CASE REPORT

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Anesthesia Management in a Patient Diagnosed with Brugada Syndrome

Brugada Sendromu Tanılı Hastada Anestezi Yönetimi

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Abstract

Brugada syndrome (BrS) is a rare yet serious condition that can lead to death if not properly managed. Consequently, anesthesiologists must exercise special caution during the perioperative period. This report shares our experience with a patient diagnosed with type 3 BrS. We managed the intraoperative anesthesia in a 27-year-old patient scheduled for elective lumbar discectomy surgery. The patient had no additional comorbidities apart from BrS. After making the necessary preparations, the patient underwent surgery. Throughout the operation, the patient's hemodynamics remained stable. During the postoperative follow-up in the coronary intensive care unit, the patient reported experiencing chest pain and palpitations. However, no arrhythmia was detected, except for tachycardia. The patient was discharged after 48 h once clinical stability was achieved. In contrast to our case, patients who exhibit symptoms such as syncope, palpitations, and a family history indicative of cardiac diseases but have not been diagnosed with BrS should be thoroughly evaluated. It is crucial to ensure appropriate physiological and pharmacological conditions for these patients.

Keywords: Anesthesia, arrhythmia, Brugada syndrome

Öz

Brugada sendromu (BrS) nadir görülen ancak gözden kaçması durumunda ölümle sonuçlanabilecek ciddi bir hastalıktır. Bu nedenle anestezistlerin perioperatif özellikle dikkat etmesi gerekir. Bu raporumuzda tip 3 BrS tanılı hastayla ilgili deneyimimizi paylaşmayı amaçladık. Yirmi yedi yaşında elektif lomber diskektomi cerrahisi planlanan, BrS dışında ek özelliği olmayan hastanın intraoperatif anestezi yönetimi rapor edildi. Gerekli hazırlıklar yapılarak hasta operasyona alındı. İntraoperatif hemodinami stabil seyretti. Postoperatif koroner yoğun bakım ünitesinde takibi sırasında hastada göğüs ağrısı ve çarpıntı şikayeti meydana geldi. Taşikardi dışında aritmi saptanmadı. Kırk sekiz saat sonra klinik stabilite ile taburcu edildi. Olgumuzdan farklı olarak BrS tanısı olmayan ama kardiyak hastalıkları işaret eden aile öyküsü ve senkop, çarpıntı gibi semptomları olan hastalar dikkatlice sorgulanmalıdır. Bu hastalar için fizyolojik ve farmakolojik uygun şartlar sağlanmalıdır.

Anahtar kelimeler: Anestezi, aritmi, Brugada sendromu

Introduction

Brugada syndrome (BrS), first described by the Brugada brothers in 1992, is a rare condition that can lead to malignant arrhythmias and sudden cardiac death due to ion channel disorders associated with the transmission of electrical impulses in the heart (1). Anesthesiologists should be particularly mindful of this condition. It is characterized by autosomal dominant genetic transmission, primarily as sodium canalopathy due to *SCN5A* gene mutation. However, numerous gene mutations involving potassium and calcium channels have also been identified.

Electrocardiography (ECG) findings typically show ST segment elevation in the right precordial leads, independent of electrolyte disturbance, heart disease, or cardiac ischemia. However, these findings can vary depending on the time and conditions. Although BrS can be detected in all age groups, from early infancy to advanced age, it is most prevalent in the 20-40 age range, with a higher incidence in men (2).

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The only effective prophylactic treatment for these patients is an implantable defibrillator (ICD). However, it is recommended only for high-risk patients, such as survivors of cardiac arrest, those with a history of syncope caused by ventricular arrhythmias, or those who develop ventricular arrhythmias during a provocation test.

In this article, our aim is to share our experience with a patient diagnosed with type 3 BrS who exhibited minimal changes in ECG but could be overlooked during pre-operative evaluation.

Case Report

A 27-year-old male patient diagnosed with BrS was admitted to our hospital for elective L5-S1 discectomy. In his medical history, the patient presented to the neurology clinic in 2016 with complaints of headache, intermittent dizziness, and palpitations. After a normal neurological examination and detection of changes in his initial ECG, he was referred to the cardiology clinic where BrS was diagnosed. Since then, the patient has undergone regular check-ups every six months. His follow-up frequency increased to every two months after he experienced syncope for the first time in his life and was brought to the emergency department. A genetic test revealed a negative *SCN5A* gene mutation and a positive lipoprotein A gene mutation. He had undergone an uneventful appendectomy at the age of 12 years. His family history included heart failure in his father and arrhythmia in his sister. Laboratory examination showed normal complete blood count and electrolyte levels. The ECG showed normal sinus rhythm with no pathology detected other than T negativity in lead V1 (Figure 1). Echocardiography findings were normal.

Informed consent was obtained from the patient. An external defibrillator was kept open and ready in the operating room. Standard monitoring was applied. The patient's heart rate was 71 beats/min, non-invasive blood pressure was 108/66 mmHg, and peripheral SpO_2 was 99%. An intravenous route was established. The following preoxygenation, general anesthesia was induced with 7 mg/kg thiopental, 1 mcg/kg fentanyl, and 0.6 mg/kg rocuronium. The patient was intubated with a number 7.5 endotracheal tube. Maintenance of anesthesia was achieved with 6% desflurane, 50-50% air- O_2, and remifentanil infusion. Rocuronium (10 mg) was also administered every 30 min in the prone position. For postoperative analgesia, intravenous 0.5 mg/kg tramadol was administered. At the end of the surgery, 3 mg/kg sugammadex was administered to reverse the neuromuscular blockade. The operation proceeded smoothly, with stable vital signs, and lasted 130 min. The patient with regular and adequate spontaneous respiration was extubate. He was transferred to the cardiology intensive care unit for postoperative follow-up. There was no significant change in the postoperative ECG (Figure 2). During follow-up, the patient reported chest pain and nocturnal palpitations. Except for sinus tachycardia (max 122 beats/min), no arrhythmia was detected. The patient was re-evaluated by cardiologists before discharge. No findings were found in favor of ischemia or acute myocardial infarction. The patient was transferred to the Neurosurgery clinic at the end of 24 h. The follow-up period was completed to 48 h. He was discharged with clinical stability.

Discussion

The adult advanced life support guideline, published by the International Consensus on Cardiopulmonary Resuscitation in 2020, emphasizes the importance of predicting and preventing death due to sudden cardiac arrest, particularly in young adults. It urges serious consideration of the existence of misinterpreted and underestimated symptoms. In particular, it recommends

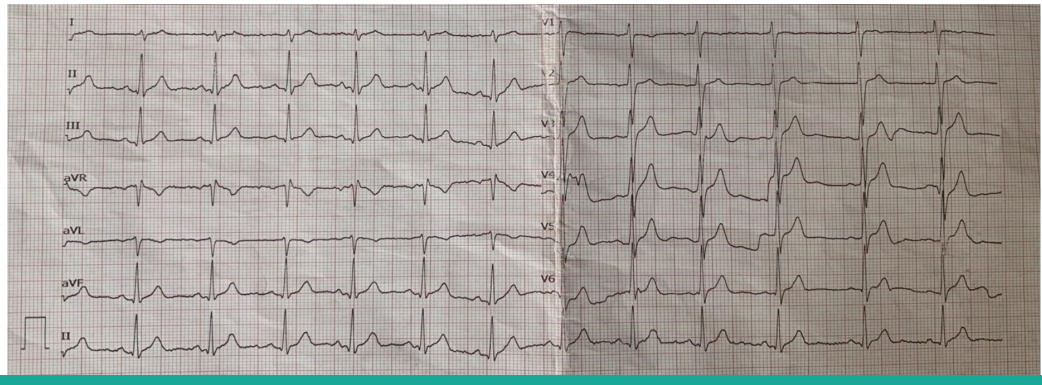

Figure 1. Preoperative electrocardiogram of the patient with Brugada syndrome

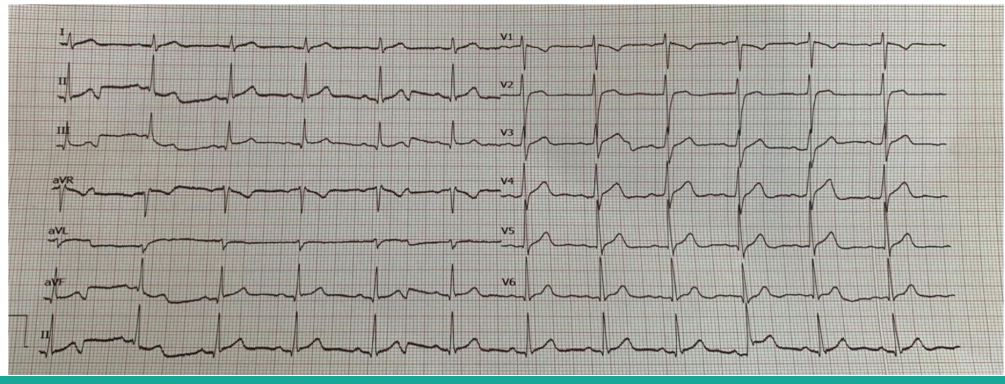

Figure 2. Postoperative control electrocardiogram of the patient with Brugada syndrome

thorough investigation of the causes of syncope (3). Similarly, the 2021 guideline of the European Resuscitation Council lists BrS among the electrical causes of sudden cardiac death, stating that it is often associated with sudden cardiac death in young people (4).

BrS, diagnosed in our patient, is identified as one of the leading causes of sudden cardiac arrest in individuals under the age of 40 years. It may exhibit autosomal dominant inheritance, but 60% of patients do not have an affected family member. Other risk factors include male sex, race (more common in Asians than other races), electrolyte disturbances, certain medications (www.Brugadadrugs.org.), fever, and use of alcohol and cocaine (2). Unpredictable problems and malignant arrhythmias that may occur during anesthesia management due to anesthetic drugs can trigger arrhythmias. Because we only have cases and case series in the literature, an ideal anesthesia management strategy for BrS has not yet been clarified. There is no definite recommendation for general or regional anesthesia in these patients; both can be preferred. In our patient, electrolytes such as sodium, potassium, and magnesium, which may aggravate the situation, were at normal levels. A cardiology opinion was obtained, and our patient was operated on under appropriate conditions. We planned general anesthesia.

High-dose use of propofol, known to be proarrhythmogenic, is one of the drugs that should be used with caution because it causes Brugada-like changes in ECG (5). However, there are also cases arguing that the use of a single dose in induction is safe (6,7). Because Brugada-like ECG findings have not been detected with thiopental to date, many studies have reported that it can be safely used (8,9). Therefore, we preferred thiopental for induction. From the data obtained, benzodiazepines can be used safely (7,10), while ketamine is among the drugs that should be avoided (5,11). We used fentanyl for induction and remifentanil for maintenance because there are publications indicating that these drugs can be safely used and no complications have developed (9). Although all volatile anesthetics are known to cause QT interval prolongation, it has been suggested that the use of isoflurane, sevoflurane, and desflurane does not produce cardiac arrhythmogenic effects (6). Because of the low blood gas solubility, we preferred desflurane as a maintenance anesthetic. Because there were no case series with any complications for rocuronium, we used it safely (8). We administered low-dose tramadol for postoperative analgesia. Tramadol is indicated among the drugs that should be used with caution (5,11). There is a report showing Brugada-like changes in ECG because of high-dose tramadol administration (12). The clinical risk of this drug at therapeutic doses is unknown, and stronger evidence is needed to contraindicate its use. We preferred sugammadex to reverse the neuromuscular block while the anesthesia was terminated because it is an antidote of rocuronium, it does not have any mechanism affecting ion channels, and it can be safely used in many cases (13). Because BrS arrhythmias occur mostly at night, at rest, or when the vagal tone is active, the increase in parasympathetic tone and use of parasympathomimetic drugs increase the risk of arrhythmias. Therefore, careful use of neostigmine, a parasympathomimetic agent, is recommended (9).

However, there are reports in the literature suggesting that there is no problem when used in combination with atropine (10). Additionally, because all local anesthetics block the sodium channel, they should be considered in terms of arrhythmia. Unlike lidocaine, local anesthetics such as bupivacaine and ropivacaine, which have a long-lasting effect, require particular attention. Their use in BrS is controversial, with case reports of ventricular arrhythmia following their use (14). Lidocaine, being short-acting, is likely safer and should be preferred over other local anesthetics. Beta-adrenergic blockade and alpha-

receptor agonists can exacerbate ST segment changes in BrS patients; this can be prevented with beta-agonists or alpha-blockade (15). In cases of increased vagal tone and bradycardia, it is recommended to administer atropine and ephedrine (1).

ConclusionsGeneral anesthesia is the preferred method in the anesthesia management of patients with BrS. However, high-quality data are still inconclusive, and more comprehensive records are needed to understand the safety of commonly used drugs. Unlike our case, in patients who do not provide a detailed medical history, symptoms that may be associated with arrhythmia, such as sudden death at an early age in the family, cardiac diseases in family members, unexplained syncope, dizziness, shortness of breath especially at night, palpitations, and seizures, should be carefully investigated. Minimal ECG variability may be overlooked if not evaluated in this context. During the perioperative period, anesthesiologists should focus on autonomic changes, avoid superficial anesthesia and inadequate analgesia, minimize position changes, correct electrolyte imbalances, and maintain normothermy, normocarbia, and normovolemia. A defibrillator should be readily available in the operating room, just in case.

Ethics

Informed Consent: Informed consent was obtained from the patient.

Authorship Contributions

Surgical and Medical Practices: S.A., Y.C.A., Design: S.A., Y.C.A., Analysis or Interpretation: Y.C.A., Literature Search: S.A., Writing: S.A.

Conflict of Interest: No conflict of interest was declared by the authors.

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