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Comparison of laparoscopy versus laparotomy for the surgical treatment of ovarian dermoid cysts

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Abstract To compare laparoscopy with laparotomy for the surgical management of ovarian dermoid cysts, a retrospective analysis of data of 108 patients who had surgery at our institution from January 1998 to August 2001 was performed. The surgical data of these patients were obtained from a computerized data base. The following data were abstracted: the patients' demographic features, size of dermoid cysts, spillage rate, estimated blood loss, operative times, duration of hospital stays, and intraoperative or postoperative complications. Statistical techniques included Student's *t*-tests, Fisher's exact tests, Mann-Whitney tests, and chi-square analysis. Of 108 patients with dermoid cysts, 53 (49.1%) underwent laparoscopy and 55 (50.9%) had laparotomy. The mean estimated blood loss was significantly less in laparoscopy (71.6 ± 63.5 ml) compared with laparotomy (119.2 ± 101.6 ml). Hospital stay was significantly shorter in the laparoscopy group (0.6 ± 0.8 days) compared with the laparotomy group (2.2 ± 1.0 days). Also, the postoperative complication rate was lower in the laparoscopy group (3.8%) compared with the laparotomy group (14.5%), but the difference did not reach statistical significance. Whereas the laparotomy group's spillage rate of 4.1% and operative time of 86.7 ± 39.6 min were significantly lower than the laparoscopy group's spillage rate of 31.4% and operative time of 118.4 ± 51.5 min, the laparoscopy group had less blood loss, shorter hospital stay, and fewer complications. The laparoscopic management of benign cystic teratomas can be safely performed.

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Introduction

Ovarian dermoid cysts (benign cystic teratomas) constitute 25% of all ovarian neoplasms [1], and 10–15% of them are bilateral [2, 3]. The majority of dermoid cysts are asymptomatic and are often found incidentally on pelvic exam or imaging studies, especially in the reproductive age group [2]. The potential for complications such as torsion, spontaneous rupture, risk of chemical peritonitis, and malignant transformation (approximately 1–3%) makes surgical treatment necessary upon diagnosis [1, 4–6]. Gross examination usually reveals a prominent cavity with sebaceous material, bones, hair, skin, and extremities. Histologic examination reveals only mature adult tissue [7].

Traditionally, cystectomy or oophorectomy by laparotomy has been the standard surgical approach. As the benefits of laparoscopy are well documented, the laparoscopic approach to dermoid management is gaining acceptance. The available literature with small case series has documented less discomfort, reduced hospital stay, faster recovery, lower economic costs, and improved cosmesis. The laparoscopic spillage rates vary from 48–88% in surgical settings [8–12]. The purpose of this study was to compare the operative course, postoperative course, and complications between laparoscopy and laparotomy in a larger patient population.

Materials and methods

Hospital records of all patients ($n = 250$) undergoing surgery for benign cystic teratomas at the University of Miami Jackson Memorial Hospital during the 44-month period between January 1998 and August 2001 were reviewed. The records were retrieved via a computer

search for pathologic diagnosis of benign cystic teratomas. Only those patients with a preoperative diagnosis of suspected dermoid cyst and without concomitant major gynecologic surgery were included in the study ($n = 108$). All surgeries were performed at one institution. The study was approved by the Institutional Review Board at the University of Miami.

Hospital charts were reviewed to obtain demographic data and to determine the preoperative evaluation, including admission diagnosis, preoperative imaging and laboratory results, and presenting chief complaints. Operative reports were reviewed for details of the procedure, including operative time (time of incision to wound closure), surgical complications, cyst size (ultrasound measurement), intraoperative spillage of ovarian contents (visual estimate quantified), method of specimen removal, and estimated blood loss. Hospital progress notes were reviewed for postoperative complications, length of stay, and readmissions. Data were abstracted onto a data collection form and then entered into a computer Excel file. This file was imported into Statistix (Analytical Software, Tallahassee, FL, USA) for statistical analyses.

After each laparoscopic patient underwent general anesthesia, three or four trocars were inserted: at the umbilicus (10/12 mm, Hasson cannula) and at two or three sites (5 mm; right lower quadrant, left lower quadrant, and suprapubic). Twenty-one percent of the patients required four trocars.

The 53 laparoscopy patients were divided into two categories: laparoscopic cystectomy ($n = 32$, 60.4%) and laparoscopic oophorectomy ($n = 21$, 39.4%). Laparoscopic cystectomy was performed by first enucleating and separating the cyst from the ovarian tissue. In all laparoscopic cases, the dermoid was placed in an impermeable bag, the Endopouch (Ethicon Endo-Surgery, Cincinnati, OH, USA), the Endo-catch (U.S. Surgical, Norwalk, CT, USA), or the Cook LapSac (Cook OB/GYN, Spencer, IN, USA). The dermoid was then removed through the larger port site, usually the umbilicus, by bringing the opening of the bag out through the port opening and draining the cyst while in the bagging device.

When spillage occurred, the peritoneal cavity was carefully lavaged with normal saline or lactated Ringer's until irrigation fluid was devoid of sebum material or hair (on average, 2–4 l). Both laparoscopic cystectomy and oophorectomy achieved hemostasis by coagulation (monopolar or bipolar), Harmonic Scalpel, endoloops, EndoGIA stapler, CO_2 laser, or a combination thereof. After cystectomy, the ovary was rendered hemostatic and wrapped in Interceed antiadhesive (Gynecare, Somerville, NJ, USA) and allowed to heal by secondary intention.

Laparotomy cystectomy or oophorectomy was performed routinely via a Pfannenstiel skin incision, and excision was done using electrocautery and sharp and blunt dissection. Conservative enucleation was performed, and sutures were placed to repair the ovarian crater. The specimen was sent to pathology for frozen section to rule out malignancy if there was any suspicion on gross examination during surgery.

Statistical methods

Statistical techniques included Student's *t*-tests for comparing the means of variables with normal or approximately normal distributions, Mann-Whitney tests for comparing variables with skewed distributions, Fisher's exact tests for analyzing 2×2-tables with small frequencies, and chi-square analyses for assessing the association between discrete variables. Results of tests with corresponding $P < 0.05$ were considered statistically significant. For continuous variables, values are reported throughout as mean ± SD.

Results

Between January 1998 and August 2001, 108 patients without concomitant major gynecologic surgery underwent laparotomy or laparoscopy for removal of ovarian dermoid cysts. Patients undergoing laparotomy were significantly younger ($P < 0.001$) than those undergoing laparoscopy (27.6 ± 8.65 years, range 7–46 vs. 33.5 ± 8.68 years, range 19–55). Forty-one percent of the women were nulliparous. Additional demographic and anthropometric characteristics are compared in Table 1.

Most of the women had sought medical advice because of chronic (68.5%) or acute pelvic pain (3.7%). In 22.2% of cases, the cysts were discovered serendipitously during ultrasound examination and/or by gynecological exam (Table 2). Approximately one-third of the patients voiced a secondary complaint.

Table 1 Characteristics of patients undergoing laparoscopy or laparotomy for the removal of ovarian dermoid cysts (*BMI* body mass index)

Characteristic	Statistic ($n = 53$)	Laparoscopy ($n = 55$)	Laparotomy	*P*-value
Age (years)	Mean ± SD	33.5 ± 7.7	27.6 ± 8.6	0.0003
Height (in)	Mean ± SD	64.2 ± 3.2	63.3 ± 3.7	0.1955
Weight (lbs)	Mean ± SD	160.3 ± 38.7	151.0 ± 43.7	0.2440
BMI	Mean ± SD	27.2 ± 5.4	26.1 ± 6.0	0.3062
Race				0.1904
Black	*n* (%)	20 (37.7)	21 (38.2)	
White	*n* (%)	6 (11.3)	13 (23.6)	
Hispanic	*n* (%)	27 (50.9)	21 (38.2)	

Table 2 Frequency distribution of mode of presentation for patients undergoing laparoscopy or laparotomy for the removal of ovarian dermoid cysts

Presentation	Overall *n* (%)	Laparoscopy *n* (%)	Laparotomy *n* (%)
Chronic pelvic pain (≥6 months)	74 (68.5)	34 (64.2)	40 (72.7)
Asymptomatic	24 (22.2)	15 (28.3)	9 (16.4)
Acute pelvic pain	4 (3.7)	2 (3.8)	2 (3.6)
Menometrorrhagia	3 (2.8)	1 (1.9)	2 (3.6)
Increased abdominal girth	2 (1.8)	1 (1.9)	1 (1.8)
Dyspareunia	1 (0.9)	0 (0.0)	1 (1.8)

Table 3 Clinical characteristics and clinical course of patients undergoing laparoscopy or laparotomy for the removal of ovarian dermoid cysts

Characteristic	Statistic $n = 53$	Laparoscopy $n = 55$	Laparotomy	*P*-value
Operating time (min)	Mean ± SD	118.4 ± 51.5	86.7 ± 39.6	
	Median (range)	114.0 (33.0–300.0)	76.0 (28.0–178.0)	0.0008
Blood loss (ml)	Mean ± SD	71.6 ± 63.4	119.8 ± 101.6	
	Median (range)	50.0 (10.0–350.0)	75.0 (20.0–400.0)	0.0015
Cyst diameter (cm)	Mean ± SD	6.5 ± 2.3	9.8 ± 6.0	
	Median (range)	6.0 (2.0–12.0)	8.0 (1.5–30.0)	0.0070
Hospital stay (days)	Mean ± SD	0.6 ± 0.8	2.2 ± 1.0	
	Median (range)	0.0 (0.0–3.0)	2.0 (0.0–5.0)	0.0000
Bilaterality	*n* (%)	5 (9.4)	10 (18.1)	0.1888
Spillage	*n* (%)	16 (31.4)	2 (4.1)	0.0004
Postoperative complications	*n* (%)	2 (3.8)	8(14.5)	0.0936
Prior abdominal surgery	*n* (%)	21 (40.4)	14 (25.5)	0.0999
Torsion	*n* (%)	2 (3.8)	9 (16.4)	0.0306

P-values for the continuous variables correspond to two-tailed Mann-Whitney tests
P-values for the discrete variables correspond to chi-square tests except for the one for postoperative complications, which corresponds to a two-tailed Fisher's exact test

As shown in Table 3, the mean cyst diameter was 9.75 ± 6.04 cm (range 1.5–30) for the laparotomy group and 6.52 ± 2.31 cm (range 2–12) for the laparoscopy group ($P = 0.007$). Dermoid cysts were bilateral in 13.9% of all cases. Spillage of dermoid contents occurred in 31.4% of cases with laparoscopy, whereas it occurred in only two cases during laparotomy (4.1%). The mean operating time was significantly higher ($P < 0.001$) for laparoscopy than for laparotomy (118 ± 51.4 min, range 33–300 vs. 87 ± 39.6 min, range 28–178). Mean blood loss for laparotomy was 119.2 ± 101.6 ml (range 20–400) compared with 71.6 ± 63.5 ml (range 10–350) for laparoscopy ($P = 0.002$).

The frequency distributions of intraoperative complications are shown in Table 4. They included uterine perforation with bleeding in two patients and an ileal enterotomy after lysis of adhesions and fistula repair. Postoperative complications included wound infections, cellulitis, incisional hernia, pyelonephritis, death, and fever requiring intravenous antibiotics. One obese patient in the laparotomy group with a 24-cm partially infarcted dermoid cyst died on postoperative day 1. Autopsy determined the cause of death to be cardiac arrhythmia. In the laparoscopy group, nine patients underwent conversion to laparotomy secondary to the size of the mass (44%) or to dense adhesions (56%). Nine out of 11 patients with acute pain had cyst torsion and underwent laparotomy.

However, after adjusting for cyst size, oophorectomy, and cystectomy, the surgical approach was found to be a significant predictor of spillage, with 66.7% of spillage

Table 4 Frequency distribution of intraoperative and postoperative complications for patients undergoing laparoscopy or laparotomy for the removal of ovarian dermoid cysts

Complication	Laparoscopy ($n = 53$)	Laparotomy ($n = 55$)	*P*-value
Intraoperative			
Uterine perforation	2 (3.8)	0 (0.0)	
Enterotomy	1 (1.9)	0 (0.0)	
Cystotomy	0 (0.0)	1 (1.8)	
Total	3 (5.7)	1 (1.8)	0.359
Postoperative			
Wound infection	1 (1.9)	4 (7.3)	
Urinary tract infection	0 (0.0)	1 (1.8)	
Febrile morbidity	0 (0.0)	2 (3.6)	
Hernia	1 (1.9)	0 (0.0)	
Death	0 (0.0)	1 (1.8)	
Total	2 (3.8%)	8 (14.5%)	0.094

P-values correspond to two-tailed Fisher's exact tests

Table 5 Frequency distribution of spillage based on surgical route

Surgical route	*n* (%)
Laparoscopic cystectomy	12 (66.7)
Laparoscopic oophorectomy	4 (27.2)
Laparotomy cystectomy	1 (5.6)
Laparotomy oophorectomy	1 (5.6)

occurring in the laparoscopic cystectomy group (Table 5). Although not statistically significant, there was an increasing trend of spillage relative to cyst size. In this study none of the patients had chemical peritonitis secondary to spillage of the dermoid cyst contents.

Discussion

The outcomes that differed when the laparoscopic approach to dermoid management was compared with laparotomy include length of surgery, blood loss, length of hospital stay, length of recovery, complications, and spillage rates.

Blood loss and hospital stay in the laparoscopy and laparotomy groups in our study are comparable to those reported by other investigators [13, 14]. Our spillage rates in the laparoscopy group were considerably lower than previously reported in the literature, although still significantly higher than in the laparotomy group. Clearly, the tasks of performing laparoscopic dermoid surgery involve three-dimensional targeting, ambidexterity, proper tissue handling, fine motor control, and spatial judgment in a two-dimensional environment [15] and are not translatable from the skills needed for laparotomy surgery [16].

Spillage of cyst contents has theoretical risks of chemical peritonitis and malignancy spread. However, no cases of malignancy spread have been reported in the literature to date [13], and numerous studies reveal that proper management of spillage does not lead to peritonitis [2, 14].

Exposure of the peritoneal cavity to dermoid material may be associated with significant inflammation and adhesion formation. The use of saline lavage to effect clearance of all visible dermoid material has been shown to bring inflammation and adhesion close to control levels [17].

The diagnosis of dermoid cyst can be made confidently by ultrasound, and because most of these cysts are benign, laparoscopy should be the surgery of choice in these patients due to the advantages of minimal blood loss, less postoperative pain, and shorter hospital stay. No data are currently available on the long-term effects of spillage of dermoid cyst contents into the peritoneal cavity. However, it will be interesting to determine whether spillage, especially hair, into the peritoneal cavity has any long-lasting effects.

In summary, laparoscopic management of dermoid cysts is a safe and beneficial procedure when performed by an experienced laparoscopic surgeon.

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