

## The comparison of surgical outcomes and complications for patients undergoing percutaneous nephrolithotomy under spinal anesthesia and general anesthesia

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### Abstract:

**Aim:** The comparison of surgical outcomes and complications for patients undergoing percutaneous nephrolithotomy under spinal anesthesia and general anesthesia. **Material and methods:** The current investigation had 60 patients in all, who were roughly split into two study groups. Group A patients had percutaneous nephrolithotomy while under spinal anesthesia. Group B includes patients who received percutaneous nephrolithotomy while under general anesthesia. All patients' complete clinical and demographic information was gathered. All patients' preoperative biochemistry profiles were compiled. Both study group participants received the appropriate kind of anesthesia. **Results:** Patients in groups A and B had mean ages of  $49.11 \pm 4.25$  and  $48.32 \pm 5.22$  years, respectively. Group A had 18 male, whilst Group B contained 16 males. The patients in groups A and B had respective mean weights of  $70.25 \pm 7.89$  kg and  $71.55 \pm 8.85$  kg. The mean height of the participants in group A was  $165.11 \pm 4.58$  cm, whereas the mean height of the individuals in group B was  $166.01 \pm 5.58$  cm. In the current investigation, the stone was found on the left side of 20 participants in group A and 17 subjects in group B, and on the right side of 10 patients in group A and 13 subjects. Surgery took an average of  $116.58 \pm 5.98$  minutes and  $113.88 \pm 6.39$  minutes on participants in groups A and B, respectively. **Conclusion:** Patients having percutaneous nephrolithotomy are candidates for either spinal or general anesthesia, according to the authors' findings and conclusions, both types of anesthesia are equally successful in achieving the desired level of patient relaxation and comfort. On the other hand, it is suggested that further research be conducted in order to properly explore the findings.

**Keywords:** Complications, Percutaneous nephrolithotomy, Spinal Anesthesia, General Anesthesia

### Introduction

In 1976, Fernstrom I. and Johansson B. showed that renal calculus may be removed via nephrostomy tract by open surgery; nevertheless, PCNL has since been the therapy of choice for the removal of renal stones.<sup>1</sup> PCNL has been the technique of choice in recent years because of advances in technology, as well as improvements in the knowledge and abilities of surgeons and anaesthesiologists.<sup>2</sup> A minimally invasive endoscopic method known as percutaneous nephrolithotomy (PCNL) is the treatment of choice for renal calculi bigger than 20-30 mm, staghorn stones, and stones that are either numerous or resistant to extra corporeal shock wave lithotripsy.<sup>3,4</sup> Due to the patient's comfort and the high dermatomal degree of anesthesia that is necessary for PCNL, general anesthesia (GA) has traditionally been the method of choice among the majority of urologists and anesthesiologists.<sup>5</sup>

However, GA may result in problems such as adverse medication responses, migration of the endotracheal tube, aspiration of stomach contents, pulmonary atelectasis, vascular injury, neurological issue, and cardiac complication. These are all possible outcomes.<sup>6,7</sup> Peterson GN et al. presented the first description of PCNL while the patient was under the influence of regional anesthesia in the year 1985.<sup>8</sup> Only a few studies suggest that general anesthesia's regional counterpart, which is known as regional anesthesia, may be a feasible option in PCNL.<sup>9,10</sup> Because surgery is conducted in the prone position, the management of respiratory depression and the administration of general anesthesia might be challenging when using regional anesthesia. During the process, it may become difficult for the anesthetist to relieve the patient's discomfort, as well as to keep the patient quiet and comfortable.

## Material and methods

The department of anesthesia was where the current research was carried out. In it, the effectiveness of spinal and general anesthesia for patients having percutaneous nephrolithotomy was evaluated and compared. After thoroughly outlining the full study methodology, the institutional ethics committee granted ethical approval, and signed permission was acquired. The current investigation had 60 patients in all, who were roughly split into two study groups. Group A patients had percutaneous nephrolithotomy while under spinal anesthesia. Group B includes patients who received percutaneous nephrolithotomy while under general anesthesia. The inclusion criteria for this research were patients older than 18 years of age, the presence of renal stones bigger than 15 mm, the absence of any other systemic ailment, and the lack of any prior history of known medication allergies. All patients' complete clinical and demographic information was gathered. All patients' preoperative biochemistry profiles were compiled. Both study group participants received the appropriate kind of anesthesia. In every patient, a percutaneous nephrolithotomy was performed. Hemodynamic parameters were watched while the surgery was being done. Patients were contacted often for follow-up. The SPSS program was used to analyze every information once it had been entered into a Microsoft Excel sheet. The degree of significance was evaluated using the chi-square test. P-values lower than 0.05 were considered significant.

## Results

In this research, the effectiveness of spinal and general anesthesia for patients having percutaneous

nephrolithotomy will be compared. The current research had 60 patients in total, who were roughly split into Group A and Group B study groups according to the kind of anesthesia employed. Patients in groups A and B had mean ages of  $49.11 \pm 4.25$  and  $48.32 \pm 5.22$  years, respectively. Group A had 18 male, whilst Group B contained 16 males. The patients in groups A and B had respective mean weights of  $70.25 \pm 7.89$  kg and  $71.55 \pm 8.85$  kg. The mean height of the participants in group A was  $165.11 \pm 4.58$  cm, whereas the mean height of the individuals in group B was  $166.01 \pm 5.58$  cm.

In the current investigation, the stone was found on the left side of 20 participants in group A and 17 subjects in group B, and on the right side of 10 patients in group A and 13 subjects.

Surgery took an average of  $116.58 \pm 5.98$  minutes and  $113.88 \pm 6.39$  minutes on participants in groups A and B, respectively. Two patients in group A had intraoperative discomfort, but group B did not. Three patients in group A and two patients in group B both had intraoperative hypotension. When comparing the incidence of intraoperative complications in participants from groups A and B, respectively, non-significant findings were found. In the current research, there were 7 patients in group A and 6 patients in group B who had postoperative discomfort. 11 patients in group A and 9 individuals in group B both had postoperative fever. The average length of stay in the hospital was 10.55 days for group A participants and 14.05 days for group B individuals. When comparing the mean length of stay in the hospital between the two study groups, significant findings were achieved. However, non-significant findings were found when comparing the surgical outcome between the two research groups.

**Table 1: Basic profile**

Parameter	Group A	Group B
Gender		
Males	18(60%)	16(53.33%)
Females	12(40%)	14(16.67%)
Mean age (years)	$49.11 \pm 4.25$	$48.32 \pm 5.22$
Mean weight (Kg)	$70.25 \pm 7.89$	$71.55 \pm 8.85$
Mean height (cm)	$165.11 \pm 4.58$	$166.01 \pm 5.58$

**Table 2: Intraoperative events**

Parameter	Group A	Group B	p- value
Duration of surgery (minutes)	116.58±5.98	113.88±6.39	0.11
Presence of intraoperative pain	2(6.67%)	0	0.36
Hypotension	3(10%)	2(6.67%)	0.45
Nausea vomiting	3(10%)	0	0.63
Bleeding	3(10%)	3(10%)	0.22

**Table 3: Anaesthetic outcome**

Parameter	Group A	Group B	p- value
Hospitalization days	10.55	14.05	0.001
Postoperative sore throat	2.5	2.5	0.58
Postoperative pain	7(23.33%)	5(16.67%)	0.15
Postoperative fever	11(36.67%)	9(30%)	0.47
Patient satisfaction	28(93.33%)	27(90%)	0.41

## Discussion

Percutaneous nephrolithotomy (PNCL) is now a standard procedure for removing renal and urinary stones, and it is the modality of choice for big, many, and stag-horn stones. Additionally, individuals who had unsuccessful shock and endoscopic treatments might benefit from PNCL. General anesthesia (GA) or regional anesthesia, such as spinal anesthesia (SA), are used during urologic operations in roughly 20% of patients.<sup>11-13</sup>

Patients in groups A and B had mean ages of 49.11±4.25 and 48.32± 5.22 years, respectively. Group A had 18 male, whilst Group B contained 16 males. The patients in groups A and B had respective mean weights of 70.25±7.89 kg and 71.55±8.85 kg. The mean height of the participants in group A was 165.11±4.58 cm, whereas the mean height of the individuals in group B was 166.01±5.58 cm.

In light of the aforementioned issues, Movasseghi G et al. contrasted the preferences of spinal anesthesia (SA) and general anesthesia (GA). 59 individuals who received PCNL as part of this randomized clinical

study were split into SA and GA groups. Patients in the SA group (n = 29) received premedication of 0.01-0.02 mg of midazolam and 15-20 mg of intra-thecal bupivacaine 0.5%. Patients in the GA group (n = 30) received premedications of 0.01-0.02 mg/kg of midazolam and 1-2 g/kg of fentanyl before being put to sleep intravenously with propofol and atracurium at 100 g/kg/min and 50% N2O/O2. Heart rate and mean arterial pressure (MAP) were monitored both during surgery and thereafter. At the specified time periods between the two groups, there are no discernible variations in MAP or heart rate (P > 0.05). Surgery duration, anesthetic duration, bleeding volume, and analgesic use were decreased considerably (P<0.05) in the SA group. It seems that SA is just as efficient and secure as GA for patients receiving PNCL.<sup>14</sup>

In the current investigation, the stone was found on the left side of 20 participants in group A and 17 subjects in group B, and on the right side of 10 patients in group A and 13 subjects. Surgery took an average of 116.58± 5.98 minutes and 113.88±6.39 minutes on participants in groups A and B, respectively. Two patients in group A had intraoperative discomfort, but group B did not. Three patients in group A and two

patients in group B both had intraoperative hypotension. When comparing the incidence of intraoperative complications in participants from groups A and B, respectively, non-significant findings were found.

For patients receiving PCNL, Kamal M. et al. assessed the viability of spinal anesthesia in terms of intraoperative and postoperative outcomes. Between January 2013 and December 2016, a total of 1298 PCNL procedures were performed for kidney stones, of which 1160 patients had PCNL under SA and the remaining 138 procedures were performed under GA in the prone position. The average calculus measured 30.2 mm by 11.8 mm. In our investigation, the return of sensory and motor activity was  $150.0 \pm 29.2$  and  $111.0 \pm 18.8$  minutes, respectively. 148 (12.75%) individuals had hypotension within the first 10 minutes after anesthesia. Ephedrine 6 mg was administered intravenously (IV) to treat the condition. A total of 72 patients (6.2%) required blood transfusions, and 32 (2.7%) reported experiencing headache, vertigo, and low back discomfort for two to four days after surgery. These symptoms subsided with analgesics and bed rest. On follow-up ultrasonography, 90% of the patients either had full calculus clearance or had no significant residual calculi greater than 5 mm. According to their research, spinal anesthesia is the most secure and efficient anesthesia technique for PCNL in adult patients.<sup>15</sup>

In the current research, there were 7 patients in group A and 6 patients in group B who had postoperative discomfort. 11 patients in group A and 9 individuals in group B both had postoperative fever. The average length of stay in the hospital was 10.55 days for group A participants and 14.05 days for group B individuals. When comparing the mean length of stay in the hospital between the two study groups, significant findings were achieved. However, non-significant findings were found when comparing the surgical outcome between the two research groups.

In PCNL, Shah R et al. evaluated the effectiveness and safety of spinal anesthesia vs general anesthesia. 60 patients were separated into two groups in a randomized prospective research; group 1 (n = 30) received PCNL in general anesthesia, and group 2 (n = 30) underwent PCNL under spinal anesthesia while prone using the traditional procedure. The problems related to the anesthesia were not significantly different from one another. In comparison to group 2, group 1 had considerably more headache and postoperative nausea and vomiting (p 0.001). In comparison to group 1, group 2 had a greater overall

patient satisfaction rate (p=0.01). Hospital stays in groups 1 and 2 were 5.27 and 1.87 days, respectively (p = 0.07). Each group's stone success rate was comparable (p = 0.50). PCNL may be carried out safely and efficiently using spinal anesthesia.<sup>16</sup>

## Conclusion

Patients having percutaneous nephrolithotomy are candidates for either spinal or general anesthesia, according to the authors' findings and conclusions, both types of anesthesia are equally successful in achieving the desired level of patient relaxation and comfort. On the other hand, it is suggested that further research be conducted in order to properly explore the findings.

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