

A PROSPECTIVE STUDY ON COMPARATIVE EVALUATION OF CONTINUOUS EPIDURAL VERSUS CONTINUOUS LUMBAR PARAVERTEBRAL BLOCK FOR POSTOPERATIVE PAIN RELIEF IN HIP SURGERIES

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Abstract

Background: Regional anaesthesia is a valid analgesic treatment option for hip surgery that reduces postoperative pain and opioid requirements. Continuous epidural analgesia and lumbar paravertebral block provide excellent postoperative analgesia with a low incidence of complications for hip surgeries. This study compared the analgesic efficacy of continuous lumbar paravertebral and epidural blocks after hip surgery. **Materials and Methods:** This prospective, randomised, comparative study included 60 patients undergoing elective hip surgeries under subarachnoid block at Govt Kilpauk Medical College and Govt Royapettah Hospital, Chennai, between May 2019 and November 2019. Sixty patients were randomly divided into Group A (30) continuous paravertebral patients and Group B (30) continuous epidural patients. **Results:** The mean age of the patients in the epidural group was 51.63±16.325 years, and in the paravertebral group was 59.87±11.352 years, respectively. Sex, height, weight, ASA status, and procedures performed across the two groups were similar, with no significant differences. The mean time of the patients in the paravertebral group was lower than that of the epidural group, with a value of 2.172 with a highly significant ($p < 0.005$). Of the 30 patients in the epidural group, 22 (72%) did not require rescue analgesia, whereas 25 (83.3%) were in the paravertebral group. **Conclusion:** Lumbar paravertebral block is more efficacious than epidural block in providing analgesia in patients undergoing proximal hip surgeries. Paravertebral block delays the need for rescue analgesia and reduces the 24-hour analgesic requirement compared with epidural analgesia.

INTRODUCTION

The effective control of postoperative pain remains one of the most important issues in the field of surgery and has a significant impact on the healthcare system. Pain following hip surgery, which constitutes most operations in the elderly with existing comorbid conditions, is a challenge for perioperative physicians. The major joints are richly innervated, producing massive nociceptive inputs and bouts of severe reflex spasms, resulting in continuous deep somatic pain mediated by the same

and adjacent spinal cord segments superimposed onto the incision pain. Adequate postoperative pain relief improves surgical outcomes in terms of reduced morbidity, hospital stays in the postoperative period, and postoperative organ dysfunction. Regional anaesthesia is a valid analgesic treatment option for hip surgery that reduces postoperative pain and opioid requirements. Continuous epidural analgesia and lumbar paravertebral block provide excellent postoperative analgesia with a low incidence of complications for hip surgeries.

Aim

This study compared the analgesic efficacy of continuous lumbar paravertebral and epidural blocks after hip surgery.

MATERIALS AND METHODS

This prospective, randomised, comparative study was conducted on 60 patients undergoing elective hip surgeries under subarachnoid block at the Govt Kilpauk Medical College and Govt Royapettah Hospital, Chennai, between May 2019 and November 2019. The study received approval from the institutional ethics committee before its initiation.

Inclusion Criteria

Unilateral elective hip surgeries under the subarachnoid block were performed in patients with valid informed consent, aged between 18 and 60 years, and ASA classes 1 and 2 were included.

Exclusion Criteria

Patients with sepsis over the lumbar vertebra, patients on chronic analgesic/anticoagulant therapy, and patients with a neurological disorder known as allergy to any local anaesthetic dementia that prevented proper comprehension and impaired ability to communicate (e.g. confusion, poor hearing, or language barrier) were excluded.

Patients satisfying the above inclusion criteria were counselled about the procedure and the study's purpose, risks, and benefits. After obtaining consent, the patients were included in the study. They were allocated to one of these groups using computer-generated numbers. Sixty patients were randomly divided into Group A (30) continuous paravertebral patients and Group B (30) continuous epidural patients.

The patients were preoperatively evaluated and clinically examined, and proper investigations were performed before assessment. All patients were orally administered nil for 8 h. Antacid prophylaxis was administered with intravenous Inj Ranitidine 50 mg, which was shifted to OT 20 min before the procedure. The emergency airway cart and drugs were kept ready, and a machine check was performed. Routine monitoring included ECG, pulse oximetry, NIBP, and temperature measurements. Intravenous cannulation was performed with an 18G venflon, baseline parameters of the patients were recorded, and nasal oxygen was administered with a Hudson mask (4 L/min).

All patients received 5-7 ml/kg lactated Ringer's solution before spinal anaesthesia. The patients were positioned in the sitting position, supported, and chin-flexed on the chest; those unable to sit were positioned in the lateral decubitus position. The back was prepared using povidone-iodine wiped with a methylated spirit, and the area was draped with a sterile towel.

In group A, the puncture site was found on the upper border of the spinous process of the L2

vertebra, 3 cm lateral to the first point on the target side. An anaesthetic was injected at the puncture site, and a 16-G Tuohy needle was advanced to the transverse process of the L2 vertebra. The stylet was removed, and 10 mL of saline was injected to expand the compartment. An 18-G catheter was inserted through the needle and advanced 4 cm caudally into the compartment. A 3-mL test dose solution containing 2% lidocaine and 1:200,000 epinephrine was injected via the paravertebral catheter. A lumbar puncture was performed, and 2.5 to 3.0 mL of 0.5% heavy bupivacaine was injected.

In group B, the L2-L3 interspace was identified and infiltrated with local anaesthetic. A 16-G Tuohy needle was inserted through the L2-L3 interspace, and the epidural space was located using the loss-of-resistance technique. The stylet was removed, and a 3-mL test dose solution containing 2% lidocaine and 1: 200,000 epinephrine was injected. Subsequently, a lumbar puncture was performed at the L3-L4 interspace with a 25-G spinal needle, and 2.5-3.0 mL of 0.5% heavy bupivacaine was injected. The catheter was then advanced approximately 4-5 cm cephalad and secured.

Sensory blockade was assessed using a 25-gauge short-bevel needle, and various parameters were monitored in all patients, including heart rate, ECG, noninvasive blood pressure, SPO₂, blood loss, urine output, and IV fluid input. Intravenous fluids were administered in doses based on the patient's weight and adjusted based on blood loss during surgery. Hypotension was treated with a rapid infusion of fluids and ephedrine intravenously, while bradycardia was treated with intravenous atropine sulphate. At the end of the operation, patients were connected to a local anaesthetic pump to deliver 0.125% bupivacaine at a rate of 5 mL/h for 24 h. Several parameters were assessed postoperatively, including the regional anaesthesia procedure time, pain severity, vital parameters, supplemental analgesic requirements, catheter-related problems, and complications. Inj. provided rescue analgesia, and paracetamol 1 g IV. Haemodynamic parameters were measured, with the preoperative heart rate and mean arterial pressure recorded before the procedure and subsequent readings every 5 min of anaesthesia.

RESULTS

The mean age of the patients in the epidural group was 51.63±16.325 years, while the mean age in the paravertebral group was 59.87±11.352 years, respectively. The sex distribution of the patients showed no significant differences between the two groups, with males in the epidural group and males in the paravertebral group. The females in the epidural group were 16, compared to 12 in the paravertebral group. Height, weight, ASA status, and procedure were similar between the two groups, with no significant differences. [Table 1]

The mean time of patients in the paravertebral group was lower than that in the epidural group. The Student's t-test showed a value of 2.172, with a highly significant difference ($p < 0.05$).

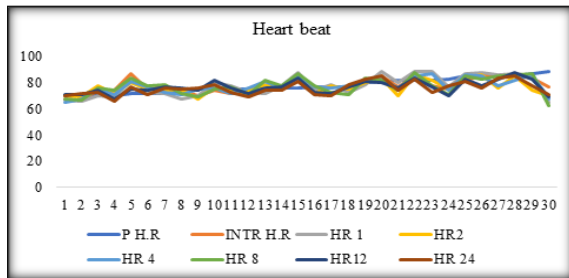


Figure 1: Heart rate in epidural group

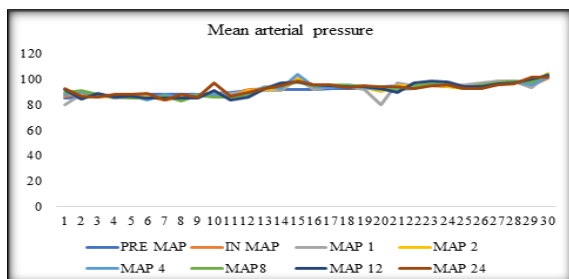


Figure 2: Mean arterial pressure in the epidural group

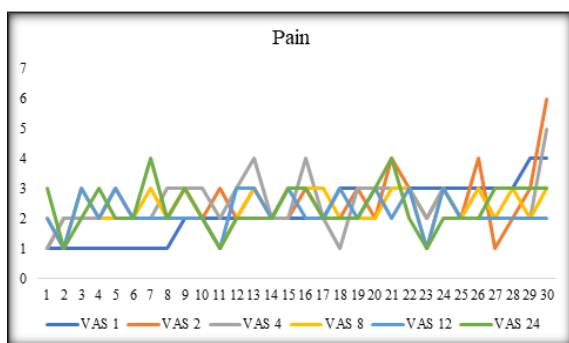


Figure 3: Pain in the epidural group

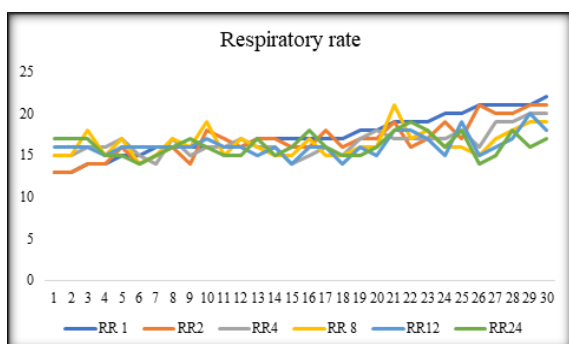


Figure 4: Respiratory rate in the epidural group

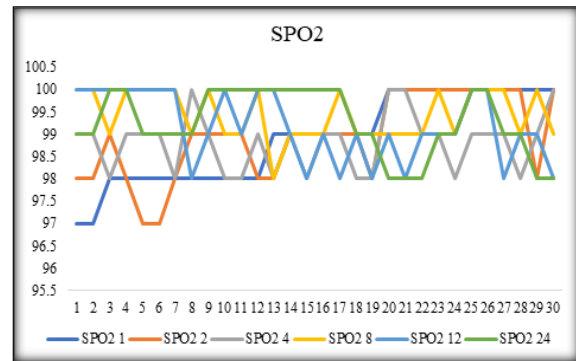


Figure 5: SPO2 in the epidural group

Of the 30 patients in the epidural group, 22 (72%) did not require rescue analgesia, whereas 25 (83.3%) were in the paravertebral group.

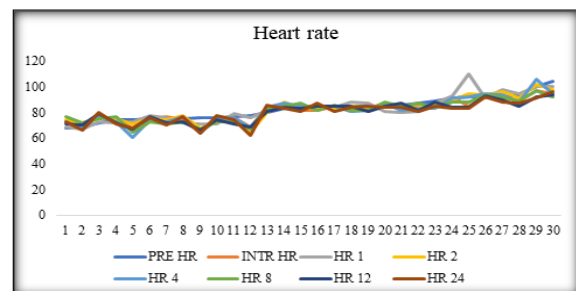


Figure 6: Heart rate in the paravertebral group

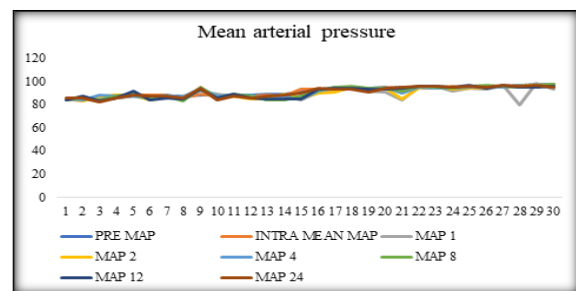


Figure 7: Mean arterial pressure in the paravertebral group

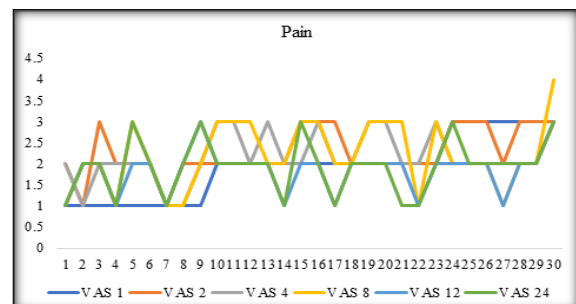


Figure 8: Pain in the paravertebral group

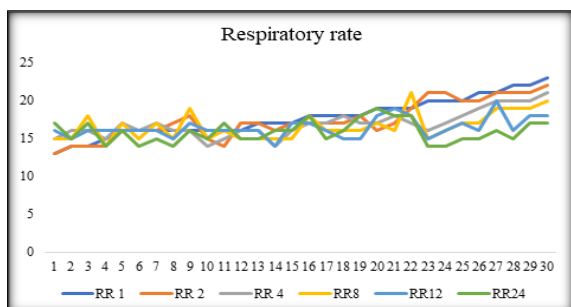


Figure 9: Respiratory rate in the paravertebral group

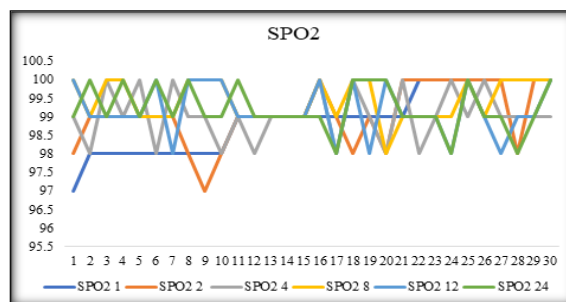


Figure 10: SPO2 in the paravertebral group

Compared to the requirement for rescue analgesia, only five of them (16.7%) in the paravertebral group required rescue analgesia at the 8th hour. However, for the patients in the epidural group, eight required rescue analgesia (26.7%). The time ranged from 6 h (n=4, 13.3%) to 12 h (n=1, 3.3%). Three patients (10%) required analgesia at the 8th hour

Table 1: Demographic data of the study groups

		Mean± SD/ Frequency (%)		P-value
		Epidural Group	Paravertebral Group	
Age (years)		51.63±16.325	59.87±11.352	-
Gender	Male	14 (46.7%)	18 (60%)	0.67
	Female	16 (53.3%)	12 (40%)	
Height		160.50±3.721	162.20±3.652	0.76
Weight		58.73±4.62	59.17±4.94	0.85
ASA status	1	11 (36.7%)	13 (43.3%)	0.74
	2	19 (63.3%)	17 (56.7%)	
Procedure	Dynamic hip screw	9 (30%)	9 (30)	0.72
	Hemiarthroplasty	3 (10%)	4 (13.3%)	
	Proximal femoral nailing	4 (13.3%)	4 (13.3%)	
	Total hip replacement	14 (46.7%)	13 (43.3%)	
Procedure time mins		19.27±3.6	17.27±3.54	0.034

DISCUSSION

This study compared the analgesic efficacy of continuous epidural and lumbar paravertebral blocks in patients undergoing proximal hip surgeries. In both groups, patients were connected to a local anaesthetic pump set to deliver an infusion of 0.125% bupivacaine at a rate of 5 mL/h for 24 h. Patients were given visual analogue scorecards and instructed to mark the severity of pain. The time was noted for the first request for rescue analgesia in all patients. The mean age of the patients in the epidural group was 51.63 years, with a standard deviation of 16.325 years, whereas the mean age in the paravertebral group was 59.87 years, with a standard deviation of 11.352 years.

The sex distribution of the patients showed no significant differences between the two groups, with males in the epidural group and males in the paravertebral group. The females in the epidural group were 16, compared to 12 in the paravertebral group.

Perttunen et al,^[6] demonstrated good postoperative pain relief at rest in paravertebral and extradural groups 1 hour after surgery and found comparable segmental analgesia in both groups up to 20 hours. The rescue analgesia was provided with Inj. voveran

1 mg/kg IM, and there was no significant difference in the number of doses that was required in both groups.

The paravertebral block effects a predominantly unilateral sympathetic blockade, whereas an epidural block is usually bilateral; the extent of the spread of the drugs is also greater. These differences might explain the disparities in the incidence of hypotension between the 2 groups. This conquer with the study G Turker et al,^[7] White and Chappell⁸, Richardson et al.^[9]

CONCLUSION

It was concluded that the lumbar paravertebral block is more efficacious than the epidural block for providing analgesia in patients undergoing proximal hip surgeries. Paravertebral block delays the need for rescue analgesia and reduces the 24-hour analgesic requirement compared with epidural analgesia.

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