

# Severe mitral stenosis in term pregnancy: management by simultaneous cesarean section and mitral valve replacement. Case report

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## Summary

A 38-year-old woman in the 37<sup>th</sup> week of pregnancy was admitted for acute presentation of severe cough and aggravated dyspnea. She was previously diagnosed with rheumatic heart disease (RHD) at the age of 31. During the present pregnancy, she reported at 37 weeks and had RHD, severe mitral stenosis, secondary pulmonary hypertension, and heart failure. As a consequence, the patient underwent an emergency cesarean section followed by reoperative mitral valve replacement, which was successfully under a cardiopulmonary bypass (CPB). In this report, the authors present the successful experience of management of severe mitral stenosis in pregnancy.

**Key words:** Pregnancy; Mitral stenosis; Cesarean section; Mitral valve replacement; CPB.

## Introduction

Cardiac disease in pregnancy is associated with high mortality and morbidity rates for mothers and their babies [1]. Rheumatic heart disease (RHD), of which mitral stenosis is the most common type, is still the leading cause of adverse pregnancy outcome, especially in developing countries [2]. Here, the authors share the successful experience of management of severe mitral stenosis in pregnancy.

## Case Report

The patient, a 38-year-old woman, was admitted to the Obstetrics Department of Shandong Provincial hospital at 37 weeks gestation, with cough and dyspnea lasting two months and aggravated for two weeks. Her past medical history was significant for RHD diagnosed when she was 31 years old. Obstetric history included three pregnancies with two abortions and one normal delivery eight years prior and no obstetrical complications during labor.

At admission, the patient showed dyspnea and orthopnea, even while at rest, with severe activity limitations and was in New York Heart Association (NYHA) functional class IV of congestive heart failure. Physical examination showed her systemic arterial pressure was 118/84 mmHg, and her heart rate (HR) was 110 beats per minute (bpm), with no fever, and oxygen saturation at 90~95% with oxygen by mask. Sound of breath was rough without dry or moist rales; grade 3/6 rumbling diastolic murmur was best heard at the apical area and accentuated P2 sound were noted during chest examination; obstetrical examination showed a gravid uterus, with fundus height of 32 cm, abdominal circumference of 93 cm, and the fetal heart sounds were normal at 140 bpm. There were no signs of edema or peripheral cyanosis.

Electrocardiogram indicated her HR was 110 bpm with the pres-

ence of an atrial fibrillation. Doppler echocardiogram revealed severe mitral stenosis and regurgitation with a mitral valve area of 0.74 cm<sup>2</sup> and severe calcification, moderate-severe tricuspid regurgitation, mild aortic regurgitation, and ejection fraction of left ventricular (LVEF) of 50%. Maternal transthoracic echocardiography showed severe pulmonary hypertension (pulmonary artery pressure was 75/40 mmHg).

An obstetric ultrasound examination revealed a biparietal diameter (BPD) of 9.0 cm, femoral length (FL) of 7.1 cm, and the amount of amniotic fluid was normal. Fetal echocardiography excluded major congenital heart diseases. Fetal development was within normal limits. Blood count, coagulation tests, urinalysis, liver, and kidney function tests were normal.

Admitting diagnoses were pregnancy with 37<sup>+</sup> gestation weeks, RHD, severe mitral stenosis, secondary pulmonary hypertension, and heart failure. The patient was kept under conditions of absolute rest and received necessary medication. However, the patient's symptoms did not seem to improve and she received multidisciplinary consultancies from cardiologists, cardiac surgeons, anesthesiologists, neonatologists, and experts from intensive care unit (ICU) to plan optimal treatment. The patient and her relatives were appropriately informed about the possibility of fatal complications of mother and the fetus. Also, the risks and benefits of valve surgery were discussed. Consequently, the patient agreed to undergo valve surgery. Then, under sufficient preparation, the case was successfully managed by simultaneous cesarean section and mitral valve replacement with no complications. At first, under general anesthesia, opened the chest and cannulated the aorta and right atrium in readiness to institute cardiopulmonary bypass (CPB), then performed rapid low segment cesarean section. As the authors had supposed, just immediately after the delivery of the fetus, ventricular fibrillation and cardiac arrest occurred. According to the operation plan, the patient was fully heparinized and CPB was established immediately. The obstetric operation was suspended by the intrauterine

packing with gauze to prevent postpartum hemorrhage after the delivery of placenta. The mitral valve was successfully replaced with bioprosthesis mitral. Then, after extracting the gauze, cesarean section wound was closed satisfactorily by the obstetric team. The newborn weighed 2,920 grams with one- and five-minute Apgar scores of 1 and 3, respectively, with active resuscitation. Spontaneous breathing of the newborn was seen one hour later and tracheal intubation was extracted. Then, the patient was transferred to the coronary ICU after the operation for hemodynamic monitoring and discharged on the 16<sup>th</sup> postpartum day for outpatient follow-up. The patient was followed clinically for 24 months. She remained asymptomatic and hemodynamically stable. Neither the mother nor the child experienced any intra- or postoperative complications.

## Discussion

Pregnancy is associated with important cardiocirculatory changes, including an increase of circulating blood volume and HR. The hemodynamic changes are usually well tolerated, while limited adaptation to the physiological cardiovascular changes occurred in patients with heart diseases [1]. Mitral stenosis can prevent normal emptying of the left atrium and filling of the left ventricle, which results in a reduced stroke volume, a fixed cardiac output, elevated left atrium, pulmonary arterial pressures, and eventually pulmonary edema. Increased venous return, especially immediately postpartum, can lead to an increase in left atrial irritability, which can result in acute pulmonary edema. Therefore, severe mitral stenosis (especially if valve area < 1.0 cm<sup>2</sup>) can result in rapid clinical deterioration and maternal and fetal mortality.

Valvuloplasty or valve surgery before pregnancy is shown to be effective [2]. Therefore, preconception or early counseling regarding management and risk of adverse cardiac outcomes is very important, especially in patients with severe mitral stenosis. Obviously, the present patient did not receive any effective counseling and her clinical conditions were extremely serious on admission, which made management of in this kind of patient very difficult.

Conventional options for the management of symptomatic pregnant patients of mitral stenosis have included therapeutic abortion (especially in the first trimester) or valve surgery. If cardiac surgery is necessary in a pregnant patient, it should be undertaken as early as possible, in the second trimester preferably. At present, percutaneous mitral valvuloplasty (PMV) is considered the first management therapeutic choice for pregnant patients with symptomatic mitral stenosis [3]. Several authors have reported the balloon mitral valvulotomy or PMV performed during pregnancy. In suitable patients, percutaneous mitral valvuloplasty can be performed irrespective of gestational age, and appears to improve the patient's clinical conditions, permitting a pregnant woman to return to NYHA functional class I or II. It can also be used as a palliative procedure allowing deferral of mitral valve replacement until after delivery. Closed mitral valve commissurotomy is associated with a fetal mortality rate of 10%. However, special considerations for percutaneous mitral valvuloplasty include radiation exposure time and possible effect on pregnancy outcome, such as congenital malformations or abortions. Shielding the gravid uterus and decreasing

the operation time to the minimum are needed. Furthermore, transesophageal echocardiography (TEE) can be used to reduce irradiation. If PMV is not feasible, open mitral valvulotomies can also be performed with acceptable risks. Neither open nor percutaneous mitral commissurotomy are viable options if there is moderate-to-severe mitral regurgitation and a heavily calcified valve. With improvements in the surgical and anesthetic techniques, valve surgery performed under general anesthesia and extracorporeal circulation is associated with lower maternal and fetal mortality than previously reported [4, 5]. The present patient had severe mitral stenosis with congestive heart failure which was refractory to medical therapy, and was also already in 37<sup>th</sup> gestation week, which means delivery would occur at any time and the fetus was viable. According to the presentations of this patient and the character of mitral valve, simultaneous cesarean section and mitral valve replacement was selected.

There are few reports about the management of combined cesarean section and mitral valve replacement during pregnancy. Devbhandari *et al.* reported emergency repeat mitral valve replacement and cesarean section at 26 weeks' gestation with cardiogenic shock secondary to obstruction of the mitral prosthesis [6]. The mitral valve area is strongly and significantly associated with the risk of maternal events, and to the present authors' knowledge, this is the first reported case of combined mitral valve replacement and cesarean section in term pregnancy with severe mitral stenosis (with a mitral valve area of 0.74 cm<sup>2</sup>) in the literature. Also in the present case, the mother and baby did not experience any intra- or postoperative complications. It provides a new feasible option for this kind of the patients when indicated clinically.

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