



ANAESTHETIC MANAGEMENT OF A PATIENT WITH RHEUMATIC VALVULAR HEART DISEASE POSTED FOR FIXATION OF ACETABULUM FRACTURE

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ABSTRACT Patients with rheumatic heart disease (RHD) undergoing non-cardiac surgeries present a challenge for anesthesiologists. This case report discusses the anesthetic management of a 56-year-old female with severe mitral stenosis, posted for acetabulum fracture fixation. The patient's history revealed RHD with severe mitral stenosis, mild mitral regurgitation, and severe pulmonary hypertension.

Considering the risks associated with neuraxial anesthesia in mitral stenosis, general anesthesia (GA) with a Pericapsular Nerve Group (PENG) block was chosen. The patient was carefully premedicated, induced with appropriate drugs, and monitored intraoperatively. The PENG block, performed under ultrasound guidance, aimed to reduce hip pain without causing motor blockade.

The patient remained hemodynamically stable throughout the surgery, and postoperatively, the combination of GA with PENG block provided effective pain control, reducing the need for opioids. This approach contributed to an early recovery, emphasizing the importance of tailored anesthesia strategies for valvular heart disease patients undergoing non-cardiac surgeries.

KEYWORDS : Rheumatic heart disease, Valvular heart disease, Acetabulum fracture, Anesthetic management, Pericapsular Nerve Group (PENG) block, General anesthesia, Mitral stenosis, Hemodynamic stability, Postoperative analgesia, Hip surgery.

INTRODUCTION

When a patient with rheumatic heart disease (RHD) needs surgery anesthesiologist face a tricky balancing act to ensure their safety and comfort during the operation. RHD accounts for majority of valvular pathology. The burden of valvular heart disease in developed countries is steadily increasing with current estimates of an overall prevalence of 2.5% in the United States who have moderate or severe valvular disease, increasing to 13% prevalence in those older than 75 years of age. The overall incidence of valvular heart disease increases with age(1). In these patients surgeries, especially for hip fractures, have the additional challenge of managing pain perioperatively.

The anesthetic management aims to provide intraoperative hemodynamic stability while ensuring good postoperative analgesia. For this various options are available ranging from systemic analgesics to regional anesthesia. In this article we have discussed the plan of anesthetic management of a patient with acetabulum fracture posted for fixation, why we have chosen particular approach and what benefits it offered.

Case Report

A 56years old female was admitted to the hospital with right closed acetabulum fracture without distal neurovascular deficit. She had history of fall 2 days back but no history suggestive of head injury. Patient gave history of exertional breathlessness, no history of chest pain, palpitation, cough or edema. Patient gave history suggestive of rheumatic fever.

On examination her pulse rate was 82/min, blood pressure was 120/80 mmHg, respiratory rate was 18/min and saturation was 95-98% on room air. On systemic examination both heart sounds were heard, systolic murmur was present in mitral area and air entry was equal on both sides.

Investigation reports showed hemoglobin 11gm%, total leucocyte count count were 7530/cmm, platelets were 1.50lakh/cumm, serum creatinine was 0.8mg/dl, blood urea was 34mg/dl, serum sodium was 141mEq/L, serum potassium was 4.8mEq/L, total bilirubin was 1.7 mg %, indirect bilirubin was 0.2 mg%, indirect bilirubin was 1.5 mg/dl, serum S.G.O.T. was 23 U/L, serum S.G.P.T. was 11 U/L, prothrombin time(PT) was 11.3 sec, international normalized ration(INR) was 0.94, random blood sugar level was 108 mg/dl.

ECG showed "M" pattern in lead V₁, chest x-ray showed cardiomegaly with raised bronchovascular marking and on 2D Echo ejection fraction was 55%, RHD, severe MS, mild MR, severe pulmonary hypertension, mitral valve area by plannimetry was 1.0 cm² & by pressure half-time was 0.8cm², PASP by tricuspid regurgitation jet is 74 mmHg, good left ventricular systolic function.

Considering the diagnosis of valvular heart disease; patient was started on tab. frusemide + Spironolactone (20/50mg), tab. Metoprolol XL 25mg.

Patient was posted for open reduction with plating of acetabulum. Plan of anesthesia was general anesthesia (GA) with pericapsular nerve group (PENG) block. Preoperatively informed written high risk consent taken. Intraoperative monitoring included Heart Rate, Spo₂, ECG, ETCo₂, Urine output & BP (Invasive arterial).

After preoxygenation, premedication was done with Inj. Midazolam 2mg + Inj. Fentanyl 100mcg. Induction was done with Inj. Etomidate 20 mg + Inj. Vecuronium 6 mg. Then endotracheal intubation was done with ET tube no 7 and anaesthesia was maintained on oxygen + air + 2-3% Sevoflurane + intermittent doses of Inj. Vecuronium (1mg). Ultrasound guided PENG (Pericapsular nerve group) block was given with 20ml Inj. Ropivacaine (0.375%).

Patient was hemodynamically stable intra operatively & surgery was uneventful. Duration of surgery was 4 hours. Intraoperative blood loss was 500 ml which was replaced with PRBCs. Postoperatively patient was monitored in ICU for 24 hours & discharged from the hospital on 8th post-operative day.

DISCUSSION

Rheumatic heart disease is caused by repeated or continuous infection by group A Streptococcus after first attack of rheumatic fever which affects the heart. The patient presented here had RHD with severe mitral stenosis, mild mitral regurgitation and severe pulmonary hypertension.

Intraoperative Hemodynamic goals for the patient with mitral stenosis (2) are (i) Maintain adequate preload, (ii) Maintain the heart rate between 70 & 90 beats per min.[Maintain sinus rhythm(3)], (iii)Maintain afterload in the normal range, (iv)Maintain myocardial contractility.

Routinely hip surgeries are done in neuraxial block. But here in this case of RHD with severe MS for non-cardiac surgery neuraxial anesthesia can be hazardous (1). Mitral stenosis is a fixed cardiac output condition. Spinal Anesthesia leads to decrease in afterload due to peripheral vasodilatation which causes severe hypotension (4). Routinely hypotension of spinal anesthesia is treated with bolus IV fluids administration and vasopressors if required. In patients with mitral stenosis fluid bolus can lead to fluid overload and subsequently pulmonary edema. Hence spinal anesthesia is not recommended in these patients. With epidural anesthesia even though hemodynamic changes are less profound compared to spinal anesthesia it is technically more challenging due to problems related to patient

position. In acetabulum fracture surgery because of operative blood loss reflex tachycardia can occur. This tachycardia causes decreased time of diastolic filling of left ventricle leading to pulmonary edema. Increase in pulmonary arterial pressures can be avoided by preventing hypoxia, hypercarbia, acidosis, lung hyper expansion, and use of nitrous oxide(5).

General anesthesia is the preferred choice in RHD with severe MS although it is not without problems. Routinely for GA patient is premedicated with glycopyrolate which is most commonly used anticholinergic drug having an antisialagogue effect. As it causes tachycardia & cardiac arrhythmia(6) it is avoided in RHD patients. We used Midazolam, a short-acting benzodiazepine, for anxiolysis, hypnosis, sedation, anterograde amnesia, and anticonvulsant effect(7). Midazolam typically has minimal impact on cardiovascular system making it a suitable choice for patients with RHD. Fentanyl, a potent synthetic opioid, was given to blunt the intubation response which would have caused tachycardia. Etomidate which is an ultra-short acting, non-barbiturate hypnotic intravenous induction anesthetic agent was used because it has a favorable hemodynamic profile on induction, with minimal blood pressure depression, making it ideal for patients with significant cardiovascular disease(8).Where as Propofol was avoided as it causes post-induction hypotension which results from arterial dilation with reduced systemic vascular resistance rather than venous dilation or reduced myocardial contractility(9). Ketamine, an intravenous dissociative anesthetic agent used for induction, causes transient increases in blood pressure, bradycardia, left ventricular dysfunction in patients with heart failure, respiratory and cardiac arrest, arrhythmias and QTc interval prolongation and should be avoided (2,10,11). Amongst muscle relaxants, Vecuronium and rocuronium have stable cardiovascular profile (10). In our patient we used Vecuronium. Sevoflurane was administered to the patient due to its superior cardioprotective properties compared to isoflurane. This results in a reduced likelihood of myocardial infarction, decreased need for pharmacological and mechanical support, and shortened durations of both ICU and hospital stays(11).The utilization of nitrous oxide is contraindicated, as it may exacerbate the existing elevation in pulmonary vascular resistance in patients with pre-existing cardiac conditions (4).

Titrated doses of vasopressors like phenylephrine to maintain BP and short acting β -blockers like esmolol or metoprolol or calcium channel blockers like diltiazem to control heart rate can be used when required. Due to intra operative pain there is tachycardia and hypertension which in turn leads to pulmonary edema. Hence generous amount of opioids are needed to abolish hemodynamic response to intubation, intra operative pain and for post-operative analgesia. But the drawback of opioids is respiratory depression. Therefore we decided to give general anesthesia (GA) with PENG Block in this patient. Goals of hemodynamic stability were achieved by addition of novel regional analgesia technique- PENG Block to GA along with reduction in opioid consumption and related adverse effects of opioids (12).

PENG Block was first described in 2018 by Giron- Arango et al(12). It is a technique to reduce hip pain in surgeries. In this technique Ultrasound guided local anesthetic drug is deposited in fascial plane between psoas muscle anteriorly & superior pubic ramus posteriorly (see fig 1 and 2 below). It aims to block articular branches supplied by femoral, obturator & accessory obturator nerves(13).

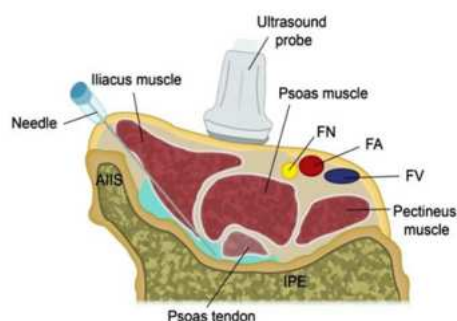


Figure 1(12). Diagrammatic representation of the Pericapsular Nerve Group blocks being performed. AIIIS = Anterior inferior iliac spine, IPE = iliopectineal eminence, FN = femoral nerve, FA = femoral artery, FV = femoral vein.

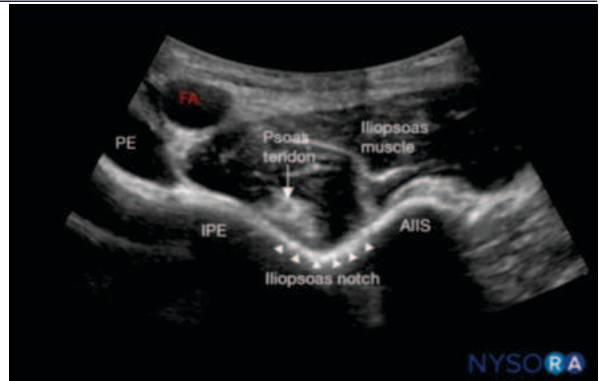


Figure 2. Sonographic anatomy of the Pericapsular Nerve Group Block(14).

Most commonly performed peripheral nerve blocks for hip fractures include lumbar plexus block, or a supra inguinal fascia iliaca compartment block. But the articular branches of both the femoral and obturator nerve, those which innervate the anterior hip capsule, may not be optimally blocked by these techniques. These blocks also generally cause a degree of motor blockade, which can delay post-operative mobilization(12).Whereas PENG block targets only the sensory innervation of the hip, and case studies have reported a potential motor-sparing effect when compared with other peripheral nerve blocks(12).Absence of motor blockade after PENG block may allow earlier patient mobilization postoperatively and earlier participation in rehabilitation, contributing to an early recovery(12).

CONCLUSION

In Patient with severe MS posted for acetabular fracture fixation; use of PENG Block along with GA provides excellent intra-operative analgesia with good hemodynamic stability, decreases requirement of intra operative anesthetic drugs & provides post-operative analgesia as well contributing to early recovery.

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