Section: Anaesthesiology

Case Report

CHALLENGES IN ANAESTHETIC MANAGEMENT OF A CASE OF BRUGADA SYNDROME – A CASE REPORT

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Abstract

Background: Brugada syndrome (BrS) is an inherited disease characterized by coved-type ST-segment elevation in the right precordial leads on the electrocardiogram and increased risk of ventricular fibrillation and sudden cardiac death, in the absence of structural heart disease. Patients at higher risk of sudden cardiac death are usually treated with an automated implantable cardioverter defibrillator(AICD). Anesthetic care of patients with Brugada syndrome involves many factors which may precipitate a significant risk of malignant arrhythmias and sudden cardiac arrest. The choice of anesthetic agents and techniques plays a crucial role in avoiding major cardiac complications. Literature search reveals very few case reports on the anesthetic management of patients with BrS, with AICD in situ. We report a case of successful anesthetic management of a patient with BrS and AICD in situ, coming for an elective orthopaedic procedure.

INTRODUCTION

Brugada syndrome (BrS) is an uncommon inherited channelopathy that predisposes patients to fatal cardiac arrhythmias and sudden death. The syndrome was described nearly 30 years ago by the Brugada brothers, characterized by typical electrocardiographic (ECG) changes in the absence of any metabolic, ischemic, or structural heart diseases.[1] The symptoms of BrS are caused due to re-entry ventricular arrhythmias and manifest as 3 main clinical presentations: (1) Polymorphic ventricular tachycardia (VT) or ventricular fibrillation (VF) associated with cardiac arrest (2) Syncope and (3) no symptoms, depending on the duration of aberrant rhythm.[2]

There are three main ECG patterns in BrS. The type 1 ECG pattern is characterized by an elevation of the J point, a coved-type ST segment, and an inverted T wave in V1 and V2. The type 2 pattern has a saddleback ST segment elevated by more than 1mm, and in the type 3 pattern, the ST segment is elevated by less than 1mm. The type 1 ECG pattern is considered characteristic of BrS.[3] The unpredictability of the occurrence and duration of arrhythmia leads to clinical management being focused on prophylactic prevention of fatal arrhythmias. Treatment options include antiarrhythmics, ablative procedures, and the insertion of an automated implantable cardioverter defibrillator (AICD).

Implanting an AICD is considered to be the most powerful preventive modality to avoid sudden cardiac death in patients with a previous history of VF or aborted sudden cardiac death.[4] AICD in BrS is currently indicated in patients with spontaneous type 1 ECG pattern and cardiac arrest, sustained ventricular arrhythmia (VA), or a recent history of syncope due to VA.[5] This case report highlights the preoperative workup and peri-operative management of a patient with Brugada syndrome with AICD coming for an elective orthopedic surgical procedure.

Case Report

A 37 year old male patient, a known case of Brugada syndrome with an automated implantable cardioverter defibrillator (AICD) in situ was posted for implant removal surgery from the right proximal humerus. The patient had an episode of syncope 4 years ago and following evaluation, a diagnosis of Brugada syndrome was made. The patient underwent implantation of AICD in the left pectoral region. The patient had undergone uneventful anesthesia for the fixation of a fracture right humerus under general anesthesia previously. There were no further episodes of syncope, malignant arrhythmias, or aborted sudden cardiac death, following the insertion of the AICD.

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The patient was seen in the cardiology clinic before the procedure and a detailed evaluation of the AICD was done. Echocardiography was normal and he was not on any regular medications. In the pre-anesthesia clinic, his HR-76/min, BP-128/76 mmHg, and his ECG showed Right bundle branch block (RBBB) along with coved ST segment in V1 and V2 leads. The airway examination was normal and the blood investigations including serum electrolytes were within the acceptable range.

The patient was explained about the various anesthesia options for the surgery including their advantages and risks. He had consented to general anesthesia with right interscalene brachial plexus block which would be advantageous for achieving stable hemodynamics intraoperatively along with good intra and postoperative analgesia. The case was discussed in a multidisciplinary meeting including the anaesthetist, cardiologist, and surgeon, and taking all the necessary precautions, it was decided to proceed with the surgery without disabling the AICD.

In the operating room the patient was connected to all the basic monitors including 5 lead ECG, SpO2, EtCO2, and an invasive arterial line was inserted in the left radial artery. The patient was sedated with injection of midazolam 1mg and fentanyl 100mcg. TOF-watch was used for continuous neuromuscular monitoring. After preoxygenation, general anesthesia was induced with propofol 150 mg and rocuronium 50 mg, and dexamethasone 4mg followed by intubation using an 8-sized cuffed endotracheal tube. Anaesthesia was maintained with an Oxygen-air mixture (1L/1min) along with sevoflurane adjusted to a MAC age of 0.8. The patient was connected to Bair Hugger forced-air warmer and continuous temperature monitoring was done. A right-side interscalene brachial plexus block was performed under ultrasound guidance and ropivacaine 0.25% 15 ml was injected using single point injection technique. It was decided by the surgeon to use only bipolar cautery during the procedure. The patient was maintained on intermittent boluses of rocuronium 10 mg and the surgery lasted for 2 hours. Toward the end of the procedure, the patient received paracetamol 1gm, parecoxib 40 mg, and ondansetron 4 mg. The patient was reversed with sugammadex 200 mg and was smoothly extubated in the OR uneventfully. The ECG was continuously monitored throughout the procedure and showed no abnormal changes as a result of the anaesthesia or the surgical procedure. The patient's hemodynamics and oxygen saturation remained stable throughout the procedure. Normothermia was maintained throughout the procedure. The patient was shifted to the post anaesthesia care unit, was absolutely pain-free with an uneventful course, and was later shifted to the high dependency unit for further observation and monitoring.

DISCUSSION

Literature about the anaesthetic management of a BrS patient with implanted AICD is scarce. The goal of perioperative care is to prevent the occurrence of malignant arrhythmias. This includes a thorough assessment with emphasis on a history of syncope, arrhythmias, and aborted sudden cardiac death. In our case, the patient had an AICD implanted following an arrhythmogenicsyncopal attack 4 years back. Electromagnetic interference due to the use of electrocautery in surgery could lead to inappropriate shocks in patients with an AICD. Use of monopolar cautery, superior to the inguinal ligament has been cited as a risk factor for Electromagnetic interference, while the use of bipolar cautery or monopolar cautery below the level of inguinal ligament is associated with reduced incidence of electromagnetic interference.[6]

In our patient, the surgery planned was the removal of an orthopaedic implant from the right humerus, which was at least 25 cm away from the AICD implanted in the left pectoral region. In addition, the surgeon had volunteered to use bipolar cautery alone for achieving haemostasis during surgery. The use of bipolar cautery, a surgical site 25 cm away from the AICD, and the procedure being low risk, led to the decision of proceeding without disabling the anti-tachyarrhythmia mode of the AICD. The dispersive pad was applied to the patient's forearm distal to the site of surgery and draped. External defibrillators were attached to the patient in an anteroposterior placement to avoid overlying the AICD. The application of an external defibrillator pad was a precautionary measure in case disabling the AICD was required intraoperatively or in case of AICD failure. The primary concern during anesthesia is the administration of safe drugs that do not trigger malignant arrhythmias. Opioids, volatile anaesthetics, and muscle relaxants are safe in managing patients with BrS.[7] while concerns have been raised in the past about the potential arrhythmogenic effect of Propofol, especially with prolonged infusions. Recent studies have demonstrated the safety of bolus doses of Propofol during induction of anesthesia.[3,7,8]

We decided to proceed with the relatively safer combination of propofol induction followed by maintenance with Sevoflurane, rather than Total Intra Venous Anesthesia (TIVA). Local anaesthetics especially bupivacaine and ropivacaine, in view of their sodium blockade have been reported to cause electrocardiographic changes associated with malignant arrhythmias.[9] Reduction in the dose of local anaesthetic and minimizing absorption of the drug have been utilized by authors to administer peripheral nerve blocks and epidurals with ropivacaine safely, in patients with BrS.[10] We employed a low-dose interscalene block with 15 ml of 0.375% ropivacaine, thereby restricting the total dose of ropivacaine to 56.25 mg, well below the

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maximum dose of 3 mg/kg body weight. Inadequate or lighter plane of anesthesia should be avoided intraoperatively to prevent the facilitation of malignant arrhythmias.[9]

Our patient had no pain during the immediate postoperative stay in the Post Anesthesia Care Unit (PACU). The patient was clinically stable throughout the procedure and was reversed with Sugammadex, as Neostigmine could potentially cause vagotonic effects predisposing to malignant arrhythmias.[7]

CONCLUSION

Patients with implantable cardiac devices pose a huge challenge to anaesthesiologists. Adequate preoperative optimisation, appropriate choice of anaesthetic techniques and drugs are key to successful management of patients with implanted cardiac devices and contribute hugely to reducing or avoiding major adverse cardiac events in the perioperative period.

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