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VALVULAR HEART DISEASE

CLINICAL CASE

# Mitral Transcatheter Edge-to-Edge Repair in a Pregnant Woman

## Procedure and Pregnancy Outcomes

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**ABSTRACT**

Secondary mitral regurgitation (MR) associated with left ventricular dysfunction carries a high risk of acute heart failure during pregnancy because of associated hemodynamic changes. Mitral transcatheter edge-to-edge repair (TEER) is currently recommended for symptomatic patients with secondary MR; however, no evidence exists on the use of this therapy in pregnancy. We present a case of secondary MR in a pregnant woman with dilated cardiomyopathy. She was successfully treated with TEER with minimal use of fluoroscopy (35 seconds). This is the first case to our knowledge of mitral TEER during pregnancy described in the literature, suggesting feasibility and safety of this procedure. (JACC Case Rep. 2025;30:102995) © 2025 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

## HISTORY OF PRESENTATION

A 32-year-old woman, with known dilated cardiomyopathy and moderate secondary mitral regurgitation (MR), presented at 6 weeks' gestation. She was asymptomatic under 10 mg of bisoprolol and 80 mg of furosemide, other drugs having been discontinued recently because of pregnancy.

### TAKE-HOME MESSAGES

- The risk of worsening of secondary MR during pregnancy is important because of the increased cardiac output and stroke volume.
- TEER may be considered in selected cases during pregnancy, as a safe therapeutic solution.

## PAST MEDICAL HISTORY

One year earlier, the patient has been hospitalized for a first episode heart failure at 22 weeks of her first pregnancy. She had no history before this hospitalization. Transthoracic echocardiography (TTE) had shown moderate left ventricular (LV) dysfunction, with left ventricular ejection fraction (LVEF) 40% and a severe secondary MR (**Figure 1**). Despite the introduction of diuretic agents, the patient remained symptomatic with orthopnea and pulmonary crackles. Given the lack of the improvement, the patient underwent a cesarean delivery at 27 weeks. The baby unfortunately did not survive following digestive surgery for enterocolitis after 3 weeks of life. Investigations, including genetic evaluation, did not identify any etiology of the cardiomyopathy, and

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**ABBREVIATIONS AND ACRONYMS**

**LV** = left ventricle/ventricular

**LVEF** = left ventricular ejection fraction

**MR** = mitral regurgitation

**TEER** = transcatheter edge-to-edge repair

**TTE** = transthoracic echocardiography

guideline-directed medical therapy was initiated. She received optimal guideline-directed medical therapy (10 mg of ramipril, 10 mg of bisoprolol, 25 mg of eplerenone, and 10 mg of dapagliflozin). She became asymptomatic, and TTE showed an improvement in LVEF to 50% and a reduction in MR from severe to mild (effective regurgitant orifice area of 25 $mm^2$ and regurgitation volume of 45 mL) 6 months after pregnancy (**Figure 2**).

## DIFFERENTIAL DIAGNOSIS

Main differential diagnosis is peripartum cardiomyopathy. However, peripartum cardiomyopathy results in heart failure at the end of pregnancy or postpartum, whereas this patient had symptoms of heart failure in early-term pregnancy. Ultimately, the investigation did not allow us to identify any etiology.

## INVESTIGATIONS

At 6 weeks of her second pregnancy, laboratory tests revealed normal liver enzymes and normal kidney function. N-terminal pro-B-type natriuretic peptide was normal (78 ng/L).

TTE showed a mildly reduced LVEF of 45% to 50%, with a dilated LV (LV end-diastolic diameter 61 mm or 36 $mm/m^2$, LV end-systolic diameter 39 mm or 23 $mm/m^2$). There was a mild-to-moderate secondary MR caused by a restricted closure of the posterior leaflet with effective regurgitant orifice area of 16 $mm^2$ and regurgitation volume of 33 mL without systolic pulmonary vein flow reversal. Systolic pulmonary artery pressure was 37 mm Hg.

## MANAGEMENT

The management of this patient was discussed by a multidisciplinary team including expert obstetricians, cardiologists, and anesthesiologists. Despite good initial tolerance, a worsening of severity of MR leading to heart failure was expected due to the discontinuation of heart failure medical treatment and the pregnancy-related increase in cardiac output and stroke volume. This fear was strongly supported by the outcome of the first pregnancy. Thus, the patient was considered to be at high risk of hemodynamic decompensation. The heart team decision was to perform a mitral transcatheter edge-to-edge repair (TEER) in early pregnancy, aiming at reducing the risk of myocardial infarction worsening. Intervention was performed at 8 weeks pregnancy under general anesthesia, with a lead apron x-ray protection placed under the patient's abdomen. The use of fluoroscopy was reduced to 35 seconds at the end of the procedure, and the total dose was: 13 cGy • $cm^2$. One MitraClip XTW (Abbott Vascular) was implanted centrally at the A2-P2 segments, reducing MR from moderate to mild, with a mean transmitral gradient of 4 mm Hg at the end of the procedure. There were no procedural complications. The patient was discharged 3 days after the procedure with 10 mg of bisoprolol and 20 mg of furosemide.

## OUTCOME AND FOLLOW-UP

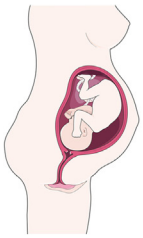
Following the procedure, the patient was followed every month clinically and by TTE. At 22 weeks' gestation, she was admitted to hospital for threatened preterm labor. During this hospitalization, she developed orthopnea and pulmonary crackles. TTE revealed a worsening of MR, which had become severe despite the presence of the MitraClip. Diuretic and beta-blocker dosages were increased to 80 mg of furosemide intravenous and 15 mg of bisoprolol, with no need for oxygen therapy. Finally, the patient delivered a female infant by cesarean section at 29 weeks for obstetric (threat of late miscarriage) rather than cardiological reasons, without complications, and the cardiomyopathy did not contribute to the obstetric deterioration. The child survived after several weeks in neonatal intensive care. At 6 months postpartum, under optimal guideline-directed medical treatment, the patient was asymptomatic, and TTE showed an LVEF of 50% with MR that had returned to mild to moderate with effective regurgitant orifice area of 18 $mm^2$ and regurgitation volume of 35 mL (**Figure 3**).

## DISCUSSION

This is the first case, to our knowledge, of mitral TEER described in the literature during pregnancy. This case suggests the feasibility and the safety of this procedure, with short fluoroscopy time, during pregnancy to treat secondary MR.

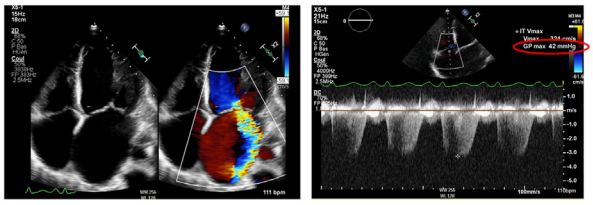
Chronic primary MR is often well-tolerated during pregnancy, with low maternal and fetal morbidity, provided LV function is preserved.[1-3] In the case of secondary MR, there is a risk of increased regurgitation severity due to hemodynamic changes. However, few data exist on maternal or obstetrical outcomes in

**VISUAL SUMMARY** **Management of Secondary Mitral Regurgitation With Left Ventricular Dysfunction During the 2 Pregnancies and Between Pregnancies**



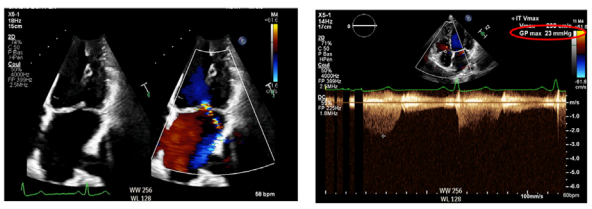
## Secondary mitral regurgitation with left ventricular dysfunction during pregnancy

### First pregnancy




**Optimal guideline-directed medical therapy after delivery**

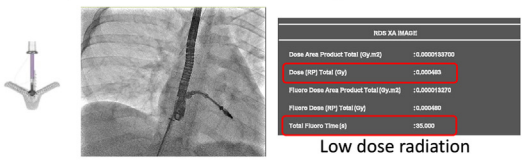
### Between pregnancies




**New pregnancy**

**Stop fetotoxic agents**

**Mitral transcatheter edge-to-edge repair at 8 weeks pregnancy**




Low dose radiation

### Second pregnancy

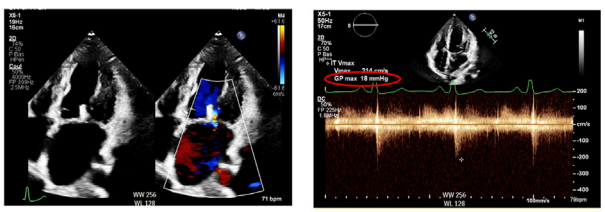
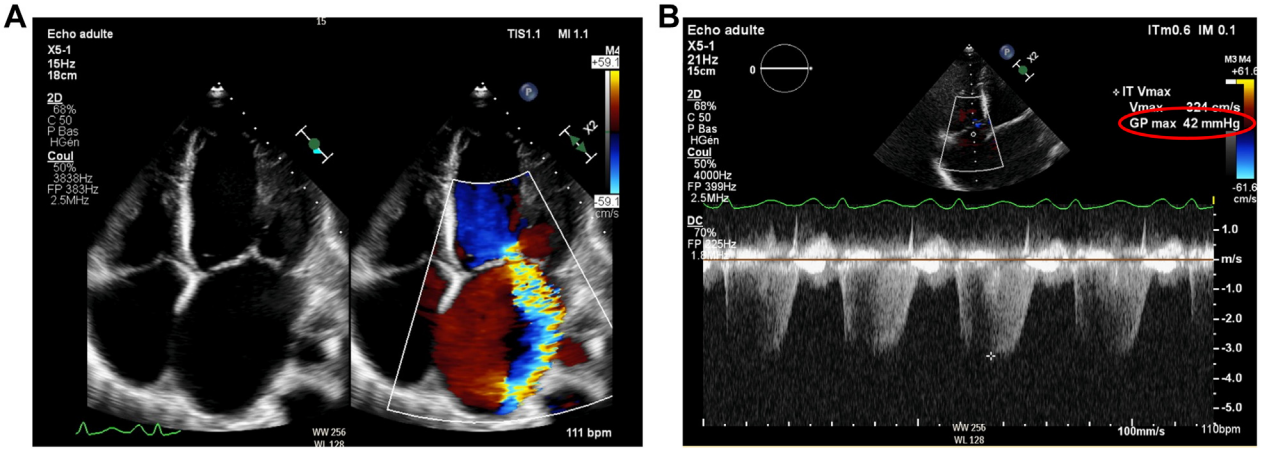


**FIGURE 1** **TTE During the First Pregnancy**

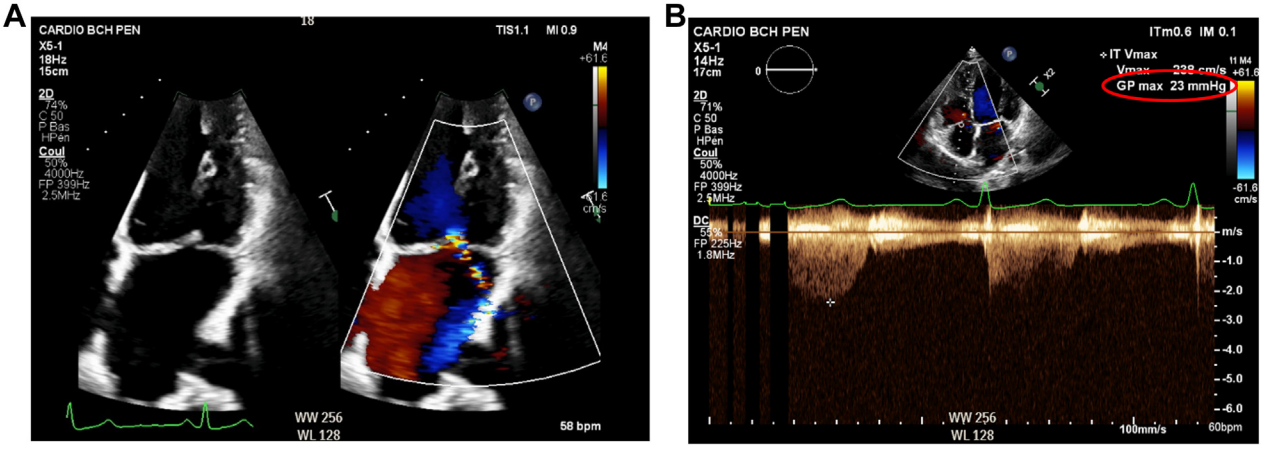



Transthoracic echocardiography (TTE) during the first pregnancy with severe secondary mitral regurgitation (A) and increased pulmonary artery systolic pressure (B).

patients with secondary MR. Mild LV dysfunction (LVEF >45%) is classified as a risk class II-III according to the modified World Health Organization classification, corresponding to an intermediate increased risk of maternal morbidity, with a maternal cardiac event rate between 10% and 19%.[3] This risk does not take into account the presence of secondary MR, which overestimates LVEF assessment. According to the European guidelines for the management of cardiovascular diseases during pregnancy in 2018,[3] management of patients with symptoms or acute heart failure is similar to nonpregnant woman, with loop diuretic agent use, avoiding fetotoxic agents.

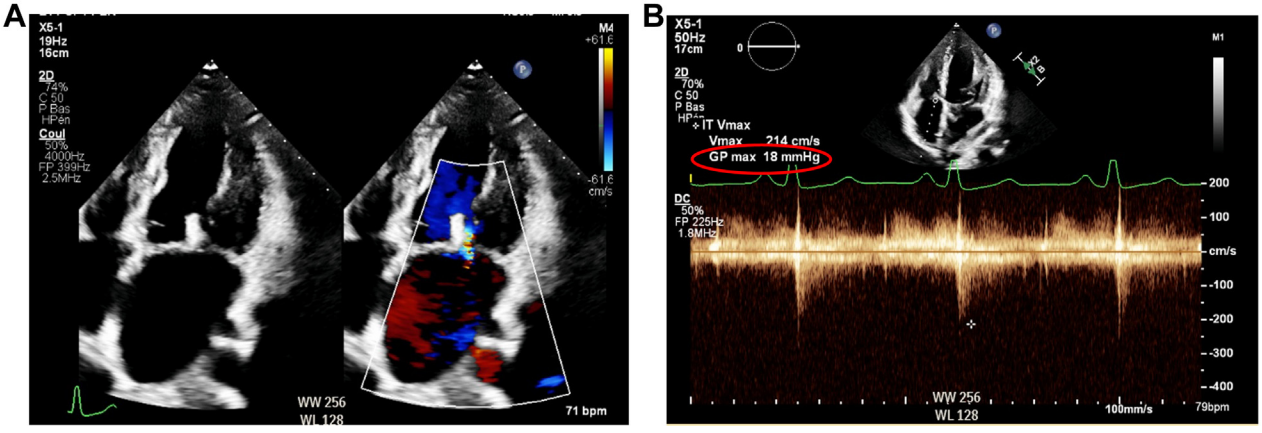
For the treatment of secondary MR, the European guidelines[4] recommend guideline-directed medical therapy of heart failure as a first and essential step. TEER should be considered in selected symptomatic patients not eligible for surgery, with optimal guideline-directed medical therapy. In this case, TEER was indicated in this patient with moderate MR

**FIGURE 2** **TTE After the First Pregnancy**




Transthoracic echocardiography (TTE) after the first pregnancy, under optimal guideline-directed medical therapy with a reduction of mitral regurgitation (A) and normal pulmonary artery systolic pressure (B).

**FIGURE 3** **TTE at 6 Months Post-Partum, After the Second Pregnancy**




Transthoracic echocardiography (TTE) at 6 months postpartum, after the second pregnancy, under optimal guideline-directed medical therapy with mild secondary mitral regurgitation (A) and normal pulmonary artery systolic pressure (B).

because of the major risk of worsening of regurgitation and hemodynamic decompensation during pregnancy, as had occurred during her previous pregnancy, which had ultimately resulted in a premature newborn who died early. Despite the MitraClip, MR became severe during the second pregnancy, but the MitraClip was beneficial as the patient showed better hemodynamic tolerance than during her first pregnancy. Finally, she gave birth at 29 weeks for obstetric reasons, compared with 27 weeks in her first pregnancy, resulting in an improved prognosis for the child's survival.

Few data exist on the use of percutaneous therapies during pregnancy. It has been suggested that they could be proposed to women contemplating pregnancy, in order to delay mechanical valve replacement after pregnancy.[5] Few cases have been reported on transcatheter valve-in-valve aortic valve replacement for bioprosthetic aortic stenosis during pregnancy.[6-8] Recently, a case of transcatheter mitral valve-in-valve implantation has also been described in a 11-week pregnant woman.[9] Finally, percutaneous balloon mitral valvuloplasty is also an effective and safe percutaneous therapy in pregnant women with rheumatic mitral stenosis.[10]

## CONCLUSIONS

The case underlines the challenges inherent in management of heart failure and secondary mitral regurgitation in pregnant woman. Transcatheter therapies can be safe therapeutic solutions in pregnant woman, using appropriate radiation protection measures and performed in experienced teams.

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**KEY WORDS** **mitral regurgitation, pregnancy, transcatheter edge-to-edge repair**