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# Original Research

## A comparative assessment of sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery

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***ABSTRACT:***
**Background:** The combined spinal epidural (CSE) is a common anesthetic technique today. The present study compared sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery. **Materials & Methods:** 70 ASA class I or II patients scheduled for lower limb orthopaedic surgerywere divided into 2 groups of 35 each. All underwent lower limb orthopaedic surgery. In group I, sequential combined spinal epidural (SCSE) and in group II, epidural volume extension (EVE) technique was employed. **Results:** Group I had 20 males and 15 females and group II had 19 males and 16 females. The duration of surgery was 124.2 minutes in group I and 118.8 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II. Duration of motor block was 174.2 minutes in group I and 146.2 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). The mean pethidine consumption was 4.5 mg in group I and 3.4 mg in group II. The time for sensory regression to T12 was 130.2minutes in group I and 122.2 minutes in group II. Supplementation with general anesthesia was 1 in group I and 3 minutes in group II, time to first request for postoperative analgesia was 224.6 minutes in group I and 190.1 minutes in group II. Number of patients who required pethidine was 8 in group I and 6 in group II. The difference was significant (P< 0.05). **Conclusion:** Both the SCSE and EVE procedures are efficient for patients having orthopedic surgery on the lower limbs.
**Key words:** Combined spinal epidural, orthopaedic surgery, postoperative analgesia

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## INTRODUCTION

The combined spinal epidural (CSE) is a common anesthetic technique today. It offers postoperative analgesia, quick onset, longer duration, and lower incidence of local anesthetic toxicity. Due to lower cardiorespiratory reserve and other comorbidities, elderly individuals undergoing major orthopedic surgery are substantially more at risk than younger patients.[1] Although spinal anesthetic is a rapid and easy procedure, there is a danger of severe hypotension.[2] Sequential combined spinal epidural (SCSE) is a modified kind of anesthesia in which the block is first extended cephalad with an epidural anesthetic before a minor spinal dose insufficient for surgery is given to try to reduce the likelihood of hypotension. Due to the growing popularity of this method in the field of obstetric anesthesia, patients undergoing orthopedic surgery.[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 comparedsequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery.

## MATERIALS & METHODS

The present study was conducted among70 ASA class I or II patients scheduled for lower limb orthopaedic surgery of both genders. 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 35 each. All underwent lower limb orthopaedic surgery. In group I, sequential combined spinal epidural (SCSE) and in group II, epidural volume extension (EVE) technique was employed. 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 < 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 | 20:15 | 19:16 |

Table I shows that group I had 20 males and 15 females and group II had 19 males and 16 females.

**Table II Baseline parameters**

| Parameters | Group I | Group II | P value |
|---|---|---|---|
| Duration of surgery (min) | 124.2 | 118.8 | 0.17 |
| Anesthesia readiness time (min) | 20.1 | 18.5 | 0.04 |
| Duration of motor block (min) | 174.2 | 146.2 | 0.03 |
| Modified Bromage motor score | 2 | 1 | 0.05 |

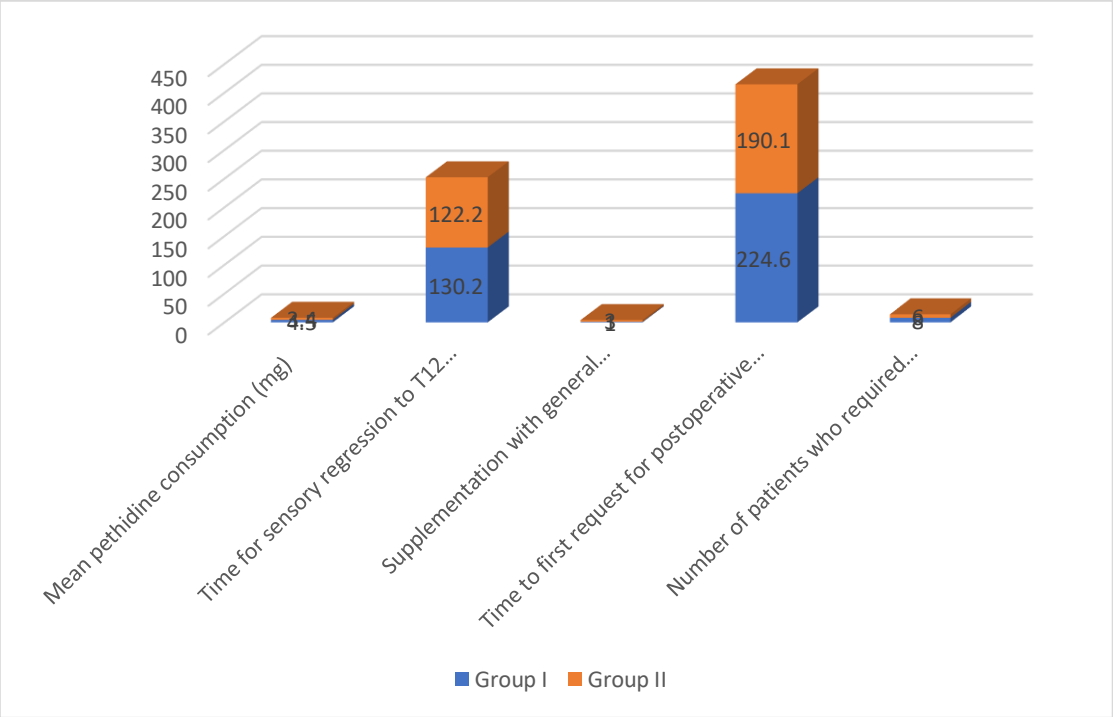
Table II shows that duration of surgery was 124.2 minutes in group I and 118.8 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II. Duration of motor block was 174.2 minutes in group I and 146.2 minutes in group II. The mean modified bromage motor score was 2 in group I and 1 in group II. The difference was significant (P< 0.05).

**Table III Assessment of parameters**

| Parameters | Group I | Group II | P value |
|---|---|---|---|
| Mean pethidine consumption (mg) | 4.5 | 3.4 | 0.85 |
| Time for sensory regression to T12 (min) | 130.2 | 122.2 | 0.05 |
| Supplementation with general anesthesia(min) | 1 | 3 | 0.02 |
| Time to first request for postoperative analgesia | 224.6 | 190.1 | 0.05 |
| Number of patients who required pethidine | 8 | 6 | 0.91 |

Table III, graph I shows that mean pethidine consumption was 4.5 mg in group I and 3.4 mg in group II.The time for sensory regression to T12 was 130.2minutes in group I and 122.2 minutes in group II. Supplementation with general anesthesia was 1 in group I and 3 minutes in group II, time to first request for postoperative analgesia was 224.6 minutes in group I and 190.1 minutes in group II. Number of patients who required pethidine was 8 in group I and 6 in group II. The difference was significant (P< 0.05).

**Graph I Assessment of parameters**




## DISCUSSION

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.[6]

The combined spinal epidural (CSE) is a common anesthetic technique today. It offers postoperative analgesia, quick onset, longer duration, and lower incidence of local anesthetic toxicity. Due to lower cardiorespiratory reserve and other comorbidities, elderly individuals undergoing major orthopedic surgery are substantially more at risk than younger patients.[7,8] Although spinal anesthetic is a rapid and easy procedure, there is a danger of severe hypotension.[9] Sequential combined spinal epidural (SCSE) is a modified kind of anesthesia in which the block is first extended cephalad with an epidural anesthetic before a minor spinal dose insufficient for surgery is given to try to reduce the likelihood of hypotension. Due to the growing popularity of this method in the field of obstetric anesthesia, patients undergoing orthopedic surgery.[10,11]The present study compared sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery.

We found that group I had 20 males and 15 females and group II had 19 males and 16 females. Suzuki et al[12] 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 observed that duration of surgery was 124.2 minutes in group I and 118.8 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II. Duration of motor block was 174.2 minutes in group I and 146.2 minutes in group II. The mean modified bromage motor score was 2 in group I and 1 in group II. Gupta et al[13]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.

## CONCLUSION

Authors found that both the SCSE and EVE procedures are efficient for patients having orthopedic surgery on the lower limbs.

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