ORIGINAL RESEARCH PAPER

Anaesthesiology

KEY WORDS:

A STUDYOF EVALUATION OF THE EFFICACY OF EPIDURAL BUPIVACAINE WITH SUFENTANIL FOR LABOUR ANALGESIA

Dr.Rathesh Thangam M.D., Senior Assistant Professor, Department of Anaesthesiology and Critical Care, Thanjavur medical college,Thanjavur.

Dr.B.Mohamed Sameer* Associate Professor, Department of Anaesthesiology and Critical Care, Thanjavur medical college,Thanjavur. *Corresponding author

INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. Among these labor is a very painful process. It represent the most common form of acute severe pain in adult life, the severity compared to that of causalgia, cancer pain and amputation of digit and expressed as worst pain experienced by the patient.

Labor pain produces significant deleterious effect on mother and the fetus. It increases the maternal mean arterial pressure due to stress induced release of catecholamines that cause concomitant decrease in uterine blood flow and subsequent fetal adverse effects .Pain induced hyperventilation shift O_2-Hb dissociation curve to the left. This causes increased affinity of hemoglobin for oxygen which makes unloading of O_2 to fetus un favourable. After initial period of hyperventilation parturient may hypoventilate which may lead to decrease in arterial oxygen saturation.this decrease in oxygenation may cause fetal acidosis. Labor pain increases in coordinate labor with irregular contractions.

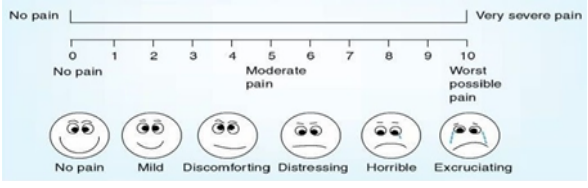
Among the various methods of labor analgesia , epidural analgesia is the most effective method .

AIM OF THE STUDY

The aim of this study is to assess the efficacy of epidural bupivacaine with sufentanil for pain relief in labor and to assess the complications and neonatal outcome.

METHODS OF PAIN MEASUREMENT

In our study we have one such measurement namely **visual analogue pain score chart** with numerical descriptive scale. In this scale one end is marked as "**NO PAIN**" and the other end as " **THE UNBEARABLE PAIN**". The position of the mark on the line measures how much pain the subject experiences. If the score is less than 30 mm the pain relief is considered as good.



METHOD OF MOTOR BLOCK ASSESSMENT

Modified bromage scale

Motor blockade is assessed by modified bromage scale. In this scale value of less than 4 is taken as presence of motor blockde.

1. Complete blockade(unable to move feet or knees)
2. Almost complete block (able to move feet only)
3 Partial block.(just able to move knee)
4. Detactable weakness in hip flexion with supine (Able to flex knee fully).
5. No detactable weakness of hip flexion with supine.
6. Able to perform partial knee bend

Level of blockade

In this study the level of sensory blockade is assessed by pin-prick test. After giving epidural injection number of segments blocked and maximum level of blockade were assessed.

MATERIALS AND METHODS

After obtaining the approval of the local ethical committee of thanjavur medical college hospital , the study was conducted on 30 parturients of American Society of Anaesthesiologists classification I & II for the purpose of standardization , selection criteria were fixed as age between 20 and 32 years , weight between 50-65kg and height between 145 and 160cm.

Patients with pregnancy induced hypertension , respiratory problems, cardiovascular, neurological or any other systemic disorders, anemia , multiple pregnancy, abnormal presentation were excluded from the study

Informed consent was obtained from the patients after explaining the procedure in detail. All the parturients were thoroughly examined and basic vital parameters such as blood pressure , heart rate, ECG,SPO2 ,respiratory rate and neurological status of the patients were recorded.

Emergency airway devices and all emergency drugs were kept ready before starting the procedure .After securing intravenous line, all the patients were given premedication with injection. Ranitidine 50mg and Injection metoclopromide 10mg intravenously and 500ml of ringer lactate was infused.

Monitoring is done with NIBP, pulse oximetry and ECG. Baseline blood pressure and pulse rate were recorded. At the onset of labor when the cervical dilatation is 4 to 5 centimeters as assessed by the obstetrician, patient was positioned in lateral decubitus position.

Under strict aseptic precaution , after infiltration with local anaesthetic in L_2L_3 interspace epidural space was approached through a midline approach using 17 gauge tuohy needle. Identification of the epidural space was done with loss-of-resistance to air technique. A 19 G catheter was introduced into the space and secured in place after leaving 3-5cm inside the epidural space. 10ml of local anaesthetic solution containing injection . Bupivacaine 0.0625% with injection sufentanil 1 micro gm/ml of local anaesthetic was injected slowly after careful aspiration for CSF and blood. After repositioning the patient, a wedge was placed properly to displace the gravid uterus.

After initiating the procedure blood pressure was recorded for every five minutes for 30 minutes and then for every 15 minutes. Pulse rate and oxygen saturation were monitored continuously. Onset of pain relief and level of blockade were assessed using pin prick test. Pain was assessed with visual analogue pain score chart immediately before epidural injection and at five minute intervals for the first 30 minute after bolus injection, then every hour until birth. Motor blockade was assessed using modified bromage scale in which score of less than 4 is considered as presence of motor blockade. Duration of analgesia is defined as the period between the first painless contraction after epidural injection and the appearance of pain subsequently. The obstetrician observes nature of uterine contractions, cervical dilatation, progress of labor and fetal heart rate.

Hypotension is treated with injection ephedrine and crystalloids when systolic blood pressure fall is greater than 30% of the baseline value or falls below 90mm Hgsystolic. Bradycardia is treated with injection atrophine 0.6 mg intravenously as and when required.

Additional dose s consisting of 5ml 0.0625% Bupivacaine and sufentanil1 microgm/ml of local anaesthetic was given when the analgesia wears off and the patient complains of pain. During II stage of labor if analgesia is not adequate as evidenced by patient complaining of pain another dose of 10ml of 0.0625 bupivacaine and sufentanil 1 micro gm/ml of local anaesthetic is given. Similar precautions and monitoring were employed.

OBSERVATION AND RESULTS

The total number of patients in this study group is 30. Only gravida I and II patients were selected with American society of anaesthesiology classification I . The drug administered was 10ml of 0.0625% Bupivacaine with sufentanil 1 micro gm/ml.

Physical characteristics

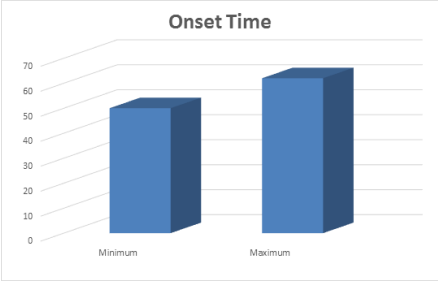
The groups were comparable with respect to Age,Weight and Height and were statistically insignificant.

Onset of pain relief

In this study the onset of analgesia ranged between 8 to 11 minutes. In 8 patients the onset time was between 8 to 9 minutes and in 16 patient the onset time was between 9 to 10 minutes and in 6 patient it is between 10 to 11 minutes.

Onset time	No of patient	Percentage
8-9 min	8	26.6%
9-10min	16	53.33%
10-11min	6	20%

Graph:1 Onset of pain relief



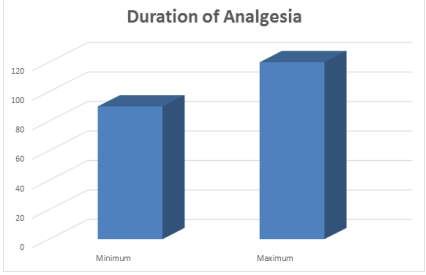
Satisfactory analgesia

Satisfactory analgesia was reported by 94% of the parturient. It is assessed by visual analogue pain score chart with numerical and descriptive scale which showed <30mm on the scale at 15 minutes. The visual analogue score before the administration of epidural analgesia was more than 70 mm. 28 patient in the study group showed a score of less than 30 mm after giving epidural analgesia.

Duration of analgesia

In this study the duration of analgesia ranged between 96 to 124 minutes. In 12 patients the duration was between 96 to 110 minutes which is about 40% and in 18 patients the duration was between 110 to 124 minutes this account to 60% of the total.

Graph. 2: Duration of Analgesia



Level of blockade

In this study the highest level of blockade as assessed by pin prick test was T8. 2 patient had level of blockade upto T8 and in 5 patient it was upto T9. In 23 patients the level was limited to T10 level.

Motor blockade

In this study group , none of the patient developed motor blockade of less than 4 according to modified bromage scale. All were ambulant.

Hypotension

In this study 3 patient developed fall in systolic blood pressure of less than 90 mm Hg .in all the three patients,hypotension occurred after the initial bolus dose. They were treated with injection ephedrine 6mg intravenously and with crystalloids. The incidence of hypotension in this study is 10%.

Neonatal outcome

90% of the babies had APGAR of 9 at 1 minute. All the babies had score of 9 at 5 minutes. 1 baby showed 1 minute APGAR of 7 which I about 3.3% and 2 babies had score of 8 at 1 minute and this comes to about 6.6%. in all the three babies, the score improved to 9 at 5 minutes.

Instrumental / caesarean delivery

In this study the incidence of instrumental delivery occurred in one parturient which is about 3.3%. outlet forceps was applied. The pain during the procedure was bearable by the patient. There is no incidence of caesarean delivery in this study.

Other effects

Pruritus occurred in 4 patients in this study which is about 14%. It is mild and none of the patients required treatment. There is no incident of vomiting and respiratory depression in any of the parturients in this study.

DISCUSSION

Pain experienced by the parturient during the process of vaginal delivery is one among the severe form of pain. Knowing this, measures were taken since the period of grandly dickl-read and then by dr.fernand Lamaze. Later various methods were developed among these, epidural analgesia for labor pain remains the most effective method. Morgan BM and hi colleagues in their comparative study of 1000 mothers confirmed that lumbar epidural analgesia provides superior pain relief and proved strikingly more effective than other modalities of pain relief.

Stress and pain induced release of catecholamine during labor cause decreased uteroplacental blood flow leading to deleterious foetal effects. Epidural analgesia increases intervillous blood flow. Maternal oxygenation is also improved by epidural analgesia. Neonatal mortality is decreased especially in low birth weight babies when mothers had epidural analgesics as shown by David.H.Roen in his study.

In this study , epidural injection of combination of 10 ml of 0.0625% Bupivacaine and sufentanil 1 micro gm/ml in relieving labor pain is proved to be effective and beneficial. Phiilip.G, found that addition of sufentanil to Bupivacaine significantly improves analgesia than using Bupivacaine alone. Adding sufentanil also decreases the requirement of local anaesthetic , enables them to be used in low concentration and decrease the side effects.Boselli.E and his colleague in their study on labor analgesia concluded that sufentanil decreases the local anaesthetic dose requirement by 30% to 40%.Naulty JS also showed that addition of even micro gram of sufentanil to Bupivacaine significantly potentiates analgesia and enable extremely low concentration of 0.0312% Bupivacaine to be effective.

In this study the minimum time taken for onset of pain reliefis 8 min and the maximum is 11 minutes with mean of 9.5 minutes.

Rolfeng in his comparative study of epidural sufentanil and fentanyl with Bupivacaine concluded that the mean onset time for

sufentanil is 10 min. It is in concurrence with our study. Satisfactory analgesia is reported by 94% of parturients in this study. It is assessed by visual analogue pain score chart with numerical and descriptive scale. It showed less than 30mm at 15 minutes after administration of epidural analgesia.

Dahl V in hi study of labor analgesia with combination of Bupivacaine and sufentanil showed that 97% of the mothers had satisfactory analgesia. Rolfeng also showed similar results in his study. Both are in concurrence with our study.

Duration of analgesia in this study ranges between 96 minutes and 124 minutes with mean duration of 110 minutes. Studies show that addition of sufentanil to Bupivacaine increases the duration of action of Bupivacaine and also shortens the onset time.

Vansteenberg and DE Broux in a study pointed out that addition of sufentanil to Bupivacaine shortened the onset time and prolonged the duration of action from 86 minutes in control group to 130 minutes in sufentanil group.Phillips in his comparative study concluded that sufentanil when added to Bupivacaine prolongs duration of analgesia from 90 minutes to 144 minutes.

In this study motor blockade had not occurred in any patient. It is assessed by modified bromage scale. According to this scale motor blockade is defined as scale of less than 4. In this study group all the parturient can flex their hip and knees and all are ambulant.

Benhamon in his comparative study of 0.0625% and 0.0125% Bupivacaine with sufentanil 0.5 micro gm/ml ,concluded that 0.0625% Bupivacaine produce less motor blockade.

Rolfseng in his comparative study using Bupivacaine and sufentanil for labor analgesia showed that all parturient can walk for 20 meters without help.

There is only once incidence of instrumental delivery in this study. Studies show that epidural analgesia when instituted properly , decreases the incidence of instrumental deliveries and dysfunctional labor. There is no incidence of caesarean delivery.

Benhamoh D in a comparative study showed that combination of Bupivacaine and sufentanil decreases the rate of assisted delivery. In our study three patients had fall in blood pressure of less than 90 mm Hg systolic. All were treated with injection ephedrine and crystalloids. In all the three patients it occurred with the initial dose. In all other parturient the hemodynamic were stable.

H.J .Clement an his colleagues in a comparative study of Bupivacaine and ropivacaine with sufentanil showed that incidence of hypotension was 10%. This is in concurrence with our study. In this study 4 parturients had pruritus, which is about 14%. It is tolerable by the patients. Studies show that the range of incidence for pruritus is wide.

Dahl.V and his colleagues in their study of epidural analgesia for labor with Bupivacaine and sufentanil had 18% incidence of pruritus. But H.J.Clement study came across with incidence of 45% for pruritus.

Neonatal outcome is not affected in this study. One minute APGAR is 7 in only one baby and 8 in two babies. It improved to 9 at five minutes score in all the three babies. All the others had score of 9. Deckardt .R and Fembacher in a study showed that epidural analgesia actually improves neonatal outcome by maintaining the neonatal acid-base status by virtue of increasing maternal oxygen saturation.

CONCLUSION

This study proves that the combination of 0.0625% Bupivacaine and sufentanil 1 micro gm/ml of local anesthetic is effective in relieving labor pain. The motor blockade is very minimal which make the parturient ambulant. There is no increased incidence of complications and assisted or caesarean deliveries. The neonatal outcome is good.

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