

Endourology

Small-tract percutaneous nephrolithotomy for an elderly female with renal and ureteral stones complicated by pyogenic kidney

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ABSTRACT

Percutaneous nephrolithotomy (PCNL) is feasible in the extremely elderly patients. However, there were higher rate of complications and longer hospitalizations. The case presented is a 95-year-old female who was admitted to the hospital and was diagnosed with multiple stones in the right kidney and upper ureter with right renal effusion and infection, urosepsis, and chronic bronchitis. After sufficient preoperative preparation, small-tract PCNL under vacuum suctioning was performed using the left lateral position under combined lumbar spinal and epidural anesthesia. The patient recovered and was discharged smoothly on schedule. Good clinical and social effects have achieved.

Background

Percutaneous nephrolithotomy (PCNL) is feasible in the extremely elderly patients. However, there were higher rate of complications and longer hospitalizations.¹ PCNL for kidney stones in elderly patients is effective but with a significantly increased risk of postoperative blood transfusions compared to young patients.²

Case presentation

Patient is a 95-year-old female. She was admitted to the hospital due to right flank pain with chills and high fever. The past medical history included recurrent episodes of chronic bronchitis. After admission, a complete blood cell count, urinalysis, and X-ray and kidney, ureter, and bladder (KUB) [Fig. 1], and computed tomography (CT) examination were performed. Multiple stones in the right kidney and upper ureter were diagnosed with right renal effusion and infection. In the early stage of hospitalization, the patient's condition deteriorated sharply. Urosepsis was diagnosed and she was transferred to ICU to get strengthen anti-inflammatory, supportive and symptomatic treatment for more than 2 weeks. Her vital signs were gradually stabilized. After

multidisciplinary discussions and full communication with family members, small-tract percutaneous PCNL was planned.

The operation was performed under combined lumbar spinal and epidural anesthesia. The patient was placed in the lithotomy position firstly. A 5Fr ureteral catheter was inserted retrogradely through the ureteroscope to the upper part of the right ureter. The saline solution was dripped at a height of about 50cm. The patient was then changed to the left lateral position to fully expose the right waist and rib area and protect the pressured part. A single-channel stone extraction scheme was designed according to preoperative conventional KUB and CT films. Under the guidance of real-time B-ultrasound, the puncture point was located under the 12th costal margin or between the 12th costal apex, between the axillary line and the scapular line. A 18G ultrasonic puncture needle was used to target the rear group of mid calyces. There was pus overflow, which was collected for culture with drug susceptibility study. A Zebra guidewire was then inserted, fascial dilators were used to expand a percutaneous tract from 8Fr to 18Fr. We then chose an 18Fr suctioning percutaneous metal sheath to be inserted to form a PCNL working channel. The patented stone clearance system produced by Shenyang Shenda Endoscope Co., Ltd. (patent number: 2008201374346) (Fig. 2) was then used being connected to a negative

Abbreviations: PCNL, Percutaneous nephrolithotomy; KUB, Kidney, Ureter, and Bladder X-ray; CT, Computed Tomography; ICU, Intensive Care Unit.

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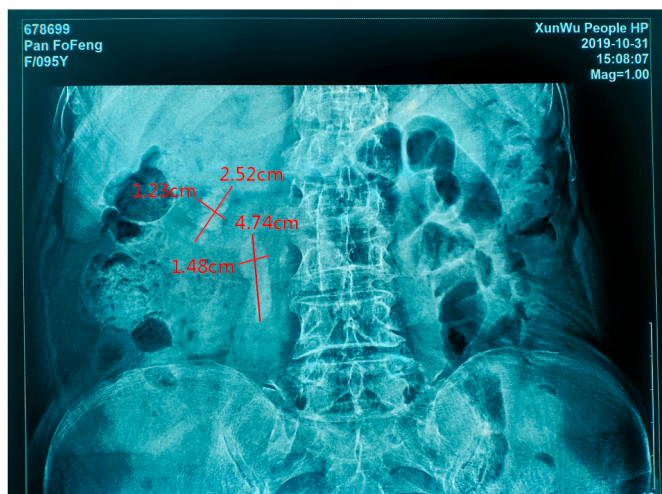


Fig. 1. Preoperative KUB.



Fig. 2. Percutaneous nephroscopic suctioning stone-clearance system.

pressure suction device. A perfusion flow of 400–500 ml was set during the operation. The perfusion pressure was set to be 250–300 mmHg, and suction pressure was set to be a value between 0.01 and 0.02 MPa (Fig. 2). Under continuous perfusion, 12Fr percutaneous nephroscope was used to slowly rinse and drain the pus until the visual field became clear. After entering the collection system, we made sure that the front end of the metal sheath was always in front of the nephroscopic lens, and the negative pressure was further adjusted to make the collection system at low-negative pressure.³ After finding the stone, an 100W Lumenis holmium laser 550 μm fiber (2.0–3.0J \times 15–20HZ) was used to break the stone in cutting fashion. During the lithotripsy, gravel particles smaller than 2mm were removed simultaneously by the suction. Gravel particles 2mm ~ 5mm in size were sucked away by retracting the nephroscope to the sheath gyration cavity. After clearing the stones, a 7Fr double J tube was placed through the zebra guide wire, and a 16Fr nephrostomy tube was indwelled at the end of the operation. The patient's vital signs were closely monitored after the operation, and anti-inflammatory, hemostatic, supportive and symptomatic treatment was carried out. The drainage was monitored and maintained. Postoperative KUB was reviewed (Fig. 3). The drainage tube was later removed on schedule, and the patient quickly recovered and was then discharged.

Discussion

The patient was diagnosed with multiple stones in the right kidney and upper ureter with right renal effusion and infection, urinary sepsis, and chronic bronchitis. After two weeks of ICU rescue treatment, the



Fig. 3. Review of KUB after surgery.

vital signs were gradually stabilized. The surgical indications were clear. The multiple calculi in the right kidney and ureter must be cleared to completely resolve the occurrence of right-sided urinary obstruction-induced infections,⁴ and the timing of surgery was right.

Considering the age of the patient, she would be difficult to accept the risk of second-stage surgery and anesthesia. We would adopt the small-tract PCNL to promote rapid recovery of patients and reduce economic burden, should we be able to establish the percutaneous renal channel smoothly. However, should there be significant bleeding during the establishment of the percutaneous renal channel, or occurrence of adverse reaction from the anesthesia, then a simpler percutaneous nephrostomy drainage would be adopted.

Because this elderly patient has a history of recurrent episodes of chronic bronchitis, the combined lumbar spinal and epidural anesthesia was therefore adopted as first choice. Should the combined lumbar spinal and epidural puncture fail, local anesthesia with sedation should be used. As the prone position of conventional percutaneous nephrology has certain influence on the heart and lung function of elderly patients during the operation, the decision was made to choose the healthy lateral position, which is also beneficial for the anesthesiologist to communicate with the patient during surgery and monitor the patient's vital signs.

The patient recovered and was discharged smoothly on schedule. Good clinical and social effects have been achieved. The key technologies are summarized as follows: 1) Establishing a good small-tract percutaneous renal working channel under the guidance of B-mode ultrasonographic real-time monitoring³; 2) Suctioning nature of the small-tract PCNL using the patented stone-clearance system can ensure that the collection system is in a low negative pressure state,³ to prevent bacteria and its internal and external toxins from flowing back to the blood, causing bacteremia or sepsis³; 3) surgeon has rich operating skills and clinical experience, can adapt to different surgical positions for this operation.

Conclusion

Small-tract PCNL under vacuum suctioning for complicated nephrolithiasis and ureteral stone is feasible for extremely elderly patient with corresponding modifications on operative body position and anesthetic approach.

Consent

Written informed consent was obtained from the patient for publication of this report and any accompanying images. Copies of the written consent are available for review by the Editor of the journal.

Ethical standard

Ethical and regulatory approvals were sought and obtained from the Affiliated Ganzhou Hospital of Nanchang University.

Author contribution

Protocol/project development: Fan, Xie, Song Data collection or management: Fan, Luo, Li M, Chen, Li Q, Yang, Liao, Li J Data analysis:

Xie, Fan, Li M, Luo Manuscript writing/editing: Xie, Fan, Michel, Song.

Conflict of Interest

None.

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References

1. Abedali ZA, Large T, Heiman JM, et al. Percutaneous nephrolithotomy in the 80 Years of age and older population. *Urology*. 2019;134:62–65.
2. Haider R, Regnier P, Roustan FR, et al. Percutaneous nephrolithotomy for kidney stones in elderly patients: meta-analysis of results and complications. *Prog Urol*. 2017; 27:58–67.
3. Song L, Chen Z, Liu T, et al. The application of a patented system to minimally invasive percutaneous nephrolithotomy. *J Endourol*. 2011;25:1281–1286.
4. Arcaniolo D, De Sio M, Rassweiler J, et al. Emergent versus delayed lithotripsy for obstructing ureteral stones: a cumulative analysis of comparative studies. *Urolithiasis*. 2017;45:563–572.