

## Unusual management of parturient patient with severe bicuspid aortic valve stenosis and congestive heart failure

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### Case Report

#### Abstract

**BACKGROUND:** Critical aortic stenosis (AS) is an unusual cardiac pathology in pregnancy, but has significant impact on the fetal and maternal outcomes of pregnancy. Pregnant patients with aortic stenosis and heart failure represent a major challenge for the heart team and anesthesiologist who should balance the risks and benefits of different treatment strategies and their effects on the mother and fetus.

**CASE REPORT:** We present a 26-year-old parturient who underwent cesarean section at 30 weeks of gestation under general anesthesia in the presence of cardiac surgical team followed by deferred aortic valve replacement after two weeks.

**CONCLUSION:** This report describes the importance of multidisciplinary preoperative evaluation, and careful surgical and anesthetic planning to avoid the deterioration of perioperative cardiac condition in such patients.

**Keywords:** Pregnancy, Aortic Stenosis (AS), Bicuspid Aortic Valve (BAV), Aortic Valve Replacement (AVR), Congestive Heart Failure (CHF)

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#### Introduction

Significant aortic stenosis (AS) in pregnancy has been described infrequently and there is no reported case series large enough to reach consensus about the its optimal management.<sup>1,2</sup> Altered hemodynamic function during pregnancy in addition to the relatively fixed cardiac output caused by severely stenotic valve precipitates congestive heart failure (CHF) with associated maternal and fetal mortality.<sup>3</sup>

Pregnant patients with CHF represent a major challenge for the anesthesiologist and heart team who should balance the risks and benefits of different anesthesiological strategies and their effects on the mother and fetus.

We describe successful unusual management of a parturient patient with severe AS and CHF in whom cesarean section and subsequent aortic valve replacement (AVR) wer deferred under strict surveillance to optimize the fetus viability and minimize the maternal mortality.

#### Case Report

A 26-year-old, 73-kg primigravida woman presented at 28<sup>th</sup> week of gestation being referred from a rural clinic to our university referral hospital, complaining of worsening respiratory distress with primary suspicion of pulmonary embolism.

Significant lower extremity edema and severe orthopnea with pulmonary rales were appreciated at the physical examination.

The echocardiographic investigations showed bicuspid aortic valve (BAV), thickened and calcified leaflets, pressure gradient of aortic valve of 88/53 mm Hg (peak/mean), severe AS with aortic valve area (AVA) of 0.75 cm<sup>2</sup>, ejection fraction (EF) of 30%, concentric left ventricular hypertrophy (LVH), and up to moderate functional mitral regurgitation (MR).

After discussion and consultation with the cardiologists, cardiovascular surgeons, and obstetricians, medical treatment for patient's CHF and watchful waiting till maturation of the fetus was planned. The patient was admitted at intensive care

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unit (ICU), and anti-CHF therapy was started with inotrope and furosemide, with meticulous monitoring of cardiovascular status, and fetus surveillance.

During ICU admission, patient's symptoms were relieved dramatically and elective cesarean section (CS) was planned for the delivery of the fetus at 30<sup>th</sup> week of gestation. As the patient did not offer consent for simultaneous CS and valve replacement, decision was taken to proceed to cesarean section under general anesthesia with attendance of the cardiac surgical team to intervene if required.

During general anesthesia, hemodynamic parameters were planned to be sustained close to the baseline with balance of vasoactive and anesthetic agents; and emergency institution of cardiopulmonary bypass (CPB) was possible if hemodynamic deteriorates or cardiac arrest happened.

Immediately after general anesthesia, the consultant obstetrician proceeded to deliver the baby by lower segment CS (LSCS). Delivery of a healthy female infant with the weight of 2750 g was achieved in 3 minutes. APGAR score at 1<sup>st</sup> and 5<sup>th</sup> minutes was 8 and 9, respectively. To facilitate uterine muscle contraction, uterine massage, and infusion of oxytocin (10 units/hour) along with intramuscular injection of prostaglandin (250 µg) were applied.

The patient's recovery was uneventful and she was successfully extubated at operating room, then transferred to ICU for hemodynamic monitoring. Two weeks later, along with worsening of patient's symptoms of CHF, she finally consented to aortic valve replacement (AVR).

After establishment of cardiopulmonary bypass, AVR with mechanical St Jude No. 21 combined with septal myectomy was performed. Postoperative transthoracic echocardiography (TTE) revealed peak and mean gradients of 25 and 16 mmHg, respectively, trace MR, and left ventricular ejection fraction (LVEF) of 45%. The patient was discharged to home on her 5<sup>th</sup> day of valve replacement with acceptable condition. Clinical and echocardiographic assessment during one-year follow-up period was satisfactory.

### Discussion

Pregnancy in patients with severe AS is associated with high risk of mortality reaching as high as 17%. Pregnancy with severe AS is characterized by an increased incidence of CHF (16.7%), poor class of New York Heart Association (NYHA) classification, shorter duration of pregnancy, and premature labor (25%).<sup>4</sup>

As bicuspid AS is more common in men, and in childbearing women's severe AS is uncommon, experience of pregnancy in these patients is scarce.<sup>5</sup>

Physiological changes during pregnancy including increased intravascular blood volume, cardiac output, and diminished systemic vascular resistance (SVR) may lead to deterioration in the cardiac status of patients with AS during pregnancy.

Different strategies have been described in literature for patients with severe AS and pregnancy based on the severity of symptoms, presence of CHF, and gestational age. Severe AS has been reported in 15 pregnant patients of whom four patients manifested CHF. Six patients required cesarean section at a mean gestational age of  $33.8 \pm 4.5$  weeks (median, 33.5 weeks). Intervention for AS was required in nine patients of whom four had balloon aortic valvuloplasty during pregnancy, two patients underwent AVR after delivery and three patients underwent concomitant AVR and cesarean section.<sup>6</sup>

The induction of anesthesia is a critical step in patients with significant AS. Avoidance of hypovolemia, myocardial depression, vasodilation, tachycardia, or dysrhythmias is important, as all of these can lower the cardiac output precipitously ending in sudden cardiac arrest. Moreover, intravenous bolus administration of oxytocin after delivery can induce significant hypotension and must be avoided.<sup>7</sup>

In our presented case, balloon dilatation of the stenotic aortic valve was not possible due to severe calcific BAV. In parturient patients with CHF symptoms and viable fetus, concomitant cesarean and aortic valve replacement can be done to decrease the cardiac events and mortality. Nevertheless, this was not an option as the patient refused cardiac surgery. As CHF symptoms decreased after medical treatment, a multidisciplinary team decided for LSCS and deferred AVR in another setting. To the best of our knowledge, there is no such report of CS and deferred AVR in pregnant patient with severe AS and CHF symptoms in the literature. Of note, anesthetic considerations are of great importance in the management of such patients.<sup>8,9</sup> Although deferring AVR can diminish the complications of concomitant CS, but it carries the potential risks of severe AS itself. In our experience, strict hemodynamic monitoring of such patients before, during, and after any intervention is a great tool for minimizing the possible adverse events of patients with severe AS.

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**Conflict of Interests**

Authors have no conflict of interests.

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