ABSTRACT

Background: Utricular cysts are usually the result of incomplete involution of the Müllerian ducts and may have no urethral connection. Treatment options for symptomatic utricular cysts include an open abdominal approach, trans-vesical excision, vasoligation without excision and laparoscopic/robotic-assisted excision.

Patients and methods: Two patients (14 and 45 years old) with recurrent urinary tract infections associated with recurrent lower urinary tract irritative symptoms and recurrent perineal pains presented to our department. Clinical, radiological and MRI examinations showed 6x3 and 5x4cm utricular cysts, respectively. Both patients underwent robotic-assisted complete dissection of the cyst, including its neck. Separation of the cysts from surrounding tissues as well as the seminal vesicles while avoiding injury to the neurovascular bundles was followed by incision of the prostate base to dissect the cyst neck from the prostatic parenchyma up to its connection to the urethra. The cyst neck was secured with either one clip or 4/0 vicryl sutures. The
Thanks to recent advances in male pelvic-cavity imaging, such as abdominal computed tomography/magnetic resonance scans (CT/MRI) and trans-rectal ultrasound (TRUS), there has been an increase in the reported incidence of prostatic cysts, ranging between 5–8.6%. Cystic lesions of the prostate may include cystic dilatations of the ejaculatory system, utricle cysts (Müllerian cysts), prostatic cysts, seminal vesicle cysts and ejaculatory duct cysts. A recent classification of midline prostatic cysts was proposed based on the presence of communication with the urethra or seminal vesicles. The authors reported that the most common type of cysts was cystic dilatation of the prostatic utricle. These utricle cysts are usually the result of incomplete involution of the Müllerian ducts. However, this definition remains controversial. Müllerian duct cysts are characterized by the complete absence of any communication with the urethra and are lined with cuboidal or columnar epithelium. On the other hand, utricle cysts probably develop after complete or incomplete obstruction of the communication between the urethra and the prostatic utricle.

Regardless of the type of prostatic cyst, there is a broad range of clinical presentations. While most patients present in the third and fourth decades, there are also a significant number of case reports in young adults and even infants. Patients usually present with various unspecific symptoms such as urinary and ejaculatory obstructive symptoms, urogenital dysfunction, recurrent epididymitis, irritative lower urinary tract symptoms, and acute urinary retention, or may even be completely asymptomatic. This makes an accurate clinical differential diagnosis challenging. Pelvic imaging can reveal cystic lesions in the prostatic or seminal vesicle region, a pelvic or abdominal mass, or even prostate malignancy-like structures.

Treatment for symptomatic cysts is mandatory and includes an open abdominal approach, transvesical excision, vasoligation without excision and laparoscopic as well as robotic-assisted excision. However, a standard treatment is still not available.

This report describes two patients presenting with giant utricular cysts that were successfully treated with robotic-assisted laparoscopic excision. Case work-up, technique and follow-up are provided.
Clinical and digital rectal examination (DRE)
In both patients, clinical and laboratory examinations revealed no general abnormalities. There was a palpable midline cyst by DRE. This was not compressible or tender, and is related to the prostate base. Both seminal vesicles were not palpable.

Abdominal and transrectal ultrasound
In both patients, ultrasound examination showed no other abdominal pathology. TRUS excluded the possibility of recurrent urethral valve and/or urethral dilatation (Case 1). There was a central midline giant cyst between the seminal vesicles with a long cyst neck seen in the prostatic parenchyma. The cysts were filled with clear fluids without echoes. No patent contact to the urethra or seminal vesicles was detected.

Voiding cysto-urethrography and diagnostic cystoscopy
These examinations revealed no pathological findings or visible connections to the urethra and ruled out any relevant stricture, urethral valve and reflux.

Abdominal-pelvic magnetic resonance tomography
MRI showed 6x3 and 5x4cm cysts, respectively, in the midline of the lower abdomen, dorsal to the prostate without communication with the urethra, seminal vesicles or adjacent structures. These cysts were considered to be giant utricular cysts (Fig. 1a,b).

Robotic-assisted procedures
After standard preoperative preparation, both patients were scheduled for robotic-assisted resection of the utricle cyst. Under general anesthesia, the patient was placed in the Trendelenburg position and the robotic patient-side cart was installed between the lower extremities. Four work trocars were used. A 12 mm trocar was placed through mini-laparotomy at the umbilicus for the 0-degree robotic camera and pneumoperitoneum was achieved (12 mmHg). Two robotic trocars were inserted under direct vision in the left and right iliac fossae. Another 12 mm assistant trocar was inserted midway between the two trocars on the left (Case 2).

Diagnostic laparoscopy was performed to exclude the possibility of any associated abnormalities. The peritoneal reflection coating the fundus and posterior wall of the urinary bladder was incised with an inverted T-shaped incision. This was followed by separation of both seminal vesicles in the midline under preservation of their blood supply and neurovascular bundles. After identification of the utricle cyst, it was dissected free from the surrounding tissues of the retro-vesical space as well as the seminal vesicles. Dissection was extended through the prostate base, to the insertion of the cyst neck. Particular attention was given to avoid injury to the bladder neck, urethra, rectum, ureters, vas deferens, prostate and seminal vesicles.

The occasional use of robotic monopolar scissor and bipolar coagulation provided a completely bloodless dissection of all adhesions without the need for clips or ligatures. Dissection of the cyst neck was followed by incision of the prostate base, while dissecting only the cyst neck from the prostatic parenchyma up to its closed connection to the urethra. After complete dissection, the cyst neck was secured with either one clip or 4/0 vicryl sutures. This was followed by resection just beyond its junction with the urethra.

The field was reconstructed with the same sutures mentioned above, beginning with the prostate base, followed by the retro-vesical tissues and then the peritoneum. The specimen was removed through the 10 mm port. The bladder Foley catheter was left in place at the end of the procedure. Drains were removed after the cessation of excretions.

Follow-up
Patients were followed-up with regular clinical, abdominal and MRI examinations beginning 3 months postoperatively.

RESULTS
There were no intraoperative complications or injuries of the seminal vesicles, vas deferens or urethra. The operative time was 95 and 80 minutes, respectively, with negligible blood loss. Both patients made an uneventful recovery from surgery, and were discharged home on the 5th post-operative day with normal serum laboratory examinations.

Figure 1. MRI examination in Patient 1 (14 years old) a) Coronal and b) longitudinal sections) showing a 6x3cm median prostatic cyst in the midline of the lower abdomen, dorsal to the prostate without communication with the urethra, seminal vesicles or adjacent structures. The cyst was considered to be a giant utricular cyst.
Urethral catheters were removed at the 4th day, followed by non-problematic spontaneous micturition. Histopathological results showed squamous epithelium with chronic inflammation and low-grade fibrosis without any evidence of malignancy (Case 1). The cyst wall showed multiple rows of cubic epithelial cells without malignancy (Case 2).

Follow-up
Patient 1 suffered an unclear acute episode of retrosymphseal pain 14 days postoperatively. Ultrasound and blood testing showed no pathological results. The pain dissipated under conservative treatment over the following 3 days. Both patients were clinically re-evaluated. Ultrasound showed a normally configured prostate and bladder without any evidence of recurrence of the utricular cyst. Cysto-urethroscopy and micturating cysto-urethrography revealed no residual cyst remnant.

Patient 1 has experienced no further episodes of epididymitis to date and has no voiding dysfunction. Both cases were asymptomatic over a 15-month follow-up.

**DISCUSSION**

Regression of the Müllerian ducts occurs at about the 10th week of male fetal intrauterine life. Only the cephalic and caudal ends of the Müllerian ducts persist after complete male sexual development, as the appendix testis and part of the prostatic utricle, respectively. Incomplete regression of the Müllerian ducts or incomplete masculinization of the urogenital sinus could be the result of an error in hormonal function of the fetal testes, with regard to either the production of or sensitivity to local testosterone or Müllerian inhibiting factor.

Patients with Müllerian cysts can present with various complaints, including lower urinary tract irritative symptoms, post-void dribbling, and urethral discharge. If there is contact with the urethra, the filled cavity drains passively after voiding, which causes these symptoms. Small cystic remnants seldom cause symptoms, but large ones extending into the peritoneal cavity and inguinal region invariably cause symptoms. Sepsis may complicate the clinical picture. Lastly, Müllerian duct remnants can be associated with various conditions, including intersex, hypospadias, and cryptorchidism.

The most common physical finding is a palpable midline mass superior to the prostate on rectal examination. In the absence of infection, micturition cysto-urethrography is very helpful for outlining these cystic structures when a connection exists, otherwise they will not opacify. Furthermore, abdominal ultrasonography/TRUS are helpful for establishing the nature of the mass and outlining its location and extent. However, as an operator-dependent procedure, its diagnostic accuracy is less than those of CT and MRI.

Generally, the management of Müllerian duct remnants is based on the age of the patient, clinical presentation, size, relationship with adjacent structures and radiological classification. Conservative treatment seems to be used for uncomplicated enlarged prostatic utricle (grades 0 and 1) in the absence of other Müllerian structures (i.e., vagina or uterus) or lower urinary tract anomalies. Other indications include Müllerian remnants and cystic dilatations without urethral/adjacent structure connections and asymptomatic lesions. Conservative management of these patients, after a thorough diagnosis, includes careful follow-up based on periodic clinical examinations and abdominal ultrasound. When indicated, micturition cysto-urethrography and cystoscopy can be performed periodically.

Several approaches for the excision of utricular cysts have been described. The transvesical transtrigonal approach was considered to provide excellent exposure of the retrovesical space after posterior splitting of the bladder wall. The cyst could be excised after separation of the vasa, if it ends normally. Reconstructive surgeries of the vasa deferentia, such as anti-refluxive operations or urethral implantation, have been shown to be feasible. The main disadvantages of this technique are the need for prolonged catheterization until the bladder is completely healed and occasional transient vesico-ureteral reflux in the postoperative period.

The transperitoneal approach has been indicated for large cysts, especially those that are accompanied by intraperitoneal abnormalities like vagina masculina with an emerging uterine structure from the peritoneal fold. The results of this approach were very good. Difficulties with this technique were observed only in cases with small cysts, where exposure requires extensive dissection of the retro-vesical space. This may lead to a high risk of damage to the nerves, urethra, ureters and vasa. Moreover, opening the peritoneum can create adhesions and consequently bowel obstruction.

Anterior and posterior sagittal transanorectal approaches have been described to provide extensive exposure of the rectourethral space by splitting the anterior or posterior and then anterior rectal walls, respectively. While these techniques do not interfere with fetal continence, they require meticulous bowel preparation, fasting for a week postoperatively, antibiotic therapy and temporary colostomy, when indicated. Infectious complications in this area could compromise fecal continence and result in fistulas and abscesses. A posterior pararectal or perirectal approach with rectal retraction has been reported to avoid colostomy. Impaired fecal continence due to rectal mobilization and denervation as well as limitation of the field by the anus at the distal extent of incision, in cases of huge cysts, make this approach unsuitable for standard cyst excisions.

To minimize trauma associated with the approach, endoscopic electro-fogulation of these cysts has been introduced, with encouraging results and minimal perioperative morbidity. However, this technique has many limitations. For example, it is not adequate for vaginal masculina, as Müllerian duct remnants are obliterated rather than removed. Furthermore, there is a risk of injuring the adjacent ejaculatory ducts by transmitted electrical hazard. Limitations of endoscopic manipulations, even in experienced hands, as well as incomplete removal of the cystic wall are further disadvantages. This does not eliminate the risk of neoplastic changes in the tissue remnants. The incidence of neoplasia arising in Müllerian duct remnants has been reported to be 3%. Adenocarcinoma and squamous cell carcinoma are the two reported neoplastic cell types in these cysts. Logically, simplifying the surgical procedure with partial excision should not be at the expense of outcomes. Thus, complete excision of the whole patol...
ology should be recommended whenever possible.

The above procedures are often technically challenging and carry a potential risk of complications, such as infection, incontinence and impotence.\textsuperscript{16,17,25} Minimally invasive surgeries opened a new era in the urological armamentarium. While the transperitoneal laparoscopic excision of Mullerian cysts has been recommended,\textsuperscript{19,25} the recent era of robotic-assisted surgeries, with its known advantages, could replace this technique in rare cases. We presented 2 cases of solitary Mullerian cyst, which were successfully removed by transperitoneal robotic-assisted surgery and the surgical details. There were no perioperative complications. The older patient was able to resume sexual activity without ejaculatory problems. Both patients no longer suffer from lower urinary tract symptoms/infecions.

This non-invasive approach allows excellent visualization of all pelvic structures. This promotes easy dissection of the recto-vesical space, under direct vision, providing adequate exposure of the cysts without organ/tissue injury.

Generally, the excision of utricular cysts can be accompanied by some difficulties. The anterior cyst wall could be adherent to the posterior surface of the bladder, prostate, or seminal vesicles. The described T-shaped incision of the peritoneum allows adequate identification of both structures to minimize intra-operative injuries. Complete excision may be difficult, particularly at the attachment to the posterior urethra. Therefore, meticulous blunt and sharp dissection of the prostatic part of the cyst neck to its insertion in the urethra is mandatory. Furthermore, care should be taken to not injure adjacent structures, especially the rectum; otherwise, there will be an increased risk of rectovesical fistula. This constitutes a major drawback of the previously described transrectal/peri-anal approaches. Lastly, an abnormal connection between the cysts and vas deferens may require vasa reconstruction or urethral implantation, which is challenging when done as robotic-assisted surgery.

The current work has the same limitations as all preliminary reports. However, adequate prescription of this technique could help urologists in decision-making for those patients.

CONCLUSION

Symptomatic presentation of utricular cysts may be associated with recurrent urinary tract infections, orchitis epididymitis and potential for malignancy. The robotic-assisted surgical excision of symptomatic utricular cysts is a feasible and safe procedure. It seems to offer excellent visualization and access to these lesions, and provides these patients with the advantages of minimally invasive surgery. \textsuperscript{31}

AUTHORS' DISCLOSURES

The authors report that there are no conflicts of interest.

REFERENCES