International Journal of Medical and Health Sciences

Journal Home Page: http://www.ijmhs.net ISSN:2277-4505

Case Report

Patient with congenital aortic stenosis undergoing noncardiac surgery: Anaesthetic implication

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ABSTRACT

Patients of congenital aortic stenosis requiring noncardiac surgery need special anaesthetic considerations as pathophysiology of aortic stenosis is complex & there occur significant effect of anaesthetic drugs on heart rate, rhythm, preload, after load, myocardial contractility, systemic & pulmonary vascular resistance. We hereby present our experience in a case of a 5 year old male child, known case of aortic stenosis who underwent inguinal herniotomy.

KEYWORDS: Aortic stenosis, Noncardiac surgery, Congenital

INTRODUCTION

Congenital heart disease is a major cause of morbidity and mortality in children. Aortic stenosis can be either congenital or acquired. Bicuspid aortic valve is commonest cause of aortic stenosis, accounting for 1-2 % of general population with autosomal dominant inheritance and a variable penetrance [1]. A bicuspid aortic valve usually asymptomatic in early phase, will later lead to scarring and calcification of aortic valve,hence progressing to aortic stenosis with or without aortic regurgitation.

The severity of aortic stenosis is highly predictive of perioperative complication [2]. Mild aortic stenosis is well tolerated during anaesthesia but moderate to severe aortic stenosis is a major risk factor for perioperative morbidity and mortality.

Anaesthetic consideration of patient with congenital aortic stenosis undergoing noncardiac surgery includes understanding complex pathophysiology of aortic stenosis, avoiding fluctuation in hemodynamics while achieving adequate anaesthetic depth and preventing drug induced cardiac complications. We hereby report a case of moderate aortic stenosis with Mild aortic regurgitation, who was successfully managed for inguinal herniotomy.

CASE REPORT

A 5 years old male child, known case of aortic stenosis, weighing 17 kg was admitted for inguinal herniotomy. On preanaesthetic check up, there was no history of breathlessness, syncope, chest pain, recurrent cough, cold and cyanotic spell. Patient was not on any medication. On examination, pulse was irregular in rhythm with variable rate of 85-110 beats per minute and a systolic ejection murmur of grade III radiating towards neck and left side was heard over 2nd right intercostal space. Airway was adequate and respiratory and centralnervous system examinations were within normal limit.

All routine blood investigation and coagulation profile were normal. Chest X-Ray showed cardiomegaly (fig-1) and ECG finding were of left axis deviation. Past history revealed that he had undergone inguinalherniotomy on the other side at 11m of age under general anaesthesia with an uneventful course. However, 2D Echo done at that time revealed mild aortic stenosis (Pressure gradient - 35.2 mm Hg) with mild aortic regurgitation with left ventricular ejection fraction of 80%.

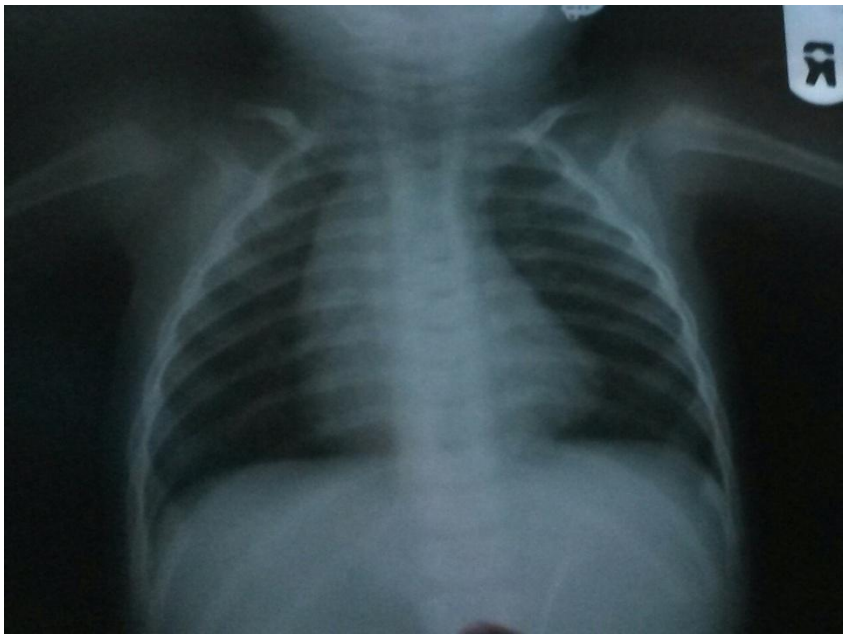
Present 2D Echo reported Bicuspid aortic valve with moderate aortic stenosis (pressure gradient - 46.5 mm Hg) with mild aortic regurgitation with normal left ventricular

systolic function with left ventricular ejection fraction of 65%. Cardiologist consultations reported high risk for this surgery. As the child was asymptomatic with ejection fraction of 65, no surgical intervention was required preoperatively for aortic stenosis.

In the operation theatre, all emergency drugs and defibrillator were kept ready. On arrival of patient in Operation theatre, patient was premedicated with Inj. Midazolam 0.85mg and Inj. Glycopyrrolate 0.08mg through I.V. line in situ and Inj. ringers lactate started. Routine monitors like pulse oximetry, NIBP and ECG were attached and baseline parameters recorded. Baseline BP-103/63 mm Hg,, SpO_2 - 100%, PR- 83/min, irregular. Inj. atropine 0.2 mg was given I.V. and heart rate increased to 112/min with regular rhythm.

After preoxygenating the child for 5 min, Inj. Fentanyl 30 µg was given slowly I.V. and pulse and Blood Pressure was monitored. Induction of anaesthesia was done with Inj. propofol 40 mg mixed with Inj. xylocard 2% (1mg/ml) in a slow and titrated manner. After adequate law relaxation, proseal LMA size 2 was inserted to secure airway. Anaesthesia was maintained with O_2 and sevoflurane with spontaneous ventilation. After completion of surgery, patient was kept on 100% O_2 in recovery room. proseal LMA was removed once patient became awake. Postoperative course was uneventful and child was discharged with advice to follow up in cardiology department.

Figure 1: Chest X-Ray of the patient showing cardiomegaly



DISCUSSION

Congenital aortic stenosis accounts for a live birth incidence of ~0.1% [3]. Aortic stenosis either congenital or acquired causes pressure overload to myocardium which later progresses to classical triad of angina (35%), syncope (15%) and dyspnea (50%) indicative of poor outcome and death within 5,3 and 2 yrs. [4].

Aortic valve area is normally $2cm^2/m^2$ of Body Surface Area. 2/3rd of children with congenital aortic stenosis present with bicuspid aortic valve and remaining 1/3rd have tricuspid valve that can be either fused or have dysplatic cusps [5]. According to classification of aortic stenosis in children based on valvular peak systolic ejection gradient [PSEG], Our child had moderate aortic stenosis with PSEG of 46.5 mm Hg with bicuspid aortic valve [5]. Initially as aortic outflow obstruction occur, compensatory left ventricular hypertrophy occur to maintain pressure gradient and hence cardiac output is maintained. Later, hypertrophied ventricle become stiff leading to diastolic dysfunction and reduced compliance. Eventually aortic stenosis progresses, precipitating the heart failure and myocardial ischemia.

In patient with known aortic stenosis, there is progressive reduction in valve area of ~$0.1cm^2$/year [3]. So, these patients require close monitoring. A repeat ECHO should be done if symptoms have progressed. In our child, previous ECHO done at the age of 11m, showed mild aortic stenosis with pressure gradient of 35.2 mm Hg and left ventricular ejection fraction(LVEF) of 80%, which had progressed to moderate aortic stenosis with PSEG of 46.5mm and LVEF of 65%.

Anaesthetic implications in patients with congenital aortic stenosis undergoing noncardiac surgery include intensive hemodynamic monitoring, adequate preloading, avoidance of hypotension, avoidance of bradycardia as well as tachycardia and maintainance of since rhythm. Avoidance of bradycardia is done to prevent fall in cardiac output and tachycardia because it can lead to ischemia due to reduction in diastolic coronary perfusion. Hypotension must be prevented and treated promptly with vasopressors. Infusion and maintenance of vasopressors are preferred over bolus dose of vasopressors.

Heart rate should be kept normal or slightly higher in children. β blockers can be used in case of excessive tachycardia. Cardioversion may he required to maintain sinus rhythm. Defibrillator and emergency drugs should be kept in hand. There is paucity of literature regarding anaesthetic management in Pediatric patient with aortic stenosis undergoing noncardiac surgery. One case report was of a 9 year old gild posted for liver transplantation [6]. Other was of a child with aortic stenosis posted for IOL implantation [7]. Sinha et al used thiopentone and fentanyl for induction of anaesthesia and vecuronium and isoflurane was used for maintenance of anaesthesia. Proseal LMA was used for airway securement. 2 case reports of children with aortic stenosis undergoing cardiac surgery has been described. One case was of PDA ligation and in other percutaneous transcatheter device occlusion had been done [8,9].

In our patient, preoperative bradyarrythmia was treated with Inj. atropine 0.2mg. Since child was asymptomatic and surgery was minor with no anticipated major fluid shift, invasive monitoring like invasive Blood Pressure, Central Venous Pressure monitoring was not done.

Proseal LMA was preferred over ET tube to prevent hemodynamic changes during induction and emergence associated with intubation. We preferred multimodal analgesia in form of I.V. fentanyl and paracetamol suppository in our child. Caudal anaesthesia for providing intraoperative and postoperative analgesia could have been another option but its beneficiary role must be weighed for slight hypotension which may be a consequence of caudal block. Though there are reports of use of neuraxial block in form of spinal and epidural block with catheter placement in adults, to the best of our knowledge there is no literature of use of single shot caudal block in children with aortic stenosis.

CONCLUSION

In conclusion, anaesthetic management of patient with aortic stenosis coming for noncardiac surgery may not be associated with adverse complication provided hemodynamic stability is maintained by sound knowledge of physiological and pharmacological principles.

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