

ORIGINAL ARTICLE

ASSESSMENT OF VARIOUS ANAESTHETIC TECHNIQUES FOR THE TREATMENT OF SUPINE PERCUTANEOUS NEPHROLITHOTRIPSY: A COMPARATIVE STUDY

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ABSTRACT:

Background: One of the common methods employed nowadays for the treatment of renal and urinary stones is PNCL which is a choice modality in large, multiple, and stag-horn stones. In patients with failed shock and endoscopic trials also, PNCL can be used. In about 20% of cases, urologic procedures are undertaken with general anesthesia (GA) or regional anesthesia such as spinal anesthesia (SA). As each type of anesthesia has some advantages and disadvantages and the results of such studies were not entirely consistent and future studies are required. Hence; we comparatively evaluated the quality and efficiency of Continuous Spinal Anesthesia (CSA) and Combined Spinal Epidural Anesthesia (CSE) in supine PCNL. **Materials & methods:** A total of 80 patients were included in the present study. All the patients reporting to the department of Urology from 2012 to 2014 were included in the present study. Ethical approval was taken from the institutional ethical committee and written consent was obtained from all the patients after explaining them in written the entire research protocol. Patients were randomly allocated to either CSA group or CSE group according to a computer-generated list made before the start of the study. Patients were pre-medicated with suitable medicines and intra-venous access was gained. All procedures were carried out in prone position. Pre-operative parameters included patients' demographics, ASA status, body mass index and stone size. Intra-operative parameters included recording of pulse, blood pressure at basal level and every 15 min till the end of procedure. Any conversion from spinal to general anesthesia was documented and the patient was excluded from the study. The blockade consisted of performing a spinal block by a 27-G spinal needle that was introduced through a Touhy needle 18-G. Recording of the post-surgical complications was done. All the results were analyzed by SPSS software. **Results:** Mean age of the patients in group A and group B was 33.5 and 31.5 years respectively. Non-significant results were obtained while comparing the p-values for the mean age, mean body weight and all other demographic details of the patients. Mean duration of surgery in group A and group B patients was 96 and 99 minutes respectively. Significant difference was obtained between the patients of group A and group B while comparing the total ephedrine delivered to the patients in both the groups. **Conclusion:** In terms of effectiveness and safety, both the techniques are equally good for treatment of patients with PCNL in the supine position.

Key words: Anaesthesia, Nephrolithotripsy, Spinal

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INTRODUCTION

One of the common methods employed nowadays for the treatment of renal and urinary stones is percutaneous nephrolithotomy (PNCL) which is a choice modality in large, multiple, and stag-horn stones. In patients with failed shock and endoscopic trials also, PNCL can be used.^{1, 2} In about 20% of cases, urologic procedures are undertaken with general anesthesia (GA) or regional anesthesia such as spinal anesthesia (SA). Despite good results of PNCL with GA, it may cause atelectasis, drug reactions, nausea, and vomiting.^{3, 4} In abdominal and lower extremities surgeries, SA is mainly employed by a single drug and comprises some advantages such as less bleeding, and reduces venous pressure in the surgery field.^{5, 6} Some

advantages of RA over GA had been shown in many surgeries; however, much of the effect of RA on PNL is still under veil. For the comparison of the efficacy and safety of the RA and GA, several studies have been carried out since 2008. As each type of anesthesia has some advantages and disadvantages and the results of such studies were not entirely consistent; future studies of the available evidence are required to find their superiorities for PNL by comparing the outcomes of PNL under RA with those under GA.^{7, 8} Hence; we comparatively evaluated the quality and efficiency of Continuous Spinal Anesthesia (CSA) and Combined Spinal Epidural Anesthesia (CSE) in supine PCNL.

MATERIALS & METHODS

A total of 80 patients were included in the present study. All the patients reporting to the department of Urology from 2012 to 2014 were included in the present study. Ethical approval was taken from the institutional ethical committee and written consent was obtained from all the patients after explaining them in written the entire research protocol. Inclusion criteria were: American Society of Anaesthesiologists Classification (ASA) status class I-III, age between 20 and 50 years, and Body Mass Index (BMI) between 20 and 30kg/m². Patients with history of any other systemic illness, any known drug allergy, patients more than 55 years of age, patients who underwent any major or minor surgical procedure under anaesthesia in the past one year were excluded from the present study. Patients were randomly allocated to either CSA group or CSE group according to a computer-generated list made before the start of the study. Intravenous access was obtained by puncturing a forearm vein with a 18-G cannula. Patients were premedicated with 2mg of midazolam i.v. Infusion of Ringer’s lactate solution 500ml before the start of the regional block. All were monitored with a continuous 3-lead ECG, pulse oximetry and non-invasive blood pressure. While patient was in modified lithotomy position, a 5-French open tip ureteric catheter was inserted by using 19-ch. cystoscopy. Under fluoroscopy, renal punctures were created at time of surgery in all patients by the urologist. All procedures were carried out in prone position. Pre-operative parameters included patients’ demographics, ASA status, body mass index and stone size. Intra-operative parameters included recording of pulse, blood pressure at basal level and every 15 min till the end of procedure. Hypotension was defined when systolic blood pressure was <90 mm Hg. Bradycardia was defined when pulse <60 beat/min. Any conversion from spinal to general anesthesia was documented and the patient was excluded from the study. Operative time was calculated starting from onset of cystoscopic fixation of ureteric

catheter till end of PCNL. All techniques were performed in the L3-L4 interspace in the midline with the patient awake and sedated in the lateral position, skin infiltrated with lignocaine 1%. CSE was performed by means of “needle-through-needle” technique using a single interspace. The blockade consisted of performing a spinal block by a 27-G spinal needle that was introduced through a Touhy needle 18-G. After identifying the epidural space using loss of resistance to air technique, then the epidural catheter was threaded in the same fashion cranially to a distance of 3 to 4cm in the epidural space. Recording of the post-surgical complications was done. All the results were analyzed by SPSS software. Chi-square test was used for the assist of the level of significance.

RESULTS

Graph 1 shows the demographic details of the patients. Mean age of the patients in group A and group B was 33.5 and 31.5 years respectively. Mean body weight of the patients was 63.1 and 65.2 kg in group A and group B respectively. 55.4 percent of the patients in group A and 56.3 percent of the patients in the group B were males. Mean BMI of the patients in group A and group B was 26.2 and 27.5 kg/m² respectively. **Table 1** highlights the p-value for the comparison of demographic details between group A and group B. Non-significant results were obtained while comparing the p-values for the mean age, mean body weight and all other demographic details of the patients. **Graph 2** shows the clinical anaesthetic parameters of the patients in both the study groups. Mean duration of surgery in group A and group B patients was 96 and 99 minutes respectively. **Table 2** shows the p-value for Clinical anaesthetic parameters of the patients in both the study groups. Significant difference was obtained between the patients of group A and group B while comparing the total ephedrine delivered to the patients in both the groups.

Graph 1: Demographic details of the patients.

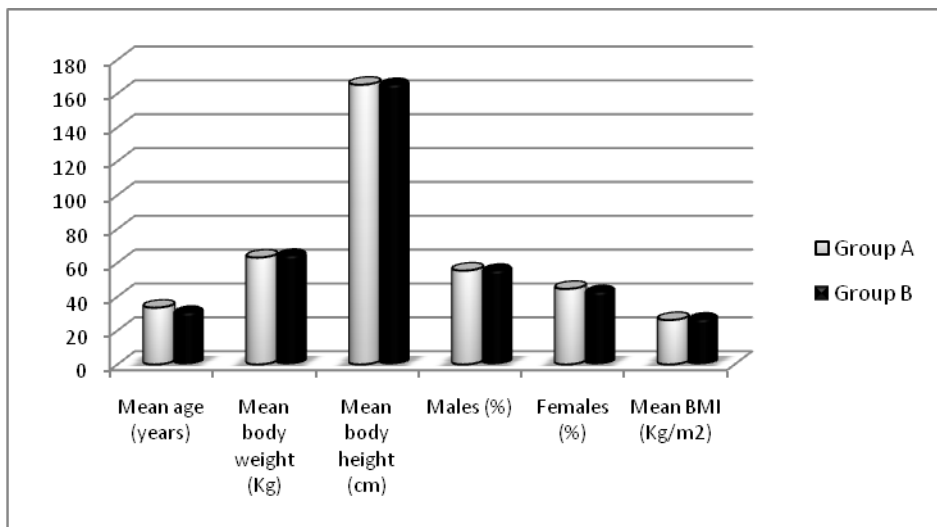


Table 1: P-value for the comparison of demographic details between group A and group B

Parameter	p-value
Mean age (years)	NS
Mean body weight (Kg)	NS
Mean body height (cm)	NS
Males (%)	NS
Females (%)	NS
Mean BMI (Kg/m ²)	NS

BMI: Body Mass Index, NS: Non significant

Graph 2: Clinical anaesthetic parameters of the patients in both the study groups.

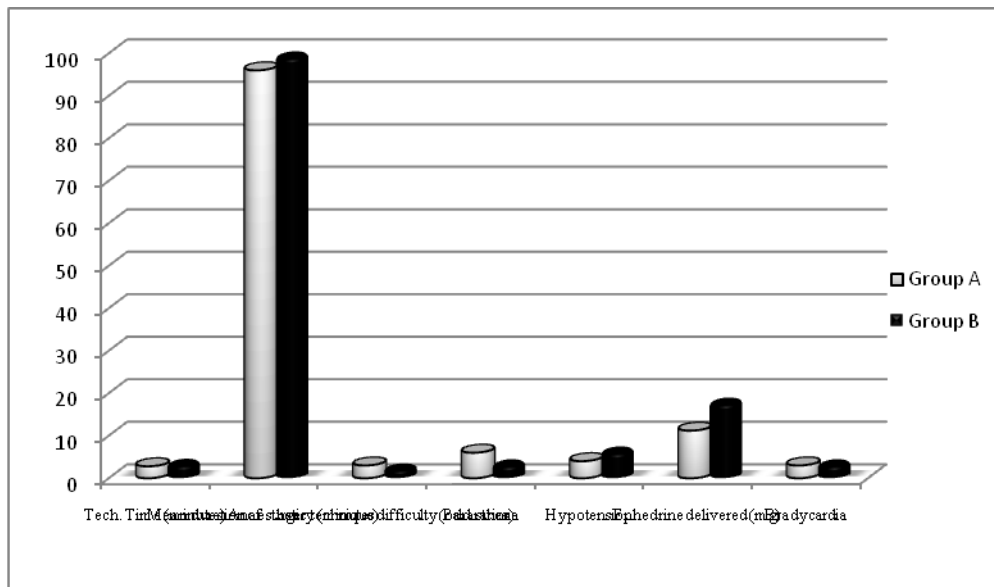


Table 2: p-value for Clinical anaesthetic parameters of the patients in both the study groups

Clinical parameter	p-value
Tech. Time (minutes)	NS
Mean duration of surgery (minutes)	NS
Anaesthetic technique difficulty (odd ratios)	NS
Parasthesia	NS
Hypotension	NS
Ephedrine delivered (mg)	S
Bradycardia	NS

NS: Non significant, S: Significant

DISCUSSION

One of the most reliable method of giving regional block is the Spinal (intrathecal) anaesthesia in which the needle insertion technique is relatively straightforward, with cerebrospinal fluid (CSF) providing both a clear indication of successful needle placement and a medium through which local anaesthetic solution usually spreads readily.⁹ Since few decades back, Fernstrom and Johansson first removed arenal calculus through a nephrostomy tract in 1976. Since then, PNL has dramatically changed and is continuing to evolve. Currently, PNL is an integral compo-nent of the management of large-volume renal calculus disease. It has the possible advantages of better stone clearance rates, cost-effectiveness, and early convalescence compared with other modalities such as open stone surgery.^{10, 11} Hence; we comparatively evaluated the quality and efficiency of Continuous Spinal Anesthesia

(CSA) and Combined Spinal Epidural Anesthesia (CSE) in supine PCNL.

In the present study, we observed that in terms of cardiovascular status, CSA was proved to be better causing less hypotension in 6 patients in CSA and in 10 patients in CSE, more often in CSE and a significantly higher dose of ephedrine in CSE than in CSA. Our results were in correlation with the results of Klimscha, et al. who proved that using CSA in old patients manifested less hypotension and accordingly lesser usage of vaso-pressor drugs than patients receiving epidural alone.¹² Different complications favor different anesthesia types. Intraoperative hypotension seemed to occur more in the RA group, which could be effectively managed with ephedrine. In contrast, the frequency of other complications including blood transfusion, nausea and vomiting, and fever in RA group were lower than in the GA group. The reduced blood transfusion may be

caused by the lower thoracic pressure during surgery, decreased blood pressure and vasodilation following sympathetic block and shorter operative time.¹³ Singh et al prospectively randomized and compared the surgical parameters and stone clearance in patients who underwent PNL under CSEA versus those who underwent PNL under general anesthesia (GA). They evaluated and divided 64 patients with renal calculi into 2 groups and evaluated for the purpose of this study. Group 1 consisted of patients who underwent PNL under CSEA and Group 2 consisted of patients who underwent PNL under GA. The operative time, stone clearance rate, visual pain analog score, mean analgesic dose and mean hospital stay were compared amongst other parameters. They observed that the difference between visual pain analog score after the operation and the dose of analgesic requirement was significant between both groups. From the results, they concluded that PNL under CSEA is as effective and safe as PNL under GA.¹⁴ Mehrabi et al compared the efficacy and complications of spinal anesthesia versus general anesthesia in PCNL. They prospectively analyzed 110 patients and randomly assigned into two groups for PCNL; group 1 (n = 52) underwent general anesthesia and group 2 (n = 58) received spinal anesthesia. They observed that intra-operative hypotension and postoperative headache and low back pain were more in spinal group than the general group with a significant difference. From the results, they concluded that spinal anesthesia with combined bupivacaine and fentanyl is a safe, effective, and cost-effective method for performing PCNL in adult patients.¹⁵ Tangpaitoon et al compared the efficacy and safety of regional epidural anesthesia and general anesthesia in patients who underwent PCNL. They analyzed 50 patients who were submitted to PCNL and randomized them into two groups: Group I (N = 26) received general anesthesia and Group II (N = 24) received regional epidural anesthesia. They observed that less morphine was required in the regional epidural anesthesia group compared to the general anesthesia group. From the results, they concluded that for treatment of patients with PCNL, regional epidural anaesthesia is an alternate technique which offers more patients satisfaction.¹⁶

CONCLUSION

From the above results, the authors concluded that in terms of effectiveness and safety, both the techniques are equally good for treatment of patients with PCNL in the supine position.

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