

Needle Manipulation for Removing Inaccessible Stones in Parallel Calices during Percutaneous Nephrolithotomy

Seyed Habibollah Mousavi-Bahar, Ali Ahanian, Babak Borzouei

*Urology and Nephrology
Research Center, Hamedan
University of Medical Sci-
ences, Hamedan, Iran*

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INTRODUCTION

Percutaneous nephrolithotomy (PCNL) is the standard treatment for renal stones in patients who are not candidate for extracorporeal shockwave lithotripsy (SWL). In patients with complex renal stones, it may be impossible to access all the stones via a single-tract. In these cases, multiple access tracts may be required to increase stone-free rate, which obviously increase the risk of complications and morbidity.^(1,2) Other procedures have also been described for this purpose, including flexible nephroscopy, guidewire-assisted infundibular tilt, angular access PCNL, and SWL, as an adjuvant procedure. Here, we describe a new technique for displacing the stone from an inaccessible calyx of the kidney to an accessible area by the single pre-existing tract, called “Needle Manipulation”.

CASE REPORT

During 10 years of work in endourology field and among more than 1500 cases of PCNL, we had 48 cases that needed needle manipulation. Patients with ≥ 2 calculi in two neighborhood calices or staghorn calculi that occupied calices without hydronephrosis and acute angle between calices were included in the study. Exclusion criteria were non-opaque calculi, long length of infundibulum, large size of residual stone, acute angle of infundibulum, and smooth surface of calculus.

Forty-eight patients were enrolled in the study, including 33 men and 15 women, with the mean age of 38 ± 5 years. Six subjects had some degrees of renal mal-

Corresponding Author:

*Seyed Habibollah
Mousavi-Bahar, MD
Department of Urology,
Shahid Beheshti Hospital,
Eram Blvd, Hamedan, Iran*

*Tel: +98 918 111 3612
Fax: +98 811 838 1035
E-mail: shmbahar@
umsha.ac.ir*

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rotation. The procedure was done by one surgeon (SHMB).

TECHNIQUE

In this case, we inserted a number 4 or 5 ureteral stent, like other routine procedures. By contrast material injection through the ureteral stent, the pyelocaliceal system was opacified. Using Shiba needle (18-gauge), we accessed the calyx with the largest stone burden. We selected the calyx with maximum access to stone burden. After tract dilatation and Amplatz sheath insertion, accessible stones were broken and removed (Figure A). If stones could not be accessed in other calices, especially parallel calices, we inserted the needle into the kidney at the site of inaccessible stone under fluoroscopy (Figure B). Thereafter, we tried to touch and push the stone using the needle to displace it into or near an accessible area, such as the renal pelvis, by the primary tract (Figure C). Displaced stone was finally grasped, fragmented, and removed through the primary tract (Figure D). If manipulation fails to displace the stone, we can pass a guidewire through the same needle and create a new tract to remove the stone. Needle manipulation may cause minimal hemorrhage, which is clinically of insignificant importance.

RESULTS

Among more than 1500 PCNLs, we used needle manipulation in 48 cases. The mean stone size was 10 mm (range, 7 to 20 mm) in its largest diameter. This technique was successful in 42 (87.5%) subjects. There was more failure (50%) in patients with renal malrotation (3 out of 6).

DISCUSSION

Skolarikos and Papatsoris have described that residual stone fragments can occur in up to 8% of patients who undergo PCNL. When left untreated, approximately half of them will develop a stone-related complication in the future, and more than

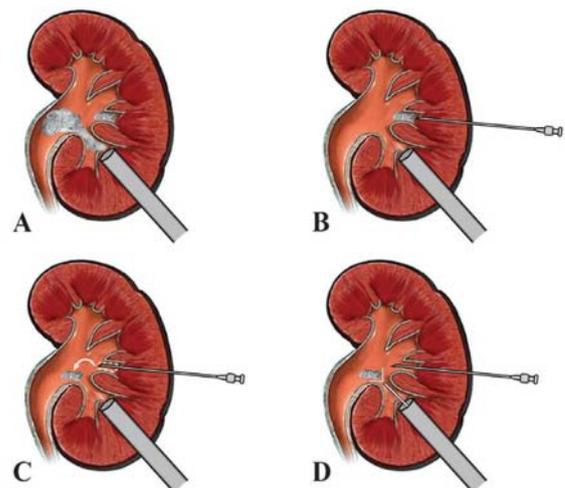
half of these patients will ultimately require another surgical intervention.⁽³⁾

Sometimes it is impossible to access all the stones by a single-tract during PCNL, which may be due to scattered stone fragments, complex stones, or a large staghorn calculus. Furthermore, an accessible stone may migrate into an inaccessible calyx during surgery.

Saline irrigation of the kidney is one of the easiest maneuvers to displace such stones, but it may not be always successful.⁽⁴⁾ Moreover, creating another tract can lead to increased morbidity. In some studies, multiple-tract PCNL was accompanied by significant increase in serum level of creatinine and reduction in creatinine clearance postoperatively.^(5,6) Furthermore, hospitalization was prolonged, but hemorrhage was not different from single-tract PCNL.⁽⁵⁾

In the “Angular Percutaneous Renal Access” that was described by Liatsikos and colleagues, the skin incision was single, but it was used for multiple nephrostomy tracts. The cosmetic results were better than multiple-tract PCNL, but the transfusion rate was 45%.⁽⁷⁾

Guidewire-assisted infundibular tilt technique has



(A) Tract dilatation and Amplatz sheath insertion; (B) The needle is into the kidney at the site of inaccessible stone; (C) The stone is touched and pushed into or near an accessible area; and (D) Displaced stone is grasped, fragmented, and removed.

also been described, but its utility is limited to subjects with moderate to severe dilatation of the pyelocaliceal system, in which the parenchymal wall between the two adjacent calices is thin and permits tilting of stone bearing calyx and opening its infundibulum. This technique is not useful in patients with no or mild hydronephrosis.^(8,9)

Adjuvant SWL can lead to complications, such as residual stone fragments, infection, and adverse effects on adjacent tissues, including urinary, gastrointestinal, cardiovascular, genital, and reproductive systems.⁽¹⁰⁾ Flexible nephroscopy during the primary operation or as a second-look procedure can increase the stone-free rate and decrease the need to multiple-tract creation,⁽¹¹⁻¹³⁾ but the instruments are very expensive and are not available in all communities.

Our technique does not need additional tract creation and has no additional risk for the patient. Its limitation is seemed in patients with narrow infundibulum that does not permit stone or instrument passage. There is also increase in radiation time, but using a needle holder can decrease radiation exposure of the surgeon's hand. However, needle manipulation is not useful for stones in the anterior calices. We made second tract for important residuals and left small residuals, and followed them by medication or SWL if needle manipulation was not helpful.

CONFLICT OF INTEREST

None declared.

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