

Abstract

We describe the management experience of a **transcatheter mitral valve-in-valve (TMViV) replacement** in a **high-risk pregnant woman** with bioprosthetic valve failure and **antiphospholipid syndrome (APS)**. To our knowledge, this is the first case of cardiac surgery with complex systemic immune disease and safe maternal and infant outcomes.

Introduction

- **Double high risk:**
 - 1.High risk of cardiac surgery:** Reoperation and 16~33% fetal loss;
 - 2.Obstetric risks associated with APS:** Unexplained death, the premature birth and consecutive spontaneous abortions.
- **Double challenge:**
 - 1.Surgical Protocol:** surgical timing, minimally invasive methods, cardio-pulmonary bypass (CPB) and the effects on material and fetus;
 - 2.Perioperative management:** Perioperative evaluation, fetal monitoring, anticoagulant program, mutidispline teamwork

Case Infomation

- **Basic information:** A 35-year-old woman, gravida 2 para 0 at **18⁺4 weeks gestation**, was admitted to our multidisciplinary team for shortness of breath and palpitation.
- **Past Medical History:** In 2018, due to presence of severe valvular insufficiency, dilated double atrium, and decreased cardiac function, she had undergone a **double bioprosthetic valve replacement** (21mm Carpentier-Edwards Perimount aortic prosthesis and 25mm Carpentier-Edwards Perimount prosthesis), **tricuspid valvuloplasty** (30mm Carpentier-Edwards MC3), and **atrial fibrillation ablation**. At the same time, she was diagnosed with anti-phospholipid syndrome (APS) and started taking hydroxychloroquine 200mg and methylprednisolone 4mg regularly every day.
- **Auxiliary test result:** Her blood test showed no thrombocytopenia and slightly increased of fibrinogen and D-dimer. Blood tests of the rheumatic immune indicated anti-nuclear antibody (**ANA**) (**+**), anti-cardiolipin antibody (ACA) IgA 53.7 APL/ml, anti-β2-glycoprotein I antibody (A-β2-GP I) IgA 56.3 U/ml and **anti-SSA/Ro60 antibody** (**+++**).

Surgical Technique



Figure 1: Her preoperative transthoracic echocardiogram (TEE) showed **severe intravalvular regurgitation** (regurgitation area 8.1cm², mean gradient 17.3mmHg) and **severe pulmonary artery hypertension** (91mmHg, PAH). Fetal ultrasound showed that the fetus was healthy.

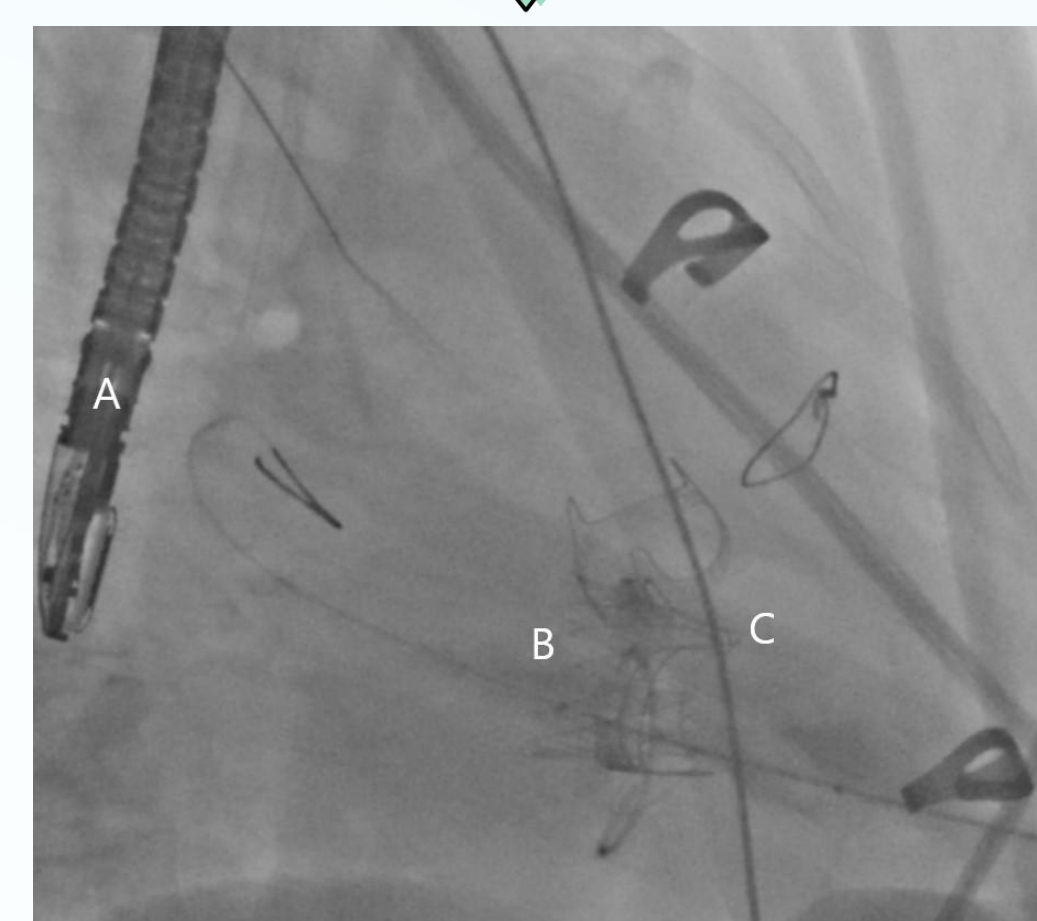


Figure 2: A support track across the original mitral valve bioprosthesis was formed, and a 20Fr vascular sheath was used to dilate it. A **25mm J-valve** (JieCheng Medical Technology Corporation Ltd., Suzhou, China) was delivered. A: Transoeso-phageal echocardiogram probe; B: 25mm J-valve; C: mitral bioprosthetic valve failure.

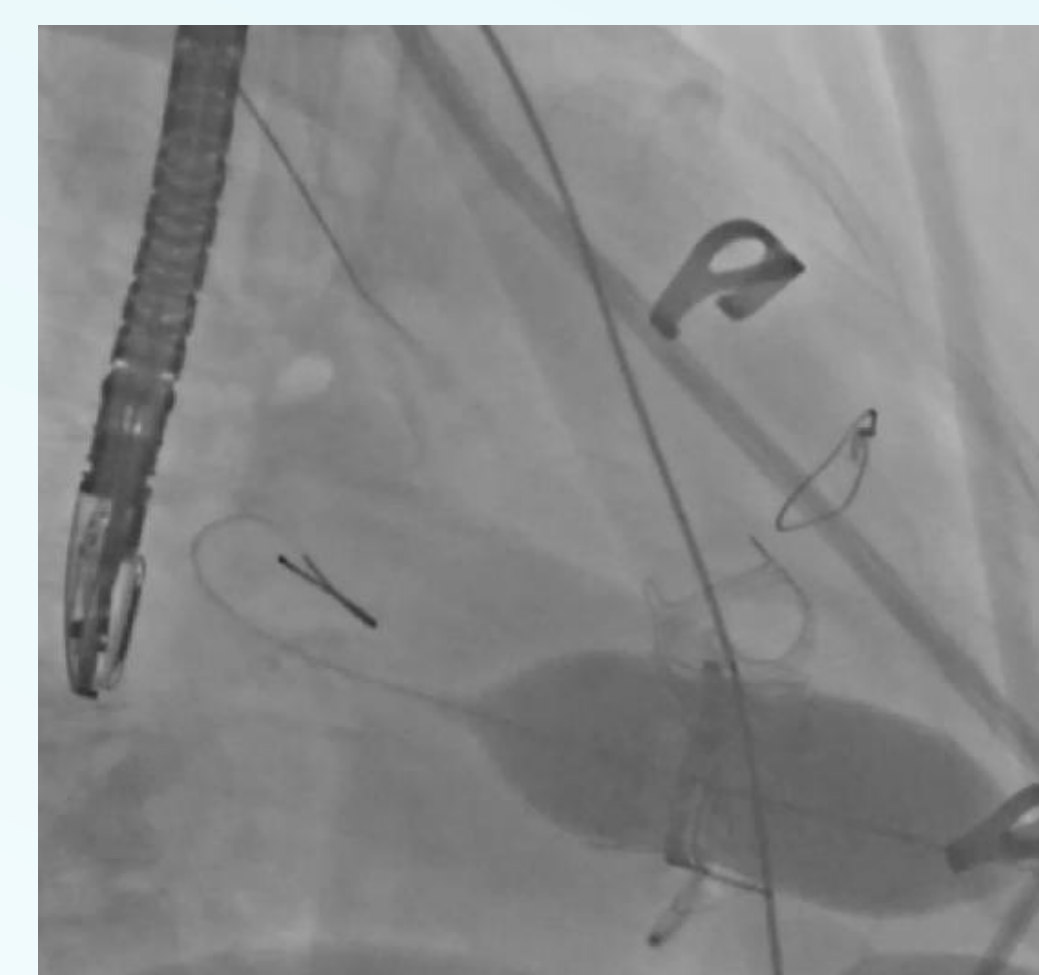


Figure 3: The valve position was determined by fluoroscopic image, and the mitral valve was not fully expanded. The shape of the valve after dilation with a **25Fr balloon** was more appropriate.

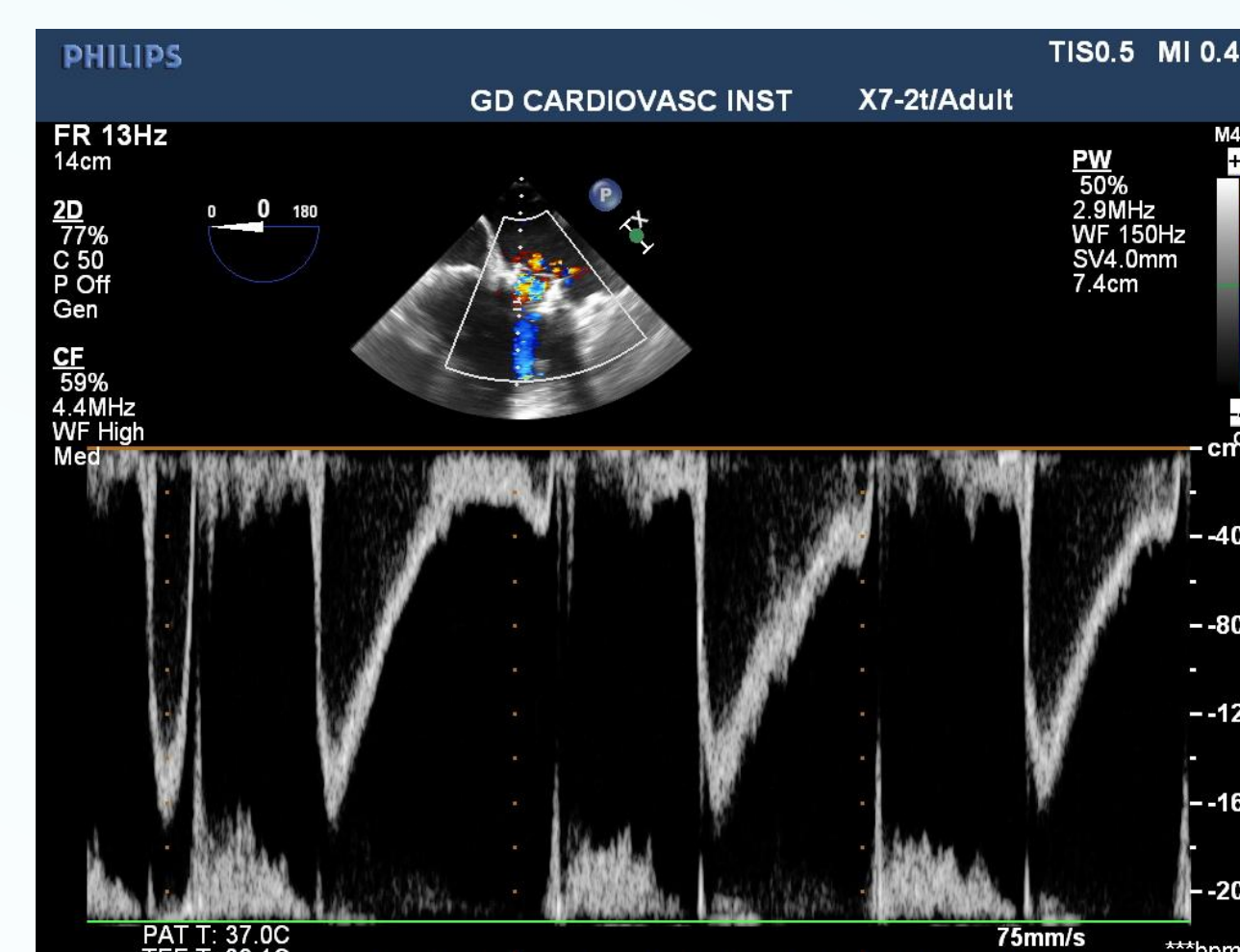


Figure 4: Postoperative TOE revealed a mean mitral valve gradient of 2 mmHg and no obvious valvular regurgitation. Place a drainage tube last to avoid tamponade. Finally, the patient was transferred to ICU.

1. The findings of TEE and symptoms were consistent with surgical indications.
2. The patient has a strong desire to give birth. The fetus is a **“precious child”**.

Minimally invasive thoracoscopic surgery and median thoracotomy cannot be performed without CPB support.

TMViV:
Advantages: No need for CPB, shorter operation time, smaller wound
Disadvantages: The presence of radiation, only bioprosthetic valve, more expensive.

Difficulty:
1. **Without CT evaluation and contrast**, the procedure depends on the experience of the surgeon, X-rays and TOE
2. Postoperative follow-up is still required

Follow up

She was **discharged three days after surgery**. Fetal and transthoracic ultrasound were performed at least every two weeks and rheumatic immune indicators are tested monthly. Blood tests showed ANA (-), ACA IgA 68.5-59.1APL/ml, A-β2-GP I IgA 48.8-67.2U/ml and anti-SSA/Ro60 antibody(+++). With the approval of the rheumatologist, **hydroxychloroquine 200mg, methylprednisolone 4mg, aspirin 100mg and LMWH 0.6ml were given every day**. At 29 weeks gestation, it was decided to **stop aspirin, and LMWH was changed to 0.4ml**. At 33+3 weeks gestation, she was diagnosed threatened premature labour. TEE showed LVEF of 40% and PAH of 50 mmHg. After a multidisciplinary team consultation, it was determined to perform a **cesarean section** because of the high maternal and fetal risk of continued pregnancy. She gave birth to a healthy baby at **34⁺1 weeks** and the APGAR scores of the newborn was 10 at both 1st and 5th min.

Conclusion

- ✓ The success of the TMViV has provided a new option for patients with sever valvular heart disease during pregnancy.
- ✓ Multidisciplinary teams are essential for treating patients with multiple diseases.
- ✓ With the development of surgical techniques, cardiac surgery during pregnancy may play an increasingly important role in the future.