Journal of Clinical and Medical Images

Case Report

ISSN: 2640-9615 | Volume 6

Management of the Patient with Dextrocardia, ASD, VSD and Scoliosis Under General Anesthesia: A Case Report

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Received: 05 Oct 2022
Accepted: 17 Oct 2022
Published: 21 Oct 2022
J Short Name: JCMI

Citation:

Sert İE, Management of the Patient with Dextrocardia, ASD, VSD and Scoliosis Under General Anesthesia: A Case Report. J Clin Med Img. 2022; V6(18): 1-3

Keywords:

Anesthesia; Dextrocardia; ASD; VSD; Scoliosis; Management

1. Abstract

1.1. Background: With the new anesthesia methods and developments in pediatric surgery, the life expectancy of patients with congenital heart disease (CHD) has been prolonged. The presence of congenital and cardiac anomalies complicates the management of anesthesia and perioperative difficulties may be experienced for the anesthetist when cardiac or non-cardiac surgeries are planned for these patients. In our case, we present a patient who had a right-to-left shunt due to CHD and therefore had a basal peripheral oxygen saturation (SpO2) of 80-85%.

1.2. Case Presentation: A 27-year-old male patient presented with indirect inguinal hernia and incisional hernia. He had dextrocardia, atrial septal defect (ASD), ventricular septal defect (VSD) and scoliosis. His SpO2 levels were between 80-85%. He was assigned an American Society of Anesthesiologists (ASA) score of 4. Indirect inguinal hernia and incisional hernia operation was planned. He was operated under general anesthesia (GA). The postoperative period was uneventful and the patient was discharged home.

1.3. Conclusion: There is no harm in administering GA with careful observation throughout the surgery for patients with a baseline SpO2 of 80-85% due to a left-to-right shunt. We have demonstrated in this case report that a patient with dextrocardia, VSD, ASD and hemodynamic instability can undergo non-cardiac surgery with detailed monitoring, optimization and correct patient management.

2. Introduction

The incidence of CHD is 0.9% in all live births [1]. The incidence of dextrocardia is approximately 1 in 12000 births [2] As dextrocardia causes arrhythmias, especially AV blocks, it can be a problem for the anesthetist in patient management by causing dysrhythmias [3]. The life expectancy of patients with CHD has increased with new anesthetic methods and advances in pediatric surgery. This increases the morbidity and mortality risk of anesthesia. Monitoring is more important in specific cases with CHD. Preoxygenation should be done more carefully in these patients due to the presence of shunt.

In this case, we present a patient who underwent inguinal and incisional hernia repair under GA without any intraoperative complications.

3. Case Report

A 27-year-old male patient (168 cm, 73 kg) who had undergone cardiac surgery twice at the age of 6 and 8 years and has ASD, VSD, dextrocardia and hypertension presented for indirect inguinal hernia and incisional hernia operation. Written consent of the patient and approval of the local ethics committee were obtained. In the preoperative evaluation, the patient's SpO2 was 78%. Blood investigations were within normal limits. He had been taking digoksin®, aspirin® and furosemide® tablets. Electrocardiography (ECG) showed atrial fibrillation. The transthoracic echocardiography (TTE) revealed a 45-50% ejection fraction, large secundum

ASD, VSD, mild mitral regurgitation and severe tricuspid regurgitation. Chest X-ray showed dextrocardia, cardiomegaly and scoliosis (Figure 1).

Mallampati score was evaluated as 3. He was assigned an ASA score of 4. The patient was premedicated with midazolam 2 mg in the preoperative room. 2 grams of cefazolin® was given preoperatively for endocarditis prophylaxis. Standard monitoring was done. Pulse oximeter and continuous ECG was instituted. ECG electrodes were placed in opposite way. Vascular access was opened with a 20g intraket. Arterial cannula was placed under local anesthesia. After sleeping, a central venous catheter was inserted. The defibrillator was kept ready in the room in case the patient could enter ventricular tachycardia and ventricular fibrillation at any time. To prevent paradoxical air embolism, air filters were used to prevent air from entering the peripheral vascular lines. Transesophageal echocardiography was available to observe intraoperative complications. In the operating room (OP), initial SpO2 was 85%, blood pressure (BP) was 110/65 mmHg and heart rate (HR) was 90 beats/min. He was preoxygenated with 100% oxygen. GA was induced with intravenous (IV) anesthesia of 2 mg/kg propofol, 1-5 µg/kg fentanyl and 0.6 mg/kg rocuronium. The patient was intubated with a videolaryngoscope. Volume controlled ventilation with was applied. The tidal volume was set to 4 mL/kg, the frequency to 12 and positive end expiratory pressure (PEEP) to [6-8]. During the intraoperative period, the patient's SaO2 was between 82-90%. His heart rate and blood pressure remained stable. In ECG, atrial flatter was observed. (Figure 2) Due to a loading dose of 300 mg and a 30-minute infusion of 900 mg of amiadorone were administered. The total fluid administered to the patient intraoperatively was 1000 ml. The duration of surgery was 2 hours. In the end of the surgery, extubation was performed. Pain control was carefully achieved. We observed the patient in the recovery room for 20 minutes before sending him to the ward. Anticoagulants were started as soon as possible postoperatively. The postoperative period was uneventful and the patient was discharged home.

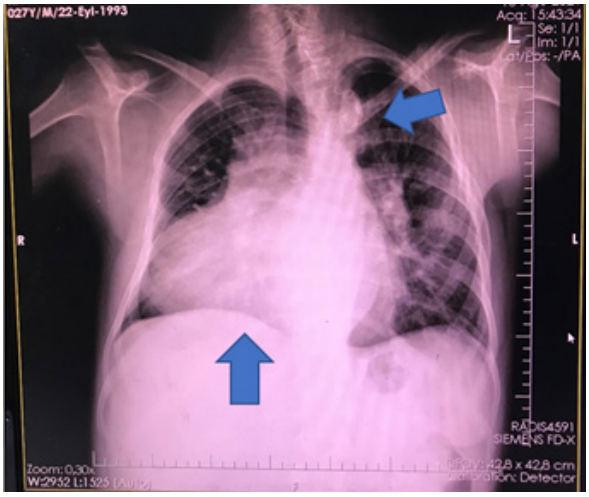

Figure 1:

Figure 2:

4. Discussion

Dextrocardia is a congenital abnormality in which the heart is positioned in the right hemithorax. Dextrocardia alone is less likely to affect airway pathology, but when dextrocardia is diagnosed as part of situs inversus, the patient has a 25% chance of having Kartagener's syndrome or primary ciliary dyskinesia [4].

Solitary ASDs constitute approximately 6-10% of all CHD and are the most common CHD. CHDs are detectable in the general population in up to 75/1000 live births [5].

Both ASDs and VSDs cause volume overload of the heart. Over time, this loading causes right ventricular enlargement and increased pulmonary vascular pressures. VSDs tend to cause pulmonary hypertension more easily and earlier than ASDs [6].

Changes in systemic vascular resistance (SVR) and pulmonary vascular resistance (PVR) are the main determinants of how the shunt behaves [7]. Small decreases in SVR will reduce the size of the left-to-right shunt by promoting systemic blood flow. Inadequate anesthesia and sympathetic discharge will cause increased SVR. Normovolemia (avoidance of hypovolemia) and maintenance of normal SVR and prevention of acute increases in PVR are required in these patients. Hypoxia, hypothermia, acidosis, hypercarbia, hypervolemia/hypovolemia and sympathetic discharge increase the shunt by causing PVR elevation.

Choosing anesthetic management in these patients depends on the presence of shunt, hypoxemia, pulmonary hypertension and arrhythmia. We could have preferred regional anesthesia, but we did not prefer spinal because the patient's hemodynamics was unstable. We did not perform the epidural because the patient did not want it.

Left-to-right shunts have minimal effect on inhalation or intravenous induction. Normal saturation should not be expected in these patients. High partial arterial oxygen pressure (PaO2) and low PaCO2 cause vasodilation in pulmonary vessels. Accordingly, we avoided hyperventilation with end tidal co2 between 34-36., 100% oxygenation and hyperventilation increase pulmonary congestion in patients with L-R shunts and should be avoided [8].

In a case presented by Abdelhamid et al., a female patient 78-year-old with long standing Eisenmenger syndrome had future neck femur, arthroplasty under hemi spinal anesthesia. It is very important to maintain cardiovascular stability in these patients. In our patient, we preferred GA and early extubation, not spinal anesthesia. Therefore, early extubation should be avoided, it may cause worsening of shunt and thromboembolic phenomena. In studies, they recommended a general anesthetic technique with normal hemodynamics, with adequate pain control and initiation of thromboprophylaxis as early as possible [9].

In a case presented by Kim et al., a 58-year-old male patient was scheduled to undergo elective mitral valve repair surgery to repair mitral valve prolapse. Complications during surgery can be prevented by preoperative evaluation of these patients in terms of anatomical differences and comorbidities. ECG with reversed lead placement should be applied to prevent misinterpretation of the ECG [10].

In another case study for Abraham et al., they described a case of a 38-year-old male patient with dextrocardia, pulmonary artery hypertension and VSD due to Kartagener's syndrome was administered combined spinal anesthesia for hernioplasty and hydrocelectomy operation. The procedure was uneventful till the patient was discharged [8].

In a case presented by Karnawat et al., A 30-year-old 34-week pregnant patient with dextrocardia, ASD, VSD and pulmonary hypertension underwent elective cesarean section. It was emphasized that in patients with VSD, hemodynamic targets should be higher preload and PVR, and lower SVR [11].

5. Conclusion

We have demonstrated in this case report that a patient with dextrocardia, VSD, ASD and hemodynamic instability can undergo non-cardiac surgery with careful monitoring. We think that preoperative preparation, close monitoring, optimal and multidisciplinary approach are important.

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