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Original Research Article

Labour analgesia and obstetric outcome in heart disease complicating pregnancy in tertiary care center

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ABSTRACT

Background: One of the most severe pain experienced by a woman is during child birth. It is imperative to understand the pain transmission for providing labour analgesia. Hemodynamic status in labour fluctuates greatly during uterine contraction and true labour pains. Therefore, pregnant women with cardiovascular disease need epidural anaesthesia during labour depending upon the type of cardiovascular disease. Objective of this study was to assess the impact of labour analgesia and the obstetric outcome and cardiac events during labour.

Methods: This is an observational study conducted in 46 pregnant women with cardiovascular disease during the period of January 2019 to December 2019 (12 months).

Results: A total of 46 antenatal mother with cardiovascular disease was admitted in the department of obstetrics and gynecology over a period of one year out of which 25 patients who had epidural analgesia during labour and 21 patients who had no epidural analgesia during labour. Cardiovascular events significantly reduced in epidural group (25 patients) and there was no increase in cesarean section in epidural group.

Conclusions: The data showed there was significant decrease in cardiovascular events related to arrhythmia hence decreased maternal morbidity and mortality. There was no associated increase in cesarean section rate but slight increase in instrumental vaginal delivery.

Keywords: Analgesia, Arrhythmia, Epidural anesthesia, Heart disease complicating pregnancy, Instrumental delivery, Labour maternal morbidity and mortality

INTRODUCTION

Epidural analgesia is a central nerve blockade technique which involves the injection of local anaesthetic into epidural space of the spine. It blocks the painful impulses generated from the nerves of the contracting uterus during labour. Afferent impulses from the Uterus and Cervix are transmitted via A δ and C fibres which travel with sympathetic nerves via the hypogastric plexus to enter the sympathetic chain. Central connections to the spinal cord are via the dorsal root ganglion and lateral divisions of the posterior roots of T10 -L1 (visceral pain). Afferent transmission from the Vagina and pelvic outlet

is also via A δ and C fibers but with parasympathetic bundle in the pudendal nerves S2, S3, S4 (Somatic pain). Therefore, the anaesthesia must cover the dermatomes from L2 to S5. First stage pain is visceral pain best relieved by a Narcotic analgesic. Second stage pain is somatic in nature best relieved by a local anaesthetic. Thus, neuraxial analgesic technique that use combination of local anaesthetic and narcotic in low doses are considered the most versatile technique of pain relief in Labour. The primary aim of our study is to investigate the effect of epidural analgesia and the delivery outcome in women with cardiac disease complicating pregnancy. Ideally, all pregnant women with cardiac disease should

be guided by a multidisciplinary plan of management during pregnancy, delivery and postpartum period. They are classified according to the severity of the cardiac disease using New York Heart Association (NYHA). Women with NYHA Class 1 or 2 usually present little problem in pregnancy or labour and those with NYHA class 3 or 4 may not tolerate the physiological changes of pregnancy as they approach 20th - 28th week of gestation. Potential maternal problems include arrhythmia, heart failure, hypoxaemia and deep venous thrombosis. epidural analgesia removes the stress response to pain during labour in cardiac patients and facilitates an uneventful delivery although, previous studies have shown that vaginal delivery rates are affected by epidural analgesia.^{1,2}

Labour should be conducted in the left lateral decubitus position to decrease the haemodynamic fluctuations associated with contraction. In third stage, there is always risk of pulmonary edema caused by fluid shift which can be minimized by decreased after load associated with epidural analgesia. A graded epidural anaesthesia was planned to maintain hemodynamic stability and to maintain optimum systolic blood pressure, diastolic blood pressure, heart rate, central venous pressure and to prevent further rise in pulmonary vascular resistance.

METHODS

This was an observational study in women with heart disease complicating pregnancy admitted in Government Mohan Kumaramangalam Medical College and Hospital, Salem during the period of 12 months from January 2019 to December 2019 for institutional delivery. The statistical analysis used was chi-square test.

Inclusion criteria

- Antenatal mother with Heart disease confirmed by echo
- Normal body mass index (BMI <25 kg/m²)
- Under the age of 40 years
- Singleton cephalic presentation.

Exclusion criteria

- Patients with other associated maternal complications
- Fetal congenital abnormalities
- Multiple pregnancies.

Maternal data recorded include age, BMI at booking visit, type of heart disease, labour and delivery data which includes drugs used for augmentation, time taken in second stage of labour, mode of delivery (normal vaginal delivery, instrumental vaginal delivery and caesarean section), indications for instrumental delivery and caesarean section. Neonatal data recorded are birth weight, Apgar score at 1 and 5 minutes and admission to neonatal unit (NICU).

In our study for Group A patient's Epidural catheter are placed at the L2 - L3 or L3 - L4 interspace when women have a cervical dilatation of ≥ 3 cm. Our study included 46 antenatal mothers with heart disease of which 25 patients had epidural analgesia (Group A) and 21 Patients had no epidural analgesia (Group B). The blood pressure was checked at 5 minutes interval during labour. Epidural anaesthesia was stopped 2 hours after delivery.

RESULTS

The observational study included a total of 46 Antenatal mother with Heart disease complicating pregnancy of which mean maternal age at delivery was 26.7 years, the mean BMI was 21 kg/m² and 32 were primigravida and 14 were multigravida.

During labour, 25 patients (54.3%) out of 46 had an epidural analgesia for pain relief and the instrumental delivery rate was 64% and over all caesarean section rate was 36% respectively. The mean birth weight was 2.52 kg with 4% of all new-born were admitted to neonatal units.

Table 1: Case distribution according to mode of delivery.

Mode of delivery	Group A - 25 epidural group	Group B - 21 non-epidural group
LSCS	9 (36%)	6 (28%)
Instrumental vaginal delivery	16 (64%)	15 (72%)

During labour 25 patients who had epidural analgesia 64% had instrumental vaginal delivery and 36% had LSCS. Among 21 patients in non-epidural group 72% had instrumental vaginal delivery and 28% had LSCS as shown in Table 1.

Table 2: Gravida wise distribution.

Parity	Normal
Primi	32 (69%)
> Gravida 2	14 (31%)

Among 46 cases, 69% were primigravida and 31% were multigravida as shown in Table 2.

Table 3: Indication for instrumental delivery.

Indication	Instrumental delivery
Prolonged second stage	40%
Maternal exhaustion (failed maternal efforts)	20%
CTG abnormalities	4 %

Most common indication for Instrumental delivery is prolonged second stage of labour (40%) followed by

maternal exhaustion (20%) and CTG abnormalities (4%) as shown in Table 3.

Table 4: The indication for caesarean section.

Indication	Caesarean section
Failed induction	16%
Arrest of descent	8%
CTG abnormalities	8%
Failed instrumental delivery	4%

Most common indication for caesarean section in our hospital is failed induction (16%) followed by arrest of descent (8%) and CTG abnormalities (8%) as shown in Table 4.

Augmentation of labour, prolongation of second stage of labour and instrumental delivery were increased as a result of epidural anaesthesia. There were no events that adversely affected the maternal outcome. The vaginal delivery rate, blood loss during delivery and neonatal outcome were not affected by epidural anaesthesia. Cardiovascular events (like arrhythmias) significantly occurred during labour in non-epidural group.

Previous studies have shown that the vaginal delivery rate is affected by epidural anaesthesia. In this study the vaginal delivery rate was affected by epidural anaesthesia consistent with previous studies. A prolongation of the second stage of labour due to epidural anaesthesia has been reported.¹ Patient on epidural analgesia fail to strain during delivery and hence an increase in instrumental delivery has been found.¹ Our study showed the same findings but there was no significant increase in cardiovascular events or blood loss during delivery nor it affected the neonatal outcome.

The increase of venous return associated with uterine contraction was controlled by epidural anaesthesia. While the activation of sympathetic nerve is controlled by decreasing the pain due to uterine contraction, the rise in blood pressure and induced arrhythmia can be controlled. Extreme fluctuation in blood pressure can lead to breakdown of hemodynamic status hence we compared the systolic blood pressure before labour and during labour. In epidural group there was no significant variation in systolic BP and we can conclude that epidural anaesthesia is effective.

DISCUSSION

We found that women with epidural analgesia had prolonged second stage of labour and there were more instrumental vaginal deliveries.^{3,4}

However, there was no increase in cesarean section. There was reduced event of arrhythmias. the neonates of women with epidural analgesia in our Group A, when compared to those without epidural analgesia had

significantly low Apgar score at 1 minute but similar Apgar score at 5 minutes. Epidural analgesia has no effect on the Apgar score.⁵

Women with epidural analgesia in our study when compared to those without epidural analgesia had no significant difference in the rate of caesarean delivery overall.^{6,7} It has been reported that the motor block was the chief complication of labour epidural analgesia which might have resulted in prolonged labour and therefore increase the rates of instrumental assisted delivery.⁸ This is in line with the Cochrane review of 2011 which indicates an increased rate of assisted vaginal delivery in women with an epidural during labour (RR = 1.42; 95% CI: 1.28-1.57).

There is certain limitation to be considered about our study, our database does not have a mandatory field for recording the epidural regimen that was used. There is literature evidence showing that different epidural analgesia formulas exhibit a different effect on the course of labour and the delivery outcome.^{8,10}

Epidural anesthesia allows a gradual onset of block with avoidance of hypotension by intermittent fluid bolus. Keeping the underlying pathophysiology in view, we aimed to maintain hemodynamic stability by maintaining an optimum systemic vascular resistance, preload, heart rate, sinus rhythm and decrease in pulmonary vascular resistance.

This was achieved by epidural anesthesia in a graded manner using small fractionated doses of local anesthetics to ensure a gradual onset of block and minimize hemodynamic changes resulting from sympathetic autonomic blockade. We administered oxytocin by slow IV infusion to avoid tachycardia and diastolic hypotension. Agent that increased peripheral vascular resistance such as methylergometrine, prostaglandin F2 alpha, hypothermia, hypoxia and inadequate analgesia were strictly avoided.

CONCLUSION

Epidural anaesthesia provides a safe parturition to women with cardiac disease complicating pregnancy. Successful management necessitates strict vigilance and an extremely cautious approach to maintain the hemodynamic stability throughout the peripartum period. Good analgesia minimizes the cardiovascular changes which accompany labour. The widespread use of dilute local anaesthetic solution and epidural opioids for labour analgesia has increased the use of labour analgesia in antenatal mother with cardiac disease.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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