coagulation. In these two cases we observed a drop in hemoglobin levels below 8 g%. In another two cases bleeding following injury of the superior epigastric artery in the left upper abdomen was controlled by suture ligation with

an emergency needle. No case of postoperative peritonitis was recorded. Postoperatively we found that the menstruation and fertility of post-enucleation patients were better than those who underwent salpingo-oophorectomy. During follow-up after laparoscopic treatment, we performed the following examinations on a 3, 6 and 12-month basis: CA125 level measurement and clinical examination by transvaginal sonography. Two years postoperatively study patients had no any clinical symptoms. Over a follow-up period of up to 24 months, ovarian folliculogenesis was confirmed ultrasonographically. During this period we did not find any recurrence of dermoid cysts in the treated or the contralateral ovary. Fourteen of the study patients have undergone a second-look laparoscopy for other clinical indications. Slight or mild adhesions were found only in seven (10.44%) of the treated ovaries. We could not detect any cysts in the treated ovaries or contralateral ones. In the group of 65 patients treated by conservative surgery (cystectomy or partial oophorectomy), 43 (64.17%) desired pregnancy, and 37 (86.04%) patients conceived spontaneously.

Our overall intrauterine pregnancy rate was 83.7% (36/43) in women aged from 19 to 34 years; one 37-year-old patient had an ectopic pregnancy (2.32%; 1/43). Thirty six-had intrauterine pregnancies and one patient had an ectopic pregnancy. All of the intrauterine pregnancies [36] went to term and no fetal abnormalities or other problems were reported.

Discussion

Laparoscopic removal of dermoid cysts has increased in the last few years [16]. Clinical studies in large patient populations show that most ovarian masses can be successfully treated by laparoscopy [17]. However, proper early qualification, based on medical history, gynecological and sonographic examination is of great importance. The risk of unexpected malignancy of the masses is reduced by accurate presurgical staging and an absence of spillage in expert hands [18, 19]. The reliability of transvaginal ultrasonographic diagnosis associated with negative CA125 and clinical oncological examination provide a highly certain diagnosis of benign ovarian swelling and hence dermoid cysts [20-22]. However serum CA125 concentrations are an unreliable indicator of malignancy, producing high rates of false-positive and false-negative results [23]. Benacerraf *et al.* reported a 15% failure rate in the ultrasonographic diagnosis of malignant cysts [24]. Miaman *et. al* confirmed that in fact 31% of malignant tumors in their sample had similar features to benign ones [25]. Malignancy is rare and malignant transformation of an originally benign teratoma, which occurs mostly only in women in postmenopause, occurs even less often [26]. Each dermoid cyst, in which there is possible malignant potential, should be totally removed according to the standards set in oncosurgery taking care to avoid rupture [27-29]. Dermoid cysts are characterized by continuous growth. Due to this and possible complications, namely rupture, torsion, infection,

malignancy or malignant degeneration, respectively, dermoid cysts should be surgically removed. It bears some disadvantages. The standard practice is to avoid spillage of the cystic content. Spillage can be as high as 80% in laparoscopic procedures [29]. In our experience, spillage occurred in 32.5% of the laparoscopic procedures. Contents of dermoid cysts cause chemical peritonitis. A review of the literature reveals a 0.2% incidence of chemical peritonitis following laparoscopic removal of dermoid cysts [30]. It is obligatory to undertake extensive rinsing of the abdominal cavity with sodium chloride solution at body temperature until no fatty particles can be detected in the lavage [31]. Only in a few cases has bacterial peritonitis been reported following treatment for dermoid cysts during laparoscopy [31, 32]. To avoid this complication, it is important to not allow the cyst contents to spread from the lower pelvis to the intestinal loop with the aid of a salvage bag. Following extirpation of dermoid cysts the adhesion rate versus no adhesions on the adnexes in second-look laparoscopies has been variously reported [33-37]. Some adhesions are inevitable because of the very large ovarian incision that is necessary to remove the cyst intact. Adhesions can impair reproductive function and cause postsurgical pain. The use of specific anti-adhesion agents, such as barrier methods, or as fluid ingredients reduce the frequency of this complication [38-40]. Dermoid cysts do not occur often during pregnancy, but their high-risk complications (torsion, rupture and malignancy) demand immediate surgical intervention [40, 41]. In the first trimester of pregnancy, ovarian cysts are often functional without complications. After 16 weeks of gestation, frequency of ovarian cysts has been reported between 0.5-3.0% [42]. Approximately 2-5% of ovarian tumors in gravid women are malignant [43-47]. Immediate treatment of symptomatic masses permits conservative, fertility-preserving surgery and has no adverse effect on pregnancy outcome [48]. Tawa and White reported that the frequency of dermoid cysts surgically resected in gravid women was 21.1 and 40.3%, respectively [49, 50]. Laparoscopic management of dermoid cysts is a safe and beneficial method in selected patients when performed by an experienced laparoscopic surgeon. For the laparoscopic approach strict adherence to guidelines for selecting patients for preoperative clinical assessment and intraoperative management are obligatory. In approximately half of the non-malignant ovarian cysts, transvaginal ultrasound is capable of distinguishing between the different histopathological diagnoses of non-malignant ovarian masses [51]. Women older than 40 years of age with uncertain ultrasonographic parameters and high tumor marker levels should be evaluated with great care. In these cases it is absolutely obligatory to perform a frozen section during the operation. When laparoscopy is not possible or inadvisable, laparotomy is still irreplaceable [52]. Where malignancy is suspected, laparoscopy is contraindicated and a median laparotomy is appropriate for radical extirpative surgery. Laparoscopy should be considered the method of choice for the removal of benign ovarian cystic teratomas as it offers the advantages of

fewer postoperative adhesions, shorter hospital stay, and better cosmetic results in comparison to classical surgery. It should be performed by surgeons with considerable experience in advanced laparoscopic surgery. Laparoscopy is a safe approach to adnexal masses and may decrease the rate of unnecessary laparotomies for benign cysts, which give no suspicious ultrasonographic signs [53]. Our evaluation of laparoscopic surgery showed that removal of the enucleated cyst from the abdominal cavity using a plastic bag is advantageous in terms of operating time and postoperative complications as well as in cosmetic results compared to extraction of the cyst through an extended abdominal incision. In most cases we have successfully dissected all ovarian cysts without breakage and preserved the ovary with a reproducible laparoscopic technique. Whether the ovary needs to be closed after cystectomy is controversial. After laparoscopy the ovary was left open to allow healing by secondary intention. According to some authors ovarian closure is unnecessary after laparoscopic cystectomy for cystadenomas and dermoid cysts because the postoperative adhesion rate appears to be minimal [54-57]. Suturing of ovarian tissue may increase adhesion formation [58]. However, this opinion is controversial for endometriotic cysts [58-60]. Laparoscopic cystectomy is effective in treating large endometriomas. However, operative difficulties may be encountered, explaining persistent endometriomas and postoperative adhesions [61]. Important surgical and postoperative complications were not observed. The fertility following laparoscopic treatment of adnexal cysts appears to be normal. In our patients the pregnancy rate was 86.04%. According to other authors the overall pregnancy rate is high (64.46% - 94.6%) [62, 63]. Sergent *et al.* reported that the discovery of an ovarian cyst has become relatively common in the beginning of pregnancy. After 16 weeks of pregnancy, organic cysts are the most frequent, mainly dermoid cysts. Their prevalence is estimated between 0.5 and 2 per thousand of pregnancies [64]. The ideal period for scheduled surgery is probably the beginning of the second trimester and the rate of abortion is minimized. The rate of complications (rupture, torsion, obstruction of labor) resulting from dermoid cysts in pregnant women can be as high as 22%. Removal by laparoscopy has been reported as being safe and free of obstetric complications [65]. We conclude that laparoscopic dermoid cyst enucleation was the most commonly applied procedure. Salpingo-oophorectomy or partial oophorectomy is the safest treatment for dermoid cysts, however it is justified only in women in perimenopause or postmenopause, respectively. We suggest this surgical procedure for women in reproductive age only when malignancy is suspected.

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