Minimally Invasive Beating-Heart Mitral Valve Replacement for Severe Mitral Annular Calcification After Two Prior CABG Operations

I. Gecse[1], M. Lopez Trevino[1], F. Ramirez Del Val[1]
1 Houston Methodist DeBakey Heart & Vascular Center, Houston, TX, USA;

BACKGROUND

Severe mitral stenosis in the setting of **mitral annular calcification (MAC)** in patients with prior **CABG** presents major operative challenges.

Resternotomy and **aortic cross-clamping** carry **substantial risk.**

Transcatheter options are often **limited** or **not feasible.**

RELEVANT HISTORY

PATIENT

- 78-year-old male
- Progressive dyspnea and exercise intolerance

DECLINED FOR SURGERY ×2

CARDIAC HISTORY

- Ischemic cardiomyopathy
- Severe symptomatic MS
- Severe circumferential MAC

PRIOR CORONARY SURGERY

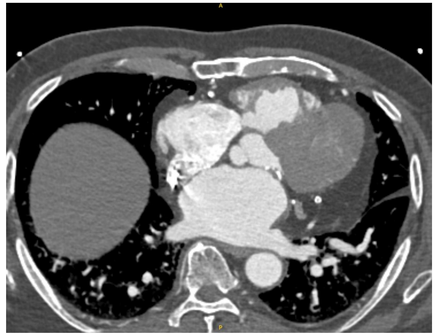
- CABG ×2 (1992, 2008)
- Patent grafts:
  - LIMA → Ramus
  - RIMA → RCA
  - SVG → LAD
  - SVG → OM

COMORBIDITIES

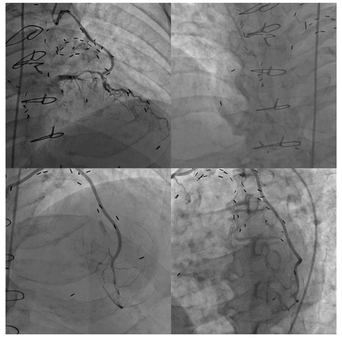
CKD Stage III · Obesity · HTN · Dyslipidemia · Borderline Diabetes

PREOPERATIVE EVALUATION

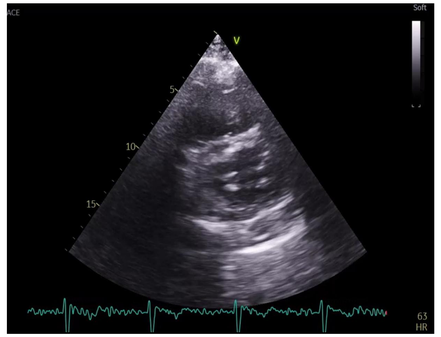
Cardiac CT
(Patent grafts close to sternum)



Coronary Angiography
(Patent grafts)



Echocardiography
(TTE showing parasternal short axis)



OPERATIVE STRATEGY – STEP BY STEP

1 POSITIONING & ACCESS

- Supine positioning
- General anesthesia
- Right thoracotomy

2 PERIPHERAL CANNULATION

- 17 Fr RIJ venous cannula
- 25 Fr femoral venous cannula
- 19 Fr femoral arterial cannula
- Aortic root vent placement

3 INITIATION OF CPB

- Cardiopulmonary bypass initiated
- Cooling to 28°C
- CO_2 insufflation
- Heart allowed to fibrillate (no cross-clamping)

4 LEFT ATRIOTOMY & VALVE EXPOSURE

- Left atrium opened via Sondergaard's groove
- Exposure of mitral valve
- Old partial ring and severely calcified leaflets identified

5 MAC DEBRIDEMENT

- Leaflets and annulus debrided
- Anterior leaflet split
- Papillary muscles preserved

6 PROSTHETIC VALVE IMPLANTATION

- Twelve 2-0 pledgeted Ethibond sutures placed
- Annulus sized to 25 mm
- 25 mm Epic bioprosthesis seated
- Cor-Knots secured

7 CLOSURE & COMPLETION

- Left atrium closed
- Standard deairing maneuvers
- External defibrillation
- Weaned from CPB
- TEE: no PVL, no AI, normal wall motion

POSTOPERATIVE COURSE

POD1 — Reoperation for diaphragmatic artery bleeding, hemothorax

POD2 — AKI developed CRRT started; CRRT discontinued on POD 8

POD13 — CT chest: Pneumonia (Klebsiella)

POD14 — Tunneled dialysis catheter placed

POD20 — Discharged to nursing facility

Discharge TEE

- Well-seated bioprosthetic mitral valve
- No paravalvular leak
- Mean mitral gradient: 2 mmHg
- Normal biventricular function

KEY TAKEAWAYS

- Right thoracotomy avoids high-risk redo sternotomy and graft manipulation.
- Beating-heart strategy eliminates aortic cross-clamping and reduces ischemic risk.
- Peripheral cannulation enables graft-sparing access.
- Feasible and safe option for severe MAC in carefully selected high-risk patients.