



Scalpel Morcellation During Laparoscopic Hysterectomy for Large Uterine Fibroids. Is It a Safe Alternative to Power-Morcellation?

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Abstract

Background Laparoscopic hysterectomy has many surgical advantages. Specimen retrieval options after a laparoscopic hysterectomy include laparotomy or “mini-laparotomy,” vaginal delivery, and removal through a laparoscopic port using intracorporeal power morcellation.

Patients and Methods Fifty-two lady patients underwent (manual) scalpel morcellation of the uterus through the anterior abdominal wall after laparoscopic hysterectomy for large uterine fibroids, to facilitate specimen delivery through the vagina without employing any abdominal incisions; this study was done in the Department of Surgical Oncology, Oncology Center, Mansoura University, Egypt.

Results The mean operative time was 140 min; the mean scalping time was 17.21 min. The estimated blood loss was 105.29 ml. Extensive intraoperative adhesions were noted in 67.3% of the patients. The postoperative uterine weight had a median of 450 g (range 320–740 g). The median uterine length was 14 cm (range 9–23 cm), while its width was 9 cm (range 6–18 cm). Leiomyoma was the common postoperative pathology in most of the cases (96.15%) with a median size of 8 cm (range 5–12 cm).

Conclusion Scalpel morcellation of large uterine leiomyomas after laparoscopic hysterectomy is a safe and cheap method. Its merits include no intraperitoneal dissemination, spillage, and intact specimens’ delivery for proper postoperative pathological examination.

Keywords Laparoscopic hysterectomy · Scalpel morcellation · Large uterus

Introduction

Leiomyomas are the most common indication for hysterectomy, accounting for about 40% of all hysterectomies performed worldwide, and nowadays minimally invasive

surgery (MIS) such as laparoscopic hysterectomy is the gold standard approach of management [1]. The advantages of MIS include less blood loss, early return to normal daily activities, shorter hospital stay, lower rates of wound-related complications, less pain, lower risks of venous thromboembolism, and better cosmetic outcomes [2]. There are many options for specimen removal after laparoscopic hysterectomy including laparotomy or “mini-laparotomy,” vaginal delivery, and removal through laparoscopic port sites (size 10–15 mm ports) using intracorporeal morcellation.

Manual tissue morcellation was developed by Kurt Semm in 1973 and the Electromechanical morcellator was approved by the Food and Drug Administration (FDA) in 1995 [3]. Mechanical morcellators have the potential for tissue dissemination that leads to parasitic myoma and endometriosis. Moreover, it risks unexpected cancers dissemination, which results in tumor upstaging and affects the patient’s survival [4, 5]. Power tissue morcellation may cause direct trauma to the nearby structures, such as the urinary bladder, the surrounding intestine, and major blood vessels. A systematic

Highlights

- Laparoscopic hysterectomy is nowadays considered the standard approach for most uterine diseases.
- Specimen removal after laparoscopic surgery remains an area of debate.
- Scalpel morcellation of the uterus preserves the specimen for adequate pathological examination.

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review has published papers from 1993 and 2013 regarding the complications associated with power morcellation and they reported fifty-five cases with visceral and vascular injuries and six patients with mortalities [6].

The FDA has released in November 2014, the contraindications to using the power morcellator including removal of uterine leiomyoma that are candidates for en-bloc resection through vaginal delivery or mini-laparotomy and removal of the uterus known or suspicious of malignancy [7]. This study aimed to assess the feasibility and safety of manual scalping of the uterus through the abdominal wall in patients undergoing laparoscopic hysterectomy with sizable uterus/uterine fibroids, without using a mini-laparotomy for delivery of the specimens.

Patients and Methods

Study Design

This case series was done in the Department of Surgical Oncology, Oncology Center, Mansoura University (OCMU), Egypt. Between April 2016 and May 2021, fifty-two lady patients underwent laparoscopic hysterectomy and manual scalpel morcellation of the uterus for easy vaginal extraction of specimens. An Institutional Research Board (IRB) approval of the Faculty of Medicine, Mansoura University code (R.21.07.1387) was obtained. All patients with benign uterine diseases such as leiomyoma, adenomyosis, and dysfunctional uterine bleeding were enrolled in this study. Patients excluded from this study were those with pathologically confirmed uterine malignancy, a history of ≥ 2 years of tamoxifen therapy, a history of pelvic irradiation, patients with radiological suspicious uterine mass, and those unfit for general anesthesia or laparoscopic surgeries. The procedure was explained to the patients and written informed consent was obtained from all the patients before surgery. Demographic and clinical features were collected from the patients' database registry in OCMU. Preoperative preparations included pelviabdominal ultrasonography (US), measurement of the uterine size (by bimanual examination according to the appropriate pregnancy week), dilatation, and curettage (D&C) for any patient with a thick endometrial plate to exclude endometrial carcinoma and pelvic MRI for any suspicious uterine mass with guided needle biopsy to exclude sarcomatous changes.

Procedure

All surgical procedures were performed under general anesthesia by the same surgical team. The procedures started with pneumoperitoneum, then 3 laparoscopy ports were placed; one port sized 10 mm in the umbilicus for

the 30-degree rigid camera, and two working 5 mm ports were placed following the baseball diamond concept. Careful examination of the peritoneum was done for adhesions, implantation and to rule out uterine leiomyosarcoma. A uterine manipulator was applied at the start of the procedure to facilitate manipulation of the uterus for easier dissection and visualization of the pelvic structures.

Laparoscopic hysterectomy started with transection of the round ligaments lateral to the uterus using the Ligasure (by Covidien™) then the broad ligaments were dissected on both sides into anterior and posterior leaflets. An incision in the anterior leaflet was done toward the bladder for bladder flap formation, and the bladder was dissected away from the uterus utilizing either the harmonic scalpel (by Ethicon™) or Ligasure (by Covidien™). Transection of the infundibulopelvic ligaments was done using the 5 mm LigaSure (by Covidien™) in cases associated with salpingo-oophorectomy or the ovarian ligaments when ovaries were preserved. The uterine manipulator was then pushed cranially to ensure that the uterine arteries were away from the ureters. The ascending uterine vessels were skeletonized, sealed, and divided using the 5 mm Ligasure, then the uterus was separated from the vagina.

For the specimen delivery, No.24 scalpel was inserted through the abdominal wall (Fig. 1a) in the suprapubic region or through the previous Pfannenstiel incision in patients with a history of Cesarean section (CS). The uterus is grasped from two opposing points and approximated to the anterior abdominal wall (Fig. 1b). The scalpel morcellation was started in the craniocaudal direction from the fundus of the uterus (Fig. 2) till the complete separation of the uterus into two halves with the preservation of its gross architecture (Fig. 3). Each half is then delivered easily from the vagina using artery forceps. The vagina is closed with intracorporeal sutures and the scalpel entrance site in the anterior abdominal wall was assessed for any bleeding. A pelvic drain was placed for postoperative drainage and monitoring.

Statistical Analysis

Analysis of data was performed using Statistical Package for Scientific Studies (SPSS) v.26 for macOS v11.3. Numerical data were expressed as means \pm standard deviation (SD).

Results

Patients' Characteristics

The patients' mean age was 47.71 years, and the mean BMI was 35.19 kg/m². Most of the patients (67.3%) had ASA (American Society of Anesthesiology) score I. Hypertension

Fig. 1 Scalpel morcellation after laparoscopic hysterectomy: **a** Insertion of the scalpel through the anterior abdominal wall, **b** Grasping the uterus from two opposing points toward the anterior abdominal wall

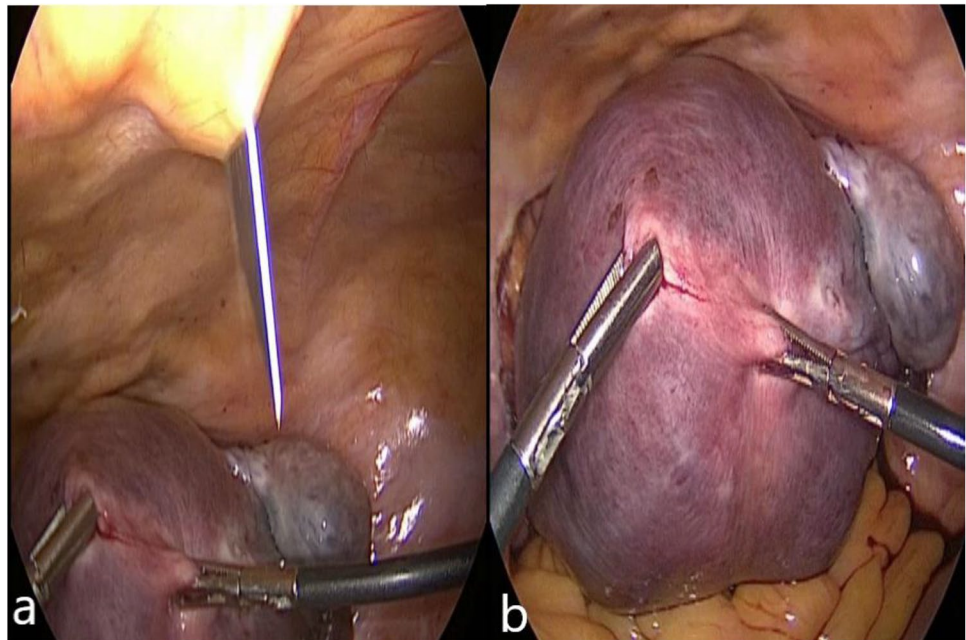
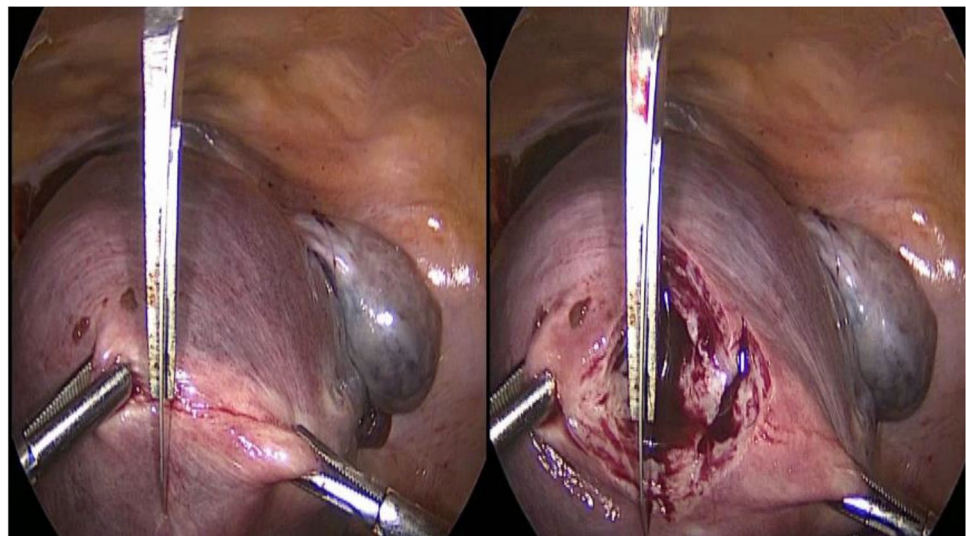


Fig. 2 Craniocaudal direction of scalpel morcellation after laparoscopic hysterectomy



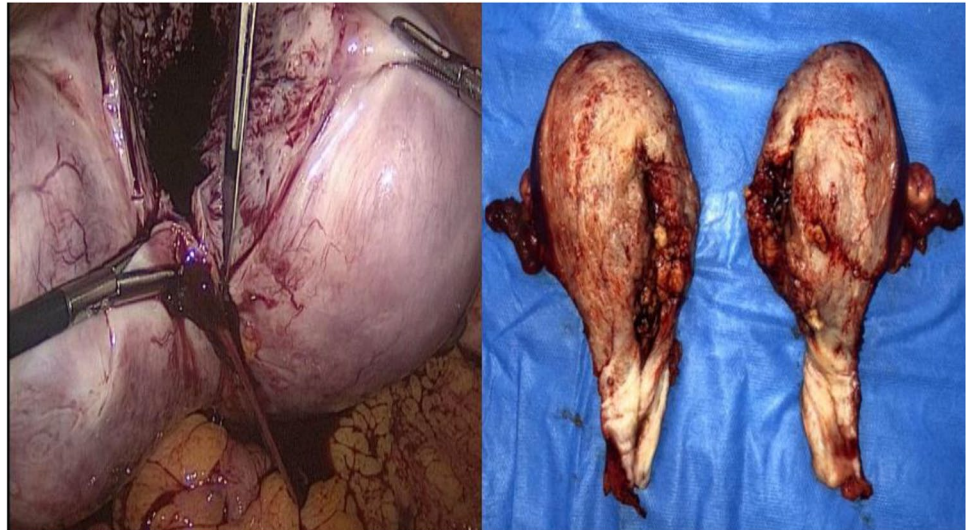
was the common comorbidity in 10 patients, combined hypertension, and diabetes in four patients, two patients had hypothyroidism and one patient had rheumatic heart disease. Eleven patients had previous abdominal surgeries, previous Cesarean section (CS) was reported in 49 patients and normal/vaginal delivery was reported in 20 patients. All patients were multipara except one postmenopausal patient who did not conceive. The median preoperative uterine size was 12 weeks (range 8–20 weeks) (Table 1).

Intraoperative Parameters

Leiomyoma was the main indication of laparoscopic hysterectomy in most of the patients (86.5%) enrolled

in this study (Table 2). Half of the patients (51.9%) had a total abdominal hysterectomy and bilateral salpingo-oophorectomy. The mean operative time was 140 SD37 minutes, while the mean scalping time was 17.21 SD6.4 minutes. The mean estimated blood loss was 105.29 ml and nine patients needed an intraoperative blood transfusion. Extensive intraoperative adhesions were noted in 67.3% of patients. Four patients had intraoperative complications during laparoscopic hysterectomy; three had iatrogenic bladder injury and one patient had a rectal serosal tear.

Fig. 3 Separation of the uterus into two specimens with preservation of its gross architecture using scalpel morcellation after laparoscopic hysterectomy



Postoperative Outcomes

Postoperative data were reported in (Table 3). Two patients had grade II postoperative complications (according to Clavien and Dindo classification); one patient required blood transfusion, and the other one had a small pelvic collection that was treated conservatively. One patient had grade III postoperative complication and was reoperated for an evident urinary bladder leak. The median hospital stay was 2 days (range 1–12 days), and the median follow-up duration was 3 months (range 1–12 months). Postoperative uterine weight had a median of 450 g (range 320–740 g). The median uterine length was 14 cm (range 9–23 cm), while its width was 9 cm (range 6–18 cm). Leiomyoma was the common postoperative pathology in (96.15%) with a median size of 8 cm (range 5–12 cm).

Discussion

This study aimed to assess the feasibility of manual morcellation of the uterus using an intracorporeal scalpel after laparoscopic hysterectomy for easy delivery of the specimen through the vagina. Since 1993, power morcellation had been used in most gynecological laparoscopic surgeries [8]. However, in April 2014, the FDA reported many drawbacks of morcellation use in laparoscopic hysterectomies such as intraperitoneal dissemination of uterine fibroids and occult uterine sarcoma. Several studies have reported the development of parasitic myoma after the use of power morcellation [9]. A multicenter study from China reported that the prevalence of pathological malignant tumors after morcellation in patients with uterine fibroids was 1/544 [10]. Till now, few studies have discussed the prognosis of sarcoma patients after applications of power morcellation claiming that it may

change the sites of original metastasis and thus affects the treatment decisions in such patients. Moreover, it is very difficult to estimate the exact origin of peritoneal or retroperitoneal metastatic lesions that may arise either from the morcellated uterine tissue or disseminated from the primary tumor. These issues of laparoscopic power morcellation have restricted its use in many laparoscopic centers worldwide.

The mean age of patients who underwent a laparoscopic hysterectomy in this study was 47.71 years, and the mean BMI was 35.19 kg/m², compared with another study having a similar age group for laparoscopic hysterectomy for leiomyoma (mean 48 years), while the BMI of their patients was lower (mean 32.8 kg/m²) [11]. About a fifth of patients in the current study (21.2%) had previous abdominal surgeries and the majority (94.2%) had one or more previous Cesarean sections which was higher than that reported by another study as it was (27.7%) [12]. This is owing to the increased frequency of Cesarean sections as an approach of delivery in our country in recent years. Only 38.5% of our patients had previous vaginal delivery which made the vaginal delivery of the uterus after laparoscopic hysterectomy difficult even with average-sized leiomyoma. The preoperative uterine size was 12 weeks, and it was comparable to another study that had a preoperative uterine size of (12.2 weeks) [13].

The mean operative time in the current study was 140 min and the mean scalping time was 17.21 min, and the latter was variable according to the size and pathology of the uterus. Another study of laparoscopic hysterectomy with trans-umbilical morcellation reported a mean operative time of 135.3 min and the mean morcellation time was 25.3 min [14]. Extensive intraoperative adhesions were found in 67.3% of the patients due to previous CS in 49 patients especially 44 of them having at least two CS. Most adhesions were between the greater omentum, the urinary bladder, and the anterior abdominal wall, which lead to

Table 1 Baseline characteristics of patients who underwent scalpel morcellation after laparoscopic hysterectomy

	<i>n</i> = 52 (%)
Age, years (mean ± SD)	47.71 ± 4.717
BMI, kg/m ² (mean ± SD)	35.19 ± 6.016
ASA score	
I	35 (67.3%)
II	17 (32.7%)
Comorbidities	
None	35 (67.3%)
HTN	10 (19.2%)
DM and HTN	4 (7.7%)
Hypothyroidism	2 (3.8%)
RHD	1 (1.9%)
Previous abdominal surgery	
No	41 (78.8%)
Yes	11 (21.2%)
Types of previous abdominal surgeries	
Paraumbilical hernia	2 (3.8%)
Cholecystectomy	4 (7.7%)
Appendectomy	4 (7.7%)
Myomectomy	1 (1.9%)
Menstrual history	
Premenopausal	26 (50.0%)
Postmenopausal	26 (50.0%)
Parity	
Nullipara	1 (1.9%)
Multipara	51 (98.1%)
Previous Cesarean section (CS)	
No previous CS	3 (5.8%)
One CS	5 (9.6%)
Two CS	20 (38.5%)
Three CS	20 (38.5%)
More than three CS	4 (7.7%)
History of vaginal delivery	
No	32 (61.5%)
Yes	20 (38.5%)
Preoperative uterine size/weeks (median, range)	12 (8–20)

SD standard deviation, *BMI* body mass index, *ASA* American Society of Anesthesiology, *HTN* hypertension, *DM* diabetes mellitus, *RHD* rheumatic heart disease

iatrogenic bladder injury in 3 cases during the hysterectomy procedure. Intraoperative adhesions were also high in another study that reported it in 54.5% of their patients [11]. The median uterine weight in our study was 450 g and the maximum weight was 740 g, and the median uterine width was 9 cm. A study has reported a median uterine weight after transvaginal morcellation was 622 g and the maximum weight was 975 g [14]. Another study reported a median uterine width of 10.8 cm [13].

Table 2 Surgical characteristics of the patients who underwent scalpel morcellation after laparoscopic hysterectomy

	<i>n</i> = 52 (%)
Indications of surgery	
Leiomyoma	45 (86.5%)
DUB	7 (13.5%)
Type of hysterectomy	
TAH	18 (34.6%)
TAH and USO	7 (13.5%)
TAH and BSO	27 (51.9%)
Conversion rate	0 (0%)
Operative time (min; mean ± SD)	140 ± 37.312
Scalping time (min; mean ± SD)	17.21 ± 6.369
EBL (ml; mean ± SD)	105.29 ± 50.60
Blood transfusion	
No	43 (82.7%)
Yes	9 (17.3%)
Operative complications	
No	48 (92.3%)
Urinary bladder injury	3 (5.8%)
Serosal rectal tear	1 (1.9%)
Intraoperative adhesions	
No	17 (32.7%)
Yes	35 (67.3%)

DUB dysfunctional uterine bleeding, *TAH* total abdominal hysterectomy, *USO* unilateral salpingo-oophorectomy, *BSO* bilateral salpingo-oophorectomy, *EBL* estimated blood loss

Most of the postoperative pathology in this study was leiomyoma (96.15%) with a median size of 8 cm and was comparable to the size reported by another study that was 9 cm [15]. We did not encounter any occult carcinoma or sarcoma in the 52 patients included in this study and all patients in this study did not have any intraperitoneal dissemination during the follow-up. A systematic review reported pelvic implantation after using power morcellation in laparoscopic hysterectomy for benign diseases with an incidence of 0.5% for adenomyosis, 0.9% for leiomyoma, and 1.4% for endometriosis; so, the intraabdominal implantation risk after power morcellation for benign diseases was 1% of the cases [16].

Occult sarcoma incidence after hysterectomy and morcellation for uterine leiomyoma is extremely variable between studies. Many studies and systematic reviews reported the rate of occult sarcoma in patients who had hysterectomy or myomectomy for benign leiomyomas, is about 0.2% (1 in 500) [17], while a European multicenter study found a smaller risk (1:2500 cases). It was reported that 1 patient with leiomyosarcoma among 1961 patients underwent a hysterectomy for leiomyomas [18]. Recently, data from the Agency for Healthcare Research and Quality reported a variable risk from 1/770 to 1/10,000 [19]. The 5-year survival rate of stage I leiomyosarcoma is about 55%

Table 3 Postoperative outcomes of the patients who underwent scalpel morcellation after laparoscopic hysterectomy

	<i>n</i> = 52 (%)
Postoperative complications (CD classification)	
CD I	49 (94.2%)
CD II	2 (3.8%)
CD III	1 (1.9%)
30-day mortality	0 (100%)
Hemoglobin decrease (mg/dL; mean \pm SD)	0.08 \pm 0.269
Hospital stay (days; median, range)	2 (1–12)
Uterine weight (g; median, range)	450 (320–740)
Uterine length (cm; median, range)	14 (9–23)
Uterine width (cm; median, range)	9 (6–18)
Fibroid size (cm; median, range)	8 (5–12)
Postoperative pathology	
Leiomyoma	40 (76.9%)
Endometrial hyperplasia	1 (1.9%)
Leiomyoma and endometrial hyperplasia	4 (7.7%)
Leiomyoma and adenomyosis and bilateral ovarian masses	1 (1.9%)
Leiomyoma and endometriosis	2 (3.8%)
Leiomyoma and adenomyosis	3 (5.8%)
Adenomyosis and endometrial hyperplasia	1 (1.9%)
Follow up (months; median, range)	3 (1–12)

CD Clavien Dindo classification

[20]. The 5-year survival rate of undifferentiated endometrial stromal sarcoma is 15–25%, and it was found that power morcellation might upgrade the stages of sarcoma [21]. A comparative study described patients who underwent hysterectomy and divided them into morcellation vs. non- morcellation groups and concluded a high rate of recurrence and intraperitoneal dissemination in the patients of the power morcellation group (44 vs. 12.9%) [22].

The 2017 Agency for Healthcare Research and Quality meta-analysis described 24 studies on patients with leiomyosarcoma and showed differences in the 5-year survival (30% with the use of power morcellation, 59% with the use of scalpel morcellation, and 60% without any morcellation) [19]. Thus, survival rates after scalpel morcellation were comparable to that without the use of any morcellation. Another meta-analysis of 60 studies, included 202 cases and compared the oncological outcome of power morcellation with patients who had no morcellation, and found intra-peritoneal recurrence rates were (39 vs. 9%, respectively) and mortality rates (48 vs. 29%, respectively) [23]. A population-based study showed that the rate of intra-abdominal recurrence with power morcellation was 72.2% and 41.2% for those with intact specimen removal. The adjusted risk ratio for death at 1 year was significantly higher in the morcellation group, but at 3 years, there were no significant differences in survival [24]. The samples obtained after power morcellation were difficult to be evaluated by the pathologists, as the specimens were fragmented and gross demarcation of the uterus, ovaries, and margins

cannot be easily done, so it affects the diagnosis and staging of these tumors.

In-bag morcellation was used after FDA warning reports of the hazards of morcellation of malignant tissues. The specimen is morcellated within a containment bag, to decrease the spillage of tissues in the peritoneal cavity [25]. Also, there was a cheaper method for morcellation with the use of a latex glove through a skin retractor to protect against port site spread [26]. The use of a containment bag for morcellation in laparoscopy needs multiple investigations as it has limitations in the visualization of the specimen morcellation, the surrounding structures, and the costs of the bag [6]. Thus, our study found that manual scalpel morcellation offers a safe and cheap method for specimen retrieval after laparoscopic hysterectomy without the abovementioned risks.

Conclusion

Scalpel morcellation of large uterine leiomyomas after laparoscopic hysterectomy is a safe and cheap method. Its merits include no intraperitoneal dissemination, spillage, and intact specimens' delivery for proper postoperative pathological examination.

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Authors' Contributions All the authors contributed to the study design, collection, analysis, and data interpretation. All the authors have read and approved the submitted version of the manuscript.

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Data Availability The datasets generated and analysed during the current study are not publicly available and are available from the corresponding author on reasonable request.

Declarations

Ethics Approval and Consent to Participate This study was approved by the Institutional Research Board (IRB) of the Faculty of Medicine, Mansoura University code (R.21.07.1387). A written informed consent was obtained from all the patients included in this study.

Competing Interests The authors declare no competing interests.

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