Minimally-invasive treatment of complicated ureteroceles in adults avoiding vesico-ureteric reflux

Joerg Seibold, Saladin H. Alloussi, David Schilling, Daniela Colleselli, Arnulf Stenzl, Christian Schwentner

Department of Urology, Eberhard-Karls-University Tuebingen, Germany

KEY WORDS

ureterocele ◗ urolithiasis ◗ minimally invasive treatment ◗ endoscopic incision ◗ bladder outlet obstruction

ABSTRACT

Introduction. Ureteroceles are not rare findings in adults. In contrast to pediatric ureteroceles, the therapy modalities in adults are different and recommendations are scarce.

Patients and methods. Nine complicated ureteroceles in eight adults were treated minimally invasive by endoscopic incision or puncture. All ureteroceles were located orthotopically. One patient had a bladder outlet obstruction due to a sliding ureterocele. In four patients urolithiasis was found within the ureterocele, bilaterally in one of these. All operative interventions were done endoscopically. In five patients with calculi, a low transversal incision, i.e. unroofing of the ureterocele, allowed for stone extraction preserving the flap valve func-tion. In the patient with bladder outlet obstruction a single puncture using a bug bee electrode led to decompression of the ureterocele.

Results. The follow-up was done by ultrasound and urine examinations as well as voiding cystography. In no patients was there post-void residual urine or infections postoperatively. The mean follow up time was 21.3 months (4 to 48 mos.). All patients were endoscopically and sonographically free of stones and voiding discomfort was resolved. There were no cases of postoperative vesicoureteral reflux or secondary surgery.

Conclusions. Uncomplicated ureteroceles usually do not require treatment; in symptomatic ureteroceles, requiring individual surgical intervention, an endoscopic approach is feasible and easy to perform according to the clinical and anatomical findings. In case of obstructive voiding problems in young adults, a sliding ureterocele into the bladder neck should be considered.

INTRODUCTION

Ureteroceles occur as a consequence of a malformation of the intravesical submucosal segment of the ureter. In contrast to the widespread opinion, ureteroceles are not rare being found in 1 out of 4,000 autopsy cases [1]. In children, ureteroceles are even more frequent (1 in 500). In 80% they are associated with the upper pole of a duplex system with the orifice located ectopically (60%) [2]. They are present bilaterally in 15% of cases. However, in only 20% of these cases are associated with a non-duplicated collecting system [3]. A solitary calculus in a ureterocele is not uncommon, being secondary to urinary stasis and obstruction. Almost a third of all patients present with associated stone disease.

According to the classification recommended by the section on Urology of the American Academy of Pediatrics, the current nomenclature identifies intravesical ureteroceles (entirely within the bladder) or ectopic ureteroceles (part of the ureterocele is situated permanently at the bladder neck or in the urethra) [4].

Ureteroceles occur 4 to 7 times more frequently in female patients with 10% located bilaterally. Single ectopic ureteroceles are rare and occur more commonly in male patients [2]. In the pediatric population treatment of ureteroceles is quite standardized comprising endoscopic incision, ureteral reimplantation, and even laparoscopic heminephroureterectomy. [4] In adults, ureteroceles are in general part of a complete intravesical orthotopic single system. Common symptoms leading to diagnosis are flank pain, fever, urinary frequency, urgency, and dysuria. The orifice of the ureterocele is usually stenotic. A typical radiographic finding is the "Cobra head" adult-type ureterocele showing a slight dilatation of the distal ureter that inserts in a normal position into the vesical trigone. "Cobra head" ureteroceles are not an uncommon finding on routine IVP [4]. Unlike congenital ureteroceles, they subtend a normal single system and fill with contrast dye. A halo appearance of the protruding ureter in the bladder is characteristic. It seems probable that ureteroceles on single ureters are not always congenital but may also be acquired in adulthood. Inflammation or trauma, narrowing the ureteral orifice, could result in ureteral prolapse into the bladder lumen. Most often they are incidental findings and require no treatment [2, 5]. However, adult ureteroceles, which are non-obstructing and non-refluxing, do not require specific therapy. If stone formation is found, surgical intervention is necessary and may be performed endoscopically. Since there are only a few articles about complicated ureteroceles in adults available, their appropriate management remains somewhat uncertain. Herein, we present our experience with minimal-invasive management of such complicated ureteroceles in adults.

PATIENTS AND METHODS

We report on eight adult patients (five males and three females), aged 17 to 82 years (median 47.8 years), with nine ureteroceles. All patients presented with urinary tract symptoms. Five patients had an intravesicular single system ureterocele and associated stone formation. Of those, one had bilateral calculi. Two patients presented with cystitis or pyelonephritis (Table 1). Five patients had urolithiasis.

Besides history, basic diagnostics were urine analysis, urine culture, and ultrasound examination of the kidneys and bladder. Additionally, intravenous pyelography was performed when necessary. Moreover, outpatient cystoscopy was done in two patients.

All operations were done minimally invasive using an adult endoscope (17 French) with a straight working channel and

Table 1. Patient characteristics and clinical outcome after treatment.

Pat.	Age	Gender	Laterality	Diagnosis	Clinical symptoms	Stone analysis	Stenting	Findings
1	17	M	Unilateral left	Sliding ureterocele	Bladder outlet obstruction	–	no	No reflux, no obstruction
2	47	M	Unilateral left	Stone	Intermittent flank pain, testicular pain	Urate	no	Stone free, no reflux
3	49	F	Unilateral left	Stone	Cystitits, flank pain, genital discomfort	Urate	no	Stone free, no reflux
4	50	M	Unilateral right	Stone	Flank pain	Urate	no	Stone free, no reflux
5	52	M	Bilateral	Stone	Flank pain	Urate	no	Stone free, no reflux
6	82	M	Unilateral left	Stone	Microhematuria	Ca-oxalate	no	Stone free, no reflux
7	49	F	Unilateral left	Ureterocele	Fever, pyelonephritis	–	no	Infection free, no reflux
8	52	F	Unilateral left	Ureterocele	Cystitis, bacteruria	–	no	Infection free, no reflux

a Bugbee wire electrode with a cutting current. Calculi were either extracted with a stone basket or fragmented with a Lithoclast-device (EMS Electro Medical Systems). All operations were done in a tubeless manor without double-J stenting.

Follow-up included postoperative history, uroflowmetry, residual urine measurements, a questionnaire (International Prostate Symptom Score, IPSS), ultrasound, and voiding cystography to rule out *de novo* reflux. The IPSS score is a validated questionnaire used for obstructive voiding disorders. It is the standard questionnaire for BPH and therefore familiar to urologists. We used it to describe obstructive voiding symptoms. The follow-up investigations were performed after 4 weeks, 3 months, 1 year, and at the end of this study.

RESULTS

All nine ureteroceles in eight patients were treated minimally invasive. All stones could be removed, regarding their size, either directly or after disintegration using a lithoclast instrument. Stones and fragments were then extracted. Stone free situation was confirmed intraoperatively by retrograde pyelography and under direct vision using an 8.5 French ureterorenoscope. All patients had an indwelling Foley catheter overnight. No further interventions were necessary in any case.

The hospital stay ranged from two to four days (mean 2.7 days). The mean follow up time was 21.3 months (4 to 48 months). In patients with lithiasis, uroflowmetry showed a maximum flow rate from 15 to 19 ml/sec (mean 16.8 ml/sec) and micturition volume ranged from 223 to 320 ml (mean 279 ml). In all patients, no residual urine was found. IPSS-Score ranged from two to six (mean 5) and life quality index from one to three (mean two). No postoperative urinary infections were reported. Voiding discomfort resolved after endoscopic treatment (Table 1).

DISCUSSION

The endoscopic approach to a single orthotopic ureterocele, by either incision or puncture, is easily feasible and can be individually adapted to further needs e.g. ureteroscopy and stone extraction with a satisfying result concerning secondary vesicoureteral reflux. The description of ureterocele incision dates back to Zielinski's technique of a low transverse and longitudinal ureterocele incision proposed by Hutch and Chisholm [6, 7]. Sometimes repeated puncture is necessary, being sufficient for drainage [8] and no further surgery is required in more than 90% of patients [8, 9]. Endoscopic incision of ureterocele (EIU) is a well-established technique used primarily in adults to preserve the flap valve mechanism of the

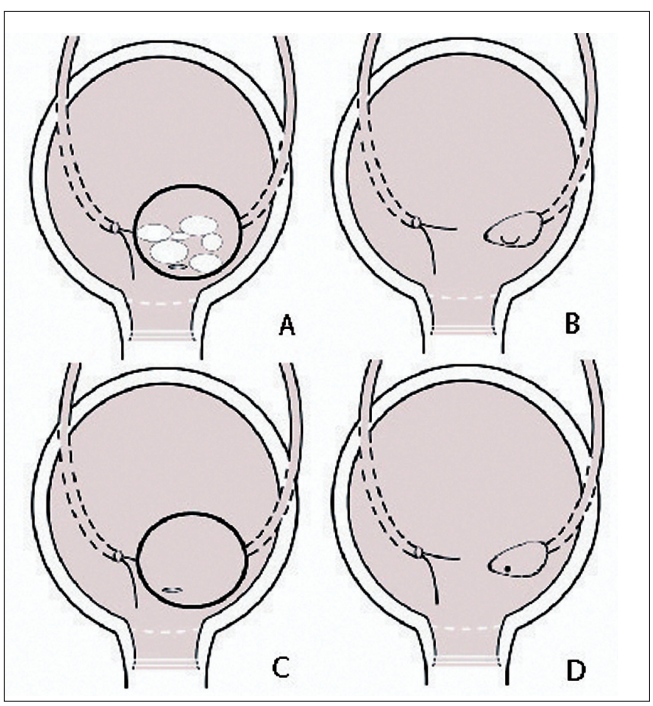

Fig. 1. Schematic illustration of preoperative and postoperative anatomy: a. demonstrates calculi within the ureterocele (patients 2, 3, 4, 6); b. postoperative anatomy after stone extraction; c. demonstrates an orthotopic ureterocele (patient 1); d. postoperative anatomy after unroofing.

decompressed ureterocele preventing reflux into the associated ureter.

In children this technique is also gaining acceptance with EIU being considered a definitive procedure for intravesical ureteroceles in 71.5%. However, almost all ectopic ureteroceles require secondary surgical treatment [10]. Coplen and Duckett showed that the low transverse incision of intravesical ureteroceles in children was a definitive procedure in more than 90% of cases [2]. In ectopic ureteroceles endoscopic incision showed to be a definitive procedure in 30-37% of patients [8, 11]. Therefore, the need for upper urinary tract surgery can be diminished. In addition to that, decompression may simplify subsequent reconstruction rendering ureteral reimplantation easier since the ureter does not need to be tapered [8, 11]. Coplen and coworkers stated that a second operation was required in nearly 50% of cases of ectopia [2]. A later review of the literature on puncturing ectopic ureteroceles showed a necessity for bladder surgery in nearly all patients [9]. As published lately, the development of endoscopic management

by performing a double incision of the ectopic ureterocele followed by DJ-Stent insertion and fulguration of the collapsed ureterocele walls shows a need for secondary open surgical intervention in only 10% of patients [12]. Unroofing of the ureterocele becomes obsolete and may be used as a temporizing procedure only in the critically ill infant [11].

Although orthotopic ureteroceles in adults and adolescents rarely become symptomatic, typical clinical findings like voiding problems and flank pain as well as uncharacteristic discomfort in the lower abdomen and pelvic pain may lead to the diagnosis of a ureterocele. In the literature there are cases of sliding ureteroceles causing bladder outlet obstruction accompanied by sharp, intermittent flank pain [13]. Another case report told about a woman with worsening lower abdominal and pelvic pain accompanied by urinary urgency/frequency for over eight months where an orthotopic ureterocele masquerading as a bladder tumor was found by cystoscopy and upper tract imaging and where a calculus in the distal intravesical portion of the ureter also was present [14]. The urinary stasis in the dilated distal "Cobra-head" shaped part of the ureter often favors the development of stones. Hence, a previously asymptomatic ureterocele becomes troublesome.

According to the available literature and our series the therapies for symptomatic ureteroceles in adults, they should preferably be minimally invasive. All patients did well postoperatively and no one required further interventions. Ultrasound showed a decrease of the ureteroceles. No postoperative reflux was evident. No ascending or isolated urinary infections were found. No voiding problems, urge, pain, or recurrent urolithiasis were reported.

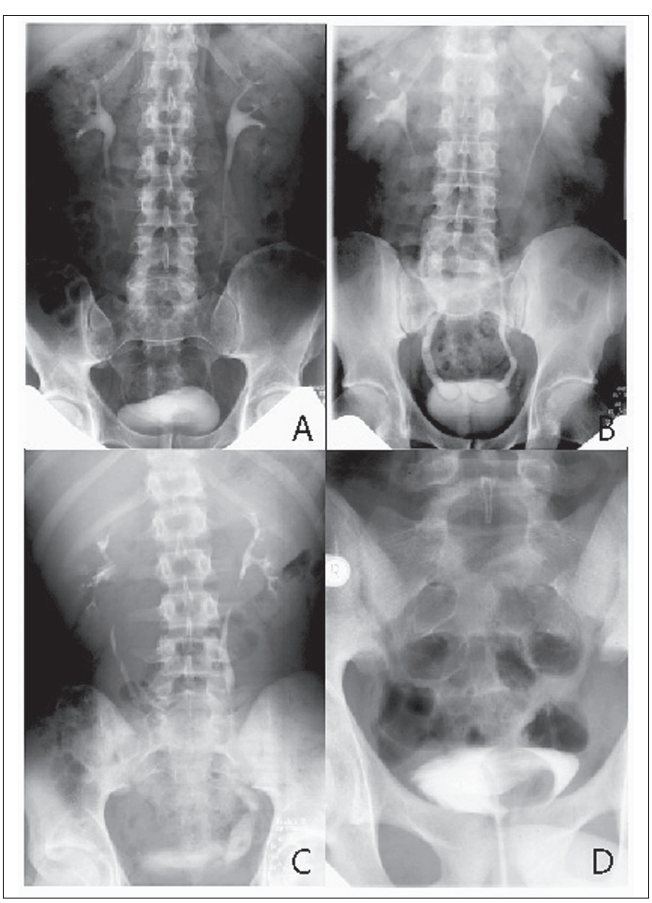

Fig. 2. Intravenous pyelography examples of adult ureteroceles: a. classical appearance of an intravesical ureterocele (patient 1); b. bilateral halo-sign (patient 2); c. excretory urography of patient 3; d. excretory urography of patient 3.

CONCLUSIONS

Ureteroceles are not a rare finding, presenting more often in female patients. Symptomatic and complicated ureteroceles require individual surgical intervention. An endoscopic approach is recommended. For treatment of lithiasis common urological endoscopic methods can be performed. In younger patients with voiding problems, subvesical obstruction, and lower abdominal pain it is worthwhile to consider a ureterocele sliding into the bladder neck.

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Correspondence
Christian Schwentner
Department of Urology
University Hospital Tuebingen
3, Hoppe-Seyler Street
72076 Tuebingen, Germany
phone +49 707 129 85 092
christian.schwentner@googlemail.com