



**ORIGINAL RESEARCH PAPER**

**Surgery**

**COMPARATIVE STUDY OF PERCUTANEOUS NEPHROLITHOTOMY IN SUPINE VERSUS PRONE POSITION**

**KEY WORDS:** Percutaneous Nephrolithotomy, Supine Position, Prone Position

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**ABSTRACT**

Prone positioning in percutaneous nephrolithotomy is more and more being replaced by supine positioning now a days for its various benefits. This is a prospective study which does Comparative study on percutaneous nephrolithotomy in supine versus prone position and their various outcomes were analysed. There were totally 100 patients included in the study with 50 patients each group (supine versus prone). 57 were male and 43 female patients. Age ranging from 18 to 70 years. Right side stones were 58 and left side was 42. Age, gender and side of stones were similar between two groups. Stone burden were 2.6cm and 2.9cm for supine and prone group respectively. But average operating time were 63.5 minutes ( 35 to 120 minutes) for supine group versus 80 minutes ( 45 to 160 minutes) for prone group. fluoroscopy time was 18.9 minutes for supine group versus 29.4 minutes for prone group. Clearance rate in our study were pretty good in both groups around 90% in both groups (90% vs 88%), five had complications in form of sepsis and bleeding requiring blood transfusion in both groups. Five in supine group and six in prone group required second procedures. Thus Supine percutaneous nephrolithotomy group had significant advantage in terms of less operative duration and less fluoroscopy time than prone percutaneous nephrolithotomy .The stone clearance and complication rates were similar in both the groups.

**INTRODUCTION:**

With the introduction of new technologies in genitourinary surgery, the indications for open surgery for urolithiasis have decreased considerably. Minimal invasive treatment or surgery has become increasingly popular since its reduction in patients morbidity and period of convalescence. 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. The rising number of PCNL (percutaneous Nephrolithotomy) procedures combined with increasing confidence and experience has caused researchers to modify the prone technique in an effort to improve success rate and overcome some limitations. Since 1998 when Valdivia-Uria described the lateral access with the patient in supine position, some urologists have used this approach for PCNL. 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 [1-5].

**MATERIALS AND METHODS:**

This is a prospective study which analyzes outcome of percutaneous nephrolithotomy in supine versus prone position. Those patients with renal calculi admitted in genitourinary 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 100 patients included in the study. The preoperative evaluation included complete history, clinical examination and laboratory investigations. All patients had noncontrast spiral Computed tomography 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 hours before PCNL, and the treatment continued for 7days afterwards.



**Figure- 1:** intraoperative supine and prone PCNL images

The procedure began with the patient in the supine and prone positions respectively, 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 D-J stent placement. 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 images for supine and prone positions is shown in figure 1.

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 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:**

Currently, percutaneous nephrolithotomy is the treatment of choice for large renal stones, staghorn calculi, stones resistant to fragmentation, or stones occurring in kidneys with an abnormal anatomy [6]. Percutaneous nephrolithotomy has been widely accepted and its indications well enlarged, replacing open surgical removal of large renal calculi at most

urologic institutions worldwide. Traditionally, PCNL has been performed in the prone position, which is known to provide a larger surface area for the choice of puncture site, a wider space for instrument manipulation, unlimited instrument excursions, feasible multiple accesses and a possibly a lower risk of splanchnic injury. Nonetheless, it also has several disadvantages,

including patient discomfort, the need for several assistants to correctly position the patient before surgery and for additional intraoperative changes of the decubitus in case of simultaneous retrograde instrumentation of the ureter, a more evident risk related to pressure points, circulatory and ventilator difficulties (especially in the morbidly obese, kyphotic and debilitated patients) [7].

There were totally 100 patients included in the study with 50 patients each group (supine versus prone). 57 were male and 43 female patients. Age ranging from 18 to 70 years. Right side stones were 58 and left side was 42. Stone burden were 2.6cm and 2.9cm for supine and prone group respectively. Age, gender, side of stones and stone burden were similar between two groups, these data were shown in table 1.

**Table-1: The Perioperative Variables**

S.No	Variable	Supine Group	Prone Group
1	Gender: a) male	27	30
	b) female	23	20
2	Age (years) - range	18 to 70 years	18 to 68 years
	mean age	43 years	44 years
3	Stone side: right	30	28
	left	20	22
4	Stone burden(cm)- range	1.8 to 6cm	2 to 5cm
	mean	2.6cm	2.9cm

Average operating time were 63.5 minutes ( 35 to 120 minutes) for supine group versus 80 minutes ( 45 to 160 minutes) for prone group which is 16.5 minutes shorter and quicker for supine group. Fluoroscopy time was 18.9 minutes for supine group versus 29.4 minutes for prone group which is 10.5 minutes lesser in supine group . Clearance rate in our study were pretty good in both groups around 90% in both groups (90% vs 88%). five had complications in form of sepsis and bleeding requiring blood transfusion in both groups. Five in supine group and six in prone group required second procedures like ESWL (Extracorporeal Shock Wave Lithotripsy) in and required Retrograde Intrarenal Surgery. The data are shown in table 2.

**Table-2: Outcomes Of The Procedure**

S.No	Variable	Supine Group	Prone Group
1	Operative duration (min) – range	35 to 120 minutes	45 to 160 minutes
	mean	63.5 minutes	80 minutes
2	Fluoroscopy time (min) – range	5 to 35 minutes	15 to 45 minutes
	mean	18.9 minutes	29.4 minutes
3	Clearance rate	45/50 – 90%	44/50 – 88%
4	Complications	5/50 – 10%	5/50 – 10%
5	Second procedure	5/50 – 10%	6/50-12%

The stones were cleared in 45 (90%) in supine group and 44 (88%) of the present patients; this was a better rate than reported by Hoznek et al. [7] and Falahatkar et al. [5], 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. There were complications rate of 10% involving 5 cases in form of sepsis ( mostly managed by higher antibiotics seen in diabetic patients) and only one patient in each group 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. [8].

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.

**CONCLUSION:**

Supine positioning in PCNL has various advantages with higher technical feasibility and very useful in high risk patients for anesthesia. In our study there is significant reduction in operative and fluoroscopy times in supine position, with no added risk in this technique. In conclusion, for general patients with renal calculi, the operative and fluoroscopy time significantly decrease in supine position, and the stone-free rate of supine are similar with prone position. Supine PCNL do not increase related complications.

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