Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

STUDY COMPARING DIFFERENT CONCENTRATIONS OF ROPIVACAINE 0.125% VS 0.2%, WHEN GIVEN WITH FENTANYL 2 MCG/ML FOR EPIDURAL LABOUR ANALGESIA

Dr.Pallavi S R[1], Dr. Sanjay R[2], Dr.Upasana Tiwari[3], Dr.Harshitha M S[4*]

[1, 2,3,4*]Senior Resident, Department of Anaesthesiology, Shimoga Institute of Medical Sciences, Shimoga.

Corresponding Author: Dr.Harshitha M S

Abstract

Introduction: Analgesic adequacy during labor along with the avoidance of adverse effects is vital for obstetric conditions. Painful labor can have negative impacts on maternal and fetal physiology. In neuraxial analgesia, the analgesics are injected or infused in close proximity to the spinal cord by using catheter, usually either intrathecally into the cerebrospinal fluid or epidurally into the fatty tissues around the dura, to block nerves that transmits pain signals to the brain. Much lower pain scores with least adverse effects on maternal cardiovascular or pulmonary functions and fetal physiology with higher maternal satisfaction are reported with the use of neuraxial analgesic techniques during labor and delivery.

Materials and Methods: A total of 100 parturients in active labor were randomly assigned to two groups of 50 each, to receive an epidural injection of 10 ml ropivacaine 0.125% with fentanyl (2 mcg/ml) in group R1 and 10 ml of ropivacaine 0.2% with fentanyl (2 mcg/ml) in group R2 as initial bolus dose. Same dose regimen was used as subsequent top-up dose on patients demand for pain relief. The duration and quality of analgesia, motor block, top-up doses required, consumption of ropivacaine and fentanyl and foetomaternal out come in both groups were compared.

Results: Effective labor analgesia with no motor blockade was observed in both groups. The mean age in group R1 was 22.7 ± 1.70 years which was lesser when compared to group R2 (23.5 ± 1.15 years). Height, weight and parity did not show much variation in both groups. Duration of analgesia after initial bolus dose was also significantly longer in group R2 (126.40 ± 10.41 min) than in group R1 (73.17± 27.50 min).

Conclusion: We find that both ropivacaine (0.2% and 0.125%) and fentanyl concentrations were efficacious in generating epidural labour analgesia. 0.2% concentration was found to be superior in terms of duration, breakthrough pain, requiring fewer top-ups, and opioid use. For labour analgesia, our study recommends 10 ml of 0.2% ropivacaine plus 2 mcg/ml fentanyl over 0.125% ropivacaine.

Key Words: Analgesic adequacy, maternal cardiovascular, pulmonary functions, cerebrospinal fluid.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

INTRODUCTION

Myths and controversies are always attached with pain relief during labor. Epidural local anaesthetics and opioids are used with local analgesia during labor for pain relief since long time.[1]

Analgesic adequacy during labor along with the avoidance of adverse effects is vital for obstetric conditions. Painful labor can have negative impacts on maternal and fetal physiology.[2] In neuraxial analgesia, the analgesics are injected or infused in close proximity to the spinal cord by using catheter, usually either intrathecally into the cerebrospinal fluid or epidurally into the fatty tissues around the dura, to block nerves that transmits pain signals to the brain. Much lower pain scores with least adverse effects on maternal cardiovascular or pulmonary functions and fetal physiology with higher maternal satisfaction are reported with the use of neuraxial analgesic techniques during labor and delivery.[3]

Ropivacaine, an amide local anesthetic is fewer cardiotoxic in animals as well as it may also be more selective for sensory fibers when compared to other local anesthetics, producing less motor block.[4] This permits for raise maternal ambulation and also allows for normal progression of labor, which translates into lesser instrumental deliveries and higher vaginal deliveries although this is controversial. These factors indicate that ropivacaine may be superior to bupivacaine in obstetric analgesia. Side effects of ropivacaine are hypotension, hypersensitivity reactions, nausea, vomiting, paresthesia, dizziness, arrhrythmia, urinary retention, foetal bradycardia.[5]

Aim of the study was to compare the effects of selected concentrations of ropivacaine in labor analgesia. The objective of this study was to evaluate the efficacy of 0.125% and 0.2% ropivacaine both mixed with fentanyl 2 mcg/ml for epidural labor analgesia regarding their sensory and motor block characteristics as well as the foetomaternal outcomes.

MATERIALS AND METHODS

A total of 100 parturients in active labor were randomly assigned to two groups of 50 each, to receive an epidural injection of 10 ml ropivacaine 0.125% with fentanyl (2 mcg/ml) in group R1 and 10 ml of ropivacaine 0.2% with fentanyl (2 mcg/ml) in group R2 as initial bolus dose. Same dose regimen was used as subsequent top-up dose on patients demand for pain relief. The duration and quality of analgesia, motor block, top-up doses required, consumption of ropivacaine and fentanyl and foetomaternal out come in both groups were compared.

After informed consent patients were subjected to a thorough pre-anesthetic evaluation. The study drug was administered epidurally as intermittent bolus doses (top-ups) through epidural catheters. Epidural catheter was inserted via an appropriate lumbar inter vertebral space at L3–L4 under strict aseptic precautions. After excluding intra vascular–subarachnoid placement of the epidural catheter, patients received 10 ml of epidural ropivacaine 0.125% with fentanyl 2μg/ml or ropivacaine 0.2% with fentanyl 2μg/ml. Subsequent top-up doses of 10 ml were given on

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

patient request. Before placement of the epidural catheter, VAS score was noted with VAS 0 = no pain and 10 = the worst imaginable pain along with base line vitals. This dose was defined as first initial bolus dose and time was noted. The adequacy of analgesia was assessed 5 min after the first initial bolus dose of study drug had been administered. Analgesia was considered adequate if pain score was < 3. If analgesia was not adequate 15 min after the first initial dose, an additional 10 ml of study medication (second initial dose) was administered, and analgesia reassessed in the same manner. If pain relief was in adequate 15 min after the second initial dose of ropivacaine; the epidural anesthetic was classified as block failure, and patient withdrawn from the study. Presence of motor block in the lower extremities was assessed using a Breen modified Bromage scale (BMBS). VAS and BMBS was assessed every 15 min. All parturient were given a trial walk to assess their ability to ambulate. An additional dose of ropivacaine 10 ml was given as a top-up dose on patient request, Epidural analgesia was continued through the second stage of labor.

Data Recording

Demographic data (age, weight, height) Pain score (VAS), sensory and motor block using a cardiotocograph, and any evidence of fetal heart rate decelerations was recorded. Neonatal assessment was performed by assessing the Apgar score at 1 and 5 min characteristics and vital parameters (pulse, mean arterial pressure,) were recorded at 0 (before epidural), 5,15 min and then every 15 min till 1 hour and then every 30 min until the delivery. Sensory block height was assessed by loss of sensation top in prick (blunt head of a pin). Fetal heart rate was monitored.

Inclusion Criteria

- American Society of Anesthesiologists (ASA) grade I and II parturients.
- Uncomplicated pregnancy in a vertex presentation
- Primi or multi parous,
- Age 20-30 yrs.
- Singleton vertex presentation,
- Previous Normal Vaginal Delivery.
- Dilatation 3-5 cm.

Exclusion Criteria

- Patient refusal, Infection, Fixed cardiac output, Severe coagulopathy an d Platelet count <75000/mm.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

RESULTS

Effective labor analgesia with no motor blockade was observed in both groups. The mean age in group R1 was 22.7 ± 1.70 years which was lesser when compared to group R2 (23.5 ± 1.15 years). Height, weight and parity did not show much variation in both groups (Table 1).

Duration of analgesia after initial bolus dose was also significantly longer in group R2 (126.40 ± 10.41 min) than in group R1 (73.17± 27.50 min) (Table 2).

Mean VAS scores were significantly less in group R2 than in group R1 at 5, 15, and 30 min (Table 3). Requirement of top-up doses was less in group R2. 72% of the 50 patients of group R2 were managed with bolus dose only. In group R1 only 40% of the 50 patients could be managed with bolus dose. 14 patients required one top up dose, 10 patients required two top up doses and three patients required 6 top up doses in group R1. In group R2 10 patients required one top up dose 4 patients required 2 top up doses and none required third dose (Table 4).

Consumption of ropivacaine was comparable in both the groups (57.12 ± 5.25 mg in group R1 and 65.17±6.21 mg in group R2, but consumption of fentanyl was significantly high in group R1 (94.13±4.90 mg) as compared to group R2 (64.51±2.80 mg), P <0.001 (Table 5). There were no significant changes in haemodynamics, nor adverse effects related to neonatal or maternal out comes in both groups.

	Group R1	**Group R2**
Age	22.7±1.70	23.5±1.15
Weight (kg)	55±5	56±6
Height (cm)	157±4.5	155±4.14
Primi gravidae	28	26
Multi gravidae	22	24

Table 1: Patient demographics

Parameter	**Group R1**	**Group R2**
Duration of Analgesia with bolus Dose (minutes)	73.17±27.50	126.40±10.41
Meantime to First Top UP (minutes)	61.15±11.32	123.15±11.57
Meantime to Second Top UP (minutes)	68.12±9.12	125.12±10.12

Table 2: Block characteristics

Parameter	**Group R1**	**Group R2**
Before Bolus Dose	9.84	9.90
5 min After Bolus Dose	4.8	1.62
15 min After Bolus	0.54	0
30 min After Bolus	0.30	0

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

Table 3: Vas Score

Parameter	Group R1	Group R2
Bolus dose only	20	16
Bolus Dose + 1 Top-UP	14	10
Bolus Dose + 2 Top-UP	10	4
Bolus Dose + 3 Top-UP	6	0

Table 4: Dose requirement (ml)

Total Dose	Group R1	Group R2
Ropivacaine (mg)	57.12±5.25	65.17±6.21
Fentanyl (mcg)	94.13±4.90	64.51±2.80

Table 5: Total drug consumption

DISCUSSION

The benefits are effective pain relief without appreciable motor block, decrease in maternal catecholamines, means to rapidly achieve surgical anaesthesia. The obstetric epidural analgesia maybe associated with prolonged labour and increased incidence of instrumental deliveries and Caesarean section for dystocia. Ropivacaine is a new long-acting local anaesthetic, chemically homologous to bupivacaine manufactured as the pure S-enantiomer, whereas the others are racemic mixtures.[6]

Ropivacaine, an amide local anesthetic is less cardio toxic as well as it may also be more selective for sensory fibers when compared to other local anesthetics, producing less motor block. The less pronounced motor block in the ropivacaine group may have enabled more active participation and more effective bearing down, resulting in the increased incidence of spontaneous vaginal delivery.[7] At the same time, a lesser reduction in the tone of the pelvic diaphragm might have enabled normal rotation of the fetal head during the second stage.[8]

However, Russell and Reynolds, when comparing epidural labour pain relief with plain bupivacaine 1.25 mg or bupivacaine 0.625 mg with low-dose fentanyl or sufentanil could not demonstrate a difference in spontaneous deliveries between these groups, although motor block was significantly lower in the latter group. Ropivacaine is characterized by lower CNS and cardiovascular toxicity than bupivacaine at equal doses. Meister et al, administered 0.125% bupivacaine or 0.125% bupivacaine with Fentanyl 2 μg/ml for labor analgesia and found both the drugs were equipotent as demonstrated by mean hourly drug use, sensory level stop in prick, and over all patient satisfaction. Whether epidural analgesia has adverse effects on the progress and outcome of labor has been the topic of much debate. One of the factors implicated in the association between epidural analgesia and increased rates of operative delivery was motor block from the epidural local anesthetic. This may decrease maternal mobility, reduce maternal effort in the second stage, and may also predispose to in adequate rotation of the fetal presenting part secondary to relaxation of pelvic floor muscles.[9]

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

In the present study, epidural labor analgesia with ropivacaine 0.125% or 0.2% both combined with fentanyl (2 mcg/ml) produced adequate labor analgesia in all the 50 parturients in both groups. Duration of analgesia of initial bolus dose was also significantly more with 0.2% ropivacaine in our study. Addition of adjuvant opioids led to further increase in duration of analgesia. Time of first top-up was also significantly more in 0.2% group, which was in concordance with other studies. Requirement of top-up doses was also significantly less frequent in 0.2% group, but total dose of ropivacaine was comparable in two groups. In the present study, no motor block was observed in both groups. We also observed slight fall in the MAP and heart rate, but none of the patients had episodes of hypotension and bradycardia.[10]

CONCLUSION

We find that both ropivacaine (0.2% and 0.125%) and fentanyl concentrations were efficacious in generating epidural labour analgesia. 0.2% concentration was found to be superior in terms of duration, breakthrough pain, requiring fewer top-ups, and opioid use. For labour analgesia, our study recommends 10 ml of 0.2% ropivacaine plus 2 mcg/ml fentanyl over 0.125% ropivacaine.

REFERENCES

1. Nancarrow C, Rutten AJ, Runciman WB, Mather LE, Carapetis RJ, McLean CF, et al. Myocardial and cerebral drug concentrations and the mechanisms of death afterfatal intravenous doses of lidocaine, bupivacaine, and ropivacaine in the sheep. AnesthAnalg. 1989;69:276-83.
2. Zaric D, Nydahl PA, Philipson L, Samuelsson L, Heierson A, Axelsson K. The effectof continuous lumbar epidural infusion of ropivacaine (0.1%, 0.2%, and 0.3%) and 0.25% bupivacaine on sensory and motor block in volunteers: adouble-blind study. Reg Anesth. 1996;21:14-25.
3. Comparative Obstetric Mobile Epidural Trial (COMET) Study Group UK. Effectof low-dose mobile versus traditional epidural techniques on mode of delivery: A randomised controlled trial. Lancet.2001;358:19-23.
4. Nageotte MP, Larson D, Rumney PJ, Sidhu M, Hollenbach K. Epidural analgesia compared with combined spinal-epidural analgesia during labor in nulliparous women. N Engl J Med.1997;337:1715-9.
5. Dewandre PY. The right drug and dose for neuraxial labour analgesia. Acta AnaesthesiolBelg. 2006;57:395-9.
6. Chhetty YK, Naithani U, Gupta S, Bedi V, Agrawal I, Swain L. Epidural labor analgesia: acomparison of ropivacaine 0.125% versus 0.2% with fentanyl. J ObstetAnaesthCrit Care.2013;3:16-22.
7. Handley G, Perkins G. The addition ofpethidine to epidural bupivacaine in labour-effect of changing bupivacaine strength. Anaesth Intens Care.1992;20:151-5.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

8. Duggan J, Bowler GM, McClure JH, Wildsmith JA. Extradural block with bupivacaine: Influence of dose, volume, concentration and patient characteristics. Br J Anaesth. 1988;61:324-31.
9. Lee BB, Ngan Kee WD, Wong EL, Liu JY. Dose-response study of epidural ropivacaine for labor analgesia. Anesthesiology.2001;94:767-72.
10. Ngan Kee WD, Ng FF, Khaw KS, Lee A, Gin T. Determination and comparison of graded dose-response curves for epidural bupivacaine and ropivacaine for analgesia in laboring nulliparous women. Anesthesiology.2010;113:445-53.