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Aorta: Research

Effects of Residual Arch Tears on Late Outcomes After Hemiarch Replacement for DeBakey I Dissection

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ABSTRACT

BACKGROUND This study evaluated the effect of residual arch tears on late reinterventions and arch dilatation after hemiarch replacement for patients with acute DeBakey type I aortic dissection.

METHODS Between January 1995 and October 2018, 160 consecutive patients who underwent hemiarch replacement for DeBakey type I dissection were retrospectively enrolled. They were divided into patients with (n = 73) and without (n = 87) residual arch tears. The arch tears group was subdivided into the proximal/middle arch (n = 26) and distal arch (n = 47) groups to evaluate arch growth rates according to the locations of residual arch tears. The endpoints were arch growth rate and late arch and composite events.

RESULTS The arch diameter increased significantly over time in patients with residual arch tears (1.620 mm/y, $P < .001$). The increase occurred more rapidly when residual tears occurred at the distal arch than at the proximal/middle arch level (2.101 vs 1.001 mm/y). In the adjusted linear mixed model, residual arch tears or luminal communications at the distal arch level were significant factors associated with increases in the arch diameter over time. The 10-year freedom from late arch and composite event rate was significantly lower for patients with residual arch tears than for those without (82.4% vs 95.5%, $P = .001$; and 68.0% vs 89.3%, $P = .002$, respectively).

CONCLUSIONS Residual arch tears are significant factors associated with late arch dilatation and reinterventions, especially for patients with distal arch tears. Extensive arch replacement during the initial surgery to avoid residual arch tears may improve long-term outcomes.

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Reducing operative mortality is a major concern when treating acute DeBakey type I aortic dissection (AIAD). Furthermore, determining the appropriate extent of resection in emergency situations is important for improving surgical outcomes. Removing the primary intimal tear using the tear-oriented strategy is a mainstay of surgical therapy.[1] Several researchers have reported that more extensive surgery with total arch replacement (TAR) is required for certain patients with intimal tears at the arch or proximal descending thoracic aorta (DTA), arch aneurysms, connective tissue disease, or malperfusion.[2,3] Limited aortic surgery with ascending and/or hemiarch replacement (HAR) is the most common approach to reducing the operative time and short-term risks of mortality and morbidity, even when the tear is located at the aortic arch.[4]

After HAR, a nonresected residual arch tear (AT) or newly developed tear of the distal anastomosis may remain. The existence of residual tears after AIAD

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Abbreviations and Acronyms

AIAD = Acute DeBakey type I aortic dissection
AT = arch tear
CT = computed tomography
DA = distal arch
DTA = descending thoracic aorta
FL = false lumen
HAR = hemiarch replacement
HR = hazard ratio
MFS = Marfan syndrome
PMA = proximal/middle arch
TAR = total arch replacement

surgery is associated with increased risks of progressive aortic dilatation, rupture, or secondary aortic reoperation.[5] However, the long-term clinical effects of residual ATs remain unclear. We hypothesized that the presence of an AT and the location of the luminal communication are important predictive factors for adverse events, including aortic arch dilation and reinterventions. Therefore, in this study, we evaluated the effects of residual ATs on late arch events and changes in the arch diameter over time after HAR for patients with AIAD.

PATIENTS AND METHODS

STUDY POPULATION. Between January 1995 and October 2018, 367 consecutive patients with AIAD underwent surgical replacement at the Severance Cardiovascular Hospital, Yonsei University College of Medicine, Seoul, Korea. Patients who underwent aortic surgery for iatrogenic or retrograde aortic dissection, who underwent partial or TAR, who had not undergone predischarge computed tomography (CT), or who died perioperatively were excluded. Finally, 160 patients who underwent HAR were enrolled.

Based on the presence of residual AT identified using predischarge CT, patients were divided into 2 groups: those with AT (AT group; n = 73) and those without AT (non-AT group; n = 87). Furthermore, patients with AT were subclassified as having a proximal/middle arch (PMA) tear (n = 26) and distal arch (DA) tear (n = 47). The PMA is from the distal anastomosis site to the left common carotid artery, and the DA is after the left common carotid artery (Figure 1).

This study was approved by the institutional review board of Yonsei University College of Medicine (4-2021-0367). The requirement for patient consent was waived given the retrospective nature of the study.

SURGICAL TECHNIQUE. After median sternotomy, standard cardiopulmonary bypass was performed using side-graft cannulation of the right axillary and femoral arteries under moderate systemic hypothermia (28°C). The extent of surgery was mainly determined by the location of the primary tear. Additionally, the comorbidities of patients and discretion of the surgeons were considered when determining the surgical approach. HAR included the lesser curvature of the aortic arch beyond the level of the innominate artery; however, it did not involve the greater curvature. The detailed surgical procedures, including cardiopulmonary bypass and anastomosis, have been described previously.[6]

IMAGE ASSESSMENT. The entire aorta was assessed using a 16-channel helical or 64-channel multidetector CT scanner (Somatom Sensation 16; Siemens Medical Solutions, Forchheim, Germany). All patients underwent at least 2 postoperative CT assessments. The non-AT group underwent an average of 2.7 ± 1.1 CT scans, whereas the AT group underwent an average of 3.1 ± 1.4 CT scans. Predischarge CT was performed within a mean of 13.4 ± 17.9 days. Patients underwent CT at our outpatient clinic at 6-12 months after discharge and annually thereafter, when possible. The mean elapsed times between the predischarge CT assessment and the most recent CT assessment were 5.3 ± 4.8 and 5.2 ± 4.5 years for the non-AT group and AT group, respectively.

We defined residual tears as the presence of communication between the true lumen and false lumen (FL) at the level of the arch vessels (including the convex part of the arch), DTA, or abdominal aorta. The maximal arch diameter was the largest diameter at each level of the arch.

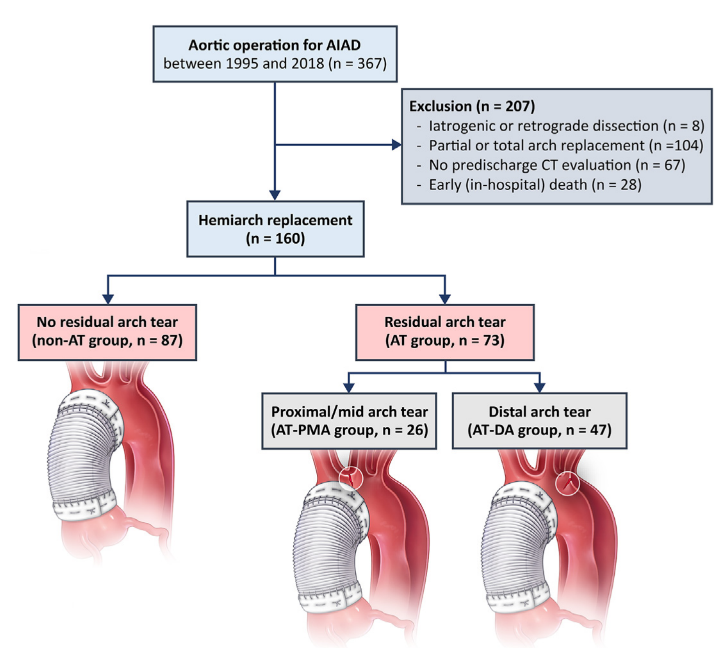

FIGURE 1 Flow diagram of the study population. (AIAD, acute DeBakey type I aortic dissection; AT, arch tear; CT, computed tomography; DA, distal arch; PMA, proximal/middle arch.)

TABLE 1 Patients' Baseline Characteristics and Surgical Data

Variables	All (N = 160)	Non-AT (n = 87)	AT (n = 73)	*P* Value
Age, y	57.9 ± 14.0	62.5 ± 12.4	52.5 ± 13.9	<.001
Male	73 (45.6)	28 (32.2)	45 (61.6)	<.001
Body surface area, m^2	1.72 ± 0.23	1.68 ± 0.25	1.77 ± 0.20	.021
Smoking	37 (23.1)	17 (19.5)	20 (27.4)	.240
Hypertension	116 (72.5)	72 (82.8)	44 (60.3)	.002
Dyslipidemia	11 (6.9)	5 (5.7)	6 (8.2)	.550
Diabetes mellitus	12 (7.5)	10 (11.5)	2 (2.7)	.036
Chronic renal failure	28 (17.5)	19 (21.8)	9 (12.3)	.115
Cerebrovascular accidents	8 (5.0)	7 (8.0)	1 (1.4)	.072
COPD	7 (4.4)	6 (6.9)	1 (1.4)	.127
Coronary arterial disease	23 (14.4)	17 (19.5)	6 (8.2)	.042
Marfan syndrome	15 (9.4)	3 (3.4)	12 (16.4)	.005
Shock	12 (7.5)	7 (8.0)	5 (6.8)	.775
Surgical data				
Location of tear confirmed by pre- and intraoperative findings				
Ascending aorta	117 (73.1)	62 (71.3)	55 (75.3)	.562
Innominate artery	16 (10.0)	8 (9.2)	8 (11.0)	.711
Left common carotid artery	12 (7.5)	0 (0)	12 (16.4)	<.001
Left subclavian artery	10 (6.3)	0 (0)	10 (13.7)	<.001
DTA/abdominal aorta	24 (15.0)	11 (12.6)	13 (17.8)	.362
Unknown[a]	27 (16.9)	17 (19.5)	10 (13.7)	.326
Concomitant procedures				
Bentall operation	24 (15.0)	7 (8.0)	17 (23.3)	.007
CABG	13 (8.1)	10 (11.5)	3 (4.1)	.089
Mitral valve repair	2 (1.3)	2 (2.3)	0 (0)	.501
Tricuspid valve repair	3 (1.9)	2 (2.3)	1 (1.4)	>.999
CPB time, min	192.6 ± 68.8	189.8 ± 64.2	196.7 ± 74.1	.573
Aortic cross-clamp time, min	114.4 ± 46.6	107.6 ± 42.6	122.6 ± 50.1	.045
TCA time, min	35.2 ± 16.0	35.0 ± 14.6	35.4 ± 17.6	.891

[a]No records of tear sites according to preoperative computed tomography and intraoperative findings. Values are presented as mean ± SD or n (%). AT, arch tear; CABG, coronary artery bypass graft; COPD, chronic obstructive pulmonary disease; CPB, cardiopulmonary bypass; DTA, descending thoracic aorta; TCA, total circulatory arrest.

DATA COLLECTION AND STUDY ENDPOINTS. Preoperative, perioperative, and postoperative data were retrospectively collected from the cardiac and vascular research databases and medical records. Survival data were obtained from the Korea National Statistical Office database. The completeness of follow-up for survival was 100%. The mean duration of clinical follow-up was 8.2 ± 5.4 years.

The primary endpoint was the occurrence of late arch events, including arch reinterventions and progressive arch dilatation (maximal diameter ≥55 mm). Secondary endpoints were the arch growth rate over time, late survival, and composite events comprising aortic related death or any aortic reinterventions. Aortic reintervention was defined as any surgical or endovascular procedure performed for the root, arch, DTA, or abdominal aorta. Indications for reintervention were a maximal aortic diameter of ≥55 mm or rapid growth (ie, 5 mm within 6 months) on serial CT scans.

STATISTICAL ANALYSIS. Continuous variables are presented as the mean ± SD or the median and interquartile range, and categorical variables are expressed as the frequency and percentage. Between-group comparisons were performed using Student's *t* test or Mann-Whitney U test for continuous variables; the χ^2 test or Fisher's exact test was used for categorical variables.

Late survival and freedom from late arch and composite event rates were estimated using the Kaplan-Meier method, and between-group differences were compared using the log-rank test. The Cox proportional hazards regression model was used to calculate the hazard ratios (HRs) and determine the predictors of late arch and composite events. Variables with $P < .1$ in the univariable analysis were included in the multivariable model. Using predischarge CT findings as baseline measurements, the aortic growth rates after HAR were analyzed using a linear mixed model. Subject effects were considered random effects. The continuous response variable (aortic diameter) was modeled as a linear function of time (in years). $P < .05$ was considered significant. R (version 4.0.5; R Development Core Team, Vienna, Austria) and SPSS (version 23.0; IBM Corp, Armonk, NY) were used for statistical analyses.

RESULTS

BASELINE CHARACTERISTICS AND SURGICAL DATA. Compared with the non-AT group, the AT group comprised a relatively large proportion of young patients (62.5 ± 12.4 vs 52.5 ± 13.9 years; $P < .001$) and more men (32.2% vs 61.6%; $P < .001$) (Table 1). The non-AT group had significantly more patients with hypertension, diabetes, and coronary arterial disease than the AT group ($P < .05$ for all). After surgery, 3 patients in the non-AT group and 12 in the AT group were diagnosed with Marfan syndrome (MFS) ($P = .005$). The AT group had more Bentall procedures ($P = .007$) and longer aortic cross-clamp times than the non-AT group ($P = .045$).

EARLY OUTCOMES AND LATE SURVIVAL. No significant between-group differences in early clinical outcomes were observed (Table 2). During follow-up, 13 patients died because of cerebrovascular disorders (n = 2), sepsis (n = 4), malignancy (n = 1), aortic-related causes (aortic rupture, n = 2; coagulopathy after aortic reoperation, n = 3), and unknown causes (n = 1). The 10-year late survival rate of the non-AT group (93.3% ± 3.8%) was similar to that of the AT group (90.6% ± 4.6%; $P = .430$) (Figure 2).

ARCH DIAMETER AND GROWTH RATE. According to the predischarge CT and most recent follow-up CT (Table 2), maximal arch diameters were significantly larger in the AT group. The presence of residual AT was significantly associated with an increasing aortic arch diameter (1.62 mm/y; $P < .001$) (Figure 3). Moreover, the arch diameter increased more rapidly in patients with DA tears than in those with PMA tears. Significant factors associated with increasing arch diameters over time were residual AT and age in adjusted model 1 and luminal communication at the DA level in model 2 ($P < .001$ for all). Postoperative arch diameter was a significant factor in both models ($P < .001$) (Table 3).

LATE AORTIC EVENTS. In 27 patients who underwent late aortic reinterventions, arch and DTA reinterventions occurred more frequently in the AT group (Table 2). Additionally, 7 of 15 patients with MFS required subsequent reoperation for arch and DTA (no statistical significance between groups). During follow-up, 12 patients underwent late arch reinterventions because of an aneurysm of the arch or arch/proximal DTA (TAR, n = 6; TAR with elephant trunk, n = 3; TAR with frozen elephant trunk, n = 2; zone 0 endovascular repair, n = 1). The 10-year freedom from late arch event rate was significantly lower in the AT group than in the non-AT group (82.4% ± 5.5% vs 95.5% ± 3.1%; $P = .001$) (Figure 4A). Furthermore, the 10-year freedom from composite event rate was significantly lower in the AT group than in the non-AT group (68.0% ± 6.8% vs 89.3% ± 4.4%; $P = .002$) (Figure 4B). In the subgroup analysis, the freedom from late arch and composite event rate was lower in the AT-DA group than in the AT-PMA group, although no significant differences were identified between the non-AT and AT-PMA groups (Figures 4C, 4D).

RISK FACTORS FOR LATE ARCH AND COMPOSITE EVENTS. Cox univariate analysis revealed that young age, MFS, large arch diameter, and residual tear at the DA were significant factors associated with late arch events (Table 4). The multivariate analysis indicated that a larger arch diameter (HR, 1.083; $P = .021$) and luminal communication at the DA (HR, 5.628; $P = .001$) were significant risk factors for late arch events. Additionally, the independent risk factors for composite events were luminal communication at the DA or DTA/abdomen (Supplemental Table 1).

COMMENT

In this study, residual AT (especially in cases of DA tears) and large arch diameter were confirmed as significant factors affecting late arch events and increasing arch diameter over time. The growth rate of DA increased more rapidly than that of PMA and non-AT. Compared with the non-AT group, the AT group had similar early postoperative complications and late survival rates but a significantly higher incidence of aortic reinterventions for the arch and DTA.

Despite the use of tear-oriented surgery as a gold standard strategy for AIAD, a substantial number of ATs were identified during predischarge CT. When the AT is extremely small or located distal to the lesser curvature, identification of the tear may be difficult. Additionally, HAR is generally performed for life-threatening

TABLE 2 Early and Late Clinical Outcomes

Variables	All (N = 160)	Non-AT (n = 87)	AT (n = 73)	*P* Value
Early outcomes				
Reoperation for bleeding	13 (8.1)	8 (9.2)	5 (6.8)	.589
Stroke	9 (5.6)	5 (5.7)	4 (5.5)	>.999
Prolonged ventilation (>72 h)	26 (16.3)	14 (16.1)	12 (16.4)	.953
Newly required dialysis	4 (2.5)	2 (2.3)	2 (2.7)	>.999
CT findings on predischarge				
Maximal arch diameter (mm)	36.7 ± 5.2	35.9 ± 5.2	37.6 ± 5.1	.042
Arch diameter >40 mm	27 (16.9)	9 (10.3)	18 (24.7)	.016
Late outcomes				
Late death	13 (8.1)	6 (6.9)	7 (9.6)	.535
Any aortic reinterventions	27 (16.9)	8 (9.2)	19 (26.0)	.005
Root	7 (4.4)	3 (3.4)	4 (5.5)	.703
Arch	12 (7.5)	3 (3.4)	9 (12.3)	.034
Descending thoracic aorta	16 (10.0)	4 (4.6)	12 (16.4)	.013
Abdominal aorta	5 (3.1)	1 (1.1)	4 (5.5)	.179
CT findings on last follow-up				
Maximal arch diameter (mm)	42.3 ± 9.7	39.4 ± 7.0	45.8 ± 11.8	<.001
Arch diameter ≥55 mm	9 (5.6)	2 (2.3)	7 (9.6)	.081

Values are presented as mean ± SD or n (%). AT, arch tear; CT, computed tomography.

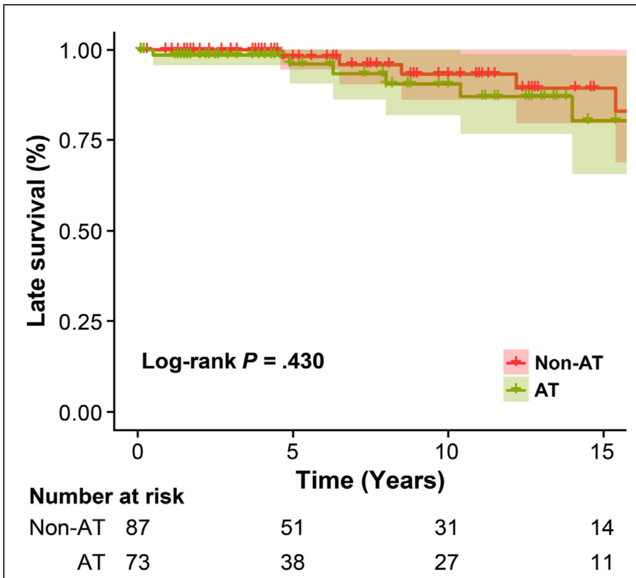

FIGURE 2 Late survival curves of patients with and without residual arch tears (AT).

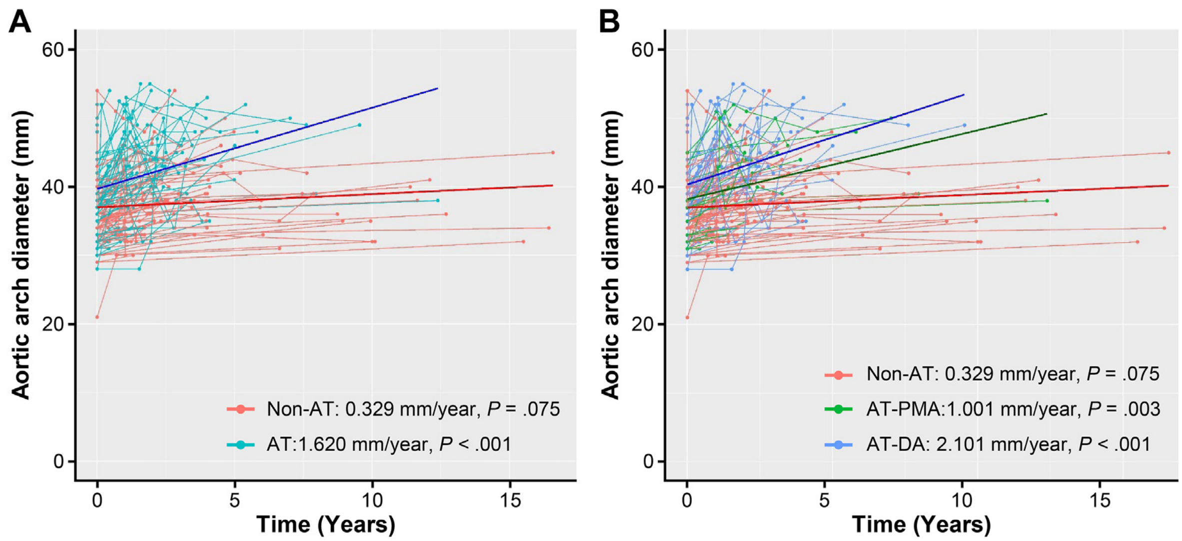

FIGURE 3 Linear mixed model of the arch diameter over time for (A) the presence of residual arch tears and (B) the location of luminal communication at the arch. (AT, arch tear; DA, distal arch; PMA, proximal/middle arch.)

conditions to prevent aortic rupture and restore flow to the dissected branch[4,7]; it may have been chosen based on the condition of the patient, preference of the surgeon, and experience of the surgeon with aortic pathology and arch replacement. Therefore, the dissected aorta should be carefully checked before and during surgery to avoid leaving tears. If the condition of the patient permits, AIAD surgery performed by aortic specialists may help to completely remove the intimal tear.

After HAR, newly developed or unresected tears may lead to unfavorable aortic remodeling caused by a patent and pressurized FL. The presence of residual tears is related to FL patency in the arch/proximal DTA, which leads to continuous aortic diameter growth and a greater risk of late aortic dilation.[8] Ikeno and associates[9] reported that the arch diameter at the left subclavian artery significantly increased in patients without TAR. Omura and colleagues[3] reported that FL patency at the DA level was higher in the non-TAR group (61.6% vs 21.1%; $P < .01$). Our results revealed that the arch growth rate of the AT-DA group was significantly faster than that in the non-AT and AT-PMA groups. Furthermore, residual AT (especially when distally located) was an important prognostic factor for late arch dilation and reintervention. To reduce the risk of late aortic events, removal of the intimal tear in the arch is an important goal for patients with AIAD. Therefore, extensive arch replacement for patients with AT may be effective.

TABLE 3 Change Over Time in Arch Diameter by Linear Mixed Model

	Unadjusted		Adjusted	Model 1	Model 2	
Variables	*B* (SE)	*P* Value	*B* (SE)	*P* Value	*B* (SE)	*P* Value
Age	−0.123 (0.025)	<.001	−0.054 (0.016)	.012		
Sex	4.277 (0.712)	<.001				
Hypertension	−2.190 (0.794)	.006				
Coronary arterial disease	−0.931 (1.149)	.419				
Marfan	−0.452 (1.184)	.703				
Arch diameter	0.989 (0.065)	<.001	0.921 (0.053)	<.001	0.901 (0.053)	<.001
Residual arch tear[a]	4.629 (0.688)	<.001	2.281 (0.469)	<.001		
Location of luminal communication[b]						
Proximal/middle arch	0.048 (0.982)	.961				
Distal arch	5.158 (0.741)	<.001			3.477 (0.470)	<.001

[a]Model 1 contains the variable "residual arch tear"; [b]Model 2 contains the variables "proximal/middle arch" and "distal arch." *B*, beta (slope).

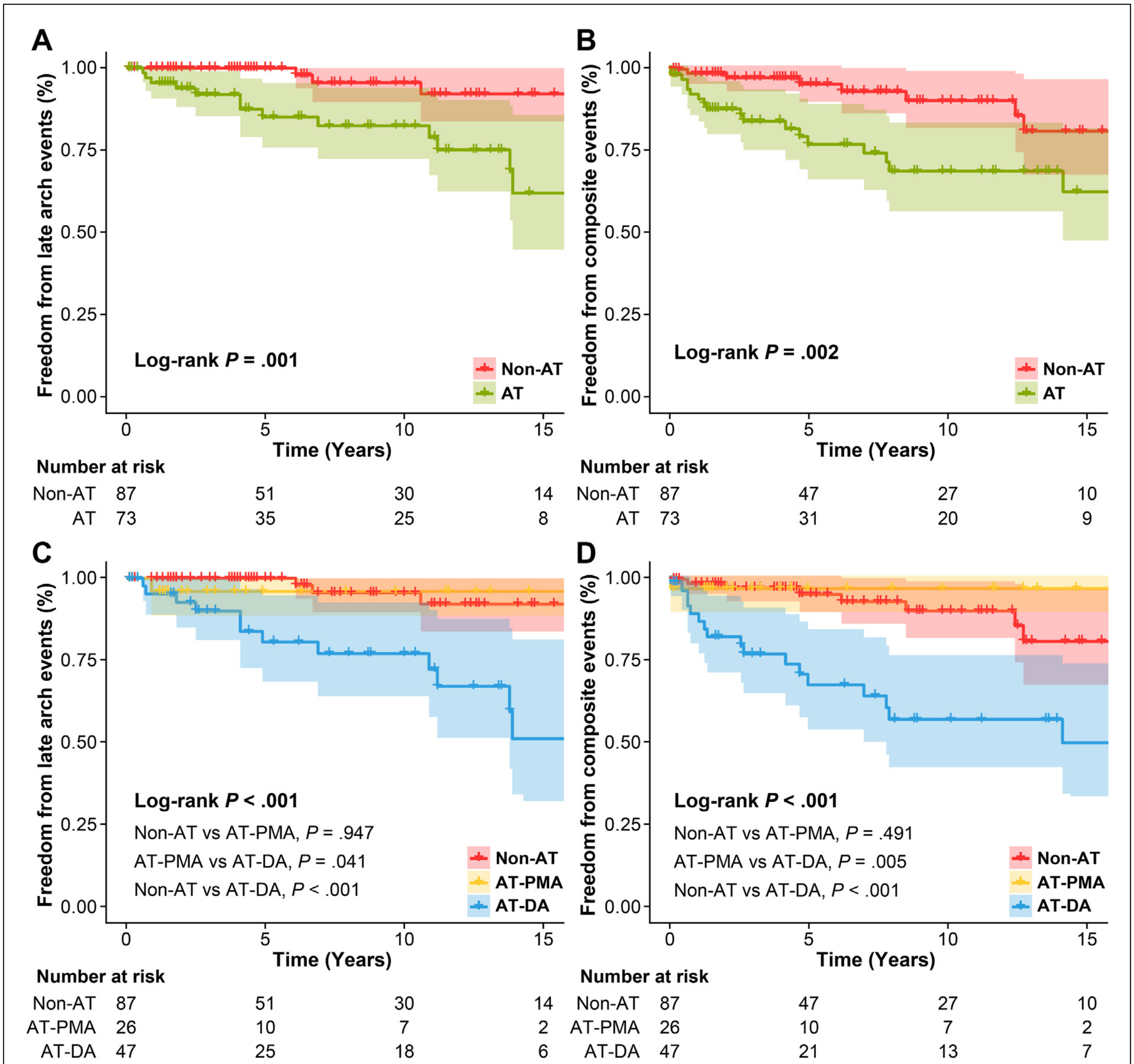

FIGURE 4 Kaplan-Meier curves comparing freedom from (A) late arch and (B) composite events of the AT and non-AT groups. Curves of freedom from (C) late arch and (D) composite events according to the location of luminal communication at the arch of the subgroup analysis. (AT, arch tear; DA, distal arch; PMA, proximal/middle arch.)

Several risk factors, including residual tear at the arch branch,[10,11] distal anastomotic leakage,[12] MFS,[13,14] and young age[13] can affect late aortic events (progressive aortic dilatation and reinterventions) after HAR. Persistent blood flow from the dissected arch branch into the FL of the arch and proximal DTA may lead to aortic dilation and may increase the risk of subsequent aortic reoperation. Furthermore, the causes of patent FL after AIAD surgery are related to nonresected tears, reentry of the distal aorta, and new entry of distal anastomosis. Rylski and coworkers[8] reported at least 1 communication at the arch branch (50%) and distal anastomosis (70%) on predischarge CT scans and demonstrated that the number of communications at the aortic arch and distal anastomosis is associated with accelerated aortic growth. Therefore, accurate preoperative and intraoperative tear assessments may help determine the extent of AIAD surgery, even if the tear is small or located distally to the aortic arch.

MFS increases the risk of distal aortic reoperation for AIAD patients.[14] Most patients with MFS are prone to the development of an aortic aneurysm of the dissected arch and/or proximal DTA, and subsequent arch replacement is required because of further expansion of a persistent FL in the aortic arch. However, several studies[15,16] have suggested that TAR for MFS patients during initial

TABLE 4 Predictors of Late Arch Events

	Univariate		Multivariate	
Variables	HR (95% CI)	*P* Value	HR (95% CI)	*P* Value
Age	0.953 (0.924-0.983)	.002		
Male	2.295 (0.902-5.842)	.081		
Hypertension	0.545 (0.219-1.352)	.190		
Marfan syndrome	3.221 (1.212-8.560)	.019		
Arch diameter (mm)	1.090 (1.036-1.146)	.001	1.083 (1.012-1.159)	.021
Location of luminal communication				
Proximal/middle arch	0.376 (0.050-2.825)	.342		
Distal arch	6.922 (2.491-19.234)	<.001	5.628 (2.018-15.696)	.001

HR, hazard ratio.

surgery for type A dissection is not recommended unless there are intimal tears in the arch. Our multivariate Cox analysis results did not support MFS and young age as risk factors for late aortic events. The reoperation rate was high for MFS patients with residual AT, but it was not significant because of the small sample size. Moreover, because elasticity and distensibility of the aorta decrease with age, aortic enlargement may be limited in elderly patients with aortic dissection compared with that in young patients.[17] Therefore, we support the importance of considering patient-specific and pathologic aortic factors during initial surgery for AIAD. TAR may prevent late arch reinterventions if there are ATs or preexisting aneurysms of the arch/proximal DTA in certain MFS and younger patients.

In this study, the late survival rates and postoperative complications did not differ between groups. The exclusion of patients who died during hospitalization might have influenced the early and late outcomes. Moreover, among the 22 patients who underwent aortic reinterventions for the arch/DTA (except root and abdominal aorta), 3 died because of postoperative coagulopathy (13.6%). The main cause of late arch/DTA reoperation for most patients was progressive enlargement of the FL caused by unresected intimal tears. However, contrary to the rather high mortality rate of reoperation during our study, some studies[18,19] have reported that distal reintervention after acute type A dissection was associated with low mortality. Wang and associates[19] showed that the in-hospital mortality rate for all reoperations was 7.0% (elective, 6.3%; nonelective, 11.1%) and that rates of organ-specific morbidity were acceptable. Although reoperation is a more extensive and technically demanding procedure, surgeons who specialize in aortic surgery may safely perform it with low mortality. This acceptable outcome will help when deciding which is the best surgical strategy for AIAD.

This study had several limitations. First, this was a single-center, retrospective study with a relatively small number of patients. Second, the characteristics of the groups (age, sex, comorbidities, and aortic pathologies) differed, and numerous factors (diagnostic imaging systems, surgeons, arch replacement strategies, surgical techniques, and postoperative care) have changed over the past 20 years. These patient selection and surgical biases could have influenced our clinical outcomes. Furthermore, although preoperative CT images have not been analyzed, postoperative CT could more accurately assess the number of ATs because it is more likely to detect small ATs, newly developed ATs, and distal anastomosis leakage. Third, the FL status and presence of residual tears at the DTA and abdominal aorta levels were not thoroughly analyzed. However, tears in the DTA and abdominal aorta would have minor effects on the arch, and the existence of communication can be considered partial or complete patency of the FL. Finally, information regarding patients who underwent other surgical approaches, such as TAR with or without frozen elephant trunk, hybrid aortic arch repair, staged endovascular repair with distal stent coverage, and use of the Ascyrus Medical Dissection Stent (Ascyrus Medical),[20] is not available. These approaches may result in promoting aortic remodeling by sealing the FL. The hybrid branched endovascular repair has the advantage of maintaining a relatively low circulatory arrest time. The Ascyrus Medical Dissection Stent allows coverage of the FL and resolution of malperfusion by expanding the true lumen, and it improves remodeling of the dissected aorta. Therefore, further large-scale studies are needed to gain a better understanding of the influence of different surgical approaches on late aortic reinterventions.

In conclusion, HAR for AIAD remains a reasonable treatment for high-risk patients in emergency situations. Although late survival after HAR was similar between patients with and without residual ATs, the presence of ATs increased the risk of subsequent arch surgery, especially in cases of DA tears. Therefore, careful evaluation of ATs using preoperative CT could help determine the surgical extent. Furthermore, large arch diameter was associated with rapid arch growth and late arch reintervention. If ATs and arch aneurysms are observed in the dissected aorta, then we highly recommend extensive arch surgery to decrease the risk of future reoperation.

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The Jigsaw Puzzle of Arch Management in Acute Ascending Aortic Dissection

INVITED COMMENTARY:

The management of aortic arch in patients with acute type A aortic dissection remains a matter of debate. Literature is contradictory about the acute and chronic effects of a more aggressive total arch replacement vs limiting the procedure to a hemiarch replacement (HAR) only. It is, however, quite well accepted that residual arch tears (ATs) with persistent distal dissection may lead to a faster increase in distal aortic diameter and subsequent need for late aortic reintervention, while total arch replacement in the acute setting may prevent late arch reinterventions in young patients and those with Marfan disease with aneurysmal arch and/or AT.

In this issue of *The Annals of Thoracic Surgery*, the retrospective study by Kim and colleagues[1] from Korea adds another puzzle piece to the management algorithm in acute type A aortic dissection. In an elegant paper, the authors followed up on 160 patients with DeBakey I dissection, treated with HAR, and they looked at the effect of AT existing at discharge, on aortic growth rate, late survival, and late arch and composite events. ATs were defined as newly developed tears at the distal anastomosis, or untreated arch tears, as seen on the discharge computed tomography scan. Distinction was made between proximal (up to the left carotid artery) and distal AT (from the left carotid artery to the descending aorta). The center's surgeons favor a tear-oriented approach, with partial or total arch replacement whenever an entry site was discovered in the arch, and during the same