

# How to remove TAVR valve

Bo Yang, MD, Ph.D.

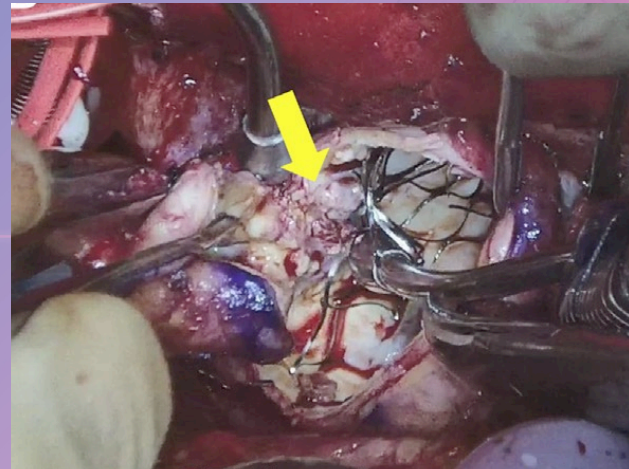
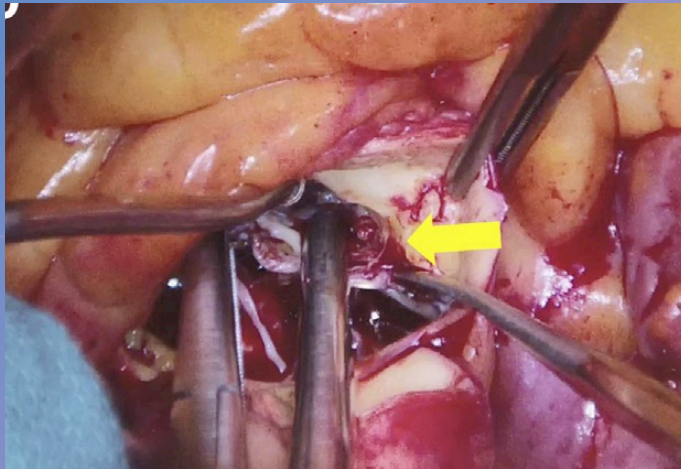
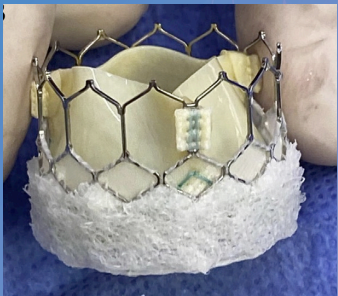
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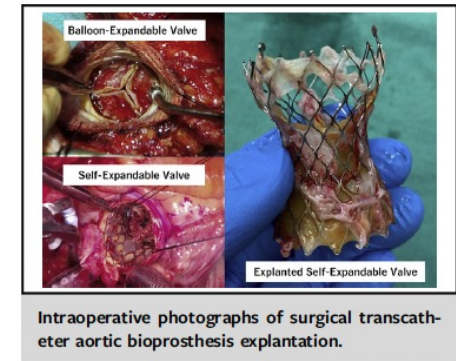
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# Surgical explantation of transcatheter aortic bioprosthesis: A systematic review and meta-analysis

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**Results:** A total of 10 studies were identified that included 1690 patients undergoing a TAVR explant. The frequency of TAVR explant among TAVR recipients was 0.4% (95% confidence interval [CI], 0.2%-0.6%). The mean patient age was 73.7 years (95% CI, 72.9-74.6 years). The mean Society of Thoracic Surgeons predicted risk of mortality was 5.9% (95% CI, 2.9%-8.8%) at the index TAVR and 8.1% (95% CI, 5.4%-10.8%) at TAVR explant. The mean time from implant to explant was 345.0 days (95% CI, 196.7-493.3 days). Among patients with documented device type, 59.8% (95% CI, 43.5%-76.0%) had a balloon-expandable valve and 40.2% (95% CI, 24.0%-56.5%) had a self-expandable valve. Concomitant procedures during TAVR explant were performed in 52.9% of patients (95% CI, 33.8%-72.0%), and the most common concomitant procedure was aortic repair (28.5%; 95% CI, 14.0%-42.9%). The 30-day mortality after TAVR explant was 16.7% (95% CI, 12.2%-21.2%).

## CENTRAL MESSAGE

Surgical transcatheter aortic valve replacement (TAVR) valve explantation appears to be rare; however, its mortality and morbidity are substantial. Implanters must be mindful of the need for a lifetime management strategy when choosing candidates for TAVR.





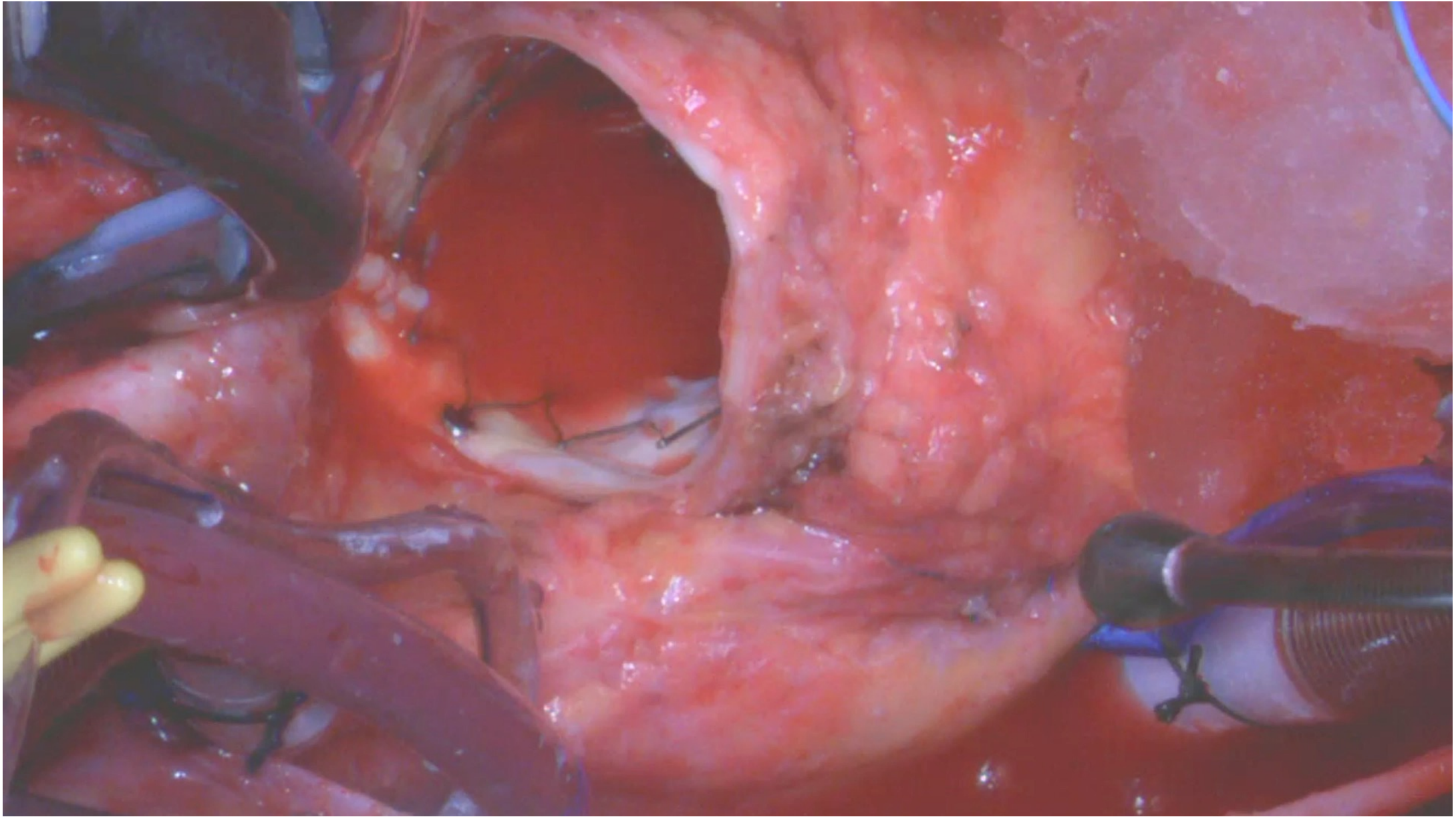
**TABLE 4 Postoperative Outcomes**

Variables	Balloon-expandable Device (n = 330)	Self-expandable Device (n = 153)	P Value
30-d mortality	59 (18)	30 (20)	.63
30-d mortality with isolated SAVR	18 (15)	10 (17)	.67
30-d mortality with isolated SAVR and available STS-PROM O/E ratio	10 (10) (n = 105) 2.0	7 (14) (n = 52) 2.3	.46 N/A
Stroke	15 (5)	11 (7)	.23
Pneumonia	25 (8)	16 (11)	.29
Prolonged ventilation	118 (36)	61 (40)	.38
Renal failure	40 (12)	25 (16)	.21
Dialysis	28 (9)	20 (13)	.12
New pacemaker	43 (16) <sup>a</sup>	22 (17) <sup>a</sup>	.70
Blood transfusions (U)	237 (72)	117 (77)	.28
PRBCs	1.0 (0-4.0)	2.0 (0-4.0)	<b>.034</b>
FFPs	0 (0-2.0)	0 (0-2.0)	.40
Platelets	0 (0-2.0)	0 (0-3.0)	.14
Cryoprecipitate	0 (0-1.0)	0 (0-2.0)	<b>.050</b>
ICU length of stay (h)	93 (47-175)	114 (60-204)	.096
Hospital length of stay (d)	13 (7-20)	14 (8-19)	.99
Discharge location			.40
Home	122 (45)	61 (50)	
Others	149 (55)	62 (50)	
Readmission	42 (13)	18 (12)	.77

## Postoperative Outcomes: Native VS. VIV-TAVR Group

Variables	Native TAVR (n=42)	VIV-TAVR (n=24)	p-value
Operative mortality (%)	6 (14.3)	0 (0)	0.079
Length of hospital stay (days)	14.0 (8.8–23.5)	10.5 (6.3–16.5)	0.086
Stroke	2 (4.8)	1 (4.2)	1.00
Prolonged ventilation	24 (57.1)	9 (37.5)	0.13
Renal failure requiring dialysis (n=57)	7 (20.6)	0	0.034
Reoperation for bleeding	3 (7.1)	0	0.30
Permanent pacemaker	5 (11.5)	3 (11.5)	2(11.1)
Composite complication	29 (69.0)	12 (50.0)	0.13
1 complication	13 (44.8)	9 (75.0)	0.078
2 complications	13 (44.8)	3 (25.0)	0.31
3 complications	3 (10.3)	0	0.54





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Double Kocher Clamp TAVR Explant  
Balloon-Expandable Valve

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# Self-Expandable Valve with Low Implantation

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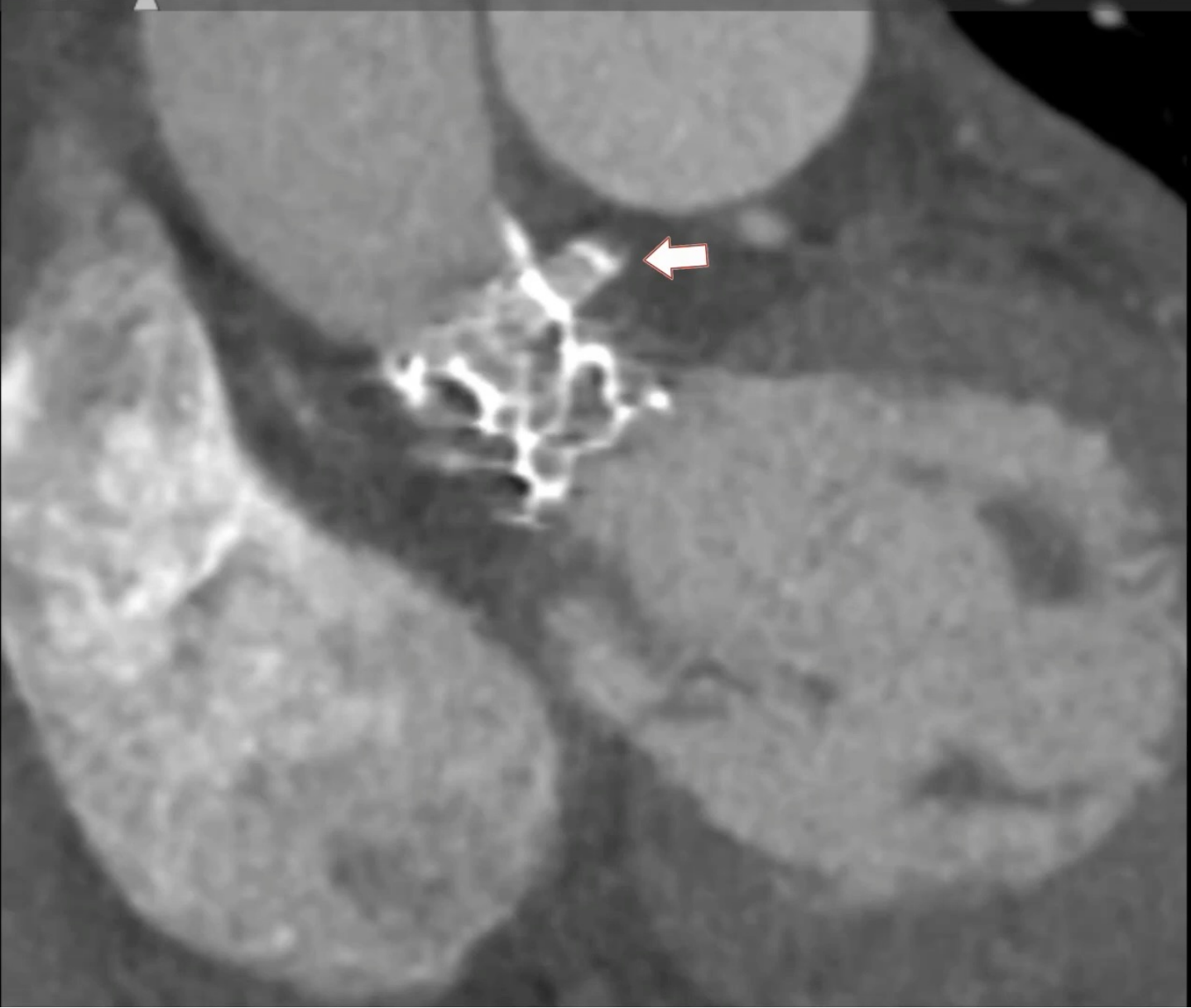
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## TAVR with “orthotopic” snorkel stent of the left coronary artery

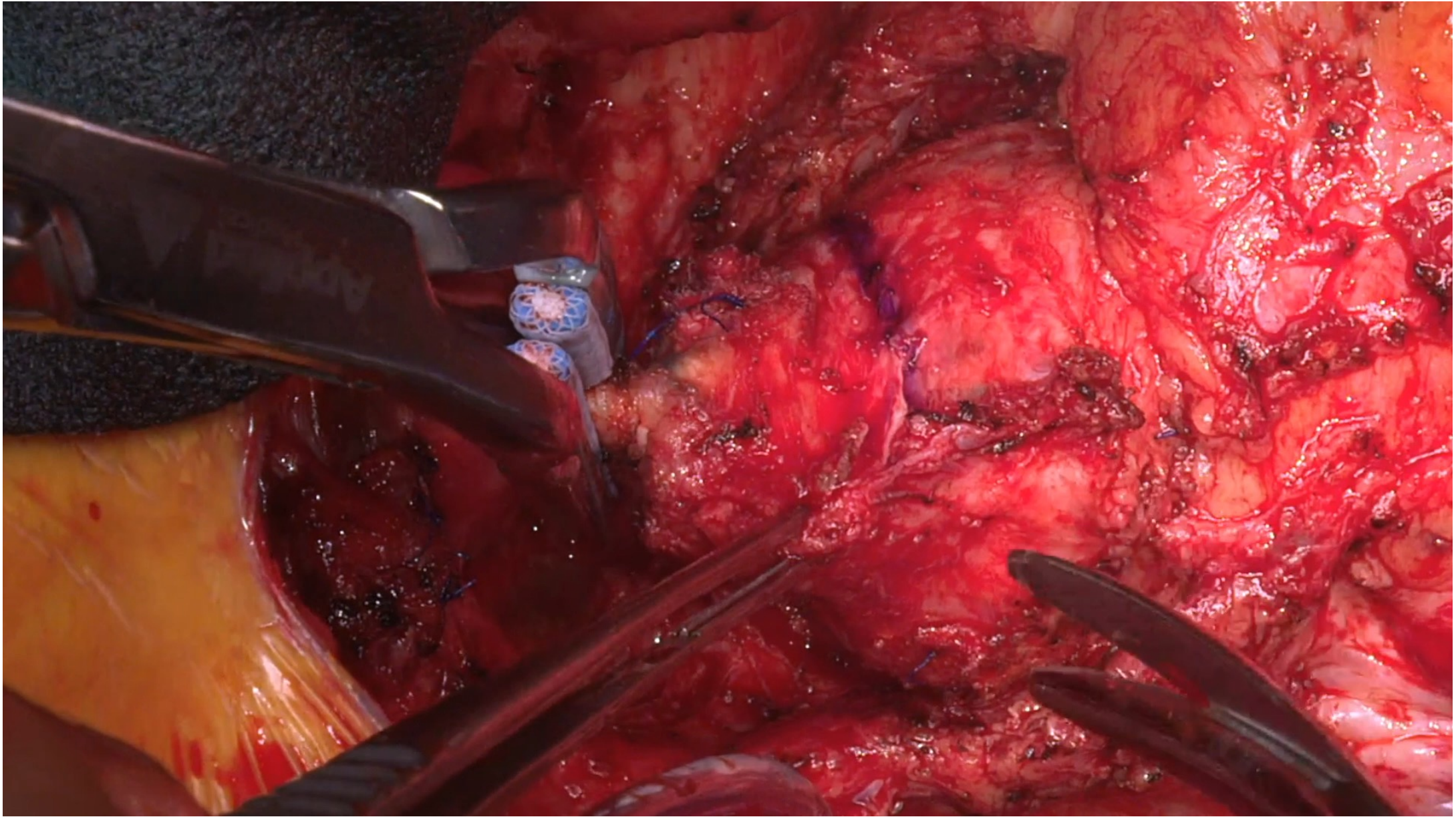
- 23 mm balloon-expandable TAVR with left main stent 6 years ago
  - Presented with severe AS
  - Redo TAVR not feasible due to the risk of both coronary obstruction
-



R  
A



L  
P



## TAVR Explant Difficulty Index

Points	0	1	2
Degree of adhesions (STJ, aortic root, LVOT, anterior mitral leaflet)	None-Mild No or minor adhesions separating spontaneously or traction	Moderate Dense adhesions separating by sharp dissection or forceful traction	Severe Tissue damage requiring replacement
Myocardial protection	No issues	Inability to utilize standard cardioplegia delivery	
Coronary ostia	No issues	Presence of chimney stents	
Total points	0–1	2–3	4–
Difficulty index	Low	Intermediate	High







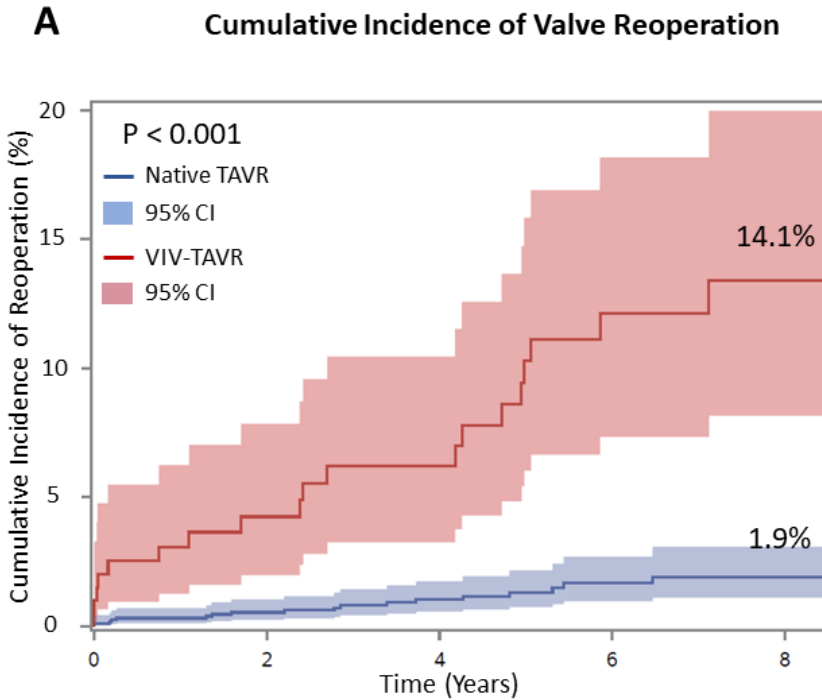
# Conclusion



- Native TAVR should be selected for patients who unlikely need SAVR in the future, such as limited left expectancy, high likely hood of second TAVR - TAVR.
- SAVR-TAVR should not be used in small SAVR valve (<25) unless patients are not surgical candidate.
- SAVR should give patients large prosthetic valve ( $\geq 25$ ) with the inner diameter of the opening of the cusps matching the native aortic annulus with/out aortic annular/root enlargement and prepare patients for future SAVR - TAVR if needed

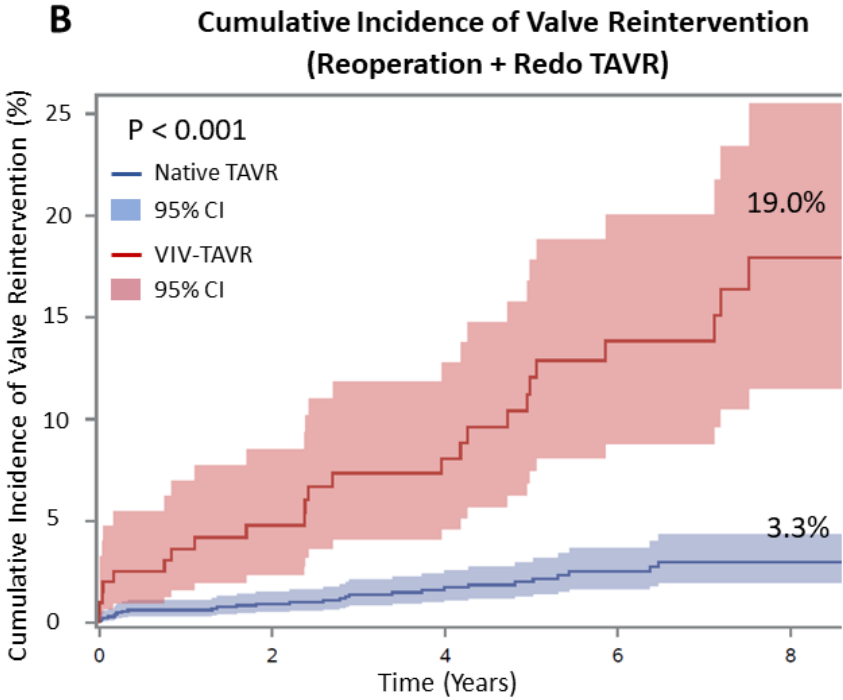


# Cumulative Incidence of Post-Implant Reintervention: Native VS. VIV-TAVR



Number at risk

Native TAVR	1633	941	420	124	18
VIV-TAVR	201	141	78	23	6



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Native TAVR	1633	941	420	124	18
VIV-TAVR	201	141	78	23	6




**TABLE 2 Details of the Present Aortic Valve Disease**

<b>Variables</b>	<b>Balloon-expandable Device (n = 330)</b>	<b>Self-expandable Device (n = 153)</b>	<b>P Value</b>
Aortic stenosis	194 (59)	83 (54)	.35
Mean gradient (mm Hg)	41.9 ± 18.9	40.6 ± 19.7	.65
Aortic valve area (cm <sup>2</sup> )	0.89 ± 0.53	0.94 ± 0.56	.59
Aortic insufficiency moderate or greater	100 (30)	67 (44)	<b>.004</b>
Primary device explant cause			
Endocarditis	79 (24)	20 (13)	<b>.006</b>
Structural valve degeneration	20 (6)	8 (5)	.72
Aortic insufficiency or paravalvular leak	49 (15)	29 (19)	.25
Aortic dissection or aneurysm	5 (2)	10 (7)	<b>.008</b>
Stenosis	64 (19)	24 (16)	.33
Procedure-related failure	91 (28)	55 (36)	.062
Others	22 (7)	7 (5)	.37

Variables are expressed as numbers (%) or means ± SDs. Bold indicates statistically significant (*P* < .05).

**TABLE 3 Operative Details**

Variables	Balloon-expandable Self-expandable		P Value
	Device (n = 330)	Device (n = 153)	
Implanted prosthesis			
Bioprosthesis	246 (75)	120 (78)	.35
Mechanical	35 (13)	10 (8)	.15
Others	49 (15)	23 (15)	.96
Implanted valve size (mm)	23.3 ± 2.3	23.7 ± 2.5	.063
Concurrent procedures performed	208 (63)	95 (62)	.84
Total aorta procedures	87 (26)	44 (29)	.58
Unplanned	18 (21)	10 (23)	.83
Root	79 (24)	29 (19)	.22
Ascending	28 (9)	34 (22)	<b>&lt;.001</b>



# Redo Surgical Aortic Valve Replacement After Prior Transcatheter Versus Surgical Aortic Valve Replacement



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**RESULTS** Of 31,106 SAVR patients, 1,126 had prior TAVR (TAVR-SAVR), 674 had prior SAVR and TAVR (SAVR-TAVR-SAVR), and 29,306 had prior SAVR (SAVR-SAVR). Yearly rates of TAVR-SAVR and SAVR-TAVR-SAVR increased over time, whereas SAVR-SAVR was stable. The TAVR-SAVR patients were older, with higher acuity, and with greater comorbidities than other cohorts. The unadjusted operative mortality was highest in the TAVR-SAVR group (17% vs 12% vs 9%, respectively;  $P < 0.001$ ). Compared with SAVR-SAVR, risk-adjusted operative mortality was significantly higher for TAVR-SAVR (OR: 1.53;  $P = 0.004$ ), but not SAVR-TAVR-SAVR (OR: 1.02;  $P = 0.927$ ). After propensity score matching, operative mortality of isolated SAVR was 1.74 times higher for TAVR-SAVR than SAVR-SAVR patients ( $P = 0.020$ ).



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## Operative Data: Native VS. VIV-TAVR Group

	Native TAVR (n=42)	VIV-TAVR (n=24)	p-value
CPB time (minute)	180 (130–235)	189 (145–265)	0.46
Aortic cross-clamp time (minute)	138 (89–189)	126 (95–198)	0.79
Isolated SAVR	9 (21.4)	3 (12.5)	0.37
Aortic root replacement	7 (16.7)	8 (33.3)	0.12
<b>Aortic root replacement after excluding previous root surgery/root abscess cases (n=46)</b>	<b>4 (11.1)</b>	<b>0</b>	<b>0.57</b>
Ascending aortic replacement	3 (7.1)	4 (16.7)	0.23
<b>Unplanned aortic repair</b>	<b>6 (14.3)</b>	<b>0</b>	<b>0.079</b>
Mitral repair/replacement	13 (31.0)	5 (20.8)	0.38
Tricuspid repair/replacement	6 (14.3)	5 (20.8)	0.49
CABG	5 (11.9)	2 (8.3)	0.65
<b>VSD repair</b>	<b>1 (2.4)</b>	<b>0</b>	<b>1.00</b>
<b>IABP</b>	<b>2 (4.8)</b>	<b>0</b>	<b>0.53</b>
<b>VA-ECMO</b>	<b>3 (7.1)</b>	<b>0</b>	<b>0.30</b>



# TAVR Explant Difficulty Score & Index

