

Case Report

Retroperitoneoscopic Pyelolithotomy as Initial Treatment for Upper Urinary Tract Large Stone

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We report a case in which retroperitoneoscopic pyelolithotomy was the procedure selected to treat a large stone in the upper urinary tract. A 71-year-old woman who had multiple cerebral infarction and dementia was admitted with a persistent high fever unresponsive to antibiotics. The diagnosis was pyelonephritis and urosepsis associated with ureteral calculus. A large calculus (3.0 × 2.0 cm) was found in the left ureter at the L₃ level. She underwent nephrostomy of the left side. After the patient's general condition had improved, surgery was performed successfully with an uneventful recovery. The findings in this case confirm that retroperitoneoscopic surgery allows removal of a large stone in a single, minimally invasive procedure.

Key words: retroperitoneoscopic pyelolithotomy, urinary stone, laparoscopic surgery

Following the historic report of laparoscopic ureterolithotomy by Wickham in 1979 via the retroperitoneal approach, there was little therapeutic laparoscopic urological activity for some time [1]. In 1992 Gaur developed a balloon dissection technique of the retroperitoneum [2]. He successfully used this approach for multiple retroperitoneal procedures, including simple nephrectomy, renal biopsy, varicocelectomy and ureterolithotomy. Since then, the retroperitoneoscopic approach to the urinary tract has been widely employed in the field of urology [3-5]. However, at present, the indications for retroperitoneoscopic surgery of urinary stones are still limited, because extracorporeal shock wave lithotripsy (ESWL), transurethral ureterolithotomy (TUL) and percutaneous nephrolithotomy (PNL) have been adopted in most cases, and with excellent success

rates. We report a case in which retroperitoneoscopic ureterolithotomy was considered the best way among all the available procedures to remove a large stone in the upper urinary tract.

Case Report

A 71 year-old woman who had multiple cerebral infarction and cerebral vascular dementia was admitted to Okayama Rosai Hospital with the chief complaint of high fever (39.5 °C). She had taken oral antibiotics in the nursing home but with no relief of her fever. Her extremities were atrophied due to her bedridden state. Dementia interfered with patient communication, and she often removed the drip infusion line by herself.

Ultrasonography demonstrated left hydronephrosis and a ureteral stone on the left side at the ureteropelvic junction. The diagnosis was complicated pyelonephritis associated with ureteral calculus. A large calculus (3.0 × 2.0 cm) was found in the left ureter at the L₃ level in both

the plain x-ray film (Fig. 1A) and the computerized tomogram (CT). She underwent nephrostomy of the left side immediately after her first visit to our clinic. Pus-like urine was drained from the nephrostomy. *Proteus Mirabilis*, *Escherichia coli* and *Klebsiella pneumoniae* were cultured in the drained urine. Panipenem Betamipron (PAPM/BP) was administered, and her general condition and laboratory findings improved within a week. After nephrostomy formation, the stone was pulled back into the renal pelvis spontaneously (Fig. 1B).

After the general condition had improved, retroperitoneoscopic pyelolithotomy was performed under general anesthesia. The patient was secured in a standard flank position. A transverse skin incision (2 cm) was made just anterior to the tip of the 12th rib. The posterior layer of the thoracolumbar fascia was identified and incised between 2 stay sutures. The flank muscle fibers were bluntly separated until the anterior layer of the thoracolumbar fascia was reached, and 2 full-thickness stay sutures were inserted. Finger dissection was performed in the retroperitoneum to create a working space for placement of the balloon dilator (PDB balloon, Tyco Health, Tokyo, Japan). After balloon dissection of retroperitoneal cavity, a Hassan trocar was inserted and secured with the preplaced stay sutures. A carbon dioxide pneumoretroperitoneum was established and a rigid laparoscope was inserted (Viscera, Olympus, Tokyo, Japan). One 10 mm trocar for the surgeon's right hand and two

5 mm trocars were inserted under endoscopic view. Ureterolysis was performed proximally, until the renal pelvis was exposed. A vertical incision about 2 cm was made at the lower part of the dilated renal pelvis, then the calculus was extracted (Fig. 2A, Fig. 2B). The mucosa was sutured with 3 stitches of 4-0 vicryl using an RB-1 needle. Ureteral stenting was not performed. The stone was $30 \times 18 \times 10$ mm in size, and biochemical analysis showed that its composition was magnesium ammonium phosphate, calcium phosphate, and calcium carbonate.

The postoperative course was uneventful. The excretory urogram showed no deformity at the renal pelvis 6 months after surgery, and the patient was without any symptoms of urinary infection or pain at the one-year follow-up examination.

Discussion

The advent of extracorporeal shockwave lithotripsy (ESWL), PNL, and TUL has almost eliminated the need for open surgical ureterolithotomy. Nevertheless, some patients still require open surgery, including those in whom minimally invasive approaches have failed or other pathological conditions coexist. In recent years technology has evolved making laparoscopic surgery for urinary calculi possible. Micali *et al.* reported 17 cases of laparoscopic treatment of renal and ureteral calculi [6]. All procedures were performed transperitoneally. Of the

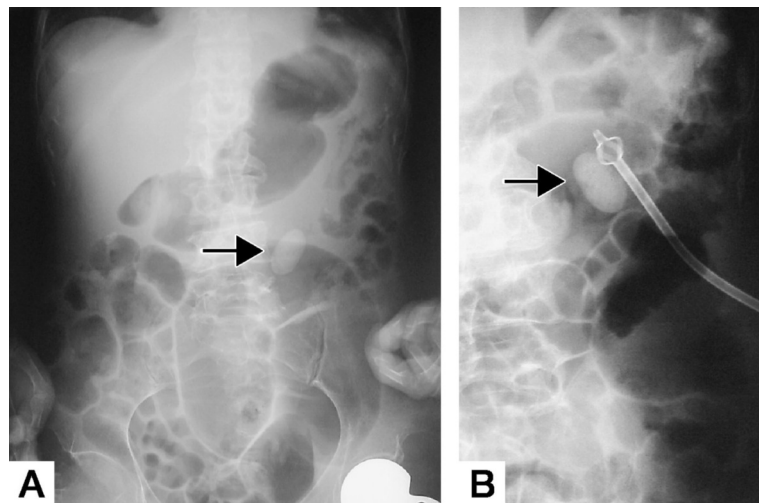


Fig. 1 A, Plain X-ray film on the day of admission. A stone (30×20 mm) appears in the left upper ureter. The patient could not hold her arm to the side. B, KUB 2 weeks after she underwent nephrostomy, just before retroperitoneoscopic pyelolithotomy. Stone pulled back into renal pelvis.

17 cases, he reported only 3 instances of postoperative complications including prolonged ileus (2) and a urinoma requiring secondary drainage (1). Gaur *et al.* reported that retroperitoneoscopic ureterolithotomy is a safe and reliable, minimally invasive procedure [2]. Rassweiler *et al.* reported 200 cases of retroperitoneoscopic surgery. In the last 50 cases, the complication, conversion and reintervention rates (2, 4, and 2%, respectively) were acceptable for routine clinical application [7]. Although its role as a salvage procedure for failed ESWL and ureteroscopy is undisputed, in selected patients with large chronically impacted ureteral stones and particularly with solitary kidneys, it may be considered a first-line treatment.

Less clear is the indication for retroperitoneoscopic pyelolithotomy as the initial treatment for renal calculus. However, an obvious advantage of the retroperitoneoscopic surgery is the ability to remove highly complicated stones by a single minimally invasive procedure. Accord-

ing to Watson *et al.*, the first attempt at access was successful in 87% of ureteroscopy, and only 23% were cleared of stone fragments immediately following the procedure [8]. Similarly with ESWL, retreatment is necessary in up to 36% of patients [9]. Ancillary procedures may be required in up to 46%, including ureteroscopy (18%) and secondary re-positioning (26%). Although the risk of having residual fragments following initial treatment for large nephrolithiasis is clearly higher after ESWL monotherapy (50%) than after PNL (26.7%), PNL often requires a second anesthetic procedure or prolonged hospital stay [10]. In our case, ESWL was not recommended because the patient might move during sessions, and her bedridden condition would prevent complete discharge of the disintegrated debris. Residual fragments of infected calculi left in the renal collecting systems may be associated with recurrent infections and eventual regrowth of these fragments into significant stones leading to additional morbidity. The advantages of laparoscopic surgery over open surgery have been well documented previously and include less trauma, reduced post-operative discomfort, shorter hospital stays, reduced cost for the patient, less morbidity and shorter convalescence [11]. These typical benefits are illustrated by this case.

Once laparoscopic pyelolithotomy has been chosen, the decision to approach the stone trans- or retroperitoneally is not necessarily clear. Although identifying the ureter has been reported to be difficult in some cases [12], the retroperitoneal approach affords the distinct advantages of minimizing potential intraperitoneal organ injury, eliminating bacterial contamination of the peritoneal cavity, and confining postoperative urinoma or hematoma collection to the retroperitoneum [13]. In this case, retroperitoneoscopic pyelolithotomy was both safe and effective, in addition to offering significant advantages over ESWL or ureteroscopy techniques as a primary treatment. Since infection stones should be removed completely, a single retroperitoneoscopic procedure is preferable in patients who are not candidates for multiple sessions of ESWL and/or endoscopic treatments because of concomitant general and local underlying diseases.

Retroperitoneoscopic pyelolithotomy is less invasive and the method of choice to remove stones completely in selected patients.

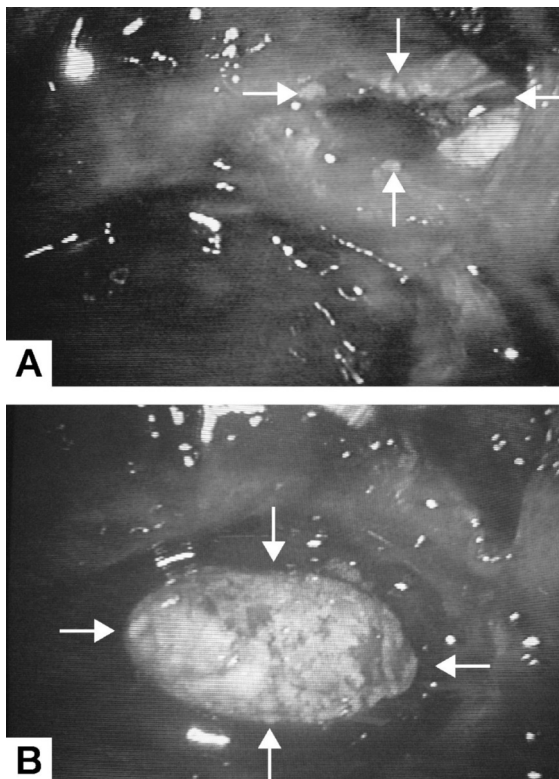


Fig. 2 A, Intraoperative photograph showing incision of the lower part of the pelvis. The arrow indicates the incised portion. B, Intraoperative photograph of large stone in the renal pelvis. The arrow indicates the stone.

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