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True Supine Percutaneous Nephrolithotomy for Recurrent Right Renal Calculi in a Previously Operated Kidney: A Case Report and Review of the Literature

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Abstract: ***Background: Percutaneous nephrolithotomy (PCNL) is the standard treatment for large or complex renal calculi. True supine positioning offers anesthetic and logistical advantages, but its use in a previously operated kidney is less well described. Case presentation: A 55-year-old woman with no known comorbidities presented with right flank pain of 6 months' duration and intermittent mild dysuria. She had undergone right PCNL 1.5 years earlier. Non-contrast CT showed [right renal calculi: number, size, location, HU]. She underwent right PCNL in the true supine position through three tracts. The operative time was 1.5 hours, and the procedure was uneventful. A right DJ stent was placed at the end of the procedure. Haemoglobin fell from 12.4 to 11.6 g/dL, and serum creatinine remained normal. She was discharged on postoperative day 3. Conclusion: True supine PCNL is a feasible and safe option for recurrent stones in a previously operated kidney, with minimal haemoglobin drop and preserved renal function.***

Keywords: percutaneous nephrolithotomy, true supine, renal calculi, recurrent stones, multiple tracts

1. Introduction

PCNL is recommended for renal stones larger than 2 cm and for selected smaller stones. Traditionally, it is performed in the prone position, which can compromise ventilation and complicate airway access, especially in obese or high-risk patients. Supine and true supine approaches allow simultaneous antegrade and retrograde access, easier anaesthetic management and a shorter setup time. Stone recurrence after prior PCNL, with perirenal scarring and altered anatomy, can make repeat access more demanding. We report a case of recurrent right renal calculi managed by true supine PCNL.

2. Case Presentation

History

A 55-year-old woman presented with right flank pain of 6 months' duration and intermittent mild dysuria. She had no known comorbidities. Her surgical history was notable for right PCNL 1.5 years earlier, with an uneventful course.

Investigations

Non-contrast CT of the abdomen and pelvis (Fig. 1) demonstrated [stone number, size in mm, location, laterality, HU, hydronephrosis, cortical thickness]. Preoperative haemoglobin was 12.4 g/dL, and serum creatinine was within normal limits. [Urine culture: sterile.]

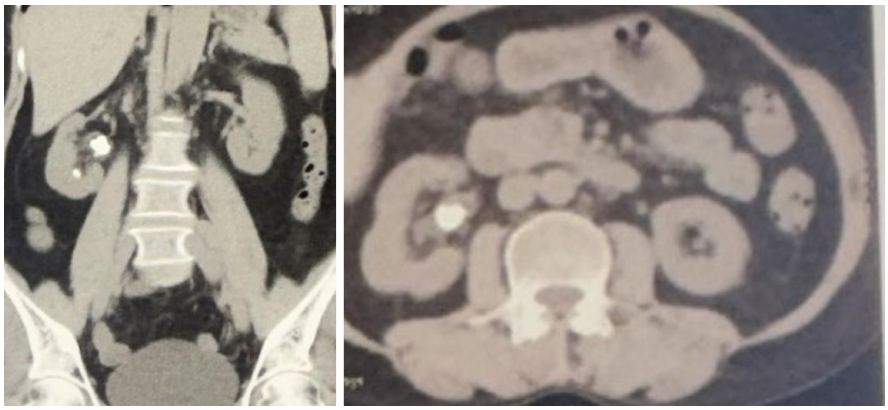


Figure 1: Preoperative non-contrast CT, coronal (left) and axial (right), showing right renal calculi



Figure 2: Intraoperative fluoroscopy showing stones in all the calyces

Procedure

Under general anaesthesia, the patient was positioned true supine; no lithotomy or Valdivia position was required. A ureteric catheter was placed retrogradely with the patient in the same supine position. Under fluoroscopic guidance (Fig. 4), percutaneous access to the right collecting system was obtained with lower, middle and upper calyceal punctures, and three tracts were established (Fig. 3). The tracts were dilated to 21 Fr (lower calyx), 18 Fr (middle calyx) and 16 Fr (upper calyx). Stone fragmentation was performed with pneumatic lithotripsy, and the fragments were retrieved. Final fluoroscopy showed complete clearance, and a right DJ stent was placed. The total operative time was 1.5 hours.



Figure 3: Intraoperative photograph in the true supine position with the percutaneous tracts in situ.



Figure 4: Intraoperative fluoroscopy confirming tract position.

Outcome

The postoperative course was uneventful. Hemoglobin on postoperative day 1 was 11.6 g/dL (a drop of 0.8 g/dL), and no transfusion was required. Serum creatinine remained normal. The patient was discharged on postoperative day 3. Follow-up plain abdominal radiography (X-ray of the kidneys, ureters and bladder) showed complete clearance.

3. Discussion

True Supine Versus the Valdivia-Type Supine Position

The Valdivia and modified Valdivia (Galdakao) positions keep the patient supine but rely on a bolster or tilt under the ipsilateral flank and a specific leg arrangement to expose the flank and the urethra at the same time [2,3]. These adjustments mean that the final posture must still be set up and checked and, in many cases, modified between the endoscopic and percutaneous stages or when a different calyx is targeted. In the true supine position used here, the patient lies flat on the table and is not rotated, bolstered or moved at any stage. Ureteric catheterization, retrograde access, percutaneous puncture, tract dilatation, lithotripsy and stent placement all take place in one unchanged position. In this case, that avoided any repositioning and the associated delay and allowed the retrograde and antegrade teams to work together. The concept is not new: Falahatkar et al. reported

complete supine PCNL with no rolled towel under the flank and no change in leg position [4], and a recent series described a true supine technique that omits bolsters and stirrups altogether [5].

Dixit et al. recently refined this approach in a retrospective study of 400 patients comparing a true supine technique without bolsters or stirrups against traditional supine PCNL. Their technique uses an anatomical landmark, the Dixit line, to guide the initial puncture [5]. The true supine group had a significantly shorter operative time (53 versus 70 minutes) and a trend toward earlier discharge, with no significant differences in most other intraoperative and postoperative outcomes, supporting the efficiency and safety of the technique [5]. Because the line relies on surface anatomy rather than on positioning aids, it makes the puncture reproducible in a flat, unmoved patient, which suits the approach we describe.

Advantages of the Supine Approach

- **Anaesthesia and safety:** easier airway management, better ventilation, the option of regional anaesthesia (which matters in high-risk patients) and rapid access to the patient for resuscitation. In the complete supine position, simultaneous PCNL and ureteroscopic procedures and seated operating have also been highlighted [4].
- **Efficiency:** no turning, so shorter anaesthesia and setup times. Our operative time was 1.5 hours for a repeat procedure with multiple tracts.
- **Combined access:** simultaneous antegrade and retrograde (flexible ureteroscopic) access allows endoscopic combined intrarenal surgery, which helps clear stones that are difficult to reach through a single tract [3].
- **Drainage and infection:** low-pressure drainage of irrigant and fragments through the sheath, with lower intrarenal pressure, has been associated with fewer infectious complications in some series, although the evidence is not uniform [6].
- **Ergonomics and radiation:** the surgeon can work seated, and the shorter skin-to-kidney distance may shorten the working distance.

Comparative evidence is mixed. A systematic review found that supine PCNL can yield outcomes similar to those of prone PCNL in carefully selected patients with uncomplicated stones [6]. A randomized comparison of complete supine and prone PCNL found a significantly shorter operative time with similar stone-free rates and no colon injury [4]. In contrast, the CROES PCNL Global Study reported longer operative times and lower stone-free rates for the supine position, which the authors attributed partly to differences in how operative time and residual stones were defined and assessed [7]. Position should therefore be chosen on the basis of surgeon experience and patient factors rather than an assumed superiority of either approach.

Access to All Calyces and Staghorn Calculi

A common concern is that the supine position limits access to the posterior calyces, the upper pole and large branched stones. True supine access through the flank allows puncture of the lower, middle and upper calyceal groups from the same position, with the C-arm moved around the patient for triangulation and the kidney assessed in more than one fluoroscopic plane. Because multiple tracts can be placed in one session without repositioning, complete staghorn clearance is possible in the supine position; a single-surgeon series of 322 consecutive supine PCNLs included staghorn and bilateral stones, with no position-related complications [8]. Flexible nephroscopy or a second tract can be used for residual calyceal stones. In the present case, three tracts were used (Fig. 3), which supports this approach in a previously operated kidney. Upper-pole supracostal access carries a recognized risk of pleural injury and should be performed in expiration, with the fluoroscopic and postoperative chest findings checked.

4. Conclusion

True supine PCNL was feasible and safe for recurrent right renal stones in a previously operated kidney in this patient, with minimal blood loss and preserved renal function. Further series are needed to define its role in this setting.

Ethics Statement

Written informed consent for participation in the treatment and for publication of this case report and the accompanying images was obtained from the patient, and a signed copy is available to the journal on request.

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and the accompanying images.

Conflicts of Interest and Funding

The authors declare no conflicts of interest. This work received no specific funding

Figure Legends

Figure 1: Preoperative non-contrast CT (coronal and axial) showing right renal calculi [arrows; size/HU].
Figure 2: Intraoperative fluoroscopy showing stones in all the calyces
Figure 3: Intraoperative photograph of the patient in the true supine position with 3 tracts in situ.
Figure 4: Intraoperative fluoroscopy confirming the position of the tracts.

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