



Research Article

ANESTHETIC MANAGEMENT FOR KYPHOSCOLIOSIS CORRECTION IN A PATIENT WITH A LARGE ASD WITH MODERATE PULMONARY HYPERTENSION: A CASE REPORT

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ARTICLE INFO

Article History:

Received 06th December, 2019

Received in revised form 14th

January, 2020

Accepted 23rd February, 2020

Published online 28th March, 2020

Key words:

Kyphoscoliosis, Pulmonary Hypertension, Atrial Septal defect, Congenital Heart Disease.

ABSTRACT

Introduction: Kyphoscoliosis is a complex deformity of the spine and anaesthesia for kyphoscoliosis surgery associated with CHD can be challenging, with several aspects to be kept in mind simultaneously. Patients should be evaluated in terms of airway difficulties, respiratory, cardiovascular and neurological system disorders in the preoperative evaluation. Particular attention should be paid to important cardiac problems and congenital anomalies. Cardiac pathologies such as atrial septal defect (ASD) may be most common. **Case Report:** A 16year old male with k/c/o kyphoscoliosis with recently diagnosed ASD was posted for kyphoscoliosis correction surgery. On examination patient had complaints of dyspnea on exertion. Airway assessment revealed mallampati grades 1 with mouth opening of 3 fingers, neck movements were normal. **Discussion:** Kyphoscoliosis associated with ASD pose a great challenge to the anesthetist as both of them cause severe cardiopulmonary compromise. Kyphoscoliosis is a progressive spinal deformity characterized by anterior flexion and lateral curvature of vertebra. Patient with severe spinal deformity usually have smaller lung volume and loss of thoracic elasticity resulting in increased energy requirements. **Conclusion:** Kyphoscoliosis with ASD poses a great challenge for anesthetist as both may cause cardiopulmonary complications.

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INTRODUCTION

Kyphoscoliosis is a complex deformity of the spine and anaesthesia for kyphoscoliosis surgery associated with CHD can be challenging, with several aspects to be kept in mind simultaneously. Patients should be evaluated in terms of airway difficulties, respiratory, cardiovascular and neurological system disorders in the preoperative evaluation. Particular attention should be paid to important cardiac problems and congenital anomalies. Cardiac pathologies such as atrial septal defect (ASD) may be most common. The risk of perioperative complications is higher in children with congenital heart disease (CHD) for both minor and major surgery. Although CHD is uncommon, it is important for the anaesthetist to understand how to recognise a child with CHD, and the principles of anaesthetic management for children with both unrepaired and repaired lesions.

Kyphoscoliosis can be present at any age with prevalence more in males for infantile/juvenile scoliosis and female more prone to adolescent scoliosis.

Prevalence of 0.3%-15.3% in general population

Curves >10 degree - 1.5%-3% population.

Curves >20 degree – 0.3%-0.5% population.

Curves >30 degree – 0.2%-0.3% population.

Assessment of Severity

COBB'S method of measurement is used for the assessment of severity.

To measure COBB'S angle identify upper and lower end vertebra

Draw lines extending along the vertebral border and measure the cobb angle.

Case Report

A 16year old male with k/c/o kyphoscoliosis with recently diagnosed ASD was posted for kyphoscoliosis correction surgery. On examination patient had complaints of dyspnea on exertion. Airway assessment revealed mallampati grades 1 with mouth opening of 3 fingers, neck movements were normal. On auscultation chest was clear, heart sounds revealed fixed splitting of S2 with systolic murmur. Patient was advised routine investigation such as Complete Blood Count, ECG and Chest X-ray which were within normal limit, additional investigation which were advised was pulmonary function test

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which revealed Restrictive Airway Disease with Poor Elastic Recoil, 2D ECHO revealed Ostium Secundum ASD (19-20mm) , Left to Right shunt with moderate PAH (PASP-50mmhg) with Left Ventricle Ejection Fraction of 60%. X-ray spine revealed Thoraco Lumbar Scoliosis with Cobb's Angle of 50 degrees. Patient was planned under general anesthesia. The aim was to maintain stable depth of anesthesia without any hemodynamic stability. Patient was pre medicated with i.v. GPL and Midazolam and induction was done using i.v. propofol 1.5mg/kg body weight followed by a non depolarizing muscular blocking drugs i.v. cis atria 0.2mg/kg body weight and tracheal intubation done using armoured tube of size 7.00mm. Anesthesia was maintained using sevoflurane at 0.6MAC with air and oxygen. IV fentanyl 0.5mg/kg body weight and PCM 15mg/kg body weight were given for analgesia. Calculated fluid was given to the patient to avoid fluid overload as it may worsen the right heart failure, care was taken to avoid air bubble through i.v. line as air can enter the left chamber of heart through the shunt and may lead to embolism. Patient remained stable throughout the surgery and was extubated uneventfully. Intra operative blood loss was estimated to be 800ml. Patient was shifted to ICU and 1unit pcv was transfused post operatively.

Positioning

Patient was turned into prone position; care was taken while turning the patient as it can cause accidental extubation, dislodgement of urinary catheters and intra vascular catheters. Patient's head was rested on Wilson frame and extensive flexion or extension of neck was avoided. Eyes were covered with proper padding to avoid pressure related injuries to optic nerve which can result in postoperative vision loss. Arms were abducted to less than 90degrees, peripheral nerves and genitalia were covered to avoid compression and soft tissue damage. After turning the patient chest was auscultated again to make sure B/L air entry is equal.

Monitoring

All non invasive routine monitors such as ECG, NIBP, ETCO₂ and SPO₂ were used. 2 Large bore i.v. catheters were sited. Body temperatures can considerably decrease throughout the surgery therefore warm IV fluids and blankets were used to prevent hypothermia.

DISCUSSION

Kyphoscoliosis associated with ASD pose a great challenge to the anesthetist as both of them cause severe cardiopulmonary compromise. Kyphoscoliosis is a progressive spinal deformity characterized by anterior flexion and lateral curvature of vertebra. Patient with severe spinal deformity usually have smaller lung volume and loss of thoracic elasticity resulting in increased energy requirements. It causes a decrease in vital capacity of lung, compliance and tidal volume while residual volume and total lung capacity are normal. Patient with kyphotic hyperventilate and likely to experience respiratory failure such as hypercapnia, hypoxemia and respiratory acidosis. The severity of pulmonary derangement in patient with kyphoscoliosis is related to Cobb's Angle. Chest deformities are known to increase pulmonary vascular resistance by preventing the development of pulmonary vascular system, persistent increase in pulmonary vascular resistance can cause pulmonary hypertension which can lead to Right Heart Failure associated with ASD further adds to insult

and can worsen the Right Heart Failure. Anesthetic management includes decrease in magnitude of shunt and preventing establishment of hypoxic shunt known as Eisenmenger Syndrome by maintenance of systemic and pulmonary vascular resistance. Anesthetic management strategies include use Benzodiazepines and opioids are used for as they are hemodynamically stable at sedative doses and cause very less decrease in systemic vascular resistance, careful use of general anesthetic agent such as propofol, sevoflurane as they cause decrease in SVR. Adequate volume resuscitation, careful titration of general anesthetics and avoiding hypoxia are all important management strategies. Agent to avoid is Ketamine as it causes sustained increase in SVR and will have a major impact on shunt physiology.

Patient posted for kyphoscoliosis correction surgery are at increased risk of blood loss which can be reduced by avoiding light anesthesia, hypertension and hypercapnia, proper positioning by avoiding raised intra abdominal pressure, anesthesia hypotensive management by using vasodilators such as nitroglycerine and beta adrenergic blockers such as esmolol and labetalol and use pharmacological agents such as Tranexemic Acid @10mg/kg body weight since patient is ventilated in prone position the anesthetist should make sure the arms are abducted at less than 90 degrees to avoid brachial plexus stretching. With elbows flexed in prone position the ulnar is at risk of pressure related injury and should be protected, proper padding of eye to avoid pressure related injuries, head end should be elevated above the level of right atrium to avoid venous air embolism, chest and abdomen should be supported away from the bed to avoid increase abdominal pressure which causes increase bleeding from valveless epidural veins, reducing cardiac output and increases the risk of lower limb thrombosis. Post operative pain management should be multimodal and it includes use of opioids such as Tramadol 2mg/kg body weight, Paracetamol 15-20mg/kg body weight. NSAID'S such as ketorolac, ibuprofen should be avoided as they may impair bone healing.

Wake Up Test

It is considered to be the Gold Standard method of assessing spinal cord function for surgeries of vertebral column. Patient was explained pre-operatively about wake up test and was asked to squeeze the anesthesiologist's hand and move their feet before the induction of anesthesia. Intraoperatively maintenance of anesthesia by sevoflurane was stopped and infusion of fentanyl at dose of 1-3mcg/kg/hr was started to avoid intraoperative pain. Patients were asked repeatedly during the procedure to move their hands and feet. After finishing the wake up test, the maintenance of anesthesia was continued.

CONCLUSION

Kyphoscoliosis with ASD poses a great challenge for anesthetist as both may cause cardiopulmonary complications. A detailed Pre anesthetic checkup and optimization of both respiratory and cardiovascular system is imperative. Intraoperative considerations include monitoring, fluid management, positioning, blood conservation, post operative intensive care and post operative analgesia.

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How to cite this article:

Dr. Preeti Tiwari *et al* (2020) 'Anesthetic Management for Kyphoscoliosis Correction in A Patient with A Large Asd with Moderate Pulmonary Hypertension: A Case Report', *International Journal of Current Advanced Research*, 09(03), pp. 21507-21509. DOI: <http://dx.doi.org/10.24327/ijcar.2020.21509.4229>
