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COMPARISON BETWEEN EPIDURAL ROPIVACAINE PLUS MORPHINE INTERMITTENT BOLUSES VERSUS CONTINUOUS INFUSION FOR POST OPERATIVE ANALGESIA IN LOWER LIMB SURGERY

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Abstract

Background: Intermittent bolus administration increases the extent of neural blockade and decreases unilateral blockade, thereby improving the quality of epidural analgesia in postsurgical pain management. Hence, the present study investigates the "Comparison between epidural Ropivacaine plus morphine intermittent boluses versus continuous infusion for post operative analgesia in lower limb surgery". **Materials and Methods:** A total 30 participants who were undergoing elective lower limb surgeries were randomly allocated into two groups, group 1 of 15 participants received intermittent bolus (Group IB) and remaining 15 received continuous infusion (Group CI). The comparison between epidural bolus analgesia vs Intermittent bolus with Ropivacaine 0.1% and Morphine 1mg (total of 50ml) ,6mL bolus given every 60 min vs epidural infusion of 6 mL/h flow of Ropivacaine 0.1%/ml and Morphine 1mg. **Results:** The age, height, weight, BMI and ASA showed a significant difference between the group CI and group IB, respectively, the P value is 0.001*. The VAS showed a significant difference between the 12th and 24th hr of group CI. Additionally, the systolic and diastolic blood pressure and heart rate does not show any significant between the 12th and 24th hr of group CI. **Conclusion:** Based on study findings, we conclude Intermittent boluses are similar to continuous infusion of epidural ropivacaine plus morphine for post operative analgesia and produced a faster onset, greater success rate of analgesia.

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Keywords: Ropivacaine, Morphine, Intermittent Bolus and Continuous Infusion

Introduction

The world is changing quickly, and there is a growing desire for early ambulation, complete recovery, and minimal side effects. Regional anesthesia has become popular among anesthesiologists worldwide because of its many benefits (1-2). Bupivacaine has historically been the medication most frequently used to induce spinal anesthesia. Nevertheless, due to its unfavorable effects, which include central nervous system toxicity, hypotension, bradycardia, prolonged motor paralysis, and cardiotoxicity, the long-acting pure S-enantiomer of Ropivacaine was identified (3-4).

The chemical structure of Ropivacaine, a novel amino-amide local anesthetic, is comparable to that of Bupivacaine (5). Ropivacaine is safe and effective for use in regional anesthetic procedures such as brachial plexus block and epidural blocks, according to a wealth of clinical data (6). Recent research studies have shown that Ropivacaine is effective for spinal anesthesia, and that it has a greater recovery rate for motor function than Bupivacaine due to its sensory dissociation feature (7-8).

Morphine is hydrophilic and binds with high affinity to the central nervous system opioids receptors (9). Morphine was the first opioid to be approved by Food and Drug Administration for its use in neuraxial anaesthesia. Intrathecal morphine (ITM) is a good alternative for postoperative analgesia in patients scheduled for total knee and hip surgery under spinal anesthesia because of its long duration of analgesia (10). Many studies have endeavored to define or determine the low dose of ITM with excellent analgesic effects and minimal or no side effects. Most patients that are scheduled for hip and knee arthroplasty are elderly; Intrathecal morphine has the advantage of reducing the stress response and metabolic demand during surgery and anaesthesia in the elderly (11-12).

Comparing epidural analgesia to parenteral opioids following major abdominal surgery, there is a considerable improvement in postoperative pain control, a decrease in the need for opioids, and improved clinical outcomes (13). Continuous epidural infusion (CEI) and patient-controlled epidural analgesia (PCEA) bolus are generally the traditional methods for epidural analgesia (14). However, CEI has some disadvantages, a limited area of distribution of the local anesthetic, resulting in a limited extent of the analgesic area and increased consumption of local anesthetic (15). Theoretically, intermittent bolus administration increases the extent of neural blockade and decreases unilateral blockade, thereby improving the quality of epidural analgesia in postsurgical pain management (16). Hence, the present study investigates the “Comparison between epidural Ropivacaine plus morphine intermittent boluses versus continuous infusion for post operative analgesia in lower limb surgery”.

Materials and Methods

This Quasi experimental study was conducted in department of anesthesia collaborated with department of orthopedics, yenepoya medical college and hospital, Mangalore, Karnataka. A total 30 participants who were undergoing elective lower limb surgeries were randomly allocated into two groups, group 1 is 15 participants receiving intermittent bolus (Group IB) and remaining 15 were continuous infusion (Group CI). After obtaining the Ethical committee clearance and written informed consent the participants were included.

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Common procedure for both groups : Patients (ASA classification 1 and 2) scheduled for elective lower limb surgeries was counselled before surgery. In the operation theater, standard monitoring was applied according to current ASA guidelines. Insertion of a lumbar epidural catheter (Perifix; B. Braun,) using a loss-of-resistance technique with Tuohy's needle was performed after skin disinfection in the sitting position at the L3-L4 or L2- L3 interspaces under mild sedation using 1-2 mg of intravenous (IV) midazolam. Following negative aspiration and negative response, a test dose of 3 mL of Lidocaine 2% with epinephrine was given. Spinal anaesthesia with Quincke's 26G needle, following free flow of CSF,3 ml of 0.5% of hyperbaric bupivacaine was injected into the sub arachnoid space. The indwelling catheter was fixed using sterile dressing. After 5 min, cold/warm sensibility testing was performed bilaterally to evaluate the appropriate spread. After surgery, patients were transferred to the post-anaesthesia care unit (PACU).

Intervention for Group CI: 50cc Infusion syringe with infusion pump containing Ropivacaine 0.1%/ml and Morphine 1mg (total of 50ml) was connected to the epidural catheter. The pump was programmed with a continuous infusion of 6 mL/h flow.

Intervention for Group IB: Intermittent bolus with ropivacaine 0.1% and Morphine 1mg (total of 50ml) ,6mL bolus was given every 60 min. For both groups epidural analgesia was started once the patient started complaining of pain or VAS score more than 4.

In case of insufficient analgesic response, controlled bolus injection of 4 mL (with lockout time: 30 min) was given if the VAS score was more than 4. IV rescue analgesia with Inj tramadol 50 mg intravenously was allowed as a 'rescue option' for all participants in both groups. As adverse effects there might be a fall in blood pressure during epidural bolus injection which was continuously monitored and taken care by immediately stopping the infusion or bolus and if required inj ephedrine 3 mg iv was given to stabilize the BP. In very few patients there were mild breathing difficulties which was temporary and very rarely needed support, otherwise no other adverse effects were present. The patients were followed up at 12th& 24th hour interval. Pain assessment was done by a 10 cm visual analogue scale (VAS); 0 no pain 10 worst imaginable pain. Change in heart rate and blood pressure was also monitored. Patients were reassessed and monitored for any side effects like nausea, vomiting, gastric irritation and respiratory depression every 30 minutes.

Results and Discussion

Table 1: Comparison of study variables between Group CI and Group IB

Parameters	**CI**			**IB**			**P-Values**
Age	60.07	±	8.40	60.47	±	7.78	0.001**
Gender (M: F)	9:6			7:8			-
Height	159.67	±	0.001*	165.60	±	9.12	0.001**
Weight	66.60	±	0.001*	73.60	±	8.02	0.001**
BMI	24.35	±	0.001*	22.70	±	2.22	0.001**
ASA	2.13	±	0.001*	2.33	±	0.49	0.001**

Table 1 shows the comparison of study variables between group CI and group IB. The age, height, weight, BMI and ASA showed a significant difference between the group CI and group IB, respectively, the P value is 0.001*.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 02, 2024

Table 2: Comparison of study variables between 12th and 24th hr of group CI

Parameters	CI						P-Values
	12th Hr			24th Hr			
VAS	4.47	±	0.99	3.53	±	0.74	0.001**
SBP	131.33	±	19.22	123.33	±	9.76	0.219
DBP	74.67	±	9.90	76.00	±	9.86	0.422
HR	83.07	±	15.69	77.67	±	9.79	0.596

Table 2 illustrate the comparison of study variables between 12th and 24th hr of group CI. The VAS showed a significant difference between the 12th and 24th hr of group CI. Additionally, the systolic and diastolic blood pressure and heart rate does not show any significant between the 12th and 24th hr of group CI.

Table 3: Comparison of study variables between 12th and 24th hr of IB

Parameters	IB						P-Values
	12th Hr			24th Hr			
VAS	2.93	±	0.88	2.47	±	0.74	0.001*
SBP	122.00	±	11.46	124.00	±	9.86	0.219
DBP	117.47	±	167.40	76.13	±	5.21	0.422
HR	79.53	±	8.97	79.93	±	7.27	0.596

Table 3 illustrate the comparison of study variables between 12th and 24th hr of group IB. The VAS showed a significant between the 12th and 24th hr of group IB (P=0.001**). Additionally, the systolic and diastolic blood pressure and heart rate does not show any significant between the 12th and 24th hr of group CI.

Table 4: Correlation of study variables between CI and IB

Parameter	ASA		VAS	
	r- value	P-value	r- value	P-value
Age	0.102	0.59	0.305	0.10
Height	0.297	0.11	0.277	0.13
Weight	0.098	0.60	0.078	0.68
BMI	0.007	0.97	0.102	0.59
SBP	0.348	0.05*	0.286	0.02*
DBP	0.104	0.58	0.027	0.83
HR	0.297	0.111	0.157	0.230

Table 4 shows the correlation of study variables between group CI and group IB. There is no significant correlation between ASA, VAS and age, Height, Weight, BMI, DBP and HR. There was a significant positive correlation between the ASA, VAS and systolic blood pressure, the P value is 0.02*.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 02, 2024

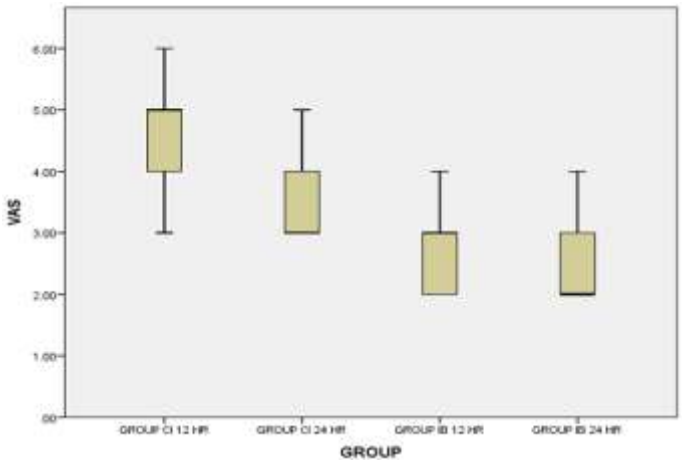

Figure 1: Shows the box plot between visual analogue scale and study subjects

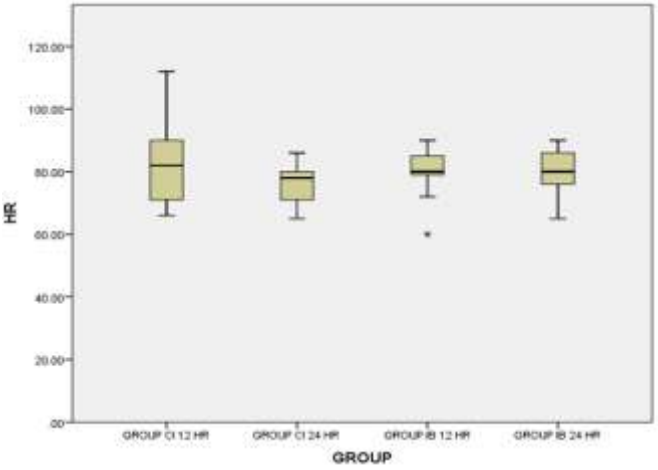

Figure 2: Shows the box plot between heart rate and study subjects

Compared to 0.1% ml of plain ropivacaine, spinal anesthesia with hyperbaric ropivacaine 0.1 % ml led to a considerably faster recovery of both motor and sensory block, as well as a shorter time to first voluntary micturition and home-readiness (17-18). Many studies have been done to find the suitable dose of morphine or defining the dose of intrathecal morphine in patients undergoing hip and knee arthroplasty which provide good analgesia and less side effects (19-20). The use of ropivacaine and morphine for intrathecal anesthesia in the lower abdominal and lower limb surgeries provided an adequate level of block for the surgery with faster onset of sensory and motor blockade, lesser duration of motor blockade with good analgesia and stable hemodynamics. The studies have reported ropivacaine produced a faster onset, greater success rate of analgesia at the level of T10 dermatome, and faster recovery of the block.

Conclusion

Based on study findings, we conclude Intermittent boluses are similar to continuous infusion of epidural ropivacaine plus morphine for post operative analgesia and produced a faster onset, greater success rate of analgesia.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 02, 2024

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