

Anaesthetic management of a patient with sick sinus syndrome for exploratory laparotomy

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Abstract

Sick sinus syndrome is a generalised abnormality of cardiac impulse formation that may be caused either by an intrinsic disease of the sinus node, which makes it unable to perform its pacemaking function, or by extrinsic factors. It commonly affects elderly persons. While the syndrome can have many causes, it usually is idiopathic. Abnormalities encompassed by this syndrome include sinus bradycardia, sinus arrest or exit block, combinations of sinoatrial and atrioventricular nodal conduction disturbances and atrial tachyarrhythmias. Diagnosis of sick sinus syndrome can be difficult because of its nonspecific symptoms and elusive findings on an electrocardiogram or a Holter monitor. Here, we present the perioperative management of an elderly patient with sick sinus syndrome with seminoma of undescended testis posted for exploratory laparotomy.

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Introduction

Sick sinus syndrome comprises a variety of conditions involving sinus node dysfunction and commonly affects elderly persons. While the syndrome can have many causes, it usually is idiopathic.¹ Diagnosis of sick sinus syndrome can be difficult because of its nonspecific symptoms and elusive findings on an electrocardiogram (ECG) or a Holter monitor. The mainstay of treatment is atrial or dual-chamber pacemaker placement, which generally provides effective relief of symptoms and lowers the incidence of atrial fibrillation, thromboembolic events, heart failure and mortality, compared with ventricular pacemakers.¹

Case report

A 73-year-old man was admitted with a history of left lower abdominal pain. A physical examination revealed a mass palpable on the left lower side of the abdomen and an empty scrotal sac, and a provisional diagnosis of undescended testis was made. An exploratory laparotomy was planned. The preanaesthetic examination revealed an elderly man with apparently no co-morbid diseases, who had

good effort tolerance. Blood pressure was 160/90 mmHg and pulse rate was irregularly irregular with a range of 48–66/minute. Laboratory findings were within normal limits. An ECG showed bradycardia and irregular rate (see Figure 1). A chest X-ray disclosed no abnormality. In view of the irregularly irregular pulse and abnormal ECG in the elderly man, a cardiological evaluation was done. The cardiologist diagnosed an incomplete left bundle branch block with possible sick sinus syndrome. The anaesthetic technique contemplated was general endotracheal anaesthesia supplemented with graded epidural analgesia, keeping transcutaneous pacing on standby. However, the decision for transcutaneous pacing was taken cautiously as the movement during transcutaneous pacing makes abdominal or thoracic procedures difficult and the possibility of requirement of transvenous pacing is quite high for such procedures.

Once the patient was taken into the operation theatre, monitors were connected as follows: noninvasive blood pressure, pulse oximetry and five-lead ECG. The right radial artery was cannulated under local anaesthesia to monitor beat-to-beat information about atrioventricular synchrony. Transcutaneous paddles

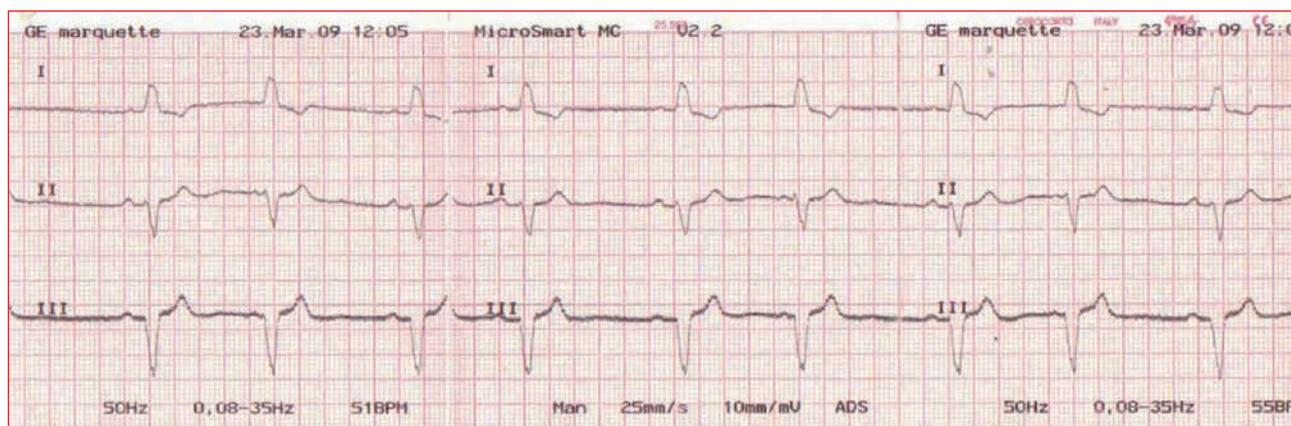


Figure 1: Preoperative ECG showing bradycardia and irregular rate

were attached and the pacer was set for synchronous, fixed mode, 50 ppm, 40 mA. The ECG showed an irregularly irregular rate (ranging between 27 and 57 per minute) with wide QRS complexes alternating with sinus waves with impending haemodynamic instability. Anticipating the autonomic disturbances that could occur under anaesthesia, which may have significant haemodynamic implications when superimposed on the sick sinus syndrome, it was decided to insert a temporary transvenous demand pacemaker. The transvenous pacing wires were introduced via the right internal jugular vein under fluoroscopic guidance. The heart rate was maintained around 70 beats per minute with continuous pacing. The anaesthetic plan was revised to epidural anaesthesia, as neuraxial anaesthesia limits exposure to opioids that exacerbate bradycardia. With the temporary pacemaker and invasive arterial monitoring in situ, an epidural catheter was inserted at L1-L2 interspace. Epidural anaesthesia was graded to achieve a sensory level of T8 with 0.5% bupivacaine. The surgeon was asked to use bipolar cautery, and short bursts with long pauses were used.

Anaesthesia and surgery were uneventful for the rest of the procedure. The patient was shifted to the post-anaesthesia care unit with stable vitals, and adequate analgesia was provided during the postoperative period with 0.125% bupivacaine. The pacemaker was removed on the second postoperative day, pacing not being evident after the first postoperative day. No episode of bradycardia was reported after pacemaker removal, and the pulse rate remained between 70 and 80 per minute with regular rhythm. The postoperative course was uncomplicated and the patient was discharged on the tenth postoperative day.

Discussion

Patients with sick sinus syndrome are often asymptomatic or have symptoms that are mild and nonspecific.² Symptoms are related to the

decreased cardiac output that occurs with the bradyarrhythmias or tachyarrhythmias. Most of the symptoms are caused by decreased cerebral perfusion, and 50% of patients have syncope or presyncope.³ Sick sinus syndrome can produce a variety of ECG manifestations consisting of atrial bradyarrhythmias, atrial tachyarrhythmias and alternating bradyarrhythmias and tachyarrhythmias.

Pharmacological treatment of sick sinus syndrome is usually unsuccessful.⁴ Sick sinus syndrome in its chronic form runs an erratic course, with periods of normal SA node function and periods of abnormal function. If episodes of sinus bradycardia are frequent or symptoms such as dizzy spells, unexplained congestive cardiac failure, syncope or cardiac arrest occur, permanent pacing should be instituted.⁵

According to several reports,^{6,7} there are some examinations that can unveil sick sinus syndrome preoperatively, such as routine preoperative 24-hour Holter ECG, evaluation of cardiovascular responses to beta stimulants or electrical atrial pacing⁶ and evaluation of the response to carotid massage.⁷ But employing these examinations routinely preoperatively poses several clinical problems, considering cost, time and invasiveness. It is most important to suspect the existence of sinus nodal dysfunction if there is severe bradycardia during anaesthesia. Beta stimulants and an external cardiac pacemaker should always be prepared for immediate use.

Experts do not agree on the criteria for temporary pacemaker placement.⁸ Unexpected interruption of the pacing can have serious consequences, and temporary pacemakers are known to malfunction unexpectedly, leading to sudden haemodynamic instability.⁹ The American Heart Association/American College of Cardiology guidelines do not recommend permanent pacing in patients with asymptomatic complete heart block.¹⁰ Temporary

pacing is most commonly used to treat symptomatic bradycardia for short periods. Toprak et al¹¹ described two episodes of severe bradycardia in the same patient during general anaesthesia, the second of which they managed with a temporary pacemaker. Nakamura et al recommended temporary pacemakers for asymptomatic patients with sick sinus syndrome who were resistant to atropine. Furthermore, they suggested combining drug treatment with temporary pacing to treat vasovagal syncope.¹² Çevik et al described the management of a parturient with asymptomatic complete heart block for whom they instituted temporary pacing before general anaesthesia to avoid bradyarrhythmias during Caesarean delivery and permanent pacing when she became symptomatic postoperatively.¹³

Artificial pacemakers are well tolerated in elderly patients.¹⁴ In all patients with this syndrome, except those with chronic atrial fibrillation, atrial-based pacemakers are recommended.^{15,16} Compared with ventricular pacing, atrial pacing is associated with a lower incidence of thromboembolic complications, atrial fibrillation, heart failure, cardiovascular mortality and total morbidity. Intraoperative continuous ECG monitoring is essential to monitor pacemaker functioning. In addition, both electrical and mechanical evidence of the heart function should be monitored by manual palpation of the pulse, pulse oximetry, precordial stethoscope and arterial line, if indicated.

The anaesthetic technique should be planned on a case-to-case basis. Both narcotic and inhalational techniques can be used successfully. These anaesthetic agents do not alter the current and voltage thresholds of the pacemaker. The muscle fasciculation induced by succinylcholine can be avoided by using a nondepolarising muscle relaxant or by defasciculating with a nondepolarising muscle relaxant before giving succinylcholine. Etomidate and ketamine should be avoided, as these cause myoclonic movements.¹⁷ Pacemaker function should be verified before and after initiating mechanical ventilation, as there may be dislodgement of the pacemaker leads by positive pressure ventilation or nitrous oxide entrapment in the pacemaker pocket.¹⁸ Perioperative considerations with regard to the use of cautery in a patient on pacing have to be kept in mind.¹⁹ Drugs such as isoproterenol and atropine should be available. Careful monitoring of pulse, pulse oximetry and arterial pressure is necessary during electrocautery, as ECG monitoring can also be affected by interference. Recent improvements in rate-responsive pacemaker engineering have led to improvements in maximum heart rate, exercise

tolerance, functional status, suppression of dysrhythmias and a sense of well-being in patients.

Conclusion

The achievement of near-physiologic rate responsiveness and atrioventricular synchrony, as well as decreased mortality and morbidity, has led to a better prognosis in patients with sick sinus syndrome.²⁰ We suggest that drug treatment, as well as temporary transvenous pacing, are useful for this condition perioperatively, particularly for abdominal or thoracic procedures.

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