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Original Article

Sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery- A clinical study

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ABSTRACT:

Background: Combined spinal epidural (CSE) is popular in modern anesthesia practice. The present study was conducted to compare sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery. **Materials & Methods:** 74 ASA class I or II patients aged 20–60 years old scheduled for lower limb orthopaedic surgery were divided into 2 groups of 37 each. Group I was sequential combined spinal epidural (SCSE) group and group II was Epidural volume extension (EVE) group. Hemodynamic parameters was recorded and compared. **Results:** Group I had 20 males and 17 females and group II had 18 males and 21 females. Duration of surgery was 124.2 minutes in group I and 126.8 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II, modified Bromage motor score was 2 in group I and 1 in group II. Duration of motor block was 176.2 minutes in group I and 148.2 minutes in group II. Time for sensory regression to T12 was 134.2 minutes in group I and 124.2 minutes in group II. Supplementation with general anesthesia was 1 in group I and 4 minutes in group II, time to first request for postoperative analgesia was 232.6 minutes in group I and 192.1 minutes in group II. Number of patients who required pethidine was 8 in group I and 6 in group II and mean pethidine consumption (mg) was 4.3 mg in group I and 3.9 in group II. The difference was significant (P< 0.05). **Conclusion:** Both SCSE and EVE techniques is effective in patients undergoing lower limb orthopedic surgery.

Key words: Combined spinal epidural, Epidural volume extension, Modified Bromage score

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INTRODUCTION

Combined spinal epidural (CSE) is popular in modern anesthesia practice. It provides rapid onset, prolonged duration, less incidence of toxicity from local anesthetics, and postoperative analgesia. Geriatric patients undergoing major orthopedic surgery are much more at risk than younger ones due to less cardiorespiratory reserve and other comorbidities.[1] Epidural anesthesia may be associated with incomplete sensory blockade and poor sacral spread. It however allows for gradual dosing and thus intermittent assessment of completeness of sensory blockade and change in blood pressure. A CSE with a low-dose spinal anesthetic can achieve similarly stable hemodynamics, while reliably producing dense, non-patchy sensory blockade with improved sacral spread when compared to epidural anesthesia alone.[2]

Sequential combined spinal epidural (SCSE) is a modified method of anesthesia in which a small spinal dose inadequate for surgery is used in an attempt to decrease incidence of hypotension and the block is then extended cephalad with the epidural drug. This technique is becoming famous in obstetric anesthesia practice but also can be used in patients undergoing orthopedic surgery due to hemodynamic stability.[3]

Epidural volume extension (EVE) is another modified method of CSE. This approach includes the use of normal saline into the epidural space immediately after intrathecal injection of the local anesthetic.[4] Another proposed explanation for the improved

success rate of the CSE technique is that the spinal needle may aid in correct identification of the epidural space. A spinal needle with adequate CSF return when using a needle-through-needle CSE technique suggests proper placement of the Tuohy needle in the epidural space.[5] The present study was conducted to compare sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery.

MATERIALS & METHODS

The present study comprised of 74 ASA class I or II patients aged 20–60 years old scheduled for lower limb orthopaedic surgery. Exclusion criteria were ASA class ≥ III, contraindications to regional anesthesia, history of chronic use of opioids, body mass index (BMI) ≥ 35, uncooperative patients.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 37 each. Group I was sequential combined spinal epidural (SCSE) group and group II was Epidural volume extension (EVE) group. Lower limb orthopaedic surgery was conducted as per standardized operative procedure. Parameters such as anesthesia readiness time, modified bromage motor score, duration of motor block, time for sensory regression to T12, supplementation with general anesthesia, time to the first request for postoperative analgesia, number of patients who required pethidine and mean pethidine consumption (mg) was recorded in both groups. Results were statistically analyzed. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Method	Sequential combined spinal epidural	Epidural volume extension
M:F	20:17	18:21

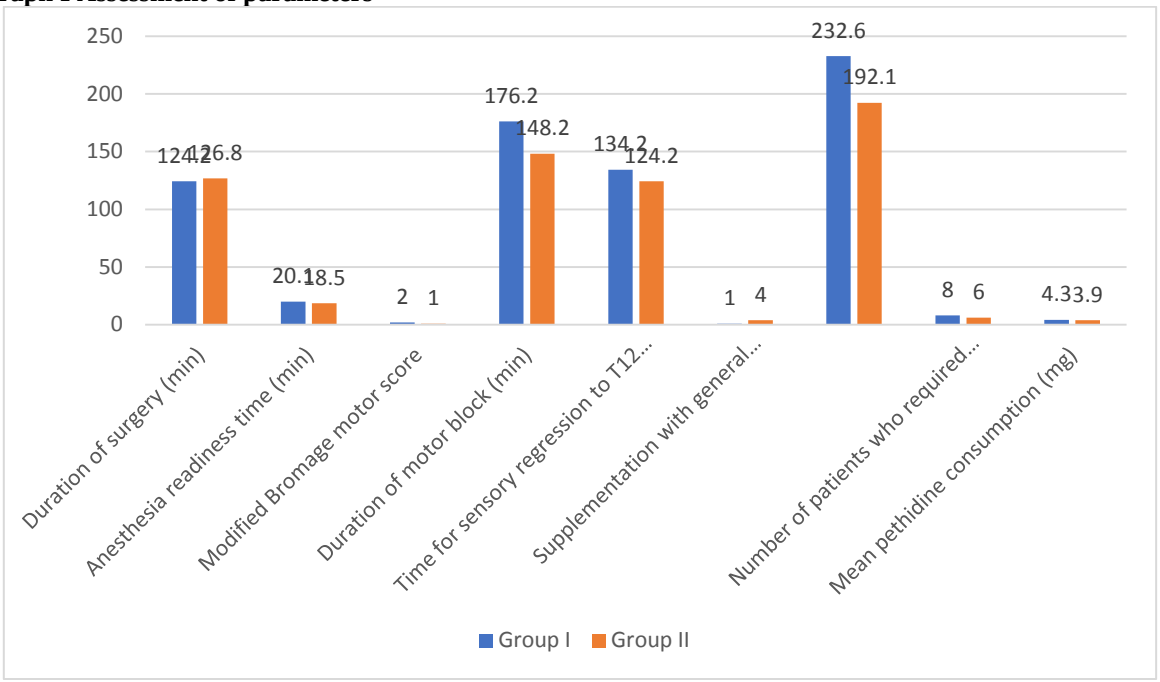
Table I shows that group I had 20 males and 17 females and group II had 18 males and 21 females.

Table II Assessment of parameters

Parameters	Group I	Group II	P value
Duration of surgery (min)	124.2	126.8	0.12
Anesthesia readiness time (min)	20.1	18.5	0.05
Modified Bromage motor score	2	1	0.02
Duration of motor block (min)	176.2	148.2	0.01
Time for sensory regression to T12 (min)	134.2	124.2	0.04
Supplementation with general anesthesia	1	4	0.001
Time to first request for postoperative analgesia	232.6	192.1	0.03
Number of patients who required pethidine	8	6	0.82
Mean pethidine consumption (mg)	4.3	3.9	0.71

Table II, graph I shows that duration of surgery was 124.2 minutes in group I and 126.8 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II, modified Bromage motor score was 2 in group I and 1 in group II. Duration of motor block was 176.2 minutes in group I and 148.2 minutes in group II. Time for sensory regression to T12 was 134.2 minutes in group I and 124.2 minutes in group II. Supplementation with general anesthesia was 1 in group I and 4 minutes in group II, time to first request for postoperative analgesia was 232.6 minutes in group I and 192.1 minutes in group II. Number of patients who required pethidine was 8 in group I and 6 in group II and mean pethidine consumption (mg) was 4.3 mg in group I and 3.9 in group II. The difference was significant (P< 0.05).

Graph I Assessment of parameters



DISCUSSION

Proper use of the CSE technique requires an understanding of the interrelationship between the thecal sac and the epidural space. Administration of an epidural fluid bolus may increase pressure in the epidural compartment resulting in compression of the thecal sac.[6] During CSE, epidural bolus injection and thecal sac compression can lead to enhanced cephalad spread of the spinal anesthetic in the intrathecal space. This volume based phenomenon is termed epidural volume extension (EVE), epidural volume expansion, or epidural top-up.[7] Saline or local anesthetic appear to have similar effects on enhanced spinal anesthetic spread. Timing of the epidural bolus, and local anesthetic baricity further determine the extent of EVE. If the epidural bolus is administered shortly after the spinal dose, intrathecal spread is more pronounced than when it is given more than 20 minutes after the spinal dose.[8] The present study was conducted to compare sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery.

We found that group I had 20 males and 17 females and group II had 18 males and 21 females. Suzuki et al[9] demonstrated enhanced caudal spread of local anesthetic when the dura was punctured with a 26-gauge spinal needle prior to an epidural bolus when compared to patients who received an epidural alone.

We found that duration of surgery was 124.2 minutes in group I and 126.8 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II, modified Bromage motor score was 2 in group I and 1 in group II. Duration of motor block was 176.2 minutes in group I and 148.2 minutes in group II. CSE is an effective way to reduce the total drug dosage required for anesthesia or analgesia. The intrathecal injection achieves rapid onset with minimal doses of local anesthetics and opioids, and the block can be prolonged with low-dose epidural maintenance administration. In addition, the sequential CSE method can be used to extend the dermatomal block with minimal additional drugs or even saline. Reduction in total drug dosage has made truly selective blockade possible. Many studies have confirmed that low-dose CSE with local anesthetic and opioid, or low-dose epidural block alone, will provide effective analgesia with minimal motor and proprioceptive block. Such neurologic selective blockade has made it possible for most patients to walk and bear down normally in labor or postoperatively. There remains concern about the risk of infection being increased when the CSE technique is used in place of epidural block alone.[10]

We observed that time for sensory regression to T12 was 134.2 minutes in group I and 124.2 minutes in group II. Supplementation with general anesthesia was 1 in group I and 4 minutes in group II, time to first request for postoperative analgesia was 232.6 minutes in group I and 192.1 minutes in group II. Number of patients who required pethidine was 8 in group I and 6 in group II and mean pethidine consumption (mg) was 4.3 mg in group I and 3.9 in group II. Combined Spinal Epidurals can be placed using two primary techniques, the needle-through-needle technique (NTN) and the separate-needle technique (SN). The SN technique allows for testing the epidural catheter prior to administering the spinal anesthetic. The NTN is quicker to perform and better tolerated by patients.[11] The separate-needle (SN) combined spinal epidural technique involves two

separate needle punctures, one to place the epidural catheter and one to deposit the spinal anesthetic dose. With this technique, the practitioner can test the function of the epidural catheter prior to spinal anesthetic administration. The epidural catheter can be bolused with a fasting acting local anesthetic to assess for uniform bilateral spread. Because the spinal needle is inserted after epidural catheter placement, there is a theoretical risk of epidural catheter shearing by the spinal needle but this complication has yet to be reported.[12]

CONCLUSION

Authors found that both SCSE and EVE techniques is effective in patients undergoing lower limb orthopedic surgery.

REFERENCES

1. Bhattacharya D, Tewari I, Chowdhuri S (2007b) Comparative study of sequential combined spinal epidural anesthesia versus spinal anesthesia in high risk geriatric patients for major orthopedic surgery. Indian J. Anaesth 51(1):32–36.
2. Cohen SE, Hamilton CL, Riley ET et al (1998) Obstetric postanesthesia care unit stays: reevaluation of discharge criteria after regional anesthesia. Anesthesiology. 89(6):1559–1565.
3. Dureja GP, Madan R, Kaul HL. Combined spinal epidural anaesthesia. In: Regional anaesthesia and pain management (current perspectives) B. I. Churchill Livingstone Pvt. Ltd., 2000; 139-145.
4. Hamdani GA, Chohan U, Zubair NA (2002) Clinical usefulness of sequential combined spinal epidural anesthesia in high risk geriatric patients for major orthopaedic surgery. J Anaesth Clin Pharmacol 18(2):163–166.
5. Holmstrom E, Laugaland K, Rawal N et al (1993) Combined spinal epidural block versus spinal and epidural block for orthopedic surgery. Can J Anaesth 10(7): 601–606.
6. Loubert C, O'Brien PJ, Fernando R et al (2011) Epidural volume extension in combined spinal epidural anesthesia for elective caesarean section: a randomized controlled trial. Anesthesia 66:341–347.
7. Lucas DN, Gough KL (2013) Enhanced recovery in obstetrics—a new frontier? Int J Obstet Anesth. 22(2):92–95.
8. Mardirosoff C, Dumont L, Lemedioni P et al (1998) Sensory block extension during combined spinal and epidural. Reg Anesth Pain Med 23:92–95.
9. Suzuki N, Koganemaru M, Onizuka S, et al. Dural puncture with a 26G spinal needle affects spread of epidural anesthesia. Anesth Analg 1996;82:1040-4.
10. Rawal N, Holmström B, Crowhurst JA, Van Zundert A. The combined spinal-epidural technique. Anesthesiology Clinics of North America. 2000 Jun 1;18(2):267-95.
11. McNaught AF, Stocks GM (2007) Epidural volume extension and low-dose sequential combined spinal-epidural blockade: two ways to reduce spinal dose requirement for caesarean section. International Journal of Obstetric Anesthesia 16:346–353.
12. Higuchi H, Adachi Y, Kazama T. Effects of epidural saline injection on cerebrospinal fluid volume and velocity waveform: a magnetic resonance imaging study. Anesthesiology 2005;102:285-92.