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Anesthesiology

# A COMPARATIVE STUDY OF COMBINED SPINAL EPIDURAL ANAESTHESIA VERSUS EPIDURAL ANAESTHESIA FOR ELECTIVE CAESAREAN SECTION

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**ABSTRACT**

**Background and aims**

This study was done to compare the efficacy of combined spinal epidural(CSEA) anaesthesia with epidural anaesthesia based on the parameters such as onset time,quality of intraoperative analgesia, quality of motor blockade,incidence of hypotension and total local anaesthetic dose requirement

**Materials and methods-**

50 patients undergoing elective LSCS were divided into two groups of 25 each .One group received combined spinal epidural anaesthesia (CSE). The other group received epidural anaesthesia.The combined spinal epidural (CSE) group received 1 ml of 0.5% hyperbaric bupivacaine intrathecally followed by 10 ml of 0.5% plain bupivacaine with adrenaline 5mcg/ml (1 in 2,00,000) epidurally. The epidural group patients received 16 ml of 0.5% plain bupivacaine with adrenaline epidurally.

Study parameters were noted.

**Observation and results**

In CSE group 72% achieved complete anaesthesia ,while in epidural group only 40% achieved complete anaesthesia which is statistically significant.($p<0.05$) Complete motor blockade was achieved in 68% in CSE group and 36% in Epidural group. Incidence of hypotension was similar in both groups. Mean local anaesthetic dose was 55 mg in CSE group compared to 86mg in the epidural group which was statistically significant.

**Conclusion**

Combined spinal epidural anaesthesia offers rapid onset of intense neuraxial blockade, better muscle relaxation, better intraoperative analgesia and decrease in the total requirement of local anaesthetic dose when compared with epidural anaesthesia in elective caesarean section.

**KEYWORDS :** Spinal anaesthesia ,combined spinal epidural , LSCS,

## AIM OF STUDY

To compare the efficacy of combined spinal epidural (CSEA) anaesthesia with epidural anaesthesia based on the following parameters.

a) Onset time-Time taken to achieve T4 level of analgesia
b )Quality of intra operative analgesia
c) Quality of motor blockade
d) Incidence of hypotension
e) Local anaesthetic dose requirement

## MATERIALS AND METHODS

After getting the approval of the local ethical committee of our hospital,50 patients undergoing elective LSCS were divided into two groups of 25 each .One group received combined spinal epidural anaesthesia(CSE). The other group received epidural anaesthesia.

For the purpose of standardization ,the selection criteria was fixed as age between 20 and 30,weight between 50 and 70 kgs, height between 145-165 cms. Patients with pregnancy induced hypertension ,respiratory problems, cardiovascular, neurological or any other systemic disorders were excluded from the study. Informed consent was obtained from the patients after explanation of the procedure.

In the immediate preoperative period, after thorough systemic examination of the patient, basic data like pulse rate, BP, height and weight were recorded.An intravenous line was started with 18 G cannula and 1080 ml of Ringer lactate solution was infused before starting the procedure. In the operating room, the basal line pulse rate and BP was recorded..

### Combined spinal epidural group (CSE group)

In this study the sequential method of combined spinal epidural anaesthesia was used.The block was performed with the special CSE kit (PORTEX,CSE cure combined spinal epidural minipack with lock). It contains 16G epidural needle ,16G epidural catheter and 26G Whitacre spinal needle. The block was performed in the right lateral position. Under aseptic precaution, after infiltration of skin with 2% lignocaine, the epidural needle was inserted at L2-3 space. The epidural space was identified using loss of resistance to air. Through the epidural needle, the special 26G whitacre spinal needle was introduced and subarachnoid space was entered. After ensuring free flow of CSF , 1ml of 0.5% hyperbaric bupivacaine was injected into the subarachnoid space. The spinal needle was removed and a 16 G epidural catheter was inserted through the epidural needle. 4cm of the epidural catheter was left inside the epidural space and the epidural needle removed. The catheter was secured and patient was turned to supine position with left lateral tilt using a wedge under the right hip. Pulse rate, BP and the level of analgesia were noted. The catheter was tested using 2ml of 0.5% plain bupivacaine with 1 in 200000 adrenaline. After the test dose was found to be negative 8ml of 0.5% plain bupivacaine with 1 in 200000 adrenaline was injected very slowly.

### Epidural group

Epidural block was performed in the right lateral position using 16G epidural needle and 16 G catheter. Under strict aseptic precaution , after infiltration of skin with 2% lignocaine epidural needle was inserted at L2-3 space. The epidural space was identified at 4 cm using loss of resistance to air..Epidural catheter was fixed at 9 cm. The patient was turned to supine position with left lateral tilt using wedge under the right hip. The catheter was tested using 2ml of 0.5% bupivacaine with 1 in 200000 adrenaline. 14 ml of 0.5% plain bupivacaine with 1 in 200000 adrenaline was injected very slowly. . Pulse rate and BP were recorded every 2 minutes till the delivery of the baby and every 5 minutes thereafter.5 litre/min flow of oxygen was administered using polymask.

If systolic blood pressure fell by 30% of the baseline BP or below 90 mmHg , it was regarded as hypotension and was promptly treated with injection Ephedrine 6mg I.V.If bradycardia (HR<60/min) developed, inj. Atrophine sulphate 0.6mg was given intravenously. In both groups , the level of sensory block was tested by pin prick, every minute till it reached T4. When the level reached T10 , the surgeon was asked to paint and drape. If the level did not reach T4 after 15 minutes, additional 0.5% plain bupivacaine was given in a dose 2.5ml per unblocked segment upto T4.

The quality of surgical anaesthesia was assessed using a scale proposed by belzorena et al.

**Quality of anaesthesia**

| | |
|---|---|
| Excellent | No complaints from the patient<br>No supplementary drug needed. |
| Good | Mild discomfort<br>One supplementary dose needed. |
| Fair | Complaints of pain<br>More than one supplementary dose needed. |
| Poor | Severe discomfort or pain.<br>General anaesthesia necessary. |

If the patient complained of pain, inj. Ketamine 0.5mg/kg was given intravenously. Motor blockade was assessed using the modified bromage scale.

**Bromage scale**

| | |
|---|---|
| Grade I | Complete,unable to move feet or knees |
| Grade II | Almost complete, able to move feet only |
| Grade III | Partial, able to move ankle , just able to move knees. |
| Grade IV | Null, complete flexion and extensionof knees and feet. |

Neonatal well being was assessed by APGAR scores at 1,5 and 10 minutes after delivery by the paediatrician on duty.

During intraoperative period any adverse events like nausea, vomiting,headache,shivering and chest pain were noted .At the conclusion of surgery,0.02 mg/kg of buprenorphine diluted in 6ml of normal saline was injected through the epidural catheter for post operative pain relief.

## OBSERVATION AND RESULTS

### Physical characteristics

The patients were statistically comparable with respect to age, weight and height in both groups.

### Age distributions

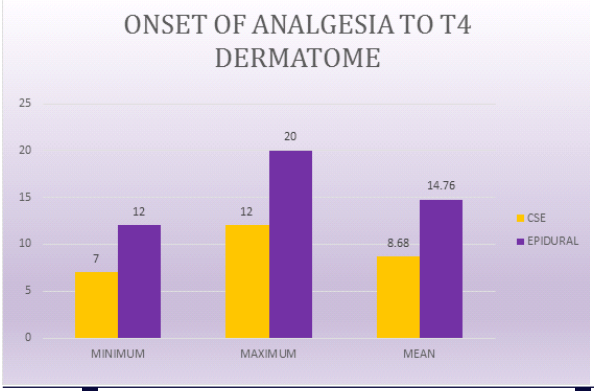
The range of age in CSE group was 21-30 years ,while in epidural group it was 20-30 years . The average age in both groups were statistically similar

**Table 1- Mean time of onset of analgesia**

| Onset time to T4 (min) | CSE | Epidural |
|---|---|---|
| Minimum | 7 | 12 |
| Maximum | 12 | 20 |
| Mean | 8.68 | 14.76 |

P Value < 0.05 students 't' test

**Graph 1: Mean time of onset of analgesia**



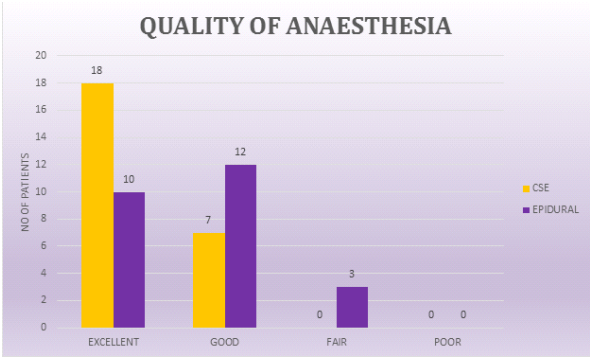

**Quality of Anaesthesia**

**Table 2:Quality of anaesthesia**

| Grade | CSE | Epidural |
|---|---|---|
| Excellent | 18 (72%) | 10 (40%) |
| Good | 7 (28%) | 12 (48%) |
| Fair | 0 | 3 (12%) |
| Poor | 0 | 0 |

P value < 0.01 chisquare test

**Graph 2:Quality of anaesthesia**




Quality of anesthesia was graded based on patients complaints and the intraoperative supplementation of ketamine. In CSE group, 72% achieved excellent anaesthesia and 28% achieved good anaesthesia. In epidural group 40% achieved excellent anaesthesia 48% achieved good anesthesia and 12% achieved fair anaesthesia. Therefore in CSE group 72% achieved complete anesthesia while in epidural group only 40% achieved complete anaesthesia The difference is statistically significant.($p<0.05$)

### Incidence of Hypotension

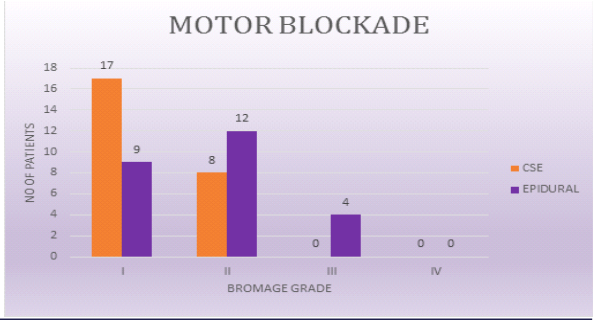
If the fall in systolic BP was more than 30% of the baseline systolic blood pressure or below 90mmHg,it was treated. In CSE group 28% (7 patients) developed hypotension while in the epidural group 24%(6 patients) developed hypotension.This differences is not statistically significant.($p > 0.05$) .

**Quality of motor blockade**

**Table 3: Quality of motor blockade**

| Bromage Grade | CSE | Epidural |
|---|---|---|
| I | 17(68%) | 9 (36%) |
| II | 8 (32%) | 12(48%) |
| III | 0 | 4(16%) |
| IV | 0 | 0 |

**Graph 3: Quality of motor blockade**

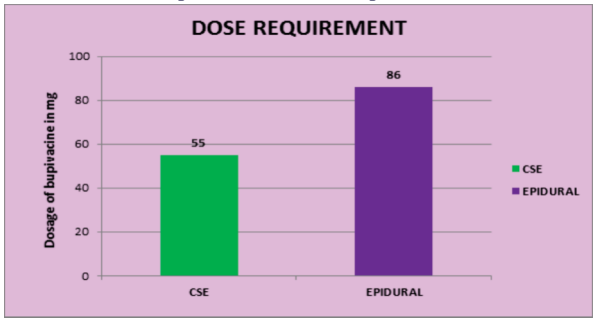


Muscle relaxation was assessed using Bromage scale. In CSE group 68% grade I block and 32% achieved grade II Block.In Epidural block 36% achieved grade I block 48% achieved grade II block and 16% achieved grade III block. Therefore complete motor blockade was achieved in 68% in CSE group and 36% in Epidural group.

The difference was statistically significant.($p<0.05$)

**Dose requirement**

**Graph 4:Total dose of bupivacaine**




In CSE group,all patients attained T4 level after the first dose of epidural bupivacaine given sequentially with spinal bupivacaine.In epidural group, 6 patients required additional epidural top up after initial bupivacaine bolus.Mean total analgesic dose was 55 mg in CSE group and 86 mg in epidural group.The difference was statistically significant.($p<0.05$)

**Incidence of side effects.**

The incidence of side effects in the two groups are tabulated below

**Table 4:Incidence of side effects**

| SIDE EFFECTS | CSE | EPIDURAL |
|---|---|---|
| Bradycardia | 2 | 1 |
| Nausea | 2 | 2 |
| Vomiting | 0 | 1 |
| Rigor | 4 | 6 |
| PDPH | 0 | 0 |

**Technical failures:**

Failure of CSE occurred in two cases.These were excluded from the study.

## DISCUSSION

This study was a randomized controlled trial.Variables like age, weight and height were all standardized in both groups as confirmed by statistical data.

**Time of onset of action**

The rapid onset of action is the attractive features of CSE . Onset time to reach T4 level analgesia was earlier in CSE group 8.68±2.13 minutes as compared to epidural group 14.76±1.28 minutes. A mean onset time gain of 6.08 minutes was achieved in CSE group.

DAVIES et al in their study compared CSE and epidural anaesthesia for caesarean section and concluded that onset time was six minutes earlier in CSE groups. This observation is in concurrence with our study.

**Quality of Anaesthesia**

Based on the patients complaints and the need for intraoperative ketamine ,the quality of anaesthesia was graded excellent, good,fair and poor. In CSE group, quality of anaesthesia was excellent in 72% and good in 28%. In epidural group, anaesthesia was excellent in 40%, good in 48% and fair in 12%. Therefore, in CSE group 72% had zero pain and in the epidural group only 40 % had zero pain. The difference in quality of anaesthesia is statistically significant.

DAVIES et al in their study in comparison of epidural and CSE for caesarean section reported zero pain scores in 63% of CSE patients and 44% in epidural patients.

RAWAL et al in their study on epidural versus CSE block for caesarean section concluded that CSE block gives better analgesia and more intense block than epidural anaesthesia for caesarean section.
Motor blockade Another important aspect of CSE is profound motor blockade. In CSE group 68% achieved complete relaxation (bromage grade I) while in the epidural group 36% achieved complete relaxation. The difference is statistically significant.

DAVIES et al in their study achieved complete relaxation in 56% patients of CSE group.

**Hypotension**

Considering the incidence ,severity and rate of onset of hypotension, epidural anaesthesia is superior to spinal anaesthesia . CSE retains this advantage of epidural anaesthesia and produces similar incidence of hypotension. This feature is important since intraoperative hypotension may lead onto fetal hypoxia.

In our study 7 patients (28%) developed hypotension in CSE group and 6 patients (24%) in epidural group which is not statistically significant. The onset of hypotension was gradual in both the groups.

DAVIES et al in their study concluded that the baseline systolic pressure , lowest systolic blood pressure and the maximum fall in the BP were similar for both epidural and CSE groups.

RAWAL et al in their study found that the incidence of hypotension was similar (33%) in both epidural and CSE group.

**Dose requirement**

The total local anaesthetic dose requirement is less in CSE and thus the possibility of systemic toxicity is also less. The total quantity of bupivacaine used in the CSE group was 55mg while it was 86mg in the epidural group. RAWAL et al in their study found that the requirement of bupivacaine was three times higher in patients receiving epidurals,when compared to CSE.

## CONCLUSION

In this study,the following conclusions were obtained

- The onset time of sensory blockade to T4 level in combined spinal epidural group was significantly faster than the epidural group with an average time again of 6.08 minutes.
- The quality of anaesthesia provided by combined spinal anaesthesia was better than that provided by epidural anaesthesia.
- Combined spinal epidural anaesthesia provided better muscle relaxation than epidural anaesthesia.
- Incidence of hypotension in combined spinal epidural anaesthesia was not statistically different from the incidence of hypotension in epidural anaesthesia.
- The total dose of bupivacaine used in combined spinal epidural anaesthesia was significantly lower than the dose used in epidural group.
- Thus , the combined spinal epidural anaesthesia offers rapid onset of intense neuraxial blockade, better muscle relaxation, better intraoperative analgesia and decrease in the total requirement of local anaesthetic dose when compared with epidural anaesthesia in caesarean section.

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