DOI: *10.4081/aiua.2025.14075*

LETTER TO EDITOR

COMMENT ON:
Barts flank-free modified supine position vs prone position in percutaneous nephrolithotomy: Systematic review and meta-analysis

Khaled Ghanem, Damiete Harry, Junaid Masood

Endourology and Stone Services, King George, and Queens Hospitals, BHR university hospitals NHS Trust, London UK.

KEY WORDS: *Percutaneous nephrolithotomy; Prone; Barts flank free modified supine position.*

Submitted 13 June 2025; Accepted 13 July 2025

To the Editor,

We read the meta-analysis by *Ananda et al.* (1), with great interest and congratulate the authors on their contribution. Described in 2012 by *Masood* (2), we are delighted to see the *Barts flank-free modified supine* (Barts FFMS) position for PCNL popularised. It offers many advantages over the prone position for both the surgeon and patients (2).
Ananda et al., concluded the surgery duration was significantly shorter in the Barts FFMS position vs the prone position with no significant differences in the *stone free rates* (SFR), complications, screening time, and length of stay. They state the choice of patient position should be based on the surgeon's preference and the patient's clinical choice.
Advantages of prone PCNL include excellent exposure of the flank, ample space for several tracts to be placed if needed and good manipulation of instruments (3). Upper pole puncture may be easier in the prone position as the posteromedial location of the upper pole brings it closer to the posterior abdominal wall (4). However, prone PCNL has several disadvantages. Patients need to be repositioned after the first stage increasing operating time, potentially causing injury and jeopardising airway access (3). Managing cardiorespiratory emergencies in the prone position is challenging. Lying on the abdomen causes anaesthetic difficulties with reduced lung compliance and increased *intraabdominal pressure* (IAP) potentially leading to a reduction in cardiac output (5). There is increased risk of ophthalmological complications such as orbital/corneal abrasions and raised intraocular pressure causing ischaemic oculopathy (6). The prone position is not suitable for carrying out simultaneous *retrograde intra-renal surgery* (RIRS). Patients with significant cardiorespiratory morbidities, certain musculoskeletal deformities or the very obese cannot be placed prone. The prone position may increase the surgeon's radiation exposure by standing close to the patient and working with instruments in a more perpendicular direction (4).
We recommend patients are placed on a Montreal mattress (5, 7) (Figure 1) during prone PCNL. This rectangular mattress used for spinal procedures is hollow in the centre allowing abdominal contents to fall through reducing IAP, improving ventilation and cardiac output (5, 7). It allows for flexion of the hips giving more space for renal access between the ribs and iliac crests and prevents extension reducing stress on the back.

Figure 1.
The Montreal mattress with a hollow centre. It allows for flexion at the hips to reduce any strain on the spine with better access to the kidney.

The head should be supported in a Prone-view™ protective helmet system (*Dupaco, Oceanside, CA*) maintaining neutral neck alignment.
This consists of a cushion, protective helmet with legs, and a base mirror with posts (Figure 2) aiding the anaesthetist to view the patient's face and endotracheal tube, important in case of a ventilation problem during surgery (5). These mitigate against some of the anaesthetic and skeletal complications arising in the prone position (5).
Our preferred position for PCNL "*The Barts FFMS*" allows for easy access with fluoroscopy or ultrasound (torso tilted around 15%) to reduce the radiation exposure (2). The Barts FFMS position gives the best exposure of the flank among the supine positions (2, 3) (Figure 3). A flank free from any support provides space for planning and dilating multiple tracts since the kidney is in a neutral position and therefore less mobile (2). The tract is essentially horizontal which allows easy washout of fragments with low intrarenal pressures (2). The surgeon can sit down whilst operating reducing tiredness whilst improved radiological safety is maintained as the surgeon's hands are less exposed compared with the prone position. Simultaneous RIRS can be easily carried out (2) (Figure 4). It caters for patients with significant cardiovascular and respiratory morbidity, musculoskeletal deformities and obese patients who cannot be placed prone.
Ananda et al., accept their meta-analysis is limited by the inclusion of a small number of studies with inconsistencies and heterogeneity in reporting and outcomes. Evidence suggests equivalence in SFR and surgical complications between supine and prone positions (8). Larger scale multi centre randomised studies are needed to further clarify if a difference exists. However supine PCNL has numerous other advantages including available simultaneous RIRS, shorter operating time and lower intrarenal pressures during the surgery possibly accounting for the lower risk of infective complications (9). Indeed, infective complications are statistically more common in patients undergoing prone PCNL with the prone position an independent risk factor for post operative infections (10).

Figure 2.
The Prone-view™ helmet system with a cushion, a protective helmet with legs, and a base mirror with posts. It enables neutral head and neck alignment and allows the patient's face and the endotracheal tube to be viewed.

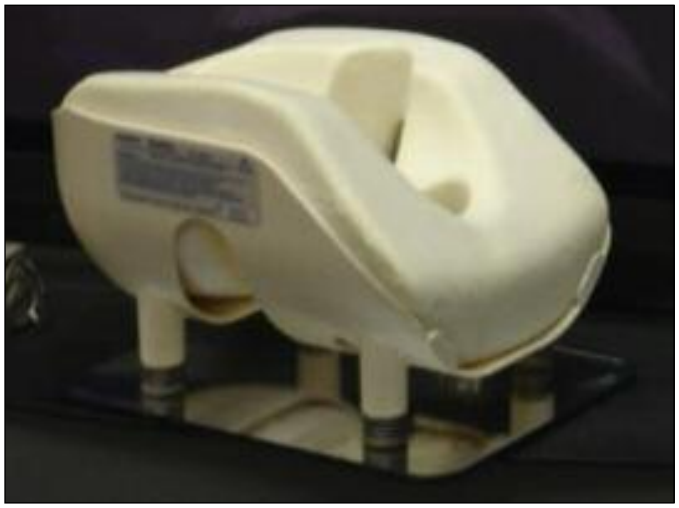

Figure 3.
Barts FFMS position. Note a gel pad under the ipsilateral pelvis (1) and under the rib cage (2) leaving the flank free. IC: iliac crest; PAL: Posterior axillary line, also marked are the 10th, 11th and 12th ribs.

Figure 4.
Showing the Barts FFMS position from below allowing for easy RIRS access. Please note the ipsilateral leg is relatively extended and the contralateral side abducted.

A recent global census carried out by the Endourological society confirmed the growing popularity of supine PCNL. Prone PCNL still remains the most common with 47.5% of endourologists using this position exclusively. 16.3% use the supine position exclusively and 36% use both positions (11).
We believe the Barts FFMS position is the standard for carrying out PCNL as highlighted by its many advantages over the prone position but accept there may be rare situations where a prone position PCNL could be indicated for example in certain upper pole punctures. With more education and training, supine PCNL with its numerous advantages will be further adopted as the standard PCNL approach.

References

1. Ananda IGYP, Santosa KB, Yudiana IW, et al. Barts flank-free modified supine position vs prone position in percutaneous nephrolithotomy: Systematic review and meta analysis. Arch Ital Urol Androl 2024; 96:12944.

2. Bach C, Goyal A, Kumar P, et al. The Barts 'flank-free' modified supine position for percutaneous nephrolithotomy. Urol Int. 2012; 89: 365-8.

3. Karaolides T, Moraitis K, Bach C, et al. Positions for percutaneous nephrolithotomy: Thirty-five years of evolution. Arab J Urol. 2012; 10:307-16.

4. Ray AA, Chung DG, Honey RJ. Percutaneous nephrolithotomy in the prone and prone-flexed positions: anatomic considerations. J Endourol 2009; 23:1607-14.

5. Papatsoris A, Masood J, El-Husseiny T, et al. Improving patient positioning to reduce complications in prone percutaneous nephrolithotomy. J Endourol 2009; 23:831-2.

6. Hunt K, Bajekal R, Calder I, et al. Changes in intraocular pressure in anesthetized prone patients. J Neurosurg Anesthesiol 2004; 16:287-90.

7. Feindel W. Neurosurgery at the Montreal Neurological Institute and McGill University Hospitals. Neurosurgery 1996; 39:830-839.

8. Li J, Gao L, Li Q, et al. Supine versus prone position percutaneous nephrolithotomy: A meta-analysis of randomised controlled trials. Int J Surg. 2019; 66:62-71.

9. Farkouh A, Park K, Buell MI, et al. Prone vs supine percutaneous nephrolithotomy: does position affect renal pelvic pressures? Urolithiasis. 2024; 52:66.

10. Kasap Y, Senel S, Uzun E, et al. Does surgical position affect infective complications in percutaneous nephrolithotomy? Urolithiasis 2022; 50:765-771.

11. Moreland H, Smith L, Stowasser V, et al. The endourological society inaugural census report. J Endourol 2023; 37:199-206.

Declarations

Ethical approval and consent for participate: *Not applicable.*

Consent for publication: *Granted.*

Availability of data and material: *The licence for images has been obtained and was attached to the previous payment email.*

Competing interests: *None.*

Funding: *None.*

Authors' contributions: *All authors participated in the conceptualisation of the idea. The writing was done by the main author and the manuscript was revised and edited the senior authors.*

Acknowledgments: *None.*

Correspondence

Khaled Ghanem MBBS, MRCS, MSc (Corresponding Author)
Urology Registrar
khaledghanem899@hotmail.com
Endourology and Stone Services, Department of Urology, King George and Queens Hospitals, BHR University Hospitals NHS Trust
Barley Lane, Ilford, IG3 8YB, London UK

Damiete Harry, MBBS, MRCS, FRCS (Urol)
Consultant Urological Surgeon
damiete.harry@nhs.net

Junaid Masood, MBBS, FRCS (Eng), FRCS (Urol) MSc (Urol)
Consultant Urological and Stone Surgeon
Junaid.masood@nhs.net

Endourology and Stone Services, Department of Urology, King George and Queens Hospitals, BHR University Hospitals NHS Trust, London UK