

TCT 2025 Surgical Aortic Valve Replacement Following TAVR:

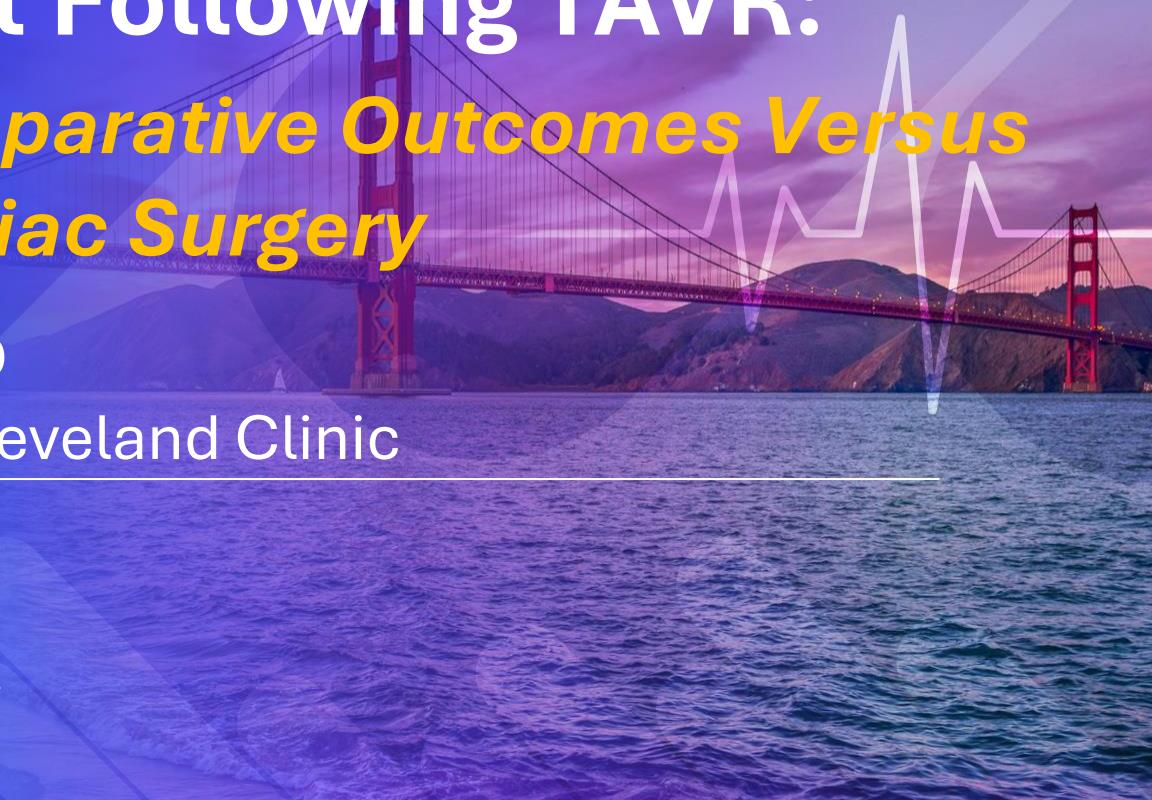
*Long-Term Comparative Outcomes Versus
Non-SAVR Cardiac Surgery*

Osamah Badwan, MD

Cardiology Fellow, Cleveland Clinic



TRANSCATHETER
CARDIOVASCULAR
THERAPEUTICS®



Disclosure of Relevant Financial Relationships

I, [Osamah Badwan](#), DO NOT have any financial relationships to disclose.

Acknowledgment

- We would like to express our sincere gratitude to all co-authors and collaborators for their contributions to this work:
- **Co-authors**

Fawzi Zghyer, MD, Issam Motairek, MD, Rishi Puri, MD, Grant Reed, MD, MSc, Amar Krishnaswamy, MD, James Yun, MD, PhD, Samir Kapadia, MD
- **Institutional Support**

Heart, Vascular & Thoracic Institute
Cleveland Clinic, Cleveland, OH, USA

Background

- As TAVR expands into broader populations, understanding the implications of subsequent cardiac surgery is important
- While ViV TAVR is often preferred, SAVR after TAVR (explant) is required in scenarios such as:
 - Prosthetic valve endocarditis
 - Severe paravalvular leak
 - Structural valve degeneration with unsuitable anatomy
- SAVR after TAVR (explant) perceived as high-risk; long-term comparative data limited.

Hypothesis

- Among patients with prior TAVR who undergo open-heart surgery, do long-term outcomes differ between SAVR and non-SAVR OHS?
- Is risk from explant itself or from patient acuity/comorbidities?
- **Hypothesis:** After balancing comorbidities, SAVR after TAVR has comparable long-term risk to non-SAVR OHS.

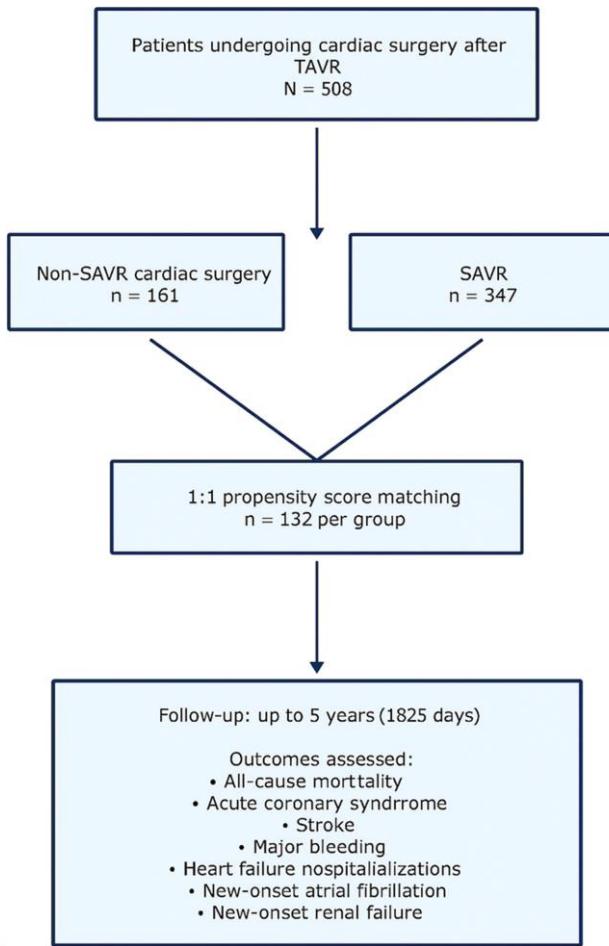
Methods

Data Source & Design

- **Data Source:** TriNetX U.S. Collaborative Network - deidentified electronic health records from 103 healthcare organizations.
- **Study period:** 2010–2023
- **Population:** adults ≥ 18 years with prior TAVR then SAVR or OHS.
- Outcomes to 5 years

Methods: Cohorts

Cohort	Included Procedures	Codes (CPT / ICD-10-PCS / SNOMED)
SAVR after TAVR	Surgical aortic valve replacement (SAVR), including: Aortic valve replacement with prosthetic valve (mechanical, bioprosthetic, homograft, stentless, or allograft) With or without annulus enlargement (e.g., Konno procedure)	CPT: 33405, 33406, 33410, 33411, 33412 ICD-10-PCS: 02RF07Z, 02RF08Z, 02RF08N, 02RF0JZ, 02RF0KZ
Non-SAVR Cardiac Surgery after TAVR	Other open heart surgeries including: <ul style="list-style-type: none">• Coronary artery bypass grafting (CABG)• Mitral valve replacement/repair• Tricuspid valve surgery• Atrial/ventricular septal defect repair• Thoracic aortic surgeries excluding aortic root surgeries	CPT: 33533, 33534, 33535, 33536, 33430, 33425, 33460, 33464, 33641, 33647, 33870, 33880, 33881, 33883, 33884, 33886 ICD-10-PCS: 02100Z9, 02QG0ZZ, 02QJ0ZZ, 02QH0ZZ, 02U50JZ, 02U70JZ SNOMED: 2598006



Propensity-Score Matching

- 1:1 match on 26 variables (demographics, comorbidities, medications, LVEF, BMI).
- Caliper 0.1 SD; SMD < 0.1 after matching.
- Final cohorts: 132 SAVR vs 132 OHS

Table 1

Baseline characteristics of propensity-matched patients undergoing surgical aortic valve replacement (SAVR) versus non-SAVR cardiac surgery following prior TAVR

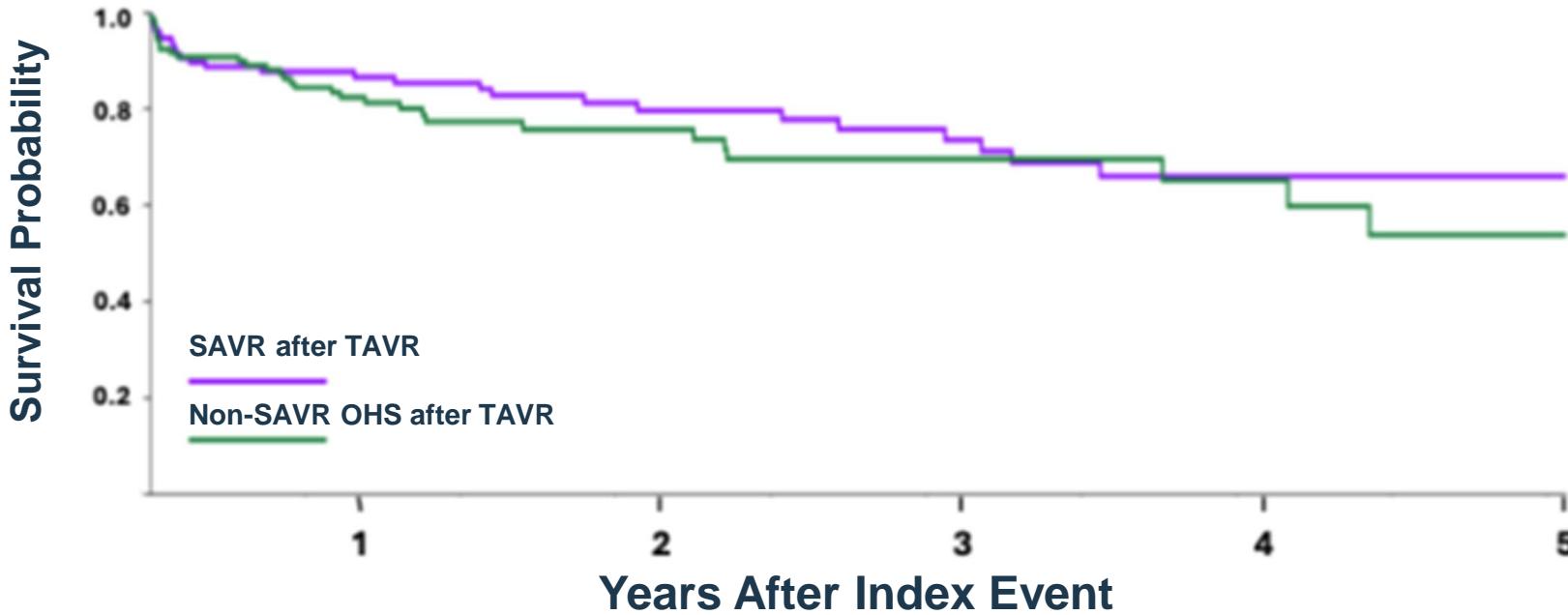
Variable	SAVR after TAVR (N = 132)	OHS after TAVR (N = 132)	p-value	Std diff.
Age at Index (years)	72.0 ± 10.4	72.2 ± 10.6	0.855	0.022
Female sex, n (%)	52 (39.4)	54 (40.9)	0.802	0.031
White, n (%)	101 (76.5)	97 (73.5)	0.570	0.070
Black, n (%)	13 (9.8)	14 (10.6)	0.839	0.025
Hispanic/Latino, n (%)	<10 (<7.6)	<10 (<7.6)	1.000	<0.001
Diabetes mellitus, n (%)	63 (47.7)	63 (47.7)	1.000	<0.001
Chronic kidney disease, n (%)	62 (47.0)	64 (48.5)	0.805	0.030
Heart failure, n (%)	107 (81.1)	111 (84.1)	0.516	0.080
Prior MI (any STEMI/NSTEMI), n (%)	59 (44.7)	65 (49.2)	0.462	0.090
Prior stroke/TIA, n (%)	22 (16.7)	21 (15.9)	0.868	0.021
Hypertension, n (%)	99 (75.0)	113 (85.6)	0.030	0.269
Hyperlipidemia, n (%)	109 (82.6)	98 (74.2)	0.100	0.204
COPD, n (%)	28 (21.2)	35 (26.5)	0.312	0.125
Prior PCI, n (%)	15 (11.4)	13 (9.8)	0.689	0.049
Dialysis, n (%)	10 (7.6)	11 (8.3)	0.820	0.028
LVEF (%)	56.1 ± 13.6	53.9 ± 16.1	0.531	0.148
BMI (kg/m ²)	30.4 ± 6.6	28.1 ± 6.5	0.008	0.351
Statin use, n (%)	109 (82.6)	122 (92.4)	0.016	0.301
Aspirin use, n (%)	124 (93.9)	119 (90.2)	0.255	0.140
P2Y12 inhibitor (clopidogrel), n (%)	90 (68.2)	90 (68.2)	1.000	<0.001
Beta-blocker use, n (%)	119 (90.2)	120 (90.9)	0.834	0.026
ACEi or ARB use, n (%)	110 (83.3)	97 (73.5)	0.049	0.242
Loop diuretic use, n (%)	99 (75.0)	99 (75.0)	1.000	<0.001

Results

Baseline Characteristics (Post-Match)

Results

Primary Outcome: Mortality (5 Years)



HR 0.78 (95% CI 0.47–1.31), log-rank p = 0.35

Results

Five-Year Event Rates

Table 2

Five-year clinical outcomes of surgical aortic valve replacement (SAVR) versus non-SAVR cardiac surgery following prior transcatheter aortic valve replacement (TAVR).

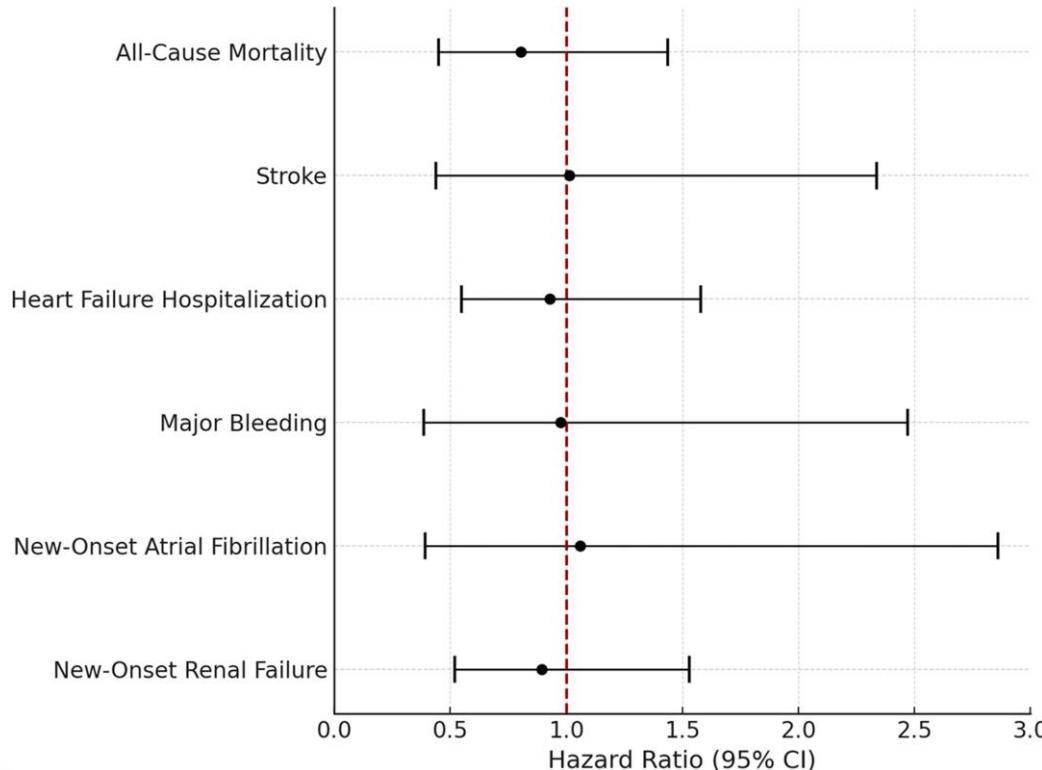
Outcome	SAVR after TAVR (N = 132)	Non-SAVR after TAVR (N = 132)	HR (95% CI)	OR (95% CI)	p-value (log-rank)
All-cause mortality	27 (20.5%)	32 (24.2%)	0.78 (0.47–1.31)	0.80 (0.45–1.44)	0.35
Acute coronary syndrome	21 (15.9%)	23 (17.4%)	0.86 (0.47–1.55)	0.90 (0.47–1.71)	0.61
Stroke	11 (8.3%)	11 (8.3%)	1.01 (0.44–2.34)	1.00 (0.42–2.39)	0.98
Heart failure hospitalization	38 (28.8%)	40 (30.3%)	0.92 (0.59–1.43)	0.93 (0.55–1.58)	0.70
Major bleeding	18 (13.6%)	15 (11.4%)	1.16 (0.58–2.30)	1.23 (0.59–2.56)	0.68
New-onset renal failure	35 (26.5%)	38 (28.8%)	0.85 (0.54–1.35)	0.89 (0.52–1.53)	0.50

Abbreviations: SAVR = surgical aortic valve replacement; TAVR = transcatheter aortic valve replacement; OHS = open-heart surgery.

This table summarizes key outcomes at 5 years in a propensity-matched cohort ($n = 132$ per group) comparing SAVR after TAVR to non-SAVR open-heart surgery after TAVR. No statistically significant differences were observed in all-cause mortality, acute coronary syndromes, stroke, heart failure hospitalization, major bleeding, new-onset atrial fibrillation (excluding prior AFib cases), or new-onset renal failure.

Results

Forest Plot - Secondary Outcomes (5 Years)



No statistically significant differences across endpoints

Discussion

- After balancing comorbidities, SAVR after TAVR \approx OHS for long-term outcomes.
- Reported risk likely reflects patient complexity rather than explant itself.
- Reinforces individualized heart-team decision-making.

Limitations

- Retrospective design; coding misclassification possible.
- Unmeasured confounding; limited power for rare events.
- No patient-reported outcomes; center-volume data unavailable.

Conclusion

- SAVR after TAVR (explant) has similar 3–5 year outcomes vs non-SAVR OHS in matched cohort.
- Risk appears patient-driven more than procedure-intrinsic.
- Heart-team decisions should remain anatomy- & comorbidity-based.

Thank You!

For more information, please check out our simultaneous publication:



ARTICLE IN PRESS

JID: AJC [m5GUS; October 11, 2025; 15:41]

The American Journal of Cardiology xxx (2025) xxx-xxx

Contents lists available at ScienceDirect

The American Journal of Cardiology

journal homepage: www.elsevier.com/locate/ajc



Surgical Aortic Valve Replacement Following TAVR: Long-Term Comparative Outcomes Versus Non-SAVR Cardiac Surgery

Osamah Badwan, MD^a, Issam Motairek, MD^a, Fawzi Zghyer, MD^a, Rishi Puri, MD, PhD^a, Grant Reed, MD, MSc^a, Amar Krishnaswamy, MD^a, James Yun, MD^b, Samir Kapadia, MD^{a*}

^a Department of Cardiovascular Medicine, Heart, Vascular and Thoracic Institute, Cleveland Clinic

^b Department of Cardiothoracic Surgery, Heart, Vascular and Thoracic Institute, Cleveland Clinic

ARTICLE INFO

Article History:

Received 17 June 2025

Revised 2 September 2025

Accepted 20 September 2025

Keywords:

transcatheter aortic valve replacement
surgical aortic valve replacement
TAVR explantation
valve-in-valve
long-term outcomes
structural heart disease
reoperative valve surgery

Background: As TAVR use expands, some patients require later cardiac surgery, including SAVR with TAVR valve explant in certain scenarios. The long-term risks of SAVR after TAVR compared with other cardiac surgeries remain unclear.

Methods: We studied adults in the TriNetX network who underwent TAVR followed by either SAVR or non-SAVR open-heart surgery (OHS) between 2010 and 2023. Propensity-score matching was done on 26 clinical and demographic factors. We compared outcomes at 3 and 5 years.

Results: After matching, 132 patients were included in each group. The groups were well-balanced at baseline. At 3 years, mortality was similar (18.9% SAVR vs 22.0% OHS; HR: 0.83, 95% CI: 0.46 to 1.51). At 5 years, mortality remained comparable (20.5% vs 24.2%; OR: 0.80, 95% CI 0.45 to 1.44). Rates of stroke, acute coronary syndrome, heart failure hospitalization, major bleeding, new atrial fibrillation, and renal failure were also similar.

Conclusions: SAVR after TAVR was associated with similar long-term outcomes compared with OHS. These findings suggest that risks may be more related to patient complexity than to the valve explant itself.

© 2025 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)