Transperitoneal Laparoscopic Bladder Diverticulectomy

Jung-Tsung Shen, M.D.[1], Mei-Yu Jang, M.D.[1], Ching-Chia Li, M.D.[2,3], Yung-Shun Juan, M.D.[3,4]*

Department of Urology[1], Kaohsiung Municipal Hsiao-Kang Hospital, Kaohsiung, Taiwan; Department of Urology[2], Kaohsiung Municipal Ta-Tung Hospital, Kaohsiung, Taiwan; Department of Urology[3], College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan; Department of Urology[4], Kaohsiung Medical University Hospital, Kaohsiung, Taiwan

**Correspondence: Department of Urology, Kaohsiung Medical University Hospital, 100, Shih-Chuan 1st Road, Kaohsiung, Taiwan*
E-mail: ruanusuro@yahoo.com.tw

BRIEF HISTORY

A 70-year-old man presented with a long history of dysuria, pain on micturition, and residual urine sensation. He denied any significant medical history. Urinalysis showed pyuria, and urine cultures were positive for *E. coli*. Abdominal ultrasonography showed a right renal cyst, urinary bladder wall thickening and a huge right side posterior bladder diverticulum. The prostate was about 25 cm^3 on transrectal ultrasonography. Cystoscopy revealed multiple small bladder diverticula, marked urinary bladder trabeculation, and a large right diverticulum just lateral to the right ureteral orifice (Fig. 1). Closer examination revealed no stones or mucosal lesions inside the huge bladder diverticulum. The prostatic urethra and bladder neck also appeared narrow.

VIDEOURODYNAMIC STUDY

A videourodynamic study showed delayed bladder sensation (375 mL) when the bladder was filling with saline. At a bladder volume of 725 mL, a strong urge to void was recorded. After a strong spontaneous detrusor contraction (detrusor pressure 65 cmH_2O, Fig. 2A, black arrow), only a little urine was voided. A voiding cystourethrogram revealed a prominent bladder diverticulum (Fig. 2B, 2C, red arrow), showing the urine was expelled into the bladder diverticulum instead of the urethra. Bladder neck dysfunction was confirmed by an unopened bladder neck during the voiding phase together with a low flow rate.

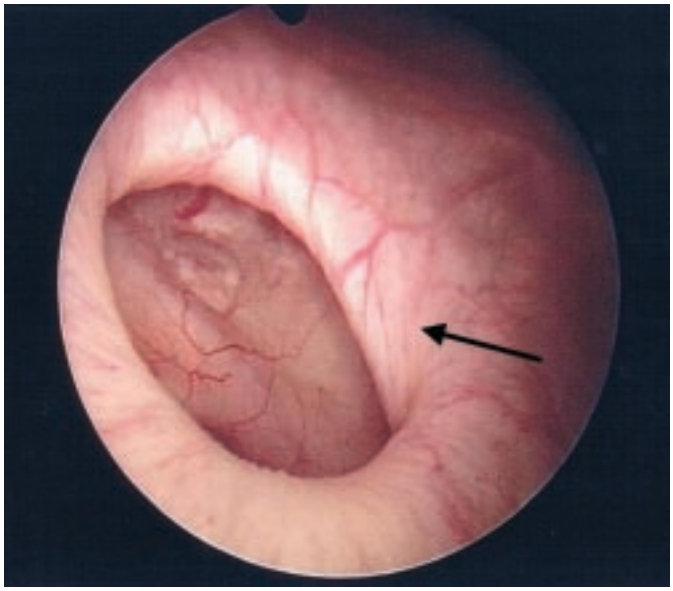

Fig. 1. A huge bladder diverticulum (arrow) located over the lateral right side of the bladder.

MANAGEMENT

The patient underwent a transurethral incision of the bladder neck (TUI-BN) and laparoscopic diverticulectomy. Preoperatively, the patient had mechanical and antibiotic bowel preparation. After induction of general anesthesia, the patient was placed in the dorsal lithotomy position. TUI-BN was performed first with a Fr 26 resectoscope and diathermy electrode using a power setting of 100 W. Double incisions were made at the 5 and 7-o'clock positions in the bladder neck to a level where the serosal layer could be visualized. A 6 Fr ureteral catheter was placed in the right ureter to avoid ureteral injury during the laparoscopic diverticulectomy.

A Veress needle was inserted and the pneumoperitoneum was attained through a subumbilical port. Two other trocars (12 mm and 5 mm) were introduced in a fan pattern. Cystoscopic examination was performed simultaneously. Having identified the diverticulum with the assistance of transillumination from the cystoscope, an incision was made in the peritoneum and the diverticulum was exposed. After circumferential dissection of the diverticulum neck, the diverticulectomy was completed (Fig. 3). A single-layer suture of 2-0 Vicryl was used to close the bladder opening. The bladder was filled with saline to confirm a watertight closure, and a drain was placed under direct vision. At the end of the procedure, all catheters were removed and a 20 Fr three-way Foley catheter was inserted into the bladder for drainage. The patient resumed a regular diet on postoperative day 3. There were no early or late complications. Cystography performed 7 days postoperatively showed no evidence of extravasation. The patient had satisfactory micturition after the urethral catheter was removal and he was discharged on the eighth postoperative day.

COMMENTS

Bladder diverticula are herniations of the bladder mucosa through the bladder wall musculature. Depending on the size and location, bladder diverticula may cause ureteral obstruction, bladder outlet obstruction, or vesicoureteral reflux [1]. Bladder diverticula most commonly occur lateral and superior to the ureteral orifices. Bladder diverticula can be wide- or narrow- mouthed according to the size of the musculature defect.

Many diverticula that are related to obstruction resolve spontaneously after relief or correction of the obstruction. If there is no resolution,

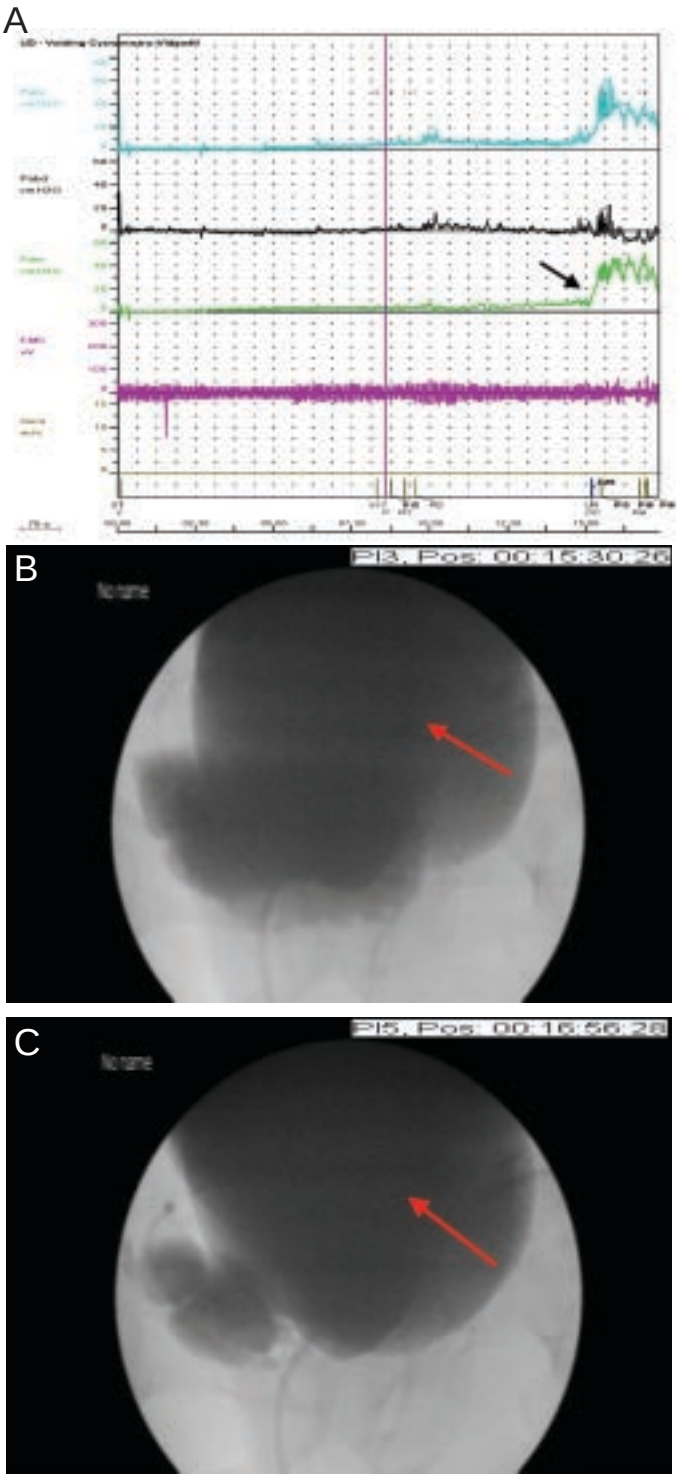

Fig. 2. Videourodynamic study shows only a little urine was voided after a strong spontaneous detrusor contraction (A, black arrow). A voiding cystourethrogram reveals a prominent bladder diverticulum (B and C, red arrow), showing the urine was expelled into the bladder diverticulum instead of the urethra.

surgical resection is indicated. Many techniques for bladder diverticulectomy have been described, including open and transurethral techniques [2], as well as transperitoneal and extraperitoneal laparoscopic bladder diverticulectomy [3]. The major goal of a bladder diverticulectomy is to successfully excise the bladder diverticulum without harming surrounding organs or the ureters. Transurethral approaches to excise or fulgurate a bladder diverticulum with cystoscopy facilitate concurrent endoscopic resection or incision of the prostate. However, these procedures are commonly limited to small diverticula.

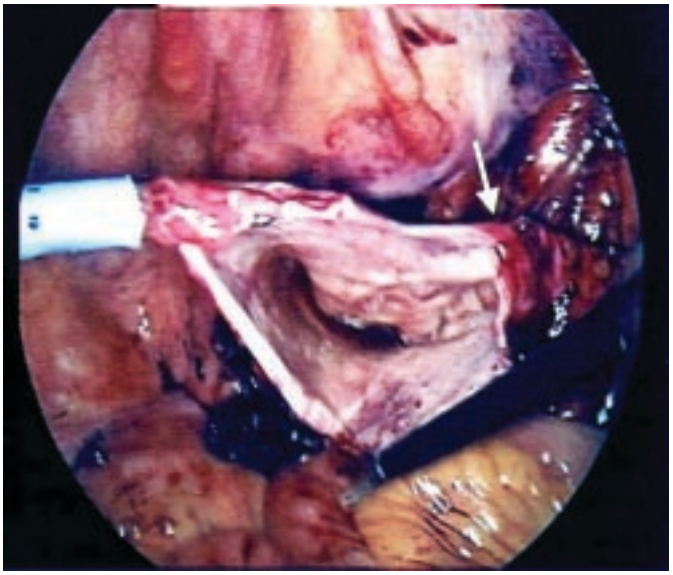

Fig. 3. After circumferential dissection of the diverticulum neck (arrow), the diverticulectomy is completed.

Laparoscopic diverticulectomy can be performed transperitoneally or extraperitoneally [4,5]. Here, we reported our experience with transperitoneal laparoscopic bladder diverticulectomy and describe the surgical technique. The most critical step in laparoscopic diverticulectomy is the initial highlighting of the diverticulum with the aid of cystoscopy. Several approaches have been described that can help in the laparoscopic identification of the diverticulum and its dissection. Transillumination by cystoscopy is effective in guiding laparoscopic dissection. Using this transperitoneal approach permits better space for identification and dissection of posterior diverticula and intracorporeal suturing. These advantages result in shorter operative times and better outcomes. Laparoscopic excision of a simple diverticulum could be an attractive alternative to open surgery for patients with diverticula responsible for bladder infection or residual urine. It is especially useful in instances when the diverticulum has a narrow neck.

REFERENCES

1. Fox M, Power RF, Bruce AW: Diverticulum of the bladder--presentation and evaluation of treatment of 115 cases. Br J Urol 1962; **34**: 286-298.
2. Clayman RV, Shahin S, Reddy P, Fraley EE: Transurethral treatment of bladder diverticula. Alternative to open diverticulectomy. Urology 1984; **23**:573-577.
3. Juan YS, Li CC, Shen JT, et al: Laparoscopic bladder diverticulectomy for large bladder diveticulum: A case report. Kaohsiung J Med Sci 2004; **20**:563-566.
4. Nadler RB, Pearle MS, McDougall EM, Clayman RV: Laparoscopic extraperitoneal bladder diverticulectomy: Initial experience. Urology 1995; **45**:524-527.
5. Porpiglia F, Tarabuzzi R, Cossu M, et al: Sequential transurethral resection of the prostate and laparoscopic bladder diverticulectomy: Comparison with open surgery. Urology 2002; **60**:1045-1049.