Anesthetic Approach for Cesarean Section in a Pregnant Patient with Moyamoya Disease: A Case Report

Moyamoya Hastalığı Olan Gebe Hastada Sezaryen için Anestezi Yaklaşımı: Olgu Sunumu

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ABSTRACT

Moyamoya is a rare cerebrovascular disease characterized by its bilateral progress in the circle of Willis and internal carotid arteries, causing the development of collateral vessels. Its first angiographic image was taken in Japan in 1957, and it was called Moyamoya, meaning "a puff of smoke in the air". Its etiology is not known accurately. Our patient was a 32-year old, 34- week 3-day pregnant woman, who was taken for an emergency cesarean section. The patient was diagnosed with Moyamoya 10 years ago, and she has prescribed 150 mg of acetylsalicylic acid per day for her condition. The patient's neurological examinations were normal during the preoperative period. The patient was successfully operated following an attentive follow-up and slow induction.

Key Words: Moyamoya, Cesarean section, Anesthesia

ÖZ

Moyamoya Willis poligonu ve internal karotid arterlerde bilateral progresif ilerleyen ve sonucunda kolleteral damarların gelişmesiyle karakterize nadir bir serebrovasküler hastalıktır. Japonya'da 1957 yılında ilk anjiyografik görüntülemesi yapıldı ve "havada dağılan sigara dumanı" anlamına gelen Moyamoya denmiştir. Etiyolojisi tam olarak bilinmemektedir. Olgumuz 32 yaşında 34 hafta + 3 günlük gebe acil sezeryana alınmıştır. Hasta 10 yıl önce Moyamoya tanısı almış ve bu durumundan dolayı günlük 150 mg asetilsalisilik asit reçete edilmiştir. Hastanın nörolojik muayenesi preoperatif dönemde normaldi. Hasta dikkatli takip ve yavaş indüksiyon ile başarılı bir şekilde ameliyat edildi.

Anahtar Sözcükler: Moyamoya, Sezaryen, Anestezi

INTRODUCTION

Moyamoya disease is rare and its etiology remains unclear. It is a cerebrovascular disease characterized by bilateral progressive stenosis in the circle of Willis and internal carotid artery. Although Moyamoya disease appears with intracranial hemorrhage in adult patients, it appears with cerebral ischemic attacks in children. Angiography is used in the diagnosis of Moyamoya disease, while the aim of treatment is to prevent complications of the disease, avoid the factors that can lead to ischemia and hemorrhage, and minimize the risks. Currently, there is no curative treatment known, although in recent years surgical treatments have been used (1).

CASE REPORT

A 32 year-old pregnant female patient (34 weeks, 3 days) presented to our university's Obstetrics and Gynecology Department with complaints of vaginal discharge. Due to the

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high risk pregnancy, according to the results of testing, the patient was scheduled for an emergency cesarean section and was taken to the operating room. Since the patient was pregnant, premedication was not given; the patient was conscious and her neurological examination was normal. The patient was diagnosed with Moyamoya nearly ten years previously and was taking 150 mg acetylsalicylic acid every day. She had no additional problems, and her complete blood count and biochemical analysis were normal. The patient was monitored in the operating room via ECG, pulse oximeter, non-invasive blood pressure measurement, and temperature monitoring.

The patient's first non-invasive blood pressure values measured were 120/80 mmHg. Afterward, the Allen's test was performed under local anesthesia with lidocaine in order to follow invasive blood pressure, and an arterial catheter was placed in the left radial artery. The invasive blood pressure was monitored, and we preferred not to insert a central venous catheter. General anesthesia was performed and a nitroglycerin infusion was prepared for a possible hypertensive attack. Following preoxygenation, anesthesia was induced with 6 $mg.kg^{-1}$ pentothal and 1.2 $mg.kg^{-1}$ rocuronium. Following the induction of anesthesia, the patient was intubated with an endotracheal tube at 7.5 mm in 30 seconds, creating cricoid pressure. After endotracheal intubation, anesthesia was maintained with a 50% O_2 mixture of 50% air and Desflurane®.

Approximately 4 minutes after a vital vertex, a 2640 g baby boy was delivered with a lower segment caesarean section. The Apgar score was 8 at the first minute, and 10 at 5 minutes. The patient was administered 100 mcg of fentanyl analgesia, and 1000 ml of 0.9% normal saline solution was given by infusion. The preoperative blood pressure was taken the moment she entered the operating room. During endotracheal intubation and the entire operation the mean arterial blood pressure was 80-110 mmHg, and the $EtCO_2$ values were maintained between 35-45 mmHg. Her heart rate was 80-100 $beats/min^{-1}$. Due to a lowering of the patient's body temperature of 35.5 °C, she had to be heated. The operation took approximately 40 min.

At the end of the operation, the patient was intubated and sedated in order to closely follow her in the post-anesthesia care unit. The patient was then connected to a mechanical ventilator and monitored. The invasive blood pressure, body temperature, ECG, and SPO_2 were followed. The mean arterial pressure was maintained at 90-100 mmHg, and the patient continued to be heated because the patient's body temperature was 35.7 °C at the first measurement. After twenty minutes, the patient's body temperature was measured to be above 36 °C and heating was terminated. Her heart rate was 90-105 $beats/min^{-1}$.

After the recovery of the patient's muscle strength due to consciousness, the cooperative patient was extubated at the thirtieth minute without complications. The spontaneously breathing patient was followed up for about 2 hours without encountering any problems. The patient was transferred to the obstetrics and gynecology clinic.

DISCUSSION

Moyamoya disease is a rare cerebrovascular disease clinically characterized by progressive stenosis of the branch and end portions of the internal carotid artery (2). The prognosis of this disease is associated with the development of dilated fragile collateral vessels. These dilated collateral vessels, upon angiography, look like smoke dispersed in the air, which is why it is called Moyamoya. The incidence of Moyamoya disease in Asian populations is much higher (3), and the clinical symptoms encountered depend on the degree of occlusion of the internal carotid artery. Symptoms due to ischemia, stroke, seizures and trans-ischemic attacks, and compensatory collateral vessels are a result of bleeding from fragile mechanisms developing due to dilatation. Headaches are caused by the transdural collaterals and can be examined in two parts (4). Moyamoya disease decreases cerebral perfusion due to progressive occlusion.

Further complications of this disease include concomitant sickle cell anemia, thyrotoxicosis, Down syndrome, hypertension and coarctation of the aorta, and are especially dangerous, requiring clinicians to be extremely careful (5). Although the anesthetic approach to cerebral perfusion preservation is not clear, ensuring adequate oxygen delivery and keeping intracranial pressure under control are important points (6). Sevoflurane in the cerebral vasculature creates two different effects. It reduces the need for metabolic reactions by vasoconstriction at low doses, and it creates vasodilation at high doses. It is known that clinical doses of sevoflurane preserve brain physiology better than isoflurane (7). In our case, we chose to use anesthesia maintained with sevoflurane.

While investigating the literature about Moyamoya disease with regard to general anesthesia and regional anesthesia in cesarean section patients, we observed that general anesthesia was often applied. Doctors should be aware of the issues of difficult intubation, which may create the possibility of aspiration and neonatal depression (8). Despite the hypertensive episodes that may occur during intubation, nitroglycerin infusions are made available. The necessary steps to prevent hypothermia should be taken in such patients to prevent cerebrovascular spasms (9). The body temperature was measured in the anesthesia care unit, and heated to bring it to the ideal level of our patient. Hypovolemia, hypotension, and hypothermia are to be avoided in terms of continuing cerebral perfusion.

Therefore, care should be exercised in applying regional anesthesia in patients with Moyamoya. We believe that general anesthesia should be preferred to avoid the regulation of hemodynamics in Moyamoya disease and its complications. Additionally, the use of 6% Desflurane as an inhalation agent played an important role for hemodynamic stability in anesthesia management in the presented case.

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