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Laparoscopic excision of urachal cyst found at preoperative examination for ovarian dermoid cyst

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Abstract A 30-year-old, gravida 1 para 1 married woman was referred to our hospital because of an ovarian dermoid cyst found during a regular check-up. Transabdominal ultrasonography and abdominal magnetic resonance imaging showed the presence of a cystic tumor in the preperitoneal space of the abdominal wall below the umbilicus, in addition to an ovarian dermoid cyst in the pelvic cavity. Under a diagnosis of urachal cyst, laparoscopic excision was performed using LigaSure Atlas at the same time as ovarian cystectomy.

Keywords Urachal · Cyst · Laparoscopic · Surgery · LigaSure

The urachus is an embryonic tubal structure that connects the bladder top to the umbilicus (Fig. 1a), and it is formed in the early period of fetal development [1]. The lumen of the normal urachus usually becomes obliterated or completely collapsed. However, incomplete obliteration of the urachal lumen can result in several anomalies (Fig. 1b–e) [2]. Urachal cyst is a remnant tubal structure of the urachus formed between the bladder and the umbilicus (Fig. 1c) and is a relatively rare disorder that occurs in approximately 1/5,000 births [2, 3]. Urachal cyst is usually found at the time of infection or malignant transformation [4]; however, an asymptomatic urachal cyst is sometimes noted at a regular check-up [2].

In this patient's case, an asymptomatic urachal cyst was incidentally detected during preoperative examination for ovarian dermoid cyst and was successfully excised by laparoscopic surgery when ovarian cystectomy was performed.

Case report

A 30-year-old, gravida 1 para 1 married woman with no previous disease history was referred to our outpatient clinic because of an ovarian dermoid cyst detected during a regular check-up. Pelvic and transvaginal ultrasonographic examination indicated the presence of an ovarian dermoid cyst. Further routine examination by transabdominal ultrasonography and magnetic resonance imaging (MRI; Fig. 2) demonstrated the presence of a cystic tumor (46×31×37 mm) that showed fluid-fluid levels in the preperitoneal space of the abdominal wall 2 cm below the umbilicus, as well as a cord-like structure that connected the cystic tumor and the bladder top. Serum tumor marker values (alpha fetoprotein 4.3 ng/ml, carcinoembryonic antigen 0.9 ng/ml, CA19-9 7.6 U/ml, CA125 11.6 U/ml, SCC 1.1 ng/ml) were within the normal ranges.

Under a diagnosis of urachal cyst in addition to ovarian dermoid cyst, gasless laparoscopic surgery was performed according to the procedure previously described [5], with some modifications. Briefly, under general anesthesia, the abdominal wall was lifted by a subcutaneous lift system (Mizuho, Tokyo, Japan), and a 5-mm OptiView port (Ethicon Japan, Tokyo, Japan) was placed in the upper left quadrant of the abdomen just lateral to the rectus sheath to introduce a 5-mm laparoscope (Olympus, Tokyo, Japan), taking care not to puncture the urachal cyst (Fig. 3). Two other OptiView ports (Ethicon Japan, Tokyo, Japan) were placed laterally under direct vision: a 5-mm port on the left side and a 12-mm port on the right side at the level of the umbilicus.

Under laparoscopic observation, there was a cystic tumor firmly attached to the anterior abdominal wall, flanked by two medial umbilical ligaments and narrowing to a fibrous band of the median umbilical ligament at the bladder dome (Fig. 4a). The following procedures were performed by the gynecology staff with monitoring by the urologist in our hospital. The peritoneum was incised just below the umbilicus cephalad to the cyst. A urachal cyst was found in the Retzius space beneath the transversalis fascia in the preperitoneal area. This tissue plane was entered, and the tumor was carefully excised out of its bed by LigaSure Atlas (Tyco Healthcare Japan, Tokyo) in continuity with its

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Fig. 1 Classification of urachal anomalies. **a** Normal urachus. **b** Patent urachus. **c** Urachal cyst. **d** Umbilical urachal cyst and sinus. **e** Vesicourachal diverticulum

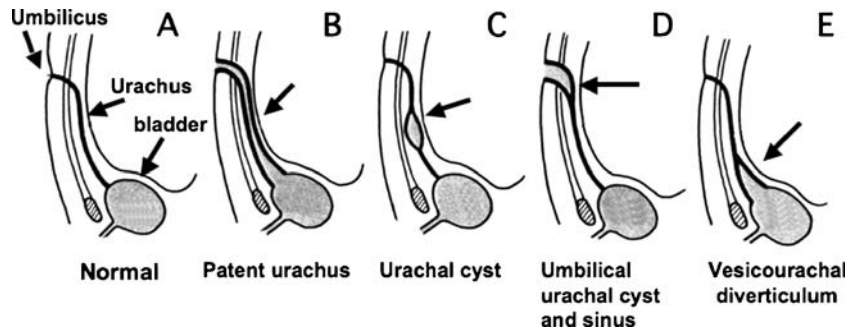


Fig. 2 **a** Sagittal T2-weighted magnetic resonance image of urachal cyst (arrow) in the preperitoneal space of the abdominal wall with a cord-like structure extending to the bladder top. An ovarian dermoid cyst is present in the Douglas cavity. **b** Cross-sectional T2-weighted magnetic resonance image of urachal cyst (arrow) in the extraperitoneal space between the peritoneum and transversalis fascia



entire tract, including the median umbilical ligament above at the bladder dome to prevent recurrence (Fig. 4b). The

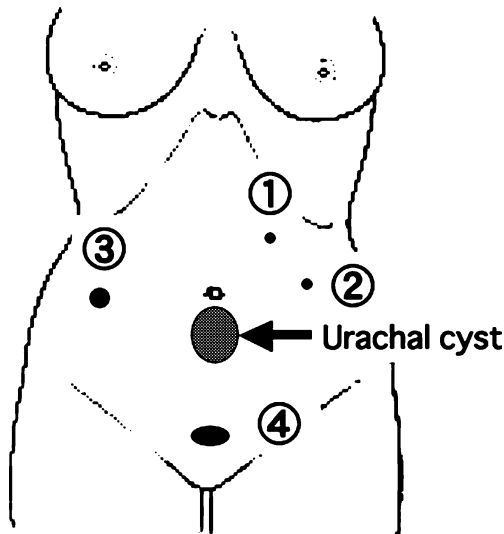


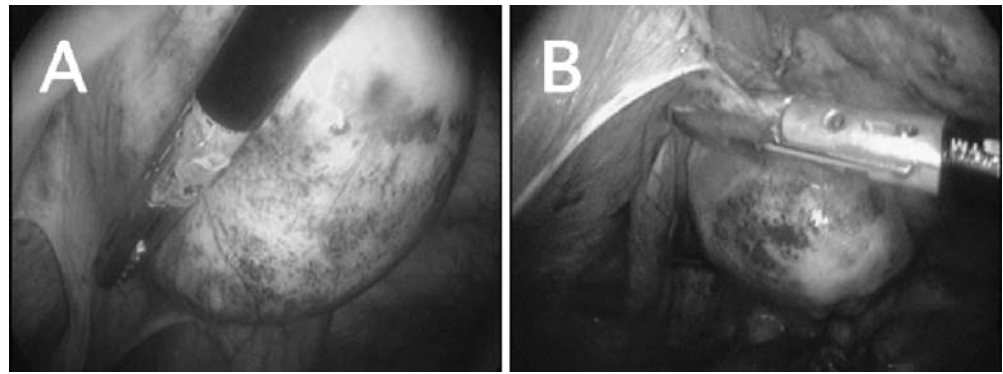
Fig. 3 Trocar placement for laparoscopic urachal excision: port 1 (5-mm OptiView) for laparoscopic observation, port 2 (5-mm OptiView) and port 3 (12-mm OptiView) for surgical procedures, port 4 (Alexis wound retractor) for extracorporeal cystectomy of the ovarian dermoid cyst as well as removal of the excised specimen from the body

excised tissue was placed in an Endopouch retriever (Ethicon Japan, Tokyo, Japan). Then a 20-mm suprapubic port (Fig. 3) was made using the Alexis wound retractor (Applied Medical, Rancho Santa Margarita, CA, USA) [6] for extracorporeal cystectomy of the ovarian dermoid cyst as well as removal of the excised urachal cyst from the body after having drained the tumor contents into the bag. The bladder was filled with saline containing indigo carmine dye, and the Foley catheter was clamped to confirm the absence of leakage. After inspection of the abdominal cavity for hemostasis, the surgical wound was closed with Dermabond (Ethicon Japan, Tokyo, Japan) after subcutaneous suturing.

The operating time for excision of the urachal cyst and ovarian cystectomy was 45 min, and the estimated blood loss was less than 20 ml. There were no intraoperative or postoperative complications. The patient was discharged 3 days after surgery. Six months later, she spontaneously became pregnant, and the pregnancy course was uneventful.

Examination of the excised specimen demonstrated a cystic structure with a thick and elastic hard wall. The cyst contained highly viscous brown materials presumably resulting from degenerated blood and exfoliated tissue. Microscopically, the cyst cavity was lined by degenerated transitional epithelium and surrounded by a thick fibrous tissue wall containing hemosiderin deposit (Fig. 5).

Fig. 4 **a** Laparoscopic view of urachal cyst. The cystic tumor was firmly attached to the anterior abdominal wall, flanked by two medial umbilical ligaments and narrowing to a fibrous band of median umbilical ligament at the bladder dome. **b** Excision of urachal cyst by LigaSure Atlas



Discussion

The urachus is a vestigial structure arising from the anterior bladder wall and extending cranially to the umbilicus within the extraperitoneal fat between the peritoneum and transversalis fascia [1]. The urachus consists of a three-layered structure of transitional cell epithelium, connective tissue, and an outer smooth muscle layer. Derived from involution of the allantois, which begins at 4–5 months of gestation, it becomes a fibrous cord, called the median umbilical ligament, by birth. The umbilicovesical fascia surrounds the urachus and extends laterally to envelop the two obliterated umbilical arteries, called medial umbilical ligaments [1].

Urachal cyst develops if the urachus closes at both the umbilical and bladder ends but remains patent between these two endpoints (Fig. 1c) [2]. It occurs primarily in the lower one-third of the urachus, while a cyst in the upper one-third, as shown in the present report, is less frequent [7]. Urachal cyst is usually small but varies considerably in size. It becomes symptomatic when enlarged due to either

infection or malignant transformation. However, it can also be found as an incidental mass during routine examination by image diagnostic procedures such as ultrasonography, computed tomography, and MRI [7]. In the present case, images obtained by MRI were more useful than findings from transabdominal sonography because the tumor's location in the preperitoneal space of the abdominal wall was especially evident on the MRI sagittal sectional view. Identification of a cord-like structure between the cyst and bladder top on the sagittal sectional view of MRI is also helpful for diagnosing urachal cyst.

Traditionally, excision of urachal cyst is performed by laparotomy with a transverse or midline infraumbilical incision [8]. However, as laparoscopic instrumentation and technical skills improve, laparoscopy has increasingly been performed as an alternative to traditional open surgery to treat urachal cyst [8]. Because urachal anomalies are rare and most such cases are treated by urologists [8] after symptoms become manifest, gynecologists may encounter urachal anomalies on limited occasions [9]. As in the present case, if the urachal cyst is located near the umbilicus, preoperative diagnosis is not difficult after detection of the tumor, and treatment by a urologist may be a choice. However, if the urachal cyst is located near the bladder, it is sometimes difficult to differentiate from an ovarian cyst and may require treatment by a gynecologist after the correct diagnosis is made by laparoscopic observation [9]. Also, if urachal cyst is incidentally found, as in the present case, during the routine examination for a gynecological disorder, a gynecological laparoscopist can positively participate in treatment because the procedure used in gynecological laparoscopic surgery can be applied to excise a urachal cyst, although a urologist's assistance could be helpful for understanding the urachal structure and avoiding bladder injury.

Location of the first trocar insertion in this case was primarily important after identifying the urachal cyst because if the trocar were inserted at the usual position around the umbilicus, the urachal cyst could be injured, making the surgical procedures more difficult. At excision of the urachal cyst, LigaSure Atlas was useful for coagulating and cutting the tissue with minimal blood loss within a short period.

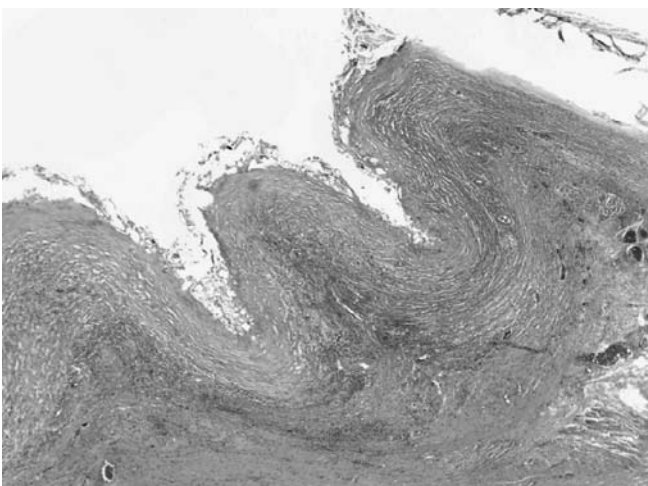


Fig. 5 Histopathologic findings of excised urachal cyst. The cyst cavity was lined by degenerated transitional epithelium and surrounded by a thick fibrous tissue wall containing hemosiderin deposit (hematoxylin-eosin stain, 100× magnification)

Although urachal cyst is a rare disorder, preoperative evaluation for the presence of such disorders other than gynecological disease should be carefully done to avoid unexpected complications.

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