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Original Article

Sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery

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ABSTRACT:
Background: 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. The present study compared sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery. **Materials & Methods:** 80 ASA class I or II patients scheduled for lower limb orthopaedic surgerywere divided into 2 groups of 40 each. Group I was sequential combined spinal epidural (SCSE) group and group II was epidural volume extension (EVE) group. 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 was recorded in both groups. **Results:** Group I had 22 males and 18 females and group II had 19 males and 21 females. Duration of surgery was 128.2 minutes in group I and 122.8 minutes in group II. Anesthesia readiness time was 21.1 minutes in group I and 19.5 minutes in group II. Duration of motor block was 178.2 minutes in group I and 150.2 minutes in group II. The mean modified bromage motor score was 2 in group I and 1 in group II. The difference was significant (P< 0.05). Time for sensory regression to T12 was 136.2minutes in group I and 125.2 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 230.6 minutes in group I and 194.1 minutes in group II. Number of patients who required pethidine was 7 in group I and 5 in group II and mean pethidine consumption (mg) was 4.7 mg in group I and 3.6 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, orthopaedic surgery.

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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]

Spinal anesthesia is a simple and quick technique, but it has a risk of severe hypotension.[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]

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.[4]

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.[5]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.[6] The present study comparedsequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery.

MATERIALS & METHODS

The present study comprised of 80 ASA class I or II patients scheduled for lower limb orthopaedic surgery. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 40 each. Group I was sequential combined spinal epidural (SCSE) group and group II was epidural volume extension (EVE) group. All underwent lower limb orthopaedic surgery. 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 was recorded in both groups. Results were subjected to statistical analysis. 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	22:18	19:21

Table I shows that group I had 22 males and 18 females and group II had 19 males and 21 females.

Table II: Baseline parameters

Parameters	Group I	Group II	P value
Duration of surgery (min)	128.2	122.8	0.12
Anesthesia readiness time (min)	21.1	19.5	0.05
Duration of motor block (min)	178.2	150.2	0.01
Modified Bromage motor score	2	1	0.02

Table II, graph I shows that duration of surgery was 128.2 minutes in group I and 122.8 minutes in group II. Anesthesia readiness time was 21.1 minutes in group I and 19.5 minutes in group II. Duration of motor block was 178.2 minutes in group I and 150.2 minutes in group II. The mean modified bromage motor score was 2 in group I and 1 in group II. The difference was significant (P< 0.05).

Graph I: Baseline parameters

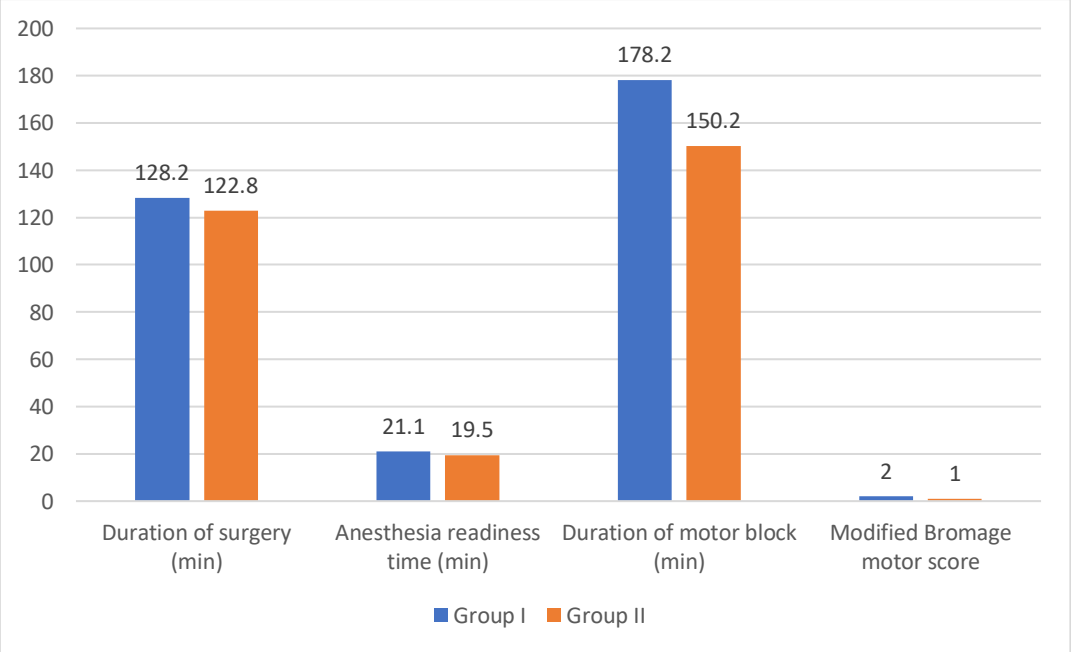

Table III: Assessment of parameters

Time for sensory regression to T12 (min)	136.2	125.2	0.05
Supplementation with general anesthesia(min)	1	3	0.01
Time to first request for postoperative analgesia	230.6	194.1	0.04
Number of patients who required pethidine	7	5	0.94
Mean pethidine consumption (mg)	4.7	3.6	0.72

Table III shows that time for sensory regression to T12 was 136.2minutes in group I and 125.2 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 230.6 minutes in group I and 194.1 minutes in group II. Number of patients who required pethidine was 7 in group I and 5 in group II and mean pethidine consumption (mg) was 4.7 mg in group I and 3.6 in group II.The difference was significant (P< 0.05).

DISCUSSION

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.[7] 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.[8]

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.[9] 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.[10]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.[11]The present study comparedsequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery.

We found that group I had 22 males and 18 females and group II had 19 males and 21 females. Gupta et al[12]compared sequential CSE with epidural block for gynaecological and orthopedic surgery. Forty patients between age group 20- 60 years of ASA grade I, II were randomly divided into 2 groups. Group A patients received CSE using “needle through needle technique” and were given 2.5 ml of 0.5% hyperbaric bupivacaine for spinal block. Group B patients received epidural block with catheter using 15 ml of 0.5% plain bupivacaine. In all patients, subsequent dosage of (1.5–2 ml per unblocked segment) 0.5% plain bupivacaine was administered through the epidural catheter to achieve a block up to T4-5. The surgical analgesia and motor blockade occurred significantly early in CSE group. Duration of analgesia was significantly shorter in CSE (81.75±11.09 min) as compared to epidural group (120.75±7.56 min). The total amount of bupivacaine required to attain the same target level was three times in epidural group.

We found that duration of surgery was 128.2 minutes in group I and 122.8 minutes in group II. Anesthesia readiness time was 21.1 minutes in group I and 19.5 minutes in group II. Duration of motor block was 178.2 minutes in group I and 150.2 minutes in group II. The mean modified bromage motor score was 2 in group I and 1 in group II. Time for sensory regression to T12 was 136.2minutes in group I and 125.2 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 230.6 minutes in group I and 194.1 minutes in group II. Number of patients who required pethidine was 7 in group I and 5 in group II and mean pethidine consumption (mg) was 4.7 mg in group I and 3.6 in group II.Suzuki et al[13] 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.

CONCLUSION

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

REFERENCES

1. Holmstrom E, Laugaland K, Rawal N et al. Combined spinal epidural block versus spinal and epidural block for orthopedic surgery. Can J Anaesth1993;10(7): 601–606.
2. Loubert C, O’Brien PJ, Fernando R et al. Epidural volume extension in combined spinal epidural anesthesia for elective caesarean section: A

randomized controlled trial. Anesthesia 2011;66:341–347.
3. Lucas DN, Gough KL. Enhanced recovery in obstetrics—a new frontier? Int J ObstetAnesth. 2013;22(2):92–95.
4. Mardirosoff C, Dumont L, Lemedioni P et al. Sensory block extension during combined spinal and epidural. Reg Anesth Pain Med 1998;23:92–95.
5. 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.
6. McNaught AF, Stocks GM. 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 2007;16:346–353.
7. Bhattacharya D, Tewari I, Chowdhuri S. Comparative study of sequential combined spinal epidural anesthesia versus spinal anesthesia in high- risk geriatric patients for major orthopedic surgery. Indian J. Anaesth 2007;51(1):32–36.
8. Cohen SE, Hamilton CL, Riley ET et al. Obstetric post anesthesia care unit stays: re-evaluation of discharge criteria after regional anesthesia. Anesthesiology. 1998;89(6):1559–1565.
9. 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.
10. Hamdani GA, Chohan U, Zubair NA. Clinical usefulness of sequential combined spinal epidural anesthesia in high- risk geriatric patients for major orthopaedic surgery. J Anaesth Clin Pharmacol 2002;18(2):163–166.
11. Higuchi H, Adachi Y, Kazama T. Effects of epidural saline injection on cerebrospinal fluid volume and velocity waveform: a magnetic resonance imaging study.Anesthesiology2005;102:285-92.
12. Gupta P, Dua CK, Verma UC, Saxena KN, Chakraborty I. Sequential combined spinal epidural versus epidural anaesthesia in orthopaedic and gynaecological surgery: a comparative evaluation. Indian Journal of Anaesthesia. 2002 Nov 1;46(6):453-6.
13. Suzuki N, Koganemaru M, Onizuka S, et al. Dural puncture with a 26G spinal needle affects spread of epidural anesthesia. AnesthAnalg1996;82:1040-4.