



SUPINE PCNL - A CASE SERIES

Urology

Dr. Griffin Mahimairaj

Assistant Professor, Dept of Urology, Saveetha Medical College

Dr. Neel Shah*

1st year Resident, Dept of Urology, Saveetha Medical College *Corresponding Author

Dr. V. Kamraj

Professor, Dept of Urology, Saveetha Medical College

Dr. N. Muthulatha

Professor, Dept of Urology, Saveetha Medical College

ABSTRACT

Introduction- The evolution of percutaneous nephrolithotomy (PCNL) has been well documented. The objective of the present study is to ensure optimum access to the renal collecting system, allowing for endoscopic combined retrograde intrarenal surgery (ECRIS), reducing operative time and anesthetic morbidity during PCNL.

Method- Patients with renal calculus/calculi were selected randomly. There were no age, gender; size, location and laterality of stone or BMI preferences. All the patients fit into the AUA guideline criteria for management by PCNL.

Results- 15 patients underwent supine PCNL in 6 months in Galdakao modified Valdivia position. There was no intra or post operative complication in any patient. In all the patients stones were cleared completely in single sitting.

Conclusion- Supine PCNL is advantageous in many ways of which major ones are ECRIS, time saving, less anesthesia complications and with spine deformity patients.

KEYWORDS

Supine Pcnl, Galdakao Modified Valdivia Position, Tubeless Pcnl

Introduction-

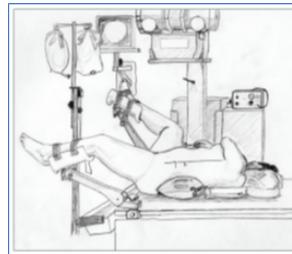
The evolution of percutaneous nephrolithotomy (PCNL) has been well documented. Ever since the first nephrostomy insertion in 1955 and Fernström and Johanssen's 'percutaneous pyelolithotomy' in 1976, urologists have sought to improve upon patient positioning while ensuring optimum access to the renal collecting system, allowing for endoscopic combined retrograde intrarenal surgery (ECRIS), reducing operative time and anesthetic morbidity during PCNL. In the late 1980s, one of the pioneers of supine PCNL, Professor Jose Gabriel Valdivia-Uria, began trialling the supine position and published his first case series in 1990. Initial experience with PCNL was in the prone position and Prone is still the most widely practised position but the last decade has seen the practise of various different positions for PCNL. These include, prone flexed, lateral, split-leg, Supine and modified supine positions. Prone PCNL has potential disadvantages, as it may cause circulatory and ventilatory compromise, especially in the obese patient; direct and indirect pressure effects, e.g. vascular, peripheral nerve and cervical spine injuries, tracheal compression and ocular injury. Simultaneous antegrade and retrograde access is also not feasible in the prone position. Supine PCNL is as effective as prone PCNL in stone-free rates, and complications. It was noted to be significantly quicker than the prone position.

Aim-

The objective of the present study is to ensure optimum access to the renal collecting system, allowing for endoscopic combined retrograde intrarenal surgery (ECRIS), reducing operative time and anesthetic morbidity during PCNL.

Method-

Patients with renal calculus were selected randomly. All the patients had renal calculus/calculi. No age or gender preference was considered. There was no preference for size, location of stone and laterality. No preference for BMI was considered. All the patients fit into the AUA guideline criteria for management by PCNL. AUA guidelines suggest for non lower pole calculus of more than 2 cm or stones with size less than 2 cm with failed ureteroscopy management and hard cysteine or brushite stone should undergo PCNL preferably. For lower pole symptomatic calculus for more than 1 cm PCNL is preferred modality unless contraindicated. All the patients were operated in Galdakao modified Valdivia position.



Picture-1: Galdakao Modified Valdivia Position for Supine PCNL

Galdakao Modified Valdivia position-

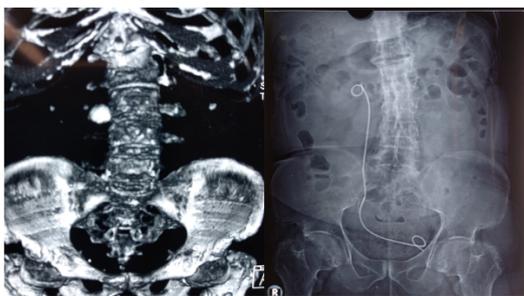
The ipsilateral arm is brought across the chest; the contralateral arm is abducted. A gentle break is placed in the table at the level of the flank. The patient is then tilted and an air-filled 3L bag (e.g. a reused saline bag) is placed under the ipsilateral flank in order to raise the side being operated on. The airbag enhances the natural lordosis of the lumbar spine and increases the surface area available for access. Upper pole punctures, which are often tricky in the prone position, are made much more achievable in the supine position.

Results-

15 patients underwent supine PCNL in 6 months in Galdakao modified Valdivia position out of which 10 were male & 5 were female. Average age was 44 years with youngest being 29 years and eldest being 57 years of age. Average stone size was 21.6 mm with largest being 28 mm and smallest of 15 mm size. Average BMI was 25.03 with lowest being 21.2 and highest being 29.4. Out of 15 patients 6 patients had Guy's Stone score (GSS) one, 4 patients had GSS two, 3 patients had GSS three and 2 patients had GSS 4. Out of 15 patients, 9 patients underwent supine PCNL on left side and 6 patients on right side. Average time for surgery was 73.6 minutes maximum being 90 minutes for patient with GSS 4 and lowest being 60 min for patient with GSS 1. Average fluro time was 280.46 seconds with lowest being 227 seconds for the patient with GSS 1 and maximum being 400 seconds for the patient with GSS 4. There was no intra operative complication in any patient. Average hemoglobin drop was 0.44 mg/dl with highest being 0.8 mg/dl and lowest being 0.2 mg/dl.

Patient	Sex	Age	Stone Size (mm)	BMI	Laterality	Guy's Stone Score	Surgery Time (min)	Fluro Time (sec)	Hb Drop
1	M	29	15	21.2	R	1	75	290	0.4
2	M	52	28	25.3	L	4	90	400	0.8
3	F	44	17	26.7	L	2	70	300	0.7
4	M	34	19	22.3	R	3	75	317	0.7
5	F	36	25	24.6	R	1	60	227	0.3
6	M	29	20	25.8	L	1	65	253	0.4
7	M	57	19	22.3	L	2	70	278	0.5
8	M	37	26	24.6	R	2	75	267	0.6
9	F	53	27	28.6	L	1	75	245	0.3
10	F	55	16	25.4	R	3	80	283	0.6
11	M	50	24	23.1	L	3	80	294	0.5
12	F	52	22	26.8	L	4	85	303	0.8
13	M	45	23	22.9	R	1	60	231	0.2
14	M	48	21	26.5	L	1	70	256	0.3
15	M	39	17	29.4	L	2	75	263	0.4

Post operative period was uneventful. All the patients were discharged on post operative day 3 after catheter removal. In all the patients stones were cleared completely in single puncture and single sitting. Nephrostomy tube was not placed in any patient (tubeless supine PCNL).



Picture 2- Before and After image of the patient with spinal deformity with right renal pelvic calculous treated with Supine PCNL.

Discussion-

It is ongoing randomized study of supine PCNL in Galdakao modified Valdivia position. Till now in case study of 15 patients we have been able to clear the stone completely in single puncture and single sitting. There is no intra operative or post operative complication in all the 15 patients treated till date. There is no anesthetic complication in all the patients. Average time for surgery and radiation exposure is also less.

Advantages of Supine PCNL include comfort for surgeon, as he can work in sitting position and his hands are away from the C-arm while working. Calyceal puncture is easier than when the patient is in the prone position. With the supine position, the incidence of the X-ray is perpendicular to the needle and calyx axis, and displacements of the calyceal papilla are better appreciated when the tip of the needle is pushing in front of them, making it unnecessary to rotate the C-arm fluoroscope. There are no iatrogenic risks, because it is not necessary to change the position of the patient. In supine position dislodgement of endotracheal tube, urethral sound, ureteral and intravenous catheters, some electrodes is avoided and time is not expended on this maneuver, hence saves time. Simultaneous URS and RIRS can be done. In the supine position, intervention is better tolerated by high-risk patients, especially the old and obese, because the vena cava is not compressed and the diaphragm is not pulled up. Moreover, in obese patients, the fat apron displaces towards the contralateral side, thus reducing the distance from the skin to the kidney. It is possible to perform PCNL with regional or even local anaesthesia, complemented by intravenous sedation. In the supine position, the risk of puncturing the colon is less than in the prone position, because when the 3-L bag elevates the lumbar fossa, the kidney and the colon are elevated too. In the prone position, the colon is pulled back, increasing this risk of damage. The ascending direction of the tract helps maintain a low intrarenal pressure, making the technique more secure and easier, because the stone fragments are dragged out by the whirlpool of water created in front of the optic.

The disadvantages of Supine PCNL include that there is usually a delay in the filling of the inferior calyces with the contrast, because the inferior renal pole is more elevated than the superior one. This inconvenience can be overcome by positioning the patient, for a few minutes, in an anti-Trendelenburg position. Distention of the collecting system will be greater in the prone than in the supine position. In some thin patients with renal ptosis, the kidney can be hypermobile in the supine position. In some patients with wide hips and thin calyces, it can be more difficult or impossible in the supine position to reach the upper calyx with a rigid nephroscope. Complications which can occur include Hemorrhage, bowel injury, pleural injury leading to pneumothorax/hemothorax, lung injury, liver and spleen injury, posterior wall of pelvis puncture, Ureteral injury and sepsis.

Professor Valdivia's Report 2011

Advantages include:

- Ergonomic position for the patient, reducing pressure on resting points.
- Anaesthetic advantages in ventilation and circulation.
- Reduced complication rate
- Ease of performing ECRIS, which theoretically improves stone clearance rate.
- Obviates need for repositioning and redraping of the patient.
- Improves access for upper pole punctures.
- Tract direction slopes downwards, creating lower intrarenal pressures and aiding fragment extraction.
- Additional advantages include a lower radiation dose and shorter operative time.

Conclusion: -

Supine PCNL is advantageous in many ways of which major ones are ECRIS, time saving, less anesthesia complications and with spine deformity patients. Supine PCNL is worth a try.

REFERENCES

- 1) Valdivia Ur í a JG , Valle Gerhold J , L ó pez L ó pez JA et al . Technique and complications of percutaneous nephroscopy: experience with 557 patients in the supine position . J Urol 1998 ; 160 : 1975 – 8
- 2) Ibarluzea G, Scoffone CM, Cracco CM, et al. Supine Valdivia and modified lithotomy position for simultaneous antegrade and retrograde endourological access. BJU International 2007;100:233-6.
- 3) Valdivia JG, Scarpa RM, Duvdevani M, et al. Supine versus prone position during percutaneous nephrolithotomy: a report from the clinical research office of the endourological society percutaneous nephrolithotomy global study. Journal of Endourology 2011;25(10):1619-25.
- 4) Scoffone CM, Cracco CM, Cossu M, et al. Endoscopic combined intrarenal surgery in Galdakao-modified supine Valdivia position: a new standard for percutaneous nephrolithotomy? European Urology 2008;54:1393-403.
- 5) Fernstrom I, Johansson B. Percutaneous pyelolithotomy. A new extraction technique. Scandinavian Journal of Urology and Nephrology 1976;10:257-9.
- 6) Patel SR, Nakada SY. The modern history and evolution of percutaneous nephrolithotomy. Journal of Endourology 2015;29(2):153-7.