The Use of Prophylactic VA-ECMO with High-Risk TAVR

Nicholas Wenz, DO Jake Chanin, MD

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Disclosure of Relevant Financial Relationships

I, Nicholas Wenz, DO NOT have any financial relationships to disclose.

Background

- TAVR is now standard for high and intermediate surgical risk severe aortic stenosis; expanding to younger/lower risk groups
- Persistent catastrophic risk: intra-procedural events (annular rupture, coronary obstruction, valve embolization, cardiogenic shock) remain unpredictable and highly lethal
- VA-ECMO role: rapid, percutaneous mechanical circulatory and respiratory support; can be used:
  - Prophylactically — preemptive support in very high-risk patients
  - Emergently — salvage after collapse or major complication
- Evidence gap: limited to small retrospective series; no randomized trials
- Incidence: ~2% of TAVR cases require VA-ECMO (pooled 14-study review)
- Complications of ECMO: mainly vascular injury and bleeding (~16% each in pooled data)

Case Presentation

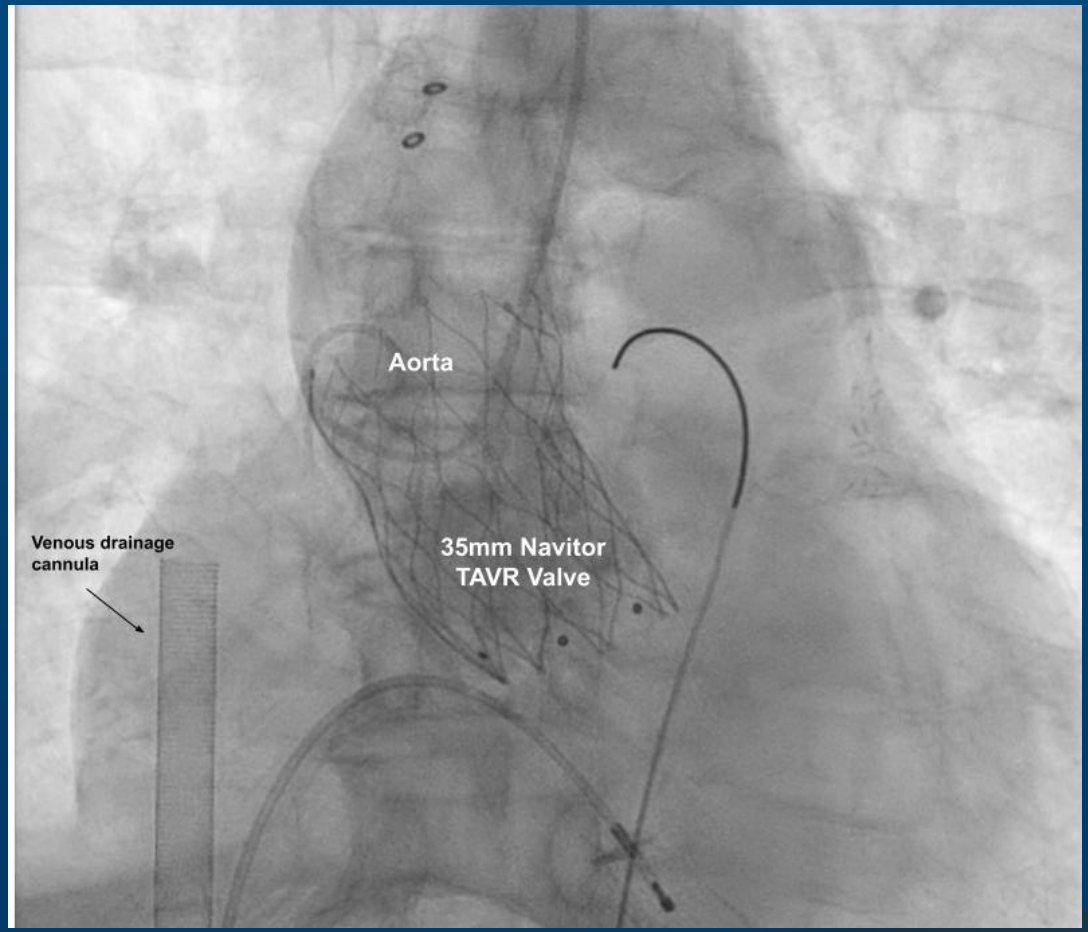
- A 78-year-old man with a history of aortic stenosis, HFrEF (EF 25-30%) and prior CABG presented to an outside facility with tachypnea, hypoxia and volume overload
  - BNP 10k (baseline 2,000), Lactate 2.1 -> 1.7
  - Repeat TTE with EF 15% (25% four months prior), AV peak velocity 3.4 m/s, MG 28mmHg. AVA 0.4cm^2
- Respiratory status improved with initial diuresis
- Decompensated HFrEF thought to be related to progression of AS and transferred for urgent surgical evaluation for aortic valve replacement.
- Not a candidate for redo-sternotomy with aortic valve replacement due to elevated STS risk score
- Referral to heart team to TAVR, delayed by mixing artifact noted on CT imaging concerning for LAA thrombus, resolved on further imaging

Procedure

- Approach: Hybrid OR with monitored anesthesia care and sterile prep. Baseline transthoracic echo obtained.
- Access: Ultrasound-guided bilateral femoral artery and vein access with Perclose pre-closure; right radial arterial access for pigtail catheter.
- Support: Prophylactic veno-arterial ECMO established (17 Fr arterial, 28 Fr venous cannulas) with UFH to maintain ACT >300 s.
- Valve Intervention:
  - Balloon aortic valvuloplasty performed during rapid pacing.
  - Initial Navitor valve could not be properly positioned and was removed.
  - Successful implantation of a 35 mm Navitor valve during rapid pacing at 120 bpm.
- Imaging: Fluoroscopy and aortography guided deployment; TTE confirmed mild paravalvular leak, no pericardial effusion.
- Weaning & Closure: ECMO weaned and decannulated; pacemaker and sheaths removed; femoral sites closed with Perclose and silk sutures.
- Outcome: Estimated blood loss <50 cc; no major intra-procedural complications aside from initial valve repositioning failure.

Imaging

Post-Implantation evaluation of TAVR placement with visualization of the ECMO drainage cannula



Post – Procedural Care

- VA-ECMO weaned and decannulated in cath lab
- The patient was briefly transferred to the ICU on dobutamine for inotropic support
- EF improved to 40%, further diuresis to euvolemia
- Remainder of his hospitalization was complicated by hematuria and intermittent hypotension with titration of GDMT

Discussion

- Survival advantage with prophylaxis:
  - Literature review — prophylactic ECMO 100% survival vs. 61% emergency rescue
  - Regensburg series — 0% 30-day mortality prophylactic vs. 44% emergency
  - JCM 2023 (27 awake prophylactic ECMO): 0% mortality, no ECMO-related vascular/bleeding complications
- Patient selection is critical
  - Severe LV dysfunction (EF ≤35%), pulmonary hypertension, high vasopressor needs, intolerance to rapid pacing
  - Concomitant high-risk PCI or challenging anatomy (low coronaries, porcelain aorta) • Technical pearls:
  - Femoral percutaneous access is standard; pre-closure devices improve hemostasis in prophylactic cases • Awake/monitored sedation can enable faster recovery and avoid intubation in high-risk patients
- Planning improves outcomes:
  - Heart-team algorithm: identify risk early, have ECMO circuit primed, and perfusion support available
  - On-table transition to open surgery if structural repair needed can minimize time and organ injury
- Limitations: small retrospective cohorts; heterogeneity; prospective multicenter validation needed

Conclusion

- ECMO is a reliable safety net; preemptive use transforms survival in selected ultra-high-risk TAVR
- Expands candidacy for patients otherwise unsuitable for surgery
- Risks and careful patient selection is imperative

Resources

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