

Single-stage standard percutaneous nephrolithotomy for a large 8 cm renal calculus

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ABSTRACT

Percutaneous nephrolithotomy (PCNL) is a technique used to remove certain stones in the kidney or upper ureter (the tube that drains urine from the kidney to the bladder) that are too large for other forms of stone treatment, such as shock wave lithotripsy or ureteroscopy. Here, we present a case of an extra-large kidney stone (8 cm×6.5 cm) in a 30-year-old male patient, which was removed through a single-puncture PCNL.

Key words: Diethylenetriamine pentaacetate renal scan, Intravenous pyelogram, Percutaneous nephrolithotomy, Renal calculus

Percutaneous renal surgery is considered one of the greatest advances in the field of minimally invasive urologic procedures, since the first successful removal of renal calculi by percutaneous nephrolithotomy (PCNL) was published in 1976 by Fernström and Johansson [1]. Since its initial introduction in the 1970s, PCNL has become the gold standard for the treatment of renal calculi >2 cm in size and is widely used worldwide. The complications with PCNL include disruption of the pelvicalyceal system, bowel perforation, and hemorrhaging requiring transfusion or angioembolization [2,3]. Multiple stages of PCNL may be required for such a large burden of stone.

Here, we are presenting single-stage PCNL as it may be considered as an option depending upon the intraoperative vitals of the patient and intraoperative bleeding. Regional anesthesia is also safe in such a lengthy procedure.

CASE REPORT


A 30-year-old young male patient presented with intermittent dull aching left loin pain for 15 days without vomiting. He had these same complaints off and on for the past 10 years. The patient was non-diabetic, non-hypertensive, and had no other clinically significant history or any past surgical history.

Upon examination, the vitals were stable. The hemoglobin was 14.2 g/dL, total leukocyte count of 5600/μL, and serum creatine 0.8 m/dL. A routine urine examination showed 2–3 pus cells per high-powered field.

An X-ray of the abdomen (kidney, ureters, and bladder) showed an extra-large left renal calculus occupying the left renal pelvis (8 cm×6.5 cm) (Fig. 1a). Ultrasonography showed the left hydronephrotic and enlarged kidney with large calculus in the pelvis. Intravenous pyelography showed a large left renal calculus without dye uptake in the left kidney, with the right kidney showing normal uptake and excretion (Fig. 1b). Diethylenetriamine pentaacetate scan showed a 42% split renal function of the left kidney.

The patient was started on intravenous antibiotics a day before the surgery and underwent PCNL the next day under spinal anesthesia in the prone position. A single supracostal upper calyceal puncture was made, tract dilatation was done by amplatz dilator, and a 30 Fr sheath with 26 Fr Nephroscope was used (Fig. 2a). The calculus was fragmented with pneumatic lithoclast. During the intraoperative period, his vitals were stable with a pulse of 76/min and blood pressure of 114/78 mmHg. The total intraoperative time was 202 min. No intraoperative bleeding and vision was clear throughout the procedure (Fig. 2b). Almost 100% stone clearance was achieved at the end of the procedure. An antegrade 6 Fr double J Stent was inserted to provide postoperative drainage (Fig. 2c).

His postoperative vitals were also stable. The postoperative course was uneventful. Postoperative blood investigations were within normal limits, and there was no significant drop in hemoglobin. The patient did not require any blood transfusion. The periurethral catheter was also removed on the 2nd day after the PCNL site wound soakage was zero. The patient was discharged a day later.

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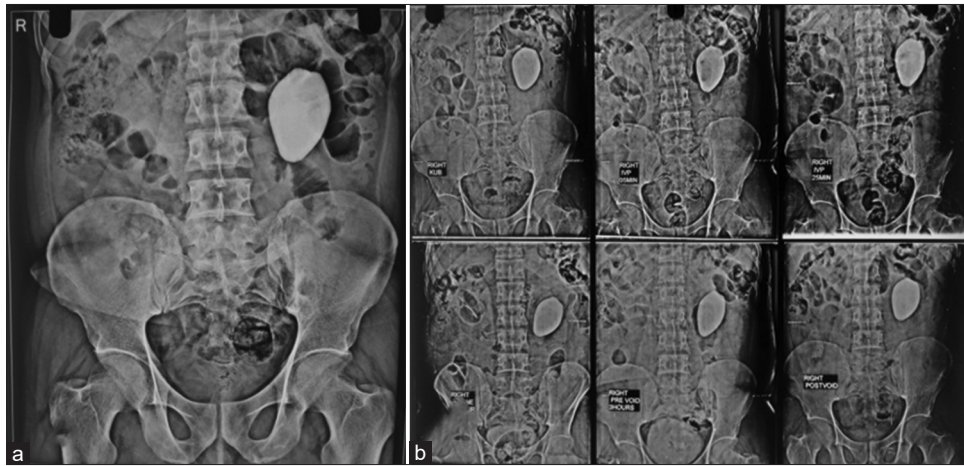


Figure 1: (a) X-ray kidney, ureters, and bladder, (b) Intravenous pyelography

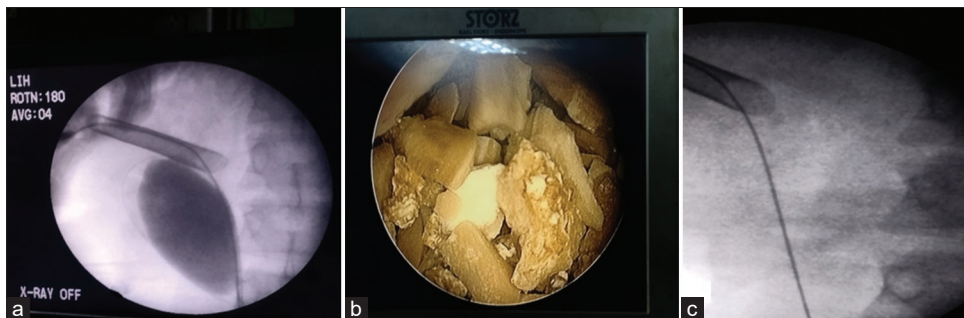


Figure 2: (a) Single supracostal prone percutaneous nephrolithotomy puncture, (b) Intraoperative, (c) Postop stone clearance

DISCUSSION

Here, we present a case of large calculi that was successfully managed by single-puncture standard PCNL. There is a lot of literature available on the use of PCNL in patients with renal calculi size 2–3 cm. However, limited data are available for calculi which have diameters >3 cm. In the present case, there was a large calculi (8 cm×6.5 cm) removed using minimally invasive single puncture PCNL.

This is a case of one of the largest renal calculi, which was removed by single-puncture PCNL. The largest renal calculi were reported by Hemendra Shah (India) in 2004 which measured 13 cm at its widest point and was removed from the left kidney of the patient [4]. However, the heaviest renal calculi were reported by Ghulam Shabir Imran Akbar Arbani and Malik Hussain (Pakistan) in 2008, which measured 620 g and was removed from the right kidney of the patient [5].

A recent meta-analysis that included five randomized and nine non-randomized studies involving 901 patients compared laparoscopic pyelolithotomy and PCNL and found that though laparoscopic pyelolithotomy is safe and effective in the treatment of large renal calculi, PCNL is still suitable for most cases and laparoscopic pyelolithotomy can be used as an alternative management procedure with a good selection of cases [6]. In a previous report by Ciccone *et al.*, a 68-year-old female had a 5-cm staghorn renal calculus and was treated with the staged ureteroscopic approach [7]. In this case, the prone or semi-prone positions were difficult, and hence, staged ureteroscopy and

lithotripsy were chosen. Although this was in contrast to our report, Ciccone *et al.* conclude that the treatment of choice for large staghorn renal calculi remains PCNL; however, in selected patients, other options can also be helpful [7].

The size of the renal calculi is directly correlated with the overall incidence of complications after PCNL, and hence, treatment of large renal calculi is still considered challenging in the majority of the cases [6]. PCNL is generally considered as a safe procedure, and there is a lot of literature available supporting its usefulness and cost-effectiveness. However, PCNL has some known complications, and the most common one is hemorrhage, which can occur during the passage of the needle, tract dilatation, or during nephrostomy. Lungs and pleura are commonly injured during PCNL, which concludes that the treatment of choice for large renal calculi remains PCNL; however, in selected patients, other options can also be helpful [7].

CONCLUSION

PCNL for the management of large renal calculi demonstrates the efficacy and safety of this minimally invasive procedure. The successful removal of the large renal calculus with minimal complications highlights the importance of proper patient selection, meticulous surgical technique, and thorough post-operative care. PCNL offers a viable treatment option for patients with large renal calculi, providing a shorter hospital stay, less post-operative pain, and a faster recovery time compared to traditional open surgical methods. Our findings suggest that PCNL should be

considered a first-line treatment option for large renal calculi, and we recommend further studies to continue evaluating the long-term outcomes and potential complications associated with this procedure.

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