Mid-term outcomes of Y incision annular root enlargement compared to traditional root enlargement techniques

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AATS Aortic Symposium
April 25–26, 2024
New York, NY, USA

Disclosures

- The authors have no relevant disclosures.

Background

- **Patient Prosthetic mismatch (PPM)** is defined as "a smaller than expected effective orifice area (EOA) in relation to the patient's body surface area (BSA) resulting in higher transvalvular gradients".[1]

- Higher incidence of PPM in Surgical Aortic Valve Replacement (SAVR) compared to Transcatheter Aortic Valve Replacement (TAVR). [2,3]

- **PPM is associated with**
  - Significant reduction in cardiac index [4]
  - Increased risk of mortality and heart failure rehospitalization after SAVR [5]
  - 2.3x increase in risk of structural valve degradation [6]
- **Prevention of PPM**
  - Valve substitution (sutureless, stentless or supra-annular bioprosthesis etc.)
  - Aortic Root enlargement
  - TAVR

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Surgical Techniques for Aortic Root Enlargement

- Nicks [7]
- Manouguian [7]
- Yang Y-incision [8]

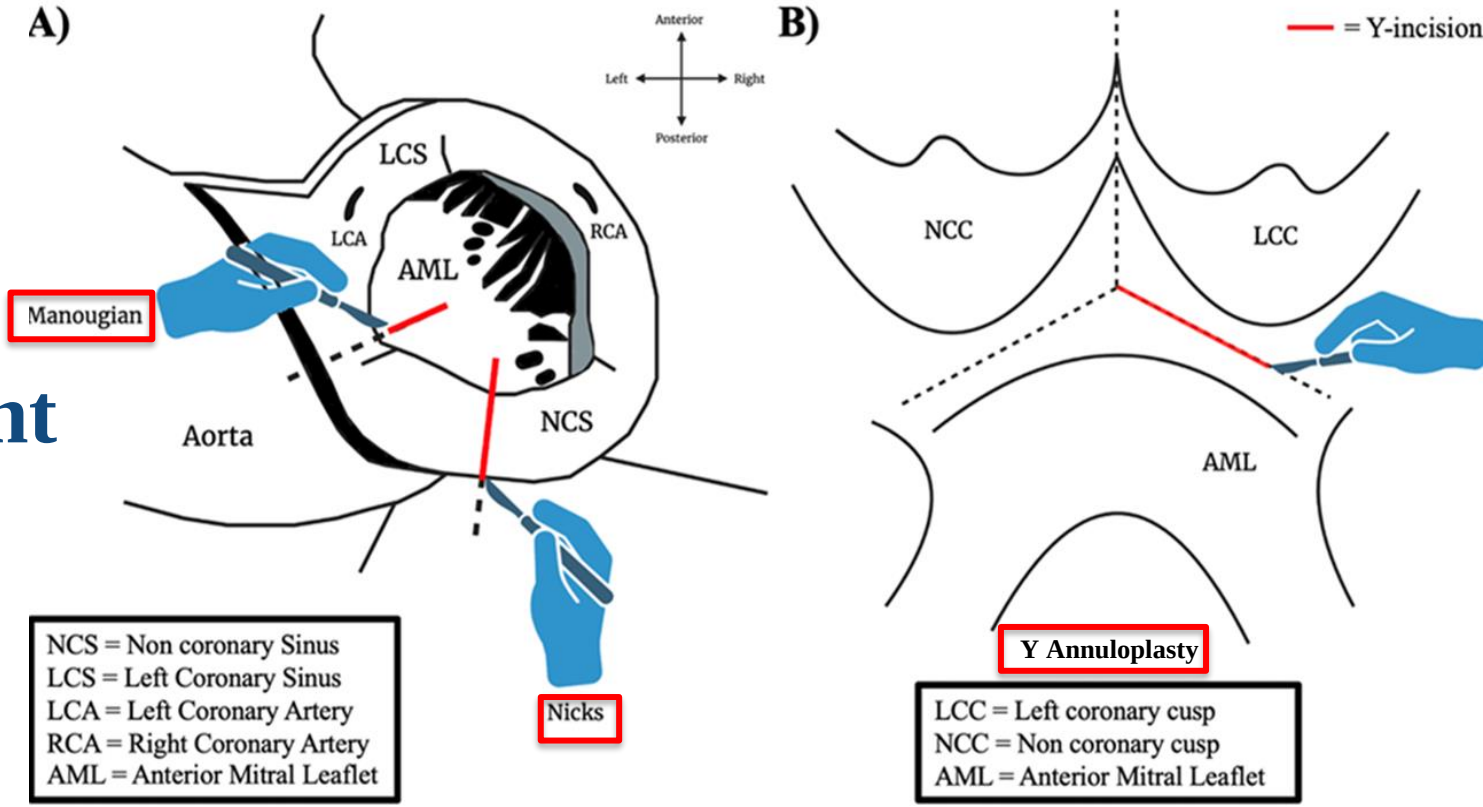

Figure 1

A) Showcases the posterior view of aortic root enlargement through two techniques: Nicks and Manouguian. **B)** Displays a novel aortic root enlargement technique: Y-incision.

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Objectives

- PPM remains a significant problem in SAVR
- The Y-incision root enlargement technique was proposed to enlarge the annulus by 3-4 valve sizes
- We compare our early results using Y- annuloplasty with traditional root enlargement (Nicks or Manouguian).

Methods

- Building institutional database
- Clinical information extracted from chart reviews
- Parameters collected:
  - Surgery type
  - Demographic characteristics
  - Procedural characteristics
  - 30-day & one-year outcomes

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Results

Demographics & comorbidities

	Total N=111	Traditional N=60	Yang N=51	p-value
Age	64.68 (11.82)	64.90 (9.71)	64.43 (14.00)	0.84
Sex				**0.005**
Female	76 (68.47%)	48 (80.00%)	28 (54.90%)	
Male	35 (31.53%)	12 (20.00%)	23 (45.10%)	
Race				0.85
White	93 (83.78%)	49 (81.67%)	44 (86.27%)	
Black/African American	11 (9.91%)	7 (11.67%)	4 (7.84%)	
Asian	4 (3.60%)	2 (3.33%)	2 (3.92%)	
Other	3 (2.70%)	2 (3.34%)	1 (1.96%)	
BMI	30.50 (7.50)	30.75 (8.62)	30.20 (5.98)	0.70
Presence of diabetes	47 (42.34%)	23 (38.33%)	24 (47.06%)	0.35
Presence of prior MI	11 (9.91%)	3 (5.00%)	8 (15.69%)	0.060
Presence of renal failure	4 (%)	2 (%)	2 (%)	0.87
Presence of endocarditis	10 (9.01%)	1 (1.67%)	9 (17.65%)	**0.003**
Previous Cardiac Interventions	41 (40.20%)	15 (28.30%)	26 (53.06%)	**0.011**
Previous SAVR/TAVR				0.55
Aortic valve replacement; surgical	29 (74.36%)	13 (76.47%)	16 (72.73%)	
Aortic valve replacement; transcatheter	6 (15.38%)	2 (11.76%)	4 (18.19%)	
Redo Sternotomy	30 (27.03%)	14 (23.33%)	17 (33.33%)	0.18
Presence of Heart Failure	50 (56.82%)	24 (52.17%)	26 (61.90%)	0.36
NYHA				0.49
Class I	18 (18.56%)	11 (20.75%)	7 (15.91%)	
Class II	34 (35.05%)	19 (35.85%)	15 (34.09%)	
Class III	40 (41.24%)	19 (35.85%)	21 (47.73%)	
Presence of Cardiac Arrhythmia	20 (22.99%)	7 (15.56%)	13 (30.95%)	0.088

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Results

Operative characteristics

	Total N=111	Traditional N=60	Yang N=51	p-value
Incidence of Surgery				0.40
First cardiovascular surgery	77 (70.00%)	45 (75.00%)	32 (64.00%)	
First re-op cardiovascular surgery	26 (26.36%)	13 (21.67%)	16 (32.00%)	
> 1 re-op cardiovascular surgery	4 (3.60%)	2 (3.33%)	2 (4.00%)	
Status				0.47
Elective	82 (73.87%)	46 (76.67%)	36 (70.59%)	
Urgent	29 (26.13%)	14 (23.33%)	15 (29.41%)	
Procedure Category				**0.028**
AVR+CAB	16 (15.53%)	9 (15.79%)	7 (15.22%)	
AVR+MVR	11 (10.68%)	1 (1.75%)	10 (21.74%)	
Isolated AVR	71 (68.93%)	43 (75.44%)	28 (60.87%)	
Cardiopulmonary Bypass Time (min)	153.51 (59.28)	129.51 (48.60)	182.41 (58.48)	**<0.001**
Aortic Cross Clamp Time (min)	118.37 (45.79)	104.71 (40.88)	135.17 (46.32)	**<0.001**
SAVR device type				1.00
Bioprosthetic	83 (77.57%)	45 (77.59%)	38 (77.55%)	
Mechanical	24 (22.43%)	13 (22.41%)	11 (22.45%)	
Bioprosthetic Valve Type				0.47
Stented	81 (96.43%)	44 (97.78%)	37 (94.87%)	
Sutureless/rapid deployment	3 (3.57%)	1 (2.22%)	2 (5.13%)	
Intraoperative Blood Products-Total Units	2.72 (2.88)	2.69 (3.11)	2.75 (2.70)	0.94

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Results

Post- Operative Outcomes

	Total N=111	Traditional N=60	Yang N=51	p-value
Implanted Aortic Valve Size	22.63 (2.04)	21.52 (1.63)	23.94 (1.67)	**<0.001**
Aortic Gradient-Mean	11.64 (5.68)	12.05 (5.18)	11.22 (6.19)	0.23
Effective Orifice Area	1.71 (0.45)	1.60 (0.40)	1.81 (0.49)	**0.05**
Total Postoperative Ventilation Hours	53.37 (172.27)	36.83 (121.30)	65.08 (201.39)	0.50
30-day Readmission to ICU	5 (5.75%)	3 (6.67%)	2 (4.76%)	0.70
30-day In Hospital Post-Op Events	61 (59.80%)	35 (61.40%)	26 (57.78%)	0.71
30-day Post-Op Bleeding/Tamponade	5 (8.33%)	2 (5.88%)	3 (11.54%)	0.43
30-day Post-Op Prolonged Ventilation	18 (29.51%)	8 (22.86%)	10 (38.46%)	0.19
30-day Post-Op Pleural Effusion	18 (29.51%)	9 (25.71%)	9 (34.62%)	0.45
30-day Post-Op AKI/ Renal Failure	12 (20.00%)	6 (17.65%)	6 (23.08%)	0.60
Mortality at 30 days post-op	4 (3.6%)	1 (1.7%)	3 (6.00%)	0.50
Cardiac specific mortality at one-year post-op	6 (5.4%)	2 (3.33%)	4 (7.8%)	0.09
One-year cardiac readmission	23 (22.55%)	11 (20.75%)	12 (24.49%)	0.65
Total Procedure Time (Hours)	5.94 (2.00)	5.39 (1.65)	6.33 (2.15)	0.051
Surgery to Discharge LOS (Days)	12.43 (9.64)	10.65 (7.27)	14.56 (11.59)	**0.033**
Total ICU Hours	150.84 (182.15)	127.26 (172.80)	175.54 (190.39)	0.22
Major Morbidity or Mortality	20 (22.99%)	10 (22.22%)	10 (23.81%)	0.86

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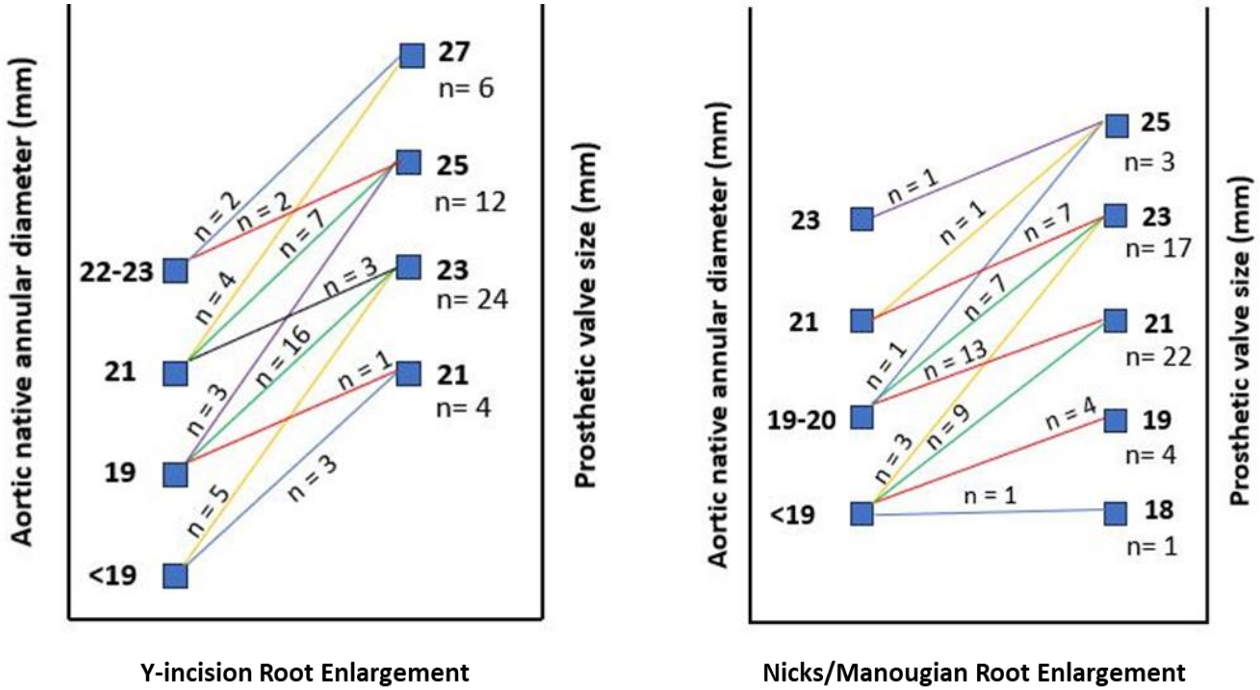
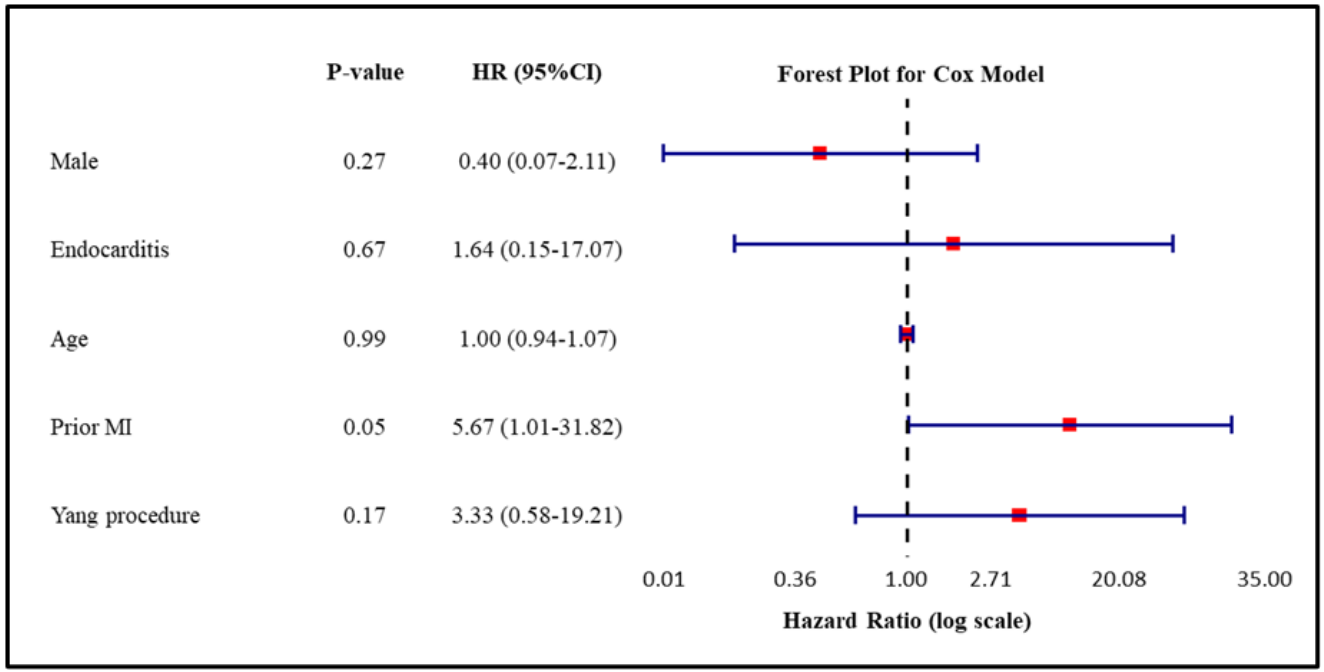
Results



Demonstration of increase in native aortic annulus diameter versus prosthesis size after Y-incision annular enlargement and Nicks/Manouguian procedures.

Results

- **Multivariable analysis**



Multivariable analysis, adjusting for age, gender, endocarditis, and prior MI, showed no significant difference in mortality hazards at 30 days (p:0.14) and one year (p:0.26) between the two procedures.

Demonstration of forest plot for hazard ratios in the Cox model.

Conclusions

- Our experience with 51 patients undergoing Y root enlargement shows similar perioperative outcomes after adjusting for comorbidities compared to traditional root enlargement techniques.
- The Y enlargement cohort was associated with a longer operative time and a more significant increase in aortic valve size.
- Further investigations are warranted to validate these early results and assess long-term effects.
- Y-incision more frequently in endocarditis and required multi-valve operations.

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