Clinical Case Reports

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CASE REPORT

Cardiac arrest during spinal anesthesia for cervical conization: a case report

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Funding Information
No sources of funding were declared for this study.

Received: 24 December 2015; Revised: 13 February 2016; Accepted: 3 March 2016

Clinical Case Reports **2016; 4(5): 466–468**

doi: 10.1002/ccr3.545

Key Clinical Message

Spinal anesthesia is regularly performed worldwide and is an integral part of the modern day anesthesia practice. Although unexpected cardiac arrests during this procedure are very rare, medical professionals should be aware of the potential for this complication. In making the decision to use spinal anesthesia, judicious patient selection, adequate preventive measures, and strict monitoring are important.

Keywords

conization, gynecologic surgical procedures, heart arrest, spinal anesthesia, spinal injections.

Introduction

Spinal anesthesia is regularly performed by anesthesiologists, as well as by obstetricians and gynecologists. It has become an integral part of obstetric surgical procedures. Several complications of spinal anesthesia have been described, including hypotension, nausea, and vomiting [1]; however, cardiac arrests during this procedure are very rare [2]. We present a case of unexpected cardiac arrest during spinal anesthesia in a young, healthy woman.

Case Presentation

A 31-year-old woman (height, 136 cm, weight, 45.6 kg), gravida 0, was scheduled for cervical conization due to cervical intraepithelial neoplasia 3. All preoperative assessments, including blood biochemistry, chest and abdominal radiography, and 12-lead electrocardiogram (ECG) were normal. She was a nonsmoker. The patient was extremely nervous, but received no premedication. An ECG monitor, an automated blood pressure cuff, and pulse oximetry were applied in the operating room. Before spinal anesthesia, the patient's blood pressure was 118/65 mmHg and heart rate (HR) was 58 beats/min. With the patient in the lateral position, hyperbaric bupivacaine (10 mg) was injected into the subarachnoid space at the L3-L4 interspace. At 5 min, maximum sensory block up to T10 was noted. In the first 15 min, her blood pressure and heart rate remained stable. After disinfection of the vagina in preparation for cervical conization, the patient complained of nausea. Cardiac arrest then occurred without her developing bradycardia. Immediately, cardiopulmonary resuscitation (CPR) was initiated and epinephrine (1 mg) was administered. Approximately 2 min after the initiation of CPR, sinus rhythm was restored and the patient recovered consciousness. However, she subsequently lost consciousness again, and pulseless ventricular tachycardia (VT) occurred. Because the patient's ECG changed immediately from pulseless VT to cardiac arrest, we restarted CPR and administered epinephrine (1 mg). The patient was successfully resuscitated after 2 min of CPR. We canceled the operation and consulted cardiologists, who performed coronary angiography because the 12-lead ECG after the revival of the patient showed cardiac infarction of the lateral wall (Fig 1).

However, no coronary artery disease was found, and the patient was diagnosed with coronary spastic angina. She was transferred to the intensive care unit for further observation.

Discussion

The incidence of cardiac arrest during spinal anesthesia varies from 1.3 in 10,000 to 18 in 10,000 patients [2]. According to previous reports, young and healthy patients may experience cardiac arrest in the operating room during spinal anesthesia [3–6]. The causes of cardiac arrest during spinal anesthesia are controversial and unclear. Unintentional total spinal anesthesia, myocardial infarction or conduction disorders, and reduction of venous return due to sudden hemorrhage or imbalance with background vagal dominance have been suggested as causative factors in previous reports [4, 7].

In this patient, because cardiac arrest occurred in the setting of oxygen saturation readings of 99%, it is unlikely that unintentional total spinal anesthesia occurred. Baron et al. found that cardiac vagal tone is enhanced by reduced venous return [8], and young patients typically have a strong vagal tone [7]. Thus, possible causes for cardiac arrest in this patient include a significant decrease in venous return to the heart due to the inhibition of sympathetic efferents during spinal anesthesia, enhanced vagal tone caused by a decrease in venous return, and vasovagal reflection due to nervous strain.

Risk factors for cardiac arrest during spinal anesthesia have been reported as follows: age <50 years, baseline heart rate <60 beats/min, American Society of Anesthesiologists (ASA) physical status I and II, use of beta blockers, sensory blockade above T6 level, and prolonged P-R interval [7]. Pollard reported that patients may be considered at high risk for cardiac arrest during spinal anesthesia when two or more of these factors are present [7]. The patient in the present case could be classified as having a greater tendency for cardiac arrest because she met three risk factors (i.e., 31 years old, baseline heart rate of 58 beats/min, and ASA status I). However, patients who meet two or more of the aforementioned risk factors are not uncommon. For example, ASA I or II denotes a normal healthy patient or a patient with mild systemic disease; therefore, many young women who are scheduled to receive spinal anesthesia for gynecological surgery or cesarean section will fall into this category. Thus, medical professionals who perform spinal anesthesia should always be aware of this possibility.

With regard to specific strategies for addressing the possibility of cardiac arrest during spinal anesthesia, the appropriateness of spinal anesthesia in high-risk patients should be evaluated carefully. Although multiple factors may lead to cardiac arrest during spinal anesthesia, evidence suggests that a decrease in venous return is one of the most important [3–7, 9]. When spinal anesthesia has been selected for a patient, maintaining an adequate preload is the key to decreasing the risk of cardiac arrest. Intravascular fluid administration of mixed α- and β-agonists has also been advocated to decrease the frequency of cardiac arrest during spinal anesthesia [7]. Furthermore, excessive anxiety and fear may cause vasovagal reflection, which applies to the present patient. Appropriate sedation might reduce this risk [9].

Worsening bradycardia (HR of 30–60 beats/min) often precedes the onset of cardiac arrest during spinal anesthesia; intravenous administration of atropine or ephedrine has been recommended as a treatment for this condition

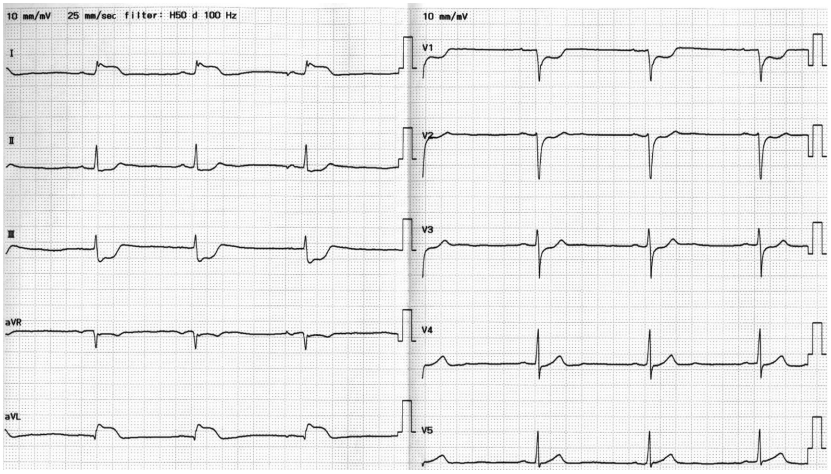

Figure 1. ECG after revival of the patient showed cardiac infarction of the lateral wall.

[4, 10]. The effectiveness of epinephrine for cardiac arrest during spinal anesthesia has previously been reported [3–6, 9, 10], and in our patient, the administration of epinephrine immediately after cardiac arrest restored the sinus rhythm and allowed the patient to regain consciousness.

Many obstetricians and gynecologists have low exposure to perioperative cardiac arrest. In remote rural areas, cesarean section is often carried out in a small clinic; this necessitates that the treating physicians be prepared to deal with intraoperative complications such as cardiac arrest, which has been reported after spinal anesthesia for this procedure [3, 9]. Although the perioperative mortality is almost 0.001% in the world [11], the survival rate of cardiac arrest during spinal anesthesia is reported to range from 20% to 77% [12, 13]. There is no difference in post–cardiac-arrest mortality between spinal anesthesia and other anesthesia methods in Japan [14]. Moreover, Charuluxananan et al. [15] reported that a surgeon performing spinal anesthesia was a significant factor associated with cardiac arrest (odds ratio, 23.5). Therefore, cardiac arrest is one of the complications that obstetricians and gynecologists should be most aware of during spinal anesthesia.

We report a case of cardiac arrest during spinal anesthesia – a complication that is not uncommon among young, healthy women. Obstetricians, gynecologists, and other medical professionals who perform this procedure should be aware of the potential for this complication, and be prepared to administer treatment. In the present patient, cardiac arrest was successfully treated by the immediate administration of epinephrine and appropriate CPR. We conclude that when making the decision to use spinal anesthesia, judicious patient selection, adequate preventive measures, and strict monitoring are very important.

Conflict of Interest

None declared.

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