

## Anaesthetic implications and considerations in a child with pacemaker posted for colostomy closure: a case report

T. Bansal, R. Jaiswal, S. Hooda

Department of Anaesthesiology and Critical Care Pt. B.D. Sharma University of Health Sciences, Rohtak, Haryana, India

Corresponding author: T. Bansal, Department of Anesthesiology and Critical care Pt. B. D. Sharma University of Health Sciences, Rohtak, Haryana, India. Email: [aggarwalteenu@rediffmail.com](mailto:aggarwalteenu@rediffmail.com)

### Key points

Anaesthetic management in patients with implanted pacemaker should be planned preoperatively as per patient's medical status. Careful intraoperative monitoring of ECG, pulse oximetry and arterial blood pressure should be done. Electrocautery needs to be used with precautions for minimum EMI. Provision of temporary pacing should be available in OT to deal with emergency situation of pacemaker malfunctioning. Pacemaker should always be rechecked after the procedure

### Abstract

Complete heart block is a significant complication following surgical closure of ventricular septal defect. Pacemakers are being used for increased frequency for management of complete heart block in these patients. Anaesthetic management should be planned preoperatively as per patient's medical status and careful monitoring should be done intraoperatively.

**Keywords:** Pacemaker, anaesthetic implications, complete heart block

### Introduction

Complete heart block ( CHB ) is a significant complication of intracardiac repair for congenital heart disease. Treatment in such situation entails lifelong dependence on an artificial pacing system. The number of patients requiring non cardiac surgery in patients with implanted pacemakers is on the rise. Care of pacemaker during surgery as well as understanding its anaesthetic implications is crucial in the management of these patients.<sup>1</sup> We

hereby present a case of 6 year old male child with pacemaker posted for colostomy closure.

### Case report

A 6 year male child weighing 20 Kg was posted for colostomy closure. He was a full term born child by caesarean section. He was diagnosed to be having anorectal malformation on first day of birth and was operated for the same. Second surgery for the same was done at the age of 6 months. Following surgery he developed septic arthritis for which he was thoroughly investigated and was found to be having VSD ( ventricular septal defect ). He was operated for VSD at the age of 6 years and after 3 days of surgery he developed complete heart block for which pacemaker had to be inserted. During present admission he presented for colostomy closure after 6 months of pacemaker insertion. There was no history of any congenital anomaly in the family.

On general physical examination, clubbing of fingers was present. Pulse and blood pressure were 68/min and 110/70 mm Hg respectively. On systemic examination, heart sounds were normal and chest was clear bilateral-

ly. Airway evaluation was unremarkable. Blood biochemistry was within normal limits. Chest X Ray showed intact leads of pacemaker and ECG showed sinus rhythm with paced beats. Echocardiography showed good left ventricular systolic function with ejection fraction of 50%. Cardiologist opinion was taken, who advised that the patient could be taken for surgery under high risk consent with minimum use of electrocautery. Standard monitors were attached. Injection isoproterenol, atropine and defibrillator were kept ready. Induction was done with fentanyl 40 µg, thiopentone sodium 100mg and atracurium 10 mg. Endotracheal intubation was done with endotracheal tube of internal diameter 5 mm. Anaesthesia was maintained with isoflurane, atracurium in 67% nitrous oxide. Surgery lasted for half an hour. Intraoperative and postoperative course was uneventful.

#### **Discussion and Conclusions**

Preoperative evaluation is an important part of anaesthetic management of a child with pacemaker undergoing non cardiac surgery. It includes evaluation of the patient and the pacemaker. In addition, one should know the severity of the cardiac disease, the current functional status and medications of the patient. Preoperative assessment should aim to identify the type of device, including details of the manufacturer and model, the programmed settings (e.g. mode and rate) and the indication for the implant. Most of this information including half life of pacemaker battery can be taken from the manufacturer's book kept with the patient. However, our patient's attendant had no pacemaker records available. General physical examination should be done to rule out the presence of congestive heart failure. A 12 lead ECG and chest X Ray (for visualization of continuity of the leads) should be performed. Measurement of serum electrolytes (especially K<sup>+</sup>) should be performed.<sup>2</sup>

Spontaneous device failure is uncommon but there are a number of potential hazards in the medical environment, the most important of which is electromagnetic interference (EMI). The use of electrocautery during surgery is

a well recognized hazard.<sup>3,4</sup> If EMI is recognized by the pacemaker, it can be converted to asynchronous mode by magnet. Magnet application is an extremely important function. However not all pacemakers switch to asynchronous mode on the application of magnet. The response varies with the model and the manufacturer. It is advisable to consult the manufacturer to know the magnet response before use.<sup>1</sup> Though it was an elective surgery, but we did not have availability of the manufacturer, so the magnet was not used in our case. Also, despite the previous recommendations to have a magnet available in operating room, routine use of magnet during surgery is not without risk and at times may be unjustified. Switching to asynchronous pacing may cause hemodynamic deterioration and there is possibility that competitive pacing may trigger ventricular tachyarrhythmia.<sup>5</sup> Also, electrocautery may still cause pacemaker failure even when the device has been switched to asynchronous mode. We used bipolar cautery as it is less hazardous than unipolar.<sup>6</sup> If unipolar cautery is to be used, the grounding plate should be placed close to the operative site and as far away as possible from the site of pacemaker, usually on the thigh and should have good skin contact. Electrocautery should not be used within 15 cm of pacemaker. Frequency of electrocautery should be limited to 1 second bursts in every 10 seconds to prevent repeated asystolic periods- short bursts with long pauses of cautery are preferred.<sup>2</sup>

The anaesthetic technique should be used according to the need of the patient. We used thiopentone sodium for induction. Etomidate and ketamine should be avoided as these cause myoclonic movements.<sup>7</sup> Succinylcholine should not be used as the myogenic electrical activity associated with muscle fasciculation induced by succinylcholine may result in EMI.<sup>8</sup> We used isoflurane for maintenance of anaesthesia as inhalational agents do not alter current voltage thresholds of pacemaker.<sup>9</sup> In the present case, intraoperative course was uneventful. There was no episode of hypoxia and hypercapnia throughout the procedure as pacing threshold may be affected

by hypoxia, hypercapnia, metabolic disturbance and electrolyte imbalance.

To conclude, in patients with implanted pacemaker, anaesthetic management should be planned preoperatively as per patient's medical status. Careful intraoperative monitoring of ECG, pulse oximetry and arterial blood pressure should be done. Electrocautery needs to be used with precautions for minimum EMI. Provision of temporary pacing should be available in OT to deal with emergency situation of pacemaker malfunctioning. Pacemaker should always be rechecked after the procedure.

### References

1. Rastogi S, Goel S, Tempe DK, Virmani S. Anaesthetic management of patients with cardiac pacemakers and defibrillators for non cardiac surgery. *Annals of cardiac anaesthesia* 2005; 8: 21-32.
2. Simon AB. Perioperative management of the pacemaker patient. *Anesthesiology* 1977; 46: 127-31.
3. Irnich W. Pacemaker related patient mortality. *Pace* 1999; 22: 1279-83.
4. Levine PA, Balady GJ, Lazar HL, Belott PH, Robert AJ. Electrocautery and pacemakers: management of the paced patient subject to electrocautery. *Ann Thorac Surg* 1986; 41: 313-7.
5. Bilitch M, Cosby RS, Cafferky EA. Ventricular fibrillation and competitive pacing. *N Engl J Med* 1967; 276: 598-604.
6. Ramon-Gonzalez J, Hyberger LK, Hayes DL. Is electrocautery still a clinically significant problem with contemporary technology. *Pace* 2001; 24: 709.
7. Senthuran S, Toff WD, Vuylsteke A, Solesbury PM, Menon DK. Implanted cardiac pacemakers and defibrillators in anaesthetic practice. *Br J Anaesth* 2002; 88: 627-31.
8. Finfer SR. Pacemaker failure on induction of anaesthesia. *Br J Anaesth* 1991; 66: 509-12.
9. Atlee JL, Bernstein AD. Cardiac rhythm management devices. ( Part II ) perioperative management. *Anesthesiology* 2001; 95: 1492-1506.