

# Successful Management Of Non Cardiac Surgery In A Patient With High Cardiac Risk

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## Abstract

Patient with un-revascularized (coronary artery bypass grafting or angioplasty) severe coronary artery disease (CAD) poses a great challenge to the anaesthesiologist. Preoperative proper history, work up, risk stratification, optimisation, judicious anaesthesia plan, peri-operative management of pain and intravascular volume status are crucial factors in avoiding adverse outcomes in such patients. We describe successful anaesthesia management of a patient with double vessel disease (DVD) with Dobutamine Stress Echo (DSE) positive for inducible ischemia recommended for percutaneous transluminal coronary angioplasty (PTCA), who underwent semi-emergency hip arthroplasty under combined spinal epidural anaesthesia (CSE).

**Keyword:** Coronary Artery Disease, Double Vessel Disease, Hip Arthroplasty, Anaesthesia

### Introduction:

We present a case of 72 year old hypertensive and CAD male patient, posted for right total hip replacement I view of poor quality of life due to non weight bearing and severe pain for last three years with history of proximal femur nailing in right hip done in 2016 and implant removal done in 2018. But severe hip pain remained in the right hip and was affecting his quality of life as he was not able to walk due to severe pain.

On pre anaesthetic check-up, he gave history of cardiac event in terms of chest pain six years back when he was diagnosed with CAD and PTCA was done in left coronary artery. Evaluation by a cardiologist in terms of Echocardiogram (ECHO) revealed akinetic posterior and lateral wall, ejection fraction (EF) was 40-45% and stress ECHO was positive for new inducible ischemia in mid distal lateral wall and basal mid inferior wall. Cardiologist again advised PTCA to RCA (Right Coronary Artery) and PLV (Posterior Left Ventricular Artery) which patient, denied to undergo and insisted on replacing his hip

in view of severe pain and was stratified as high risk in terms of cardiac events because of non revascularized arteries and positive stress echo for new inducible ischemia. Along with cardiac history he also gave history of myasthenia gravis in remission on treatment with mycophenolic acid and prednisolone and also history of bronchial asthma controlled on seroflow bronchodilator. His blood investigations including serum electrolytes were normal. He was on Tablet (tab) Ramipril 2.5 milligram (mg), bisoprolol 6.25 mg, rosuvastatin 20 mg, and ecosprin 75 mg. All cardiac medications were continued till surgery. High risk consent was taken from the patient and relatives after explaining them in detail the possible perioperative cardiac events and also delayed recovery from regional anaesthesia possible due to myasthenia gravis.

### Case Report:

The patient was classified as American Society Anaesthesiologists Grade III physical status and informed high-risk consent was obtained. In the operation

theatre, standard monitoring (ECG, noninvasive blood pressure (NIBP), and pulse oximetry) was established which recorded his basal HR to be 98/min and BP was 120/65. The SpO<sub>2</sub> on room air was 92–93%. Intravenous (IV) access was established with wide bore 18 G cannula. Right radial arterial line was cannulated under local anaesthesia for invasive arterial BP monitoring as direct arterial BP monitoring is superior to indirect monitoring techniques for early detection of intraoperative hypotension [1]. The surgery was planned under combined low dose spinal and graded epidural anaesthesia. 1.5 ml of 0.5% bupivacaine heavy with 20 microgram (mcg) fentanyl was injected intrathecally at L3-L4 space, and epidural catheter was inserted through 18 G Tuohy needle at the same space and fixed at 11 cm. Initial sensory level achieved with spinal anaesthesia was at L1 which was further extended to T10 by administering 4ml of 2% plain 0.5% bupivacaine in 2 ml aliquots through epidural catheter after negative aspirations. For maintenance of anaesthesia, after 2 hr of initial bolus, injection bupivacaine 0.25% plane was started as an infusion through epidural catheter @ 6ml/hr for rest of the duration of the surgery. Injection noradrenaline (0.08 mg/ml) was started very minimally and was titrated as per BP of the patient starting from induction to avoid fluid overloading to

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maintain BP. Injection nitro-glycerine 2-2.5 micg/kg/minute was also started for controlling of BP along with noradrenaline throughout the intraoperative period. Patient was also catheterised to monitor urine output. Injection noradrenaline and nitro-glycerine were titrated as per vitals of the patient throughout the intraoperative period. The HR and BP remained in the range of 74-90/min and 110-120/76-80 mm Hg respectively. Normothermia and normoglycemia was maintained throughout intraoperative period. Nitroglycerine was continued after surgery and was gradually tapered in the postoperative period. A total of 500-600 ml of blood loss occurred during the surgery which lasted for 2 hours and 30 minutes. Total IV fluid given during the surgery was 1000 ml of ringer's lactate, 500 ml of hydroxyethyl starch and one vac of packed red blood cells (PRBC). Injection dexmedetomidine infusion at a dose of 0.2 µg/kg/h with ketamine 0.2 mg/kg/hour was used for mild sedation. Intraoperatively, ABG done showed pH 7.45, PCO<sub>2</sub> 23.2, PO<sub>2</sub> 214.5, HCO<sub>3</sub><sup>-</sup> 22, K<sup>+</sup> 4.15, Na<sup>+</sup> 137, and lactates 0.8. Surgical procedure lasted for 2 hrs and 30 minutes without any significant changes in HR and BP. Total urine output during the surgery (21/2 hr) was more than 1ml/kg/hr (300 ml). Postoperatively, pain relief was achieved with 0.1% plane with 2µg/ml fentanyl through epidural catheter running at 6ml/hr and injection paracetamol (PCM) 1 gm IV TDS for 3 days. Injection low molecular-weight heparin 40 mg was started 12 hr. after surgery and was given once daily for next 7 days. He was discharged home after 4 days. Regular follow-up in the surgery and cardiology departments were arranged.

#### Discussion:

Major adverse cardiac events perioperatively in patients with known CAD undergoing non-cardiac surgery is mostly seen in un-optimized patients posing a challenge to the anaesthesiologists. Antiplatelet medications like aspirin and clopidogrel are stopped before surgery due to the risk of bleeding but this can lead to acute coronary events. Morbidity is more after major surgeries like thoracotomies,

exploratory laparotomy, orthopaedic surgeries etc which lead to major fluid shifts and blood loss. Patients with extensive CAD, left ventricular dysfunction and uncontrolled HT are known to have adverse outcomes. Perioperative pain and intravascular volume shifts can also lead to adverse events in such patients. The choice of anaesthetic technique and the nature of agents used during anaesthesia are very important and can decide the severity of insult to cardiovascular system. Optimizing myocardial oxygen(O<sub>2</sub>) supply and minimizing demand are the primary anaesthetic goals in managing these kind of cases.

The following approach is suggested:

- Low to normal HR (e.g. 50 to 80 beats per minute) [2] as myocardial O<sub>2</sub> demand more than doubles when HR doubles [3].
- Normal to high BP within 20 percent of baseline value.
- Avoidance of fluid overload to avoid systolic wall stress and myocardial oxygen demand.
- Treatment of severe anaemia (i.e. Hb level < 8 g/dl) to maximize O<sub>2</sub> content in the blood [4]. Keeping these goals in mind, epidural catheter was placed to take care of analgesia during intraoperative and postoperative period as inadequate pain relief could have led to cardiac event in perioperative period. Injection dexmedetomidine along with ketamine was started at a minimal rate to maintain the HR and BP. Dexmedetomidine is very beneficial in CAD patients but gradually it leads to hypotension and bradycardia. To avoid this it is combined with ketamine. Although ketamine leads to tachycardia and hypertension but when combined with dexmedetomidine in low doses, combination counteracts each other's side effects and leads to stable vitals (neither bradycardia or hypotension nor tachycardia or hypertension) along with providing smooth sedation (avoiding hallucinations with ketamine use alone) [5]. Injection ropivacaine 0.1% plain with 2 micg/ml fentanyl was given via epidural for pain relief in postoperative period to minimize the effect of ropivacaine on blood pressure yet to give adequate pain relief. Noradrenaline was used to maintain peripheral resistance and timely

replacement of the blood loss with PRBC was done to maintain vitals of the patient as we avoided use of extra fluid to avoid stress on the heart. Severe hypotension reduces myocardial oxygen supply, while severe hypertension increases demand. Nitroglycerine and noradrenaline was used for maintaining BP beginning from induction throughout the intraoperative and critical initial postoperative period. Rate control, euvoemia, euthermia and good pain relief are the important issues that should be addressed in patients having un-revascularised DVD with stress test positive for inducible ischemia. With the exception of patients with an acute coronary syndrome (ACS) myocardial revascularization prior to non-cardiac surgery to improve perioperative outcomes is not recommended [6] and also it being a semi emergency surgery in lieu of pain and poor quality of life patient was taken up for surgery without revascularization. Anaemia reduces the delivery of O<sub>2</sub> to the myocardium and thus potentially worsens cardiovascular prognosis [7]. In a review of clinical trials of patients with a non-ST elevation ACS, the risk of nonfatal MI, or recurrent ischemia at 30 days was significantly increased in patients with Hb concentration below 11 g/dL [8]. Therefore we replaced the blood loss simultaneously with PRBC to maintain the delivery of oxygen to the myocardium.

#### Conclusion:

Unrevascularised DVD patient especially with DSE positive for inducible ischemia poses a major risk for intraoperative or postoperative ischemia or cardiac failure especially in surgeries associated with major fluid shifts and blood loss. But with proper monitoring, timely and judicious replacement of fluid and blood, judicious use of inotropes and vasodilators, adequate pain relief in the perioperative period and with the backup preparation of anticipated cardiac events intraoperatively and postoperatively these high risk cases can also be successfully managed.

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