

## Effect of Combined Spinal Epidural Analgesia on the Progress of Labor and Outcome

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### Abstract

**Background:** The Combined Spinal Epidural (CSE) technique is used with increasing frequency in labor analgesia, because of its rapid onset of excellent analgesia. **Aim:** Aim of the present research was to study the effect of combined spinal epidural analgesia on the progress of labor and its outcome. **Material and Methods:** Present study was performed in the Department of Anesthesia and Gynecology at tertiary care institute of Gujarat. History taking and clinical examination was done. A total of 100 parturients receiving combined spinal epidural analgesia was compared with 100 parturient receiving the usual anesthetic used in our labor ward that is tramadol. Progress of labor was recorded in a partogram. The outcome of labor in the form of normal vaginal delivery, instrumental delivery or cesarean section was noted. The indications for cesarean section or instrumental delivery were noted. Neonatal outcome in the form of Apgar scores at 1 minute and 5 minutes and need for intensive care facilities was noted. **Results:** In cases in nulliparas the mean duration of first stage of labor was significantly reduced in the combined spinal epidural group (339.58 + 70.11 minutes) as compared to controls (400.01 + 109.12 minutes). ( $p$  - value 0.011). There was no significant difference in the duration of first stage of labor in multiparous parturients. 92.0% of parturients had a pain score of < 10 in the group receiving combined spinal epidural analgesia and the remaining 8.0% had scores between 11 and 40. In the control group none of the parturients had a pain score of < 70. **Conclusion:** Labor pain is associated with biochemical and physiological changes that may have adverse effects on both the mothers and the fetus. Combined spinal epidural analgesia is an excellent method of relieving labor pain.

**Keywords:** Cesarean section; Labor pain; Neonatal; Spinal epidural technique.

### How to cite this article:

Parth Shah, Hetal Sonavane. Effect of Combined Spinal Epidural Analgesia on the Progress of Labor and Outcome. Indian J Anesth Analg. 2019;6(6 Part - II):2157-2161.

### Introduction

Pain is the single most predominant sentinel of the beginning of labor. It is also the single most fearful thought regarding normal delivery amongst pregnant women. The control of pain should ideally form any integral part of labor management at any level.<sup>1,2</sup> An effective analgesia takes away the

disadvantages and helps for better maternal and fetal outcome. Relief of pain during labor endeavors to make the journey of labor safe and pleasant for both the mother and the baby.<sup>3</sup>

The epidural analgesia technique was used to maintain analgesia for parturients in the epidural analgesia group, which involved placing a thin catheter through a needle inserted into the epidural

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**Received on** 12.09.2019, **Accepted on** 23.10.2019

space. First, the investigator injected a test dose of 5 ml 1% lidocaine through it. If not adverse effects were observed 10 minutes after the test dose, the parturient then received a bolus injection of an initial dose of 8–10 ml mixed liquids of 0.075% ropivacaine and 0.2 µg/ml sufentanil citrate. We then connected the catheter with a Patient-controlled epidural Analgesia (PCA) pump, which provided patients the same local anesthetic and opioid mixture at 8–10 ml/h to optimize their pain relief until the delivery of neonates.

It was observed that parturients who received combined spinal epidurals form of analgesia had more rapid deliveries, although this may have resulted from the common practice of administering CSE analgesia to parturients who were multiparous or in more advanced stages of labor. In contrast, some authors have suggested that epidural analgesia may prolong labor in nulliparas, especially if administered early in labor, although the effect is probably modest.<sup>4</sup>

Over the centuries many methods have been tried for pain relief in labor. Of all, neuraxial blockade (epidural, spinal, combined spinal epidural, continuous spinal) provides the most effective analgesia. They are also the least depressant. The combined spinal epidural analgesia combines the benefits of spinal anesthetic including rapid onset and very low failure rates with the benefits of epidural analgesia like the use of catheter for continuous infusion. It causes minimal motor blockade allowing for maternal ambulation. It has also been associated with faster progress of labor. Hence, the aim of the present research was to study the effect of combined spinal epidural analgesia on the progress of labor and its outcome.

## Materials and Methods

Present study was performed in the Department of Anesthesia and Gynecology tertiary care institute of Gujarat. History taking and clinical examination was done. A total of 100 parturients receiving combined spinal epidural analgesia was compared with 100 parturient receiving the usual anesthetic used in our labor ward that is tramadol. Inclusion criteria include Singleton pregnancy, Presentation of vertex, Term gestation and Patient in active labor with cervical dilation 3–5 cm, with intact membranes and with satisfactory uterine contractions.

*Exclusion criteria* include presence of Malpresentation, Preterm labor, Presence of any fetal anomalies, Medical disorders complicating pregnancy, Obstetric complications,

Contraindications for regional analgesia. For parturients who met the above criteria, valid consent was taken. Parturients were randomly allocated to case and control group.

Spinal analgesia was given using sufentanyl 5 micrograms & bupivacaine 2.5 mg and later continued with epidural technique using sufentanil 0.3 micrograms and bupivacaine 0.125% till completion of labor. Parturients were pre-loaded with 1 liter or Ringer lactate. Parturients were put in left lateral position.

Under all aseptic precautions, combined spinal epidural analgesia was performed. In the midline approach (L2-L3 or L3-L4), lumbar epidural space was identified with an 18 G Touhy needle using loss of resistance to saline technique. After negative aspiration for blood and CSF, epidural catheter was threaded in through the Touhy needle and the needle was slowly withdrawn carefully. Spinal analgesia was instituted using a 25 G Whitacre needle by lateral approach in the same space as of the epidural.

On identification of the subarachnoid space, 1 cc of drug containing 0.5 cc of 0.5% bupivacaine hydrochloride (2.5 mg) and 0.5 cc of sufentanil containing 5 µg was injected after negative aspiration of the blood. The patient was turned supine immediately after subarachnoid block and the uterus given a left displacement using a wedge under the right buttock.

When the patient complained of pain, epidural top up was given with 11 ml of local anesthetic and opioid mixture containing 10 ml of 0.125% bupivacaine and 1 ml of sufentanil containing 3 µg. After first confirming proper placement of the epidural catheter by negative aspiration for blood and CSF. The maternal parameters were monitored at 0.5, 10, 15, 30 minutes and thereafter, every 30 minutes till the woman delivered. Fetal heart rate was continuously monitored using an electronic fetal monitor & any variations were noted. The control group received injection tramadol 100 mg intramuscularly.

Labor was managed by active management of labor for both cases & controls. In the first stage of labor ARM was done as a part of active management of labor protocol and to note the color of the liquor. Oxytocin was administered if contractions were not satisfactory. Third stage was managed by administration of an oxytic drug within one minute of delivery of the baby and delivery of the placenta by controlled cord traction.

Progress of labor was recorded in a partogram. The outcome of labor in the form of normal vaginal

delivery, instrumental delivery or cesarean section was noted. The indications for cesarean section or instrumental delivery were noted. Neonatal outcome in the form of Apgar scores at 1 minute and 5 minutes and need for intensive care facilities was noted. The patient was monitored for 2 hours following delivery and the epidural catheter was removed. The patients were followed up on the next day to enquire about their views on the procedure and their satisfaction. Patients were also enquired about any symptoms related to post-dural-puncture headache. Data was analyzed using appropriate statistical analysis.

**Statistical analysis**

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics included computation of percentages, means and standard deviations. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

**Results**

The present study was done to assess the effect of combined spinal epidural analgesia on the progress of labor and its outcome, to evaluate its efficacy as an analgesic technique and to study the maternal and fetal outcome. A total of 100 parturients in the control group were compared with 100 healthy parturients receiving combined spinal epidural analgesia. Maximum number of parturients in both groups (82% in cases and 74% in controls) belong to the age group of 20 to 30 years.

In cases in nulliparas the mean duration of first stage of labor was significantly reduced in the combined spinal epidural group (339.58 + 70.11 minutes) as compared to controls (400.01 + 109.12 minutes). (p value 0.011) There was no significant difference in the duration of first stage of labor in multiparous parturients, shows in (Table 1).

**Table 1:** Duration of first stage labor

Group	Parity	Mean	p - value
Nullipara	Case	339.58 + 70.11	0.011
	Control	400.01 + 109.12	
Multipara	Case	325.40 + 108.12	0.30
	Control	322.10 + 79.60	

There was no significant prolongation of the second stage of labor in cases as compared to controls in both the nulliparous and multiparous parturients, shows in (Table 2). Whereas, the duration of third stage of labor was similar for both cases and controls, (Table 3).

**Table 2:** Duration of second stage labor

Group	Parity	Mean	p - value
Nullipara	Case	31.97 + 13.11	0.30
	Control	28.19 + 11.93	
Multipara	Case	17.19 + 10.93	0.92
	Control	16.12 + 79.60	

**Table 3:** Duration of third stage labor

Group	Mean	p - value
Case	4.93 + 1.10	0.40
Control	5.20 + 2.92	

Ninty-two percent of parturients had a pain score of < 10 in the group receiving combined spinal epidural analgesia and the remaining 8.0% had scores between 11 and 40. In the control group none of the parturients had a pain score of < 70, shows in (Table 4).

**Table 4:** Visual analogue scale score in control and cases

Visual Analog scale score	Case	Control
< 10	92	None
11-20	4	None
21-30	2	None
31-40	2	None
70-80	None	38
81-90	None	62

**Discussion**

The effect of neuraxial analgesia in labor and obstetric outcomes has been studied extensively over the years. Among the endpoints studied were duration of first and second stages of labor, oxytocin augmentation, rate of instrumental and cesarean deliveries, maternal satisfaction and neonatal outcome.<sup>5-8</sup> As noted by ASA and ACOG, 'there is no other circumstance where it is considered acceptable for a person to experience severe pain amenable to safe intervention while under a physician's care.'<sup>9</sup> Unfortunately, labor represents one of few circumstances in which provision of effective analgesia is alleged to interfere with parturients and obstetricians' goal. Neuraxial block technique is currently the gold standard for labor analgesia.

In our study, the mean duration of first stage and active phase of first stage of labor was reduced by 60 minutes and 33 minutes respectively in cases as compared to controls in nulliparous parturients. This is statistically significant. No significant decrease in the duration of active phase of first stage of labor was seen in multiparous parturients. This is an agreement with other reports. Ji X *et al.*<sup>10</sup> reported a significant decrease ( $p < 0.05$ ) in the duration of first stage of labor and total duration of labor in the combined spinal epidural group as compared to controls. Previous studies comparing epidural analgesia with systemic opioids have shown inconsistent results. Epidural analgesia was either implicated in prolonging or showed no effect on the first stage of labor.<sup>11-15</sup> Interestingly, Tsen *et al.* demonstrated that CSE was associated with an increased cervical dilatation rate in nulliparous patients.<sup>16</sup> The authors postulated that the spinal analgesia of a CSE technique allowed, at least initially and potentially during the course of labor, for a reduction in local anesthetic dosage when compared with conventional epidural analgesia. Another postulate was that painful labor resulted in an increase in maternal adrenaline level, which may be tocolytic in itself. There is evidence to demonstrate that epidural analgesia may accelerate labor as the provision of effective analgesia reduces maternal catecholamines, and hence, minimizing its inhibitory effect on uterine contractility.<sup>17</sup> The use of CSE analgesia with its rapid onset and similar analgesic efficacy would thus be expected to have a similar effect on the duration of labor.

The mean duration of second stage of labor was not significantly prolonged in cases as compared to controls. This shows that combined spinal epidural analgesia does not interfere with the descent or internal rotation of the presenting part or the maternal expulsive forces.<sup>18</sup> In our study, no difference was found in the duration of third stage of labor and the amount of blood loss between cases and controls. Ji X *et al.* also reported no difference in the amount of blood loss between the combined spinal epidural group and the control group.<sup>19</sup>

More than 90% of the parturients reported excellent pain relief with combined spinal epidural analgesia. Collis RE *et al.*<sup>20</sup> reported complete satisfaction with analgesia and mobility by 95% of the mothers. The onset of analgesia was less than 5 minutes in all cases. Abouleish A *et al.*<sup>21</sup> also reported onset of analgesia in < 5 minutes in all cases. Norris MC *et al.*<sup>22</sup> reported mean onset of time to first pain free contraction as 7.8 + 4.3 minutes.

## Conclusion

Labor pain is associated with biochemical and physiological changes that may have adverse effects on both the mothers and the fetus. Combined spinal epidural analgesia is an excellent method of relieving labor pain.

*Conflict of Interest:* None

*Source of Support:* Nil

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