



Sugammadex in a Patient with Brugada Syndrome

Ebru Biricik, Zehra Hatipoğlu, Çağatay Küçükbingöz

Department of Anaesthesiology and Reanimation, Çukurova University School of Medicine, Adana, Turkey

Brugada Syndrome was first described in 1992 by Pedro Brugada as a genetic syndrome that is characterized by ventricular arrhythmias that may result in sudden cardiac arrest. In particular, a right bundle branch block and ST segment elevation in the right precordial leads are observed. Many perioperative pharmacological and physiological factors can trigger malignant arrhythmias. Although it is a rare condition, the anaesthetic management of Brugada syndrome is important because of the potentially fatal complications. Many anaesthetics have been administered during the operation of patients with Brugada Syndrome. The use of sugammadex instead of the anaesthetic management of patients with Brugada syndrome is discussed in this study.

Keywords: Brugada Syndrome, sugammadex, anaesthesia

Introduction

Although Brugada syndrome (BS) is rare, it is a clinical picture that has to be taken into consideration by the anaesthetists because it may cause severe arrhythmias such as ventricular tachycardia and fibrillation (1). It is an autosomal dominant disease leading to ST-segment elevation and right-bundle-branch block by affecting the ion channels of the cardiac conduction system (2). Particularly, functional loss of the sodium channels leads to characteristic ST-segment elevation by causing imbalance in the action potential of the heart and hence causing transmural voltage gradient (3). Implantable cardioverter-defibrillator (ICD) is seen as the only effective treatment in BS (4). These patients may need anaesthesia for ICD placement or other surgical interventions.

Case Presentation

The 26 year old multipara (third pregnancy) patient with a diagnosis of BS was admitted for emergency caesarean (C/S) operation because of active labour. In her medical history, she described an occasional chest pain and dizziness lasting for almost 5 minutes, which disappeared with rest, sometime in the last year. As a result of examinations, she was then diagnosed with BS. She was then admitted to the cardiology clinic and underwent ICD placement. She gave history of two siblings with sudden unknown death; her father and two brothers had a cardiac disease history. She had undergone two previous C/S operations before the diagnosis. ECG of the patient showed RBBB as well as ST segment elevations in the avr, avl and v1-3 derivations. Her laboratory investigations showed a normal haemogram and electrolyte levels (Figure 1). The echocardiography findings were normal. As a result of the cardiology consultation, infective endocarditis prophylaxis (ampicillin-sulbactam 1g) before the intervention, turning off ICD device during the operation and turning it back on afterwards were recommended. Oral and written informed consent of the patient was obtained before the surgery. Standard monitoring was performed to the patient who was taken to the operating room. Here heart rate was 130/min, non-invasive blood pressure (TA) was 120/75 mm Hg and SpO₂ was 98%. After obtaining intravenous access, 10–20 mL kg⁻¹ 0.9% NaCl was administered as fluid resuscitation. After anaesthesia induction with 7 mg kg⁻¹ thiopental and 0.6 mg kg⁻¹ rocuronium, the patient was intubated with endotracheal tube no 7.5. Anaesthesia was maintained with desflurane having 4–6% concentration and the mixture of 50–50% N₂O–O₂. APGAR 7–8 baby boys were delivered. 2 mg kg⁻¹ tramadol was administered for postoperative analgesia. Anaesthesia was terminated after the surgery and 2 mg kg⁻¹ sugammadex was administered intravenously to

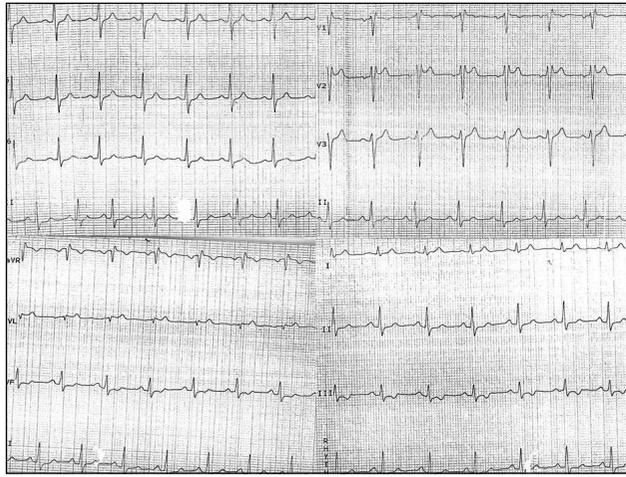


Figure 1. Preoperative electrocardiogram (ECG) of the patient with the diagnosis of Brugada syndrome
ECG: D1-3, aVR, aVL, aVF, V1-6

reverse the neuromuscular blockade. No significant difference was observed in ECG and vital signs after sugammadex administration in the postoperative period. The patient, who was physiologically stable, with sufficient spontaneous breathing and 97% SpO₂, was extubated. She was transferred to the intensive care unit for follow-up and treatment. Her ICD was reactivated in the intensive care unit, and she was transferred to the gynaecology and obstetrics clinic after a smooth follow-up of 24 hours.

Discussion

Brugada and long-QT syndrome are indicated as the most common causes of sudden cardiac arrest below 40 years of age (5). Genetic factors, fever, anaesthesia drugs, antiarrhythmic agents and antidepressants are implicated in the etiology of BS. Anaesthetic management of the patients is important with regard to the arrhythmias that may occur. Both general and regional anaesthesia can be used in these patients. However, it is reported in the literature that the drugs used may trigger severe arrhythmias; especially, propofol, lidocaine and bupivacaine are the drugs that have to be paid attention (6). In the literature, there are some studies reporting BS cases that underwent regional anaesthesia without any problem; there are also some other studies that present cases in whom Brugada-like ECG patterns were observed (7, 8). We preferred general anaesthesia for this patient because we thought we could maintain hemodynamic stability much better. Some cases of BS, similar to the present one, have been reported in which thiopental is used in general anaesthesia induction without any problem (9, 11). It was suggested that high-dose propofol infusion might cause BS-like ECG patterns at doses higher than 4 mg kg⁻¹ h⁻¹ for the purpose of sedation, especially in intensive care units (12). Flamée et al.(13) suggested that the use of single-dose propofol in induction in the patients with BS was safe. Careyet al.(1) emphasized that propofol, benzodiazepine, ketamine and barbiturates could

be used safely in induction; they also stated that propofol could also be used for the maintenance of anaesthesia, but it was necessary to decrease the dose. It was suggested that the use of sevoflurane, isoflurane and desflurane as inhalation anaesthetics in BS does not cause a problem with regard to cardiac arrhythmias (1).

In 15% of the cases with BS, SCN5A gene coding the α subunit of the sodium channel of the heart has been held implicated and in addition to this ventricular tachycardia and fibrillation form as a result of electrical heterogeneity. The drugs causing sodium channel blockade (local anaesthetics, class IA) may form Brugada-like ECG patterns. Unlike lidocaine, bupivacaine binds to the sodium channels for a long time, and causes profound depression in depolarization phase of Purkinje fibres and ventricular muscles. This may explain that arrhythmia can be triggered in patients with occult BS (14). In the literature, there are also BS cases developed after the use of local anaesthetics, such as ropivacaine and bupivacaine, in regional anaesthesia (15).

Sugammadex was preferred in this patient for the reversal of neuromuscular block while the anaesthesia was being terminated. The use of neostigmine used for antagonism of neuromuscular blockers in the process of withdrawal of anaesthesia may cause ST-segment elevation (16). Roger et al.(17) discussed the case of a 16-year-old student in whom ventricular fibrillation-related cardiac arrest developed and was treated by defibrillation. When the etiology of the ventricular fibrillation was investigated in this patient, the patient and his father were diagnosed with BS. The patient was taken into the operation room under general anaesthesia for ICD placement, and laryngospasm developed after the patient was administered i.v. neostigmine at the end of the intervention.

The authors thought that the laryngospasm may be a possible side effect of neostigmine. The parasympathetic tonus increase during general anaesthesia and the rise of the risk of ventricular arrhythmia with the use of parasympathomimetic drugs may explain the potential side effects of neostigmine (17). Edge et al.(9) have used neostigmine in the patient with BS without any problem; however, they recommend the careful use of neostigmine because there is not sufficient evidence in this regard. Because of the same reason, a case in which it was expected that the muscle power would recover spontaneously without the use of neostigmine at the end of the intervention, to avoid the possible side effects of neostigmine during the reversal of non-depolarizing neuromuscular block, has also been reported (10). Conde et al.(18) preferred sugammadex in a case of BS undergoing subtotal colectomy because of the cardiac side effects of neostigmine and emphasized that it could be used safely in these cases.

Conclusion

General anaesthesia is preferred in cases with BS, and sugammadex can be used safely without any danger in reversal

of neuromuscular block with regard to severe arrhythmias.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

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