CASE REPORT

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Anesthetic Management of Urgent Cesarean Section with Undiagnosed Transposition of Great Arteries

Nurullah Yilmaz, Ersin Koksak, Gokce Ultan Ozgen, Ersan Ozen, Ahmet Dilek, Deniz Karakaya and Fatma Ulger

Anesthesiology and Reanimation Department, Faculty of Medicine, Ondokuz Mayıs University, Samsun, Turkey

Corresponding author: Nurullah Yilmaz, Anesthesiology and Reanimation Department, Faculty of Medicine, Ondokuz Mayıs University, Samsun, Turkey. E-mail: nurisbir117@hotmail.com

ABSTRACT

We consider that general anesthesia will be an appropriate and safe method as regional methods could lead to significant time loss in the prevention or minimization of complications. High blockage required for regional anesthetic methods in pregnant women with TGA and the maintenance of hemodynamic stability may become difficult due to neuroaxial sympathectomy even if a successful neuroaxial block has been provided. Agents with minimal effect on cardiovascular functions should be preferred for anesthesia induction and maintenance and close hemodynamic monitoring should be done during intraoperative and postoperative periods.

Key words: great arteries, Cesarean section, anesthetic management.

1. INTRODUCTION

The Prevalence of congenital heart diseases (CHD) is estimated to be 8 in every 1000 live births. Transposition of great arteries (TGA) is common among the newborn with an incidence between 19.3-33.8/100 000 and consists of 5-8% of all CHDs (1, 2).

Today, children with CHD may survive until adulthood through conservative and surgical therapies. However, their desire to have a child brings severe problems for the obstetricians and anesthesiologists alike. These patients are under higher risk of obstetric complications and have high mortality and morbidity during surgical interventions. It is of great importance to understand the physiology of pregnancy and the pathophysiology of the underlying cardiac disease for a successful management of anesthesia (1).

The aim of this paper is to discuss the anesthetic methods which may be applied for urgent Cesarean section in pregnant women with undiagnosed and therefore uncorrected TGA.

2. CASE PRESENTATION

A 23-year-old pregnant woman in 31st week of gestation, whose weight was 55 kg and height was 160 cm was admitted to the emergency department with the complaint of vaginal hemorrhage and hospitalized with the prediagnosis of preterm delivery. Anhydramnios and intrauterine growth retardation were detected on obstetric examination. Systemic steroid therapy was administered to ensure lung maturity of the fetus and the decision was made for patient to undergo Cesarean section (C/S). In preoperative anamnesis, the patient did not admit any systemic disease and except for moderate fatigue with exertion, she had no other complaint. On physical examination the patient had peripheral and perioral cyanosis, 6/6 pansystolic murmur, thrill (in all cardiac foci) and clubbing were detected. Respiratory sounds were normal on auscultation. Her laboratory findings were as follows: Hemoglobin: 13 g/dL, Hematocrit: 38.7%, white blood cells: 12.990/uL, Plt: 188.000/uL, glucose: 97.9 mg/dL. The patient was taken

to the operating room and standard monitoring protocol was performed. An Urgent cardiologic consultation was requested as her peripheral oxygen saturation (SpO_2) was 75% alongside pathologic cardiac examination findings.

Echocardiographic examination revealed TGA, subvalvular pulmonary stenosis, large (3.2 mm in diameter) non-restrictive ventricular septal defect (VSD), discordant double outlet right ventricle with ventriculo-arterial association, dextrocardia, visceral and atrial situs solitus.

Anesthetic approach

Infective endocarditis prophylaxis (2 gr iv amoxicillin) was administered. Mallampati score was I, mouth opening and neck movements were normal, ASA score was evaluated as III-E. Five lead electrocardiogram, SpO_2 , invasive blood pressure monitoring with a 22G cannula through the left radial artery, capnography and arterial gas analysis monitoring were performed. The mean arterial pressure (MAP) was 90 mmHg, heart rate (HR) was 89 bpm and SpO_2 was 82%.

Rapid serial induction (lidocaine 40 mg, thiopental sodium 200 mg and rocuronium 50 mg) was administered following preoxygenation. Minimal pressure manual ventilation was applied using 100% O_2 during 90 second period with the Sellick maneuver. In addition, the depth of anesthesia was controllably increased using 1-2 MAC sevoflurane. Intubation was performed using a 7.0 mm in diameter tube. The maintenance of anesthesia was provided with 5 L/min 50% O_2 , 50% air and 1-1.5 MAC sevoflurane mixture. The APGAR score of the baby that was delivered within the first 5 min of the operation was determined as 9. After the umbilical cord was clamped, 50 μg fentanyl was administered iv and 8 IU oxytocin infusion was started. No hemodynamic instability occurred during the operation. The patients MAP was between 75-85 mmHg, HR was 80-90 bpm, SpO_2 was 92-96%. A total of 600 ml crystalloid fluid was administered during the perioperative period. The operation was completed in 35 min, 200 mg of sugammadex was administered iv in order to terminate the effect of rocuronium, after which the patient was extubated. During the postoperative period she was transferred to the intensive care unit. While in the intensive care unit, morphine administered to the patient to relieve pain. Patient was then transferred to the ward with stable vital signs (MAP 70-80 mmHg, HR 85-95 bpm, SpO_2 88-92%) and without findings of congestion on control chest graphy (Figure 1).

3. DISCUSSION

This case report revealed a successful anesthetic management which was applied to an urgent Cesarean section of a pregnant woman who had undiagnosed and therefore uncorrected TGA. TGA is a severe CHD according to the classification which categorizes adulthood CHD as mild, moderate and severe. Women with TGA are evaluated as a high risk group (Class IV) by the World Health Organization (3).

In TGA, pulmonary and systemic venous returns normally into the right and left atria respectively however, the aorta originates from the right ventricle and the pulmonary artery originates from the left ventricle.

So, whereas non-oxygenated blood returns to systemic circulation, oxygenated blood returns to lungs. Survival is possible only through the mixture of oxygenated and nonoxygenated blood via foramen ovale and patent ductus arteriosus or VSD. The presence of VSD increases the mixture of oxygenated and nonoxygenated blood thereby decreasing the level of hypoxia (4). While VSD is present in approximately 50% of these patients, others have varying degrees of subpulmonic stenosis (5). The disease typically results in severe pulmonary hypertension and is usually fatal (1).

Significant physiologic changes occur in many organ systems during pregnancy. The main changes in the cardiovascular system includes; decreased systemic vascular resistance, increased blood volume and cardiac output (due to increased HR and volume output) (6). The main changes in the respiratory system include; decreased functional residual capacity (FRC) and residual volume, increased oxygen need and consumption (proportionately with the rate metabolism) and reducing oxygen reserve. This condition makes the mother more vulnerable to hypoxia during apnea/hypoventilation periods that may occur during prolonged tracheal intubation interventions or airway obstruction. So, pregnant women desaturate more rapidly during in general anesthesia induction compared to non-pregnant women. In addition, care should be taken during airway aspiration, laryngoscopy and intubation as capillary congestion-related edema may develop in the upper airway mucosa during pregnancy (7-9).

The prevalence of cardiac diseases during pregnancy is 0.4-4.1% and are among the important causes of maternal mortality (10, 11). A successful pregnancy may be achieved in most of the women with TGA however, careful evaluation is mandatory before pregnancy. A comprehensive cardiovascular examination should include the evaluation of cardiac rhythm, ventricular functions, atrioventricular valve anomalies, associated intracardiac lesions and potential postoperative sequela. These patients should be monitored closely during pregnancy and their delivery should be actualized with a multidisciplinary approach by a health team composing of an obstetrician, cardiologist and an obstetric anesthetist (12). It is difficult to detect the potential effects of pregnancy and the degree of the lesion in patients who were not examined prior to pregnancy. A high mortality rate of about 5-15% was reported in uncorrected TGA cases according to the obstetric and anesthetic risk classification (11). In these patients, contraction, pain, anxiety and permutations in intravascular volume could lead to an additional stress on the cardiovascular system. The risk is greater during delivery, outlet periods and in the early postpartum period during which cardiac output and systemic vascular resistance abruptly increases. Therefore, maintenance of hemodynamic and cardiovascular stabilization is quite important during and after delivery (11).

When anesthesia is being planned, the physiopathology and grade of the disease should be considered and decisions should be made according to necessary consultations and tests performed (11). Both regional and

general anesthesia techniques may be used for these patients. However, it should be kept in mind that regardless of the preferred anesthetic technique, life-threatening complications like hypoxemia, cardiac dysrhythmias and thromboembolic events are possible especially during postpartum period and vast majority of maternal deaths occur within postpartum first week (13).

High risk obstetric patients are historically operated under general anesthesia however, the popularity of regional anesthesia gradually increased among these cases (5). Physicians should be quite careful if regional techniques is to be used in cases with TGA (1, 11). Epidural anesthesia which pose less abrupt reduction in peripheral vascular resistance and hypotension with a more gradual sympathectomy effect is accepted as the best regional technique for these cases (3). However, high sympathetic blockage which may result from epidural blockage may not be tolerated. Administration of medications intermittently in lower doses via the epidural route and at the same time following up hemodynamic responses closely and carefully is the most appropriate approach (11). Single shot spinal anesthesia should be avoided as much as possible due to the likelihood of a higher rate of complication (1).

If general anesthesia will be preferred the use of fast-acting iv agents is appropriate in order to attain sufficient anesthesia depth before laryngoscopy and intubation. Opioid, low dose thiopental or etomidate and a fast-acting muscle relaxant (like rocuronium) may also be used for this purpose. The most appropriate inhalation agent should be used for the maintenance of anesthesia, taking into consideration the degree of the cardiac lesion. In addition, it should be remembered that nitrous oxide may increase pulmonary vascular resistance (PVR). Additional dose of opioid may be given in order to deepen the effect of anesthesia after delivery (11). Increases in PVR (in cases of hypoxemia, hypercarbia and acidosis) and decreases in systemic vascular resistance should be avoided in pregnant women with right to left shunt TGA unless, right to left shunt may significantly increase or even be reversed (1, 11). Pregnancy-related increased volume load and other problems may not be tolerated sufficiently and additional problems such as right heart failure, tachyarrhythmia, dysrhythmia may develop. A stable cardiac rhythm should be provided by avoiding volume overload and bradycardia (3). In this case, general anesthesia with close monitoring was preferred as cardiac lesion did not lead to severe symptoms and the operation was planned under urgent conditions.

In conclusion, we consider that general anesthesia will be an appropriate and safe method as regional methods could lead to significant time loss in the prevention or minimization of complications. High blockage required for regional anesthetic methods in pregnant women with TGA and the maintenance of hemodynamic stability

may become difficult due to neuroaxial sympathectomy even if a successful neuroaxial block has been provided. Agents with minimal effect on cardiovascular functions should be preferred for anesthesia induction and maintenance and close hemodynamic monitoring should be done during intraoperative and postoperative periods.

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