Journal of Cardiovascular Disease Research
ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

EFFECT OF ADDITION OF DEXMEDETOMIDINE 0.5 mcg/ml WITH 0.2% ROPIVACAINE AND 0.2% ROPIVACAINE ALONE IN EPIDURAL LABOUR ANALGESIA : A RANDOMIZED COMPARATIVE STUDY

Dr. Priyanka Hansda[1*], Dr. Mrituanjay Kumar[2], Dr.C.D.Ram[3], Dr. (Prof.)K.Biswas[4]

[1*]Assistant Professor, Department of Anaesthesia, Shaheed Nirmal Mahto Medical College (SNMMC), Dhanbad, Jharkhand.

[2]Assistant Professor, Department of Anaesthesia, Shaheed Nirmal Mahto Medical College (SNMMC), Dhanbad, Jharkhand.

[3]Assistant Professor, Department of Anaesthesia, Shaheed Nirmal Mahto Medical College (SNMMC), Dhanbad, Jharkhand.

[4]Professor, Department of Anaesthesia, Shaheed Nirmal Mahto Medical College (SNMMC), Dhanbad, Jharkhand.

Corresponding Author: Dr. Priyanka Hansda
[2]Assistant Professor, Department of Anaesthesia, Shaheed Nirmal Mahto Medical College (SNMMC), Dhanbad, Jharkhand.
E Mail: priyanka.hansda264@gmail.com

Abstract

Introduction: Epidural labor analgesia is the most common technique for labor pain management. Ropivacaine has been used commonly for epidural labor analgesia, because of less motor block and stable hemodynamics. Dexmedetomidine, an α_2-agonist for α_2-adrenergic receptors, possesses sedative and analgesic properties without respiratory depressant effect and enhances their effects without increasing the incidence of side effects when added to local anesthetic agents.

Materials and Methods: The sample size obtained was 60 for each group. Reference article for sample size calculation is made based on the study conducted by Zhao Y et al Total of 60 parturients of age group 20-35 yrs., Heights in cm: >150 cms, full term singleton vertex presentation, previous normal vaginal delivery, consented for the study, Primigravida and multigravida of physical status ASA grade I&II, foetus having normal heart rate pattern before induction of Epidural, Cervical dilatation of 3-5 cms were included in group and divided in 2 group using computer generated randomization technique. Group RS received 0.2% ropivacaine epidurally as bolus dose of 8 mL followed by intermittent top ups as and when required and Group RD received 0.2% ropivacaine with 0.5 mcg/mL of dexmedetomidine epidurally 8 mL as bolus dose followed by intermittent top ups as and when required.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

Results: The highest sensory level in both groups was observed at T6 (p=0.190). Total drug requirement in both groups was calculated. All the subjects 60 (100%) in both the groups required first and second dose of bolus. While third bolus was required only for 60 (83.3%) subjects of RD groups compared to 60 (100%) of RS group. Fourth bolus was required only for 34 (56.7%) subjects of RD groups compared to 50 (83.3%) of RS group. Fifth bolus was required only for 2 (3.3%) subjects of RD groups compared to 12 (20.0%) of RS group. There was statistically significant difference between the two groups for third (p=0.020), fourth (p=0.024) and fifth bolus (p=0.044). The total drug requirement for RS group (32.27+- 4.91) was significantly higher than the RD group (27.46 +or- 6.53), p value of 0.021.

Conclusion: Epidural labour analgesia is considered to be a gold standard for pain management during labour, when ropivacaine along with dexmedetomidine is used. Many studies have been conducted to prove the use of dexmedetomidine in obstetric anesthesia in optimal doses. This wonder drug provides excellent maternal satisfaction and good progress of labour with minimal side effects to mother and foetus.

Key Words: Epidural labor analgesia, Dexmedetomidine, ropivacaine.

INTRODUCTION

Epidural labor analgesia is the most common technique for labor pain management. Ropivacaine has been used commonly for epidural labor analgesia, because of less motor block and stable hemodynamics. Dexmedetomidine, an α_2-agonist for α_2-adrenergic receptors, possesses sedative and analgesic properties without respiratory depressant effect and enhances their effects without increasing the incidence of side effects when added to local anesthetic agents. At present, dexmedetomidine, although approved for intravenous use only, has been successfully used in neuraxial block and epidural block in experimental and clinical studies with less side effects.

The contemporary goal of providing maternal labour analgesia is the relief of the suffering and the pain of labour and delivery, while minimizing effects on maternal safety, awareness, motor functions, progress of labour and foetal well-being. Regional anaesthetic techniques are especially well suited for achieving this goal. Over the past ten years there have been remarkable changes in the field of obstetric anaesthesia. Not only newer techniques such as combined spinal-epidural, continuous epidural infusions, walking epidurals and patient controlled epidural analgesia (PCEA) are now available, Epidural analgesia for labour was maintained either by intermittent boluses or by continuous infusion of the local anaesthetics. Each technique had its own advantages and disadvantages though the purpose remains the same: a painless labour and a healthy neonate.

We wanted to compare efficacy, safety, quality of analgesia, total drug requirement, effect on the course and duration of labour, neonatal outcome, maternal satisfaction and adverse events if any,

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

of ropivacaine 0.2% + 0.5 mcg/mL of dexmedetomidine with that of 0.2% of ropivacaine alone, for epidural labour analgesia.

MATERIALS AND METHODS

Study design: A prospective, comparative study.

Study location: Department of Anaesthesia, Shaheed Nirmal Mahto Medical College (SNMMC), Dhanbad, Jharkhand.

Study duration: January 2021 to December 2021.

Sample size: 120 patients.

The sample size obtained was 60 for each group. Reference article for sample size calculation is made based on the study conducted by Zhao Y et al Total of 60 parturients of age group 20-35 yrs., Heights in cm: >150 cms, full term singleton vertex presentation, previous normal vaginal delivery, consented for the study, Primigravida and multigravida of physical status ASA grade I&II, foetus having normal heart rate pattern before induction of Epidural, Cervical dilatation of 3-5 cms were included in group and divided in 2 group using computer generated randomization technique. Group RS received 0.2% ropivacaine epidurally as bolus dose of 8 mL followed by intermittent top ups as and when required and Group RD received 0.2% ropivacaine with 0.5 mcg/mL of dexmedetomidine epidurally 8 mL as bolus dose followed by intermittent top ups as and when required.

A complete history of each patient was obtained, and clinical examination was done. Routine investigations along with coagulation profile was obtained and noted. All baseline parameters like Heart Rate, Blood Pressure, ECG, SpO2, Foetal Heart Rate were recorded. Lignocaine sensitivity test was done. Intravenous access was achieved with 18G intravenous cannula. Preloading was done with ringer lactate solution 10 mL/Kg. With Patient in sitting position, her back was cleaned, painted and draped, to achieve and maintain asepsis. A 2mL Lignocaine 2% of solution was injected locally in L3-L4 space into the skin and subcutaneous tissue. An 18G epidural needle was advanced up to interspinous ligament. A 10cc loss of resistance syringe with 2mL of air in it was attached at the hub of the needle after removing the stylet. The needle was then advanced slowly until loss of resistance felt. Epidural space was confirmed with hanging drop technique. An 18G epidural catheter was threaded through the needle and secured in the epidural space with 5 cms of length into the epidural space. Following this, needle was removed, and catheter strapped firmLy to the back of the patient with an adhesive tape. Distal end of the catheter was covered with a sterile gauge piece and a cover. During this whole procedure care was taken not to advance either the needle or the catheter during contractions as chance of piercing the dura or a blood vessel is maximum during contractions.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

Statistical Analysis: Statistical analysis was done using descriptive and analytical statistics. The chi square test was used to check differences in proportions. Continuous variables are expressed as mean and standard deviation. The normality of continuous data was analysed by the Shapiro-Wilk test. As the data followed normal distribution, parametric test (t-test) was used to analyse the data. The independent sample t- test was used to check mean difference. The level of significance was kept at $p<0.005$.

RESULTS

The highest sensory level in both groups was observed at T6 (p=0.190). Total drug requirement in both groups was calculated. All the subjects 60 (100%) in both the groups required first and second dose of bolus. While third bolus was required only for 60 (83.3%) subjects of RD groups compared to 60 (100%) of RS group. Fourth bolus was required only for 34 (56.7%) subjects of RD groups compared to 50 (83.3%) of RS group. Fifth bolus was required only for 2 (3.3%) subjects of RD groups compared to 12 (20.0%) of RS group. There was statistically significant difference between the two groups for third (p=0.020), fourth (p=0.024) and fifth bolus (p=0.044). The total drug requirement for RS group (32.27±4.91) was significantly higher than the RD group (27.46 +or- 6.53), p value of 0.021.

APGAR	Group RS (n=60)		Group RD (n=60)		P-Value
	Mean	SD	Mean	SD	
1 min	8.00	0.35	8.10	0.36	1.00
5 min	8.90	0.31	8.96	0.18	0.308

Table 1: APGAR at Baseline and 5 Mins of the Study Population

Variable	Group RS (n=60)		Group RD (n=60)		P-Value
	Mean	SD	Mean	SD	
Stage I	163.82	20.60	158.13	15.26	0.293
Stage II	35.90	8.61	37.21	8.70	0.566
Total	199.38	24.60	180.75	21.10	0.003

Table 2: Duration of Labor (Mins) among the Study Population

Variable	Group RS (n=60)	Group RD (n=60)
Age	25.9	24.64
Weight	55.92	78.75
Height	105.70	84.53

Table 3: Age (Years), Weight (kg) and Height (cm) of the Study Population

Variable	Group RS (n=60)	Group RD (n=60)
Total drug requirement	30.93	27.46

Table 4: Comparison of Mean Drug Requirement between the Two Groups

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

Maternal Satisfaction	Group RS (n=60)	Group RD (n=60)
Excellent	26.70	53.30
Good	73.30	46.70

Table 5: Comparison of Maternal Satisfaction between the Two Groups

DISCUSSION

Ropivacaine has been introduced into obstetric anaesthetic practise with the claim of causing less motor blockade. Previous research demonstrated that when used as an adjuvant for epidural analgesia, dexmedetomidine could prolong the duration of local anaesthetics. In our study, we discovered that when combined with ropivacaine for labour analgesia, dexmedetomidine could reduce total drug requirement without increasing side effects.[6]

The current study compared the quality of analgesia, total drug requirement, effects on the course and duration of labour, neonatal outcome (APGAR Score), adverse events, if any, and maternal satisfaction while using 0.2% ropivacaine and 0.2% ropivacaine plus 0.5 mcg/ml dexmedetomidine as intermittent epidural bolus doses.[7]

S. Fyneface-Ogan et al. investigated the role of dexmedetomidine as an adjuvant with intrathecal bupivacaine versus fentanyl in bupivacaine in labour outcome. In both groups, there was no significant difference in APGAR score or umbilical venous blood pH, and foetal heart rates and maternal blood pressure remained unchanged after drug injection. In our study, we observed similar trends in foetal heart rate.[8]

In their in vivo study, Yu et al evaluated the role of dexmedetomidine in caesarean section under general anaesthesia and its effects on the foetus, placental transfer, and foetal metabolism to provide a reference for the clinical use of dexmedetomidine.[9] Because dexmedetomidine is retained in the placenta and thus only a small amount is transferable, the rate of placental transfer was 0.76. The most significant findings in our study were lower total drug requirements in the ropivacaine with dexmedetomidine group compared to the plain ropivacaine group. Tao Zang et al. concluded that in terms of analgesic effect and low drug requirement, dexmedetomidine outperforms sufentanil. Zang li et al looked at the effective median concentration EC50 of epidural ropivacaine for labour analgesia when combined with 0.5 mcg/mL dexmedetomidine.[10]

CONCLUSION

Epidural labour analgesia is considered to be a gold standard for pain management during labour, when ropivacaine along with dexmedetomidine is used. Many studies have been conducted to prove the use of dexmedetomidine in obstetric anesthesia in optimal doses. This wonder drug provides excellent maternal satisfaction and good progress of labour with minimal side effects to mother and foetus.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

REFERENCES

1. Khan MA, Yasin B, Zaffar M, et al. Epidural analgesia. The Professional Medical Journal 2008;15(01):101-3.
2. Sia AT, Kwek K, Yeo GS. The in vitro effects of clonidine and dexmedetomidine on human myometrium. Int J Obstet Anesth 2005;14(2):104-7.
3. Fernando R, Bonello E, Gill P, et al. Neonatal welfare and placental transfer of fentanyl and bupivacaine during ambulatory combined spinal epidural analgesia for labour. Anaesthesia 1997;52(6):517-24.
4. Anim-Somuah M, Smyth RM, Jones L. Epidural versus non-epidural or no analgesia in labour. Cochrane Database Sys Rev 2011;(12): CD000331.
5. Mousa WF, Al-Metwalli R, Mostafa M. Epidural analgesia during labor vs no analgesia: a comparative study. Saudi J Anaesth 2012;6(1):36-40.
6. Jun W, Zhengzhuang A, Li O. Analgesic efficacy of dexmedetomidine used for epidural anesthesia on labor analgesia. Biomedical Research 2018;29(3):426-30.
7. Kiran S, Jinjil K, Tandon U, et al. Evaluation of dexmedetomidine and fentanyl as additives to ropivacaine for epidural anesthesia and postoperative analgesia. J Anaesthesiol Clin Pharmacol 2018;34(1):41- 5.
8. Selim MF, Elnabtity AMA, Hasan AMA. Comparative evaluation of epidural bupivacaine–dexmedetomidine and bupivacaine–fentanyl on Doppler velocimetry of uterine and umbilical arteries during labor. J Prenat Med 2012;6(3):47-54.
9. Cousins MJ, Veering BT. Update on anatomy, physiology and pharmacology of epidural neural blockade. Pain Management and Anesthesiology 1998:277-94. [24] Naaz S, Ozair E. Dexmedetomidine in current anaesthesia practice-a review. J Clin Diagn Res 2014;8(10):GE01-4.
10. Wangping Z, Ming R. Optimal dose of epidural dexmedetomidine added to ropivacaine for epidural labor analgesia: a pilot study. Evid Based Complement Alternat Med 2017;2017;1-4.