

# Innovations in PCNL treatment

Supine PCNL appears to have several advantages over prone PNL in some patients



**Dr. Cesare Scoffone**  
San Luigi University  
Hospital  
Dept. of Urology  
Orbassano (IT)

scoof@libero.it



**Prof. Roberto Scarpa**  
San Luigi University  
Hospital  
Dept. of Urology  
Orbassano (IT)

romasca@tiscali.it



**Prof. Dr. Jean De La Rosette**  
Urologist  
AMC University  
Hospital  
Amsterdam (NL)

J.J.Delarosette@amc.uva.nl



**Dr. Charalampos Mamoulakis**  
AMC  
Dept. of Urology  
Amsterdam (NL)

C.Mamoulakis@amc.uva.nl

Currently, percutaneous nephrolithotomy (PNL) is the treatment of choice for large renal stones, staghorn calculi, stones resistant to fragmentation or stones occurring in kidneys with an abnormal anatomy. The safety and efficacy of PNL for the treatment of more complex stones and its use in more diverse patient populations, combined with the growing incidence of stone disease, likely explains the increasing use of PNL for stone management over the last 10 years, as indicated by recent studies [1,2].

Traditionally, PNL has been performed in the prone position as it was initially considered by many to be the handiest approach to the kidney [3]. This choice was not dictated by any prospective randomized study. The prone position, however, is often associated with restrictions and especially present in patients with morbid obesity, compromised cardiopulmonary status and staghorn calculi. The rising number of PNL procedures combined with increasing confidence and experience has caused urologists to modify the prone PNL technique in an effort to improve results and overcome these limitations.

An increasing number of communications are facing the surface presenting different approaches and techniques to improve the PNL procedure, including technical approaches and instrumental developments.

## Supine versus Prone

The prone position provides posterior access to the collecting system that theoretically enables the surgeon to puncture a posterior calyx through Brodel's avascular renal plane without causing significant parenchymal bleeding, peritoneal perforation and/or visceral injuries.

The morbidity of PNL when performed in the prone position has been documented in recent reviews [4,5], therefore the traditional prone positioning has been challenged and altered by various authors. Since several studies have demonstrated the safety of more lateral percutaneous nephrostomy placement, efforts were undertaken to study the utility of a similar

approach for PNL. It comes to no surprise that indeed in recent studies the utility and safety of supine percutaneous stone removal have been confirmed [6,7]. Especially patients at higher anesthetic risk, because of higher morbidity or longer surgery time, may benefit most from a supine approach.

The supine position offers several advantages. Patient positioning is less demanding and time-consuming since a change is not required from the lithotomy to the prone position during the procedure. A supine position is more comfortable for the patient, which might enable the use of decreased anesthetics. The supine position allows for more rapid access to the airway and therefore maybe less hazardous, especially in patients with compromised cardiopulmonary function, morbid obesity, or those who require a prolonged procedure. Additionally, if required, a more familiar approach for simultaneous ureteroscopic access is readily obtained, allowing combined PNL/URS for management of complex stone disease (7).

Limitations of supine PNL include a decreased filling of the collecting system resulting in more difficult nephroscopy. Consequently the collecting system is constantly collapsed and as a result the surgical field is relatively small for nephroscopic maneuvers. Maintaining low pressures within the renal cavities is important in order to prevent fluid absorption and urosepsis, in any case, the combined use of retrograde and antegrade instruments might increase renal cavities dilation when needed. In addition, an upper-pole calyx calyceal puncture is quite challenging, as the upper pole is more medial and posterior and concealed deeply in the rib cage, when the patient is positioned supine. Suggested ways to surpass this limitation would be to either tilt the table towards the contra-lateral side or to perform a simultaneous ureteroscopy ECIRS [7].

Considering these advantages, the supine positioning of the patient for PNL seems a very attractive option. Published series from different centers have shown that supine PNL is safe with several benefits for the patient and several technical advantages for the surgeon. Because the tract is horizontal or slightly inclined downwards the pressure of the collecting system is very low, which may facilitate the spontaneous evacuation of stone fragments.

In a recent review the advantages of prone position were compared to the supine position. It was concluded that, although the supine position seems to

provide theoretical advantages for obese and morbidly obese patients and patients with staghorn calculi, a trend in favor of better outcomes in the prone position over the supine position was identified [8].

## Combined approach: URS in combination with PNL

Available studies have confirmed the safety and possible advantages of the supine position. The supine position may be less hazardous and, if required, a more familiar approach for simultaneous ureteroscopic access is readily obtained, allowing combined PNL/URS for management of complex stone disease. In a recent manuscript by Scoffone et al. the outcome of this combined approach (Fig. 1-3) was elegantly presented [7]. In particular, combined PNL-URS allows the endovision creation of an optimal percutaneous access, the intraoperative use of retrograde flexible ureteroscopy to reach stones in the superior calyx or in calyces not otherwise visible percutaneously (avoiding the creation of multiples accesses with the related risks), a systematic final exploration of all calyces, pelvis and ureter at the end of the procedure in order to access the real stone free status [9] (Fig. 4a-d).

## Considerations

There are some considerations that should be taken into account. First of all a proper patient selection is of key importance for achieving consistently successful outcomes with minimal major complications [5]. Before embracing any new approach as possible new PNL standard, though, one should critically review the current evidence to do so. Actually some data suggest that prone PNL appears to have especially several advantages over supine PNL in obese patients and patients with staghorn calculi. When comparing prone to supine PNL, prone PNL has less operative

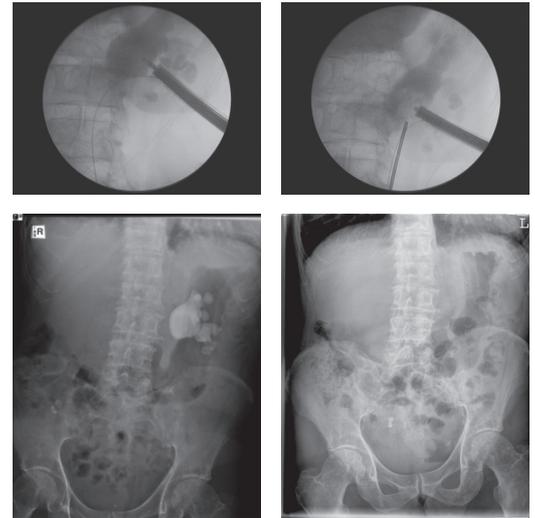


Fig. 4a-d: Combined PNL-URS allows the endovision creation of an optimal percutaneous access, the intraoperative use of retrograde flexible ureteroscopy to reach stones in the superior calyx or in calyces not otherwise visible percutaneously, a systematic final exploration of all calyces, pelvis and ureter at the end of the procedure in order to access the real stone free status.

time with similar bleeding rates and slightly better stone-free rates [8] (although how to determine these parameters should be standardized: flexible endoscopic final control? Alternatively post operative CT scan?). Most importantly is that one should be able to make use of all the different approaches and tailor treatment to each patient's specific needs. In patients with simultaneous renal pelvis stones and ureteral stones or in patients with multiple calyceal stones, a combined percutaneous and ureteroscopic approach seems most attractive. The alternative might be a prone PNL with flexible antegrade endoscopy.

Another important issue to take into account is training and maintaining skills in treatment of renal stones by PNL. It is beyond discussion that PNL is currently the most complicated stone surgery technique to teach. The steep learning curve is mainly related to obtaining renal access. Given the complexity of the treatment of renal stones, one may consider a centralized renal stone treatment in dedicated stone centers [10]. It is most likely that in these centers the combined expertise to perform a successful flexible URS and PNL is present.

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Figure 1-3: Combined approach: URS in combination with PNL