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Limb in Limbo - Anaesthetic management of a hemodynamically unstable patient with atrial Fibrillation for emergency popliteal arterial embolectomy – A case report

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Abstract

Limb ischemia in a cardiac patient is a high risk surgical emergency to save the limb, for which revascularization is required immediately. Perioperative atrial fibrillation, CHF, shock, sepsis and low platelet count are associated with major risk of morbidity and mortality. It becomes imperative for an anesthesiologist to adequately assess and maintain the hemodynamic stability to prevent further complications. Here, we report the successful anesthetic management of a patient with all these complications scheduled for emergency popliteal artery embolectomy. The risks involved and potential benefits of general anesthesia versus regional anesthesia are also discussed.

Keywords: Embolectomy, Atrial Fibrillation, General Anesthesia, CHF.

Introduction

Critical limb ischemia has significant morbidity & mortality. It needs to be promptly recognised and treated to preserve limb viability and avoid amputation. Usually, revascularization of limb is done via angioplasty, bypass surgery or embolectomy to restore the perfusion. Such patients may carry significant comorbdities like cardiovascular disease, diabetes, & infections that need to be properly addressed preoperatively. [1]

Conditions like atrial fibrillation are highly deterimental in patients with poor cardiac reserve or CHF. Rapid irregular heart rate of AF may be precipitated by several factors including sepsis, electrolyte & acid base abnormalities, pulmonary complications like pulmonary embolism, hypoxia, hypovolemic, myocardial ischemia etc. [2]

Choice of anesthetic technique for surgery and postoperative analgesia in these high risk patients undergoing revascularization remains contraversial and is quiet challenging. But adequate knowledge of the pathophysiology, clinical features, diagnostic & treatment modalities aid in careful planning and provision of safe anaesthesia resulting in favourable outcomes. This case report aims to review the

management of a patient with perioperative AF posted for emergency embolectomy. [3]

Case Report

A 50-year-old male presented in the emergency department of the hospital with complaints of worsening bilateral lower limb pain, numbness and weakness. There was discoloration of the toes of right foot. Detailed history revealed that the patient was a known case of ischemic heart disease, hyperthyroidism and was a chronic smoker. Patient was previously admitted to the cardiac care unit of the hospital for an episode of congestive cardiac failure two years back.

He was on regular treatment of Tab Amlodipine/ Atenolol 5/50 OD, Tab Ecospirin 75mg HS, Tab Clopidogrel 75mg OD, Tab Atorvastatin 20mg HS, Tab Bisoprolol 2.5 mg OD and Tab Carbimazole 10 mg OD.

On physical examination, the patient was found to be conscious and oriented to time, place & person. Pulse was thready with a heart rate of 135-154bpm, irregularly irregular in rhythm and blood pressure of 82/45mm of Hg (MAP 57 mm of Hg). ECG showed atrial fibrillation. SpO2 on room air was 88%, which improved to 95% on 6L/min of oxygen support within a few minutes. Rhonchi were present bilaterally on chest auscultation. Inj. Amiodarone 150 mg was given over 10 minutes to control active AF. Ionotropic support started in the form of noradrenaline infusion @0.19mcg/kg/min to maintain MAP>=65mmHg. Inj Tramadol 100mg given for worsening limb pain. Nebulization with duolin & budecortisone was done.

2D Echocardiography revealed hypokinesia of inferior wall, interventricular septum, basal anterior septum with EF 40%. Doppler study of lower limbs showed heteroechoic contents in bilateral popliteal arteries– likely thromboembolic occlusion with minimal distal collateral flow in left lower limb & no distal flow in right lower limb. Lab investigations were haemoglobin 13.6gm/dl, TLC - 24800, Platelet 55000, Serum creatinine 1.67mg/dl , Na+ 132mEq/L, K+ 4.7 mEq/L, INR 2.1& normal thyroid profile. ABG analysis done was suggestive of metabolic acidosis with increased lactate levels of 7.

Emergency surgery was planned to reverse the decrease in limb perfusion which was threatening the limb viability and optimization was attempted prior to surgical intervention.

Radial artery cannulation was done for invasive blood pressure monitoring. Central venous catheterisation was done for central venous pressure monitoring to guide fluid therapy intra & postoperatively.

Before shifting patient to OT, vitals recorded were HR-128/min, irregularly irregular, IBP- 100/64 mmHg on ionotropic support , CVP-5cm of H2O, SpO2 – 96% on O2 mask with flow of 6 L/min, RR-30/min with shallow breathing pattern & fewer rhonchi on auscultation.

Amiodarone infusion was started @ 1mg/minafter 20 minutes of initial bolus dose in view of persistent atrial fibrillation.

CVP guided fluid therapy, broad spectrum antibiotics , ionotropic support, SDP transfusion & nebulization with bronchodilators with concomitant administration of oxygen therapy were all done preoperatively to reduce the intraopearative hemodynamic instability and other complications.

Anaesthesia Management

Patient was wheeled into the OR and five para monitoring (ECG, SpO2, pulse, temperature, Et CO2) was started along with IBP & CVP. Amiodarone infusion & ionotropic support were continued. Due to hemodynamic instability & compromised cardiac status, general anesthesia was preferred over neuraxial anesthesia.

Patient was preoxygenated with 100% O2 for 5 minutes. Glycopyrrolate 0.1 mg and Midazolam 2 mg were given intravenous as premedication. Rapid sequence Induction was done using Sellick's manoeuvre with lignocaine 50 mg iv, Etomidate 20 mg iv, and succinylcholine 100 mg iv. Intubation was done with cuffed endotracheal tube of internal diameter 8.5 mm.

Intraoperatively, Patient was maintained on propofol-fentanyl infusion, oxygen and vecuronium as muscle relaxant with IPPV. Multimodal analgesia was given using fentanyl and paracetamol. HR remained within 90-120/min on amiodarone infusion & MAP 65-70mmHg & CVP 8 - 10 cm H2O was maintained during the surgery. Ionotropic support was tapered off to 0.11mcg/kg/min towards the end of surgery. Urine output was adequate (>0.5ml/kg/hr).

After completion of the surgery, patient was shifted to the surgical intensive care unit for elective ventilation and monitoring. Dexmedetomidine infusion was started for sedation. Analgesia was provided using fentanyl given at 8 hourly intervals. IV fluids were given guided by CVP and anticoagulants were started in form of low molecular weight heparin. Postoperatively, AF reverted back to sinus rhythm after 18 hours. Ionotropic support was gradually tapered off over next 36 hoursand stopped. Then the patient was extubated uneventfully. After 2 days , patient was shifted to ward & discharged on 5th postoperative day.

Discussion

Occlusive arterial disease most oftenly results from either atherosclerosis or thromboembolism. It is more common in the lower extremities. If compensation is made by the collateral circulation, there are no signs & symptoms of limb ischemia but in case of multiple vessel involvement, symptoms may appear in the form of intermittent claudication, acute pain, ulcers or gangrene. Arterial occlusion is a time sensitive & left, untreated, can quickly progress to infarction & loss of limb and life. Elaborated medical history and evaluation is required as vascular surgeries carry the highest perioperative risk. The severity of ischemia can be further assessed with the physical exam. The surgical approach is directed at the reperfusion of the affected extremity which can be accomplished by surgical bypass, endarterectomy or embolectomy with results variable depending on the duration of ischemia & extent of occlusion. [3] [5]

Such patients may present with a variety of cardiopulmonary complications and fierce circulatory fluctuations intraoperatively. Identifying these patients who are at high risk of cardiac events is challenging but despite these limitations, a thorough clinical assessment is essential to look for risk factors. Preoperative assessment and optimisation is a multidisciplinary approach involving patient, surgeon, anesthesiologist, cardiologist. Patient often have multiple comorbdities and should be medically optimised to reduce perioperative risk but this should be balance against the impending danger of limb ischemia. [6]

This patient had ischemic heart disease, AF, hyperthyroidism, sepsis and shock. So, emphasis was given on management of AF which included elimination/control of precipitating factors & treatment of arrhythmias with pharmacological interventions. In this case, sepsis/hypoxemia/hyperthyroidism were the likely contributing factors of AF and priority was given to control these first. Patients presenting with evidence of hemodynamic or myocardial compromise should receive immediate interventions to restore sinus rhythm or rapidly reduce ventricular rates. Pharmacological cardio version using amiodarone (class III anti arrhythmic drug) was attempted in this case. Anti arrhythmic therapy is

tailored upon cardiac features and guided by type of AF and side profile of drug. [2] [7]

While the patient waits for surgical or interventional radiology assessment, initial therapy - fluid resuscitation, pain control & heparin administration should be done. [5]

Being a limb saving surgery, postponing the surgery was not an option. The anesthetic technique and most appropriate postoperative analgesia in this high risk patient undergoing revascularization surgery remains contraversial till date. Several techniques have been successfully used such as general anesthesia or neuraxial anesthesia or peripheral regional block. [4]

In emergency surgery, both anesthesiologist and surgeon prefer general anesthesia over regional anesthesia because of presumed difficult procedure, long duration surgery and more time consuming procedure with regional prior to surgery. [8]

Spinal/ Epidural anesthesia in this patient with compromised cardiac status could result in sudden hemodynamic instability due to sympathetic blockade. Low platelet count, deranged coagulation profile & need for intraop heparinisation were the other contributing factors for not giving neuraxial blockade/ peripheral nerve block.

Goal of anesthesia in this patient was to achieve & maintain hemodynamic stability, adequate hydration, normothermic & excellent postop analgesia.

All these factors led us to chose the general anesthesia which can be used for prolonged surgeries with no patient discomfort. It offers the great advantage of easy hemodynamic control during surgery& mitigates anxiety and stress with no intraop awareness & recall. It also eliminates waiting time for the block to set up. [3]

Considering the emergency/ urgency surgical intervention in this patient, rapid sequence induction (RSI) technique is used. These patients may present severe hypotension with any anesthetic agents due to inhibition of compensatory sympathetic stimulation. Ketamine & etomidate are the agents of choice for induction with less hypotension associated with etomidate. [9]

We decided to use TIVA with propofol & fentanyl due to low possibility of changing atrial excitability threshold and maintaing hemodynamic stability by minimising the sympathetic response to laryngoscopy at induction & during surgery. Good quality analgesia is vital for patient comfort & minimising stress response. [6]

Regardless of technique used, emphasis must be given on overall improvement of perioperative care leading to improved postoperative outcomes. Irrespective of anesthetic technique, good postoperative outcome is more likely to be influenced by the meticulous management of oxygenation, fluids, temp, analgesia. [3] [6]

Intraoperative monitoring besides continuous ECG should include intra-arterial pressure & central venous acess to assess intravascular volume & to improve blood flow to operated limb and facilitate blood sample collection.

Decision of extubation was delayed in view of hemodynamic instability and bad chest preoperatively.

Postop analgesia & anxiety should be considered as the response to surgical stress & risk of myocardial ischemia are maximum at that moment. [3]

Conclusion

The factors which favoured the good outcome of this high risk patient were appropriate preoperative assessment, adequate optimization of cardiac status, formulating the anaesthetic plan according to the patient, postoperative monitoring, prompt diagnosis & management of the complications.

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