ABSTRACT We want to report a case of a parturient with a complete heart block on a permanent pacemaker who underwent elective cesarean section under combined spinal-epidural anaesthesia uneventfully. Parturients with complete heart block may be asymptomatic but are at a higher risk of sudden cardiovascular collapse, especially during labour. Permanent pacemaker insertion also imposes certain problems during the surgery. Maintenance of heart rate and rhythm is of particular importance in these cases.

KEYWORDS bupivacaine, complete heart block, permanent pacemaker, combined spinal-epidural anaesthesia

Introduction
Complete heart block is a conduction disorder characterized by a random relationship between the atrial and ventricular activation as atrial impulses are not conducted to the ventricle. Although congenital variety may be encountered in pregnancy, acquired CHB is very rare in pregnancy as it is seen mostly after 50 years. Bradycardia, hypotension, arrhythmias, cardiac arrest and even sudden death, can occur during the stress of labour and surgery in an otherwise asymptomatic patient. [1]

Case report
A 30-year-old lady, G2A1, was referred to our hospital for safe pregnancy confinement. Her previous surgical and medical history details were noted in her old medical records. The patient was a known case of PDA since birth. She was asymptomatic till 2014 when she had complaints of shortness of breath on exertion, which on examination revealed a large ostium primum, large inlet VSD, and bidirectional shunt across ASD, VSD and AML leaflet cleft. AV canal defect was repaired with tricuspid annuloplasty under general anaesthesia in 2014. The patient was well till 14/10/2016, when she developed sudden breathlessness and syncope. On evaluation, a diagnosis of complete heart block was made, and she was put on a permanent pacemaker (DDDR mode) [Boston scientific] under general anaesthesia. The procedure went uneventful, and she has been asymptomatic since then.

The present pregnancy is a spontaneous conception, and the antenatal checkup with our hospital was uneventful. A preanaesthetic checkup was done at 35weeks gestational age, as the elective cesarean section was planned at 36weeks. She had a good exercise tolerance with dyspnea on exertion of NYHA class II. On examination, she had a height of 161.5cm, a body weight of 89.4kg, and a BMI of 34.92kg/m^2. Vital signs were normal, with a heart rate of 80beats per minute. Airway assessment revealed normal neck movement and thyromental distance, Mallampati class II. ECG in preop period revealed atrial triggered ventricular pacing at the rate of 80 beats per minute. 2D ECHO revealed normal neck movement and thyromental distance, Mallampati class II. ECG in preop period revealed atrial triggered ventricular pacing at the rate of 80 beats per minute. 2D ECHO revealed normal neck movement and thyromental distance, Mallampati class II. ECG in preop period revealed atrial triggered ventricular pacing at the rate of 80 beats per minute. 2D ECHO revealed normal neck movement and thyromental distance, Mallampati class II. ECG in preop period revealed atrial triggered ventricular pacing at the rate of 80 beats per minute. 2D ECHO revealed normal neck movement and thyromental distance, Mallampati class II.

Preop orders included tab omeprazole 20mg 8 pm on the
night before surgery and at 6 am on the day of surgery and tab perinorm 10mg 8 pm on the night before surgery and at 6 am on the day of surgery. Preoperatively, prior to anaesthesia, the mode of pacemaker has been changed to asynchronous (VOOmode) (image 1) with the help of a magnet by the pacemaker technician. Defibrillator availability was checked in the operation theatre. Provision to use bipolar cautery was made to protect the pacemaker’s functioning. After changing the mode to asynchronous pacing, the electrocautery protection option was chosen for better protection of the device. In the operation theatre, intravenous access was secured with a 16G cannula, and Ringer lactate infusion started. Arterial pressure monitoring for beat-to-beat variability was secured in the left radial artery. Combined spinal-epidural anaesthesia was administered in a sitting position under aseptic precautions in L3-L4 intervertebral space. 7.5mg (1.75ml) of 0.5% heavy bupivacaine along with 20mcg of fentanyl was administered intrathecally. As a result, the maximum sensory level of T-5 was achieved. A healthy male baby weighing 2.79kg was delivered with APGAR 9 at 1, 3, 5 minutes. Oxytocin infusion of 1 unit/ml was started at 5U/hr. No episodes of hypotension were noted. Liter of Ringer lactate transfused ECG, SPO2, respiratory rate, and urine output were monitored. At the end of the surgery, the model was changed back to DDDR with atrial-triggered ventricular pacing at the rate of 80 bpm. The functioning of the pacemaker was checked again at the end of the surgery to ensure proper programming and functioning of the pulse generator (image2).

Postoperatively she was admitted and observed in our ICU for 24 hours. Postoperative pain was managed with epidural morphine 3mg, paracetamol, and epidural top-ups of 0.1%ropivacaine with 2mcg/cc fentanyl. The patient was discharged on 7th postoperative day with an uneventful postoperative period.

Discussion

Pregnancy and labour are associated with extreme stress and demand on the cardiovascular system, in addition to other physiological changes. The administration of anaesthetics may further augment the risk of failure due to myocardial depression, dysrhythmias and vasodilatation, causing decreased venous return and cardiac output. [1] The reported incidence of heart disease in pregnancy is relatively constant in a range of 0.4 - 4.1%. [2, 3] Incidence of congenital complete heart block is about 1 in 22,000 live births. A pregnant lady with CHB may be asymptomatic but can become symptomatic during labour. [4] Pacemakers treat various congenital and acquired conditions producing bradyarrhythmias such as conduction defects, dilated cardiomyopathy, hypertrophic obstructive cardiomyopathy, hypersensitive carotid sinus syndrome, and post-cardiac transplant. There is a paucity of evidence regarding the best anaesthesia practice in the parturient with permanent pacemaker insertion. This might partly be because of limited published data available for the management of a parturient with permanent pacemakers.

[5-7] Safe management starts with proper review and evaluation of previous medical records.

Indication for insertion of PPI, date of insertion, and recent follow-up details should be noted. Knowledge of the type of device, the manufacturer, model of pacing is important. An alternate plan in case of pacemaker dysfunction should be kept in mind. General alternatives include measures like percussive pacing, isoprenaline infusion, invasive transthoracic pacing (through pads placed below the right clavicle and over the apex of the heart in an anteroposterior position).

Other alternatives include transvenous and transesophageal pacing. [5] Most pacemakers are sensitive to direct or indirect electromagnetic interference. Direct sources like electrocautery or indirect sources like mechanical ventilators and orthopaedic saws could affect the pacemaker. [8] Electrocautery commonly used in surgery can have detrimental effects on a paced patient. It could damage the pulse generator, cause reprogramming of the pacemaker, changes in capture threshold or fatal arrhythmias like ventricular fibrillation. [9, 10] We followed the guidelines of the pacemaker manufacturers for our patient and changed the mode to asynchronous pacing along with protection against cautery interference (image 3). Majeed et al. have reported elective cesarean section in a patient with complete heart block under combined spinal-epidural anaesthesia. They administered 2.5 mL of 0.5% bupivacaine (2.5 mg) and 0.5 mL of fentanyl (25 µg) for the spinal block. An infusion of metaraminol was administered at a rate of 2 mg/hr.[5] Jindal et al. have reported an emergency cesarean section in a patient with complete heart block on a permanent pacemaker under subarachnoid block. They administered 500ml of 6%hydroxyethyl starch and proceeded with 2ml of 0.5%heavy bupivacaine with 25mcg of fentanyl. No episode of hypotension was encountered in this case, which may be attributed to the preload with colloid.[11] In another case report by Kumar, spinal anaesthesia was given in the L3-L4 interspace with a combination of a 1.0 mL hyperbaric 0.5% bupivacaine with 0.5 mL fentanyl (25 µg). They achieved a spinal level of T-6. Intraoperatively, the first episode of hypotension after the spinal anaesthesia was treated by increasing the pacing rate to 70 beats/min. The second episode was treated with 3 mg of IV ephedrine.[12] In a case report by George et al., a patient with congenital complete heart block with a temporary pacemaker in situ had an operative delivery under spinal anaesthesia using a standard dose of bupivacaine and fentanyl.[4]
| Products | Potential interactions | Programming mitigations |
|----------|------------------------|-------------------------|
| ICDs & CRT-Ds | • Induce ventricular arrhythmias and/or fibrillation  
• Asynchronous pacing  
• Inhibition of pacing therapy  
• Inappropriate shock therapy | • Deactivate tachy therapy.  
⇒ Program the device Tachy Mode  
Electrocautery Protection Mode or to Off-Electrocautery, if available. In this mode, tachyarrhythmia detection and therapy features are deacti- 
vated, and the pacing mode switches to an asynchronous mode (VOO, AOO, or DOO)  
⇒ Program the device Tachy Mode to Off, or place a magnet over the de- 
vice to temporarily inhibit or deactivate tachy therapy. a The brady pacing 
mode remains as programmed. |
| Pacemakersb & CRT-Ps | • Induce ventricular arrhythmias and/or fibrillation  
• Asynchronous pacing  
• Inhibition of pacing therapy  
• Trigger the EOL indicator  
• Electrical reset | • A magnet can be placed over the device to pace asynchronously at the 
magnet rate: c  
or  
The device can be programmed to an asynchronous pacing mode (VOO, 
AOO, or DOO). |

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a Use of a magnet depends on feature availability and device programming. For additional information, refer to the A closer Look articles entitled Using a Magnet to Suspend or Deactivate Tachy Therapy in ICDs and CRT-Ds and Programming a Boston Scientific Defibrillator to Inhibit Tachy Therapy Using a Magnet.

b VIGOR® pacemakers at or near replacement time may experience prolonged pacing pauses during or immediately following the use of electrocautery near the device or leads.

c The following Intermedics pacemakers remain in magnet mode for only 64 full pacing cycles: COSMOS, DART, DASH, GALAXY, MARATHON, MOMENTUM®, NOVA, QUATUM II/III, RELAY, STRIDE®, SUPRIMA, and UNITY.

Conclusion
The successful conduct of cesarean section in a patient with a postsurgical status of AV canal defect repair and complete heart block on permanent pacemaker in-situ under combined spinal-epidural anaesthesia is described.

Acknowledgement
I would like to thank Dr Manokanth M, Dr.v Swathi, Dr Madhurima B for their support and guidance.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the forms, the patient has given consent for her images and other clinical information to be reported in this journal. In addition, it was duly informed to the patient that their names and initials would not be published, and all efforts are made to conceal their identity, but anonymity cannot be guaranteed.

Financial support or sponsorship
Nil.

Conflict of interest
There are no conflicts of interest.

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