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75-year-old gentleman DM, CKD, IHD

Presented with NYHA functional class IV symptoms Acute decompensated heart failure with significant pulmonary and systemic venous congestion.

TTE: Mild concentric LVH with global hypokinesia and severely reduced LVEF 25–30%. Low-flow, low-gradient severe aortic stenosis: AVA 0.9 cm², peak gradient 40 mmHg, mean gradient 23 mmHg. LVOT diameter 22 mm, LVOT VTI 16.9 cm (reduced stroke volume), aortic valve VTI 76.1 cm, and a DVI of 0.22

Dobutamine Stress Echocardiography (DSE) At peak stress, the patient exhibited a hypotensive response and paradoxical fall in LVSF to 15–20% and progressive reduction in stroke volume. The aortic valve area remained <1.0 cm² throughout all stages of dobutamine infusion. Test was terminated due to progressive hypotension.

Guideline-directed medical therapy was optimized

Coronary angiography demonstrated 70% distal LM stenosis extending into the LAD, 70% proximal LAD disease with 99% subtotal mid-vessel occlusion with TIMI grade II flow. 80% ostial stenosis of a large D1, 50% ostial LCx disease, and 75% mid-RCA stenosis.

Risk stratification confirmed prohibitive surgical risk, with a STS score of 15.6% and EuroSCORE II of 17.43%. The Mehran score was 15, corresponding to an estimated 26.1% risk of contrast-induced nephropathy and a 1.05% risk of requiring hemodialysis.

Management plan:

The multidisciplinary heart team recommended concomitant PCI and TAVI with prophylactic Impella support during a single session. The rationale was fourfold:

- Critical left main–left anterior descending disease with impaired antegrade flow conferred substantial ischemic risk during rapid pacing for transcatheter aortic valve implantation.
- Absent contractile reserve increased the anticipated risk of hemodynamic collapse during complex percutaneous coronary intervention.
- Percutaneous coronary intervention before transcatheter aortic valve implantation was expected to reduce the likelihood of procedure-related ischemia during valve deployment.^{11,12}
- A single-session strategy could minimize cumulative contrast exposure and reduce the risk associated with repeated vascular access.

Procedure :

An Impella CP device was inserted via the right femoral artery Complex bifurcation percutaneous coronary intervention was performed using a mini-crush technique with drug-eluting stents (Ultimaster Nagomi: 2.5 × 18 mm in the diagonal branch; 2.5 × 38 mm and 3.5 × 21 mm from the left anterior descending artery to the left main) through a 7 Fr guide catheter.

During LAD stent deployment, prolonged ventriculo-arterial uncoupling with ventricular standstill lasting more than 60 seconds occurred, and native cardiac output fell below 0.3 L/min.

Despite complete cessation of effective ventricular contraction, arterial pressure was maintained by Impella flow of approximately 2.5 L/min, and the patient remained conscious without need for cardiopulmonary resuscitation.

Following restoration of coronary flow, spontaneous rhythm returned with gradual recovery of myocardial contractility.

Final angiography demonstrated TIMI grade III flow in all treated vessels. The Impella device was subsequently weaned and removed after confirmation of hemodynamic stability.

Following successful coronary revascularization, a 23 mm Edwards SAPIEN 3 Resilia valve was deployed under rapid pacing at 200 beats/min.

Post-implantation the patient was hemodynamically stable, with a residual transvalvular gradient of 13/6 mmHg, no paravalvular regurgitation, and preserved coronary patency.

The patient remained hemodynamically stable throughout without the need for inotropic support. Vascular closure achieved with no complications.

He was ambulated on post-procedure day 1 and was discharged on day 3 receiving dual antiplatelet therapy and guideline-directed medical therapy for heart failure.

Renal function improved from a baseline serum creatinine of 1.86 mg/dL (estimated glomerular filtration rate [eGFR] approximately 35 mL/min/1.73 m²) to 1.11 mg/dL (eGFR approximately 60 mL/min/1.73 m²) at 1 week, suggesting reversal of type 2 CRS.

No contrast-induced nephropathy occurred despite a predicted risk of 26.1%.

Echocardiography at 1 month demonstrated a LVEF of 35%–40% with a mean gradient of 12 mmHg across the aortic valve (AV).

Conclusion:

This case illustrates that contemporary percutaneous strategies, when integrated with prophylactic MCS and multidisciplinary planning, may expand treatment options for patients previously considered high-risk.

DSE remains valuable for assessment of contractile reserve, and in selected patients with poor reserve and critical CAD Revascularization before TAVI may mitigate the risk of profound ischemia during rapid pacing.

In this setting, Impella support can preserve systemic perfusion even during transient ventricular standstill.

For carefully selected patients, a single-session strategy combining PCI and TAVI may reduce cumulative procedural burden while facilitating hemodynamic recovery and reversal of CRS.