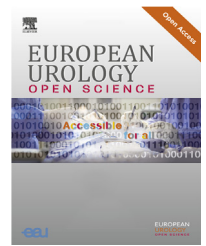




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Percutaneous Nephrolithotomy: Which Position? Supine Position!

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Abbreviations: PCNL, Percutaneous nephrolithotomy; CT, Computed Tomography.

Percutaneous nephrolithotomy (PCNL) was developed for patients in the prone position at the start of the 1980s because in this pioneering era urologists were afraid of injuring the colon, which was, and still is, one of the most frightening complications of PCNL [1]. This theory was uncritically assumed as a postulate for decades and therefore the prone position was deemed the only safe approach to prevent colonic perforation. Undoubtedly, the unavailability of computed tomography (CT) or ultrasonography at that time meant that identification of interposed organs between the skin and the kidney was impossible, thus largely justifying the intuitive approach regarding patient positioning.

Thereafter, with the advent of CT imaging, this assumption has come into question because of the intuition of Valdivia-Uria, who was the first to demonstrate that PCNL could be performed in the supine position with similar results and complication rates, but with clear advantages in terms of ergonomics and anesthesiological management [2]. With the dissemination of preoperative CT imaging, conversely to what was historically thought, it was shown that the incidence of retrorenal colon is lower in the supine than in the prone position (1.9% vs 10%) [3], completely

setting aside the idea of higher risk of damaging the colon in supine than in prone PCNL.

The supine position certainly offers some advantages over prone PCNL in terms of anesthesiological management, including better cardiovascular and airway control, especially in emergency situations, less risk of injury to the central and peripheral nervous system, and a lower risk of thromboembolism owing to the lack of inferior vena cava compression [4].

Moreover, supine positioning is unquestionably more ergonomic compared to the prone decubitus position, with less labor for OR personnel and this advantage is even more evident in obese patients [5]. In fact, the surgical position and patient draping are the same throughout the entire procedure, with no strenuous flipping of patients needed (Fig. 1).

All these little details of supine position convey to significantly shorter operative time as already demonstrated in literature [6].

Another point that certainly favors the supine position is that endoscopic approachability for the upper calyx through the lower calyx is significantly higher in supine than in prone PCNL (80% vs 20%) [7] (Fig. 2). This finding is particularly useful in mini PCNL, for which retropulsion of fragments in the upper calyx cannot rely on flexible scopes that do not fit into these smaller Amplatz sheaths.

In the supine position, the slightly downward orientation of the Amplatz sheath results in better drainage of fluids, and consequently spontaneous evacuation of stone fragments generated during lithotripsy. On the one hand, this can potentially lead to lower intrarenal pressure in the supine position, although comparative studies on this issue have not been reported yet. On the other hand, this continuous and spontaneous fluid evacuation via gravity keeps the collecting system mostly empty or even collapsed, which may sometimes impair navigation in the kidney, in particular with the new generation of combined lithotripters.

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Fig. 1 – Giusti modification of the Valdivia-Galdakao position.

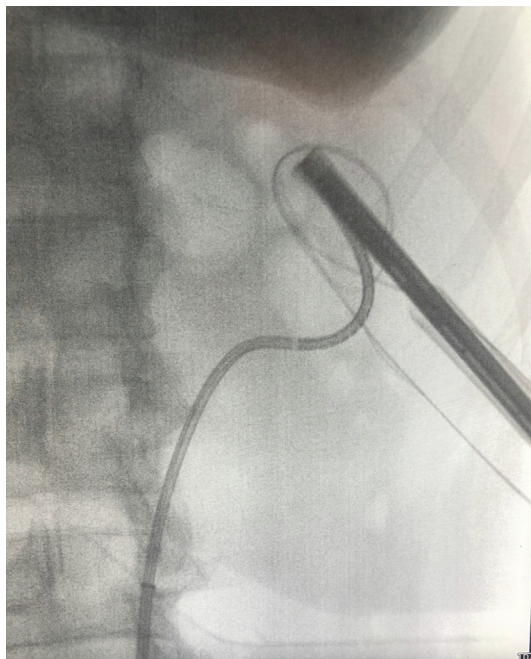


Fig. 2 – Upper pole approachability through the lower calyx with a rigid nephroscope in the supine position.

Notably, ergonomics also favors supine position: owing to the direction of the access, there is no conflict between the instruments and the C arm, so that the annoying movement of the C arm into and out of the operative field is never needed during the procedure. In addition, the surgeon can work comfortably while sitting down, and can thus avoid back stress due to prolonged standing in an uncomfortable position as required for prone PCNL.

Most importantly, the supine position facilitates execution of challenging endoscopic combined intrarenal surgery [8] and simultaneous bilateral endoscopic surgery [9], which can be considered the quintessential application of this innovative position. In addition, the radiological hazard is reduced because the surgeon's hands are never directly under the X-ray beam, as happens during puncture in the prone position.

Nevertheless, there are also a few drawbacks linked to the supine position. One the most important is the hypermobility of the kidney that may sometimes be experienced. In some patients, especially slim ones, hypermobility of the kidney is really significant, making puncture and, most importantly, dilation of the tract really demanding and dangerous if not properly performed [10].

Moreover, a non-negligible shortcoming of the supine decubitus position is the greater length of the percutaneous tract. This depends on the fact that the puncture is more lateral and the relationship to the abdominal wall is different. A longer Amplatz sheath and a rigid nephroscope may overcome this limitation. Nevertheless, from effectiveness and safety points of view, it has been widely shown that supine and prone PCNL are equivalent [11]. Thus, considering the advantages listed above, why is supine PCNL still performed in only 20% of cases worldwide?

Many experienced surgeons are not very willing to embrace the supine position because they are afraid that this radical change may be cumbersome and may impact surgical outcomes during the learning curve. Sofer et al [12] disproved this notion by showing that changing position is not that challenging and the learning curve is short, yielding similar or even better outcomes rather quickly.

All that being said, our belief is that the pros of supine PCNL clearly outweigh the cons and this will soon be appreciated by the majority of urologists worldwide, especially young urologists. The ideal situation is to be able to perform PCNL in both positions and to come back to the prone position in the few cases in which, for anatomical reasons, the supine position is contraindicated. If this is not the case, maybe someone can explain to readers why, to the best of our knowledge, there are no urologists who after starting with the supine position decided to go back to the prone position.

Sooner, the evolution of PCNL will parallel the high jump in modern athletics, with the Yashchenko ventral technique, once considered the only way possible, has definitively been abandoned in favor of the Fosbury supine technique.

Only blind and nearsighted ostracism can dissuade urologists from experiencing the evident advantages of the supine position.

Nothing is so painful to the human mind as a great and sudden change.

Mary Wollstonecraft Shelley

Conflicts of interest: Guido Giusti is a consultant for Coloplast, Rocamed, Olympus, Boston Scientific, BD-Bard, Cook Medical, and Quanta System. Silvia Proietti is a consultant for Quanta System. Maria P. Pavia and Luis Rico have nothing to disclose.

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