

주최·주관 대한심장혈관흉부외과학회

2024 대한심장혈관흉부외과학회

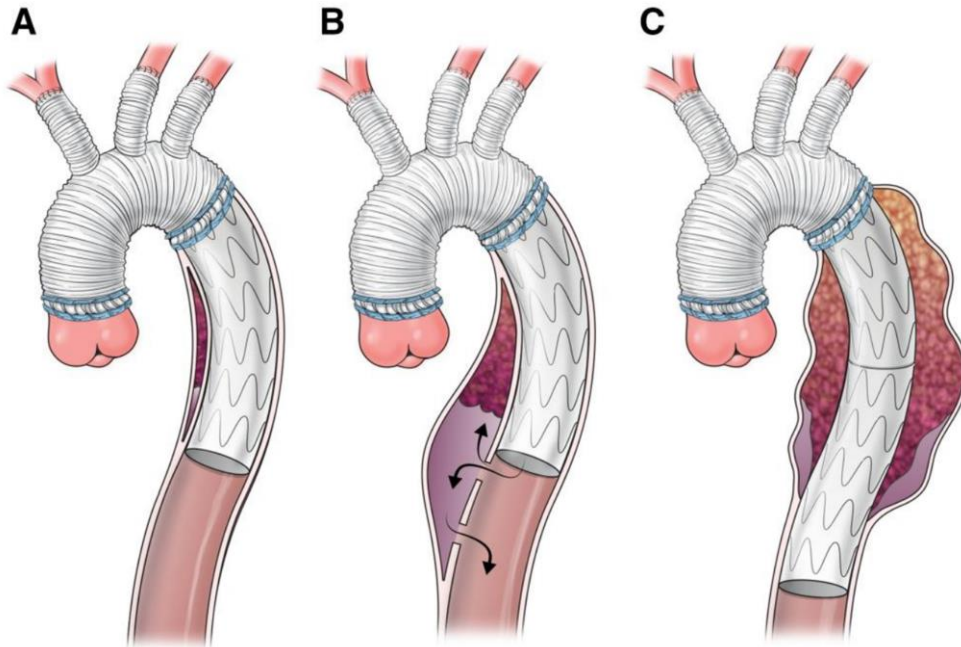
제56차 추계학술대회

2024. 10. 31 (Thu) - 11. 01 (Fri) 여수 엑스포 컨벤션센터



Early outcomes of Total Arch Replacement and Frozen Elephant Trunk technique using next generation device

- Extensive aortic pathology is difficult to treat.
- TARFET can 1) treat extensive aortic pathologies in a single stage operation, 2) pursue tear-oriented surgery, 3) manage malperfusion syndrome & 4) promote aortic remodeling
- TARFET devices are developing for mitigating complications and for patient-tailored treatment.
- To evaluate early outcomes of total arch replacement and frozen elephant trunk (TARFET) technique in extensive aortic pathologies using next generation TARFET device (E-vita OPEN NEO™, Artivion Inc.).



A. Acute Aortic Dissection (AAD) group

- Acute Type A aortic dissection/intramural hematoma
 - ✓ With malperfusion
 - ✓ With entry tear in distal arch or proximal DTA
 - ✓ With PAU in proximal DTA
- Acute Type B aortic dissection/intramural hematoma
 - ✓ Non-A non-B
 - ✓ Complicated type B when TEVAR is not feasible

B. Chronic Aortic Dissection (CAD) group

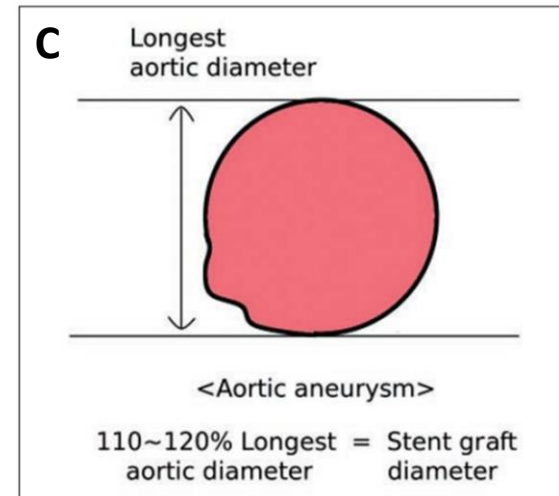
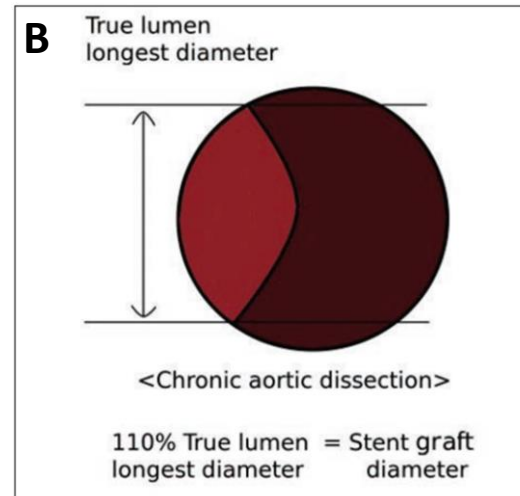
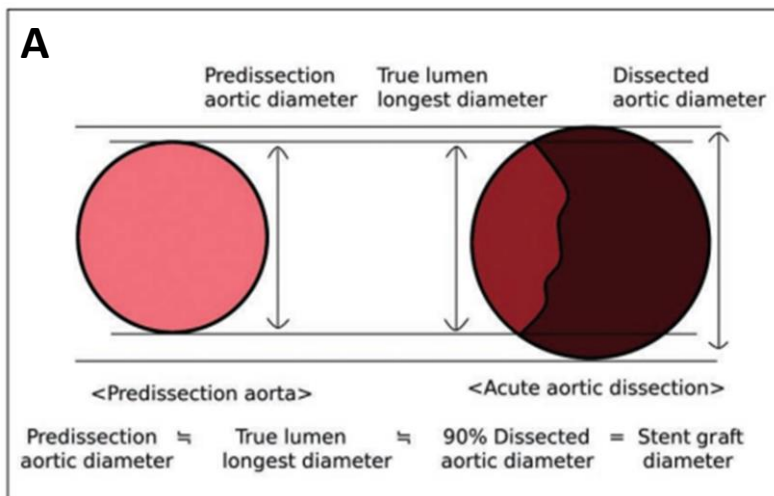
- Chronic Type B aortic dissection
 - ✓ With aneurysm
 - ✓ With entry tear in distal arch or proximal DTA
 - ✓ With PAU in proximal DTA

C. Thoracic Aortic Aneurysm (TAA) group

- At arch
- At proximal DTA

Indications of TARFET

- Between April 2021 and June 2024
- Total 250 patients were operated using TARFET device
- Sizing of stent-graft
 - ✓ Acute aortic dissection (AAD, n=137) : 90% of dissected aortic diameter
 - ✓ Chronic aortic dissection (CAD, n=24) : 110% of true lumen longest diameter
 - ✓ Thoracic aortic aneurysm (TAA, n=89) : 110~120% of longest aortic diameter
- Primary end point: freedom from aorta-related mortality
- Secondary end point: stroke, paraplegia, reoperation for bleeding, distal SINE



Sizing of stent-graft

- A: sizing at AAD
- B: sizing at CAD
- C: sizing at TAA

1. Preoperative characteristics

Variable	AAD N=137	CAD N=24	TAA N=89	Total N=250	P-value
Sex, Male	105 (76.6%)	19 (79.2%)	67 (75.3%)	191 (76.4%)	0.919
Age	60.0 [50.0;69.0]	65.0 [48.5;74.5]	74.0 [66.0;80.0]	66.0 [55.0;75.0]	< 0.001
BMI	25.3 [23.6;27.4]	25.9 [22.8;30.0]	24.4 [22.1;26.7]	25.1 [22.7;27.2]	0.018
Hypertension	82 (59.9%)	23 (95.8%)	76 (85.4%)	181 (72.4%)	< 0.001
Coronary artery disease	6 (4.4%)	2 (8.3%)	16 (18.0%)	24 (9.6%)	0.003
COPD	1 (0.7%)	1 (4.2%)	11 (12.4%)	13 (5.2%)	< 0.001
Chronic kidney disease	9 (6.6%)	4 (16.7%)	11 (12.4%)	24 (9.6%)	0.128
Dialysis	1 (0.7%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	1
Stroke	3 (2.2%)	2 (8.3%)	13 (14.6%)	18 (7.2%)	0.002

AAD, acute aortic dissection; CAD, chronic aortic dissection; TAA, thoracic aortic aneurysm; COPD, chronic obstructive pulmonary disease

3. Postoperative outcomes

Variable	AAD N=137	CAD N=24	TAA N=89	Total N=250	P-value
In-hospital mortality	1 (0.7%)	0 (0.0%)	2 (2.2%)	3 (1.2%)	0.678
30 day mortality	2 (1.5%)	0 (0.0%)	1 (1.1%)	3 (1.2%)	1
Bleeding control op.	5 (3.6%)	0 (0.0%)	2 (2.2%)	7 (2.8%)	0.857
Hospital stay, day	17.6 ± 16.8	15.1 ± 7.1	17.4 ± 10.8	17.3 ± 14.2	0.725
ICU stay, dat	5.4 ± 12.1	3.5 ± 3.6	4.5 ± 6.7	4.9 ± 9.9	0.613
Complications					
CRRT/Dialysis	2 (1.5%)	1 (4.2%)	4 (4.5%)	7 (2.8%)	0.274
Bowel ischemia	2 (1.5%)	1 (4.2%)	1 (1.1%)	4 (1.6%)	0.536
Limb ischemia	1 (0.7%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	1
Neurology deficit	5 (3.6%)	0 (0.0%)	4 (4.5%)	9 (3.6%)	0.785
Permanent paraplegia	1 (0.7%)	0 (0.0%)	1 (1.1%)	2 (0.8%)	1
Transient paraplegia	1 (0.7%)	0 (0.0%)	1 (1.1%)	2 (0.8%)	1
Pneumonia	4 (2.9%)	0 (0.0%)	3 (3.4%)	7 (2.8%)	1
Sepsis	2 (1.5%)	1 (4.2%)	2 (2.2%)	5 (2.0%)	0.38
Stroke	8 (5.8%)	1 (4.2%)	3 (3.4%)	12 (4.8%)	0.819
Tracheostomy	1 (0.7%)	0 (0.0%)	2 (2.2%)	3 (1.2%)	0.678

2. Operative details

Variable	AAD N=137	CAD N=24	TAA N=89	Total N=250	P-value
CPB time, min	140.0 [116.0;163.0]	122.0 [108.5;141.5]	119.0 [105.0;136.0]	132.5 [110.0;154.0]	< 0.001
ACC time, min	112.0 [70.0;130.0]	85.0 [45.5;102.0]	88.0 [44.0;105.0]	95.5 [50.0;121.0]	< 0.001
LBCA time, min	52.0 [44.0;61.0]	47.5 [44.0;51.5]	44.0 [40.0;51.0]	48.0 [42.0;57.0]	< 0.001
Distal anastomosis					0.009
Zone 1	2 (1.5%)	2 (8.3%)	9 (10.1%)	13 (5.2%)	
Zone 2	118 (86.1%)	17 (70.8%)	70 (78.7%)	205 (82.0%)	
Zone 3	17 (12.4%)	5 (20.8%)	8 (9.0%)	30 (12.0%)	
Zone 4	0 (0.0%)	0 (0.0%)	2 (2.2%)	2 (0.8%)	
Distal landing of FET					< 0.001
Above T8	132 (96.4%)	20 (83.3%)	67 (75.3%)	219 (87.6%)	
Below T8	5 (3.6%)	4 (16.7%)	22 (24.7%)	31 (12.4%)	
Guide wire usage	4 (2.9%)	3 (12.5%)	6 (6.7%)	13 (5.2%)	0.078
CSF drainage	1 (0.7%)	0 (0.0%)	1 (1.1%)	2 (0.8%)	1
Concomitant operation					
VSARR	3 (2.2%)	0 (0.0%)	1 (1.1%)	4 (1.6%)	1
Bentall	1 (0.7%)	0 (0.0%)	2 (2.2%)	3 (1.2%)	0.678
TEVAR					0.01
Antegrade TEVAR	1 (0.7%)	0 (0.0%)	1 (1.1%)	2 (0.8%)	
Retrograde TEVAR	4 (2.9%)	0 (0.0%)	12 (13.5%)	16 (6.4%)	
Configuration of TARFET					
C2 type	132 (96.4%)	22 (91.7%)	58 (65.2%)	212 (84.8%)	
C3 type	5 (3.6%)	2 (8.3%)	31 (34.8%)	38 (15.2%)	
Stent-graft length					< 0.001
120mm	126 (92.0%)	15 (62.5%)	25 (28.1%)	166 (66.4%)	
130mm	5 (3.6%)	4 (16.7%)	31 (34.8%)	40 (16.0%)	
175mm	0 (0.0%)	2 (8.3%)	0 (0.0%)	2 (0.8%)	
180mm	6 (4.4%)	3 (12.5%)	33 (37.1%)	42 (16.8%)	

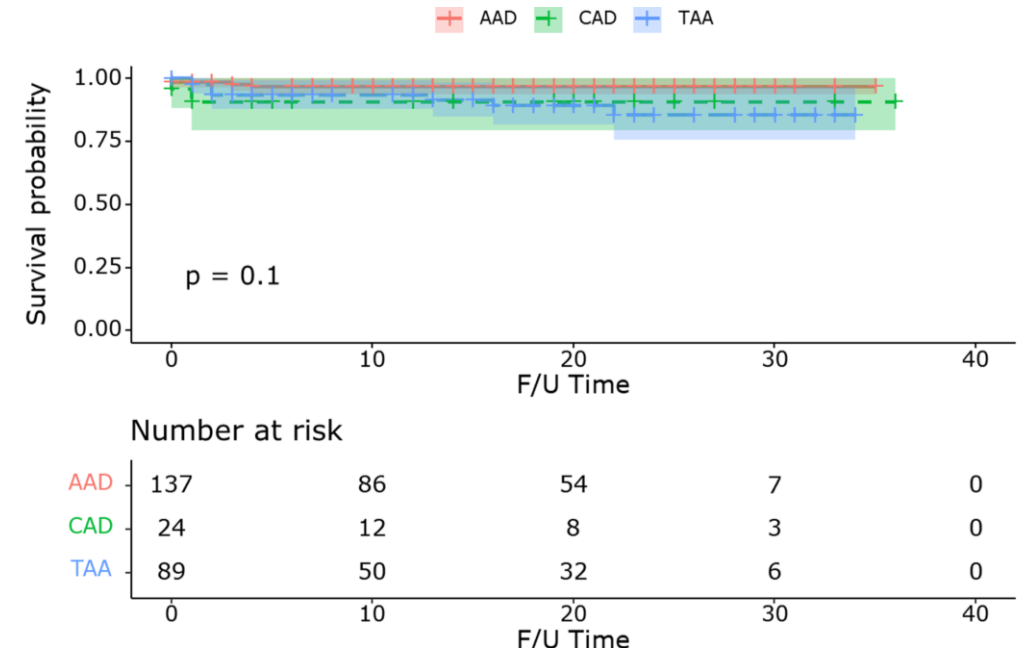
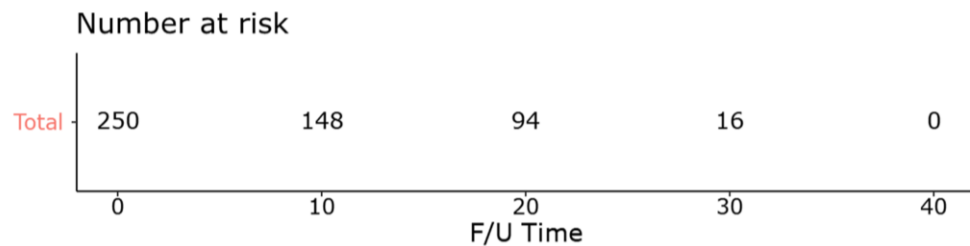
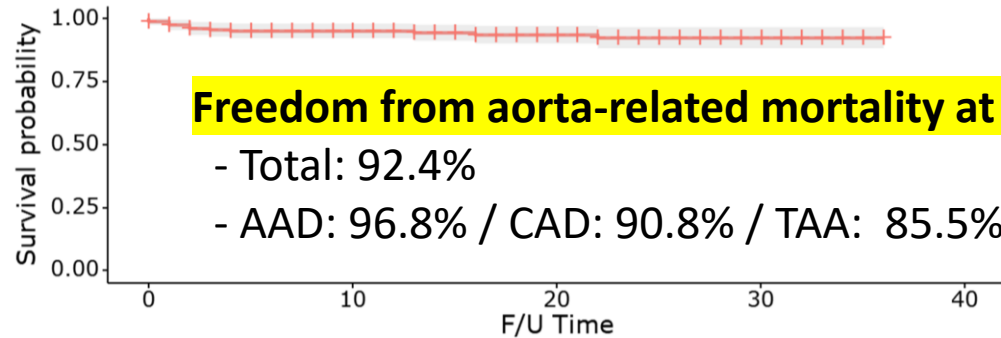
CPB, cardiopulmonary bypass; ACC, aortic cross clamp; LBCA, lower body circulatory arrest; CSF, cerebrospinal fluid; VSARR, valve sparing aortic root reimplantation;

4. Follow-up outcomes

Variable	AAD N=137	CAD N=24	TAA N=89	Total N=250	P-value
Follow-up duration, month	14.7 ± 10.0	12.8 ± 12.3	13.5 ± 10.7	14.1 ± 10.4	0.583
Aorta related mortality	4 (2.9%)	2 (8.3%)	8 (9.0%)	14 (5.6%)	0.098
All cause mortality	9 (6.6%)	2 (8.3%)	10 (11.2%)	21 (8.4%)	0.457
All aortic procedure	13 (9.5%)	4 (16.7%)	12 (13.5%)	29 (11.6%)	0.424
Reasons for intervention					
Distal SINE	2 (1.5%)	1 (4.2%)	0 (0.0%)	3 (1.2%)	0.193
Endoleak type Ib	7 (5.1%)	0 (0.0%)	8 (9.0%)	15 (6.0%)	0.237
Endoleak retrograde	0 (0.0%)	3 (12.5%)	0 (0.0%)	3 (1.2%)	0.001
Other	1 (0.7%)	0 (0.0%)	4 (4.5%)	5 (2.0%)	0.13

SINE, stent graft-induce new entry tear

— Total



- TARFET using the next generation device is a feasible and versatile approach for patients with extensive aortic pathology.
- Appropriate sizing strategy in different diagnosis is important to prevent distal SINE.
- TARFET using the next generation device can lead to favorable outcomes