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Congenital Complete Heart Block and General Anaesthesia for Caesarean Section

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Abstract

Congenital complete heart block (CHB) can be either asymptomatic or can present with a syncopal episode. Sudden cardiac death has been described in these patients, when untreated, putting them at high risk for anaesthesia, making them high risk for anaesthesia. If an obstetric patient presents with CHB, for anaesthesiologists as an anaesthesiologist, our goal is to preserve the heart rate maintain hemodynamic stability and minimize fetal compromise. Here, in this case report, we present the case of elective cesarean section for an obstetric indication with congenital CHB. We managed this case with a multidisciplinary approach using general anaesthesia with a temporary pacemaker, which helped in maintaining hemodynamic stability and perioperative heart rate control.

Keyword: CHB, LSCS, Temporary pacemaker

Introduction

Complete heart block (CHB) is usually congenital and can be isolated or associated with other cardiac defects. Operated cases of congenital heart disease may lead to CHB. In pregnancy, congenital heart block may have varied presentations and can be mistaken as physiological changes due to pregnancy. Patients may remain asymptomatic or present with sudden vascular collapse and/or sudden cardiac death, especially during labor [1]. We present our management of a 24-year-old female with a congenital CHB for lower segment cesarean section (LSCS) under general anaesthesia and with a temporary pacemaker in situ.

Case Report

A 24-year-old parturient (gravida 2, para 0, abortion 1) was admitted to our hospital at 38 weeks of gestation. She was a known case of congenital CHB. Past obstetric history revealed one abortion, which was managed uneventfully under sedation. She underwent a supervised exercise treadmill test. Her heart rate increased to 110 beats/min and had a narrow complex rhythm throughout the treadmill test. Pacemaker insertion was an option for her; however, being asymptomatic she did not undergo pacemaker implantation and remained under regular follow-up during the antenatal period. Routine ultrasonography at 35 weeks, revealed oligohydramnios. After a multidisciplinary discussion of cardiology, obstetrics pediatrics, and anaesthesia, it was decided to go ahead with LSCS. For further assessment and counseling she was referred to a pre-anesthesia clinic where, she was counseled about our anaesthetic plan of management, including risk benefits of both regional, general anaesthesia, and temporary pacemaker insertion preoperatively. Our multidisciplinary team decided to go ahead with a temporary pacemaker followed by general anaesthesia at the planned LSCS. In this precious pregnancy, the indication for LSCS was oligohydramnios with CHB.

On admission, her general condition was stable; her pulse rate was 46/min, and her blood pressure was 110/70 mmHg. Clinical examination of the cardiorespiratory and central nervous system was normal. Per-abdomen examination showed a fetus in cephalic presentation, uterine height at 38 weeks, fetal heart rate 136 beats/min and regular, and with reassuring nonstress test. Basic routine laboratory investigations were normal. Laboratory data showed mild leukocytosis (12000, 71% PMN, 21% lymph), C-reactive protein 6.2 mg/L, and erythrocyte sedimentation rate 19 mm/h. Thyroid-stimulating hormone 2.36, antinuclear antibody <1: 80, and negative Lyme serology. Electrocardiography showed a CHB with an atrial rate of 80/min, ventricular rate of 46/min, and a narrow QRS complex (Fig. 1). Echocardiography revealed a structurally normal heart with a 60% ejection fraction. She was accepted for anaesthesia under the American Society of Anesthesiologists (ASA) II and was again explained in detail about pacemaker insertion and anaesthesia techniques. The patient was kept nil by mouth from 12 midnight the day before surgery. Tab. Ranitidine 150 mg was given on the previous night followed by Tab. Ranitidine 150 mg and Tab. Metoclopramide 10 mg the next morning 2 h before the surgery. On the morning of the LSCS, she had a temporary pacemaker inserted through the right internal jugular vein approach under fluoroscopy in the cardiac Cath lab. The patients' abdomen was shielded with a lead gown during pacemaker implantation. Furthermore, the fluoroscopy time for positioning the lead was minimized (30 s). The pacemaker

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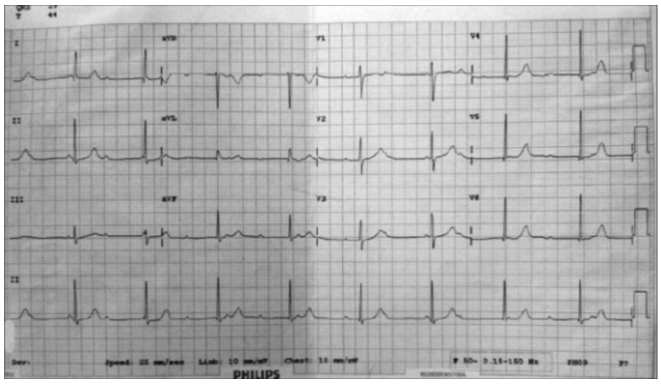

Figure 1: ECG showing congenital heart block

rate was set at 60/min. From the Cath lab, she went to the obstetric theatre for LSCS under general anaesthesia. All essential drugs and defibrillators were kept ready in anticipation of any untoward events. Interventional cardiologist and neonatologist were present. We requested the surgeon to use bipolar cautery. After putting all ASA standards monitoring, we gave left uterine displacement using a wedge, and calf compression was given using stalking. The patient was pre-loaded with 750 mL of Ringer's lactate solution "incision to delivery time" was kept minimal. General anaesthesia was given using rapid sequence induction using diluted propofol (80 mg till loss of eyelash reflex) and succinylcholine 100 mg. We gave ephedrine 6 mg after 40 mg of propofol to prevent hypotension. Maintenance was done using oxygen, air, and sevoflurane (MAC was kept around 0.7). Intra-operatively, vitals were stable throughout. Her heart rate was 62/min and she was not requiring pacing. A healthy female baby weighing 2.96 kg was born with an Apgar score of 8/10 in the 1st min and 9/10 in the 5th min. Injection oxytocin was given 15 units intravenously. We omitted the initial bolus dose and slowly administered the lowest effective dose at delivery, followed by an intravenous (IV) infusion [2]. Midazolam 1 mg and fentanyl 100 mcg were added after baby delivery to maintain adequate analgesia and amnesia intraoperatively. A total of 1.5 L of Ringer's lactate was given intra-operatively. Post-operative pain relief was achieved with transverse abdominis plane block using injection 0.75% ropivacaine 20 mL, diluted with 10 mL normal saline with 8 mg dexamethasone given bilaterally in equally divided dose. The patient was reversed with a combination of glycopyrrolate (0.5 mg) and neostigmine (2.5 mg) after respiratory attempts were detected. She was extubated after adequate respiration and muscle tone was regained. Post-operatively, the patient was shifted to the post-operative ward for continuous monitoring. Post-operative pain was managed with IV tramadol 50 mg IV and IV diclofenac 75 mg 8 hourly as per her pain score. The temporary pacemaker was removed after 72 h as she remained stable in her CHB with a narrow complex escape rate of 50–55 beats/min. Her post-natal period was uneventful, and she was discharged on the 5th day with an advice for regular follow-up with a cardiologist.

Discussion

Heart block can be congenital or acquired. Congenital heart block may occur as a singular entity or in association with other cardiac abnormalities. This condition can be detected as early as the intrauterine period using fetal echocardiography. The survival rate of fetuses with coexisting congenital heart disease is only 14%. Whereas isolated CHB have better survival, up to adulthood in 90% of cases [3]. An isolated case of CHB is a benign condition, as conduction block is at the level of the atrioventricular (AV) node. Since the pacemaker is proximal to the bifurcation of the bundle of his, the QRS complexes are narrow. The rate can vary from 40 to 80 beats/min and may change with exercise, atropine, or sympathomimetics. The risk of sudden death is always a possibility. Acquired heart block can present as acute or chronic. Acquired AV conduction blocks can be attributed to fibrosis and sclerosis of the conduction system, ischemic heart disease, use of negative chronotropic and dromotropic drugs, increased vagal tone, valvular disease, cardiomyopathies, congenitally corrected transposition of the great arteries, electrolyte disturbances, autoimmune diseases, systemic diseases such as sarcoidosis or infectious diseases such as Lyme disease [4, 5]. Surgical correction of congenital heart disease is one of the causes of acquired heart block in children or early adulthood [3]. The acquired defect is situated more distally in the conducting system. The heart rate in these conditions generally does not increase by exercise or atropine. An electrocardiogram (ECG) shows wide QRS complexes. These are associated with poor prognosis. Our patient has a case of congenital CHB with no significant cardiac symptoms.

There are references saying that prophylactic placement of a permanent pacemaker is not indicated in an asymptomatic pregnant patient with CHB as it does not cause unusual problems [6, 7, 8]. The placement of a permanent pacemaker is indicated if the patient is symptomatic during her first and second trimesters. Our patient was diagnosed with CHB after her abortion and was following up regularly with a cardiologist. She was not recommended a permanent pacemaker as she was asymptomatic and had a good chronotropic response to exercise stress. She was advised to have temporary pacing by the cardiologist in the peripartum period as a precaution. An increase in the heart rate during labor is essential to increase the cardiac output and maintain the hemodynamics, inability to do so would put the parturient at the risk of cardiac failure, with a compromised fetal outcome. Hence, for safe delivery, temporary pacemaker insertion was essential, which we inserted before LSCS.

There are a few anticipated anaesthetic problems in patients with CHB undergoing incidental surgeries, such as bradycardia, hypotension, arrhythmias, cardiac arrest, or even sudden death. The goal is to adapt such an anesthetic technique that least alters cardiac stability, which requires careful planning and execution. Modi et al. successfully managed such a case with the epidural anesthetic technique [9]. Spinal anaesthesia is associated with hemodynamic changes, there is a possibility of a higher level of blockade. Jordi et al. reported asystole following spinal anaesthesia [10]. We were concerned about severe hypotension caused by neuraxial blockade which cannot be compensated with an increase in heart rate. Furthermore, there is a possibility of lead dislodgement during positioning for regional anesthesia, neck movement associated irritability of the endocardium following a recent placement of an electrode if newly sited within the previous 3 months [11]. Hence, we planned general anesthesia for our patient.

We considered the risk associated with general anesthesia as both the

inhalational and the IV agents can affect the hemodynamics [12, 13, 14]. There are reports of prolongation of QT interval with isoflurane, sevoflurane or desflurane, and shortening with halothane [15]. Apart from these inhalational agents, propofol also may affect the morphology of sensed intracardiac ECG. These can also produce tachyarrhythmias. The defibrillation threshold is affected (reduced or raised) by sevoflurane, desflurane, lidocaine, and bupivacaine (in high doses). Certain agents such as halothane, isoflurane, sevoflurane, thiopentone, and propofol are known to depress the myocardium and decrease systemic vascular resistance. Furthermore, it was suggested that of giving general anaesthesia, agents such as pancuronium, ketamine, and isoflurane should be used, all of them having tachycardic effects. However, with temporary pacing at hand and a cardiologist in attendance, we were not concerned about bradycardia. We preferred propofol as an induction agent as it has a rapid onset and recovery and is a better choice regarding fetal depression. We gave a single dose of ephedrine to counter the probable hypotension caused by the loading dose of propofol and thus prevented hypotension. Although there is a theoretical possibility of dislodgement of pacemaker lead with fasciculations caused by succinylcholine we used it for endotracheal intubation with rapid sequence induction and cricoid pressure to minimize aspiration. In addition to that, induction delivery time was reduced (90 s) with a good Apgar score at birth. With an adequate dose of propofol, hardly any fasciculations were observed. We provided further muscle relaxation with atracurium. With the temporary pacemaker in hand, we were comfortable giving midazolam and fentanyl to maintain the depth of anesthesia; the combination of which can potentially cause bradycardia [16].

Hemodynamic stability was maintained throughout the procedure because of general anaesthesia and a temporary pacemaker. There was minimal hemodynamic alteration throughout the operation. We used a single low dose (6 mg) of vasopressor ephedrine to maintain adequate hemodynamic stability.

Regarding pacemakers, more than half of all identified cases receive pacemaker insertion before reaching adulthood. Current practice suggests that almost all diagnosed cases of all CHB will have a pacemaker at some point or the other in their life [17, 18]. Indications for pacemakers include symptoms secondary to slow heart rate or transient loss of capture which will manifest clinically as a syncope or cardiac failure or poor exercise tolerance. Risk factors for requiring a pacemaker include very slow heart rates (below 55 bpm), symptoms such as poor exercise tolerance, cardiomegaly, long QRS or QT durations, ectopy, syncope, or structural or functional heart disease [19]. According to Khadke et al. [20] temporary pacing should be done in patients with atropine-resistant bradycardia, 1st and 2° AV block, and atrial fibrillation with low ventricular rate. We inserted a temporary pacemaker in the morning of surgery in the cardiac Cath laboratory, under fluoroscopic guidance; the abdomen was protected with a lead apron. We opted for temporary pacing, as it would help us to control heart rate and avoid any possible hemodynamic instability during intraoperative or the immediate post-partum period.

Prevention of extreme bradycardia was our main aim. The pacemaker rate was set at 50/min peri and post-operatively to preserve her own rhythm. Pacing will suppress patients' own natural pacemaker and patients can become pacemaker dependent; hence, it is recommended to keep a pacemaker as a backup. With her congenital CHB, she remained stable with a rate of 60 beats/min, and a temporary pacemaker was removed on the 3rd day.

The patient was discharged with advice for regular follow-up. As per the recent guidelines, permanent pacemaker implantation is indicated in symptomatic patients with congenital CHBs.

Conclusion

We successfully managed a case of congenital CHB posted for cesarean section with a temporary pacemaker, under general anaesthesia with transverse abdominis plane block. This article emphasizes the early recognition of the risk, understanding of the physiology, advantages of a multidisciplinary approach, and utility of newer modalities in the anesthetic management of these patients.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Perloff JK. The Clinical Recognition of Congenital Heart Disease. Isolated Congenital Heart Block. 5th ed. Philadelphia, PA: Saunders. pp. 46-8.
2. Martillotti G, Talajic M, Rey E, Leduc L. Long QT syndrome in pregnancy: Are vaginal delivery and use of oxytocin permitted? A case report. J Obstet Gynaecol Can 2012;34:1073-6.
3. Reid JM, Coleman EN, Doig W. Complete congenital heart block. Report of 35 cases. Br Heart J 1982;48:236-9.
4. Zoob M, Smith KS. The aetiology of complete heart block. Br Med J 1963;5366:1149-53.
5. Mukahrji J, DiGrazia J, Galetto D, Vetrovec GW. Lyme carditis. Severe conduction disorder. Mo Med 1990;87:86-8.
6. Dalvi BV, Chaudhuri A, Kulkarni HL, Kale PA. Therapeutic guidelines for congenital complete heart block presenting in pregnancy. Obstet Gynecol 1992;79:802-4.
7. Kenmure AC, Cameron AJ. Congenital complete heart block in pregnancy. Br Heart J 1976;29:911-3.
8. Csontos CS, Bogar L, Melczer L. Temporary pacemakers for non-cardiac

surgery. Eur J Anaesthesiol 2003;20:575-88.

9. Modi PM, Butala B, Shah RV. Anaesthetic management of an unusual case of complete heart block for LSCS. Indian J Anaesth 2006;50:43-4.
10. Jordi EM, Marsch SC, Strebel S. Third degree heart block and asystole associated with spinal anaesthesia. Anaesthesiology 1998;89:257-60.
11. Crossley GH, Poole JE, Rozner MA, Asirvatham SJ, Cheng A, Chung MK, et al. The Heart Rhythm Society (HRS)/American Society of Anaesthesiologists (ASA) Expert Consensus Statement on the perioperative management of patients with implantable defibrillators, pacemakers and arrhythmia monitors: Facilities and patient management: Executive summary. Heart Rhythm 2011;8:1114-54.
12. Clayton D. Asystole associated with vecuronium (Letter). Br J Anaesth 1986;58:937-8.
13. Starr NJ, Sethna DH, Estafanous FG. Bradycardia and asystole following the rapid administration of sufentanil with vecuronium. Anaesthesiology 1986;64:521-3.
14. James MF, Reyneke CJ, Whiffler K. Heart block following propofol case report. Br J Anaesth 1989;2:213-5.
15. Rozner MA, Trankina M. Cardiac pacing and defibrillation. In: Kaplan JA, Reich DL, Lake CL, Konstadt SN, editors. Kaplan's Cardiac Anaesthesia. 5th ed. Netherlands: Elsevier Saunders; 2006. p. 830-1.
16. Inoue K, Reichelt W. Asystole and bradycardia in adult patients after a single dose of suxamethonium. Acta Anaesthesiol Scand 1986;30:571-3.
17. Buyon JP. Congenital heart block in neonatal lupus: The clinical perspective. Reumatología 2004;20:192-7.
18. Eronen M, Sirèn MK, Ekblad H, Tikanoja T, Julkunen H, Paavilainen T. Short- and long-term outcome of children with congenital complete heart block diagnosed in utero or as a newborn. Pediatrics 2000;106:86-91.
19. Atlee JL. Arrhythmia, rhythm management devices and catheter and surgical ablation. In: Hensley FA Jr., Martin DE, Gravlee GP, editors. A Practical Approach to Cardiac Anaesthesia. 3rd ed. Philadelphia, PA: Lippincott, Williams & Wilkins; 2003. p. 449-73.
20. Kharde VV, Patil VV, Dhulkhand VK, et al. A parturient with complete heart block for cesarean section. J Anaeth Clin Pharmacol 2010;26:401-2.

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