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Laparoscopic treatment of abdominal wall endometriosis: A case series

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ABSTRACT

Objective: This report summarizes the characteristics of a series of 8 recent (2020−2022) patients with abdominal wall endometriosis (AWE) who underwent laparoscopic surgery. The feasibility and advantages of laparoscopy in the treatment of AWE are set out.
Methods: The clinical data of the 8 AWE patients were retrospectively analysed. Basic clinical characteristics, operation details and postoperative details were collected and analysed.
Results: Laparoscopic treatment was successful in all 8 cases. The mean operation time was 212.13 ± 48.16 min, the mean estimated blood loss was 25.00 ± 11.18 ml, and the mean postoperative hospital stay was 5.25 ± 1.39 days. 7 of the patients were found to have concomitant pelvic endometriosis, and 1 patient was found to have concealed inguinal hernias during surgery. Concomitant laparoscopic surgery for pelvic lesions was performed, including electrocautery or lesion resection of the pelvic endometriosis lesions in 7 patients, uterine fibroidectomy in 2 patients, high ligation of the hernia sac in 1 patient and endometrial biopsy under hysteroscopy in 1 patient. Endometrial-like tissue was confirmed by postoperative pathological examination of resected AWE lesions in all patients. There were no intraoperative or postoperative complications. The mean follow-up time was 18.75 ± 3.96 months, and no recurrence of AWE was found.
Conclusion: Laparoscopic surgery is a safe, effective and feasible treatment option for AWE patients and has the advantages of simultaneous diagnosis and treatment of other pelvic lesions.

1. Introduction

Abdominal wall endometriosis (AWE) is a rare type of endometriosis characterized by ectopic endometrium-like tissue located within the abdominal wall, with an incidence of approximately 0.03–3.5% [1–3]. Previous studies have suggested that the proportion of AWE patients with concomitant pelvic endometriosis may range from 13% to 50% [4–6]. Surgery, including laparotomy with wide local excision, high-intensity focused ultrasound ablation and CT/MRI-guided cryoablation, is the preferred treatment for AWE [3–7]. However, there are limitations to the above surgical treatment modalities in patients with AWE and concomitant pelvic endometriosis. Laparoscopic resection is a minimally invasive treatment for abdominal wall lesions that has advantage of a comprehensive assessment of the abdominal cavity [8]; however, the role of this surgical approach in the treatment of AWE has not been evaluated.

This study summarizes the characteristics of 8 recent (2020–2022) AWE patients who underwent laparoscopic surgery, and investigates the feasibility and advantages of laparoscopy in the treatment of AWE.

2. Materials and Methods

2.1. Patients

The preoperative diagnostic criteria for AWE were: (1) typical cyclic abdominal wall pain during the menstrual period and a palpable abdominal wall mass; (2) a heterogeneous hypoechoic mass with or without cystic echoes within the abdominal wall on ultrasound imaging or a nonspecific solid soft tissue mass on enhanced computed tomography (CT) or magnetic resonance imaging (MRI). The inclusion criteria were: (1) preoperative diagnosis of AWE confirmed by postoperative pathological examination; (2) laparoscopic surgery. The exclusion criteria were: (1) absence of endometrial-like tissue on postoperative pathological examination; (2) other surgical treatments.

All patients were fully informed of the advantages and potential disadvantages of laparoscopic surgery, and written informed consent

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was obtained from the patients before surgery. This retrospective study was approved by the local medical ethics committee.

2.2. Surgical Procedures

The main surgical procedures are summarized as follows.

(1) General anaesthesia was induced under tracheal intubation, and then the patient was placed in the lithotomy position. The lower abdomen and perineum were routinely sterilized and draped, and then a urinary catheter was placed.
(2) Then, 10 mm (visual port), 12 mm (operating port) and 5 mm (operating port) incisions were made approximately 5 cm above the umbilicus in the left, right and middle of the abdomen, respectively, followed by puncture and placement of the laparoscopic surgical instruments (Fig. 1-A).
(3) The condition of the pelvic and abdominal cavities was thoroughly investigated, and the location of the AWE lesion was identified. The peritoneum at the site of the AWE lesion was usually contracted (Fig. 1-B).
(4) Endometrial lesions and other pathological tissues in the pelvic cavity were treated first. The peritoneum was opened at the site of the AWE lesion, the peritoneum was freed to approximately 2 cm outside the AWE lesion, and the AWE lesion was exposed. The assistant pressed from the site of the abdominal wall lesion into the pelvic and abdominal cavity to confirm the location and boundary of the AWE lesion. The muscles, fascia, and subcutaneous tissue involved in the lesion were completely removed approximately 1 cm outside the lesion. During removal, the AWE lesion was resected from the edge of the AWE lesion to the center, while taking care not to cut through the entire abdominal wall layer (Fig. 1-C).
(5) Absorbable barbed sutures were used to close the fascial and muscular layers of the abdominal wall (Fig. 1-D).
(6) The diameter of the required mesh was then measured. If the abdominal wall defect was larger than 4 cm, mesh was placed after repair of the abdominal wall fascia to prevent postoperative abdominal wall hernia formation (Fig. 2-A). If an abdominal wall mesh was required, the peritoneum was freed to the appropriate size, and a self-adhesive abdominal wall mesh was placed.
(7) The peritoneum was continuously sutured with absorbable sutures to avoid mesh exposure (Fig. 2-B, Fig. 2-C).

2.3. Postoperative Management and Follow-Up

Prophylactic antibiotics were administered for 24 h postoperatively to prevent infection. The urinary catheter was kept in place for 24 h postoperatively. The long-term management of concomitant pelvic endometriosis was based on the third edition of guidelines for the diagnosis and treatment of endometriosis in China.

All patients returned to the outpatient clinic for follow-up at 1 month and 6 months postoperatively and were followed up via telephone at 3 months and 1 year. Symptoms of the recurrence of cyclic abdominal wall pain were assessed at each follow-up, and Doppler ultrasonography of the previous AWE sites was performed at the 6-month follow-up.

2.4. Data Collection

The data collected and analysed were: basal clinical characteristics, preoperative examination results, and intraoperative and postoperative details, including reproductive history, previous pelvic surgery history, clinical symptoms, clinical signs, previous treatment status, duration of symptoms, number and size of the AWE lesions, operation duration, estimated intraoperative bleeding, length of postoperative hospital stay and complications.

2.5. Statistical Analysis

Statistical analyses were performed with SPSS version 22.0 statistical software (SPSS Inc., Chicago, IL, USA). Continuous data are expressed as the mean ± standard deviation ($\bar{x} \pm s$) or median (25% percentile, 75% percentile), and count data are expressed as the frequency.

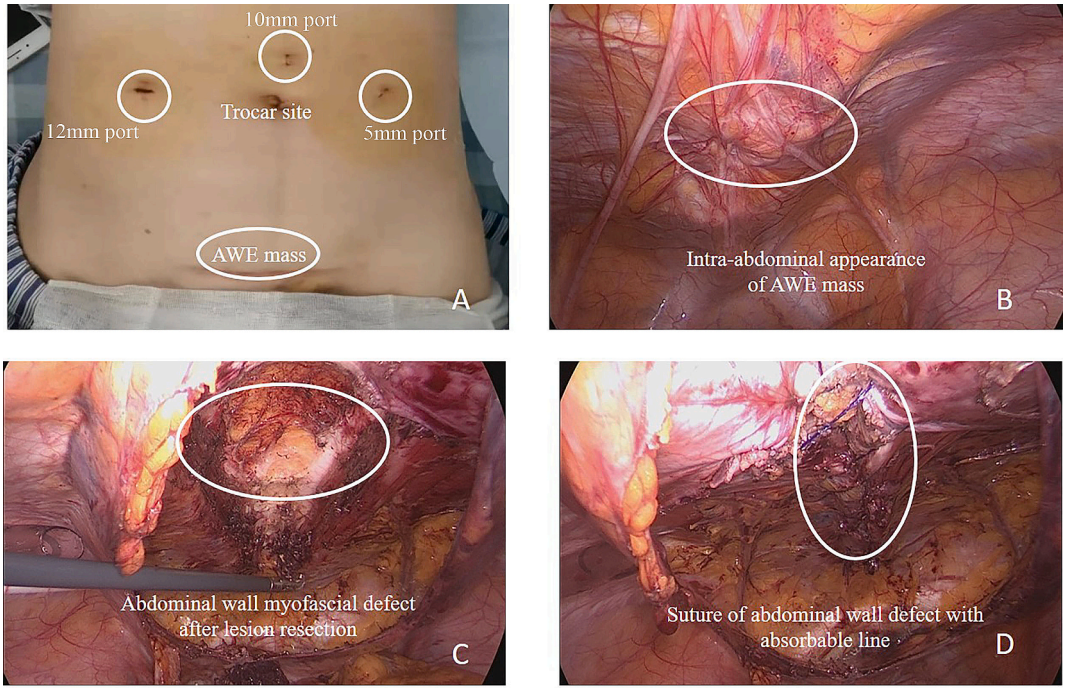

Fig. 1. A: Recommended trocar sites during surgery. B: Contracted shape of the peritoneum at the location of the AWE lesion. C:Abdominal wall myofascial defect after lesion resection. D: Suture of abdominal wall myofascial defect with absorbable barbed thread.

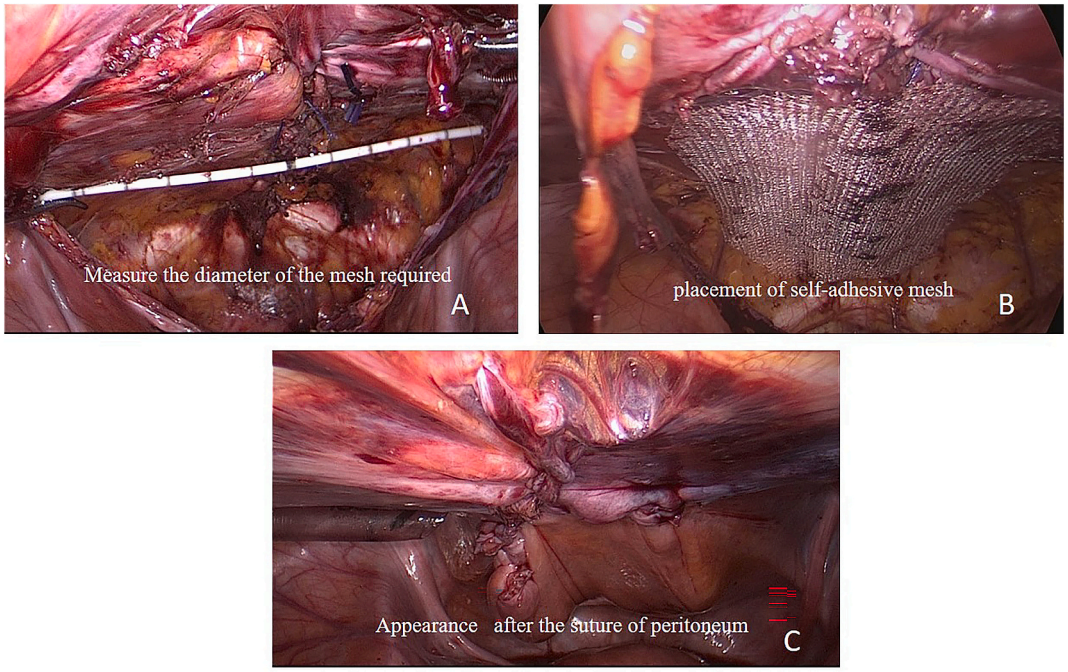

Fig. 2. A: Measure the diameter of the mesh required. If the abdominal wall defect was large, a mesh was placed after repairing the abdominal wall fascia to prevent postoperative abdominal wall hernia. B: Placement of self-adhesive mesh. C: Appearance after the suture of peritoneum.

Table 1
Baseline clinical characteristics of the present series of patients with abdominal wall endometriosis.

Characteristics	
Age (years)	34.63 ± 3.12
Delivery history (n, %)	
0	1 (12.50)
1	1(12.50)
≥2	6(75.00)
Prior pelvic surgery (n, %)	
None	1 (12.50)
CS	7 (87.50)
Interval between symptoms and pelvic surgery(months)	32.00 ± 15.53
Presentations (n, %)	
Cyclic pain	8(100.00)
Palpable mass	8(100.00)
Previous treatment (n, %)	
None	5(62.50)
HIFU, GnRHa+COC	1 (12.50)
TCM	1 (12.50)
Surgery	1 (12.50)
Transvaginal sonography (n, %)	
Normal uterus and adnexa	6(75.00)
Uterine leiomyomas	2(25.00)
Abdominal wall CT/MRI/ ultrasonography (n, %)	
Site of AWE mass	
Rectus abdominis	5(62.50)
Inguinal	1 (12.50)
Subcutaneous	1 (12.50)
Subcutaneous and rectus abdominis	1 (12.50)
No. of AWE mass (n, %)	
1	6(75.00)
2	2(25.00)
Diameter of AWE mass	28.86 ± 9.24
Tumour markers	Within normal

CS: Caesarean section. HIFU: High-intensity focused ultrasound. TCM: Traditional Chinese Medicine. COC: Combined oral contraceptive. AWE: Abdominal wall endometriosis. Tumour markers include carbohydrate antigen 125, carbohydrate antigen 153, carbohydrate antigen199, carcinoembryonic antigen and squamous cell carcinoma.

3. Results

The basic clinical characteristics of all the patients are shown in Table 1 and **Supplemental Table 1**. The mean age of the 8 patients was 34.63 ± 3.12 years, and the mean time between symptom onset and previous pelvic surgery was 32.00 ± 15.53 months. One patient, nulliparа, had no history of surgery. The remaining 7 patients had given birth 1–2 times, and all had a history of caesarean section. All patients experienced abdominal wall pain during menstruation and had a palpable abdominal wall mass.

The results of tumour marker analysis, abdominal wall sonography, transvaginal sonography, enhanced CT or MRI of the abdominal wall, number of AWE lesions and size of the AWE lesions of all the patients are shown in Table 1 and **Supplemental Table 2**. Two patients had 2 AWE lesions, and the remaining 6 patients had 1 AWE lesion. The diameter of the AWE lesions varied between 7 mm and 40 mm. The AWE lesion was located in the groin area in 1 patient, while in the other 7 patients, the AWE lesions were located in the subcutaneous or muscular layers of the abdominal wall.

The intraoperative and postoperative details of all patients are shown in Table 2 and **Supplemental Table 3**. All patients were successfully treated laparoscopically, and no patient required conversion to laparotomy. Seven patients were found to have pelvic endometriosis

Table 2
Intraoperative and postoperative details of the present series of patients with abdominal wall endometriosis.

Intraoperative and postoperative data	
Operative time (min)	212.13 ± 48.16
Estimated blood loss (ml)	25.00 ± 11.18
Concurrent pelvic endometriosis (n, %)	7(87.50)
Sacral ligament	3(37.50)
Peritoneum	4(50.00)
Fascia defect (cm) (n, %)	7.43 ± 1.05
Mesh therapy (n, %)	7(87.50)
Complications (n, %)	0(0.00)
Postoperative hospitalization (days)	5.25 ± 1.39
Follow-up(months)	18.75 ± 3.96

requiring concomitant treatment during surgery; the incidence of concomitant pelvic endometriosis was 87.5%, and electrocautery or lesion resection of the pelvic endometriosis lesions was performed simultaneously in those patients. Uterine fibroidectomy was performed simultaneously in 2 patients. Endometrial biopsy under hysteroscopy was performed on one patient with infertility. In Patient 3, the AWE lesion was found to be located in the inguinal canal and was associated with bilateral concealed inguinal hernias, and high ligation of the hernia sac was performed simultaneously (**Supplemental video**). Mesh was placed in 7 patients due to abdominal wall fascial and muscular defects after resection of the AWE lesions. No patient experienced intra- or postoperative complications. Endometrial-like tissue was confirmed by postoperative pathological examination of the resected AWE tissue in all patients. No patient experienced symptom recurrence during the follow-up period.

4. Discussion

The current study showed that laparoscopic surgery for AWE is safe, effective and feasible and could be considered a treatment option for AWE. Laparotomic resection of AWE lesions is the first-line treatment for AWE [3,10]. Previous studies have shown a success rate of >95% and a postoperative recurrence rate of 1.5–11.4% for laparotomic wide local resection of AWE lesions with at least 1 cm negative margins; however, wide local resection may lead to complications such as incision infection, delayed healing, and incisional hernia [3,10]. HIFU ablation, a noninvasive thermal ablation technique, has been performed to treat AWE for many years, with efficacy rates of up to 92% and recurrence rates ranging from 0% to 8%. However, complications such as skin burns and injury to surrounding tissues and organs have been reported with HIFU ablation of AWE [7,10–13]. CT/MRI-guided cryoablation is another noninvasive surgical treatment for AWE and was first reported by Cornelis et al. in 2014 [14]. The results of several studies suggest that the efficacy of CT/MRI-guided cryoablation for AWE lesions is comparable to that of open surgery, with a lower complication rate and shorter hospital stay [6,9,15,16]. In our study, the AWE lesions were successfully removed by laparoscopic surgery without intraoperative or postoperative complications, and symptom recurrence was not observed during the follow-up period, suggesting that laparoscopic surgery for AWE is safe and effective and could be considered a treatment option for AWE.

This study indicates that laparoscopic surgery for AWE has the advantages of simultaneous diagnosis and treatment of other pelvic lesions. In our study, 87.5% (7/8) of patients with AWE were found to have concomitant pelvic endometriosis during surgery, which is consistent with previous studies [4,6,10,17]. In traditional laparotomy for AWE, it is not necessary to routinely open the abdominal cavity if the AWE lesion is located in the subcutaneous or muscular layer of the abdominal wall and is not involved with the peritoneum; therefore, concomitant pelvic endometriosis and other lesions within the abdominal cavity cannot be diagnosed or treated simultaneously. For patients whose AWE lesions involve the entire abdominal wall, all layers of the abdomen must be excised, and the abdominal cavity must be opened [3]. However, the surgical incision may need to be enlarged when treating the concomitant pelvic lesion, which means the patient sustains more trauma. In HIFU ablation and CT/MRI-guided cryoablation treatment for AWE, exploration of the abdominal cavity is not needed, which delays the diagnosis and treatment of concomitant lesions. In our study, concomitant pelvic lesions such as endometriosis, uterine fibroids and bilateral inguinal hernias were treated simultaneously during laparoscopic resection of the AWE lesion without additional surgical incisions, suggesting that laparoscopic surgery for AWE can avoid the deficiencies of the above surgical treatments.

The results of this study indicate that laparoscopic surgery for AWE helps to identify the aetiology of AWE. Currently, the exact pathogenesis of AWE is poorly understood, and direct implantation of the endometrium into the abdominal wall at the site of incision for surgeries involving the uterus such as caesarean section and hysterectomy and surgery for endometriosis is widely considered the chief pathogenic mechanism of AWE [2–4,10,17–19]. Previous studies have suggested that 80.1% ~ 99.6% of AWE patients have a history of surgery involving the uterus [2,3,10,17]. In this study, 87.5% (7/8) of the AWE patients had a history of caesarean section, which is consistent with previous research. However, some AWE patients do not have a history of surgery, suggesting that there may be other aetiologies leading to implantation of the endometrium into the abdominal wall [2,3,10,17]. Dalkalitsis et al. reported that up to 57.9% of patients with inguinal endometriosis have no history of surgery and suggested that the cause of AWE may be retrograde menstrual blood entering the inguinal canal through inguinal defects [20]. In our study, one patient had no history of pelvic surgery, one patient had a bilateral occult inguinal hernia, and one patient was found to have an AWE lesion located in the inguinal canal during surgery. We speculate that the aetiology of AWE in this patient may have been retrograde blood flow into the pelvic cavity, which then entered the inguinal canal through the occult inguinal hernia that implanted, infiltrated and grew, resulting in the development of AWE.

The strength of this study is that it is the first case series of laparoscopic treatment for AWE. This was a small retrospective case series study conducted in a single medical centre, which limits the statistical power of our findings, and additional studies on laparoscopic treatment of AWE, including studies on indications, recurrence and complications, are needed.

5. Conclusions

In conclusion, the results of this study indicate that laparoscopic surgery may be a safe, effective and feasible treatment option for AWE patients that has the advantages of simultaneous diagnosis and treatment of other pelvic lesions.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.crwh.2024.e00616.

Contributors

Jinbo Li contributed to the collection, data analysis and interpretation, and manuscript drafting and revision for important intellectual content.

Lingbing Qiu contributed to the data collection and interpretation.

Xiao Li contributed to the data collection and interpretation.

Taicheng Zhou contributed to the data collection and interpretation.

Shuqin Chen was involved in all aspects of research conduct and manuscript drafting and revision for important intellectual content.

All authors approved the final submitted manuscript.

Declaration of generative AI and AI-assisted technologies in the writing process

AI-assisted technologies were not used in the writing process.

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Patient consent

Written informed consent was obtained from the patients for publication of the case details and accompanying images.

Ethical approval

This retrospective study was approved by the Medical Ethics Committee of Sun Yat-sen University Sixth Affiliated Hospital on November 4, 2022. Approval number: 2022ZSLYEC-510.

Provenance and peer review

This article was not commissioned and was peer reviewed.

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Conflicts of interest statement

The authors declare that they have no conflict of interest regarding the publication of this case series.

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