



Minimally Invasive Aortic Root Enlargement: Y-Technique

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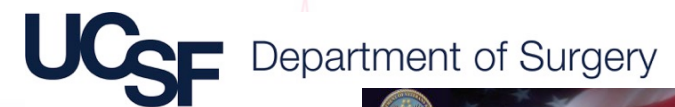
Nov 16-18, 2023 Ho Chi Minh City, Vietnam



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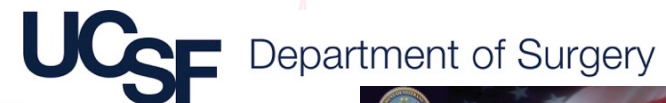
Disclosures

- None



Outline

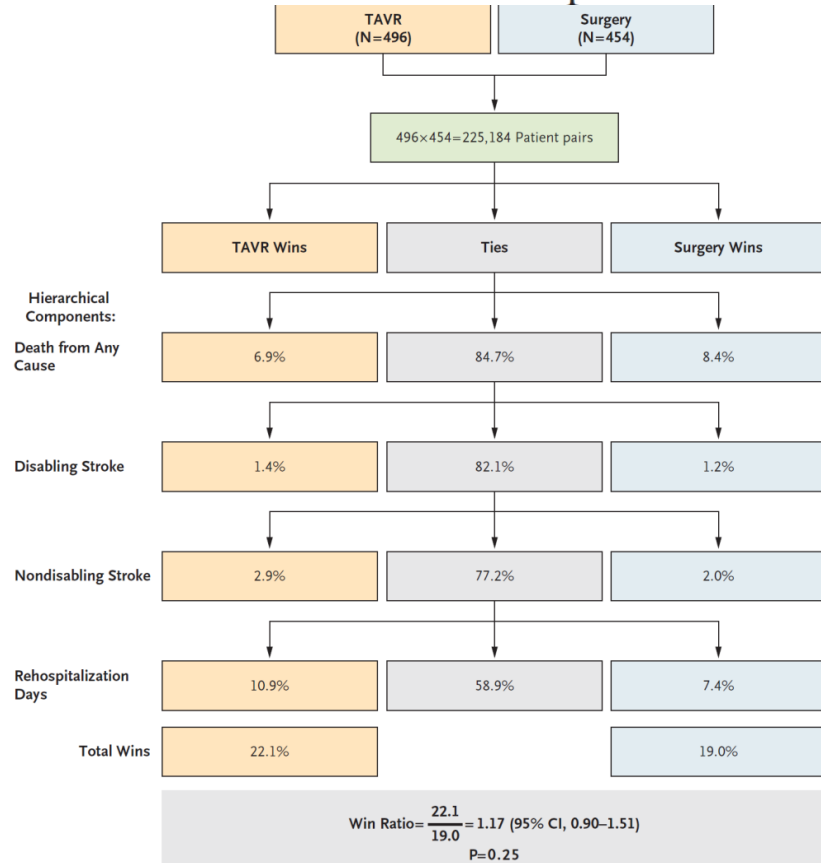
- Why is Minimally Invasive Aortic Root Enlargement Important?
 - TAVR vs SAVR in Low Risk
 - STS-TVT Registry
 - AHA Guidelines
 - Life-time Management of AS
 - Patient-prosthesis mismatch
- Technical Steps: Minimally Invasive Y-Aortic Root Enlargement



Transcatheter vs Surgical Aortic Valve Replacement

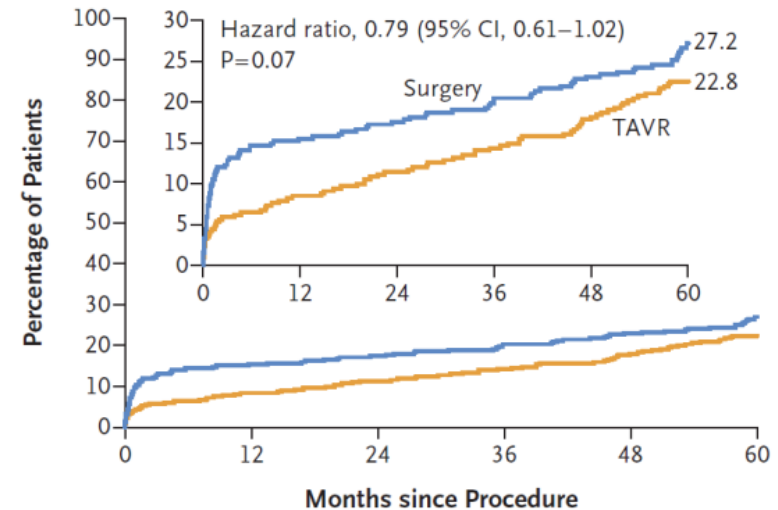
■ PARTNER 3 Trial: Low Risk Surgical Patients

Transcatheter Aortic-Valve Replacement



M.J. Mack, M.B. Leon, V.H. Thourani, P. Pibarot, R.T. Hahn, P. Genereux, S.K. Kodali, S.R. Kapadia, D.J. Cohen, S.J. Pocock, M. Lu, R. White, M. Szerlip, J. Ternacle, S.C. Malaisrie, H.C. Herrmann, W.Y. Szeto, M.J. Russo, V. Babaliaros, C.R. Smith, P. Blanke, J.G. Webb, and R. Makkar, for the PARTNER 3 Investigators*

Death from Any Cause, Stroke, or Rehospitalization

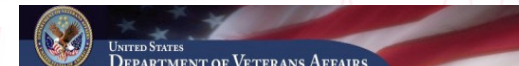
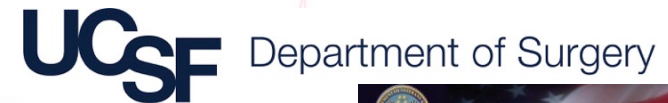


No. at Risk

	0	12	24	36	48	60
Surgery	454	372	349	328	309	276
TAVR	496	453	434	415	391	353



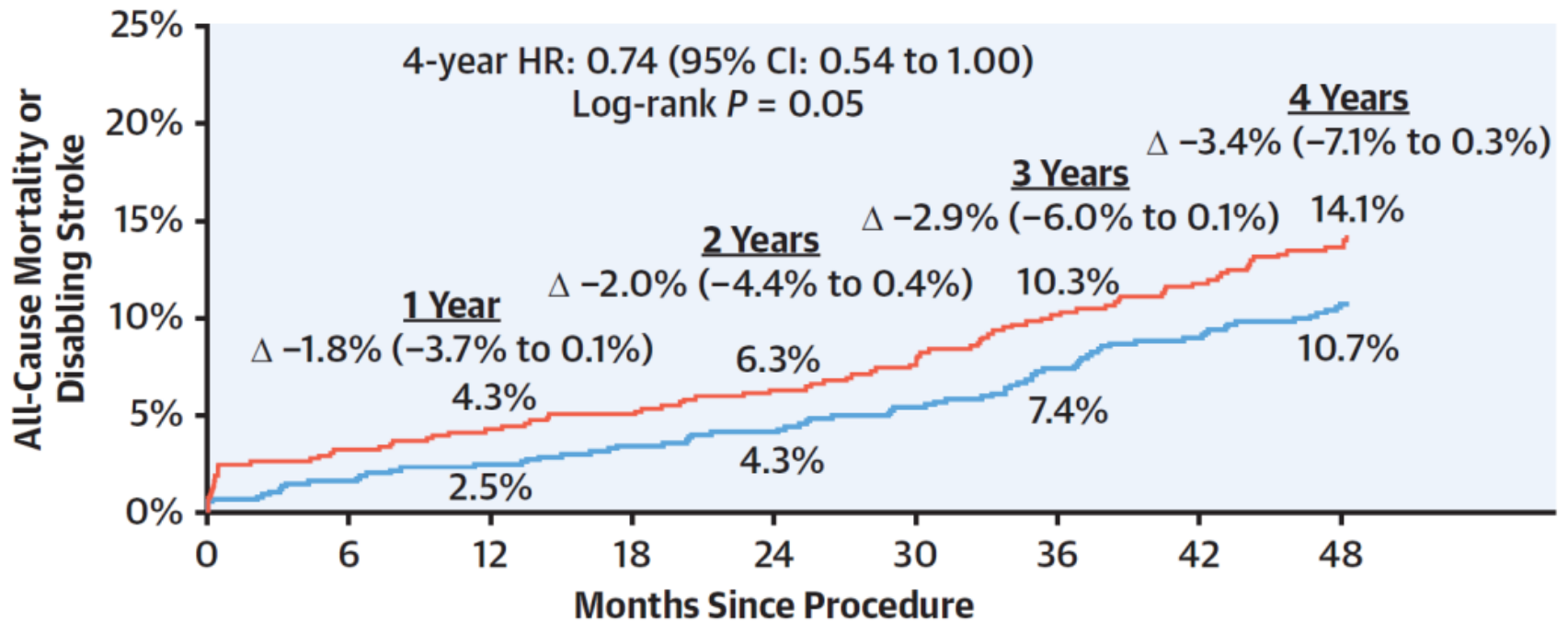
Mack, et al. NEJM. 2023



Transcatheter vs Surgical Aortic Valve Replacement

- Evolut Low Risk Study

4-Year Outcomes of Patients With Aortic Stenosis in the Evolut Low Risk Trial

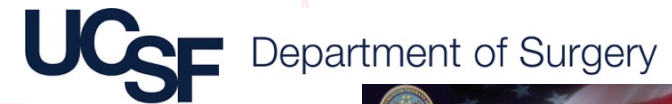
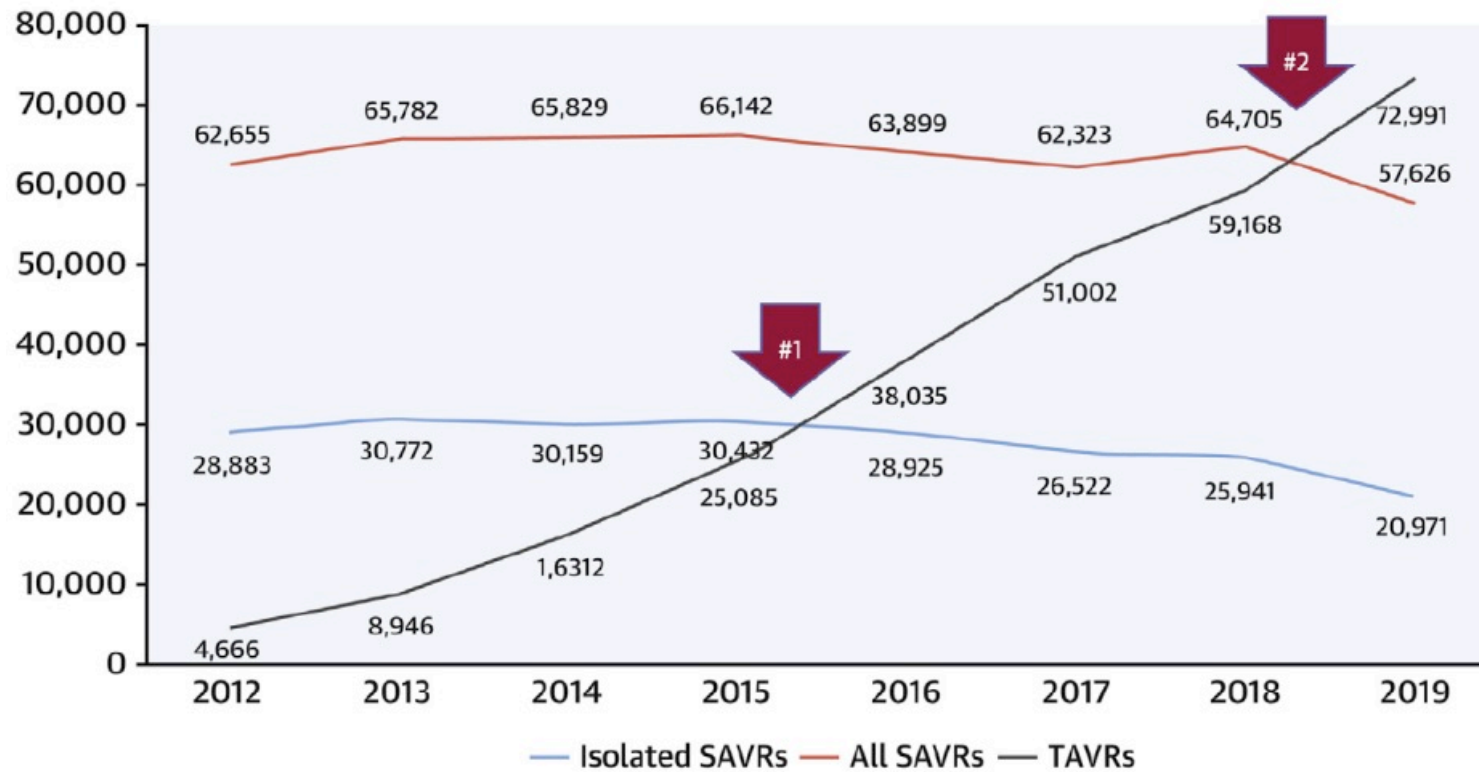


	0	6	12	18	24	30	36	42	48
— Evolut TAVR	730	715	706	695	685	671	651	627	592
— SAVR	684	648	627	616	595	574	556	533	505

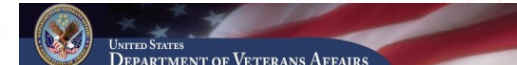


(Forrest JK et al. J Am Coll Cardiol 2023)

US TAVR vs. SAVR: Case Volume



Carroll JD, et al. STS-ACC TVT Registry at Transcatheter Aortic Valve Replacement. Ann Thorac Surg. 2021 Feb;111(2):701-722



American Heart Association Guidelines



2. For symptomatic patients with severe AS who are 65 to 80 years of age and have no anatomic contraindication to transfemoral TAVI, either SAVR or transfemoral TAVI is recommended after shared decision-making about the balance between expected patient longevity and valve durability.^{1,4-8}



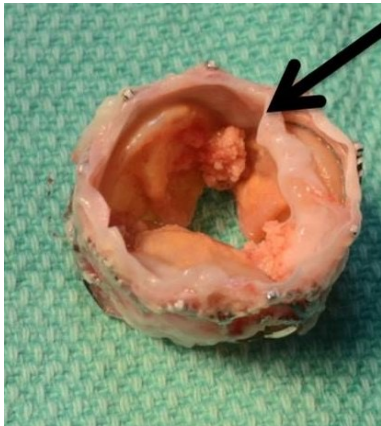
Circulation. 2021 Feb 2;143(5):e35-e71

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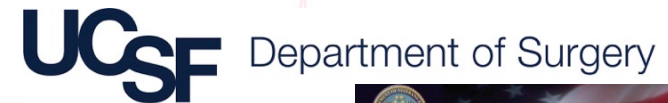
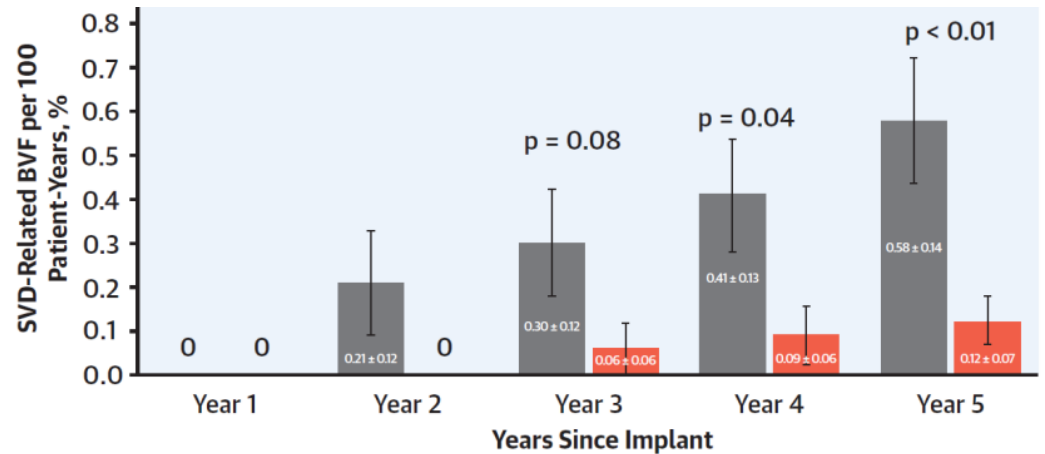
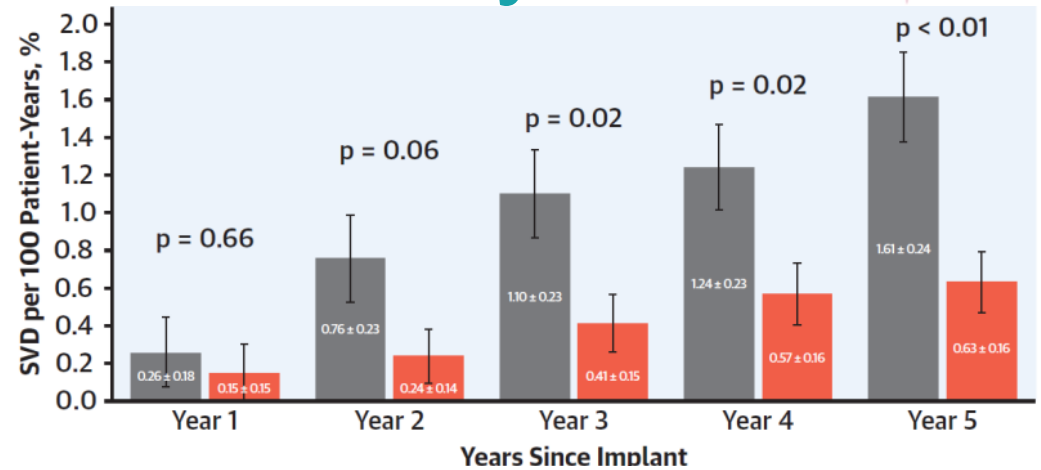


TAVR vs SAVR Durability

Engineering study estimates TAVR durability ~8 yrs. Clinical data for SAVR durability ~20 yrs.



Courtesy of Danny Dvir, M.D.



Pibarot et al. JACC 2020;76:1830-43



Life-Time Management of AS

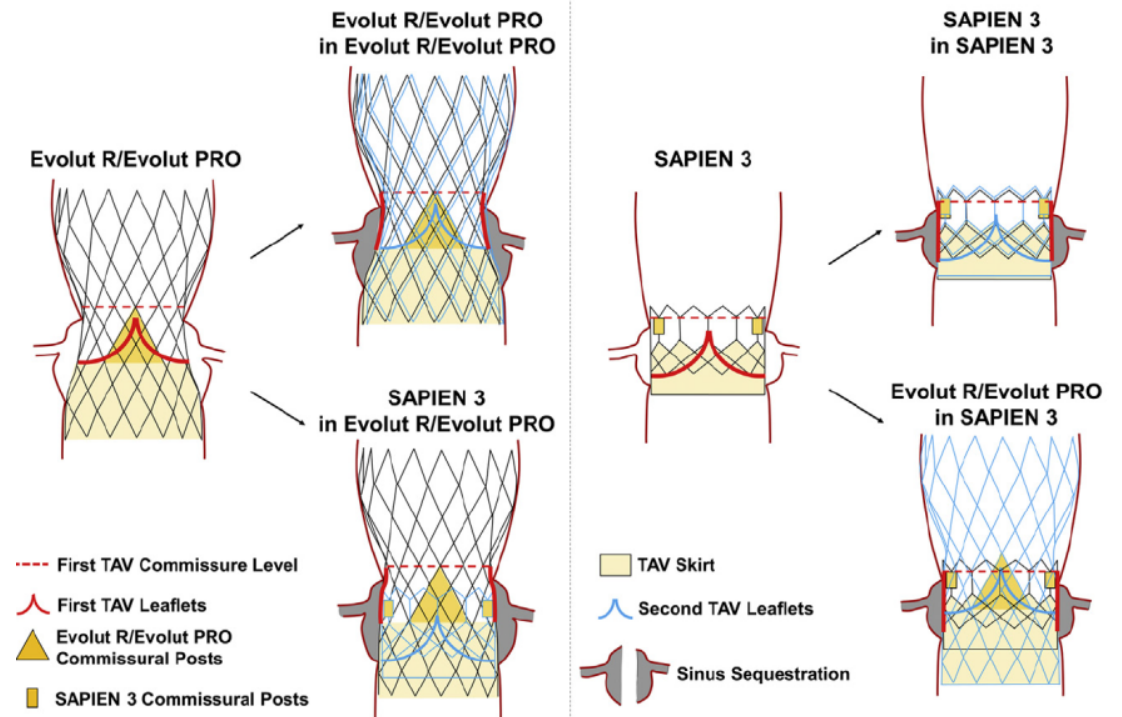
TAVR first in young low-risk patient with TAVR Degeneration

TAVR in TAVR

- Risk of coronary obstruction
- Reduced cross sectional area
- Greater need for anticoagulation
- TAVR in TAVR in TAVR...



Coronary Obstruction



Life-time Management of AS



TAVR first in young low-risk patient

Open Heart Surgery

- Explant TAVR
- Implant SAVR
- High mortality:
13% at 30 days

Surgical Explantation
0.2% (N=227)



 30-Day Mortality: **13.2%**
 1-Year Mortality: **22.9%**

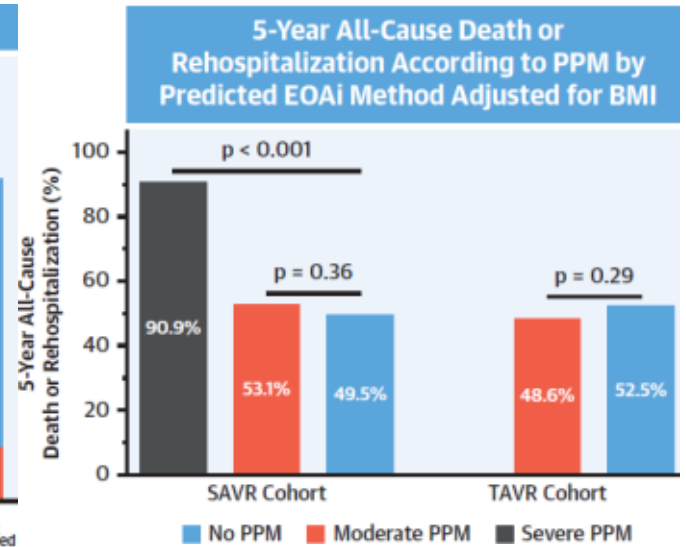
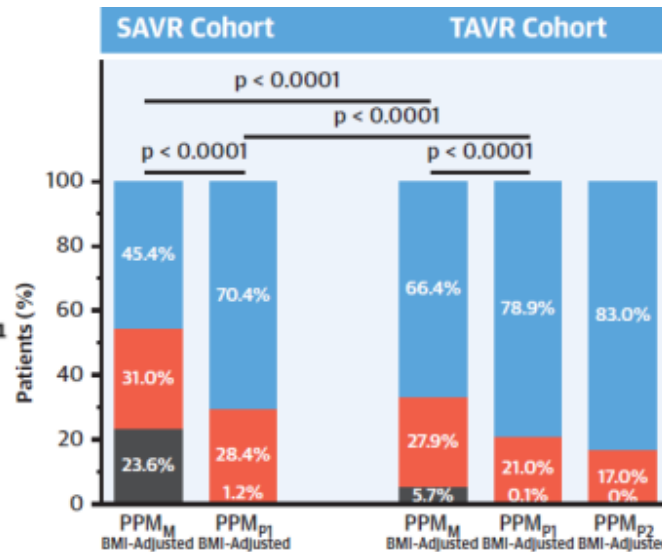
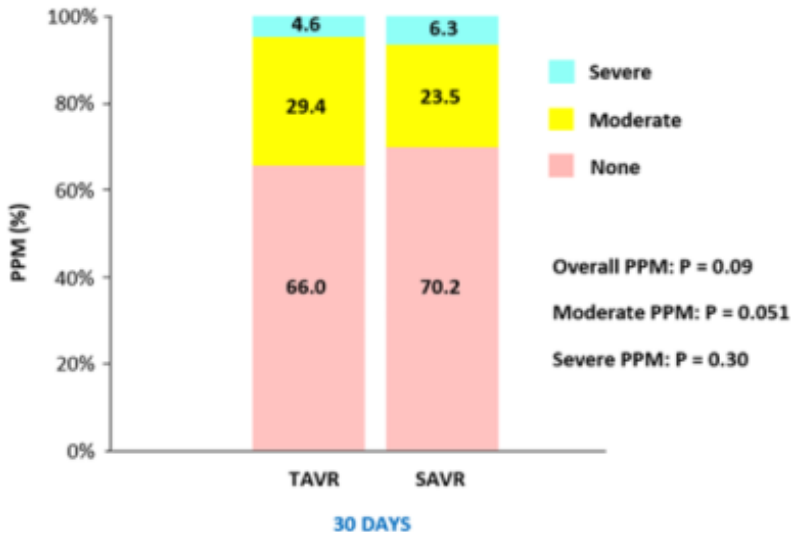
Patient-Prosthesis Mismatch

TAVR vs SAVR

Echocardiographic Results of Transcatheter Versus Surgical Aortic Valve Replacement in Low-Risk Patients

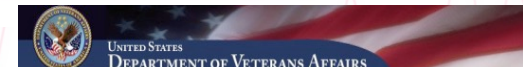
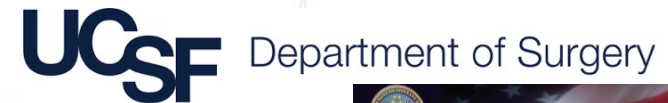
Prosthesis-Patient Mismatch After Aortic Valve Replacement in the PARTNER 2 Trial and Registry

Prosthesis-Patient Mismatch at 30 Days



Pibarot P et al. *Circulation*. 2020;141:1527-1537

Ternacle, J. et al. *J Am Coll Cardiol Intv*. 2021;14(13):1466-77



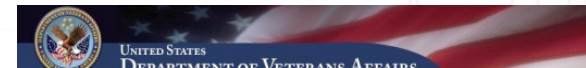
Advantages of Minimally Invasive SAVR with Root Enlargement over TAVR

For Low-Risk Younger Patients

- Patients want minimally invasive: SAVR vs TAVR
- Life-time management AS: TAVR in TAVR, TAVR Explant, TAVR in SAVR
 - Low-risk TAVR: only 5 year results
 - TAVR in TAVR not always option: Coronary obstruction
 - TAVR explantation: high mortality
- MiSAVR root enlargement: Avoids patient prosthesis mismatch
 - Root enlargement allows larger valve implantation than TAVR



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Minimally Invasive SAVR



2 weeks postop



6 weeks postop

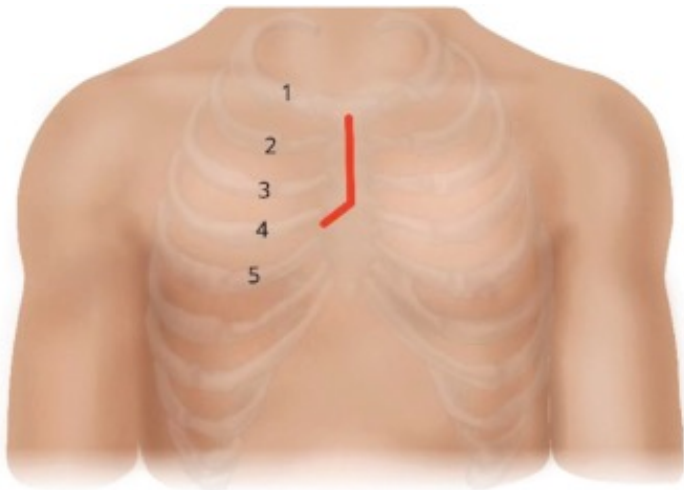


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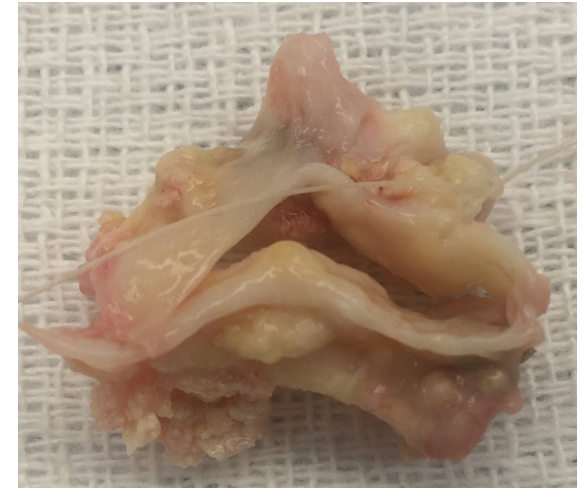
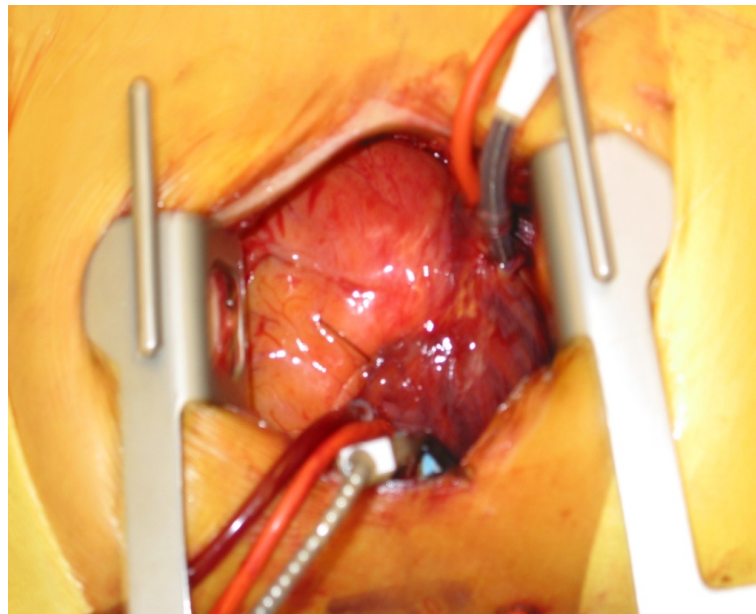


Minimally Invasive Y-Root Enlargement

- Incision and Cannulation



(Zaky 2021. Anesthetic Management for Minimally Invasive Cardiac Surgery. Cardiac Anesthesia.)



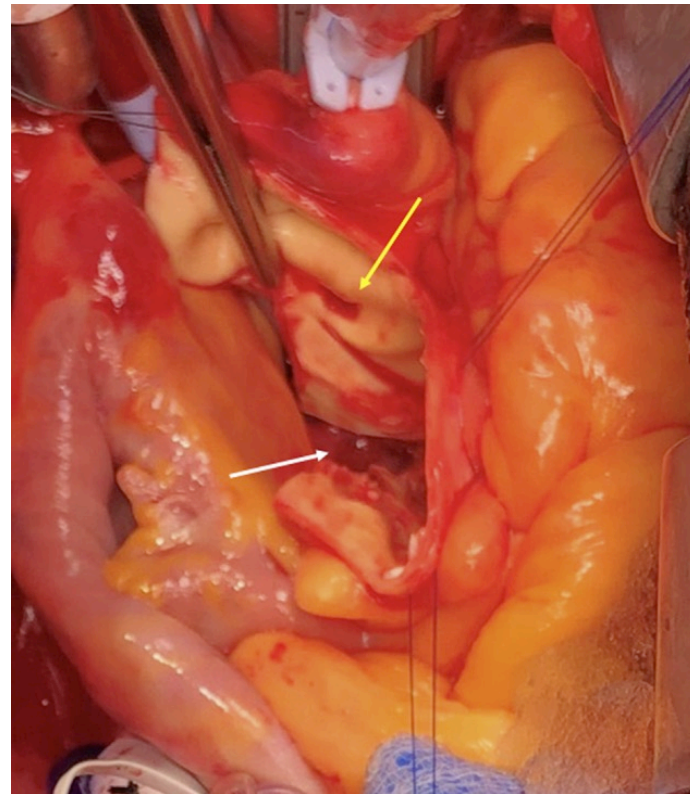
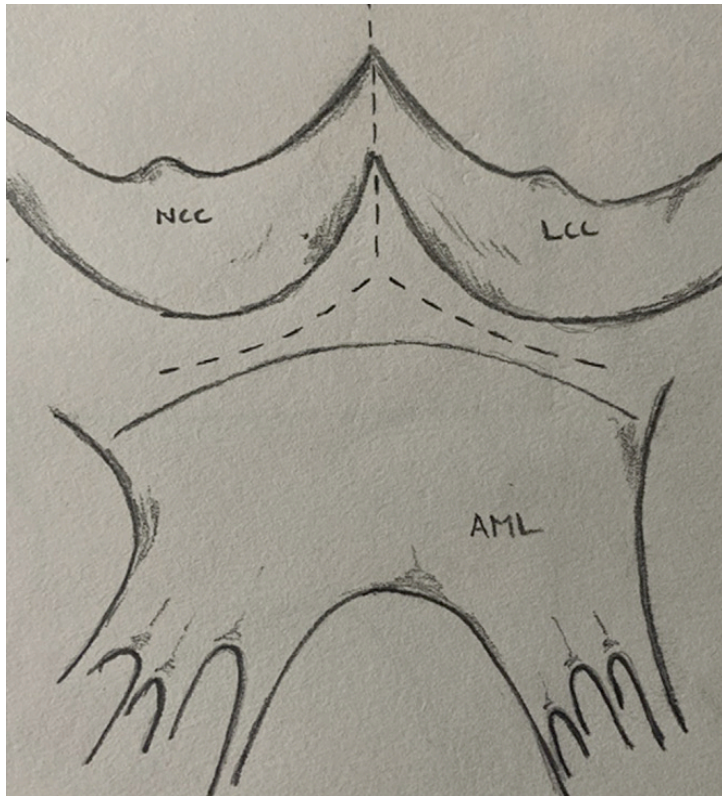
Minimally Invasive Y-Root Enlargement

- J-incision 4th ICS
- Suture pericardium to dermis edge
- Cannulate centrally aortic and venous
- Can peripherally cannulate if desired



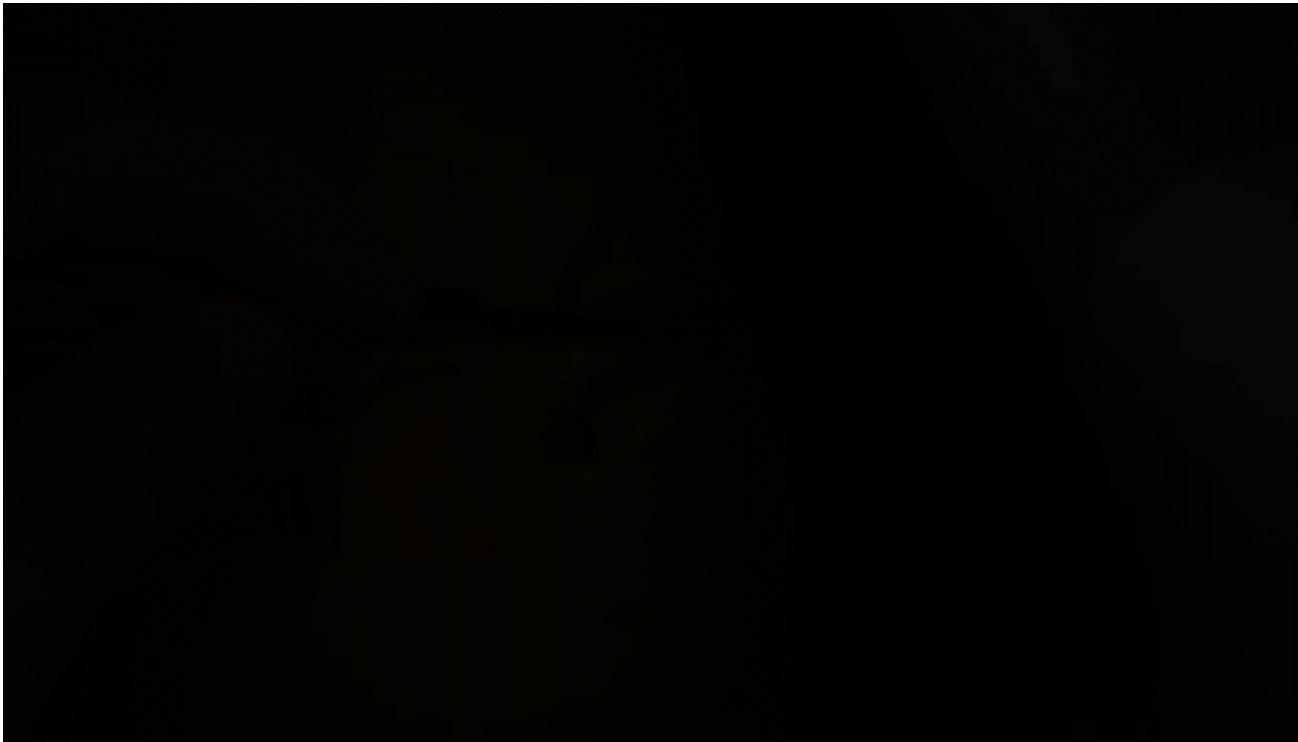
Minimally Invasive Y-Root Enlargement

Y-Technique Root Incision



Minimally Invasive Y-Root Enlargement

Y-Technique Root Incision

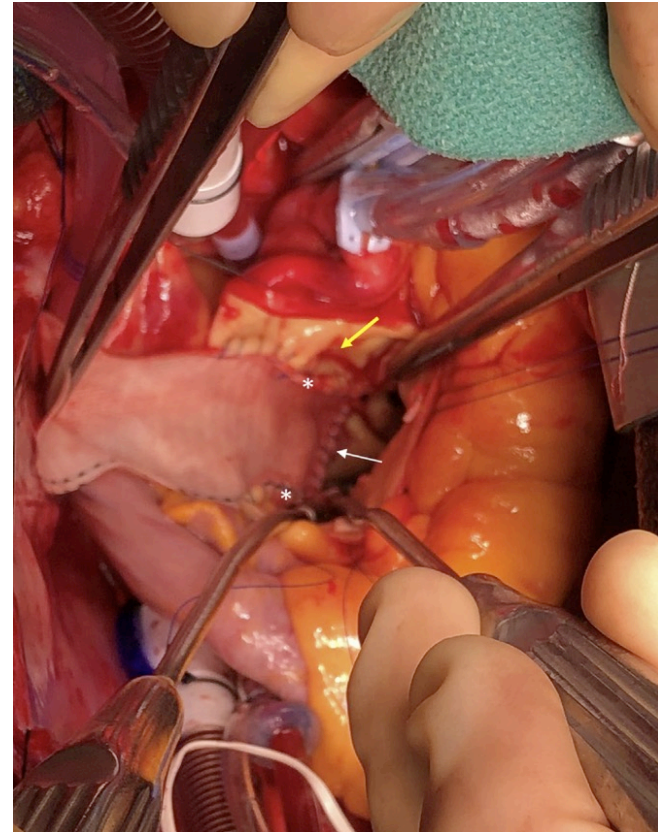
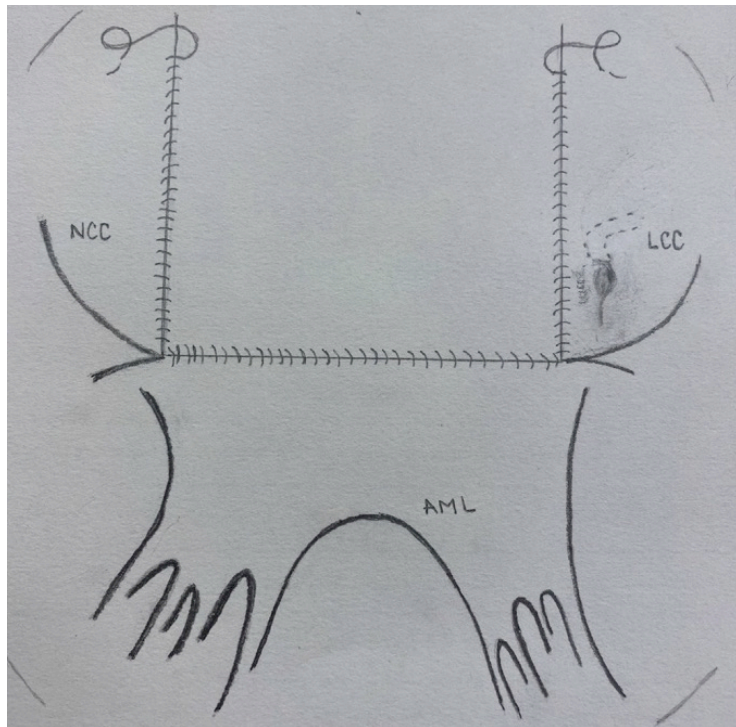


- Transverse aortotomy
 - 1-1.5cm above STJ
 - stop at L-non commissure
- Excise diseased AV
- Dissect tissue free outside non- and L coronary sinus down to nadirs
- Incise L-non commissure to just below non and L coronary annulus
- Y incision
 - Tough fibrous trigones



Minimally Invasive Y-Root Enlargement

Y-Technique Root Patch Sizing and Placement



(Yang JTCVS Techniques 2021;5:13-6)

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Minimally Invasive Y-Root Enlargement

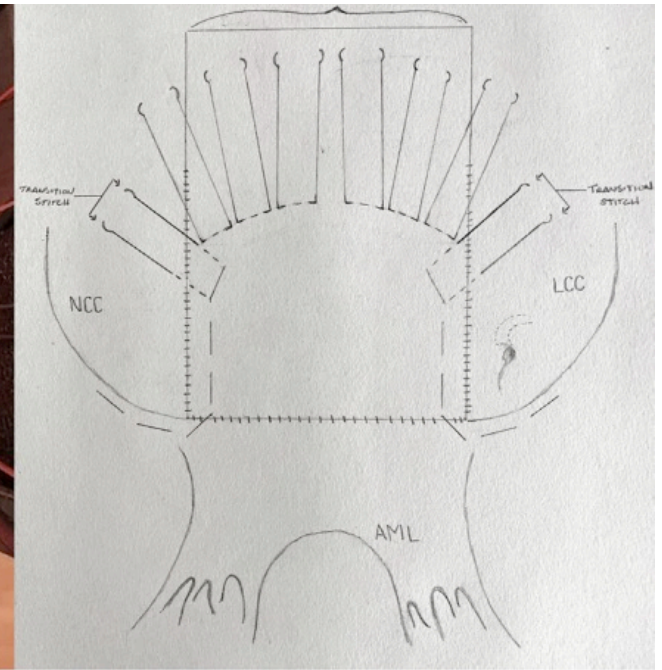
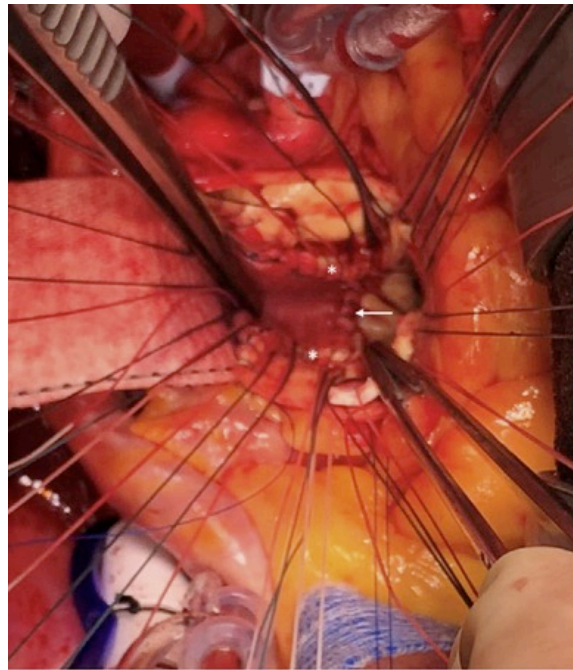
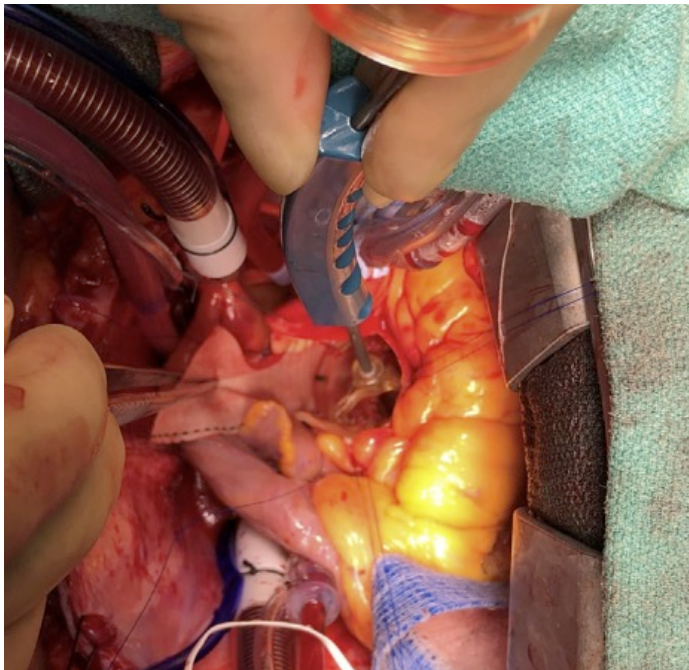
Y-Technique Root Patch Sizing and Placement



- Patch sizing
 - Measure distance btw Y ends
 - Trim rectangular Hemashield Dacron patch slightly larger than measured size: ~3.75cm width
- Sew patch starting at corner of L fibrous trigone to R fibrous trigone using 4-0 prolene.
- Transition each end of 4-0 prolene from trigones longitudinally up patch along divided non- & L- commissure to aortotomy. Secure sutures.

Minimally Invasive Y-Root Enlargement

Y-Technique Root Patch: Valve Sizing and Suture Placement



(Yang JTCVS Techniques 2021;5:13-6)

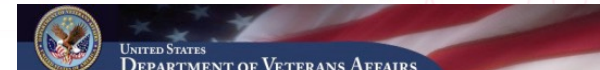
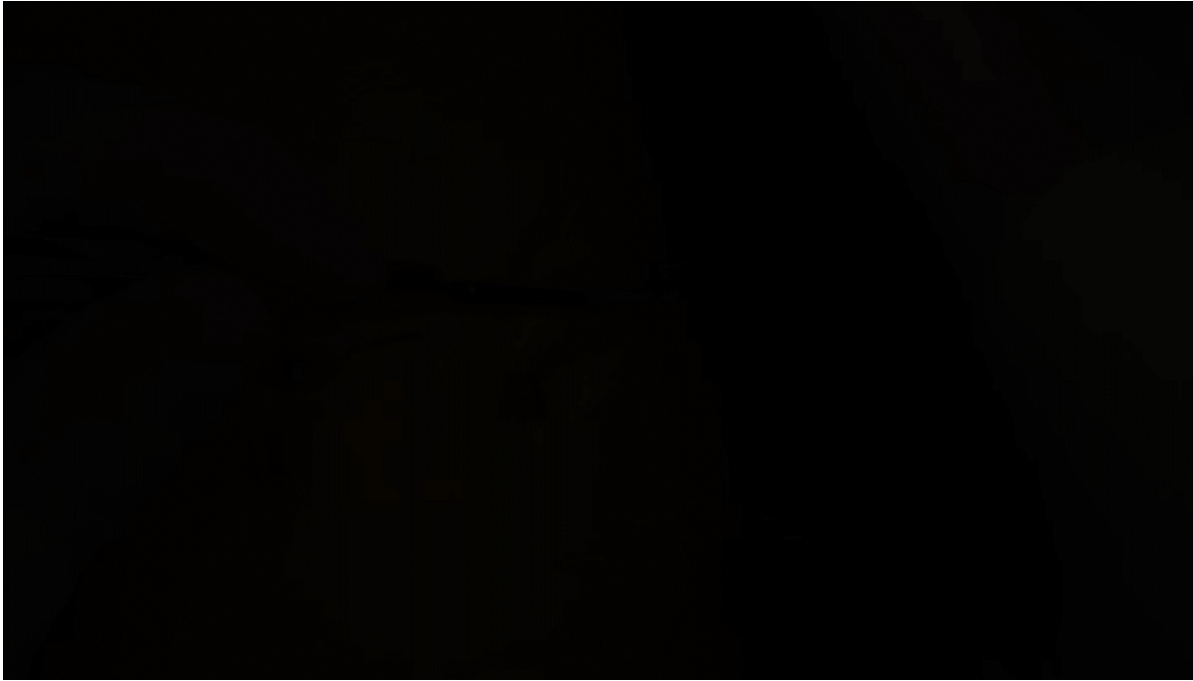
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Minimally Invasive Y-Root Enlargement

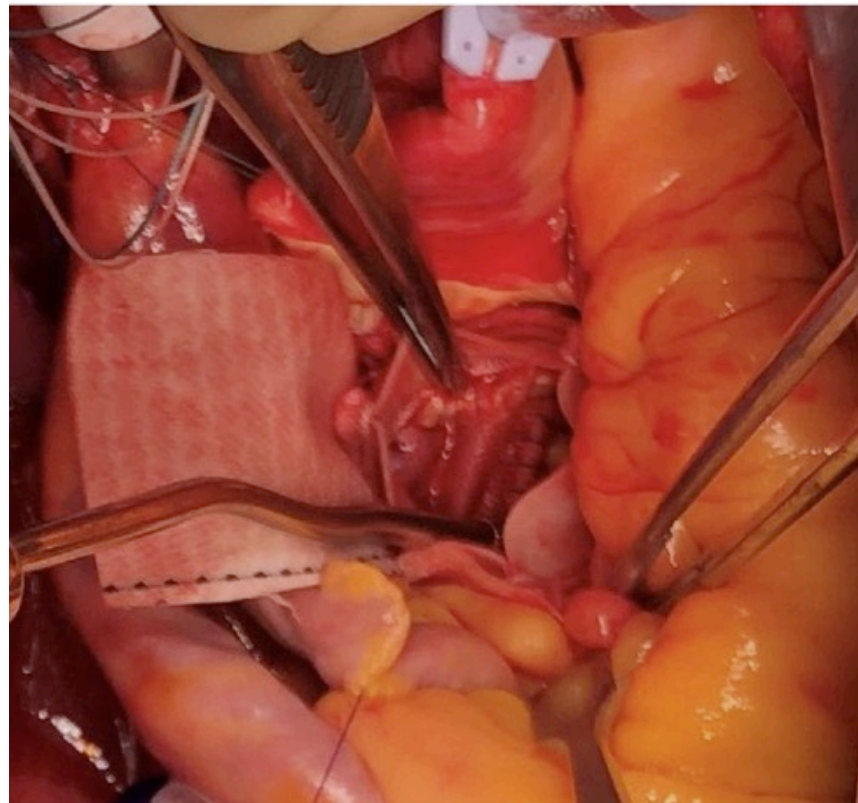
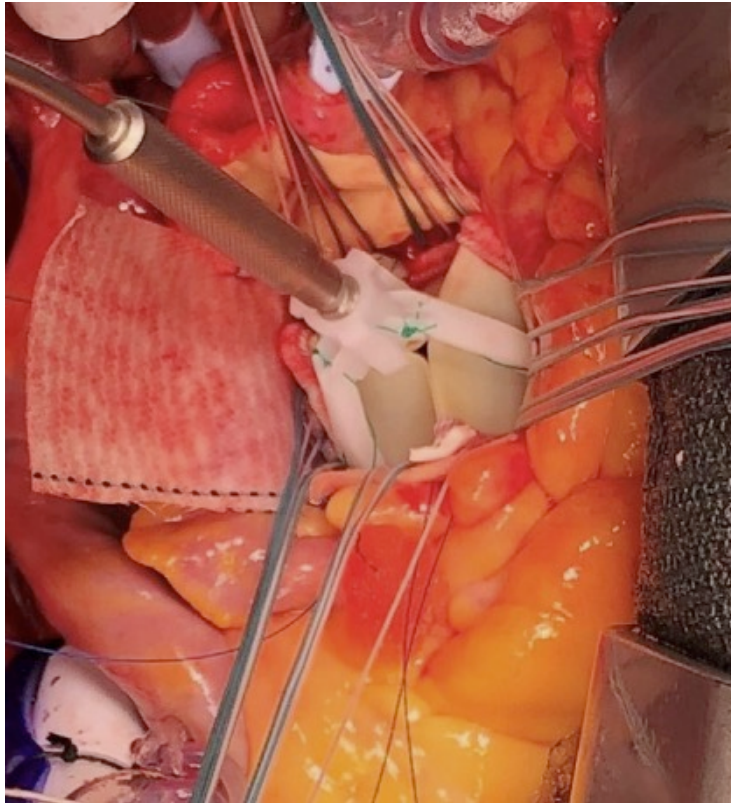
Y-Technique Root Patch: Valve Sizing and Suture Placement

- Valve sizing
 - Upsized valve sizer replica end (27 or 29mm)
 - Commissures match non-R & R-L
 - Sizer at annulus nadirs.
- Mark location of valve sizer on patch to guide suture placement.
- Suture Placement
 - Non-pledgetted 2-0 ETHIBOND sutures (Ethicon) inverting fashion at patch edge on annulus to secure corner.
 - Transition up patch until sutures can be placed single-armed circumferentially along patch marked by sizer.
 - Transition down patch similar fashion.
 - Complete native annulus sutures .



Minimally Invasive Y-Root Enlargement

Y-Technique Root Patch: Valve Placement



(Yang JTCVS Techniques 2021;5:13-6)

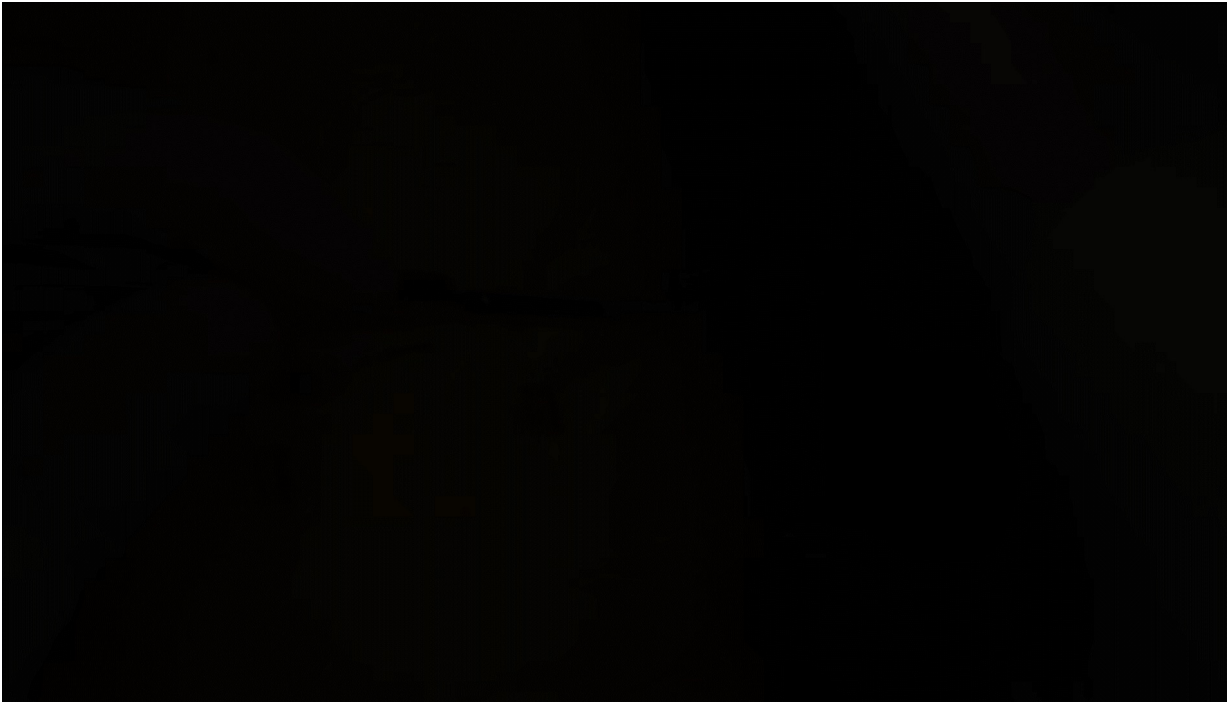
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Minimally Invasive Y-Root Enlargement

Y-Technique Root Patch: Valve Placement



- Valve sutures placed evenly through SAVR ring
- Bioprosthesis struts seated at native non-R / R-L commissures, last on patch
 - Ensure coronaries not obstructed
- Secure valve tying or Cor-Knot at each nadir
 - Continue securing remaining sutures.



Minimally Invasive Y-Root Enlargement

Y-Technique Root Patch: Patch-Aortotomy Closure



- Partial transverse aortotomy intact from L-non to ~R-L commissure
- Patch marked as triangle and cut.
- Aortotomy and patch closure:
 - Place 2 4-0 prolens at each side of patch aortotomy closure and tie.
 - Tie to prior 4-0s from enlargement.
 - Patch and aortotomy are sewn on both sides of triangle until tip where tied.
- At triangle tip, remaining native aortotomy sew with 4-0 prolene from either side of aortotomy in usual fashion.

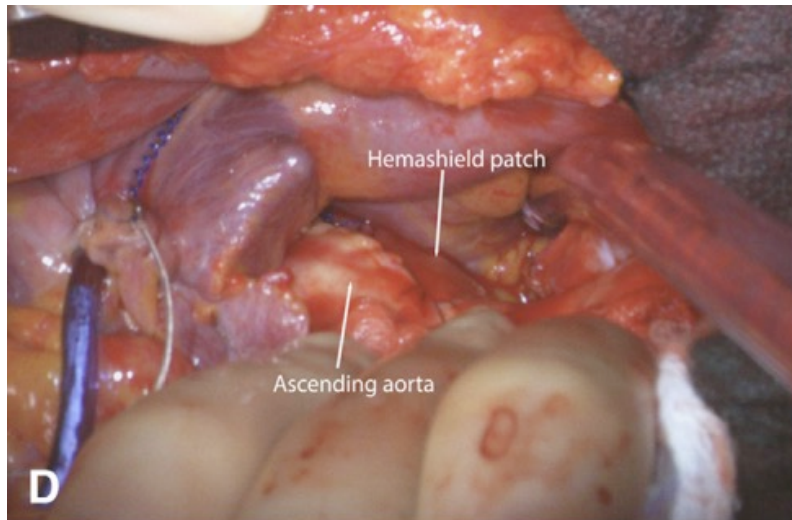


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Minimally Invasive Y-Root Enlargement

Y-Technique Root Enlargement: Final Result



(Yang JTCVS Techniques 2022;12:33-6)

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Clinical Results: Y-Root Enlargement

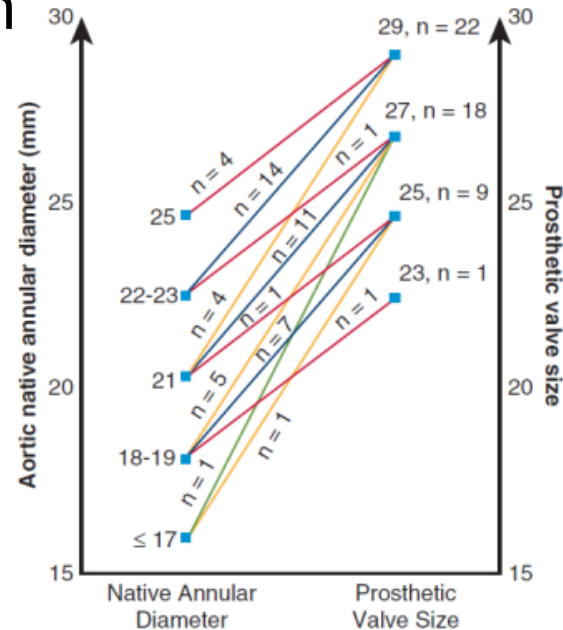
Full Sternotomy: U Michigan

50 patients underwent Y-incision aortic annular enlargement from August 2020 to February 2022

- 44 for severe aortic stenosis
- 3 for severe aortic insufficiency
- 3 for other indications

	Preoperative	Postoperative
AVA (cm ²)	0.9	1.9
AV MG (mmHg)	40	7
LVOT MG (mmHg)	2	2
Root Diameter (mm)	27	40

Operative Mortality: 0%



- Median age 65 (59, 71) yrs. 70% female, 26% previous cardiac surgery, 66% SAVR
- Native annular size 21 (19, 23)mm. After, median prosthesis size 27 (27, 29), 54% 29 or largest sized valve. Median increase 3 (3, 4) valve sizes
- At 1.5 yr f-u, no mortality, CVA, MI, valve thrombosis, PPM, mediastinitis or wound infection, or major bleeding. One endocarditis.



(Yang J Thorac Cardiovasc Surg 2022;:-1-10)



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- Bo Yang, MD: Professor of Surgery, University of Michigan
- Marko Boskovski, MD: Assistant Professor of Surgery, University of California San Francisco and San Francisco VA
- Tom Nguyen, MD: Recent transition from Chief of Cardiothoracic Surgery, University of California San Francisco to Chief Medical Executive Miami Cardiac and Vascular Institute





Thank you



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