

A Comparative Research between Epidural Analgesia versus Dural Puncture Epidural Analgesia in Labor Analgesia**Dasupuram Gunapriya¹, Kakileti Vani Subrahmaneyswari², Arunakumari Barla³, Dutta Akhila⁴**¹Assistant Professor, Department of Anaesthesiology, Rangaraya Medical College, Kakinada.²Assistant Professor, Department of Anaesthesiology, Rangaraya Medical College, Kakinada.³Assistant Professor, Department of Anaesthesiology, Rangaraya Medical College, Kakinada.⁴Resident, Rangaraya Medical College, Kakinada

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Corresponding Author: Dutta Akhila

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Abstract**Introduction:** Epidural analgesia (EA) is the gold standard technique; inadequate sacral spread and prolonged labor are the limitations. With this background, a study was conducted to compare the EA with dural puncture EA (DPEA) and 0.125% bupivacaine and fentanyl 1mcg/ml were used.**Methods:** It was a prospective randomized control study conducted in Andhra Medical College, Visakhapatnam. Pregnant women aged ≥ 18 years, ASA grade I and II, singleton study with vertex presentation with cervical dilatation of 3 – 5 cm and without any labor analgesia contraindication were included in this research. Non cooperative women, ASA grade III & IV were not considered. The study members were divided into EA and DPEA groups randomly. VAS score was used for pain analysis. Time of onset of adequate analgesia was taken as the time between initial injections until the VAS score became 3. Fetomaternal hemodynamics were monitored regularly. The labor progress was recorded by serial per vaginal examinations and mode of delivery and complications such as hypotension, pruritis, motor blockade, nausea, and vomiting were recorded. Modified Bromage scale was used for motor blockade analysis. APGAR score at 1 min and 5 min was used for neonatal outcome. Unpaired T test, chi square test were used, P value < 0.05 was considered significant.**Results:** Total 80 members were included, 40 in each group. Statistically there was no significant difference in the mean duration of labor, respectively. Statistically there was significant difference in mean time for onset of adequate anaesthesia and mean duration, respectively. In both the group majority underwent vaginal delivery, no statistical significance. All the neonates in both groups had > 7 APGAR score, statistically not significant.**Conclusion:** The DPEA technique stands as a secure alternative to EA. The study could be enhanced through the incorporation of noninvasive imaging techniques to visualize the drug spread.**Keywords:** Labor, Study, Technique, Pain.

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Introduction

Labor is an enduring event, involves a complex psychological and physiological response, cause various metabolic as well as physiological changes. [1] Various medicaments available to reduce pain during labor. The neuraxial approach stands out as the most effective among all labor analgesia techniques, ensuring both maternal satisfaction and fetomaternal safety.

Epidural analgesia (EA) is the gold standard technique; [2] however, inadequate sacral spread, more instrumental usage during the vaginal delivery rates and prolonged labor are the limitations. [2] To overcome these limitations, combinations of opioids and low concentrated local

anesthetic were practiced, preserves maternal motor function. [3] This combined spinal epidural technique is chosen over EA in which the local anesthetic drugs are administered into intrathecal space and catheter placement into the epidural space, has added advantages. [4]

With this background, a study was conducted to compare the EA with dural puncture EA (DPEA) and 0.125% bupivacaine and fentanyl 1mcg/ml were used.

Methods

It was a prospective randomized control study conducted in the department of Anaesthesiology, Andhra Medical College, Visakhapatnam. Study

was conducted between January 2019 to October 2020. Study protocol was approved by the institutional scientific and ethics committee. Written Informed consent from all the participants was taken.

Pregnant women aged ≥ 18 years, ASA grade I and II, singleton pregnancy with vertex presentation with cervical dilatation of 3 – 5 cm and without any labor analgesia contraindication were included in this research. Non cooperative women, ASA grade III & IV, those on anticoagulant therapy, those with preterm gestation, vertebral column deformity, cephalopelvic disproportion, BMI ≥ 35 were not considered in this research.

After recruiting the members, study was explained and the doubts were clarified. The detailed clinical history was taken and all the findings were recorded in the study proforma. As part of institutional protocol, complete physical examination was carried, routine blood parameters analysed and 18g IV cannula was applied. The study members were divided in to 2 groups, EA and DPEA, randomly. The techniques were applied as per the standard guidelines. [5, 6]

Maternal blood pressure (BP), heart rate, respiratory rate, oxygen saturation were noted ones in 5 minutes in the first 30 minutes and ones in 15 minutes in the next 60 minutes and for every 30 minutes for the next 120 minutes or baby delivery, whichever is earlier. VAS score was used for pain

analysis. [7] Time of onset of adequate was taken as the time between initial injections until the VAS score became 3. Fetomaternal hemodynamics were monitored regularly. Maternal hypotension was considered when there was a fall in 20% systolic BP, treated by giving IV fluid boluses and if necessary IV Mephentermine was given. The labor progress was recorded by serial per vaginal examinations and mode of delivery and complications such as hypotension, pruritis, motor blockade, nausea, and vomiting were recorded. Modified Bromage scale was used for motor blockade analysis and score $< +4$ was considered. [8] APGAR score at 1 min and 5 min was used for neonatal outcome. [9] Two hours after the delivery, the catheter was removed and a scale with 1, 2, 3 and 4 grades were used to find the maternal satisfaction during labor; the satisfaction rates were poor, fair, good and excellent, respectively.

Statistical Analysis: Data was analysed using SPSS version 21. Non-categorical data was presented in mean \pm SD and analysed by unpaired T test. Chi square test was used for categorical data. P value < 0.05 was considered significant.

Results:

Total 80 members were included, 40 (100%) in each group. In DPEA group, 75% (30) were in 18 – 24 years group and in EA group 27% (11) were in 25 – 30 years group; statistically there was no significant difference (Table 1).

Table 1: Age wise distribution of the study participants; n (%)

| Age | DPEA | EA | Total |
|----------------------|------------------------------------------|-----------|------------|
| 18 – 24 | 30 (75) | 29 (72.5) | 59 (73.75) |
| 25 – 30 | 10 (25) | 11 (27) | 21 (26.25) |
| Total | 40 (100) | 40 (100) | 80 (100) |
| Statistical analysis | Ψ^2 value = 0.8421; P value = 0.597 | | |
| | No statistical significance | | |

Statistically there was no significant difference in the mean height, weight, and mean duration of labor, respectively. The mean time for onset of adequate anaesthesia was 9 ± 1.34 and 16.38 ± 1.7 mins, respectively. Statistically there was significant difference in mean time for onset of adequate anaesthesia and mean duration, respectively. In both the group majority underwent

vaginal delivery, 90% (36) and 92.5% (37), respectively, no statistical significance. All the neonates in both groups had > 7 APGAR score at the end of the 1 and 5 minutes after delivery, statistically not significant. In DPEA group, 29 members expressed excellent, 9 expressed good whereas it was 30, 8 in EA group; no statistical significance (Table 2).

Table 2: Maternal satisfaction scores between groups among the study participants; n (%)

| Satisfaction | DPEA | EA | Total |
|----------------------|-----------------------------|----------|------------|
| Excellent | 29 (72.5) | 30 (75) | 59 (73.75) |
| Good | 9 (22.5) | 8 (20) | 17 (21.25) |
| Fair | 2 (5) | 2 (5) | 4 (5) |
| Poor | 0 | 0 | 0 |
| Total | 40 (100) | 40 (100) | 80 (100) |
| Statistical analysis | P value = 0.821 | | |
| | No statistical significance | | |

Discussion

An optimal neuraxial anesthesia technique should offer efficient pain relief while minimizing adverse effects for both the mother and fetus. EA may, at times, lead to delayed onset and insufficient distribution of anesthesia to the sacral region. Additionally, it can cause unilateral or patchy sensory blockade, motor impairment, and potential failure of the epidural catheter. [9]

The mean time for onset of adequate anaesthesia in this study was 9 ± 1.34 min and 16.38 ± 1.7 mins, respectively in EA and DPEA; statistically there was no significant difference. These findings were similar to those observed in a study conducted by Sylvia H. Wilson, Bethany et al. [10]; here comparison was between 0.125% Bupivacaine Bolus with 50mcg fentanyl noted that DPEA had shorter median times to adequate analgesia 8 minutes vs 10 minutes. Likewise, a study conducted by Yadav P et al. [11] examined whether DPEA enhances the onset, adequacy of analgesia, and duration of labor analgesia compared to the conventional EA using 10 ml of 0.2% Ropivacaine with 20 mcg of fentanyl (2 mcg/ml) and the investigators indicated that both methods of labor analgesia are effective.

All the neonates in both groups had > 7 APGAR score at the end of the 1 and 5 minutes after delivery, statistically not significant. In DPEA group, 29 members expressed excellent, 9 expressed good whereas it was 30, 8 in EA group; no statistical significance (Table 2). Similar to these study findings, Hon Sen et al. [12] also reported high APGAR scores.

The commencement of anesthesia through a DPEA technique led to a quicker onset and enhanced block quality during epidural extension in comparison to initiation with a standard epidural technique. [13] Additional research is required to validate these observations, particularly in the context of intrapartum cesarean delivery.

Conclusion

The DPEA technique stands as a secure alternative to EA, utilizing 0.125% bupivacaine with fentanyl 1 mcg/ml. This approach offers swift onset of sufficient analgesia, prolonged analgesic duration, reduced need for additional analgesics, high maternal satisfaction, and positive fetomaternal outcomes. The study could be enhanced through the incorporation of noninvasive imaging techniques to visualize the drug spread.

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