Spinal Anaesthesia for Cesarean Section in a Case of Congenital Complete Heart Block

Abstract

We report a case of congenital complete heart block on a temporary pacemaker who underwent an elective lower segment cesarean section under spinal anesthesia uneventfully. These patients could be completely asymptomatic but are at risk of sudden cardiovascular collapse. Spinal anesthesia is a safe option. Maintenance of hemodynamic stability including heart rate control with a temporary pacemaker is important

Keywords: *Bupivacaine, congenital complete heart block, fentanyl, pregnancy, spinal anesthesia, temporary pacemaker*

Manjit George, Davis Kurian, Salih V. Salim

Department of Anaesthesiology, MOSC Medical College, Kolenchery, Kerala, India

Congenital complete heart block (CCHB), a rare disorder, with an incidence of approximately 1 in 22,000 live births, may be associated with underlying structural congenital heart disease.[1,2] The presence or absence of structural heart disease usually determines the prognosis. Structural heart disease, when present is associated with high morbidity and mortality. The prevalence of heart disease in pregnant women is 0.5–4%. Pregnancy may proceed uneventfully even in the presence of CHB but significant problems could arise during labor or during an operative delivery. Sudden cardiovascular collapse can manifest as bradycardia, hypotension, arrhythmias or even sudden cardiac death (SCD).

Case Report

A 35-year-old lady, G5 P2 L1 A1 NND1, was referred to our hospital for safe confinement of pregnancy. The antenatal period was uneventful. She was a previously diagnosed case of CCHB as mentioned in her old case notes and antenatal checkup notes but interestingly, she denied any medical problems even after being specifically asked for during pre-anesthetic checkup. She had a reasonable exercise tolerance with dyspnea on exertion of NYHA class II. As she was symptomatic since birth (mild shortness of breath and occasional palpitations even during ordinary activity), she was diagnosed by cardiologists as a case of "congenital complete heart block."

Past history was only relevant for a Cesarean section done under regional anesthesia 13 years ago for failed induction. No records or details were available for the same. According to the patient, pregnancy and surgical delivery were uneventful. She was not on any regular medications.

This lady, presenting at 37 weeks of gestation, was posted for elective cesarean section, as she had undergone a previous section. On preoperative anesthetic assessment, she had a bodyweight of 90 kg and a height of 157 cm with a body mass index of 36.5 kg/m^2. Her vital signs were normal, except for bradycardia, with a pulse rate of 46/min. Assessment of her airway revealed normal neck movement and thyromental distance, but she was Mallampatti class III. Preoperative investigations were normal, except for her ECG which showed complete AV Block with a ventricular rate of 46/min [Figure 1]. Antenatal ultrasound at the calculated period of gestation of 36 weeks showed a single live intrauterine fetus with a normally placed placenta and adequate liquor volume. The estimated fetal weight was 2.8 kg.

Cardiology opinion was sought regarding the placement of a pacemaker. The cardiologist advised the placement of a temporary pacemaker preoperatively and

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Address for correspondence:
Dr. Manjit George, MD FRCA FCARCSI, Department of Anaesthesiology, MOSC Medical College, Kolenchery, Kerala, India.
E-mail: manjitgeorge@gmail.com

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then proceed to the cesarean section. Preoperative orders included oral ranitidine 150 mg, the night before surgery and at 6 AM on day of surgery and oral Metoclopramide 10 mg at 6 AM on day of surgery. She was accepted for the proposed surgery with high-risk informed consent.

Preoperatively, a St. Jude temporary transvenous pacemaker was placed via a right femoral vein under fluoroscopic guidance (with the lead cover placed over the abdomen and ensuring minimal exposure time). After confirmation of lead position, the pacemaker was set in VVI mode, rate fixed at 80 bpm, sensitivity at 0.1 mV and output of 5 V. [Figure 2] She was then brought to the operating theater. In the operating theater, intravenous access was secured using 18 G cannula and Ringer's Lactate infusion was started. The patient was positioned in the left lateral decubitus position. The spinal anesthetic was administered after preloading her with 500 mL Ringer's Lactate. A standard dose of 1.8 ml Heavy Bupivacaine 0.5% plus Fentanyl 15 mcg was given intrathecally. The maximum sensory level of T4 to pinprick was achieved. Hemodynamics was stable except for one episode of hypotension, which was managed with Inj. ephedrine 6 mg intravenously and fluid bolus. Bipolar cautery was used intraoperatively.

A healthy male baby was delivered 11 min after the spinal anesthetic, with an APGAR score of 9 at 1 and 5 min.

1.2 liters of Ringers Lactate was given intraoperatively. Blood loss was less than 500 mL. Cardiology standby was present throughout the procedure.

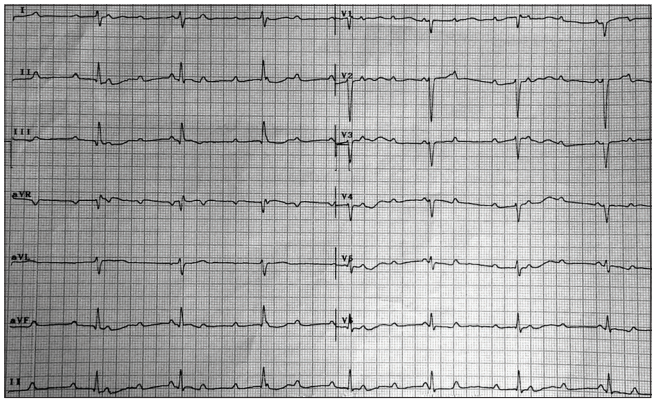

Figure 1: Original 12 lead ECG showing complete heart block

Postoperatively, she was admitted and observed in the surgical ICU overnight. Postoperative analgesia included tramadol, diclofenac, and paracetamol.

The temporary transvenous pacemaker was removed after 24 h with stable hemodynamics afterward. She was advised about the need for elective permanent pacemaker placement but was unwilling for that. The patient was discharged from the hospital on the 6th postoperative day.

Discussion

The incidence of CCHB is about 1 in 22,000 live births. The prevalence of heart disease during pregnancy is 0.5–4%.[3] A pregnant lady with a complete heart block may be asymptomatic but can become symptomatic during labor. Sudden cardiovascular collapse can manifest as bradycardia, hypotension, arrhythmias, or even SCD. Sudden cardiac arrest has been reported in patients with complete heart block for which there are no predictors available.[4] Pacemaker placement is indicated in those with symptomatic bradycardia, low cardiac output, ventricular dysfunction, wide QRS escape rhythm, complex ventricular ectopy, and in infants with a resting heart rate of less than 55/min.[5] It is recommended to have a prophylactic pacemaker inserted even for symptom-free adults with CCHB, due to the high incidence of unpredictable stokes Adams attacks with significant mortality even following first attack, a gradually decreasing ventricular rate and a high incidence of acquired MR.[6]

Even though the patient was asymptomatic during the first pregnancy, a permanent pacemaker was advised by the Cardiologist as per the guidelines, which recommend permanent pacemaker implantation (PPI), for all CCHBs (class 2a/b).[6] The patient was not able to afford that and the option of a temporary transvenous pacemaker was offered and accepted.

In a cohort study by Mandal *et al*. in pregnant mothers with complete heart block, 86% of women had vaginal delivery while 14% had a cesarean section.[7] In this case series, all patients who had operative interference had epidural analgesia and/or anesthesia.

The literature review showed cases where obstetric patients with pacemakers have undergone a cesarean

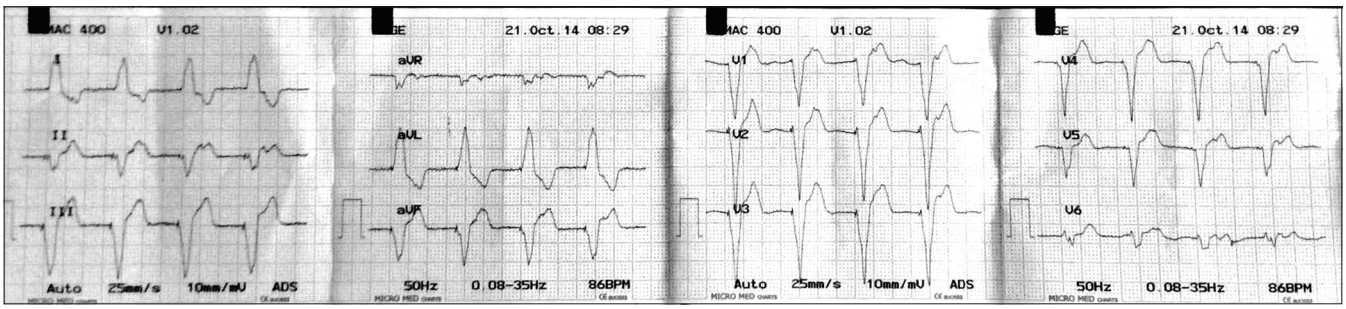

Figure 2: Original ECG showing paced rhythm

section.[8,9] General anesthesia with endotracheal intubation and controlled ventilation has been used traditionally for obstetric patients with cardiac comorbidities. There are case reports of general anesthesia administered in obstetric patients with a pacemaker.[9] Cesarean section has been carried out using general anesthesia in patients with CCHB.[10] Regional anesthesia has generally been avoided as it is associated with hemodynamic instability, which can be detrimental in patients with cardiovascular problems. Epidural and combined spinal-epidural anesthesia techniques have also been described. The subarachnoid block has been safely performed for the cesarean section in patients with CCHB, even with theoretical concerns of hemodynamic instability.

There are few case reports of successful use of regional anesthesia for operative delivery in obstetric patients with complete heart block. Jindal *et al*.[8] have reported the use of spinal anesthesia for emergency cesarean section in a parturient with a permanent pacemaker, which was implanted 15 months prior when she was diagnosed to have complete heart block. This patient was preloaded with a 500 mL colloid. Hyperbaric Bupivacaine was the drug used. In this case report, there was no episode of hypotension probably due to colloid preload. Another case report by Majeed *et al*.[11] showed the use of combined spinal-epidural anesthesia for elective cesarean section in a patient with complete heart block. Bupivacaine Fentanyl combination was used for the spinal block. Metaraminol infusion was used to support hemodynamics. Yet another case was reported by Kumar *et al*.[12] wherein elective cesarean section was performed under subarachnoid block using Bupivacaine Fentanyl combination, but with a reduced amount of local anesthetic. Intraoperatively, anesthesia episodes of hypotension occurred, the first one managed by increasing the pacing rate to 70 beats per minute and the second one with a small dose of ephedrine.

A detailed pre-operative evaluation, comprising of eliciting proper clinical history and thorough physical examination should be performed. Blood investigations should be ordered as indicated on an individual basis. A 12 lead electrocardiogram, X-ray chest PA view (for visualization of continuity of leads) and measurement of serum electrolytes (especially S. Potassium) should be performed. Potassium equilibrium across the membrane determines the resting membrane potential (RMP). Any acute alteration in potassium levels could be detrimental. An acute increase in potassium can cause less negative RMP, leading to continuous pacing by the pacemaker. An acute decrease in potassium may result in loss of pacing.

Most pacemakers are sensitive to direct or indirect electromagnetic interference. Sources such as electro-cautery or even a mechanical ventilator can be a potential source of mechanical interference that results in pacemaker dysfunction. The use of electro-cautery can lead to the failure of a pacemaker, resulting in severe arrhythmias and even death. Bipolar cautery causes less electromechanical interference and hence is preferred in such cases. If unipolar cautery is to be used, ensure that the grounding plate is placed close to the operative site and away from the pacemaker, always confirming good skin contact. Pacemaker failure can occur despite all these essential precautions and in certain clinical circumstances; placement of a temporary venous pacemaker may be indicated. The device should always be rechecked after the surgery, as was done in the present case.

Ours was a case of CCHB, with a temporary transvenous pacemaker *in situ*, who had operative delivery under spinal anesthesia using a standard dose of bupivacaine and fentanyl. The chosen anesthetic technique should be, one which affects the hemodynamics, the least. General anesthetic with controlled ventilation has been used traditionally. Continuous epidural or combined spinal-epidural techniques could be useful in this regard. Standard spinal anesthetic using bupivacaine-fentanyl combination is a safe option in these cases.

Conclusion

The successful conduct of the cesarean section in a patient with congenital heart block under spinal anesthesia, after insertion of a temporary pacemaker, is described.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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