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Approach To Pregnant Women with Mechanical Mitral Valve Prosthesis: A Case Report

Mekanik Mitral Kapak Protezi Olan Gebeye Yaklaşım: Olgu Sunumu

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Abstract

Cardiovascular diseases are one of the leading causes of maternal mortality. The management of pregnant women with mechanical valve prosthesis is difficult. Fetal-maternal mortality and morbidity are high. Selection of the most appropriate anticoagulant that will minimize fetal, maternal mortality and avoid embryopathy risk should be tailored according to the needs of each individual patient.

In this paper, in the light of the literature, we aimed to discuss our patient, who delivered at 39th gestational week after a pregnancy before which she had not been provided with prepregnancy counseling and during which she did not attend follow-up visits.

These patients prepregnancy counseling, follow-up visits, anticoagulant management during pregnancy, and prophylaxis and management of complications at the postpartum period are very important and require close follow-up.

Keywords: Mechanical Prosthesis, Mitral Valve, Pregnancy, Hearth Desease

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Öz

Kardiyovasküler hastalıklar anne ölümlerinin en önemli sebeplerindendir. Mekanik kapak protezi olan gebe hastalarda yönetim zordur. Fetal-maternal mortalite ve morbidite yüksektir. Fetal, maternal mortalite ve morbiditeyi en aza indirecek, embriyopati riski oluşturmayacak en uygun antikoagülan seçimi hastaya göre planlanmalıdır. Mekanik kapak protezi olan hastalarda gebelik öncesi danışmanlık, gebelik sürecinde takip ve antikoagülan yönetimi, postpartum dönemde de profilaksi ve komplikasyon yönetimi çok önemlidir, yakın takip gerektirir. Biz bu yazımızda gebelik öncesi danışmanlık almamış, gebelik süresinde de takiplere uyumu olmayan, otuz dokuzuncu gebelik haftasında doğumu yaptırılan olgumu literatür eşliğinde tartışmayı amaçladık.

Anahtar Kelimeler: Mekanik Protez, Mitral Kapak, Gebelik, Kalp Hastalıkları

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Introduction

Cardiovascular diseases are one of the leading causes of maternal mortality (1). Patients with mechanical valve prosthesis have an increased thromboembolic risk in pregnancy. High-risk patients, such as those with mechanical heart valves who contemplate pregnancy, should receive counseling service prior to pregnancy in order to prevent maternal mortality and morbidity (1). In patients who need valve replacement, valve repair should be carried out if possible; whenever valve replacement is required, the advantages and disadvantages of bioprosteheses and mechanical valves should be discussed with the patient in detail, and the patient should be informed about what to expect when she plans pregnancy (2). I aimed to present my patient with a discussion of the existing literature in order emphasize that pregnant patients with mechanical mitral valve prosthesis, who have an extremely high mortality rate, should not be left unmonitored as in our patient, and that planning should be done very well before pregnancy. This paper was published after the patient's written consent was obtained.

Case Report

A 23-year-old woman with a history of a pregnancy had received a mitral valve prosthesis at the age of 17 years. She had been using a vitamin K antagonist since her surgery. She had not had any complication after valve replacement. However, she had not attended regular follow-ups. When she had learned that she had been pregnant, her body weight had been 36 kg and her BMI (body mass index) 12.5 kg/m2. Her INR (international normalized ratio) level had been 7 at that time. She had not received any pre-pregnancy counseling. She and her husband were informed about possible complications of pregnancy; she was also provided with detailed information about the embryopathic effects of the anticoagulants and the option of pregnancy termination. She and her husband stated that they desired the continuation of pregnancy and that they took possible risks. When the patient presented, she had already been taking low-molecular-weight heparin as a substitute of vitamin K antagonist. However, since anti-Xa monitoring was not performed in our center, she was referred to a tertiary center. Since the use of vitamin K antagonists in the first trimester is controversial, she was admitted and heparinized at that center. Although she suffered episodes of abortus imminence with intermittent episodes of vaginal bleeding as well as subchorionic hematoma on ultrasonography, her follow-up continued uneventfully. When she reached 12th week of gestation, a vitamin K antagonist was started with a target INR level of 2.5-3, with care being taken that the dose of vitamin K antagonist did not exceed 5 mg. She was called for follow-up visits every 2 weeks and instructed to be followed up by an obstetrician and a cardiologist at a tertiary center. She was followed up with the vitamin K antagonist until the 34th week of gestation. She had no abnormality on echocardiography during her pregnancy. She did not experience any gestational complication, either. The patient received help to gain weight with the supervision of a dietician from the very beginning of her pregnancy. When her pregnancy progressed further, her cardiologist switched her anticoagulant back to low-molecular-weight heparin in order to reduce the risk of embryopathy, in line with the recommendations in the literature. Low-molecular-weight heparin was started at a dose of 6000 units twice a day. She later suffered intrauterine growth retardation of her baby at subsequent follow-ups. Therefore, weekly controls were begun. On 35th week of gestation the patient was referred to the tertiary center for planning the delivery and the follow-up of anticoagulant regimen. However, she neither presented to the tertiary center nor to my outpatient clinic. When she finally returned to the clinic, she was 39 weeks pregnant. She was informed about a considerably high maternal and fetal mortality risk at her gestational week, and was referred to the tertiary center for urgent delivery. At that time, the fetus was 35 weeks old. At the tertiary center caesarean section was selected as the delivery method. Her preoperative platelet count was 84 103/μL, and general anesthesia was preferred for anesthesia. Her postpartum follow-up was uncomplicated. The infant had an atrial septal defect with a size of 5.5 mm. The infant is still under the follow-up of a pediatric cardiologist. The patient's early postpartum follow-up was not complicated by a hemorrhagic or thromboembolic event. After hemostasis was achieved, the adult cardiology specialist started vitamin K antagonist in combination with low-molecular-weight heparin and adjusted the INR level. She had no problem at her follow-up on the 10th postpartum day. She presented with vaginal bleeding on the 25th postpartum day and was found to have a hemoglobin level of 6.5 g/dL and an INR level of 2.3. Her endometrial cavity was curetted with a bumm curette, and the bleeding was controlled by the infusion of 2.5 units of oxytocin per hour, with a total fluid infusion rate of 100 cc/h. When her hemodynamic status was stabilized,

she was referred to the tertiary center to receive erythrocyte suspension under the supervision of the adult cardiology specialist. When she was re-checked one week later, she had no recurrent bleeding, and her hemoglobin level was found to be 9 g/dL. Although a patient with mechanical valve prosthesis became pregnant, which is associated with high fetal and maternal mortality, and was non-compliant with medical treatment and follow-up until the 39th week of gestation, she did not suffer any significant complication except for an episode of late postpartum bleeding. Her close follow-up still continues at our clinic.

Discussion

It has been reported that 25% of pregnancies in women with cardiac disease are complicated with fetal and neonatal complications (3). Pregnant women with high-risk valvular disease should be followed by a team consisting of a cardiologist, an anesthesiologist, and a perinatologist (2). In pregnant women with valvular disease, intravascular volume increases in the later stages of pregnancy and may cause reduced effort capacity and increased symptoms. The factors that increase the thromboembolic event risk in pregnant women with valvular heart disease include atrial fibrillation, history of thromboembolism, mitral valve prosthesis, and multiple valve prostheses. Our patient was also at high risk due to having a mechanical heart valve at the mitral position.

Women requiring valve replacement should be evaluated in detail regarding their future pregnancy plans. The patients should be informed about the morbidity and mortality risk of thromboembolic events. The decisions regarding valve repair or replacement, and if replacement is decided, whether a bioprosthesis or mechanical valve will be used, should be thoroughly discussed regarding the possible risks. Patients with mechanical valve prosthesis are included in WHO (World Health Organization) class III, which indicates serious maternal mortality and morbidity risk. Patients with bioprosthesis are considered in WHO class II. ESC (European Society of Cardiology) 2018 and ACC (American College of Cardiology) 2020 guidelines recommend patient follow-up with at least weekly anti-Xa measurement (2,4). In order to reduce thromboembolic event risk, these patients should use anticoagulants at therapeutic doses (2).

The risk of embryopathy with vitamin K antagonists is low in the first 5 weeks; thus, regular use of vitamin K antagonists should be recommended until the patient becomes pregnant. However, when vitamin K antagonists are used between 6th and 12th weeks of gestation, they may cause nasal hypoplasia, bone hypoplasia, and optic atrophy in a dose-dependent manner. This risk is omitted at doses below 5 mg (5). In a study by Küçüker et al., only one case of warfarin embryopathy was observed in 36 pregnancies, in which the daily dose of warfarin exceeded 5 mg. The authors did not observe warfarin embryopathy at doses below 5 mg (6). While patients using vitamin K antagonists at doses above 5 mg have a fetal problem incidence of 74.2%, the incidence is reduced to 8.8% by doses below 5 mg. We also stopped vitamin K in the first trimester of our patient's pregnancy, and took care not to exceed the dose of 5 mg/day.

A metaanalysis found that maternal mortality rate is 1.8% with bioprostheses 1.8% and 1.3% with mechanical prostheses. Hemorrhagic complications occurred in 1.6% of patients with bioprosthesis and 6.1% of those with mechanical prosthesis. On the other hand, valve thrombosis occurred in no patient with bioprosthesis and 4.7% of those with mechanical valve prosthesis. Fetal loss occurred in 13.5% of patients with bioprosthesis and 29.2% with mechanical prosthesis. The most important cause of maternal mortality with bioprosthetic valves is the loss of valvular functions. The metaanalysis did not determine an ideal valve prosthesis in women who plans to become pregnant. The need for continuous low-dose anticoagulants in pregnant women with a mechanical valve prosthesis was stressed (7).

It is recommended that when a woman with a mechanical valve prosthesis becomes pregnant, LMWH (low-molecular-weight heparin) or UFH (unfractionated heparin) should be administered in a controlled manner in the first 12 weeks, followed by a vitamin K antagonist at a dose lower than 5 mg provided that adequate INR level can be reached. It was also recommended to return to LMWH or UFH when the expected delivery date approaches, no later than one week before the delivery (2). It is considered that the maternal and fetal outcomes with low-molecular-weight heparin are better than those with UFH due to more stable concentrations achieved with low-molecular-weight heparin (8).

American working groups recommend that therapeutic anticoagulation should be carried out with a vitamin K antagonist and heparin with frequent follow-ups. They do not recommend the use of low-molecular-weight

heparin for patients with a mechanical valve prosthesis unless anti-Xa level measured 4-6 hours after the last dose is maintained between 0.8 and 1.2 u/ml (2). When thromboembolic risk is considered high, aspirin 75-100 mg can be added to the regimen (6).

In patients with a moderate-to-high risk valvular disease, the delivery can be performed via vaginal route provided that adequate analgesia and anesthesia are administered and the valsalva maneuver is avoided. However, if there is severe aortic stenosis or the above criteria cannot be met, caesarean section should be recommended. Medications used for the induction of labor or prophylaxis of postpartum hemorrhage are also important and should be used in a controlled fashion. Oxytocin reduces mean arterial pressure and total peripheral vascular resistance, which may cause sudden cardiac decompensation due to a reduced afterload. Thus, this medication should be used with caution. Oxytocin can be administered at a rate of 2.5-7.5 IU/hour in an elective caesarean section and 7.5-15 ıu/hour in an intrapartum caesarean section. Albeit extremely rare, cardiovascular events after misoprostol use have been reported; thus, it is better not to use it unless there is a compelling indication. Methergine should not be used for pregnant women because it can cause vasoconstriction, coronary vasospasm, and elevated pulmonary pressure. According to the American Society of Anesthesiologists, a small amount of water ingestion should be allowed and dehydration be avoided during labor. IV fluids should be infused at 1 ml/kg per hour.

Low-dose combined spinal-epidural anesthesia is recommended for delivery in patients with a high cardiovascular risk. If general anesthesia is necessary, rapid sequential intubation is preferred after administering 100% oxygen. All drugs should be titrated slowly to preserve hemodynamic stability (9).

Infective endocarditis prophylaxis should be given to patients with prosthetic valves, those with a previous history of bacterial endocarditis, and high-risk patients with complex congenital cyanotic heart disease (10). The patient should be followed in the hospital for at least 48 hours after birth. Patients should be followed for cardiac events for at least 6 months after the delivery.

Conclusion

Patients with mechanical valve prosthesis who wish to become pregnant should receive pre-pregnancy counseling and make their plans at a tertiary center with a team consisting of a perinatologist, a cardiologist, a neonatologist, and an anesthesiologist. The same team should be present during delivery, and there should be an intensive care facility in the center of delivery. Considering high maternal mortality, pregnancy should be carefully considered during the decision-making process, and frequent and regular follow-ups should be performed by the obstetrician and the cardiologist. There is still no clear recommendation as to which anticoagulation regimen should be used, and the optimum anticoagulation regimen is unclear. More comprehensive studies are needed in the management of these patients.

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