

Epidural tramadol and bupivacaine in obstetric patients with concurrent cardiac diseases

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ABSTRACT

Introduction: The physiological changes of pregnancy and the stress of labor put added strain on already small cardiac reserve of cardiac patient. Although minimal equipment and expertise is required for regional anesthesia, the sequel of sympathetic blockade does not make it an ideal choice for cardiac patient. The use of low concentration of local analgesic agent with the addition of opioids helps keeping the cardiovascular system stabilized. We used injection tramadol with bupivacaine to study the haemodynamic stability in the obstetric cardiac patients requiring epidural analgesia.

Objective: To determine the haemodynamic stability in cardiac patients during caesarian delivery under epidural analgesia with low dose bupivacaine and tramadol

Design: A descriptive study

Place and duration of Study: This study was conducted in Mother and Child Health Center, Pakistan Institute of Medical Sciences, Islamabad from March 2006 till June 2008.

Methodology: A total of thirty patients suffering from either rheumatic heart disease, cardiomyopathies or ventricular septal defect were given epidural anesthesia. Intra operative hemodynamic parameters were recorded after every three minutes, and the data were analyzed.

Results: Thirty patients were studied. During epidural anaesthesia heart rate mean + SD was 95 + 15, systolic Blood pressure 110 + 10.3 and diastolic blood pressure at 65 + 4.3.

Conclusion: Epidural anaesthesia with bupivacaine and tramadol not only provides excellent analgesia to the cardiac patients for caesarian section but also keep their haemodynamic status near to their pre operative levels.

KEY WORDS: Cardiac disease. Epidural anaesthesia. Bupivacaine. Tramadol. Caesarian section.

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INTRODUCTION

Cardiac disease in a pregnant woman is a dilemma for both the patient as well as the doctor, as there is a significant increase in the risk for both the mother and

the fetus.¹ The physiological changes of pregnancy and the stress of labor put added strain on already small reserve of cardiac patient, which is further compromised by stress of surgery and anaesthesia.

Although regional anaesthesia is the preferred choice for normal obstetric patients,² due to lower level of expertise and equipment required for it, the effects of sympathetic blockade do not make it an ideal choice for cardiac patients. The use of low concentration of local anaesthetic agents with the addition of opioids helps in keeping the cardiovascular system stabilized. Unfortunately, the potent opioids like remifentanyl, alfentanyl, sufentanyl or fentanyl which are commonly used in combination with bupivacain for epidural anaesthesia are not available even in our tertiary care hospitals.³ We planned to study the haemodynamic stability in the obstetric cardiac patients requiring epidural anaesthesia using tramadol with bupivacain. Tramadol has slightly less effect on mu receptors as compared to morphine, but its analgesic effect is comparable to morphine suggesting some other receptor involvement as well. It also inhibits muscarinic receptors, 5-HT receptors and substance-P receptors which have an established role in nociception¹³.

METHODOLOGY

This study was conducted in department of anaesthesia, MCHC, PIMS from March 2006 till June 2008. The cons and pros of the study were discussed and permission was granted by the head of department. Written consent was taken from the patients included in the study. The inclusion criterion was pregnant patient with cardiac disease presenting for Caesarian section. Patients considered unsuitable for spinal analgesia due to any cause or those found technically suitable but unwilling for spinal were excluded.

During the study period 30 obstetric parturients with cardiac disease were provided epidural services. The mean age was 32+2.6 years. Gestational age was 8.7+0.4 months. Past cardiac history and present physical and cardiovascular status were evaluated. Pre-operative echocardiographic studies were ordered and the results reviewed. (Table 1)

All the patients were applied monitors of NIBP, ECG and SpO₂. Two large bore intravenous cannulas were

Table 1: Preoperative Cardiovascular status of patients (n=30)

Parameter	No. of Patients (%)
History of Shortness of Breath	23 (76.6)
Peripartum cardiomyopathy	16 (52.8)
Valvular heart disease	12 (40)
Ventricular septal defect	2 (6.6)
Echocardiography findings :	
Ejection Fraction %	45 ±6.7
Mitral Regurgitation (n)	14 (46.6)
Mitral Stenosis (n)	12 (40)
Pulmonary Hypertension(severe) (n)	14 (46.6)
Pulmonary Hypertension (moderate) (n)	16 (53.3)

passed as a standard protocol and all patients were preloaded with 500 to 1000 ml lactated ringer solution. After taking baseline readings of NIBP, oxygen saturation and pulse rate, the epidural space was identified by loss of resistance technique using air or saline with the patient in sitting position at either L2/3 or L3/4 spinal inter space The Tuohy epidural needle of either 16G or 18G was used. The catheter was threaded for 5-7 cm inside the epidural space. Test dose of 3ml of lignocaine 2% was used to rule out intrathecal injection. Inj. bupivacaine (Sensocaine™) 0.25% 15- 20 ml with inj. tramadol (Tramal™) 50mg (added to 20 ml of inj. bupivacaine 0.25%) was used depending on the height of the patient. Analgesia and height of the block was assessed by pinprick. If inadequate analgesia/block resulted even after 20 minutes, a further dose of 5ml of the same drug was injected. Blood pressure, heart rate and SpO₂ were recorded after every 3 minutes throughout the procedure.

RESULTS

Preoperatively mean heart rate was 95+24 / min, mean systolic blood pressure 120+15 and mean diastolic blood pressure was 70+9.7. Throughout the procedure the mean heart rate of the patients remained at 95+15 / min, the mean systolic blood pressure at 110+10.3mm of Hg and mean diastolic

blood pressure at 65±4.3. (Table 2)

A total of 15±3.9 ml of inj. bupivacaine 0.25% with 40±8.3 mg of inj. tramadol was used. Two patients

Table 2: Comparison of hemodynamic status before and after epidural

Parameter \ Values	Preop Values (Mean±SD)	Intraop Value (Mean±SD)
Heart Rate	95 ± 24	95 ± 15
SBP (mmHg)	120 ± 15	110 ± 10.3
DBP (mmHg)	70± 9.7	65 ± 4.3

were infused colloids and one patient was transfused blood due to excessive peroperative bleeding.

Nausea / vomiting occurred in 3(10%) patients and was treated with intravenous metoclopramide.

Desaturation i.e. SpO₂ of 95% was noted in 4(13.33%) patients which was rapidly corrected with 3-4 lit of oxygen via nasal cannulae.

DISCUSSION

Cardiac disease complicates 1-3% of all pregnancies. Rheumatic heart disease (RHD) accounts for majority of cases (75%).⁵ While peripartum cardiomyopathies complicates 0.25-0.3 % of all pregnancies.^{6,7} Peripartum mortality is < 1% in NYHA class I patients and is 20-30% in NYHA class III and IV.⁸ Mitral stenosis is the most common manifestation of RHD and its incidence is 90%. Symptoms occur when the valve orifice is less than 2 cm². Anesthetic goals for these patients are to avoid tachycardia, avoid overloading, and to avoid rapid and severe drop in systemic vascular resistance. Second most common valvular heart disease is mitral regurgitation (6.5%). Pregnancy compromises already overloaded heart and pulmonary congestion. Anaesthetic goals are to prevent increase in systemic vascular resistance to avoid myocardial depressants drugs; avoid bradycardia as cardiac output depends on heart rate and stroke volume is limited; prevent pain, hypoxemia, and hypercarbia as they increase the peripheral vascular resistance and to avoid

overhydration as it may worsen the regurgitation by dilating the left ventricle. The presence of cardiac failure is a major predictor of perioperative morbidity and mortality. The relative risk increase is in the order of 2-10 times when ejection fraction is less than 0.5. In addition to usual perioperative risk factors, cardiac pregnant patients have a significantly increased rate of critical events from dysrhythmia, haemorrhage and thromboembolism. The secondary concern arises from the patient's ability to cope with the stress of labour and the risk of acute decompensation.

Anaesthetic options for obstetric cardiac patients is either general anaesthesia with narcotics, volatile anesthetic agent and sodium nitropruside with aims to avoid intubation reflex, perioperative swings in peripheral vascular resistance and aspiration of gastric contents, or subarachnoid / epidural analgesia, which is devoid of complications associated with general anaesthesia. The challenges which one has to face in regional anaesthesia is to maintain blood pressure, heart rate and intra vascular volume to as normal as possible in a patient with a compromised heart function. The addition of narcotics to bupivacaine used for epidural reduces the total dose of, and subsequently the severity of local anaesthetic induced sympathetic blockade.

Yeagar MP and colleagues in their study in 1987 stated that there was a significant improvement in morbidity and mortality in 55 high risk patients receiving epidural analgesia.⁹ In another trial 1021 high risk patients had had epidural for surgery in USA and 915 high risk patients (MASTER Trial) in Australia, and a second phase trial was taken in Feb 2003. No difference in mortality was found.¹⁰ Targeted meta-analysis of epidural analgesia had shown selected benefit - improved pulmonary function and reduced MI.¹¹ Tramadol is an analgesic which is used worldwide and is freely available in our country. It is speculated that tramadol acts primarily through the activation of μ-opioid receptors and the inhibition of monoamine reuptake. Tramadol has been shown to affect G-protein coupled receptor (GPCR), including

muscarinic acetylcholine receptors and 5-HT receptors. The affinity of tramadol for μ -opioid receptor is weak, approx 10-fold less than that of codeine and 6000-fold less than that of morphine. A further mode of tramadol action has been identified as inhibition of the re-uptake of monoamines-NE and serotonin (5HT) released from nerve endings, thereby increasing neurotransmitters in descending pathways and enhancing analgesia.¹² Several studies have shown that some GPCRs and ligand-gated ion channels are also targets for tramadol.¹³ Transient receptor potential vanilloid-1 (TRPV1)- the capsaicin receptor, functions as a central integrator molecule of pain sensation. Tramadol acts as an agonist of TRPV1, causing release of vasoactive neuropeptides and a marked desensitization of the afferent fibers (hence termination of pain sensation)¹⁴.

The combination of drugs provides superior analgesia compared to either drug given alone. In current practice many different drugs, e.g., ketamine, clonidine and neostigmine, have been added to the LA, for long lasting analgesia in intra-articular injections and for post-op analgesia.¹⁵⁻¹⁶ Tramadol is unique in that it is an atypical central-acting opioid that does not cause respiratory depression.^{17,18} This advantage encouraged use of tramadol for pain management in thoracotomy patients with poor cardio-pulmonary function. Lumbar epidural and IVRA use of tramadol resulted in lighter sedation and a less pronounced decrease in oxygenation.¹⁹⁻²¹

CONCLUSION

Addition of tramadol to bupivacaine decreases the incidence of sympathetic block allowing superior analgesia and hemodynamic stability to patients with minimum side effects and is a safe and effective method for pregnant patients suffering from cardiac disease.

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