



Best Regional Analgesia in Labor: Does combined spinal-epidural analgesia have a more beneficial outcome of less adverse events, shorter duration of labor, and decrease risk of cesarean delivery, over epidural analgesia for labor?



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Abstract

Pain management is a major concern for women during labor. Unmanaged labor pain can lead to physiological and psychologically changes such as hyperventilation, uterine vasoconstriction, decrease in placental blood flow, shift of oxygen dissociation curve to the left, which all results in reduced oxygen transfer to fetus and fetal metabolic acidosis. Providing adequate analgesia can help prevent pain and decrease stress of the mother, and at the same time protect the baby from these complications caused by the stress of the mother. Regional anesthesia is used to accomplish this goal. Earlier studies have confirmed that regional analgesia provides better pain relief than opioid analgesia (Sprawson, 2017). Regional anesthesia is the most common method of analgesia for labor in the U.S. (Henos, 2020). Regional anesthesia consists of spinal and epidural analgesia. Despite the increased risks of CSE, it has a more beneficial outcome of less adverse effects, non-prolonged duration of labor, and decreased risk of cesarean delivery, than epidural analgesia for labor.

Introduction

Regional anesthesia consists of spinal and epidural analgesia. With an epidural analgesia, an indwelling catheter is placed into the epidural space a catheter is then threaded through the needle. The needle is removed, and the catheter is taped to your back, which allows the patient to receive a continuous infusion or multiple injections of local anesthetic. This procedure typically takes 10 minutes and then another 10-15 for the pain relief to take effect. Neuraxial opioids such as fentanyl and local anesthetics have a synergistic effect in epidurals (Rahmati, 2021). This synergistic effect is associated with improved maternal analgesia when used with low dose concentrations. Labor epidurals are associated with increased need for stimulation of contractions and hypotension. Spinal injections are injected into the intrathecal space with only a single injection and the patient will feel immediate pain relief which last for one to two hours. A spinal block is not the preferred method for labor because an epidural provides post operative pain management with the ability to re-dose. Complication of spinal anesthesia consists of infections such as meningitis or abscess formation, cauda equina syndrome, and peripheral nerve injury. A technique called a walking epidural, is a combination of spinal and epidural (CSE) analgesia. A combination of spinal-epidural (CSE) analgesia allows rapid pain relief from the spinal block and the continuous, long lasting pain relief from the epidural (Angelica, 2019). CSE has an increased risk of post-dural puncture headache, meningitis, and epidural catheter migration through the dural hole.

Each regional analgesia technique has its own increased risk factors for complications that can have a negative effect on the outcome of labor. Epidural is the current gold standard and popular use in labor for anesthesia analgesia. However, the epidural has a longer onset time than the spinal block and has been known to increase the chance of a cesarean section. This research explores whether combined spinal-epidural analgesia have a more beneficial outcome of less adverse events, shorter duration of labor, and decrease risk of cesarean delivery, over epidural analgesia for labor. Despite the increased risks of CSE, it has a more beneficial outcome of less adverse effects, non-prolonged duration of labor, and decreased risk of cesarean delivery, than epidural analgesia for labor.

Methods and Materials

Participants

Participants consisted of 80 nulliparous mothers with ASA (American Society of Anesthesiology) classification score of 1 or 2, with cervical dilation of 5-6cm, with preferred vaginal birth. This classification ensured that each participant was limited as healthy, or with mild systemic controlled diseases, and no high risk for complications. The mothers were divided into two groups with 40 mothers receiving the CSE technique, while the other 40 mothers received the continuous spinal technique for labor analgesia.

Materials

All supplies, drugs, and monitors for regional analgesia techniques were standardized. Equipment included disposable epidural supplies tray, Plastic Luer-Lok (3mL) and (20mL), 18-gauge epidural needle, 0.2 mcg filter, and fetal monitor. Materials used were not a variable in regional anesthesia outcome.

Procedure

The first group of women were administered a low concentration of bupivacaine (0.125% bupivacaine + fentanyl 2 µg/mL) via an epidural needle once they reached cervical dilation of 5-6cm. The second group were administered the combination of 2.5mcg sufentanil and 2.5mg bupivacaine via CSE one they reached cervical dilation of 5-6cm. Data was recorded for the following categories: pain before and after the blockade, degree of the blockade, total labor duration from the time of initiation of labor analgesia to delivery, full cervical dilation, mode of delivery, maternal cardiovascular and respiratory vitals, fetus complications, and any adverse events. The Adult Non-Verbal Pain Scale (NVPS) was used to assess pain during labor. The clinician scored the patient's pain via the categories of the patient's facial expressions, movements, guarding, vital signs, and baseline respiratory status.

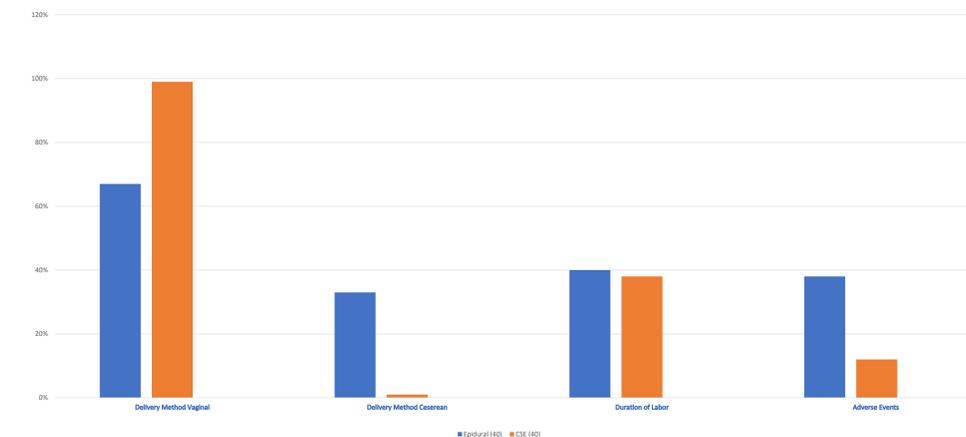
Results

The results confirmed and revealed that pain started out the same in both groups, but CSE provided a more rapid onset of analgesia with less drug dosage and had fewer cesarean deliveries than the epidural technique for analgesia. There were few (2%) adverse effects to maternal or fetus in cardiovascular or respiratory changes in the CSE group when compared to the epidural group (17%). The duration of labor was the same for epidural with low dosage of local anesthetic and CSE analgesia. The CSE group had a higher incidence of pruritus, lower sensory block, and motor weakness, which is important for pushing in vaginal birth.

Table 1. Shows the average NVPS Pain Score for each group of anesthetic of women in labor.

	NVPS Score Avg	CSE (40)	Epidural (40)
Pain before the Block	1-10	9	9
Pain 15 min After the Block	1-10	3	7
Pain after delivery	1-10	2	4

Combined Spinal Anesthesia (CSE) vs Epidural in Labor



Discussion & Conclusion

Labor is an emotional experience and involves both physiological and psychological mechanisms. Labor pain and stress may be unpleasant for the mother but can have deleterious effects on the fetus Effective management of labor pain plays a major role in the wellbeing and outcome of labor for mother and baby. It is imperative that the best regional analgesic is chosen for labor for the optimal outcome of the mother and the fetus (Avila, 2022). Even though, the low dose epidural and CSE both would not prolong duration of labor, CSE would have a more beneficial outcome of less adverse effects and decreased risk of cesarean delivery, than epidural analgesia for labor as expected. One of the limiting factors of the study may be the correct technique/experience used to administer both regional anesthetics to the groups. Incorrectly administered regional anesthesia can result in decreased analgesia effect or adverse effects. In future trials, one factor that should be added to the method is to have only experienced anesthetists administer the regional anesthetics. In summary, it is imperative that the best regional analgesic is chosen for labor for the optimal outcome of the mother and the fetus. In this study, we would see that CSE is the best regional anesthesia for the outcome of labor with less adverse effects, decreased cesarean delivery, and quicker pain relief. With more trials, CSE technique would continually prove to be the best regional analgesic and become the gold standard for labor analgesia.

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