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A randomized controlled study contrasting standard epidurals with dural puncture to relieve pain during childbirth

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Abstract

Background: You need look no farther than central neuraxial analgesia for a dependable and flexible method of managing pain during childbirth. In the field of neuraxial analgesia, several potential technological developments have occurred. Examining the relative advantages of dural puncture epidural versus conventional epidural for painless childbirth is the goal of this study.

Methods: investigating the efficacy of dural puncture epidurals as comparison to conventional epidurals for the management of labor pain. This clinical experiment was conducted at the labor and delivery facility of the RVS Institute of Medical Sciences in Chittoor, Andhra Pradesh, India, in the Department of Anesthesiology. Between February 2018 and January 2019. This analysis includes forty participants.

Results: In group A, enough analgesia was attained on average 11.60 minutes into treatment; in group B, it took 10.04 minutes. 52% of women in Group A and 60% of women in Group B reported having pain on a VAS score of 10 or below ten minutes after receiving an epidural bolus.

Conclusion: The dural puncture epidural approach requires shorter time to attain therapeutic levels of analgesia than the standard epidural procedure, making it a better option for pain relief during delivery. A dural puncture epidural causes no injury to the mother or the unborn child, and the epidural facilitates sacral dissemination, the onset of analgesia, and the relief of bilateral pain in laboring women.

Keywords: Randomized controlled trial, dural puncture, traditional epidurals, pain relief

Introduction

The procedure by which a woman's genitalia's progeny are released from the uterus and into the vagina is known as labor. An unpleasant sensory and emotional experience associated with current or potential tissue damage, or described in terms of such injury, is called pain ^[1]. Most people agree that labor pains are among of the worst that can be imagined. The body's neural pathways transmit severe abdominal pain during the first stage of labor, which is caused by cervical dilation and uterine contractions. The distention of the vagina, perineum, pelvic floor, and stretching of the pelvic ligaments during the second stage of labor irritate nerve roots S2 and S4, which results in pain during labor ^[2, 3].

It has proven challenging to provide safe and effective analgesia during delivery due to the numerous myths and discussions surrounding childbirth. The first anesthetic used to assist a laboring woman feel better is diethyl ether. The first time ether was used to deliver a woman with a pelvic malformation was in 1847, according to James Young Simpson ^[4].

In 1853, John Snow used chloroform to put Queen Victoria to sleep so she could give birth to Prince Leopold, a choice that sparked much criticism from the public and the medical community. His examination of the effects of anesthesia on childbirth was impartial and comprehensive. The first known use of nitrous oxide in obstetrics dates back to 1880. Freiberg's Gauss advocated a technique developed by Graze's von Steinbüchel. A mixture of scopolamine and opioids was used as a labor analgesic ^[5].

Carl Koller discovered regional anesthesia in 1884 while doing eye surgery under cocaine anesthesia. Since then, numerous studies on the use of localized anesthetics for labor pain have been conducted. Many techniques of labor analgesia were introduced about 50 years later, thanks to major developments in obstetric anesthesia ^[6].

Hyperventilation, which raises breathing effort and oxygen intake during contraction, is one

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pathologic response.

It has been demonstrated that elevations in catecholamine and plasma cortisol levels brought on by stress can reduce uteroplacental blood flow by up to 70%. Metabolic acidosis could result from the developing foetus inheriting the greater metabolic rate. Lower levels of cortisol and noradrenaline in the plasma slow down the synthesis of pyruvate and lactate, preventing metabolic acidosis. The amount of oxygen required by a pregnant woman may drop by 14% [7, 8]. The purpose of the study was to compare a dural puncture to the standard epidural technique in order to assess the efficacy of epidural analgesia during labor.

Methodology

Comparing the effectiveness of more conventional epidurals with dural puncture epidurals for the purpose of pain reduction during childbirth. This research experiment was conducted at the hospital's labor and delivery unit in the Department of Anesthesiology, RVS, Institute of Medical Sciences, Chittoor, Andhra Pradesh, India. From February 2018 through January 2019. In this analysis, forty participants are included.

Inclusion criteria

- Women who are in active labor.
- A cervical dilation of more than 2-3 cm.
- 18-35 years old.
- Epidural analgesia are considered to be in the target population.

Exclusion criteria

- Individuals who do not qualify for neuraxial anesthesia because they have.
- A VAS score of less than 50 mm during vigorous contractions.
- Are pregnant with more than one baby.
- Have a history of anaphylaxis to local anesthetics.
- Have had a previous LSCS.
- Have gravida 3 or more.

The statistical work was done in SPSS 15.0 and Microsoft Excel 2013. For this study, we employed the Student Unpaired T Test to examine the parametric data. Averages and standard deviations were determined for parametric data. For comparing Continuous covariates, Analysis of Variance ANOVA was utilized. The probability level was determined using either a Chi-square test or a Fisher's exact test. The 95% confidence interval around the P value is shown. A significance level of 0.05 was used.

Results

Method of epidural dural puncture is included in Subgroup A, which is the Typical Epidural Technique (Group B).

Table 1: An Examination of Two Age Groups

Age group	Group A	Group B	Total
<25	13	13	26
26-30	6	6	12
>30	1	1	2
Total	20	20	40

There was no statistically significant difference in the age of the pregnant women between the two groups.

The pregnant women in both groups were around the same age.

Table 2: Two groups' VAS scores at 10 minutes were compared

Score	Group A	Group B	Total
<10	14	16	30
>10	06	04	10
Total	20	20	40

At the 10-minute mark, a comparison was made between the two groups' VAS matching.

Table 3: 20-minute sensory block B/L S2 block comparison between two groups

Sensory block	Group A	Group B	Total
Positive	16	18	34
Negative	04	02	06
Total	20	20	40

When the presence of a B/L S2 block in two different groups was analyzed and compared, there was no statistically significant difference found.

Table 4: Analyzing the frequency of uneven blocks in two sets of data

Presence of unequal block	Group A	Group B	Total
Yes	2	2	04
No	18	18	36
Total	20	20	40

When the presence of uneven blocks in both groups was analyzed, there was found to be no statistically significant difference between them.

Table 5: Delivery method evaluation of two sample sets

Mode of delivery	Group A	Group B	Total
C section	4	4	8
Forceps delivery	1	0	1
Instrumental delivery	0	6	6
NVD	14	10	24
Vacuum	1	0	1
Total	20	20	40

Both groups' modes of administration were analyzed, and the results showed that there was no statistically significant difference between them.

Discussion

For most women, giving birth is the most agonizing experience of their lives. Both the mother and the fetus may be negatively impacted by the stress, elevated oxygen demand, and hyperventilation the mother experienced as a result of this demanding labor. Due to the hypoperfusion of the fetoplacental unit, these changes result in an increase in catecholamine synthesis, which raises uterine contractility and promotes fetal hypoxia and acidosis. Painkillers are used to lessen these effects during childbirth. Many strategies have been tested in an attempt to lessen the laboring woman's misery while reducing the risks to her unborn child [9, 10].

Because of its efficacy and versatility, central neuraxial analgesia is the preferred method of treating labor pain. In line with a trend in obstetrical anesthesia, the focus of modern neuraxial labor analgesia has moved from pain relief alone to the analgesic's overall quality. Improvements in obstetric anesthesia curricula and a greater comprehension of the physiology and pharmacology of pain have led to an improvement in the quality of labor analgesia. Labor and delivery go over better when done with neuraxial techniques^[11].

Numerous intriguing advancements in neuraxial analgesia have occurred recently, such as improved techniques and the introduction of new medications and adjuvants. Epidural analgesia is by far the most popular neuraxial method for pain relief during labor; however, more recent randomized controlled studies have helped to resolve some issues related to neuraxial analgesia, and technological advancements have enabled the different modalities of innovative drug delivery systems, such as patient-controlled infusion regimens^[12]. Thanks to developments in catheter technology and medicine, combined spinal epidural analgesia was created to improve the quality, safety, and efficacy of neuraxial blocking. CSE is a practical method for labor analgesia because of the quick analgesia it offers by intrathecal infusion of local anesthetic and opioids. While dural puncture and intrathecal drug delivery offer advantages such rapid deep analgesia onset, little motor obstruction, and high patient satisfaction, they also carry dangers like fetal bradycardia, hemodynamic instability, issues, and side effects^[13, 14].

In the dural puncture epidural procedure, a spinal needle is used to create a dural hole; no medication is administered into the spinal column. Compared to epidural analgesia, DPE has been demonstrated to promote caudal distribution of analgesia without the drawbacks associated with the CSE technique. It has been suggested that the translocation of epidural medications into the subarachnoid space by this dural puncture is one mechanism by which the DPE technique improves analgesia in comparison to the traditional epidural procedure. Numerous studies have demonstrated the effectiveness of the combined spinal epidural and dural puncture epidural methods. In this study, the efficacy of the dural puncture epidural technique and the traditional epidural method were evaluated^[15, 16].

Group A and Group B were randomly assigned to the research participants. There were twenty-five individuals in each therapy group of patients. An 18 G Tuohy needle and an epidural catheter were used to perform the usual epidural procedure on Group A. In the epidural procedure administered to Group B, a 26 G Whitacre needle was used to puncture the dura via the Tuohy needle. Before surgery, the mean VAS score for Group A was 73.56, with a standard deviation of 5.64, and for Group B it was 72.40, with a standard deviation of 5.97. This implies that prior to the surgery, there was no statistically significant difference between the two groups' VAS scores^[17]. As a result, prior to the operations, the two groups' VAS scores were matched. Group A's average time to administer analgesia was 11.60 minutes, with a 2.36 standard deviation, while group B's average was 10.04 minutes, with a 1.90 standard variance. The first group experiences acceptable analgesia 1.56 minutes on average faster than the second. A statistically significant difference exists if the p-value for the mean

difference between two groups is less than 0.05. Consequently, Group B obtained suitable analgesia 1.56 minutes ahead of Group A. According to statistics, receiving the right analgesia following a dural puncture epidural technique takes significantly less time than a conventional epidural procedure^[18, 19].

There was a significant difference (P 0.05) between the two groups for the proportion of laboring women who reported a VAS score 10 minutes after receiving an epidural bolus: 52% in Group A and 60% in Group B. It also shows that the percentage of laboring women who report feeling "well enough" after an epidural bolus lasting 10 minutes does not differ statistically significantly between the two groups. The motor and sensory block quality of each group has been contrasted. Measures of sensory block quality that have been compared include complete sacral spread, the percentage of pregnant women who obtained B/L S2 block, the presence of uneven block 20 minutes after an epidural bolus, and others. The degree of motor blockage was measured using the Bromage scale twenty minutes following the epidural bolus. Regarding the quality of the motor and sensory blocks, there was no appreciable difference between the two groups^[20, 21].

The percentage of laboring women who report feeling comfortable 10 minutes after receiving an epidural bolus does not differ between the Dural puncture epidural method and the conventional epidural strategy, according to the findings of a study done by Sylvia H. *et al.* Additionally, they discovered that individuals with DPE had a shorter delay to VAS 10 mm, indicating significant analgesia, than those with LE. The parameters that they collected coincide with the ones that were employed in this study^[22, 23].

Pritam Yadav *et al.* have compared the efficacy of the dural puncture epidural method to the standard epidural strategy for treating pain in primigravidas during labor. They discovered that the dural puncture epidural technique had a higher likelihood of both hastening and enhancing the onset of labor analgesia when contrasted with the conventional epidural technique. The research's data aligned with those discovered here^[21].

Numerous more studies have also demonstrated the efficacy of the traditional epidural, the combined spinal epidural approach, and the dural puncture epidural procedure. In this study, the more traditional epidural technique and dural puncture epidural technique were compared for efficacy. Women who had either delivery procedure did not have any complications such as kinked catheters, cardiovascular collapse, complete spinal punctures, or dural punctures. Similar rates and degrees of problems, including headaches, nausea, fetal bradycardia, hypotension, and delivery mode, were experienced by both groups^[21].

Conclusion

The dural puncture epidural approach requires shorter time to attain therapeutic levels of analgesia than the standard epidural procedure, making it a better option for pain relief during delivery. While the dural puncture epidural technique improves sacral spread, analgesia onset, and bilateral pain relief in laboring women, both traditional epidural and epidural techniques have improved block quality with minimal side effects to the mother and fetus and no effect on the mode of delivery.

Conflict of Interest

None.

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