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Brugada Syndrome: Anesthesia Management

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Abstract

Brugada's Syndrome (BrS) is a rare but highly risky medical condition. It is a genetic disorder that may result in Ventricular Fibrillations (VF) that can lead to sudden cardiac arrest. The highest possible standards of safety in anesthetic medications must be followed and adequate measures must be taken with sufficient monitorization in patients with BrS. We wanted to mention the importance of monitorization in the early detection of possible complications and a careful follow-up even though no administration of anesthetic medication is present.

Keywords

Brugada Syndrome (BrS), Cardiac Arrhythmia, Ventricular Fibrillation, Anesthesia

1. Introduction

Brugada Syndrome (BrS) is a genetic arrhythmia syndrome, which has an increased risk of sudden cardiac death with Ventricular Fibrillation (VF) episodes [1]. Arrhythmogenic risk can be triggered by different metabolic and pharmacological factors [2].

BrS is a rarely encountered disease that was first defined by Pedro and Joseph Brugada in 1992 [3]. Its prevalence is estimated to be 5 - 20 in 10,000 cases. It is observed as endemic in the Southeast Asia region. The average age of disease onset is 40 year and the incidence is higher (8 - 10 times) in men. Sudden death may occur in 4% of cases while there is no structural heart disease is present in 4% of the cases [4]. Clinical findings can be in a wide range from an asymptomatic presentation to sudden cardiac death. Initial symptoms may be dizziness, syncope, shortness of breath, especially at night, palpitations, and seizures. The most important laboratory marker is the abnormal findings in the electrocardiogram (ECG). Characteristic ST-segment elevation at V1 - V3 derivations and normal

Q-T interval are the specific findings on electrocardiography [3]. Sometimes, the first symptom may occur as syncope or sudden death. Genetic mutation studies of BrS are available in the literature. Until today, more than 500 mutations are identified in 25 genes that encode the mechanisms of sodium, potassium, or calcium channels. It has been reported that a mutation of the SCN5A gene is present in 35% of the families whose genetic map is defined [5]. As there is no extract treatment for this syndrome, methods that can prevent dangerous complications (such as implanted defibrillators, some antiarrhythmics, and ablation) are also used. Patients with BrS should also need to pay attention to their lifestyle. It is recommended for the patients to pay attention to the drug use containing sodium channel blockers and not to consume excessive alcohol and excessive food during meals.

Many patients with diagnosed or undiagnosed BrS need surgical treatment for any reason in any period of their lives. Anesthesia practices of the patients with this syndrome may have some difficulties for anesthetists. It is an important responsibility for the anesthesiologist to encounter such a patient, to decide on the anesthesia method (such as general, regional, nerve block, sedation, monitored anesthesia care), to choose appropriate drugs, and to resolve possible complications without any problems. The aim of this case presentation is to review the issues that should be considered regarding safe perioperative anesthesia management of patients with Brugada syndrome.

2. Case

Informed consent form was obtained from the patient. A 26-year-old male patient, who will undergo concha lateralization and electrocauterization processes upon the pre-diagnosis of acute sinusitis, was preoperatively evaluated. Cardiac ablation therapy was applied to the patient 1 year ago due to the arrhythmias related to BrS. In the latest Holter examination, the value was found as 700 VES/day. Echocardiography evaluation was normal. There was no history of drug use. Although he had a previous smoking history, he had not been smoking for about 3 months. No other problem was found in the systemic evaluation of the patient. There were no features in the family history.

Under normal conditions, the planned surgery could have been performed in the service or under outpatient clinic conditions if the patient had no problems. However, due to the presence of BrS, it was planned to perform the procedure via monitored anesthesia care management under operating room conditions. Routine monitorization (5-lead ECG, non-invasive blood pressure, and Pulse oximetry) was applied to the patient, who was taken to the operating room. Oxygen support was provided at 2 - 4 l/min by the help of a nasal cannula. By using a 20 G catheter, crystalloid 0.09% NaCl infusion was initiated by providing intravenous access from the back of the left hand. After the compliance of the patient was verbally provided, permission was given for the surgical procedure. Lidocaine HCL 20 mg/ml, Epinephrine HCL 0.0125 mg/ml 1 ampoule was diluted at

a ratio of 1/1 and administered to the patient by the surgeon as the local anesthetic. The patient's hemodynamic values and oxygen saturation remained stable throughout the operation. There was no interference situation. At the end of the operation, the patient was taken to the recovery room without any problems and then transferred to the service.

3. Discussion

Perioperative physiological and pharmacological changes related to the surgery and anesthesia may trigger malignant arrhythmias in the patients with BrS. In fact, despite perioperative complications for BrS have been reported in the literature, the development of complications is not observed frequently [6]. Since it is a rarely seen syndrome, prospective studies that can be conducted for the identification of anesthetic risks are unfortunately not practical. During the preoperative evaluation, the most important issue is to suspect from BrS. In general, many people with Brugada syndrome are not aware of their illness because they do not have significant complaints. During the preoperative evaluation of a patient, for whom an elective surgery is planned, in case it is suspected from characteristic Brugada pattern in ECG, a consultation should definitely be sought from the department of cardiology [7]. Avoidance of increased vagal tonus, correction of electrolytes, maintenance of normothermia, normocapnia, adequate analgesia, and adequate deep anesthesia take place among the general recommendations in perioperative period for anesthesia. The main concern in the patients with BrS is the risk of ventricular tachycardia and sudden death. [8].

While type 2 Brugada pattern is used for the patients having an undiagnosed ECG finding and the presence of sudden death in the family history, the definition of Type 1 Brugada pattern is used for the patients with ECG findings and a family history [9]. The case presentation in the present article had the characteristics of Type 1 Brugada Syndrome. However, no genetic research was conducted previously in the patient.

The activation of the parasympathetic system can easily trigger arrhythmias in the patients with BrS. Thus, attention should be paid to the applications that will stimulate the parasympathetic system in the perioperative period. In this regard, long periods of fasting, insufficient depth of anesthesia, and postural changes become important [10] [11]. It is a useful approach to control anxiety as of the preoperative period. We didn't give our patient a special anxiolytic agent. Our patient was quite conscious and calm.

In addition to routine ASA monitorization (5-lead ECG, non-invasive blood pressure, and Pulse oximetry), different monitoring parameters can also be used. In the intraoperative period, the defibrillator pads must be attached and kept ready until the patient leaves the operating room. As an alternative, some authors also stated that another defibrillator should be also kept ready [12].

We applied the monitoring procedures in our case. The defibrillator was nearby and readily available throughout the operation. We applied only monitored anes-

thesia care in our patient. We did not need any anesthetic agents.

Dendramis *et al.* emphasized that no generalization could be made in the selection of anesthetic drugs in patients with this syndrome, and also this issue should be considered on patient basis [13]. There are also controversial articles regarding the use of propofol in the patients with BrS. However, the evidence for the use of propofol in BrS is at the level IIb [14].

Ciconte *et al.* claimed that the induction of propofol and maintenance of sevoflurane are safe in the patients with high-risk BrS [15]. In their recent publications, they recommended the use of a single bolus dose of propofol and inhalation anesthetics [2]. Intravenous drugs such as midazolam and propofol are used for sedation in many cases without any problems. General anesthesia techniques are generally preferred for caesarean section in pregnant patients with BrS [16]. However, it should be noted that general anesthesia can trigger malignant hyperthermia in the patients with BrS, together with its negative effects on the mother and the newborn [14].

In some of the articles, BrS is defined as "non-long, long QT syndrome" [17]. The use of inhalation agents that can prolong the QT interval may pose a risk [18]. Sevoflurane and desflurane can be used via close monitorization [6]. The use of Thiopental [19] and midazolam [20] is recommended. Kloesel *et al.* stated that elevation of ST segment that may occur after the use of etomidate may be a limitation for this drug [6].

By contrast with depolarizing neuromuscular blockers, non-depolarizing blockers (atracurium, vecuronium, cisatracurium, and mivacurium) can be used without any adverse effects [10] [20] [21]. Kloesel *et al.* reported that the patients with this syndrome may have ST elevation after the induction dose of succinylcholine [6]. As the use of neostigmine may pose a risk in the patients by causing changes in cholinergic tonus, suggamadexin is reported as a safe agent [22]. Opioids, especially fentanyl and remifentanil, are a safely usable drug group [23]. While high doses of tramadol can trigger the arrhythmias caused by BrS, morphine can be safely preferred [24]. Intravenous lidocaine, ketorolac, diclofenac, and paracetamol are such analgesic agents that can be used safely.

Many controversial publications are present on the use of regional anesthesia techniques. Subarachnoid block techniques may be preferred more in such patients due to the need for low doses of local anesthetics [25].

Local Anesthetics (LA) are the drugs that act by blocking the sodium channels at different rates. Some researchers choose to avoid regional techniques in the patients with BrS due to the theoretically increased risk of arrhythmia when using LA having channel-blocking properties [7]. However, there are publications in the literature regarding the uneventful application of local anesthetics in BrS [6] [26]. Brown *et al.* had performed mepivacaine application in an ultrasound-guided interscalene block in a patient, to whom a pacemaker will be attached, successfully [27]. We used lidocaine as a local anesthetic agent. We didn't encounter any problems.

It is reported that the use of metpamid in the treatment of postoperative nausea and vomiting may cause problems in the patients with Type 1 BrS [28]. However, ondansetron can be used safely in the prophylaxis of nausea [29].

4. Conclusion

BrS is recognized as an important cause of sudden cardiac death in young adults. Some drugs frequently used in the perioperative period may cause ventricular arrhythmias. Although anesthesia management in patients with BrS is defined in numerous case reports, the safest anesthesia method is still unknown. In present articles, it was sought to present a case in which monitored anesthesia care was provided by the surgeon via local anesthesia despite there are general anesthesia and regional anesthesia techniques applied with different local anesthetic drugs. Regardless of the technique used, the safety of the patient should be kept at an ultimate level by taking all the necessary precautions.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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