



EARLY RESULT OF TOTAL AORTIC ARCH REPLACEMENT IN ACUTE TYPE A AORTIC DISSECTION IN HANOI HEART HOSPITAL

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Content

1. When to replace Aortic Arch in Acute type A aortic dissection (AAAD) ?
2. Total aortic arch replacement (TAAR) and non-total arch replacement (NTAAR) in AAAD.
3. Surgery protocol of TAAR in AAAD in Hanoi Heart Hospital.
4. Early result of total aortic arch replacement in AAAD in Hanoi Heart Hospital.





Acute type A aortic dissection (AAAD)

Nontotal aortic arch replacement (NTAAR)

- Standard emergency surgery
- Resection primary entry tear
- Early outcome

Total aortic arch replacement (TAAR)/ Elephant trunk (ET)

- Dilatation of the aortic arch, retrograde dissection
- False lumen thrombosis
- Cheaper, 2nd procedure

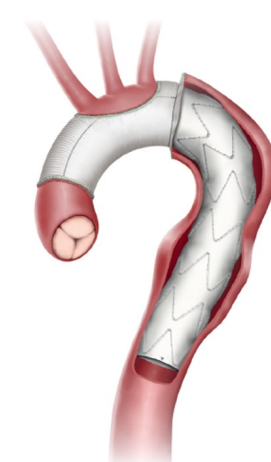
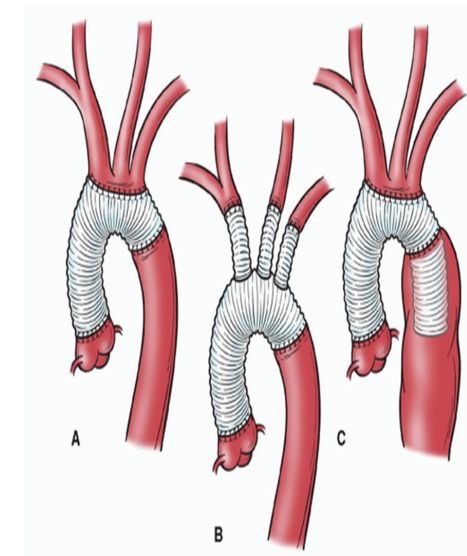
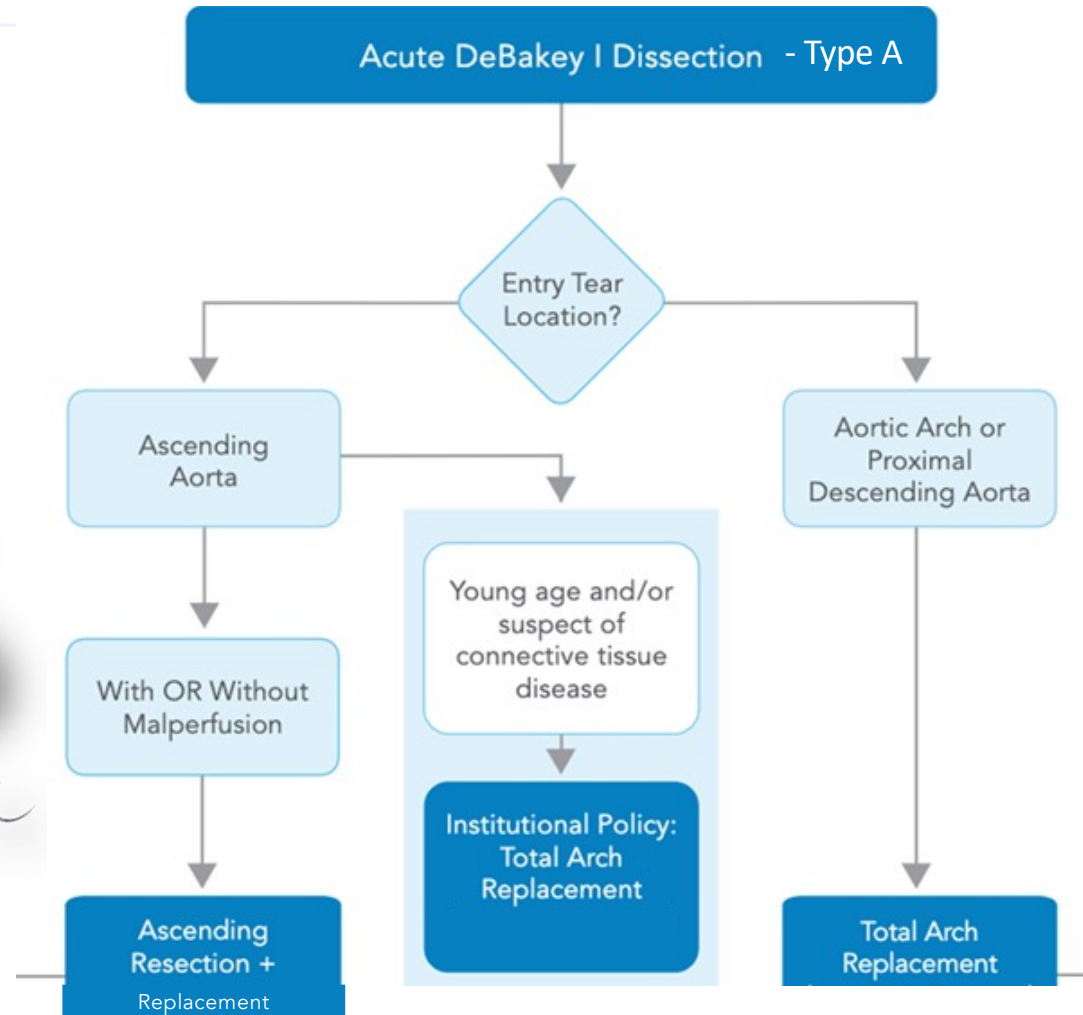
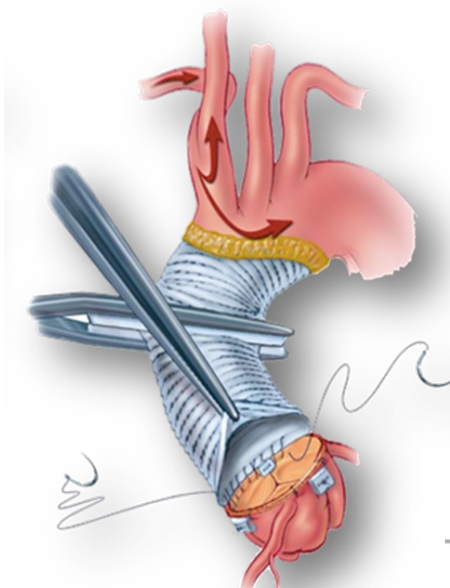
Frozen Elephant Trunk (FET)

- One stage
- Extension dissection
- Reduce complication, improve long-term outcome



TAAR

- Entry tear?
- Arch dilatation?



The current standard of care is to remove and replace the affected aorta, which is very complex. In 2019, 8448 cases received total arch replacement (TAR) with FET in China. Sun L.Z., Pangu Aortic Forum 2021. 927-934.

Is total arch replacement associated with an increased risk after acute type A dissection?

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Methods: In this retrospective observational study, we analysed a total patient cohort of 339 patients who underwent surgery for AADA from January 2001 until December 2016. A propensity score-matched analysis between the AAR- and the TAAR-group with 43 patients for each subgroup was subsequently carried out. A multivariable analysis was performed to identify risk-factors for the 30-d-mortality. The 30-day mortality was defined as the primary end-point and long-term survival was the secondary endpoint.

Results: In 292 (86.1%) patients AAR and in 47 (13.9%) patients TAAR was performed for emergent AADA. Patients were older ($P=0.049$) in the AAR group. The median log Euro-SCORE was 25.5 % (12.7; 41.7) for AAR and 19.7% (11.7; 32.2) for the TAAR patient cohort ($P=0.12$). Operative time cardiopulmonary bypass- (CPB), cross-clamp- and ischemic time were significantly longer in the TAAR group ($P<0.001$). The overall 30-day mortality-rate was 17.7% ($n=60$) but was not significantly different between the two groups ($P=0.27$). Forty-nine (16.8%) patients died in the AAR and 11 patients (23.4%) in the TAAR group. After propensity-score matching, no difference in mortality was seen between the subgroups as well ($P=0.44$). Multivariable analysis identified the Euro-SCORE, long operation-time postoperative dialysis and arrhythmia and administration of red blood cell concentrates as risk factors for 30-day mortality, but not for TAAR versus AAR.

NTAAR vs TAAR

Comparison of the outcomes between total arch replacement and nontotal arch replacement in patients with acute type A aortic dissection

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Abstract

Objective To compare the outcomes between total arch replacement (TAR) and nontotal arch replacement (non-TAR) in patients with acute type A aortic dissection (ATAAD).

Methods Between 2006 and 2018, 275 ATAAD patients were divided into 2 groups, the TAR group ($n=63$) and the non-TAR group ($n=212$), and multiple variables were analyzed.

Results The TAR patients were older than the non-TAR patients (61.5 ± 11.8 vs. 57.4 ± 14.5 years, $p=0.024$). The TAR group had longer operative, cardiopulmonary bypass, aortic clamping, and circulatory arrest times than the non-TAR group (all $p < 0.001$). The overall hospital mortality rate was 8.7% with no statistically significant difference between the TAR and non-TAR groups (9.5% vs. 8.5%, $p=0.799$). There was no significant difference in the incidence of acute kidney injury (AKI), intubation time, incidence of postoperative atrial fibrillation (AF), or reoperation for bleeding or reintervention rates between the TAR and non-TAR groups (68.3% vs. 65.7% ($p=0.912$), 44.8% vs. 33.8% ($p=0.127$), 30.2% vs. 22.6% ($p=0.222$), 9.5% vs. 9.5% ($p=0.189$), and 7.9% vs. 7.1% ($p=0.077$), respectively). The TAR group had a higher rate of new permanent neurological deficit (PND) than the non-TAR group and longer median length of hospital stay (17.5% vs. 6.1% ($p < 0.001$) and 9 vs. 12 days ($p=0.049$), respectively). TAR (relative risk (RR) 3.66, $p=0.005$) and preoperative cardiopulmonary resuscitation (CPR) (RR 6.60, $p=0.019$) were risk factors of PND. Survival rate was similar between the two groups.

Conclusion The mortality rates in ATAAD patients with TAR and non-TAR were similar. However, the incidence of new permanent postoperative neurological deficit was significantly higher, and the length of hospital stay was longer in patients with TAR. TAR in ATAAD should be avoided especially in patients who have experienced preoperative CPR to abate risk of PND.



Outcomes of hemi- vs. total arch replacement in acute type A aortic dissection: A systematic review and meta-analysis

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Background: Acute type A aortic dissections (ATAAD) pose a challenge to surgeons due to high mortality, and decision making regarding the appropriate procedure is controversial. This study compared the outcomes of hemiarch and total arch replacement for ATAAD.

Methods: The PubMed, Web of Science, Embase and Cochrane databases were searched for comparative studies on hemiarch versus total arch replacement that were published before May 1, 2022.

Results: We included 23 observational studies with a total of 4,576 patients. Combined data analysis showed that early mortality (RR = 0.82; 95% CI: 0.70–0.97; $P = 0.02$), incidence of postoperative permanent neurological dysfunction (RR = 0.72; 95%CI:0.54~0.94; $P = 0.02$), and incidence of renal failure and dialysis (RR = 0.82; 95%CI:0.71~0.96; $P = 0.01$) were all lower for hemiarch than for total arch replacement. However, hemiarch replacement had a higher rate of late mortality (RR = 1.37; 95%CI:1.10~1.71; $P = 0.005$). There were no statistically significant differences between the two groups in terms of re-operation for bleeding, aortic re-operation, or postoperative pneumonia.

Hemiarch versus total aortic arch replacement in acute type A dissection: a systematic review and meta-analysis

Shi Sum Poon, Thomas Theologou, Deborah Harrington, Manoj Kuduvali, Aung Oo, Mark Field

Result: Fourteen retrospective studies met the inclusion criteria and 2,221 patients were included in the final analysis. Pooled analysis showed that hemiarch replacement was associated with a lower risk of post-operative renal dialysis [risk ratio (RR) =0.72; 95% confidence interval (CI): 0.56–0.94; $P=0.02$; $I^2=0\%$]. There was no significant difference in terms of in-hospital mortality between the two groups (RR =0.84; 95% CI: 0.65–1.09; $P=0.20$; $I^2=0\%$). Cardiopulmonary bypass, aortic cross clamp and circulatory arrest times were significantly longer in total arch replacement. During follow up, no significant difference was reported from current studies between the two operative approaches in terms of aortic re-intervention and freedom from aortic reoperation.

European Review for Medical and Pharmacological Sciences

2019; 23: 9590-9611

Ascending aorta replacement vs. total aortic arch replacement in the treatment of acute type A dissection: a meta-analysis

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RESULTS: A total of 15 cohort studies (n = 2822 patients with ATAAD; AR with HA, partial arch = 1911, TR = 911) were deemed eligible and included in the meta-analysis. Compared with TR, AR led to a significantly lower risk of in-hospital mortality (RR = 0.77; 95% CI: 0.61-0.96), shorter cardiopulmonary bypass time (CPB, mean difference = -53.09; 95% CI: -56.68--49.50), circulatory arrest time (CA, mean difference = -8.09; 95% CI: -9.04-7.15), and antegrade cerebral perfusion (ACP, mean difference = -28.62; 95% CI: -30.23--27.00). Differences in the incidence rates of neurological dysfunctions and renal dialysis were not significant. The pooled rate of aortic re-operation was lower in TR group (AR 7.6% vs. TR 5.3%), albeit not significantly (risk ratio = 1.39; 95% CI: 0.94-2.07; $p = 0.10$).





Is extended arch replacement justified for acute type A aortic dissection?

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Abstract

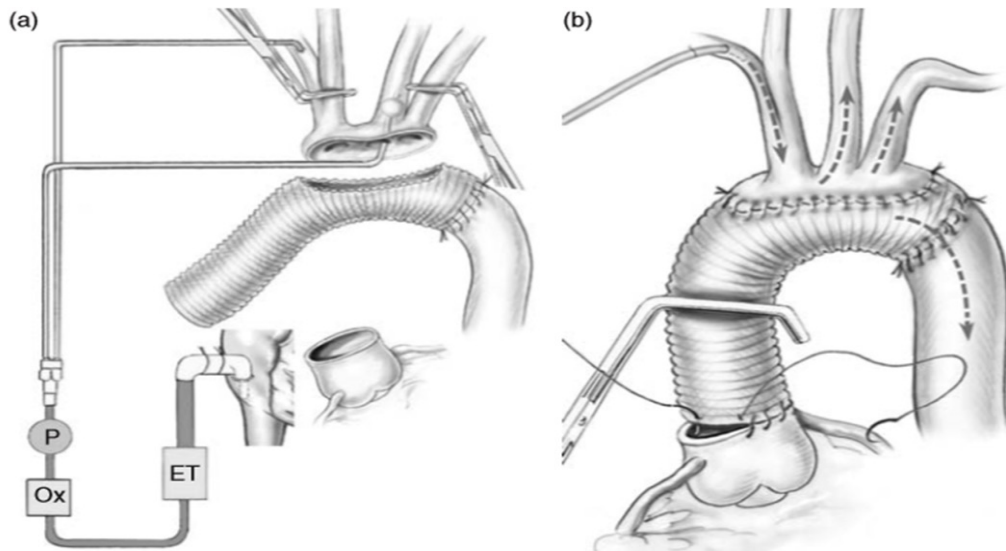
A best evidence topic in cardiac surgery was written according to a structured protocol. The question addressed is whether patients with acute type A aortic dissection have a better outcome after total arch replacement. Altogether, **138 papers** were found using the reported search, of which **8 represented** the best evidence to answer the clinical question. The authors, journal, date and country they are from, patient group studied, study type, relevant outcomes and results of these papers are tabulated. All studies are retrospective. **Five representative** studies reported that total arch replacement could be performed **safely without increasing** operative mortality and morbidity compared with hemiarch replacement, but with an overall longer time of cardiopulmonary bypass and circulatory arrest. The other **three reports** documented an apparently **higher early mortality** rate in the total arch group than in the hemiarch group. In terms of long-term results, freedom from reoperation on the distal aorta **is similar** for patients treated with total arch replacement and with hemiarch replacement at 5 and 10 years in **four papers**. As for the false lumen, **three reports** documented that the rate of complete thrombosis of the false lumen in the proximal descending aorta was significantly higher in the total arch group than in the hemiarch group ($P < 0.05$). Only one study reported similar rates of complete thrombosis formation of the distal aorta in the two groups at different follow-up points ($P > 0.05$). The remaining four reports did not provide information about the false lumen. Evidence for long-term outcomes, albeit limited, has proved that better results of thrombosis of the false lumen can be achieved with a more extensive total arch repair. Although the literature shows no advantage of the total arch over a more limited approach, the more extensive approach may be required to achieve this goal when the entry tear extends to, or is localized in, this segment of the aorta. **This suggests that a more extensive surgical strategy can be justified** when it is based on circumstances, on the individual patient's clinical condition, and on the anatomical and pathological features of the dissection.

Keywords: The aorta • Thoracic • Aortic diseases • Aneurysm • Dissecting • Cardiac surgical procedures • Vascular surgical procedures • Blood vessel prosthesis implantation



Protocol of Total aortic arch replacement in Hanoi Heart Hospital

- Antegrade selective bilateral cerebral perfusion in combination with moderate hypothermia, circulatory arrest
- Retrograde cardioplegie, HTK solution
- Open technique-Distal anastomosis first



Cannulation of the right axillary artery

Median sternotomy

Division of the arch branch

Bicaval cannulation

Rectal temperature: 29-31°C

Nasopharyngeal temperature: 26-28°C

Circulatory arrest

Cross-clamping of the origin of the innominate artery, the left subclavian artery

Right axillary artery perfusion: 10 ml/kg/min

Opening of the aortic arch

Balloon cannulation of the left common carotid artery

Bilateral perfusion: 10 ml/kg/min (50-70 mmHg)

Distal anastomosis

Reimplantation of the supra-aortic vessels (if “*island technique*”)

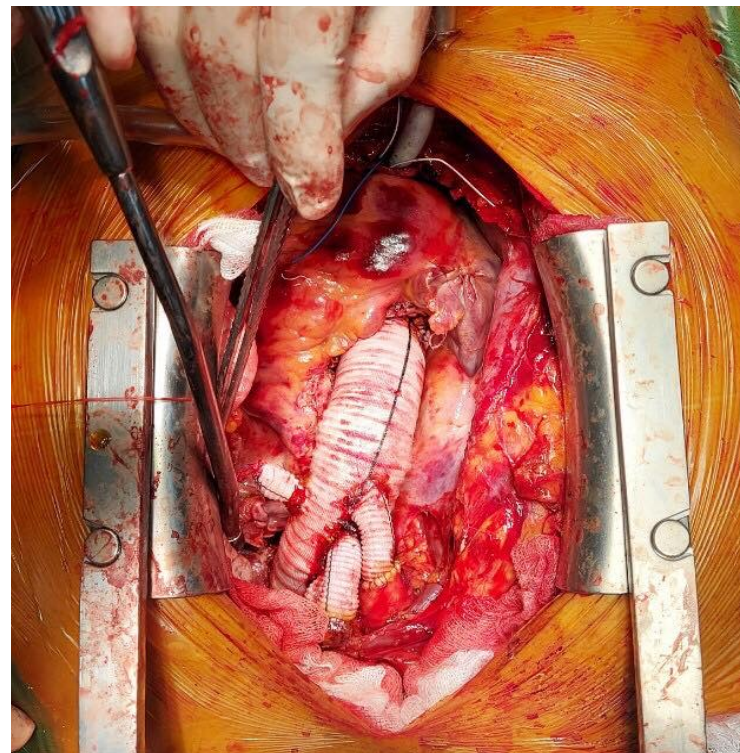
Resumption of full-flow CPB and rewarming

Proximal anastomosis or repair

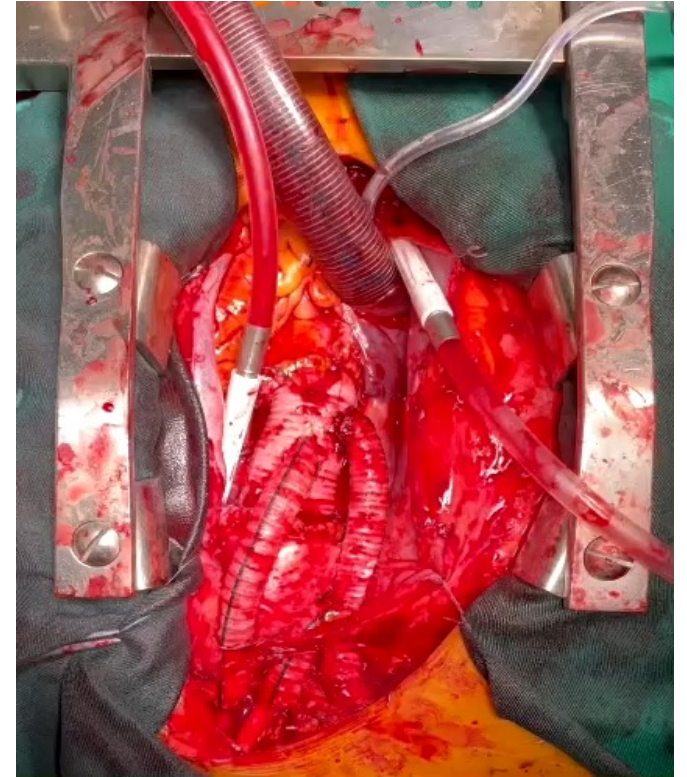
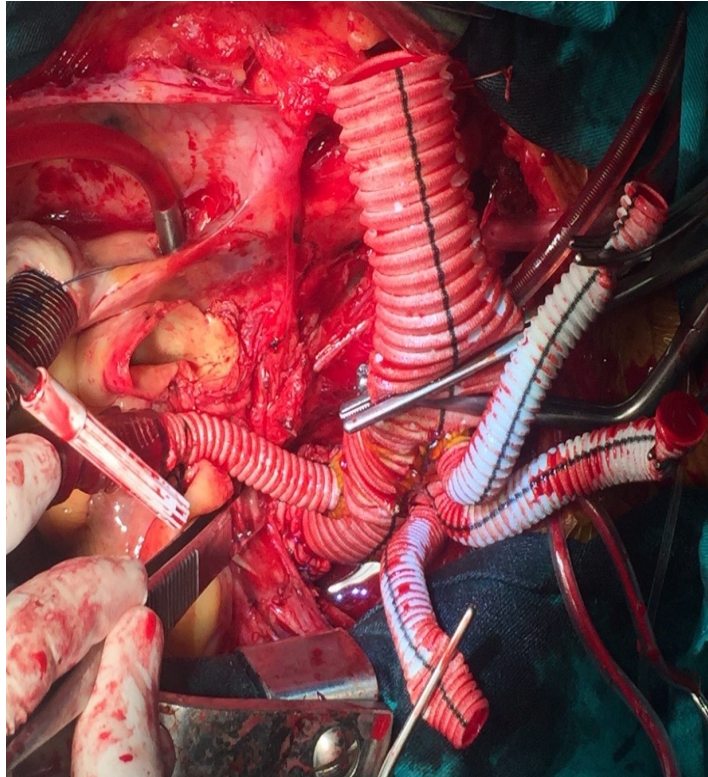
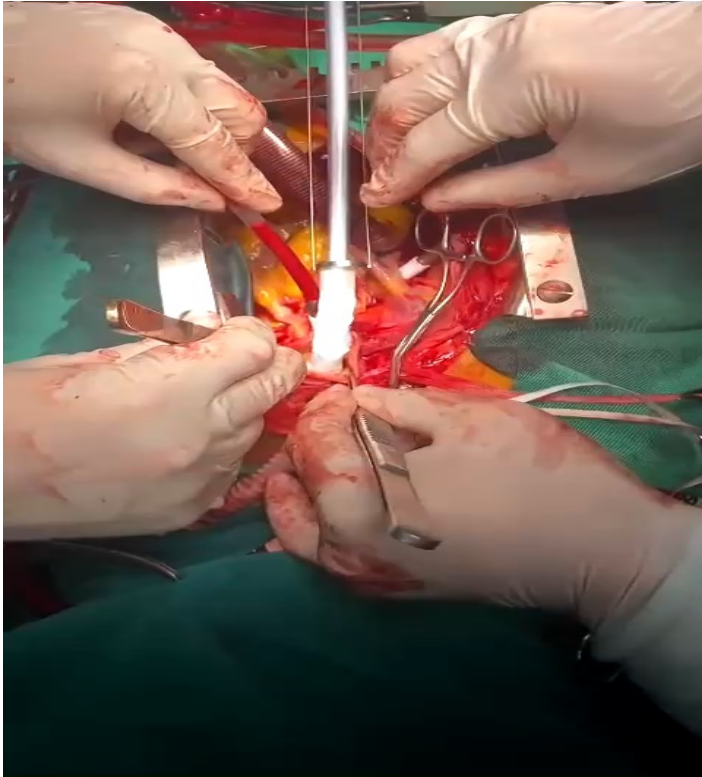
Proximal anastomosis or repair

Reimplantation of the supra-aortic vessels (if “*separately technique*”)

TAAR



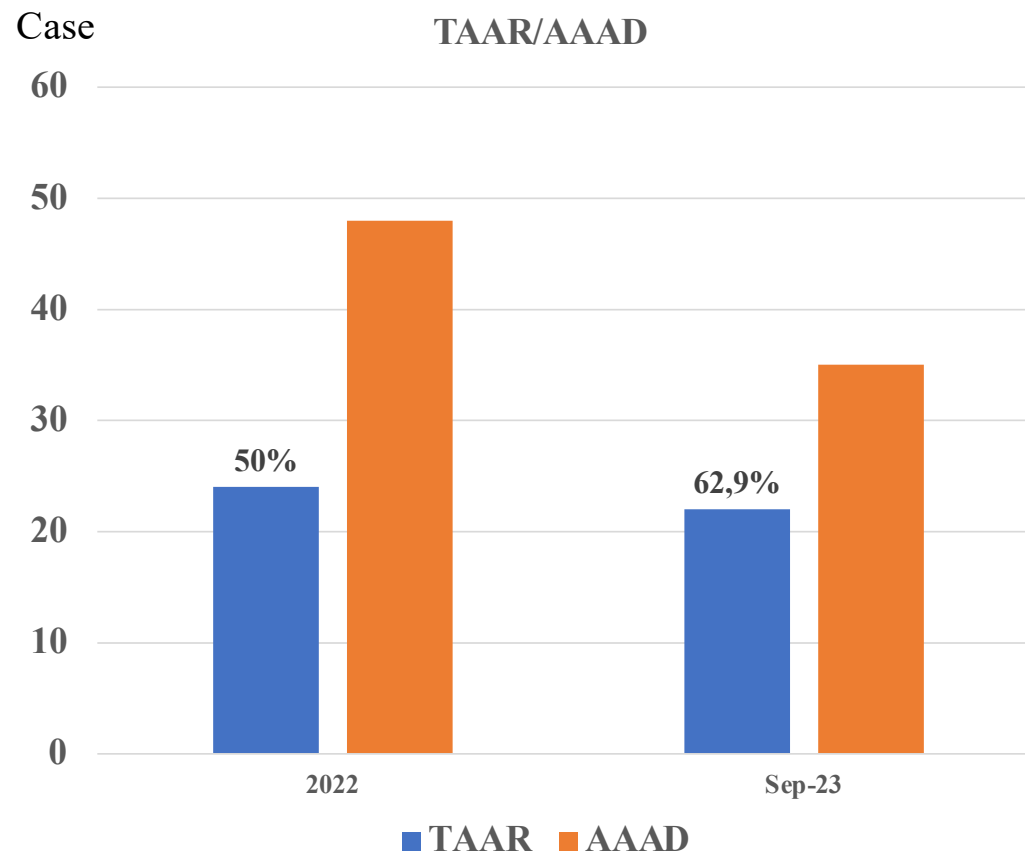
FET



Outcome in Hanoi Heart Hospital

January 2022 - September 2023:

- 83 cases of AAAD
- TAAR: 46 cases (55,4%)
- FET: 7 cases (15,2%)
- NTAAR: 37 cases (44,6%)



Patient characteristics

Result	TAAR (N=46)	NTAAR (N=37)
Age	53,7 ± 13,1 (17-71)	58,7± 17,7 (26-75)
Male	39 (84,8%)	30(81,1%)
Smoking	25(54,3%)	13(35,1%)
Hypertension	34(73,9%)	31(83,8%)
Diabetes	1(2,2%)	2(5,4%)
PAD	5(10,9%)	3(8,1%)
CAD	1(2,2%)	3(8,1%)
Marfan	3(6,5%)	2(5,4%)
Chest pain	44 (95,7%)	36(97,3%)
Pericardial effusion	32(69,6%)	29(78,4%)
Shock, tamponade	3(6,5%)	0
Emergency surgery	43(93,5%)	35(94,6%)



Operative characteristics


Result		TAAR (N=46)	NTAAR (N=37)
IMH		5(10,9%)	3(8,1%)
Primary tear	Ascending	22(47,8%)	34(91,9%)
	Arch	9(19,6%)	-
	Unidentified	16(34,8%)	3(8,1%)
Bentall surgery		6(13%)	6(16,2%)
CABG		2(4,3%)	1(2,7%)
Descending aorta replacement		2(4,3%)	-
Island technique		33(71,7%)	-





Operative characteristics

Result	TAAR (N=46)	NTAAR(N=37)
Arrest time (min)	41,7 ± 11,7(19-60)	27,3 ±6,2 (19-33)
CBP time (min)	166,9± 37,7(103-256)	119,2 ±20,9 (89-140)
Aortic time (min)	112,9 ±23,3 (65-140)	90,5 ±25,3(69-129)
Ventilation time (hour)	33,3 ±29,7 (6-100)	19,8±9,5 (13-38)
Blood loss 24h (ml)	428,7 ±285,5 9 (125-1220)	288,3 ±199,8 (100-680)



Early result

Result	TAAR (N=46)	NTAAR (N=37)
Re-op bleeding	8(17,4%)	4(10,8%)
Permanent stroke	3(6,5%)	1(2,7%)
Temporary neurological dysfunction	4(8,7%)	3(8,1%)
Pneumonia	16(34,8%)	10(27%)
Kidney failure (dialysis)	6(13%)	2(5,4%)
In-Hospital mortality	0	1(2,7%)
30 days mortality	0	0





Conclusion

- There were no significant differences between two groups in early mortality.
- Total arch replacement techniques have been mastered, allowing for expanded indications in AAAD with positive results.
- FET is the best treatment option, should be done more in the future. But TAAR can be performed regularly in AAAD.





Thank
You

FOR
LISTENING