

# Laparoscopic Excision of Ovarian Dermoid Cysts with Controlled Intraoperative Spillage

## Safety and Effectiveness

Gerardo Zanetta, M.D., Luisa Ferrari, M.D., Mario Mignini-Renzini, M.D., Michele Vignali, M.D., and Rubens Fadini, M.D.

**OBJECTIVE:** To compare the operative and postoperative course in patients undergoing laparoscopy for dermoid cyst to that observed in subjects with other types of ovarian masses and of patients undergoing laparotomy for teratomas.

**STUDY DESIGN:** Retrospective analysis. From 1994 to 1996, 49 women underwent laparoscopic cystectomy for dermoid cysts. The operative and postoperative course was compared to that of 190 patients undergoing operative laparoscopy for other adnexal masses and to that of 43 patients undergoing laparotomy for dermoid cysts from 1992 to 1996. The cysts were aspirated to reduce spillage and removed via a laparoscopic bag inserted in a 10-mm trocar. Culdotomy was never used. The abdominal cavity was abundantly flushed during the procedure and before closure.

**RESULTS:** Dermoid cystectomy was successfully performed laparoscopically in 47 of 49 cases. Spillage occurred in 43 cases (88%), and postoperative fever occurred in 3 (6.1%). No case of peritonitis was recorded. Significant differences between laparoscopy and laparotomy were observed in the rate of bilaterality (4% vs.

25%), spillage (88% vs. 9%) and mean hospital stay (37 vs. 83 hours). When laparoscopic excision of dermoid

cysts and other masses was compared, we did not observe any significant difference in operative time or complication rates, apart from transient fever.

**CONCLUSION:** Laparoscopy is safe and effective for dermoid cysts and allows

shorter hospitalization than laparotomy. As observed for other benign cysts, laparoscopy should become the technique of choice for the removal of most, if not all, ovarian dermoid cysts. (J Reprod Med 1999;44:815-820)

**Keywords:** ovarian cysts, dermoid cyst, laparoscopic surgical procedures.

### Introduction

Mature cystic teratomas represent 5-25% of all ovarian tumors.<sup>1</sup> These tumors are often diagnosed in young subjects and may interfere with fertility, cause adnexal torsion<sup>1,2</sup> and rupture, causing acute peritonitis. Malignant transformation is rare but occurs in 1-3% of all cases.<sup>1-3</sup>

**Laparoscopy should probably become the technique of choice for the removal of most, if not all, ovarian dermoid cysts.**

From the Department of Obstetrics and Gynecology, San Gerardo Hospital, Monza Branch, University of Milan, Monza, Italy.

Drs. Zanetta, Mignini-Renzini, Vignali and Fadini are Consultants.

Dr. Ferrari is Resident.

Address reprint requests to: Gerardo Zanetta, M.D., Department of Obstetrics and Gynecology, San Gerardo Hospital, Via Solferino 16, 20052 Monza, Italy.

**Financial Disclosure:** The authors have no connection to any companies or products mentioned in this article.

In the last decade, advances in laparoscopic surgery have made technically possible the removal of most benign ovarian masses<sup>4-6</sup> that previously required laparotomy.

Laparoscopic surgery is less invasive, reduces hospitalization and recovery time and is usually more favorably accepted by young subjects due to its better aesthetic results. Detractors of this technique underline the high costs due to the instruments and the longer operating time required for laparoscopic cystectomy, but other authors claim that operative laparoscopy should replace laparotomy in the management of benign ovarian masses.<sup>7</sup>

Laparoscopic removal of dermoid tumors was initially regarded with suspicion due to the presumed risks of acute peritonitis in case of spillage. In a previous study we observed that aspiration of dermoid cysts may cause pain in the short term in a significant proportion of patients due to the spillage of irritating sebaceous contents.<sup>8</sup>

Some authors have described scattered cases of acute complications after laparoscopic removal of dermoid cysts.<sup>9,10</sup> Other authors have provided evidence that laparoscopic removal of these tumors is feasible, with little if any risk of postoperative peritonitis.<sup>11-20</sup>

### **Materials and Methods**

From June 1994 to December 1996, 239 operative laparoscopies for adnexal masses in subjects aged < 45 years were performed at our department. Subjects aged > 45 years were not eligible for laparoscopic removal of masses because of the increased risk of malignancy and because we usually advise removal of the uterus and contralateral adnexum in perimenopausal women with an adnexal mass.

All procedures were performed by the authors. All had previous experience with diagnostic laparoscopy or had some training in operative laparoscopy. Nevertheless, in all respects this study describes the learning curve of the surgeons in our department.

All patients were required to undergo transvaginal ultrasound before laparoscopy in order to reduce to a minimum the risk of operating on malignant tumors and to allow an accurate preoperative diagnosis of the mass. The criteria for preoperative diagnosis of the adnexal masses were those described by Sassone et al.<sup>21</sup> Morphologic and color Doppler criteria for the preoperative diagnosis of malignant and borderline tumors were also followed.<sup>22</sup>

All patients were admitted to the hospital the evening before surgery. Laparoscopy was performed late in the morning or in the afternoon. The planned hospital stay was approximately 24 hours after the procedure.

Fifty-one dermoid cysts were diagnosed in 49 women, accounting for 18% of all masses excised and for 20% of all cases treated laparoscopically. Diagnosis of the mass had occurred during clinical examination in 31 subjects and during ultrasound examination in 18 cases.

The aim of the laparoscopic procedure was performing a cystectomy, with preservation of the ovary. Only in cases of complications or technical difficulty was oophorectomy considered. In most cases a three-port technique was utilized, with the scope inserted via an umbilical incision and the other instruments inserted via two incisions located approximately 2 cm medially and 1 cm superiorly to the anterior iliac spine. In some cases, particularly in the last part of the study, a four-port technique was used, with creation of a suprapubic port.

Laparoscopic cystectomy was performed by first enucleating and separating the cyst from the ovarian tissue. This was achieved by a combination of sharp and blunt dissection. Hydrodissection was rarely used. Suspicious areas were biopsied for frozen section.

A suction irrigator was used to deflate the cyst and reduce spillage. As this procedure was difficult in most cases, the abdominal cavity was abundantly flushed with normal saline solution during the procedure and before closure. The cyst was always removed by means of a laparoscopic bag inserted in a 10-mm trocar. Hemostasis was achieved by means of monopolar or bipolar coagulation. Suturing of the ovary was not needed, and the ovarian defect was left open. At the end of the procedure the pelvis and whole abdominal cavity were inspected and flushed to remove possible debris. During this cleaning, the patient was moved from the Trendelenburg to an anti-Trendelenburg position to further reduce the risk of subdiaphragmatic accumulation of fluid and debris. Culdotomy for removal of the mass was not needed. The patient profile, symptoms, and operative and postoperative course were recorded. For comparison, a similar number of patients with dermoid cysts, aged 45 years or less, who underwent removal of the dermoid through laparotomy in the four years immediately before or during the study interval, was identified.

For cases undergoing laparotomy, a transverse

incision was always employed. Sharp incision of the ovarian tissue was performed with a knife. A large, wet sponge was placed around the mass to avoid spillage of fluid in the peritoneal cavity. 5-0 Polyglycolic acid sutures were used for approximation of the ovary.

Follow-up laparoscopy was not used. All subjects (either after laparoscopy or laparotomy) underwent transvaginal ultrasound three months after surgery to detect possible persistence of dermoid cysts. After this first scan, further investigations were considered only for abnormal findings at pelvic examination or in cases of symptoms.

Statistical comparison was done using the  $\chi^2$  test for cross-tabulation data and two-way analysis of variance for quantitative data.

### Results

We reviewed the histories of 92 subjects with dermoid cysts. The first 43 underwent laparotomy removal from 1992 to 1996. The last 49 underwent laparoscopic removal from 1994 to 1996. Additionally, we reviewed the histories of 190 women with other adnexal masses who underwent laparoscopic removal of the mass in the same study interval. Until 1994, the unavailability of operative laparoscopy in our department left no choice about the surgical approach to adnexal masses. In 1994, instrumentation for operative laparoscopy became available, and the choice between laparoscopy and laparotomy was left to the referring physician and patient.

Among the subjects with dermoid cysts sched-

uled for laparoscopic removal, the procedure was successfully performed laparoscopically in 47 cases. In one subject, laparotomy was needed due to a complication (accidental incision of the external iliac artery). This patient underwent immediate repair through laparotomy. With the exception of this case (blood loss of 1,000 mL), all subjects had blood loss of < 100 mL. Another woman had conversion of laparoscopy to laparotomy because of technical difficulties.

Spillage of dermoid cyst contents to a varying extent occurred in all but six cases (88%) during laparoscopy, whereas it occurred only in four cases during laparotomy (9.3%). Postoperative fever (> 38°C for > 24 hours, requiring antibiotics) was recorded in three cases (6.1%). One patient with a dermoid cyst in the laparoscopy group underwent a laparotomy four days after the primary procedure due to identification of a bladder wall lesion.

Table I shows a comparison of the main characteristics of patients, masses and clinical courses from cases treated with laparotomy or laparoscopy for dermoid cysts. The two groups were comparable in terms of mean age, mean diameter of the mass, mean operating time and mean blood loss. Statistically significant differences were observed in the rate of bilaterality, incidence of spillage and mean hospital stay.

Table II shows a comparison of the postoperative course of patients with dermoid cysts and those with masses other than such cysts treated laparoscopically in the same study period.

**Table I** Comparison of Main Characteristics of Patients, Masses and Clinical Courses from Cases Treated with Laparotomy or Laparoscopically for Dermoid Cysts

Characteristic	Laparotomy	Laparoscopy	P
No. of patients	43	49	
Bilateral (%)	11 (25.5)	2 (4%)	.003
Mean diameter (cm) (range)	7.1 (3-20)	6.8 (3-15)	NS
Mean hospital stay (h) (range)	83.3 (72-144)	37.7 (24-96)	.01
Blood loss > 100 mL	2	1	NS
Spillage (%)	4 (9.3)	43 (87.7)	< .001
Oophorectomy (%)	2 (4.6)	1 (2)	NS
Immediate major complications	0	1 <sup>a</sup>	NA
Ultrasound-documented persistence at 3 mo	0	2 (4%)	NA
Mean operative time (min) (range)	90.9 (45-145)	86.7 (40-130)	NS
Postoperative fever	3	3	NS
Mean body mass index (range)	25 (19-30)	25 (20-28)	NS
Prior pelvic surgery	5	3	NA

<sup>a</sup>One patient with external artery injury.  
NA = not assessable.

**Table II** Comparison of Postoperative Course in Patients with Dermoid Cysts and Those with Other Masses

Variable	Patients with		P
	Dermoid cysts	Other masses	
No. of patients	49	190	
Mean age (yr)	29.3 (13-44)	30.7 (9-44)	NS
Mean hospital stay (h) (range)	37.7 (24-96)	39.3 (24-120)	NS
Fever > 38°C requiring antibiotics (%)	3 (6.1)	3 (1.5)	.07
Conversion to laparotomy (%)	2 (4)	4 (2.1)	NS
Need for postoperative reexploration (%)	1 (2)	0	NA
Blood loss > 100 mL	1	1	NS
Mean operating time (min) (range)	86.7 (40-130)	92.4 (35-240)	NS
Minor complications			
Subcutaneous hematoma	2	1	
Cystitis	2	1	
Subcutaneous emphysema	1	1	

NA = not assessable.

### Discussion

Laparoscopy for removal of adnexal masses is gaining popularity among gynecologists. Although this technique may not be regarded as risk free, the overwhelming majority of patients enjoy prompt recovery and better aesthetic results, with cure rates comparable to those after laparotomy.

The eligibility of dermoid cysts for laparoscopic removal has been a matter of discussion due to previous reports of peritoneal granulomatosis after spillage of sebaceous material in the peritoneal cavity. However, if one carefully reads the reports on peritoneal granulomatosis, most of them consider patients with unrecognized spontaneous spillage who were treated several days or weeks after the rupture,<sup>23,24</sup> and we are only aware of four well-documented cases of specific complications after laparoscopy. One was a case report in the English-language literature,<sup>9</sup> the second was a case report in the French literature,<sup>10</sup> and the last two cases occurred in a large study population.<sup>20</sup>

Some authors have recently documented that laparoscopic excision of dermoid cysts with controlled intraoperative spillage was not associated with postoperative morbidity or peritonitis.<sup>13,16</sup>

In our experience, spillage of some sebaceous contents was almost universal (although care was taken to keep it to a minimum), and in a few cases it was massive. Nevertheless, none of our patients complained of significant pain after surgery.

In agreement with previous reports, we think that vigorous irrigation of the peritoneal cavity (not less than 2 L) with saline solution, combined with positioning of the patient in the anti-Trendelenburg

position by the end of the procedure, minimizes the risk of chemical peritonitis.

In a recent study, Fiedler et al reported on their experience in a rabbit model.<sup>25</sup> Their objective was to determine whether peritoneal exposure to dermoid cyst material produces inflammation above control levels and whether saline lavage reduces the degree of peritoneal reaction. They concluded that dermoid cyst material produces significant peritonitis but that saline lavage brings inflammation and adhesion formation close to control levels.

We recorded an increased rate of fever requiring antibiotics (6.1% with dermoid cysts versus 1.5% with other cysts), and this might be due to some degree of peritoneal reaction to spillage. Nevertheless, none of our patients developed peritonitis or an abscess, and the mean time of hospitalization was identical to that observed with other cysts.

In our retrospective comparison of laparoscopy and laparotomy, we noticed that no significant difference existed in terms of body mass index or previous operations. The only relevant difference was the rate of bilaterality. It seems clear that when no other option was available for treatment, several women accepted surgical management of their dermoid cysts only when both ovaries were involved. With the availability of laparoscopy, more subjects agreed to undergo an operation even when only one ovary was involved.

With minimal follow-up of three months for all patients, we observed a persistence rate of 4% (two cases). The limited number of cases does not allow any definitive conclusion about the superiority of laparotomy or laparoscopy; however, we believe

Table III Published Experience with Laparoscopic Removal of Ovarian Dermoid Cysts

Year	Author	No. of patients	Procedure (no.)		Operative time (min)		Recurrences (%)	Complications		Blood loss > 100 mL
			Ovariectomy	Cystectomy	Mean	Range		Specific <sup>a</sup>	Non-specific	
1989	Nezhat <sup>11</sup>	9	—	9	NA	45-110	—	—	—	NA
1992	Bollen <sup>19</sup>	14	—	14	115'	75-175	0	—	—	NA
1992	Reich <sup>12</sup>	25	9	16	172'	75-300	0	—	1	NA
1994	Chapron <sup>14</sup>	56	8	48	103'	NA	4	—	—	NA
1994	Albini <sup>15</sup>	19	8	11	NA	NA	NA	—	1	NA
1995	Hessani <sup>16</sup>	12	—	12	NA	80-190	NA	—	—	NA
1995	Lin <sup>13</sup>	29	—	29	73'	NA	NA	—	—	2
1996	Nitke <sup>17</sup>	18	—	18	93'	70-150	NA	—	—	NA
1996	Teng <sup>18</sup>	44	15	29	107'	NA	NA	—	4	11
1997	Yuen <sup>7</sup>	17	11	6	NA	NA	NA	NA	NA	NA
1997	Canis <sup>20</sup>	221	NA	NA	NA	NA	NA	2	NA	NA
1998	Present study	49	—	49	87	40-130	4	—	2	1

<sup>a</sup>Peritonitis.

NA = not available.

that a laparoscopic approach to dermoid cysts cannot be criticized based on these results.

No life-threatening complication was recorded. Even in cases of spillage of cystic contents, the risk of peritonitis and fistulas appears minimal when the peritoneal cavity is abundantly flushed with saline solution and the patient is moved from the Trendelenburg to an anti-Trendelenburg position. The mean operating time was similar to that recorded with laparotomy for similar masses and with laparoscopy for other adnexal masses. This may be due, at least partially, to our common policy of performing an appendectomy in cases of laparotomy and to the higher percent of bilaterality in the laparotomy group. The hospitalization time was significantly shorter than for patients with dermoid cysts treated with laparotomy and was comparable to that required for the laparoscopic removal of other adnexal masses. Other authors have reported shorter hospitalization after laparoscopic removal of adnexal masses. These differences seem due mainly to different policies in the national health care systems rather than to differences in morbidity.

Table III summarizes the English-language literature on laparoscopic management of dermoid cysts, with the exclusion of case reports. In all, 488 cases are reported, and 2 cases of complications specifically attributable to spillage of cystic contents was reported (0.4%). Additionally, we are aware of case reports by Keil<sup>9</sup> and Huss.<sup>10</sup>

The published study populations regarding laparoscopic removal of dermoid cysts have been extremely heterogeneous and the methods followed

for removal of the cysts often difficult to compare. Some early studies recommended avoiding spillage,<sup>11,12,19</sup> other authors reported that spillage was unavoidable in approximately 50% of cases,<sup>14</sup> and others simply stated that spillage of cyst contents occurred in all cases and was managed by copious lavage with saline solution.<sup>13,16</sup>

Some authors have developed additional techniques for removal of an intact cyst. In particular, the use of colpotomy has been proposed.<sup>11,12,18</sup> In view of the very low risk of complications due to spillage, the use of colpotomy is of limited value as it simply adds to surgical time and may increase the complication rate. All the authors who proposed the use of a colpotomy actually reported some cases of spillage, and the incidence of spillage increased with the size of the mass; therefore, the cost-effectiveness of this additional procedure seems limited. Additionally, the maneuvers for culdotomy may cause cervical lacerations with significant bleeding.<sup>18</sup> Finally, as underlined by Teng et al,<sup>18</sup> the opening of the vagina turns the procedure into a "clean-contaminated" one, with attendant risks.

Despite differences in the selection of patients and in surgical technique, all authors agree about the safety and effectiveness of laparoscopic removal of dermoid cysts.

We conclude that laparoscopy is a safe and effective approach to dermoid cysts. This technique allows removal of the cysts with a low rate of persistence and an acceptable rate of complications. Spillage should be kept to a minimum, and different techniques may be used (transparietal cystecto-

my, intraperitoneal cystectomy with or without puncture), but culdotomy for removal of the specimen does not seem necessary. Irrespective of different national standards and of different health care systems, laparoscopy allows shorter hospitalization and more-prompt recovery. As observed for other types of benign cysts, laparoscopy should probably become the technique of choice for the removal of most, if not all, ovarian dermoid cysts.

### References

- Peterson WF, Prevost EC, Edmunds FT, et al: Benign cystic teratomas of the ovary: A clinico-statistical study of 1007 cases with review of the literature. *Am J Obstet Gynecol* 1955;70:368-375
- Pantoja E, Noy MA, Axtmayer RW, et al: Ovarian dermoids and their complications: Comprehensive historical review. *Obstet Gynecol Surv* 1975;30:1-20
- Climie AR, Heath LP: Malignant degeneration of benign cystic teratoma of the ovary: Review of the literature and report of a chondrosarcoma and a carcinoid tumor. *Cancer* 1968;22:824-832
- Nezhat F, Nezhat C, Welander C: Four ovarian cancer diagnoses during laparoscopic management of 1011 women with adnexal masses. *Am J Obstet Gynecol* 1992;167:90-95
- Childers JM, Surwit EA: Current status of operative laparoscopy in gynecologic oncology. *Oncology* 1993;7:47-51
- Parker WH: The case for laparoscopic management of the adnexal mass. *Clin Obstet Gynecol* 1995;38:362-369
- Yuen PM, Yu KM, Yip SK, et al: A randomized prospective study of laparoscopy and laparotomy in the management of benign ovarian masses. *Am J Obstet Gynecol* 1997;177:109-114
- Zanetta G, Trio D, Lissoni A: Early and short-term complications after US-guided puncture of gynecologic lesions: Evaluation after 1000 consecutive cases. *Radiology* 1993;189:161-164
- Keil KH, Julian TM: Trichouria, pneumaturia, urosepsis and bowel fistulization after pelviscopic cystectomy of a mature ovarian teratoma. *J Gynecol Surg* 1993;9:235-239
- Huss M, Lafay-Pillet MC, Lecuru F, et al: Peritonite granulomateuse après traitement coeliochirurgical d'une kiste dermoïde de l'ovaire: Diagnostic, prise en charge, prévention à propos d'un cas. *J Gynecol Obstet Biol Reprod* 1996;25:365-372
- Nezhat C, Winer WK, Nezhat F: Laparoscopic removal of dermoid cysts. *Obstet Gynecol* 1989;73:278-281
- Reich H, McGlynn F, Sekel F, et al: Laparoscopic management of ovarian dermoid cysts. *J Reprod Med* 1992;37:640-644
- Lin P, Falcone T, Tulandi T: Excision of ovarian dermoid cyst by laparoscopy and by laparotomy. *Am J Obstet Gynecol* 1995;173:769-771
- Chapron C, Dubuisson JB, Samouh N, et al: Treatment of ovarian dermoid cysts: Place and modalities of operative laparoscopy. *Surg Endosc* 1994;8:1092-1095
- Albini SM, Benadiva CA, Haverly K, et al: Management of benign ovarian cystic teratomas: Laparoscopy compared with laparotomy. *J Am Assoc Gynecol Laparosc* 1994;1:219-222
- Hessami SH, Kohanim B, Grazi RV: Laparoscopic excision of benign dermoid cysts with controlled intraoperative spillage. *J Am Assoc Gynecol Laparosc* 1995;2:479-481
- Nitke S, Goldman GA, Fisch B, et al: The management of dermoid cysts: A comparative study of laparoscopy and laparotomy. *Isr J Med Sci* 1996;32:1177-1179
- Teng FY, Muzsnai D, Perez R, et al: A comparative study of laparoscopy and colpotomy for the removal of ovarian dermoid cysts. *Obstet Gynecol* 1996;87:1009-1013
- Bollen N, Camus M, Tournaye H, et al: Laparoscopic removal of benign mature teratoma. *Hum Reprod* 1992;7:1429-1432
- Canis M, Candiani M, Giambelli F, et al: Laparoscopic management of ovarian teratoma. *Int J Gynaecol Obstet* 1997;2:47-53
- Sassone AM, Timor Tritsch IE, Artner A, et al: Transvaginal sonographic characterization of ovarian disease: Evaluation of a new scoring system to predict ovarian malignancy. *Obstet Gynecol* 1991;78:70-76
- Zanetta G, Lissoni A, Cha S, et al: Preoperative morphological and colour Doppler features of borderline tumours. *Brit J Obstet Gynaecol* 1995;102:990-996
- Ranney B: Iatrogenic spillage from benign cystic teratoma causing severe peritoneal granulomas and adhesions. *Obstet Gynecol* 1970;35:562-564
- Waxman M, Boyce JG: Intraperitoneal rupture of benign cystic ovarian teratoma. *Obstet Gynecol (suppl)* 1976;48:9S-13S
- Fiedler EP, Guzick DS, Guido R, et al: Adhesion formation from release of dermoid contents in the peritoneal cavity and effect of copious lavage: A prospective randomized, blinded, controlled study in a rabbit model. *Fertil Steril* 1996;65:852-859