

# Laparoscopic management of ovarian dermoid cysts: potential fear of dermoid spill, myths and facts

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**Abstract** The objective of this study was to evaluate the safety and potential advantages of laparoscopic approach for management of ovarian dermoid cysts and challenge the potential fear of spillage of contents of dermoid cyst during laparoscopic surgery. Out of 384 operative laparoscopies conducted at Al Ebtesama Hospital, Unit of Advanced Laparoscopic Surgery, and Cairo University Hospital, during the period May 1999 to February 2005, 26 patients underwent laparoscopic removal of dermoid cysts. We employed the three-puncture technique: a 10-mm umbilical trocar for the telescope and two auxiliary 5-mm punctures for operative intervention. Thirty-one dermoid cysts with a mean diameter of 7.5 cm were removed successfully in 26 patients. The operative techniques employed were ovarian cystectomy for 28 cysts, salpingo-oophorectomy for three cysts, and one case had salpingo-oophorectomy together with laparoscopy-assisted vaginal hysterectomy (LAVH). In one case, we performed concomitant hysteroscopic excision

of complete uterine septum. Fourteen cysts were removed through enucleation and removal through the trocar sleeve. Ten cases were treated via enucleation and removal within impermeable endobag. Seven cases were managed by removal of cysts via posterior colpotomy; one was managed during LAVH. We encountered 14 spillages during the procedures: in ten cases (71%) of trocar removal without the use of endobag, in one case (10%) of removal within an impermeable endobag, and in three cases (42%) of colpotomy removal. After a review of 14 studies in the literature, added to our study, we found only 0.2% incidence of chemical peritonitis following laparoscopic removal of dermoid cysts. Laparoscopic approach allows proper exposure of the cul-de-sac and forceful jet lavage aspiration, ensuring pelvic clean out from any microscopic material of the dermoid cyst. Such a situation may not be available during open laparotomy.

**Keywords** Laparoscopy · Dermoid cyst · Ovarian cystectomy · Spillage

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## Introduction

Benign cystic teratoma, or commonly known as dermoid cysts, are basically germ-cell tumors of the ovary. Pathologically, they are enrolled under a group of benign, mature teratomas. They account for about 20–25% of all ovarian neoplasm and occur bilaterally in 10–15% of cases [1]. The prevalence of malignant transformation in dermoid cysts has been reported as 1–3%. [2, 3] Most dermoid cysts occur without significant clinical symptoms and are often discovered incidentally during pelvic examination or routine ultrasound. The potential for complications such as torsion, spontaneous rupture, risk of chemical peritonitis, and

malignancy usually makes surgical treatment quite necessary upon diagnosis [4].

Most operative textbooks describe classic treatment for dermoid cysts as ovarian cystectomy or oophorectomy through laparotomy, with utmost care necessary to avoid spillage of cyst contents. Although laparoscopic surgery has replaced many standard laparotomy techniques, many skeptical opinions remained about role of laparoscopic surgery for dermoid cyst removal. The potential fear of spillage of cyst material and possible development of chemical peritonitis imposed fears about adopting the laparoscopic approach [4, 9]. The phobia of spillage complications existed until recently challenged by many laparoscopists [4, 9]. Accordingly, the laparoscopic approach has become increasingly accepted and more commonly adopted since 1989 [4].

Because most patients with benign cystic teratoma are of reproductive age and wish to preserve fertility, a conservative approach is ideal to minimize postoperative adhesions and decrease the chances of compromised fertility [4]. Trained endoscopic surgeons became more confident in approaching dermoid cysts via the endoscopic route and reported satisfactory results and no complications [4, 16]. In our study, we evaluated the safety and efficacy of laparoscopic management of benign cystic teratoma, and we now present some guidelines and tips to improve results of surgery and avoid possible complications that may result from cyst spillage. We also demonstrate that the use of an endobag creates satisfactory and easy removal of cysts; however, removal without an impermeable bag gives the same safety and results if certain guidelines are followed.

## Subjects and methods

Our study included 26 patients with a diagnosis of unilateral or bilateral dermoid cysts. Cases were recruited among 384 operative laparoscopies conducted during the period May 1999 to February 2002. All patients had a preoperative evaluation, including transvaginal sonography and Doppler studies, to confirm the nature of the cysts. Conclusive confirmation for the cysts was confirmed by the pathological examination for the specimens removed in all cases. Patient charts were revised for demographic data, chief complaint, obstetric history, preoperative investigations, details of operative technique, method of cyst removal, cyst incidence of spillage, blood loss, operative time, postoperative complications, duration of hospital stay, postoperative complications, and pathology reports. All patients were counseled for the procedure, and informed consent was obtained to do laparoscopic management. All operations were conducted under general anesthesia with endotracheal intubation. We utilized the Karl Storz operative endoscope and camera (Tuttlingen, Germany). We used

an infraumbilical 10-mm trocar for the telescope and two 5-mm trocars for secondary punctures and operative instrumentation. Pneumoperitoneum was achieved using Storz laparoflator, and the bowels were retracted to the upper abdomen using a fan retractor. Then, diagnostic laparoscopic inspection was conducted thoroughly to evaluate the pelvis and upper abdomen. We strongly recommend against steep Trendelenburg's position to avoid any chance for migration of spilled material to the upper abdomen during surgery. This might be little awkward during surgery, but we compensate for this by proper bowel retraction and positioning of bowels to the upper abdomen using the fan retractor.

After we obtain clear view of the pelvis, we perform lysis of any existing adhesions to allow free mobilization and cyst dissection. In cases designed for ovarian cystectomy, we applied the rules recommended by Nezhat et al. [4]. We added some modifications from our side to facilitate surgery and add safety in case of spillage. A grasper forceps was used to apply traction on the ovarian ligament and steady the ovary. Combined uterine manipulation (Zummi uterine manipulator) plus grasping the ovarian ligament allows keeping the ovarian cyst steady during cystectomy. This was facilitated by squeezing the ovary between the body of uterus and the lateral pelvic wall to maintain steady and easily accessible dissection of the cyst.

First, a cleavage plane was created by diathermy spatula or Maryland's forceps. A plane was widened between the cyst capsule and stroma, and hydrodissection continued the enucleation steadily. Combined hydrodissection with blunt peeling of the capsule completed the job easily. We used the Shawki's cutting coagulation forceps (Karl Storz, Tuttlingen, Germany) for dissection and hemostasis. This has a multifunctional value, as its narrow tip allows precise dissection of the cyst capsule, and grasping and traction with its serrated edge was quite secure. The blade of the instrument allows monopolar coagulation of any bleeding points, and sharp scissors on the proximal end of the blade can be used for precise tissue incision. This saves time that may be consumed by exchanging instruments as well as stabilizing the pneumoperitoneum throughout surgery. Grasping the edges of the cyst and slow traction apart will remove the cyst capsule and deliver the dermoid out of its bed. Eventually, the cysts were enucleated easily, and hemostasis was performed for any bleeding spots encountered during dissection. Due to the thick nature of the dermoid cyst capsule, blunt dissection and peeling was quite easy, and risk of cyst puncture seldom occurred if proper tissue planes were maintained.

In case spillage occurred, we immediately resorted to vigorous jet-wash suction irrigation using warm Ringer's solution. We used two wide-bore suction irrigation cannulae simultaneously from both secondary puncture sites. This

ensured rapid and immediate clean up of spilled material and avoided any spread to the upper abdomen and contact with viscera. A copious amount of fluid was utilized—no less than 8–12 l (up to 24 bottles of half-liter solution). Additionally, avoiding Trendelenburg's position helped keep any spillage material confined and collected in the cul-de-sac, with no spread to upper abdomen. Indeed, suction irrigation consumed most of the surgery time, but we found it of paramount importance to achieve the goals of clean surgery and avoidance of chemical peritonitis. The evacuated cyst, together with its contents were shelled out from normal ovarian tissues and removed via the trocar sleeve. We had to replace the 5-mm trocar with a 10-mm one after dilatation of port of entry to facilitate tissue retrieval.

In the endobag group, we used Ethicon endobag (Ethicon, Somerville, NJ, USA) to contain the cysts prior to its aspiration or puncture. With this method, the cyst was placed in the impermeable bag and only then punctured and aspirated, being contained inside the protective bag. Any spillage material is securely contained inside the bag, which avoids any risk from spilled material. The deflated cyst within the endobag was extracted via the 10-mm trocar sleeve. In the last group, a posterior colpotomy was performed, with attention not to lose much of the pneumoperitoneum. The cyst or adnexa was easily delivered via the vagina.

After closure of the posterior colpotomy, pneumoperitoneum was resumed to allow complete and careful inspection of the surgery site. Homeostasis was performed using bipolar forceps, Shawki's multifunction forceps, or the roller-ball electrode designed by the author (Karl Storz, Germany). We did not place any sutures, and no attempt was made to approximate ovarian edges.

A golden rule that we adopt was continuous jet-wash irrigation with prompt suction throughout surgery, taking care to avoid any spread of fluid to the upper abdomen. This kept the pelvis crystal clear, and no microscopic residue from cyst material or contents were left in the pelvis. Additionally, copious fluid dilutes the irritant effect of dermoid cyst contents. No conversion to laparotomy occurred in any of the operations.

## Results

Twenty-six patients with diagnosis of benign cystic teratoma of the ovary (Dermoid cysts) underwent operative laparoscopic removal of dermoid cysts. The mean patient age was 31.7 (range 18–47 years), and mean parity was 2 (range 0–5). The chief complaint was pelvic pain in 13 patients, irregular menstrual cycles, and pain in four cases; seven cases were asymptomatic and discovered incidentally during routine ultrasound examination; and one case

presented with acute abdomen and torsion. One of the cases had a history of recurrent abortion and complete uterine septum on hystero-graphy. Two cases had previous surgery for ovarian cysts, but no documents were available to confirm the pathological nature of these removed cysts. These two cases were subjected to salpingo-oophorectomy as there was not enough residual ovarian tissue to preserve. Accordingly, we decided to remove the whole adnexa for convenience.

Twenty-five cases had unilateral cysts, whereas three had bilateral cysts. Different procedures were performed to manage the cysts according to patient age, fertility, and clinical presentation. Twenty-eight cysts (90%) were removed by ovarian cystectomy and enucleation, three (9.7%) were subjected to salpingo-oophorectomy [one adnexa was removed as a step during laparoscopy-assisted vaginal hysterectomy (LAVH)]. In one case, concomitant hysteroscopic excision of the uterine septum was carried out for treatment of recurrent abortion. In the case in which we removed the adnexa, the indication was inadequate ovarian tissue to preserve after cyst removal and the patient was near menopause. LAVH was performed for associated fibroid uterus and irregular perimenopausal bleeding in one case.

Of all cysts removed via either cystectomy or salpingo-oophorectomy, 14 (45%) were removed via the trocar sleeve without the use of an endobag, and ten (32%) were removed within the impermeable pouch of the endobag. Inside the endobag pouch, puncture and suction of cyst contents and/or morcellation of cyst tissues was performed safely to facilitate retrieval of material via the trocar sleeve. Eight cases were removed via a posterior colpotomy, including the two cases of salpingo-oophorectomy and five cases of considerably larger cysts. In the LAVH case, the cyst was delivered along with the uterus via vaginal wound of the posterior colpotomy.

The spillage rate per patient was 53.8% (14/26), but the total spillage rate was 45% (14/31) for all cysts removed. Spillage rate varied with removal method: 10/14 (71.4%) for enucleation and removal via the trocar sleeve without endobag pouch; 1/10 (10%) for removal of cysts within the endobag; and 3/7 (42.8%) in the colpotomy group. In the LAVH case, no spillage occurred. Surprisingly, spillage was not correlated with cyst size. Mean  $\pm$  standard deviation (SD) cyst diameter was  $5.4 \pm 2.1$  cm and  $5.7 \pm 2.3$  cm for spilled and unspilled cysts, respectively ( $P > 0.05$ ).

Concomitant surgical procedure consisted of hysteroscopic excision of complete uterine septum [1], adhesiolysis [3], myolysis [4], and LAVH [2]. Mean cyst diameter, blood loss, and operative time were 7.5 cm (range 3–11 cm),  $120 \pm 70$  ml, and  $140 \pm 55$  min, respectively. In fact, straightforward cystectomy without additional operative intervention lasted  $90 \pm 35$  min. Most of the time consumption during surgery was for the irrigation step to ensure complete pelvic clean out.

There were no significant intraoperative complications apart from inferior epigastric injury during conversion of a 5-mm to a 10-mm trocar. Pathological confirmation of definite mature cystic teratoma without atypia were quite clear in all cases. Overall hospital stays was 0.9 days. Only the case with torsion stayed 3 nights because of postoperative ileus and delay of bowel motion. Three cases suffered periumbilical infection at the trocar entry site and were treated efficiently with antibiotics. Five cases reported spontaneous pregnancy during the first-year follow-up.

## Discussion

Dermoid cysts are the most common benign ovarian neoplasm occurring in the childbearing age. Conservative surgical approach with the least chance of adhesions is demanding to preserve future fertility. There is a common belief among gynecologic surgeons that spillage of cyst contents potentially leading to complications such as chemical peritonitis or spread of infection is the most important risk in laparoscopic management of dermoid cysts. Spillage rates in laparoscopy are 15–100% [4–16] compared with only 4–13% via laparotomy [11–13]. Obviously, spillage rates with laparoscopic approaches are higher than with laparotomy. However, the puzzling question is: Does spillage during laparoscopy affect the prognosis?

Apart from sporadic case reports, review of the literature revealed a total of 14 studies documenting 470 laparoscopic dermoid cystectomies. Spillage occurred in 310 cases (66%). The significant postoperative complications were seen in only one case [11], with chronic granulomatous peritonitis occurring 9 months postoperatively. However, in some of these studies, there was no mention of precaution techniques to avoid spillage or measures to clean up the pelvis after surgery. We presume that sticking to the rule of jet-wash irrigation with copious amounts of fluid, removing up to microscopic particles of cyst contents, is the gold standard to avoid complications. Importantly, there was no significant difference in complication rates between the spillage and nonspillage groups in our study. Additionally, cyst size had no impact on spillage rate. Surprisingly, we encountered easier dissection enucleation for larger cysts than for small ones.

Considering our results in addition to literature, we can confidently conclude that the rate of clinical peritonitis following spillage from laparoscopic ovarian cystectomy in dermoid cysts is 0.2%. In our series, the spillage rate was 53.8% per patient with no single case of evident clinical chemical peritonitis after the procedure. However, spillage during laparotomy has been recently reported [11, 13]. We believe that the laparoscopic approach allows better rinsing

**Table 1** Laparoscopic surgery in 31 dermoid cysts

Intervention	Number of cases
Ovarian cystectomy	28
Salpingo-oophorectomy	3
Salpingo-oophorectomy + laparoscopy-assisted vaginal hysterectomy (LAVH)	1
Cystectomy + hysteroscopic excision septum	1

and cleaning and absolute pelvic clean out than does laparotomy. The practice of pneumoperitoneum and bowel retraction allows better exposure of the pouch of Douglas and collection of spilled material in the confined space of cul-de-sac. Additionally, irrigation cannulae with jet-wash lavage is an effective cleaning method that may not be available during laparotomy. We believe that lavage during laparotomy will definitely carry the fluid to the upper abdomen and probably to the subphrenic recesses. It is quite difficult at laparotomy to aspirate back again all irrigation fluid. During laparoscopy, it is possible to aspirate the cyst after placing it intact within the endobag. Although it seems satisfactory to contain all spilled material in the endobag, even in cases of pelvic spill, there is no risk of chemical peritonitis as long as the rule for jet-irrigation aspiration is followed.

We found that spillage during enucleation of the cyst or during retrieval did not affect prognosis. In fact, in cases in which postoperative spontaneous pregnancy (3/5) were reported, spillage of cyst contents had occurred during the surgery.

A survey by American Society of Gynecologic Oncologists [18] revealed 42 cases of laparoscopic ovarian tumors subsequently found to be malignant. In our series follow-up, we did not encounter any case of subsequent malignancy, as confirmed by careful histopathologic examination. Dembo et al. [19, 20] reported that malignant ovarian cyst rupture may not affect the prognosis from spread of ovarian cancer. However, spread of malignancy is still a potential problem for laparoscopic management, probably due to the effect of the pneumoperitoneum.

**Table 2** Method of removal of dermoid cyst from peritoneal cavity

Method of removal retrieval	Number of cases
Via 10-mm sleeve without endobag	14
Within endobag	10
Posterior colpotomy	7

**Table 3** Spillage rate in relation to method of cyst retrieval from peritoneal cavity

Method of retrieval of cyst	Number of cysts removed	Number of cysts spilled rate
Trocar sleeve without endobag	14	10 ( 71%)
Within endobag	10	1 ( 10%)
Posterior colpotomy	7	3 (42.8%)
Total	31	14 ( 45%)

We recommend strict rules to avoid spillage in dermoid cysts as much as possible during laparoscopic surgery. However, in case spillage should happen, there should be no fear or anxiety of increased morbidity. We strongly advise against the laparoscopic approach in case of any doubt of malignancy in ovarian cysts. There is a real dilemma regarding the possibility of malignancy within a dermoid cyst. In our series, most patients were in the child-bearing age and satisfactory transvaginal sonography showed no ascites or risk factor for malignancy. We recommend a frozen section in unanticipated suspected cases to avoid missing malignancy and incomplete surgery.

Our operative time in laparoscopic dermoid ovarian cystectomy was comparable with laparotomy reports. Cristoforoni et al. [11] reported operative time for laparotomy as  $92 \pm 11$  min. In our cases, mean operative time excluding doing an additional procedure was  $90 \pm 35$  min, a value approaching laparotomy time, bearing in mind that we spent most of our time in the irrigation step. As previously established, hospital stay, blood loss, patient morbidity, and cosmetic and patient satisfaction were better in laparoscopic surgery compared with laparotomy.

There are few studies reporting laparoscopic dermoid cystectomy in pregnant women [22, 23], and spillage occurred in some of them neither compromise of pregnancy nor complications. We did not perform any procedure during pregnancy, but the patient with acute abdomen and torsion was recently aborted before surgery.

**Table 4** Indication of operative laparoscopy in 384 cases

Indication of procedure	Number of cases
Infertility	154
Ovarian cysts	59
Myomectomy	11
Laparoscopy-assisted vaginal hysterectomy (LAVH)	18
Ectopic pregnancy	14
Endometriosis	47
Missed intrauterine device (IUD)	7
Chronic pelvic pain	31
Ovarian drilling	43

**Table 5** Symptomatology of cases enrolled in the study for laparoscopic ovarian cystectomy for dermoid

Chief complaint	Number of cases
Chronic pelvic pain	13
Irregular menses	4
Asymptomatic	7
Acute abdomen, torsion	1
Previous ovarian surgery ?, pain	2
Recurrent abortion, irregular cycles	1

## Conclusions

Review of 14 studies in the literature, added to our study, revealed only 0.2% incidence of chemical peritonitis following laparoscopic removal of dermoid cysts. The unnecessary fear of dermoid cyst content spillage was championed by the fact that spillage never affects patient morbidity or prognosis in benign cystic teratoma, as shown in the literature.

A laparoscopic approach allows proper exposure of the cul-de-sac and forceful jet-lavage aspiration, ensuring pelvic clean out from any microscopic material of the dermoid cyst. This situation may not be available during open laparotomy. Thus, we conclude that laparoscopic management of dermoid cysts is a safe and valuable method in selected cases. The phobia of complications due to cyst rupture during laparoscopy has no scientific basis. Needless to say, experience in operative laparoscopy is essential to perform the procedure and obtain the advantages of this minimum-access approach.

**Table 6** Literature review for spillage rates and significant postoperative complications reported following removal of dermoid cysts

Author	Number of patients	Number of spillages	Incidence of chemical peritonitis
Nezhat (1989)	9	7 (78%)	0
Reich (1992)	25	11 (44%)	0
Bolan (1992)	14	14 (100%)	0
Chen (1992)	18	15 (83%)	0
Yeun (1993)	6	0	0
Chapron (1994)	56	41 (73%)	0
Mengeshikar (1995)	97	97 (100%)	0
Cristoforoni (1995)	24	8 (33%)	1
Howard (1995)	8	4 (50%)	0
Lin (1995)	29	29 (100%)	0
Luxman (1996)	41	6 (15%)	0
Teng (1996)	44	29 (66%)	0
Rosen (1998)	18	10 (56%)	0
Nezhat (1999)	81	39 (48%)	0
Shawki (present)	26	14 (53.8 %)	0
Total	496	324 (65.3%)	1 (0.2%)

Tables 1, 2, 3, 4, 5, and 6.

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