Giant lipoma in the Retzius space resected under laparoscopy: A case report

MING-YUE SHANG[1*], LI-XIN TIAN[2*], CHEN-XU TIAN[1], WEI-JIAN CHEN[1], CHENG-YUAN YU[1], ZHENG WANG[1], JING WANG[1], DONG-BO LIAN[1], GUANG-ZHONG XU[1], DE-XIAO DU[1], TIAN-XIONG LI[1], BUHE AMIN[1], NENG-WEI ZHANG[1] and LIANG WANG[1]

[1]Surgery Centre of Diabetes Mellitus, Capital Medical University Affiliated Beijing Shijitan Hospital, Beijing 100038; [2]Department of Urology, Beijing Yanhua Hospital, Beijing 102500, P.R. China

Received May 7, 2023; Accepted September 21, 2023

DOI: 10.3892/etm.2023.12290

Abstract. Lipoma is a common type of benign soft tissue tumor that can occur in the shoulders, neck and back, in addition to other body parts. The Retzius space is a small anatomical space between the pubic symphysis and the bladder located extraperitoneally and filled with loose fatty connective tissue. Giant lipomas are rare in the Retzius space. A 61-year-old Chinese male arrived at Beijing Yanhua Hospital (Beijing, China) due to frequent urination, and CT scan images of the lower abdomen observed a large pelvic mass and left inguinal hernia. Preoperative clinical manifestations and auxiliary examination suggested that the tumor originated from the urinary bladder wall. The maximum tumor diameter was ~25 cm and abdominal pressure was increased. Therefore, laparoscopic pelvic tumor resection combined with inguinal hernia repair was attempted. Intraoperatively, the tumor was found to originate from the Retzius space and the postoperative pathological diagnosis was lipoma. The present case report may serve as a reference for minimally invasive treatment of this type of rare disease in future.

Introduction

A hernia is a common condition that can be treated with surgery, with inguinal hernias being more common in men, with a prevalence of 25% (1). The Retzius space is an anatomical space between the bladder and pubic symphysis, which is located extraperitoneally (2). Lipomas are composed of mature fat cells and can develop in any part of the body where fatty tissue is located, particularly the shoulders, back, neck, breast, abdomen and proximal extremities (3). Pathologically, lipomas are categorized into spindle cell lipoma, fibrolipoma, myxolipoma, myenteric lipoma, angiolipoma, osteolipoma, pleomorphic lipoma and chondrolipoma (4). In 2009, Okuda *et al* (5) reported a case of spindle cell lipoma occurring in the Retzius space where a malignant tumor or preoperative gastric cancer metastasis was originally suspected. The tumor size was 3.0x3.0x3.5 cm. Laparotomy was performed under direct vision, the tumor was resected and the postoperative histopathological report showed that the tumor was composed of spindle cells and abundant mature adipose tissue. Immunohistochemical staining results were CD34 (+); S-100 protein (-); desmin (-); CD31 (-); and α-smooth muscle actin (-) and the diagnosis was spindle cell lipoma. The aforementioned case study could serve as a foundation for the treatment of interstitial lipoma in the Retzius space. In the past 15 years, a small number cases of lipomas in the Retzius space have been reported, particularly without the use of laparoscopic surgery for giant lipomas in the Retzius space (5). The present study reports the case of a giant lipoma in the Retzius space, measuring 25x20 cm, that was completely resected under laparoscopy. The relevant treatment regime is also summarized.

Case report

Medical history. In October 2022, a 61-year-old male presented at the Department of Urology in Beijing Yanhua Hospital (Beijing, China) with frequent urination. Routine urine tests demonstrated mild hematuria and proteinuria. Based on the initial suspicion of a urinary tumor, CT scan of the lower abdomen was performed. The CT images showed an indirect inguinal hernia and lipoma. The patient was referred to the Department of General Surgery for further treatment. The patient reported no symptoms, such as abdominal pain, nausea, vomiting, change in bowel habits or cough. Medical history included left indirect inguinal hernia for 3 months and benign prostatic hyperplasia. Physical examination showed a flat abdomen, without a mass or bulge, varicose veins in the abdominal wall, intestinal pattern or peristaltic waves. On

Correspondence to: Dr Neng-Wei Zhang or Mr. Liang Wang, Surgery Centre of Diabetes Mellitus, Capital Medical University Affiliated Beijing Shijitan Hospital, 10 Tieyi Road, Yangfangdian, Haidian, Beijing 100038, P.R. China
E-mail: zhangnw@ccmu.edu.cn
E-mail: 1911110644@pku.edu.cn

*Contributed equally

Key words: Retzius space, giant lipoma, laparoscopic surgery

palpation, the abdomen was soft, without abdominal mass and with normal bowel sounds. To clarify the presence or absence of ascites, the patient was examined for shifting dullness, which was negative. Plain abdominal CT scan images demonstrated a cystic lesion measuring ~12x12x9 cm and a CT value of -110 HU. The boundary of the lesion with the surrounding tissue was unclear (Fig. 1) However, tumor markers such as CEA, AFP, CA125 and CA19-9, were within the expected ranges. CT findings were consistent with a pelvic mass and indirect inguinal hernia, therefore, an ultrasound was not performed.

The patient provided written informed consent for publication of the present case report.

Surgical procedure and clinical course. Based on a multidisciplinary consultation, in October 2022, the patient was scheduled for laparoscopic pelvic tumor resection with high ligation of inguinal hernia. Although the tumor was located in the Retzius space, it was too large to be operated on extraperitoneally. It was difficult to remove the tumor intact, as it was too large. At the same time, preoperative CT could not distinguish whether the tumor was intraperitoneal or extraperitoneal, and an extraperitoneal surgical approach is difficult for larger tumors; therefore, intraperitoneal surgery was performed. A 10 mm trocar was placed in the umbilicus as observation port 'A', a 12 mm trocar was placed in the left upper abdomen as the main operation port 'B' and 5 mm trocars were placed in the upper umbilicus, left lower abdomen and right lower abdomen as auxiliary operation ports 'C', 'D' and 'E', respectively. The pneumoperitoneum was initially maintained with a pneumoperitoneal pressure of 15 mmHg to fully expose the field of vision. After entering the abdominal cavity, the hernia sac lateral to the inferior epigastric artery confirmed a diagnosis of inguinal hernia. A large mass with a diameter ~25 cm was located in the Retzius space and descended to the bladder. The mass was yellow, fat-like and lobulated, with an insufflation pressure of 12 mmHg. The tumor had no pedicle. Although the mass stemmed from the bladder, it had entered into the Retzius space; therefore, it was classified as a Retzius space tumor. The peritoneum was incised above the tumor with an ultrasonic scalpel and separated along the tumor border. The root of the tumor was located on the bladder wall and was fully freed. Subsequently, the muscular layer of the bladder wall and the incised peritoneum were sutured continuously in layers with absorbable barbed sutures and the left inguinal hernia was ligated at a high position. An incision ~5 cm was made in the B trocar, the incision protective sleeve was placed and an attempt was made to remove the tumor. Based on the patient medical history and preoperative examination findings, the tumor was initially thought to be benign. Therefore, a 5 cm incision protective sleeve was used. However, removal of the tumor was not smooth. Therefore, the incision was enlarged to ~8 cm and the tumor was removed smoothly. The intraoperative blood loss volume was ~20 ml. The entire procedure was performed in ~70 min; the mass was freed in ~50 min and was removed from the intraperitoneal region in ~20 min. The tumor measured ~25x20 cm and was lobulated (Fig. 2). The postoperative histopathological diagnosis was lipoma. Immunohistochemical staining demonstrated that the mass was S100(+), CD34(-), desmin(-), CDK4(-), MDM2(-) and Ki67(-) (Figs. 3 and 4).

Immunohistochemistry method. Tissue samples were placed in Eppendorf tubes and fixed 4% polyformin for 24 h at room temperature. The tissues were dehydrated using graded ethanol (70, 80, 95 and 100%), placed in xylene for transparency and then embedded in paraffin wax in order to cut them into thin slices (5 μm). Subsequently, paraffin slices were placed on polylysine slides in a water bath at 45˚C and dried for 2 h in a 60˚C drying oven.

Paraffin removal was performed with xylene for 10 min (2 times), followed by dehydration with 100, 95, 90, 80 and 70% ethanol (5 min each). The sections were soaked in PBS for 5 min.

For diaminobenzidine staining (Beijing Zhongsan Jinqiao Biotechnology Co.), the sections were treated with citrate buffer with microwave heating for antigen repair, then washed with PBS 3 times for 5 min each. The sections were then incubated with 3% H_2O_2 for 10 min at room temperature in order to block endogenous peroxidase and washed in PBS 3 times for 5 min each. An immunohistochemistry pen was used to draw a circle around the tissue to prevent the staining solution from flowing away. Primary antibody was added in a dropwise manner and placed at room temperature for 1 h, then left overnight at 4˚C. The next day, the sections were taken out and shaken slowly at low speed on a room temperature shaker for 1 h, before being allowed to rise to room temperature and washed three times with PBS for 5 min each time. Enzyme-labelled sheep anti-mouse/rabbit IgG polymer was added in a dropwise manner and incubated for 20 min at room temperature, before washing with PBS 3 times for 3 min each. Finally, the sections were incubated with DAB for 5 min at room temperature and washed with PBS 3 times for 2 min each. Staining with hematoxylin was performed for 3 min, before washing with tap water. Hematoxylin differentiation solution was used for a few seconds, before washing with tap water, then returned to blue with hematoxylin and washed with running water. Sections were then dehydrated in gradient ethanol (70, 80, 95 and 100%), made transparent with xylene and sealed with neutral gum. All images were taken using an optical microscope (Nikon ECLIPSE CI-S; Nikon Coporation) with an image analysis system (Nikon DS-U3; Nikon Coporation).

Primary antibodies used were as follows: S-100 (ready-to-use solution; cat. no. ZA-0225; rabbit anti-human antibody; Beijing Zhongsan Jinqiao Biotechnology Co.), CD34 (ready-to-use solution; cat. no. ZM-0046; mouse anti-human antibody; Beijing Zhongsan Jinqiao Biotechnology Co.), Desmin (ready-to-use solution; cat. no. ZA-0610; rabbit anti-human antibody; Beijing Zhongsan Jinqiao Biotechnology Co.), CDK4 (ready-to-use solution; cat. no. ZA-0614; rabbit anti-human antibody; Beijing Zhongsan Jinqiao Biotechnology Co.), MDM2 (ready-to-use solution; cat. no. ZM-0425; mouse anti-human antibody; Beijing Zhongsan Jinqiao Biotechnology Co.) and Ki-67 (ready-to-use solution; cat. no. ZM-0166; mouse anti-human antibody; (Beijing Zhongsan Jinqiao Biotechnology Co.). The secondary antibody was an anti-mouse/rabbit IgG (ready-to-use solution; cat. no. UM-9002; Beijing Zhongsan Jinqiao Biotechnology Co.).

Postoperative situation. On postoperative day 4, the urinary catheter was removed as the patient had no discomfort.

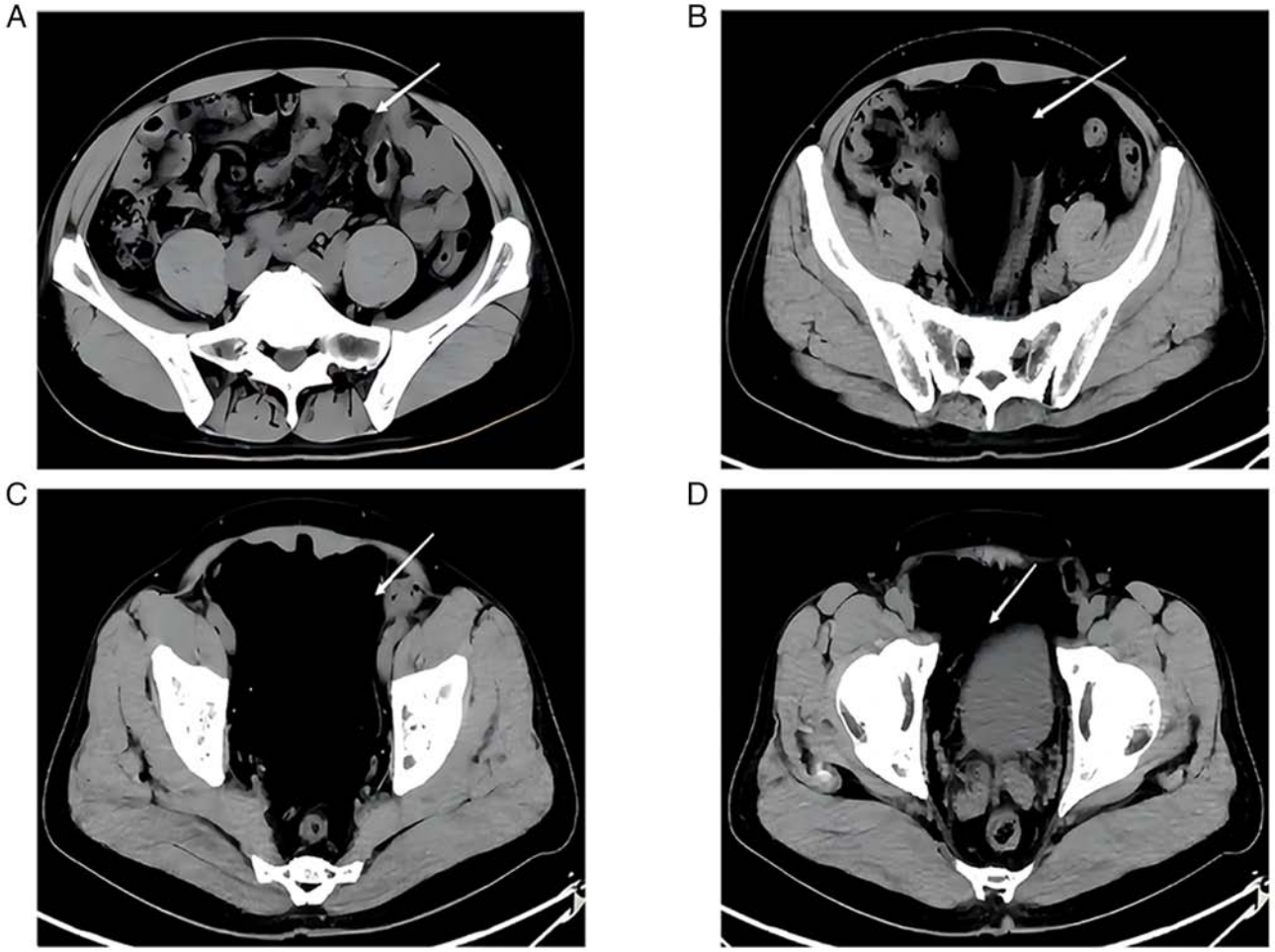

Figure 1. CT scan images of the tumor (October 2022). Lipoma (A) at presentation (white arrow indicates the presence of the lipoma) and (B) after a gradual increase in size (the arrow indicates that the lipoma is significantly enlarged and compressing the surrounding tissue). (C) Largest cross-section of the lipoma (the arrow indicates at the maximum transverse diameter of the lipoma, adjacent to the surrounding tissue.). (D) Association between the lipoma and bladder (the arrow indicates where the lipoma is adjacent to the bladder).

Subsequently, the patient was discharged. At the time of writing the present report at the 1-month follow-up, the wound had healed well.

Discussion

Compared with giant lipomas of the body surface, giant lipomas in the Retzius space are rare (5). The present case may provide a reference for diagnosis and treatment of this condition in the future.

The present patient had a left inguinal hernia, which is usually associated with increased intra-abdominal pressure. Common causes of increased intra-abdominal pressure are cigarette smoking, chronic cough, obesity and poor urination (1). However, the intra-abdominal pressure was likely increased in the present patient because of the presence of a large pelvic mass. The left inguinal hernia may have developed secondary to the mass. The present case report suggested that clinicians should consider the possibility of a pelvic mass in patients with inguinal hernia.

Large pelvic masses usually raise the abdomen and can be palpated. However, in the present case, physical examination showed no abdominal swelling on inspection and no mass on palpation. Abdominal CT demonstrated a large pelvic mass, considered to be a lipoma. When no mass is palpable on abdominal examination, the possibility of a large pelvic mass cannot be ruled out and abdominal CT should be performed to confirm the diagnosis. Here, no pelvic mass was found on physical examination because the patient had a benign soft tissue mass in the retroperitoneal position. The Retzius space is large and a soft tissue mass can grow until it fills the entire space (6). As the peritoneum covering the tumor exerts pressure on the tumor, the tumor is more likely to compress loose connective tissue in the pelvic cavity, rather than push the peritoneum up, thus manifesting as a pelvic mass (7). In summary, a large benign soft tissue mass in the pelvic cavity may manifest as a flat abdomen and no mass on palpation and this diagnosis could be confirmed by imaging findings. For patients clinically considered to have a pelvic mass, abdominal CT is helpful in confirming the diagnosis (8).

For large intra-abdominal masses, laparotomy is the treatment of choice (9). Since the 1980s, minimally invasive laparoscopic surgery has been developed and is widely used in many fields, such as general surgery, gynecology and urology (10). Previous clinical studies have reported that compared with open surgery, minimally invasive

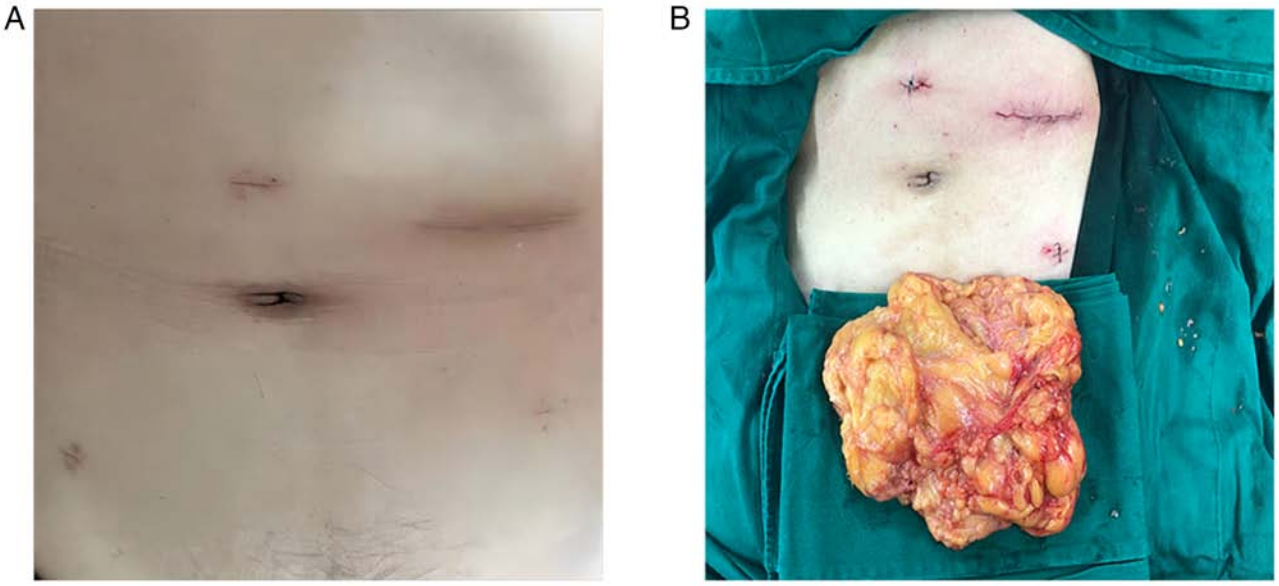

Figure 2. Intraoperative images of the tumor and surgical wound. (A) Healing of the wound (1 month after surgery). (B) Initial surgical wound and tumor.

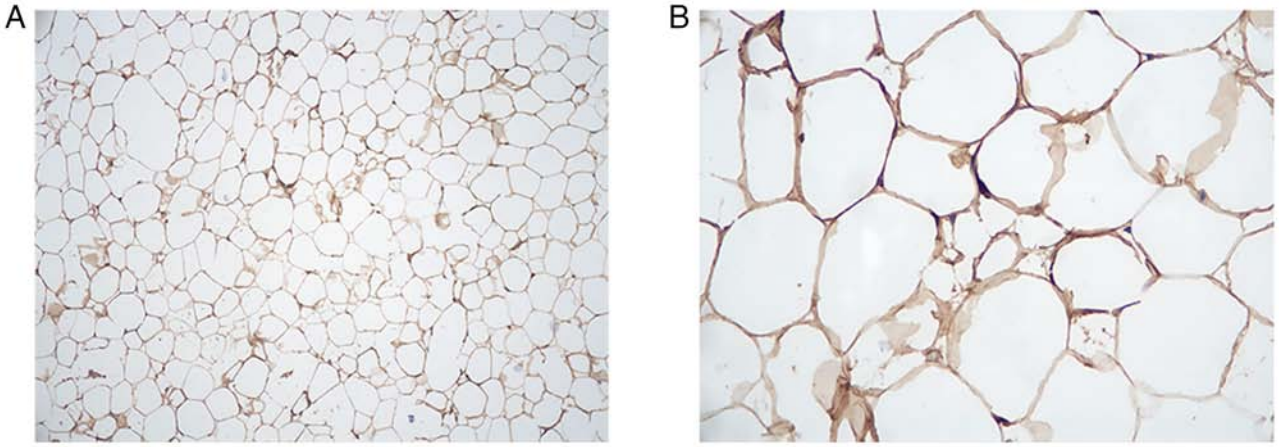

Figure 3. Immunohistochemical staining of the tumor demonstrated the mass was positive for S-100. (A) x100 and (B) x400 magnification.

laparoscopic surgery is less traumatic to patients, causes significantly less pain and leads to significantly faster postoperative recovery (11,12). In addition, laparoscopic surgery can aid in evaluating the association between the tumor and surrounding organs intraoperatively and can be used to identify the blood vessels of the tumor (13). However, only a few cases of large intra-abdominal tumors treated with laparoscopic resection have been reported and clinical experience with the distribution of the trocar, the position of the operator and the manner in which the procedure is performed remains insufficient (14-17). In 2009, Shiroshita *et al* (13) performed laparoscopic resection of a giant lipoma in the omentum of a 71-year-old male. Abdominal ultrasonography demonstrated a hyperechoic mass in the abdominal cavity and preoperative CT scan led to a preliminary diagnosis of lipoma. Considering that the tumor originated from the omentum, a transperitoneal approach was undertaken. The tumor was resected endoscopically and 10 mm trocars were placed on, above and below the umbilicus. Intraoperatively, the tumor measured ~29x19x3 cm and postoperative histopathology confirmed that the tumor was a lipoma. Using laparoscopy, Choi *et al* (18) resected a large abdominal lipoma with a diameter of ~20 cm in a 36-year-old male. The chief complaint of the patient was frequent urination, and a physical examination showed no abdominal mass. Urinalysis results were within the healthy expected ranges. CT scan showed a mass of ~20x11 cm, located between the abdominal wall muscles and compressed bladder, within the peritoneum. The postoperative histopathological diagnosis was benign lipoma.

In the present case, preoperative abdominal CT indicated that the pelvic mass was likely benign, soft and with a clear boundary with the surrounding tissues. Therefore, complete laparoscopic resection of the large pelvic mass was attempted.

Intraoperatively, because the D trocar was located in the left lower abdomen, when separating the left side of the tumor, the tumor could not initially be removed because the distance between the B and D trocars was too small. Separation on the left border of the mass was difficult. Adhesion between the

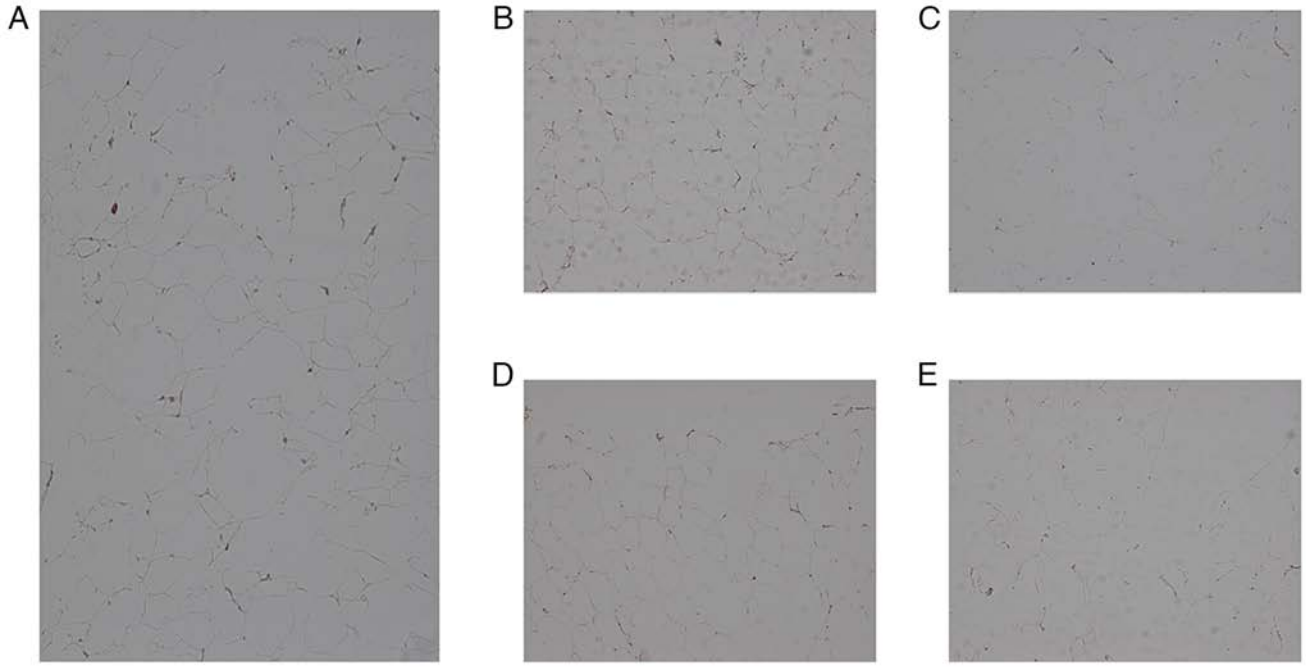

Figure 4. Immunohistochemical staining of the tumor demonstrated the mass was negative. (A) CD34 (x100 magnification), (B) CDK4 (x100 magnification), (C) desmin (x100 magnification), (D) MDM2 (x100 magnification) and (E) Ki67 (x100 magnification).

tumor and surrounding tissue could not be ruled out preoperatively, nor could the requirement of adhesion release be ruled out intraoperatively. Therefore, based on the findings during the operation, the trocar position A was better for observation. The positions of the A and B trocars remained unchanged. The C trocar was inserted at the junction of the left midclavicular line and a line drawn 2 cm above the navel. The D and E trocars were inserted at the junction of lines 2 cm lateral to the left and right midclavicular lines with a line 2 cm below the navel, respectively. The navel functioned as an auxiliary hole.

When resecting the specimen, considering that the tumor was soft and benign, a small incision was made measuring ~5 cm. However, the tumor could not be removed smoothly. Therefore, the opening was enlarged to ~8 cm. Subsequently, removal of the mass was successful but partial tearing of the specimen occurred. Therefore, for such tumors, to ensure integrity of the specimen, small incisions should not be excessively manipulated and the incision should be directly extended to an appropriate length.

Iatrogenic bladder injury is a relatively common complication of pelvic surgery, with an incidence reaching 4.5% (19,20). In the present case, the pelvic lipoma adhered tightly to the bladder wall and surgical treatment risked damaging the bladder wall. To avoid damaging the bladder wall during surgery, the bladder should be fully emptied by inserting a urinary catheter preoperatively. In addition, when the boundary of the bladder cannot be clearly defined intraoperatively, fluid or CO_2 can be injected into the bladder to clarify the boundary (19,21). If bladder injury is suspected intraoperatively, cystoscopy can be performed to confirm injury (22,23). In the present case, preoperative CT indicated that the tumor was close to the bladder and the possibility that the tumor originated from the bladder could not be ruled out.

In conclusion, the present study is a preliminary report of the successful diagnosis and treatment of a giant lipoma in the Retzius space.

Acknowledgements

Not applicable.

Funding

The present study was supported by the Beijing Municipal Science & Technology Commission (grant no. Z221100007422005).

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

LW and NWZ made contributions to the study conception and design. CXT, CYY, BA and JW contributed to the acquisition of data. WJC and MYS contributed to the analysis and interpretation of data. NWZ, GZX, DBL and TXL performed the surgery. LXT, ZW and DXD performed the imaging. MYS, LXT and JW advised on patient treatment. TXL and JW confirm the authenticity of all the raw data. All authors have read and approved the final manuscript.

Ethics approval and consent to participate

Not applicable.

Patient consent for publication

The patient consented to the use of their clinical information/data and images for the purpose of research and their publication. The patient provided written informed consent.

Competing interests

The authors declare that they have no competing interests.

References

1. Hewitt DB: Groin Hernia. JAMA 317: 2560, 2017.
2. Wagaskar VG, Mittal A, Sobotka S, Ratnani P, Lantz A, Falagario UG, Martini A, Dovey Z, Treacy PJ, Pathak P, *et al*: Hood technique for robotic radical prostatectomy-preserving periurethral anatomical structures in the space of retzius and sparing the pouch of douglas, enabling early return of continence without compromising surgical margin rates. Eur Urol 80: 213-221, 2021.
3. Jóźwik M, Kołodziejczak M, Klonowska-Dziatkiewicz E and Jóźwik M: Giant vulvar lipoma in an adolescent girl: A case study and literature review. J Pediatr Adolesc Gynecol 27: e117-e119, 2014.
4. Sergey K and Svetlana VB: Nasopharyngeal Lipoma: Clinical Case. Laryngoscope 131: E1099-E1102, 2021.
5. Okuda H: Spindle cell lipoma in Retzius' space. Int J Urol 16: 218-219, 2009.
6. Asakage N: Paradigm shift regarding the transversalis fascia, preperitoneal space, and Retzius' space. Hernia 22: 499-506, 2018.
7. Chen X, Kang C and Zhang M: Imaging features of urachal cancer: A case report. Front Oncol 9: 1274, 2019.
8. Bebobru M, Nasri FA, Niculescu-Valaenu M and Friedhoff K: Retrorectal teratoma (dermoid cyst) of an adult-Diagnosis and treatment based on an example of a case report. Dtsch Med Wochenschr 146: 104-107, 2021 (In German).
9. Koehne EL, Bajic P and Gupta GN: Robotic-assisted laparoscopic retroperitoneal adrenalectomy. Surg Oncol 31: 7, 2019.
10. Vecchio R, MacFayden BV and Palazzo F: History of laparoscopic surgery. Panminerva Med 42: 87-90, 2000.
11. Kapritsou M, Korkolis DP and Konstantinou EA: Open or laparoscopic surgery for colorectal cancer: A retrospective comparative study. Gastroenterol Nurs 36: 37-41, 2013.
12. Cha JM, Lee JI, Joo KR, Choe JW, Jung SW, Shin HP, Kim HC, Lee SH and Lim SJ: Giant mesenteric lipoma as an unusual cause of abdominal pain: A case report and a review of the literature. J Korean Med Sci 24: 333-336, 2009.
13. Shiroshita H, Komori Y, Tajima M, Bandoh T, Arita T, Shiraishi N and Kitano S: Laparoscopic examination and resection for giant lipoma of the omentum: A case report and review of related literature. Surg Laparosc Endosc Percutan Tech 19: e217-e220, 2009.
14. Jiang L, Zhao X, Han Y, Liu K and Meng X: Giant ovarian cysts treated by single-port laparoscopic surgery: A case series. Front Oncol 11: 796330, 2021.
15. Dolan MS, Boulanger SC and Salameh JR: Laparoscopic management of giant ovarian cyst. JSLS 10: 254-256, 2006.
16. Postma VA, Wegdam JA and Janssen IM: Laparoscopic extirpation of a giant ovarian cyst. Surg Endosc 16: 361, 2002.
17. Bhandarkar D, Ghuge A, Kadakia G and Shah R: Laparoscopic excision of an omental leiomyoma with a giant cystic component. JSLS 15: 409-411, 2011.
18. Choi H, Ryu D, Choi JW, Xu Y and Kim Y: A giant lipoma of the parietal peritoneum: Laparoscopic excision with the parietal peritoneum preserving procedure-a case report with literature review. BMC Surg 18: 49, 2018.
19. Saaqib S, Iqbal A, Naheed M, Saeed T and Khalid M: A randomized controlled trial of cystoinflation to prevent bladder injury in the adhesive disease of multiple caesarean sections. Sci Rep 10: 15297, 2020.
20. Vorobev V, Beloborodov V, Golub I, Frolov A, Kelchevskaya E, Tsoktoev D and Maksikova T: Urinary system iatrogenic injuries: Problem review. Urol Int 105: 460-469, 2021.
21. Findley AD and Solnik MJ: Prevention and management of urologic injury during gynecologic laparoscopy. Curr Opin Obstet Gynecol 28: 323-328, 2016.
22. Rao D, Yu H, Zhu H and Duan P: The diagnosis and treatment of iatrogenic ureteral and bladder injury caused by traditional gynaecology and obstetrics operation. Arch Gynecol Obstet 285: 763-765, 2012.
23. Vakili B, Chesson RR, Kyle BL, Shobeiri SA, Echols KT, Gist R, Zheng YT and Nolan TE: The incidence of urinary tract injury during hysterectomy: A prospective analysis based on universal cystoscopy. Am J Obstet Gynecol 192: 1599-1604, 2005.