Original Research Paper

Volume - 11 | Issue - 06 | June - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Urology

OUTCOME ANALYSIS OF PERCUTANEOUS NEPHROLITHOTOMY IN SUPINE POSITION

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ABSTRACT Supine PCNL (Percutaneous Nephrolithotomy) is an Alternative to traditional prone positioning. Benefits of the supine position include easy access to the airway and Optimization of cardiopulmonary function in patients. This is a prospective study which analyzes the outcome of percutaneous nephrolithotomy in supine position. There were totally 50 patients included in the study. 27 were male and 23 female patients. Mean age was 43 years, ranging from 18 to 70 years. Right side stones seen in 60% of cases (30/50). Average stone size was 2.6cm ranging from 1.8 to 6cm. Average operating time were 63.5 minutes and fluroscopy 18.9 minutes (5 to 35 minutes). Clearance rate in our study were pretty good with 90% (45 out of 50 cases). Five patients required secondary procedures and five had complications in form of sepsis and bleeding requiring blood transfusion. There were no visceral injury or fisrtula. Thus Supine PCNL has several potential advantages with successful technical feasibility and can be used to treat all stone sizes especially very effective in high risk patients for anesthesia. There is no added risk in this technique, and the stone clearance and complication rates are comparable to standard prone PCNL.

KEYWORDS : percutaneous nephrolithotomy, supine position

INTRODUCTION:

The first documented percutaneous nephrostomy (PCN) was by thomas hillier in 1865, but it was not until 1955 when goodwin et al. reported their work on pcn for the drainage of suppuration and urine in a hydronephrotic kidney that PCN gained widespread acceptance. Supine PCNL (Percutaneous Nephrolithotomy) first described by Valdivia uria and colleagues in 1987, the supine position is an Alternative to traditional prone positioning (Valdivia uria et al., 1987). As Originally described, the patient is positioned with the ipsilateral side toward the Most lateral aspect of the table and the flank elevated with a bolster or 3-liter bag Of saline underneath the lumbar fossa. The ipsilateral arm is positioned across The chest, and padding is applied to limit pressure to the elbow and wrist. There Have been several modifications to the prone position including the Galdakao modified Supine position (Scoffone et al., 2008) and the complete supine Position (Falahatkar et al., 2011), among others[1-3].

The complete supine Position was described in detail by Falahatkar et al., in 2011.Benefits of the supine position include easy access to the airway and Optimization of cardiopulmonary function in patients. Because patients do not Need to be repositioned after induction of anesthesia, randomized controlled Trials indicate that supine positioning is associated with faster operative times (Al-Dessoukey et al., 2014), at least in the setting of percutaneous Nephrolithotomy. Finally, radiation exposure to the physician's hands is Minimized, and the surgeon can perform the procedure in the seated position, Limiting fatigue. Drawbacks to the supine approach include limited surface area For renal puncture, difficulty accessing the upper pole, and lower intrarenal Pressures caused by the downward orientation of the access sheath, which may Impair visualization.[1,4]

MATERIALS AND METHODS:

This is a prospective study which analyzes the outcome of percutaneous nephrolithotomy in supine position. Those patients with renal calculi admitted in urology department during past three years (2018-2020) who underwent percutaneous nephrolithotomy were included. Pregnant, pediatric patients and redo surgeries were excluded from study. There were totally 50 patients included in the study. The preoperative evaluation included history, clinical examination and routine laboratory investigations. All patients had noncontrast-enhanced spiral CT of the urinary tract to evaluate the stone location, burden and radiolucency. The stone burden was determined By measuring the longest diameter on the preoperative radiological investigations; if there were multiple calculi the burden was defined as the sum of the longest diameter of each stone. A preoperative sterile urine culture was mandatory and patients with a positive culture were treated for 48 h before PCNL, and the treatment continued for 7days afterwards.

The procedure began with the patient in the lithotomy position, with insertion of an open-tip 5f ureteric catheter, using a 22 f cystoscope. The operative duration was calculated from the time of ureteric catheter insertion until dj stent placement. After inserting the ureteric catheter, the patient was placed supine with the ipsilateral arm secured to the chest, and a 1-l fluid bag under the flank. Under fluoroscopic guidance an 18 g needle was used to puncture the collecting system. Unlike in the prone position, the needle Must remain almost horizontal or slightly inclined towards the operating table. Intraoperative picture and fluoroscopy images are shown in figures 1 and 2.

A 0.032 inch guidewire was inserted, followed by dilatation of the tract up to 27 f using metallic alkan's dilators with insertion of 28f amplatz sheath. The increased mobility of the kidney, due to the absence of support when supine, caused the guidewire to buckle, hindering tract dilatation. This was managed by an assistant supporting the patient's abdomen, pushing it backward during dilatation. The duration of fluoroscopic exposure were recorded at the end of the procedure. A radiological examination was used to assess stone clearance on the first day after surgery, with either a plain film of the abdomen or ultrasonogram of the urinary tract. Average follow-up in our study was one year.

RESULTS AND DISCUSSION:

PCNL is widely accepted as the treatment of choice for large renal stones, including staghorn stones. It is less invasive, effective, safer and has a lower complication rate than open renal surgery [5]. PCNL is usually done with the patient prone, which carries several disadvantages to the patient, anaesthesiologist and urologist. In 1987, Valdivia et al. [3] reported the first study on the feasibility of PCNL in the supine patient, but it was 1998 before the same authors reported their 10-year experience of PCNL with the patient supine [7], and that this technique was then reintroduced. The results were similarly good in several other reports [8], confirming the efficacy and safety of supine PCNL for treating most renal stones.

There were totally 50 patients in our study. 27 were male and 23 female patients. Mean age was 43 years, ranging from 18 to 70 years. Right side stones seen in 60% of cases (30/50). Average stone size was 2.6cm ranging from 1.8 to 6cm. these are shown in table 1.

Various outcomes of procedures are anaylsed and tabulated in table 2. Average operating time were 63.5 minutes and fluroscopy 18.9 minutes (5 to 35 minutes). Clearance rate in our study were pretty good with 90% (45 out of 50 cases). Five patients required secondary procedures like ESWL (Extracorporeal Shock Wave Lithotripsy) in four patients and one required Retrograde Intrarenal Surgery.

The stones were cleared in 45 (90%) of the present patients; this was a better rate than reported by Hoznek et al. [6] and Falahatkar et al. [4], who achieved a stone clearance rate of 81% and 77.5%, respectively.

This might be because the stone burden in the present study was less than in the other two. Shoma et al. [8] found a stone clearance rate of 89% in their study that included 53 patients.

Table-1: the perioperative variables of the 50 patients

S.no	Variable	Number (out of 50)	Percentage (%)
1	Gender: a) male	27	54%
	b) female	23	46%
2	Age (years) - range	18 to 70 years	
	mean age	43 years	
3	Stone site: right	30	60%
	left	20	40%
4	Stone burden (cm) -range	1.8 to 6 cm	
	mean	2.6cm	

There were complications rate of 10% involving 5 cases in form of sepsis in 4 (mostly managed by higher antibiotics seen in diabetic patients) and only one patient required one unit blood transfusion due to bleeding. There had been concerns that the supine approach might put the colon at higher risk of injury than the prone approach, but we think that colonic injuries are potentially less frequent due to the more anterior displacement of the colon when the patient is supine, as described by Hopper et al. [7]. In the present series there were no colon injuries.

PCNL with the patient supine has some limitations, it decreases the filling of the collecting system, making it constantly collapsed, and thus nephroscopy tends to be more difficult. However, maintaining low pressures within the renal cavities might be important to decrease fluid absorption.

Figure- 1: intraoperative supine PCNL image

Table-2: outcomes of the procedure

S.no.	Variable	Values
1	Operative duration (min) – range	35 to 120 minutes
	mean	63.5 minutes
2	Fluoroscopy time (min) – range	5 to 35 minutes
	mean	18.9 minutes
3	Clearance rate	45/50 – 90%
4	Complications	5/50 – 10%
5	Second procedure	5/50 – 10%

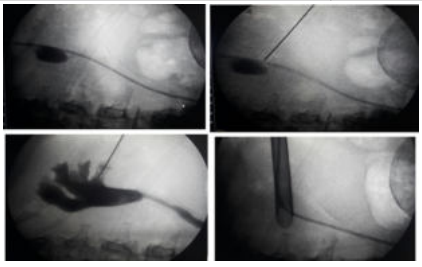

Figure 2: intraoperative fluroscopic images

CONCLUSION:

Supine PCNL has several potential advantages with successful technical feasibility and can be used to treat all stone sizes especially very effective in high risk patients for anesthesia. There is no added risk in this technique, and the stone clearance and complication rates are comparable to standard prone PCNL.

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