Received: 1 November 2023 | Revised: 12 January 2024 | Accepted: 6 March 2024

DOI: 10.1002/ccr3.8716

CASE REPORT

Clinical Case Reports Open Access WILEY

Unsuccessful laparoscopic resection of a large pelvic solitary fibrous tumor: A case report

Xuping Shao[1,2] | **Haomeng Zhang**[1,2] | **Yanqiu Wang**[3,4] | **Changzhong Li**[5] | **Jipeng Wan**[1] | **Yonghui Zou**[1]

[1]Department of Gynecology, Shandong Provincial Hospital Affiliated to Shandong First Medical University, Jinan, China

[2]Cheeloo College of Medicine, Shandong University, Jinan, China

[3]Department of Anesthesia and Surgery, Shandong Provincial Hospital Affiliated to Shandong First Medical University, Jinan, China

[4]Operating Room, Shandong Provincial Hospital Affiliated to Shandong First Medical University, Jinan, China

[5]Department of Obstetrics and Gynecology, Peking University Shenzhen Hospital, Shenzhen, China

Correspondence
Yonghui Zou, Shandong Provincial Hospital Affiliated to Shandong First Medical University, No. 324 Jingwu Weiqi Road, Huaiyin, Jinan 250021, China.
Email: 18769735015@163.com

Funding information
General project of Shenzhen Science and Technology Innovation Commission, Grant/Award Number: JCYJ20220531094012027; Shenzhen High-level Hospital Construction Fund, Grant/Award Number: YBH2019-260; Shenzhen Key Medical Discipline Construction Fund, Grant/Award Number: SZXK027; Dydrogesterone regulates endometriosis EMT through TGF-b/smad signaling pathway (Baiqun), Grant/Award Number: lcz008

Key Clinical Message

We present a rare case of a female pelvic solitary fibrous tumor unsuccessfully resected using single-port laparoscopy, requiring conversion to laparotomy. Although the resection was successful, the surgical approach could have been improved. For large tumors, minimally invasive results are possible with flexible choices of equipment and incision position.

KEYWORDS

gynecology, laparotomy, pelvic mass, single-port laparoscopy, solitary fibrous tumor

1 | INTRODUCTION

Solitary fibrous tumors (SFTs) are exceedingly rare soft tissue tumors originating from the mesenchyme, with an incidence of 1 case/million people/year, accounting for <2% of all soft tissue tumors.[1] These tumors can occur at various body sites, mostly in the pleura, and are relatively rare in the pelvis and retroperitoneum. In the abdominopelvic cavity, SFTs often grow larger owing to the ample room for growth, resulting in nonspecific space-occupying effects, including abdominal distension, constipation, and dyspareunia. Because of their rarity, awareness is limited among clinicians, resulting in a very low preoperative diagnosis rate and a high (10%–20%) preoperative misdiagnosis rate.[2] A low rate of preoperative diagnosis may result in the inappropriate choice of surgical approach, as the following case demonstrates; however, this has not been explicitly addressed in the literature. Moreover, preoperative

Xuping Shao and Haomeng Zhang should be considered joint first authors.

imaging and hematological tests are of limited relevance to clinicians unfamiliar with SFTs due to their varying and nonspecific presentation across modalities.

A young female patient presented to our gynecology department with a pelvic mass, and SFT was postoperatively diagnosed. A detailed report of this case is presented to provide a learning experience and help develop more rational diagnostic and treatment plans for such patients.

2 | CASE HISTORY

The patient was a 27-year-old nulliparous woman with regular menstrual cycles and no notable medical history. She was asymptomatic and presented for a routine health check-up.

3 | METHODS (DIFFERENTIAL DIAGNOSIS, INVESTIGATIONS AND TREATMENT)

The pelvic ultrasonography revealed a large, solid-cystic mass posterior to the uterus, measuring approximately 10.2×9.8×7.6 cm, with a honeycomb appearance, clear margins, intact peritoneum, and abundant blood flow signals within the mass (Figure 1A,B). The mass was suspected to originate from the left ovary. Laboratory tests, including complete blood count and levels of tumor markers (cancer antigen 125 [CA] 125, human epididymis protein 4, alpha-foetoprotein, and CA 199), were all within normal ranges. Based on the patient's age, normal tumor marker levels, and ultrasound findings, the provisional diagnosis of a left ovarian cystadenoma was established. Given this diagnosis, single-port laparoscopy offers advantages such as reduced trauma, reduced bleeding, and faster recovery compared with laparotomy incision; therefore, we developed a surgical plan for single-port laparoscopy.

The patient was placed in the Trendelenburg position, and a 1 cm longitudinal incision was made at the umbilicus, through which a single-port device was inserted. Laparoscopic exploration revealed a large, solid-cystic mass posterior to the uterus with poor mobility, rich surface blood vessels, well-defined borders, and an intact peritoneum. The mass was not associated with the uterus or bilateral adnexa, and no obvious adhesions were observed. The mass appeared to be attached to the right pelvic sidewall with a broad base, and tortuous and dilated vessels were visible on its surface (Figure 2A,B). To reduce the size of the mass and improve surgical exposure, we attempted to aspirate the cystic component of the mass. However, aspirating the fluid was challenging, the mass volume did not decrease significantly, and the puncture site bled persistently, obscuring the surgical field and making laparoscopic debulking challenging (Figure 2C). Considering the uncertain origin of the mass—most likely the gastrointestinal tract or retroperitoneal tissues—we consulted a gastrointestinal surgeon, who recommended laparotomy for tumor removal. The procedure was then converted to a laparotomy. To achieve good exposure and an adequate surgical field of view, we made an approximately 8-cm median longitudinal incision in the lower abdomen. After opening the abdomen, the pelvic mass in the Douglas fossa was carefully explored and demarcated from the uterus, bilateral adnexa, and intestines without apparent adhesions. The mass was connected to the anterior and lateral walls of the rectum by three thick stalks (Figure 2D). No metastatic lesion existed on the surface of the uterus, bilateral adnexa, pelvic wall, intestines, or the greater omentum. We performed a complete excision of the mass along with its attachment and partial omentectomy for biopsy. The surgical margins were negative.

4 | CONCLUSION AND RESULTS (OUTCOME AND FOLLOW-UP)

The resected specimen was a soft mass with a single layer of thin epithelium and a honeycomb-shaped connective tissue rich in blood vessels. No necrotic area was observed. The mass measured approximately 15×12×8 cm. The histopathological and immunohistochemical results were

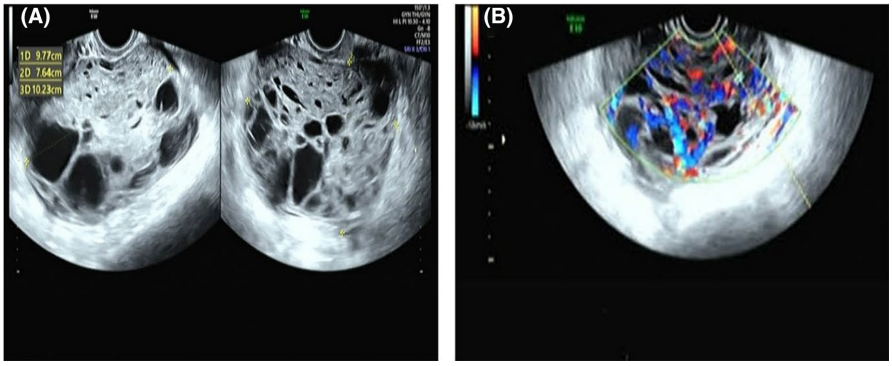

FIGURE 1 Ultrasound images of the pelvic tumor. (A) Grayscale image presenting a cystic mass with a honeycomb appearance, containing multiple cystic dark areas of various sizes within a solid component. (B) Color Doppler image revealing abundant blood flow signals within the mass.

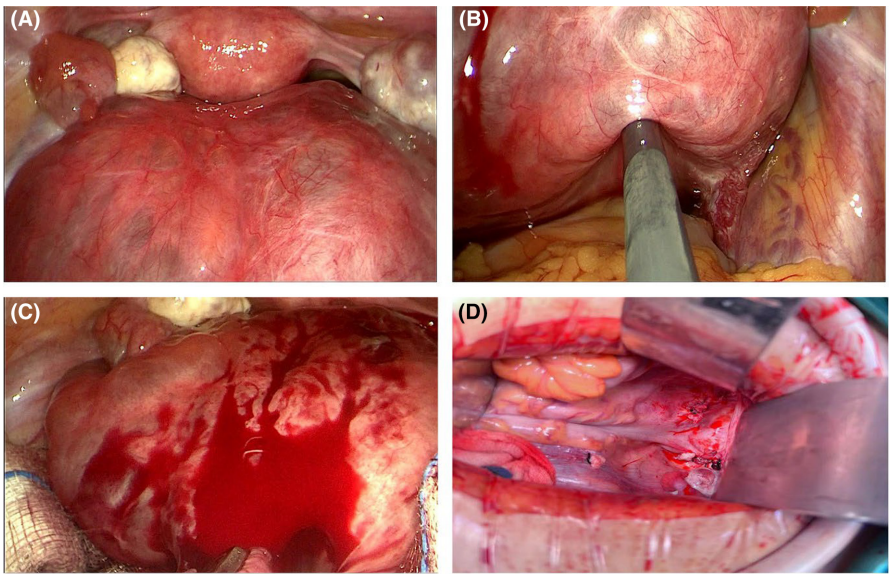

FIGURE 2 Intraoperative and postoperative observations. (A) The tumor is behind the uterus. (B) The tumor is connected to the right pelvic wall by a broad-based stalk. (C) The tumor has a brittle texture and rich blood supply; thus, the puncture site bled persistently. (D) Image after complete tumor resection, with the ligated portion being the attachment site of the tumor.

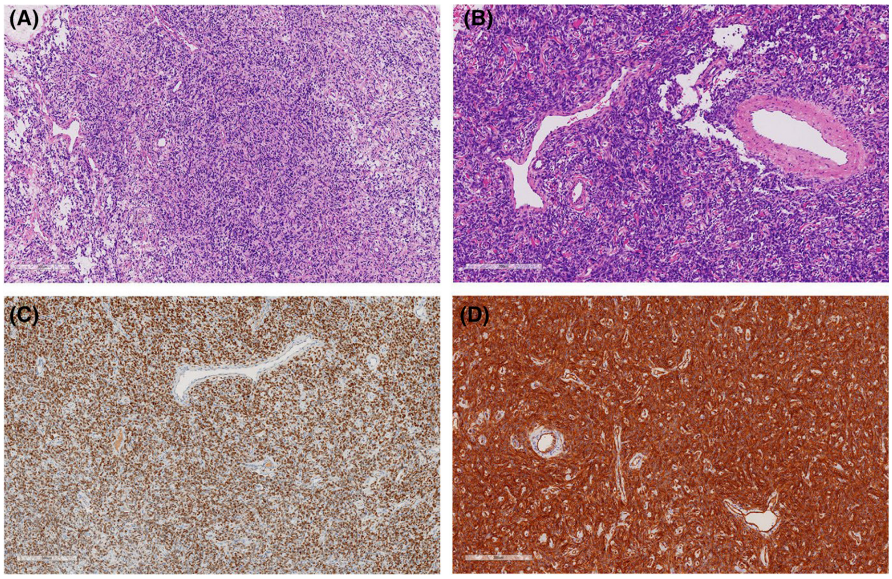

FIGURE 3 Histopathological and immunohistochemical characteristics of pelvic solitary fibrous tumor. (A) In a collagen matrix background, the spindle cells have a haphazard arrangement. (B) Branched "staghorn"-shaped vessels. (C) Nuclei of spindle cells diffusely expressing STAT6. (D) CD34 expression.

consistent with the pelvic SFT diagnosis (Figure 3A–D). We followed up with the patient for 5 months, and a follow-up pelvic ultrasound revealed no tumor recurrence.

5 | DISCUSSION

For patients with SFTs, ultrasound is relatively non-invasive, and it typically reveals heterogeneous hypoechoic or mixed echogenic masses. A color Doppler exam often reveals abundant blood flow in the periphery and center of the tumor, and computed tomography (CT) often reveals a well-defined round or lobulated mass with the same or slightly higher density than that of the muscle.[3] Contrast-enhanced CT should show contrast enhancement. In addition, SFTs usually exhibit iso-intensity with muscles on T1-weighted images (WI), while they vary on T2WI and may be of low or high intensity.[3] Furthermore, SFT serology is usually unremarkable, and tumor marker levels tend to be within the standard range. Patients with SFT tend to have mildly elevated CA125 levels, suggesting adhesions and ascites.[4]

Microscopically, SFTs display extensive histological alterations, characterized mainly by ovoid or short spindle-shaped cells haphazardly arranged around dilated, branching "staghorn"-shaped vessels within a collagenous matrix. Histology alone is insufficient to confirm an SFT diagnosis; therefore, immunohistochemistry is crucial in the differential diagnosis. The combination of CD34, CD99, and Bcl-2 has been used to distinguish SFT from other histologically similar tumors; however, these markers are not specific because they can also be expressed in other mesenchymal neoplasms. Signal transducer and activator of transcription (STAT6) is a recently

discovered highly specific and sensitive marker, with 98% of SFTs having diffuse STAT6 expression in the nucleus.[5]

Surgical resection with negative margins is the most common and effective treatment modality. Negative surgical margins significantly reduce the risk of SFT recurrence and metastasis and are associated with better prognosis.[6]

Accurate diagnosis is a prerequisite for rational treatment. In this patient, only a pelvic ultrasound was performed preoperatively, which revealed a large solid cystic mass that was easily confused with ovarian cystadenoma or cystadenocarcinoma owing to its location and appearance. This patient did not undergo further preoperative investigations such as CT and magnetic resonance imaging to clarify the lesion location and possible source, which resulted in an inadequate assessment of the tumor condition and an irrational choice of surgical approach. Therefore, gynecologists should consider a possible SFT diagnosis in large pelvic masses of unknown origin. Additional imaging tests should be performed before choosing a surgical procedure when the source and nature of the tumor are unclear. Diagnosing SFT requires the collaboration of experienced radiologists, clinicians, and pathologists to improve the preoperative diagnostic rate and surgical outcomes. Furthermore, for large pelvic SFTs with rich vascularity, laparoscopic surgery may be challenging owing to poor exposure and limited operation. Selective embolization of the tumor's main arteries can be performed preoperatively to reduce the tumor size and difficulty of laparoscopic surgery.[7]

Owing to the rarity of this tumor, standard treatment protocols have not yet been established. According to published literature, SFTs in the smaller pelvis, with a diameter of approximately 3–6 cm,[8,9] can be laparoscopically resected. Moreover, when the diameter is larger (>10 cm), laparoscopic surgery can also be performed if the tumor is detached from the surrounding area without obvious adhesions[10] to reduce bleeding and shorten the postoperative recovery time. Different laparoscopic approaches should be adopted for SFTs in various areas. When the tumor is poorly detached from its surroundings, a transabdominal approach is usually adopted; however, its rich vascularity should be considered to avoid hemorrhage during the procedure. We retrieved a previously published case similar to our case in which the patient was considered to have a 16-cm ovarian tumor after ultrasonographic evaluation and underwent laparotomy. The first operation failed owing to hemorrhage during attempts to isolate the mass from the pelvic wall, and the tumor was completely excised in a second operation after performing arterial ligation.[11]

As we failed to significantly reduce the tumor size because of the inadequate surgical view of single-port laparoscopy, and because the tumor had a rich blood supply with continuous bleeding, we converted to open surgery to promptly remove the tumor in this case. We ultimately resected the tumor through a median longitudinal incision in the lower abdomen. However, from the patient's perspective, we believe that our surgical approach could have been further improved, and that the choice of a median longitudinal incision in the lower abdomen was not optimal. Our initial intention in choosing minimally invasive surgery was to minimize patient trauma and to facilitate a rapid recovery. When minimally invasive surgery was unsuccessful, we turned directly to open surgery, ignoring the middle ground between minimally invasive and open surgery. We could have performed a minimally invasive surgery with additional equipment or changed the port placement. The hand-assisted laparoscopic surgery (HALS) procedure, which combines the advantages of traditional open surgery and minimally invasive surgery, may be an option for the removal of such tumors. The ability of an operator to insert a hand during a laparoscopic procedure improves perception, allowing greater operator precision, especially in cases with complex anatomy, and reduces the operative time, resulting in a better patient prognosis. In addition, if an open abdominal surgery is chosen, the choice of incision should be carefully considered. Pfannenstiel incision is preferred over longitudinal incision because it does not cut the muscle and is associated with less postoperative pain.

In conclusion, we report a rare case of a large pelvic SFT for which resection using single-port laparoscopy was unsuccessful, and conversion to laparotomy was required. This case highlights the challenges and pitfalls of choosing the optimal surgical approach for pelvic SFTs, which are often difficult to diagnose and manage owing to their various sizes, locations, and origins. Small-diameter tumors can be removed laparoscopically and large-diameter tumors with intact peritoneum and separation from the surrounding tissues may also be suitable for laparoscopic resection; however, appropriate access must be determined. Minimally invasive resection of tumors can be achieved with the addition of equipment such as HALS. Single-port laparoscopy is not a good choice for larger SFTs because it increases surgery difficulty and complication risks. Open resection is recommended when the tumor is highly adherent to adjacent structures and poorly demarcated; however, wariness of hemorrhage risk is necessary. Collaboration with gastrointestinal surgery, urology, vascular surgery, radiology, or pathology departments should be sought, if necessary, to ensure successful diagnosis and treatment of pelvic SFTs.

AUTHOR CONTRIBUTIONS

Xuping Shao: Conceptualization; investigation; writing – original draft. **Haomeng Zhang:** Conceptualization; investigation; writing – original draft. **Yanqiu Wang:**

Conceptualization; methodology; writing – review and editing. **Changzhong Li:** Methodology; writing – review and editing. **Jipeng Wan:** Project administration. **Yonghui Zou:** Resources; supervision; writing – review and editing.

ACKNOWLEDGMENTS

None.

FUNDING INFORMATION

This study was supported by the Shenzhen Key Medical Discipline Construction Fund (grant number: SZXK027), Shenzhen High-level Hospital Construction Fund (grant number: YBH2019-260), General Project of Shenzhen Science and Technology Innovation Commission (grant number: JCYJ20220531094012027) and Dydrogesterone regulates endometriosis EMT through TGF-b/smad signaling pathway (Baiqun) (grant number: lcz008).

CONFLICT OF INTEREST STATEMENT

None.

DATA AVAILABILITY STATEMENT

Data will be made available by the corresponding author on request.

ETHICS STATEMENT

This report was approved by the ethics committee of Shandong Provincial Hospital. Written informed consent from the patient involved in this case report was obtained.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

ORCID

Xuping Shao https://orcid.org/0009-0006-5325-9886

REFERENCES

1. Palmieri G, Grassi C, Conti L, et al. Giant solitary fibrous tumor of the pelvis: a case report and review of literature. *Int J Surg Case Rep*. 2020;77S(Suppl):S52-S56. doi:10.1016/j.ijscr.2020.09.058
2. Ozaniak A, Hladik P, Lischke R, Strizova Z. Diagnostic challenges and treatment options in patients with solitary fibrous tumor: a single-center observational study. *Front Surg*. 2022;9:952463. doi:10.3389/fsurg.2022.952463
3. Ginat DT, Bokhari A, Bhatt S, Dogra V. Imaging features of solitary fibrous tumors. *AJR Am J Roentgenol*. 2011;196(3):487-495. doi:10.2214/AJR.10.4948
4. Huang WC, Huang SH. A solitary fibrous tumor of the ovary. *Taiwan J Obstet Gynecol*. 2022;61(6):1073-1076. doi:10.1016/j.tjog.2022.02.051
5. Doyle LA, Vivero M, Fletcher CD, Mertens F, Hornick JL. Nuclear expression of STAT6 distinguishes solitary fibrous tumor from histologic mimics. *Mod Pathol*. 2014;27(3):390-395. doi:10.1038/modpathol.2013.164
6. de Bernardi A, Dufresne A, Mishellany F, Blay JY, Ray-Coquard I, Brahmi M. Novel therapeutic options for solitary fibrous tumor: antiangiogenic therapy and beyond. *Cancers (Basel)*. 2022;14(4):1064. doi:10.3390/cancers14041064
7. Yuza K, Sakata J, Nagaro H, et al. A giant pelvic solitary fibrous tumor with Doege-potter syndrome successfully treated with transcatheter arterial embolization followed by surgical resection: a case report. *Surg Case Rep*. 2020;6(1):299. doi:10.1186/s40792-020-01076-5
8. Liu W, Wu S, Cai Y, Peng B. Total laparoscopic duodenum-preserving pancreatic head resection for solitary fibrous tumor: the first case report. *Asian J Surg*. 2022;45(1):651-652. doi:10.1016/j.asjsur.2021.11.010
9. Matsui Y, Hamada M, Sumiyama F, et al. Two cases of primary solitary fibrous tumor in the pelvis resected using laparoscopic surgery. *Int J Surg Case Rep*. 2020;71:58-65. doi:10.1016/j.ijscr.2020.04.079
10. Kawamura J, Tani M, Kida Y, et al. Successful laparoscopic treatment of a giant solitary fibrous tumor of the mesorectum: a case report and literature review. *Asian J Endosc Surg*. 2017;10(1):51-54. doi:10.1111/ases.12322
11. Wat SYJ, Sur M, Dhamanaskar K. Solitary fibrous tumor (SFT) of the pelvis. *Clin Imaging*. 2008;32(2):152-156. doi:10.1016/j.clinimag.2007.07.003

How to cite this article: Shao X, Zhang H, Wang Y, Li C, Wan J, Zou Y. Unsuccessful laparoscopic resection of a large pelvic solitary fibrous tumor: A case report. *Clin Case Rep*. 2024;12:e8716. doi:10.1002/ccr3.8716