

Role of Dexmedetomidine in anesthetic management of lower limb orthopaedic surgery in a patient with low ejection fraction

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Abstract

Cardiac patient for non cardiac surgery has since forever been a topic of interest for the anaesthesiologist. Few cases have only been reported with their own suitable line of management, however the simultaneous use of combined epidural spinal anaesthesia and Dexmedetomidine, an α_2 agonist has been studied by only a handful. Use of epidural for incremental doses of local anaesthetic for allaying the postoperative pain and thereby reducing the occurrence of ischemic events is also being described.

Keywords: Ischaemic Heart Disease, Epidural Anaesthesia, Ejection Fraction, Dexmedetomidine.

Introduction

Ischemic Heart Disease (IHD) is a leading cause of perioperative morbidity and mortality in patients coming for non cardiac surgery.¹ Augmented hemodynamic control with intensive perioperative pharmacologic therapy with beta-blockers and possibly alpha-2 agonist has been shown to improve perioperative cardiovascular outcomes.² Management of such patients requires thorough clinical evaluation, medical therapy, identification of risk factors, monitoring and appropriate mode of anaesthesia. There have been very few cases reported of combined Spinal Epidural Anaesthesia for patients with IHD undergoing non cardiac surgery. Here we report a successful anesthetic management of a patient with a history of MI and ejection fraction of 40% posted for CRIF with nailing of Tibia under combined spinal epidural anesthesia and iv Dexmedetomidine.

Case Report

A 55 year old male patient with fracture Tibia and Fibula of left lower limb was posted for CRIF with nailing. The patient was a known case of IHD with a history of MI (inferior wall MI, posterior wall MI, ST elevation in leads II, III, aVF) 6 years back. Coronary intervention was not done and he was started on Tab. Metoprolol 50 mg OD, Tab Aspirin 75mg OD and Tab Atorvastatin 20 mg OD. On examination, Heart Rate was 82 bpm, BP 140/90 mmHg, Oedema absent, Mallampati Grade III, partially edentulous, airway adequate and Spine was clinically normal. Laboratory investigations (complete blood counts, liver function tests, renal function tests, coagulation profile and blood sugar) were within normal limit, chest x ray showed no abnormality and ECG showed normal sinus rhythm with heart rate of 68bpm, abnormal Q waves (II, aVF) and inverted T waves (V6). A cardiology reference was

sought thereafter and 2D Echo was done which revealed poor echo window, normal valves, dilated left ventricle, right wall motion abnormality present (inferior wall hypokinesia), Ejection fraction 40%, LVDD – I. Further Coronary Angiography revealed OSTIA c LAD-50%, DL-80%, OM-100%, RCA-70%. Case was accepted to be taken with >5% risk of cardiac risk index under ASA grade III.

Anesthetic Management

Prior to the surgery, the risk associated with the surgery was explained and written and informed consent was obtained. Patient was instructed to take Tab Alprazolam 0.5 mg HS night before surgery and to continue Tab Metoprolol and Tab Aspirin on the day of surgery. The patient was then shifted to pre operative ward where his baseline hemodynamic parameters were noted, Heart Rate of 72 bpm, Blood Pressure 140/90 mmHg, and oxygen saturation of 98% on room air. Intravenous access was secured using 18G cannula and Ringer Lactate was started at 2ml/kg/hr. Thereafter, the patient was shifted to the Operation Theatre where all cardiac emergency drugs, defibrillator and equipments for resuscitation were kept ready. Electrocardiography, Heart Rate, Non Invasive Blood Pressure and SpO₂ monitoring was done. Procedure was explained to the patient. Under all aseptic precautions with the patient in sitting position, 1.5 ml of 2% lignocaine infiltrated in L2-L3 interspace. Epidural space entered with BBraun 18G Tuohy's epidural needle with Loss of Resistance technique and 20G epidural catheter was passed upto 4cm mark through the needle. The catheter was secured in place at 10 cm mark following negative aspiration for blood and cerebrospinal fluid. A 25G spinal needle introduced in L3-L4 interspace. After free flow of CSF, 0.5% inj. Bupivacaine Heavy 1.2 ml along with inj. Fentanyl 25 μ g was given intrathecaally. The patient was

moved to supine position and oxygen was administered via Hudson mask. Subarachnoid block was achieved till T8 level. The usual side effects like hypotension and tachycardia were not noted with low dose spinal anaesthesia. Inj. Midazolam 1mg and Inj Fentanyl 25 µg were given intravenous. After patient was hemodynamically stable, Dexmedetomidine (1 µg/kg) was given intravenous over 10 minutes and thereafter an infusion was started at 0.4 µg/kg/hr. Heart Rate was maintained between 70-80 bpm, Systolic Blood Pressure between 100-110 mmHg and Diastolic Blood Pressure between 66-74 mmHg. After an hour of administration of spinal anaesthesia, 0.125% Bupivacaine 7.5 mg given via epidural. The surgery lasted for about 90 minutes. With the completion of surgery, Dexmedetomidine infusion was stopped and the patient was shifted to post operative ward. In the post operative period, 0.125% Bupivacaine 7.5 mg was given as intermittent bolus every 2 hourly upto 8 hours and 3 hourly thereafter for next 9 hours for pain relief. Epidural catheter was removed after 24 hours. Post operative period was uneventful.

Discussion

The goals for anesthesia for a patient with IHD are to maintain stable hemodynamics, optimize myocardial oxygen supply and reduce oxygen demand, monitor for ischemia, treat ischemia or infarction if it develops, and maintain normothermia. Selection of drugs should be with the objective of minimizing demand, and optimum supply of oxygen.¹

Most of the intravenous anaesthetic agents have a direct depressant action on the myocardium and may also reduce vascular tone. This results in hypotension (especially in the hypovolaemic patient), often with a compensatory tachycardia, which may cause myocardial ischaemia.³

The use of regional anaesthesia has its own advantages like epidural anaesthesia which reduces preload and afterload, coagulation responses, and in the case of thoracic epidurals, causes coronary vasodilation. These effects should reduce perioperative myocardial ischaemia, but this is not supported by research. However, good epidural analgesia may reduce the incidence of tachycardias arising due to postoperative pain.³

Increased attention should be focused on the postoperative period to reduce perioperative cardiac morbidity.⁴ Perioperative MI is a significant issue not only in patients undergoing high risk surgery but also in those with minor surgical interventions and it also can be silent; its ECG changes are frequently transient and minor troponin elevations predict early and late morbidity and mortality.⁵

Conclusion

Regional anaesthesia appears to be safer compared to General Anaesthesia (GA) in a cardiac patient for

non cardiac surgery as it maintains the myocardial oxygen supply and reduces the oxygen demand, eliminates the hypotension caused during induction and hypertension and tachycardia due to pressor response caused by laryngoscopy. It also helps in the management of post operative pain thereby reducing the risks of tachycardia, myocardial ischemia and postoperative MI. But due to uncontrolled sympathetic block there may be hypotension, which can be prevented by minimal sympathetic block with appropriate dose of intrathecal bupivacaine combined with epidural for supplemental doses. Intra operative dexmedetomidine infusion decreases heart rate and blood pressure that may be advantageous in ischemic heart disease by improving oxygen supply and demand balance.

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