

# PERCUTANEOUS BALLOON MITRAL VALVULOPLASTY IN A PREGNANT PATIENT UNDER MINIMALLY INVASIVE INTRAVENOUS ANESTHESIA

LEIGH APPLE\*, DEEPAK GUPTA\*, MICHAEL OKUMURA\*\*  
AND HONG WANG\*\*\*

## Introduction

The most common rheumatic valvular lesion encountered in pregnant patients is mitral stenosis. The clinical presentation of mitral stenosis in pregnancy is further complicated by the physiological increases in cardiac output and blood volume occurring during pregnancy that make the pregnant patient with this valvular disease more susceptible to decompensation. We report a case of a 35-year-old woman presenting at 21 weeks gestation with severe mitral valve disease who underwent percutaneous balloon mitral valvuloplasty under intravenous anesthesia. In the case described, mitral stenosis during pregnancy and available treatment approaches are being discussed.

## Case Description

A 35-year-old gravida-3-para-2 female at 21.3 weeks gestation presented with symptomatic rheumatic heart disease. The patient had been unaware of her diagnosis of rheumatic heart disease until the age of 31 and shortly after successful delivery of her second child. Her presenting symptoms were shortness of breath at minimal exertion with associated intermittent heart burn sensation. Vital signs were stable with blood pressure 99/60, heart rate 81 beats per minute, temperature 36.8°C, and an oxygen saturation of 100% on room air. Her weight was 81.5kg. She had additional past medical history of pulmonary hypertension and class III congestive heart failure. She had no past surgical history and had 2 previous spontaneous vaginal deliveries 6 and 8 years prior to the present clinical presentation. Her home medications included metoprolol 150 mg by mouth twice a day and furosemide 20 mg by mouth daily. She had no known drug allergies and her social history was negative for tobacco, alcohol, or illicit drug use. Two echocardiographic (ECHO) reports from an outside institution were reviewed with the following documented findings: mitral valve was reported as thickened mitral leaflets with thickened chordae and severe stenosis; mitral valve area was reported to be 0.6-1.1 cm<sup>2</sup> with peak gradient of 40 mmHg and mean gradient of 30 mmHg; tricuspid valve was reported as normal; aortic valve was reported as thickened leaflets with mild-moderate aortic insufficiency; pulmonary systolic pressure was 48-75 mmHg; right sided chambers were normal; left atrium was reported as dilated and left ventricular ejection fraction was 35%.

\* Resident, Anesthesiology, Detroit Medical Center, Detroit, Michigan, United States.

\*\* Staff Anesthesiologist, Detroit Medical Center, Detroit, Michigan, United States.

\*\*\* Professor, Anesthesiology, Detroit Medical Center, Detroit, Michigan, United States.

**Corresponding author:** Hong Wang MD, PhD, Box No 162, 3990 John R, Detroit, MI 48201, USA, Ph: 313-745-7233.  
E-mail: howang@med.wayne.edu

After review of the patient's ECHO results, the cardiology team recommended the patient for right heartcatheterization and percutaneous balloon mitral valvuloplasty for severe mitral stenosis. The procedure was performed with intravenous anesthesia with consideration of physiological changes in pregnancy and increased vigilance for aspiration risks. The patient was taken to the operating room, two 18-gauge peripheral venous accesses were obtained and standard ASA monitors were placed. Prior to the start of the procedure the patient was given metoclopramide 10 mg intravenously and ranitidine 5 mg intravenously. The patient was essentially awake and able to communicate throughout the procedure. A propofol infusion of 25 mcg/kg/min and a total of 150 mcg of fentanyl were given throughout the procedure in small multiple doses.

The results of the procedure showed the patient to have baseline right atrial pressure of 13/12/10 mmHg, right ventricular pressure of 71/3/12 mmHg, pulmonary artery pressure of 82/37/56 mmHg, pulmonary capillary wedge pressure of 34/29/33 mmHg, left atrial pressure of 36/28/34 mmHg, left ventricular pressure of 108/9/15 mmHg, and aortic pressure of 111/66/55 mmHg. Prior to balloon valvuloplasty, the mean gradient across the mitral valve was shown to be 19 mmHg with a calculated mitral valve area of 0.84 cm<sup>2</sup>. The procedure yielded successful balloon valvuloplasty of the mitral valve, using an Inoue 26 balloon, with reduction in mean gradient across the mitral valve from 19 mmHg to 10 mmHg and increase in the mitral valve area from 0.84 cm<sup>2</sup> to 1.17 cm<sup>2</sup>. Ejection fraction results from the procedure were 60% with no wall motion abnormalities. Procedure was completed uneventfully and patient was discharged home from our institution on postoperative day 1.

## Discussion

Mitral valvular scarring caused by rheumatic fever leads to morbidity and mortality. Progressive reduction in valvular cross-sectional area eventually presents with symptoms of mitral stenosis. However, the physiological increases in the blood volume and cardiac output in a pregnant patient with mitral stenosis precipitate the development of congestive heart failure.

This is secondary to the left atrial pressure elevation, which is caused by increased transvalvular gradient across the stenosed mitral valve during the high cardiac output state of pregnancy<sup>1</sup>. Further elevations in the circulating blood volume and heart rate secondary to auto-transfusion of shunted uterine arterial blood due to uterine contraction after the delivery of the fetus may precipitate pulmonary edema in the post-partum period<sup>2</sup>. Hence, it seems prudent to consider therapeutic interventions in pregnant patients with symptomatic severe mitral stenosis. Valvuloplasty should be a consideration for pregnant patients who have failed or responded poorly to medical management. Compared to percutaneous balloon mitral valvuloplasty, open or closed surgical commissurotomy have a 5-33% greater incidence of fetal mortality<sup>1</sup>.

Administration of anesthesia for percutaneous balloon mitral valvuloplasty in a pregnant patient is best obtained in an awake state with minimal dose of opioids to avoid fetal bradycardia and apnea in the pregnant patient. Intravenous sedation/anesthesia or regional anesthesia is preferred over general anesthesia for non-obstetrical procedures in pregnant patients so that the aspiration risks and difficult airway management with difficult endotracheal intubation can be avoided. The avoidance of general anesthesia additionally minimizes fetal exposure to the potent anesthetic agents. Though the patient is spontaneously breathing under minimal sedation or intravenous anesthesia, pregnant patients are still vigilantly monitored for aspiration risks secondary to their basal state of being full stomach due to physiologically decreased gastrointestinal motility during pregnancy. Additionally, in view of radiation exposure to fetus, postponing the procedure until after 14-20 weeks gestation is safer. Moreover, complete abdominal lead shielding with cutting down the radiation exposure time to minimum further ensures minimal risk for fetal abnormalities after percutaneous balloon mitral valvuloplasty<sup>3</sup>. Ease of the Inoue balloon for percutaneous balloon mitral valvuloplasty ensures short procedure time and hence lessens the total fluoroscopy time<sup>2</sup>.

## Conclusion

In summary, pregnant patients with severe mitral stenosis requiring percutaneous balloon

mitral valvuloplasty can be safely treated after 14 weeks gestation with minimal sedation/intravenous

anesthesia provided optimal abdominal lead shielding with minimal fluoroscopy exposure time is ensured.

## References

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