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Anesthetic Management of a Patient with a Permanent Pacemaker for Emergency Caesarean Section.

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ABSTRACT

Here we describe the anaesthetic management of a parturient with a permanent pacemaker for congenital heart block presenting for emergency caesarean section. The implications of a pacemaker and potential complications during caesarean section are described.

Keywords: Pacemaker, Regional anaesthesia, Combined spinal Epidural, Caesarean section.

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INTRODUCTION

There are major changes in cardiovascular physiology during pregnancy. The presence of cardiac disease process may have major implications for the anaesthetic management of a parturient. We report the management of a parturient at 39 weeks gestation with an implanted permanent pacemaker for complete heart block (CHB) FOR sinus node dysfunction for emergency caesarean section. The incidence, implications and management of CHB in pregnancy are reviewed.

Case Report

A 31-year-old primigravida woman presented at 39 weeks gestation for emergency Caesarean section for cephalo pelvic disproportion. Pre-anaesthetic assessment revealed a medical history of congenital complete heart block due to sick sinus syndrome for which a pacemaker was inserted 5 years ago. She had annual pacemaker checks since insertion with no recorded malfunction to date, the last check being 4 weeks prior to her admission. She gave a negative history of any other intercurrent medical condition or medication. On examination the patient weighed 64kg and was 148 cm tall. She had no symptoms or signs of cardio respiratory failure. On auscultation she had no murmurs with a normal second heart sound and no clicks. Her antenatal electrocardiogram (ECG) showed mostly sinus rhythm with atria triggered ventricular pacing at a rate of 80 bpm. Her ECG on admission showed sinus rhythm with a rate of 90 bpm. A combined spinal epidural technique was discussed with the patient and informed consent obtained. Routine aspiration prophylaxis of 30 ml of Sodium Citrate 0.3 M was given in the anaesthetic room.

An 18 gauge venous canola was inserted in the left wrist, a 16 gauge in the right wrist, monitoring of ECG, heart rate (HR), arterial hemoglobin saturation (SaO₂) and non invasive blood pressure (imp) was commenced. Initial readings of BP were 140/80 mmHg, HR of 80 bpm, SaO₂ of 99% on air. An external pacing monitor was attached to appropriately positioned self-adhesive gel pads A fluid preload of colloid 500 ml was administered. Infusions of noradrenaline and isoprenaline were prepared and a pacemaker magnet was kept to hand. A combined spinal epidural technique was performed with the patient in the left lateral position. The entire procedure was atraumatic. 2.5ml of heavy Bupivacaine 0.5% and Fentanyl 30 mcg were slowly administered intrathecally. The spinal needle was then withdrawn and an epidural catheter was threaded up to 4 cm into the epidural space. The patient was then positioned in the right lateral tilt to avoid supine hypotension syndrome.. An infusion of metaraminol was administered at a rate of 2 mg hr⁻¹. There were no major haemodynamic changes to the intrathecal dose of the local anaesthetic and opioid. The BP remained within 20% limits of initial measurements. The patient's HR remained constant at 80 bpm. Her SaO₂ on room air was 98⁻¹⁰⁰% throughout the procedure. The patient had complete anaesthesia to both light touch and temperature bilaterally to the 5th thoracic dermatome. Caesarean section proceeded without complications or discomfort and 3 kg female baby was delivered. The Apgar scores were 9 at one minute and 10 at five minutes. Syntocin was administered slowly intravenously in boluses of 1 unit every minute to a total of 5 units. After each administration of Syntocin there was an immediate fall in BP of 10-20 mm Hg, which resolved spontaneously on each occasion with no ECG rhythm changes. Antibiotic therapy was commenced preoperatively and continued post operatively. At the end of the procedure .morphine 3 mg diluted in 10 ml 0.9% saline was administered via the epidural catheter for post-operative analgesia and the epidural catheter was removed thereafter. Estimated blood loss was 600 ml. The patient was monitored carefully in the recovery room for 2 hours and shifted to surgical post op ward. She made a completely uneventful recovery and was discharged home after a week.

DISCUSSION

Pregnancy and labor are associated with extreme stress and demand on the cardiovascular system in addition to other physiological changes. The cardiovascular system can potentially fail resulting in morbidity and mortality if predisposing factors such as conduction defects, are already present [1,2]. The administration of anaesthetic agents may further augment the risk of cardiovascular failure due to the myocardial depression, dysrhythmias and vasodilatation causing reduced venous return and lowering in cardiac output. Pacemakers are used to treat various congenital or acquired conditions producing bradyarrhythmias such as conduction defects, dilated or hypertrophied cardiomyopathy, hypersensitive carotid sinus syndrome, post-cardiac transplant [3,4]. Their use reduces the risk of perioperative morbidity. There are several articles on general anaesthesia for caesarian section but paucity of literature for regional anaesthesia for patients undergoing caesarean sections with cardiac pacemakers because of anticipated haemodynamic instability. [13].

Most of those describe use of general anaesthesia for caesarean section [1,5,6,10,11,12]. On the other hand there is wealth of evidence available describing superiority of regional techniques over general anaesthesia in obstetric patients; however these techniques are generally avoided in patients with significant cardiovascular problems due to perceived association with haemodynamic instability [1].

Knowledge of the type of device is important whether the pacemaker is in a fixed mode or a rate responsive mode. In rate responsive mode the pacemaker senses body vibration as a stimulus for an increased rate. In fixed mode the pacemaker generates fixed voltage at programmed rate without responding to any stimuli. The former mode is superior as it adjusts heart rate and thus cardiac output according to varying requirements of the body, however there are several factors which can interfere with sensing these variations. These include foetal movements, shivering, peripheral nerve stimulators, transcutaneous electrical nerve stimulators (TENS) and diathermy [5,7,8].

Safe anaesthetic management of the patient with a pacemaker should start with a preoperative visit and review of the clinical records. The pacemaker should be evaluated by the physician prior to the surgery as part of the routine preoperative evaluation. The original indication for pacemaker insertion, date of insertion and details of recent follow-up pacemaker checks should all be known. The mode of action of the pacemaker should be noted. If the pacemaker has a rate modulator function, then this should be de-activated prior to anaesthesia. Direct enquiry from the patient may give clues as to recent pacemaker malfunction in terms of dizziness, syncope or heart failure. Any symptoms suggesting deterioration of the patient's underlying heart disease should be managed aggressively before anaesthesia. It is advisable to have the manufacturer's programmer available in the hospital should any problems arise.

In general anaesthesia for a full stomach, use of succinylcholine is avoided since succinylcholine can oversense the fasciculations. However, in general, the use of succinylcholine should be avoided to reduce the chances of over sensing following fasciculation [9]. Careful monitoring of the ECG is vital after any patient positioning or after commencement of mechanical ventilation to ensure that the pacemaker is still functioning appropriately. Isoprenaline infusions, where available, may be used to improve rate and rhythm. However, the most rapid and effective backup system in most hospitals is non-invasive transthoracic pacing via external pads either positioned below the right clavicle and over the apex of the heart or over the left side of the chest in the antero-posterior position [8]. Capture can usually be achieved at currents of about 80 mA. Alternatives to this include temporary transvenous and transoesophageal pacing, both of which will take longer to set up to achieve effective pacing.

Pacemaker function should be checked by technicians after the procedure, particularly if there have been any adverse events perioperatively. This will also permit the re-activation of rate modulation sensors and the re-institution of any specific pacing modes. An external defibrillator should be available perioperatively. Ideally, this should be attached to adhesive patches as this will permit external defibrillation without excessive disturbance of the operating field. Regional anaesthesia is a safe technique for caesarean section for a patient with a pacemaker if the patient is adequately prepared. Invasive monitoring should be used and an alternative method of pacing must be available.

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