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"COMPARISON OF EPIDURAL ANAESTHESIA WITH ROPIVACAINE 0.5% AND BUPIVACAINE 0.5% FOR CAESAREAN SECTION"

KEYWORDS

Evidence based Dentistry, Cochrane database, meta- analysis, cohort studies

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ABSTRACT

Background and Objectives: Several studies have demonstrated that certain drugs when used for epidural block shortens the duration of motor block with minimal effect and quality and duration of sensory block . This study is undertaken to assess the efficacy of Ropivacaine when compared to bupivacaine in epidural block in parturients undergoing cesarean section.

Methods: A prospective, randomized double blinded study was carried out in Government General Hospital, Kurnool, in which 60 parturients (ASA I or II) undergoing elective cesaren surgeries were included. Patients were randomly divided into two groups of 30 each, named as A (Ropivacaine) group and B(Bupivacaine) group. Group A received 20 ml of 0.5% Ropivacaine and Group B received 20 ml of 0.5% Bupivacaine. The onset time and duration of sensory and motor blockade were recorded. Haemodynamic variables (i.e. heart rate, non-invasive blood pressure, O2 saturation) are recorded for 24 hours post operatively.

Results :The onset time of sensory blockade, duration of analgesia and 2-segment regression of sensory blockade was comparable between the two groups. The motor blockade was of slower onset, less intense and of shorter duration in Ropivacaine group compared to that of Bupivacaine group ($p < 0.05$).There was no much variation in systolic and diastolic blood pressure in both groups. There was no significant difference between the two groups in heart rate at any point of surgery. No symptoms and signs of toxicity were seen in both the groups.

INTRODUCTION : Regional Anaesthesia for caesarean section is widely used in clinical practice. There are few choices of local anaesthetics to be used for epidural anaesthesia during caesarean section. Ropivacaine 0.5% has been shown to be effective agent for providing epidural anaesthesia for Caesarean section providing similar conditions to 0.5% Bupivacaine .

Epidural anaesthesia is obtained by blocking spinal nerves in the epidural space as the nerves emerge from the dura and then pass into the intervertebral foramina. The anaesthetic solution is deposited outside the dura and therefore differs from spinal and subdural anaesthesia, where the solution is deposited in the subarachnoid space. Continuous epidural anaesthesia is given by passing a catheter into the epidural space.[1]

The amide local anaesthetics like Bupivacaine are widely used for epidural anaesthesia.It is a racemic mixture of the dextro and levo-stereoisomers. However the dextro-enantiomer makes Bupivacaine a more cardiotoxic drug.6 Bupivacaine depresses the rapid phase of depolarisation (Vmax) in purkinjee fibres and ventricular muscles. The rate of recovery is slower in Bupivacaine due to incomplete restoration of Na+ channel available in between action potentials,which gives Bupivacaine the arrythmogenic potential[2].

The reports on cardiotoxicity with Bupivacaine provided the impetus to develop newer local anaesthetic drug with less systemic toxicity and ideal local anaesthetic characteristics.

Ropivacaine, the recently introduced propyl homologue of Bupivacaine is a pure S(-) enantiomer.It is associated with a reduced incidence of both cardiovascular and central nervous systems toxicity, has more specific effects on sensory rather than motor nerve fibres.[3,4,5.]

The relevant pharmacokinetic differences include lower lipid solubility, a slightly higher plasma clearance and shorter elimination half-life compared with racemic Bupivacaine with a similar degree of plasma protein binding[6].

The present study was done to compare 0.5% Ropivacaine with 0.5% Bupivacaine for establishing epidural block. The primary aim was to study the speed of onset of block and the Secondary aim was to compare the success and the quality of sensory block and the extent and duration of motor block.

MATERIAL AND METHODS

Source of data: Sixty patients admitted in Government General Hospital ,Kurnool undergoing Elective caesarean section procedure from 2015-2016

Inclusion criteria:

1)Patient belonging to ASA grade I and grade II.
2)Patients >/18years age.
3)Elective caesarean section with or without tubal ligation
4)Patients Height >/150cms
5)Patients weight <100kgs

Exclusion criteria:

1)Patient refusal
2)Patient belonging to ASA grade III&grade IV.
3)Infection at the site of injection.
4)Coagulation abnormalities.
5)Hypersensitive to local anesthetics
6)Neurological or neuromuscular disease.
7)Maternal diabetes mellitus
8)Alcohol/ drug abuse

PREANAESTHETIC EXAMINATION AND PREPARATION:

Hospital ethics committee approved the protocol and ethical clearance certificate was obtained.

Preanaesthetic checkup was done one day prior to the surgery. Patients were evaluated for any systemic disease and laboratory investigations recorded.

The procedure of epidural block was explained to the patient and written informed consent was obtained.The patients were educated about the procedure and side effects of epidural analgesia to gain the confidence and co-operation of the patients.

All patients had intradermal sensitivity test, only those with normal response were included.

Preparation of the patient included period of overnight fasting. Premedication was done with oral tablet Alprazolam 0.25mg and capsule Omeprazole 20 mg.

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METHOD:
Sixty patients were randomly allocated into two groups of thirty each.

GROUP A: Thirty patients received Ropivacaine 0.5%
GROUP B: Thirty patients received Bupivacaine 0.5%

PREPARATION OF OPERATING ROOM:
Anaesthesia work station was checked. Emergency drugs and equipment required for intubation were kept ready.

PROCEDURE:
On the day of surgery,preoperatively pulse rate, blood pressure and respiratory rate were recorded in addition to height and weight.

An I.V access was secured with 18G IV cannula before the procedure and 500ml of ringer lactate was infused to preload the patient.

MONITORING:
DASH 3000 monitor connected to the patients included non invasive BP, oxygen saturation using pulse oximeter and baseline PR,BP,SPo2were recorded .Three lead ECG with standard Lead II was used when necessary.

Epidural block was performed with the patient in left lateral position under strict aseptic precautions. After infiltrating the skin with 2cc of 1% lignocaine at L2-L3 or L3-L4 interspace, epidural block was given with 18G Tuohy needle using the standard midline approach.The Epidural space was identified by "loss of resistance to air technique". 3ml of local anaesthetic solution was injected as a test dose to rule out intrathecal infiltration. The patient was asked to move their toes of the dependent limb gently. After waiting for three minutes,when subarachnoid injection was ruled out,18G Epidural catheter is threaded into the space, needle was withdrawn carefully so that 4cm of the catheter was in the epidural space.The catheter was carefully taped over the back and patient was put in supine position.The remaining drug was injected carefully.

The following parameters were observed:
- Time of onset of sensory block at various dermatomal levels using pin prick
- Highest level of sensory block.
- Time of onset of motor block.
- Duration of analgesia.
- Time to 2-segment regression of sensory block
- Duration and intensity of motor block
- Recording the blood pressure and pulse rate at various intervals.
- Complications arising intraoperatively
- Post operative complications.

The Motor blockade was graded using the Modified Bromage scale.
GRADE 0-No paralysis (can fully flex the kness and feet)
GRADE I-Inability to raise extended leg(able to move the feet only)
GRADE II –Inability to flex knee(able to move the feet only)
GRADE III-Inability to flex the ankle and digits (unable to move knees,feet)

Total duration of analgesia is taken as the time from the injection of drug to the first request for rescue analgesia.

During surgery,all patients received oxygen(6lit/min) via Hudson mask.Any necessity of supplementation of anaesthesia was looked for in event of an inadequate block,patchy analgesia etc.Episodes of changes in blood pressure more than 30% of baseline,pulse rate more than 20% of baseline were noted and treated with Ephedrine I.V & Atropine 0.6 mg I.V respectively.

Complications like nausea,vomiting, hypotension,bradycardia, dizziness, convulsions, shivering etc., were noted.

DISCUSSION
Caesarean section is one of the most commonly done operative procedures in clinical practice. Introduction of new local anaesthetic like Ropivacaine which are safe to use in pregnancy because of lower central nervous system and cardiotoxic potential than Bupivacaine .

Bupivacaine has been used as standard local anaesthetic agent for epidural block and was found to be more than four times more cardio depressant and arrhythmogenic . The search for new local anaesthetic as effective and long lasting as Bupivacaine but fewer toxic side effects has resulted in Ropivacaine. several studies showed that Ropivacaine appears to provide a greater margin of safety than Bupivacaine in terms of cardiotoxicity.

The aim of the present study was to assess the Clinical efficacy of Ropivacaine when given extradurally for Caesarean section .

The present study was done in 60 patients divided into two groups. Group A Ropivacaine 0.5% and Group B Bupivacaine 0.5%. The patients were assessed for onset, duration and extent of sensory block ,motor block and hemodynamic parameters.

Sensory Block
Morton et al in their study found 84% of his patients reached a sensory block at T6 dermatomal level when 7.5mg/ml was used.[4]

Griffin from their study confirmed the results of other workers that with equal doses and concentrations, the profile of sensory block with time is same for Ropivacaine and Bupivacaine. we could find the difference in the time of onset of sensory block. Patients in Ropivacaine had earlier onset of block but there was no difference in dermatomal level of distribution .The findings in our study correlate with the study done by Griffin et tal .[11]

Crestedelt et al compared the pharmacological properties of Ropivacaine and found that 100 to 150mg was sufficient to produce the desired clinical effect .we have used a total dose of 100mg in our clinical study and we have achieved adequate desired effect.

Edward Crosby et al in their study found that one third of the patients needed supplementation.10 In our study few patients in Ropivacaine group had discomfort on exteriorisation of uterus . We had used a minimal dose of 100 mg and a concentration of 0.5% Ropivacaine which could have resulted in discomfort in small group of patients. This correlates with the work done by Edward and Crosby. [10] Most of the patients needed no supplementation but only reassurance.

Several studies have demonstrated longer duration of sensory block with Bupivacaine than with Ropivacaine . Our study however showed only minimal increase in the duration of analgesia in Bupivacaine group which when compared was statistically not significant .The duration of sensory block and two segment recession of sensory block was not significant clinically.

Motor block
Edward et al showed that Bromage score and time for onset of motor block was similar in patients who received Ropivacaine and Bupivacaine.[10] Brockway et tal found that there was difference in onset time and shorter duration of motor block in Ropivacaine group when compared to Bupivacaine group .[22] The present study showed that both Bromage score and time of onset of motor block were similar in patients who received Ropivacaine and Bupivacaine. We have used 0.5% in our study which produces less motor block correlates the results of study done by Edward and Sandier.[10]

In our study 5mg/ml produced a satisfactory motor block in majority of the patients . The onset of block is satisfactory and most of the patients undergoing Caesarean section do not need muscle relaxation and their by reducing the total dose of the Local

Volume - 7 | Issue - 3 | March - 2017 | ISSN - 2249-555X | IF : 4.894| IC Value : 79.96

anaesthetic. It is evident from our study that there is no need to use higher concentration and results are convincing that a concentration of 5mg/ml provides satisfactory operative conditions. .

Griffin and Reynolds et al showed that quality of motor block is same in both the groups but the duration of motor block (Bromage score 1 and 2) was shorter in patients who received Ropivacaine.[11]

The above findings was consistent with our study showing longer duration of motor block with Bupivacaine which was statistically significant.

Hemodynamic effects

Epidural Anaesthesia produces preganglionic sympathetic block which produces hypotension and its associated changes in the heart rate .Two important precautions have been taken in our study one was to preload the patients with 500ml ringer lactate half hour before the epidural block and placement of 10cms wedge under the right hip which is commonly responsible for hypotension due to aortocaval compression.

Kerkkamp and Gielen et al found that hypotension was seen with epidural administration of Bupivacaine and Ropivacaine.[23] In our study more number of patients in Bupivacaine group developed hypotension and bradycardia which was managed with intravenous fluids and atropine.[23]

Irestedlt and his co-workers compared pharmacokinetic properties of different doses of Ropivacaine and observed clinical effects and outcome and have suggested that 150mg as bolus dose and observed hypotension with this dose.

The changes in systolic and Diastolic blood pressure in our study were minimal and was not statistically significant. The findings were in correlation with the findings of Griffin and Reynolds.[11]

Other side effects :

In the setting of Epidural anaesthesia, postoperative nausea and vomiting is usually caused by hypotension. In patients who undergo caesarean delivery with epidural anaesthesia, these problems can be aggravated by uterine manipulation and peritoneal closure. Most of the symptoms were mild ,self limiting and no anti emetics were given .This is due to preoperative administration of Ondansetron. No other side effects were seen .

Neonatal outcome

The effects on the new born were not studied but most of the newborns had good APGAR scores after 1 and 5 minutes and no child had respiratory depression.

CONCLUSION : Ropivacaine 0.5% and Bupivacaine 0.5% produced a similar onset of sensory block with equally satisfactory duration and quality block for caesarean section. The motor blockade was of slower onset, shorter duration and less intense with Ropivacaine compared to that of Bupivacaine . There was no significant hemodynamic changes and any other side effects among both the groups.No Neonatal effects were seen in both groups

References

1. Cheng'P.A.:The anatomical and clinical aspects of epidural anesthesia. Anesth. Analg.[Cleve.]'42:398,1963.
2. Morrison L M M, Emanuelsson B M, McClure J H, et al. Efficacy and kinetics of extradural Ropivacaine: comparison with Bupivacaine. Br J Anaesth 1994; 72: 164–169.
3. Irestedt L, Emanuelsson B-M, Ekblom A, Olofsson C, Reventlid H. Ropivacaine 7.5 mg/ml for elective Caesarean section. A clinical and pharmacokinetic comparison of 150 mg and 187.5 mg. Acta Anaesthesiol Scand 1997; 41: 1149–1156.
4. Morton C P J, Bloomfield S, Magnusson A, Jozwaik H, McClure J H. Ropivacaine 0.75% for extradural anaesthesia in elective Caesarean section: an open clinical and pharmacokinetic study in mother and neonate. Br J Anaesth 1997; 79: 3–8.
5. Santos A C, DeArmas P I. Systemic toxicity of Levobupivacaine, Bupivacaine, and Ropivacaine during continuous intravenous infusion to nonpregnant and pregnant ewes. Anesthesiology 2001; 95: 1256–1264.
6. Nancarrow C, Rutten A J, Runciman W B, et al. Myocardial and cerebral drug concentrations and the mechanisms of death after fatal intravenous doses of Lidocaine, Bupivacaine, and Ropivacaine in the sheep. Anesth Analg 1989; 69: 276–283
7. Veneziani A, Gambi D, Cecchi A, Messeri E, Santagostino G. Epidural anesthesia for cesarean section: a double blind comparison of ropivacaine 7.5 mg/mL and bupivacaine 0.5 mg/Ml associated with fentanyl 100 mcg. Poster presentation: World Congress of Anaesthesiologists, Montreal; 2000.
8. CORNING, first performed epidural anaesthesia with cocaine for the relief of pain in1885.
9. Bjornestad E, Smedvig J P, Bjerkreim T, Narverud G, Kolleros D, Bergheim R. Epidural ropivacaine 7.5 mg/ml for elective Caesarean section: a double-blind comparison of efficacy and tolerability with bupivacaine 5 mg/ml. Acta Anaesthesiol Scand 1999; 43: 603–608.
10. Crosby E, Sandier A, Finucane B, et al. Comparison of epidural anaesthesia with ropivacaine 0.5% and bupivacaine 0.5% for caesarean section. Can J Anaesth 1998; 45: 1066–1071.
11. Griffin R P , Reynolds F : extradural anaesthesia for Caesarean section : a double blind comparison of 0.5% ropivacaine with 0.5% Bupivacaine . Br J Anaesthesia 1997;79: 3-8.
12. Carlos Alberto Figueiredo Côrtes, MD, Amaury Sanchez Oliveira, MD, Luis Fernando Lima Castro, MD Comparative Study between 0.5% Bupivacaine, 0.5% Enantiomeric Mixture of Bupivacaine (S75-R25) and 0.75% Ropivacaine, all Associated to Fentanyl, for Epidural Cesarean Section : Anesthesia Rev Bras Anestesiol 2003; 53: 2: 177 – 187
13. He´ctor J. Lacassie, MD*, Malachy O. Columb. The Relative Motor Blocking Potencies of Epidural Bupivacaine and Ropivacaine in Labor. Anesth Analg 2002;95:204–8
14. Yaakov Beilin, MD,* and Stephen Halpern, MD , Ropivacaine Versus Bupivacaine for Epidural Labor Analgesia.Anaesthesia and Analgesia August 2010 • Volume 111 • Number 2
15. Asik et al , Goktug A, gulay L ,AlkisN, Uysalel A:Comparision of Bupivacaine 0.2% and Ropivacaine 0.2% combined with fentanyl for epidural analgesia during labour.Eur J Anaesth.2002 Apr;19[4]:263-7.
16. G.Capogna,D.Celleno,P.Fusco,G.Lyons and M.Colomb,:Relative potencies of ropivacaine and bupivacaine for analgesia in labour..Br J Anaesth 1999;82:371-3.
17. D.A.McNamee, A.M.McClelland, S.Scott, K.R.Milligan, L.Westmann and U.Gustaffson. Spinal anaesthesia:Comparision of plain Ropivacaine 5mg/ml with bupivacaine 5mg/ml for major orthopedic surgery .BrJAnaesth 2002;89:702-6.
18. Y.Y.Lee,W.D.Ngan kee,K.Muchhal, andC.K.Chan,:Randomised double blind comparison of Ropivacaine-fentanyl and Bupivacaine-fentanyl for spinal anaesthesia for urological surgery.Acta Anaesthesiologica Scandinavica 49[2005].
19. Koch T, Fichtner A, Schwemmer U, Standl T, Volk T, Engelhard K, Stevens MF, Putzke C, Scholz J, Zenz M, Motsch J, Hempel V, Heinrichs A, Zwissler BLevobupivacaine for epidural anaesthesia and postoperative analgesia in hip surgery: a multi-center efficacy and safety equivalence study with bupivacaine and ropivacaine. Anaesthesist. 2008 May;57(5):475-82
20. Korula S, George GM, Ipe S, Abraham SP. Epidural anesthesia and post-operative analgesia for bilateral inguinal mesh hernioplasty: Comparison of equipotent doses of ropivacaine and bupivacaine. Saudi J Anaesth. 2011 Jul;5(3):277-81.
21. Tuttle AA, Katz JA, Bridenbaugh PO Quinlan R, Knarr D.A double-blind comparison of the abdominal wall relaxation produced by epidural0.75% ropivacaine and 0.75% bupivacaine in gynecologic surgery. Reg Anesth. 1995 Nov-Dec;20 (6):515-20.
22. Brockway MS, Bannister J, McClure JH, McKeown D, Wildsmith JAW. Comparison of extradural ropivacaine and bupivacaine. Br J Anaesth 1991; 66: 31-7
23. Kerkkamp HEM, Gielen MJM, Eds~rom HH. Comparison of 0.75% ropivacaine with epinephrine and 0.75% bupivacaine with epinephrine in lumbar epidural anesthesia. Reg Anesth 1990; 15: 204-7.
24. Bromage,P.R.:Mechanism of action of extradural analgesia. Br.J.Anesth.,47:199:1975
25. Lonnqvist PA, Westrin P, Larsson BA, et al. Ropivacaine Anaesthesiology Scand 1999; 43: 603-8 Cheng'P.:Epidural space.Anatomical and clinical aspects. Anaesth. Analg. [Cleve] 42:40.