Distal anastomosis new entry tear in acute type A aortic dissection: A risk factor for distal aortic reoperation

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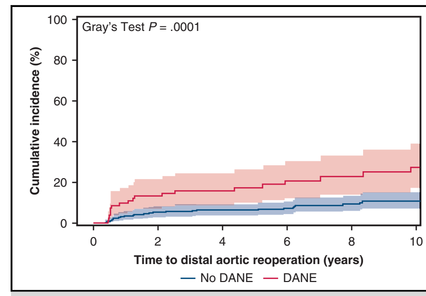
ABSTRACT

Objective: To identify predictive factors for the occurrence of a distal anastomosis new entry tear (DANE) in patients who underwent hemiarch replacement after acute type A aortic dissection (ATAAD) and examine the association of DANE with distal aortic reoperation.

Methods: Between 1996 and March 2021, 434 patients underwent hemiarch replacement for DeBakey I ATAAD, of whom 327 patients had adequate postoperative imaging. Based on the presence of DANE on postoperative computed tomography angiography, patients were divided into the DANE group (n = 81) and the no-DANE group (n = 246). Primary outcomes were the cumulative incidence of distal aortic reoperation and the risk factors for DANE.

Results: Most perioperative characteristics and outcomes, including age, sex, malperfusion syndromes, aortic diameters, and operative mortality were similar in the 2 groups. Using death as a competing factor, the 10-year cumulative incidence of distal aortic reoperation was higher in the DANE group compared to the no-DANE group (30% vs 12%; $P = .0001$). The hazard ratio for DANE in distal reoperations was 2.28 ($P = .005$). A multivariable regression model showed that having an aortic surgeon was protective against DANE compared to having a nonaortic surgeon (odds ratio [OR], 0.29; $P = .05$) and identified branch dissection (OR, 2.42; $P = .002$) as a risk factor for the occurrence of DANE. Connective tissue disease and large-bore suture (4-0 vs 5-0) were not associated with DANE.

Conclusions: Optimizing surgical techniques to prevent DANE in ATAAD repair may prevent the need for reoperation on the distal aorta in DeBakey type I ATAAD. (JTCVS Open 2025;24:77-84)



Distal anastomosis new entry tear was associated with a higher reoperation rate.

CENTRAL MESSAGE

Distal anastomosis new entry tears can be identified in the postoperative period and are associated with higher reoperation rates.

PERSPECTIVE

Special care should be taken during the index operation in the distal anastomosis to prevent new entry tears. The resulting false lumen can cause clinically significant aortic remodeling.

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Acute type A aortic dissection (ATAAD) is a life-threatening condition requiring urgent surgical intervention. Current effective surgical strategies range from aortic root repair to total arch replacement and are tailored to the extent of the dissection and the patient's specific clinical scenario. One such technique is a hemiarch replacement, which is preferred in the absence of an arch aneurysm, intimal tear at the arch, or malperfusion syndromes affecting the brain or upper extremities.[1-4] A significant postoperative complication following a hemiarch replacement is the development of a distal anastomosis new entry tear (DANE).

Abbreviations and Acronyms

AMDS = Ascyrus medical dissection stent
ATAAD = acute type A aortic dissection
CT = computed tomography
DANE = distal anastomosis new entry tear
FET = frozen elephant trunk
HR = hazard ratio
IQR = interquartile range
TEVAR = thoracic endovascular aortic repair

DANE poses a risk for continued false lumen perfusion and can necessitate further surgical intervention, thereby complicating postoperative management and impacting patient prognosis.[5] Although some studies have begun to shed light on the prognostic impact of DANE, information on how it influences the long-term need for distal aortic reoperation and survival remains limited. In the present study, we aimed to identify predictive factors for the occurrence of DANE in patients who underwent hemiarch replacement after ATAAD, as well as its long-term impact on the need for distal aortic reoperation and on survival.

METHODS

This study received approval from the Institutional Review Board at Michigan Medicine (Protocol ID: HUM00133791; approved December 3, 2017). A waiver of informed consent was obtained in accordance with the regulations outlined in the Health Insurance Portability and Accountability Act.

Data Collection

Data for ATAAD patients who underwent surgery between January 1, 1996, and March 31, 2021, were obtained from the Society of Thoracic Surgeons' Data Warehouse at the University of Michigan Department of Cardiac Surgery, and with a thorough medical chart review was performed as well.

Patient Selection

Of the 798 ATAAD patients who underwent open aortic repair, 434 underwent hemiarch repair for a DeBakey I dissection. Among these 434 patients, 327 had postoperative computed tomography (CT) scans with contrast. Patients with no CT imaging, imaging without contrast, or poor image quality, or who died during hospital admission without postoperative aortic CT scans with contrast were excluded. We identified 81 patients with DANE and 246 without DANE (Figure 1, *A*).

Radiology Method for Identifying DANEs

The presence of a DANE was defined as a tear in the dissection flap occurring within 2 cm of the distal anastomosis of the ascending graft, allowing for a channel of contrast-enhanced communication between the true lumen and proximal false lumen. Noncontrast images were assessed in conjunction with electrocardiogram-gated contrast-enhanced CT images to differentiate between high-attenuation anastomotic surgical material and contrast-enhanced communication (Figure 1, *B* and *C*). Image contrast level was chosen to optimize attenuation differences between intravascular contrast, surgical material, and periaortic tissues (approximately level 500, window 1500). CT images were assessed with 3-dimensional multiplanar reconstruction using specialized imaging software (Sectra Workstation IDS7) to provide the best possible views for assessing for DANEs. All imaging data were analyzed independently by imaging researchers experienced in vascular image analysis, under the supervision of an experienced cardiovascular imager (Dr Burris), and all cases with small or questionable DANE were adjudicated by this senior cardiovascular imager. The imaging researchers were blinded to the type of suture used in the index operation, surgical technique, surgeon, patient comorbidities, and reoperation status.

Surgical Techniques

The ascending aorta was routinely clamped before hypothermia circulatory arrest for arch repair, with a mean blood pressure >60 mm Hg maintained for distal perfusion. The surgical technique of hemiarch repair did not change significantly throughout the study period. Any intimal tear at the arch was resected with a hemiarch. Teflon felt was used for the distal anastomosis from 1996 to 2011, and from 2011 to 2021, no Teflon felt was used. Biological glues were not used for the distal anastomosis in any patient. The distal anastomosis of the graft to the aortic arch was performed with either 4-0 or 5-0 suture, dependent on surgeon preference. Surgeons used antegrade cerebral perfusion and retrograde cerebral perfusion based on their preference during hypothermic circulatory arrest for arch repair. In cases of malperfusion syndrome, the surgical team performed upfront fenestration stenting followed by delayed open aortic repair, as described previously.[6]

Statistical Analysis

Data are presented as median (interquartile range [IQR]) for continuous data and as number (%) for categorical data. The Kolmogorov-Smirnov test was used to check for the normality of continuous data. Univariable comparisons for continuous data were performed using the nonparametric 2-sample Wilcoxon rank-sum test and the χ^2 test for categorical data. Midterm survival was analyzed using the Kaplan-Meier method with log-rank testing and the cumulative incidence of distal aortic reoperation using a Fine-Gray model with death as the competing factor. The odds ratios of risk factors for the occurrence of DANE based on age, sex, aortic surgeon versus nonaortic surgeon, aortic surgeon 1 versus the other aortic surgeons, fine 5-0 suture, preoperative branch dissection, and connective tissue disease were calculated using a multivariable logistic regression model. Hazard ratios (HRs) of risk factors for distal aortic reoperation based on age, sex, DANE, branch dissection, previous cardiac surgery, malperfusion syndrome, and connective tissue disease were calculated using a Cox proportional hazards model. No collinearity was found between the risk factors used in these models. A similar analysis was done to determine the HRs of risk factors for midterm mortality. All analyses were generated using SAS version 9 for Windows (SAS Institute).

RESULTS

Demographic characteristics and preoperative comorbidities were similar in the DANE and no-DANE groups, except for a higher median body mass index (30 vs 28; $P = .03$), higher rate of preoperative branch dissection (69% vs 48%; $P = .001$), and lower rate of chronic obstructive pulmonary disease (2.5% vs 11%; $P = .02$) in the DANE group (Table 1). All patients underwent hemiarch replacement. Intraoperative characteristics were similar in the 2 groups (Table 2), and were perioperative outcomes. The rate of new arch tear on postoperative CT imaging was significantly higher in the DANE group compared to the no-DANE group (94% vs 16%; $P < .001$) (Table 3).

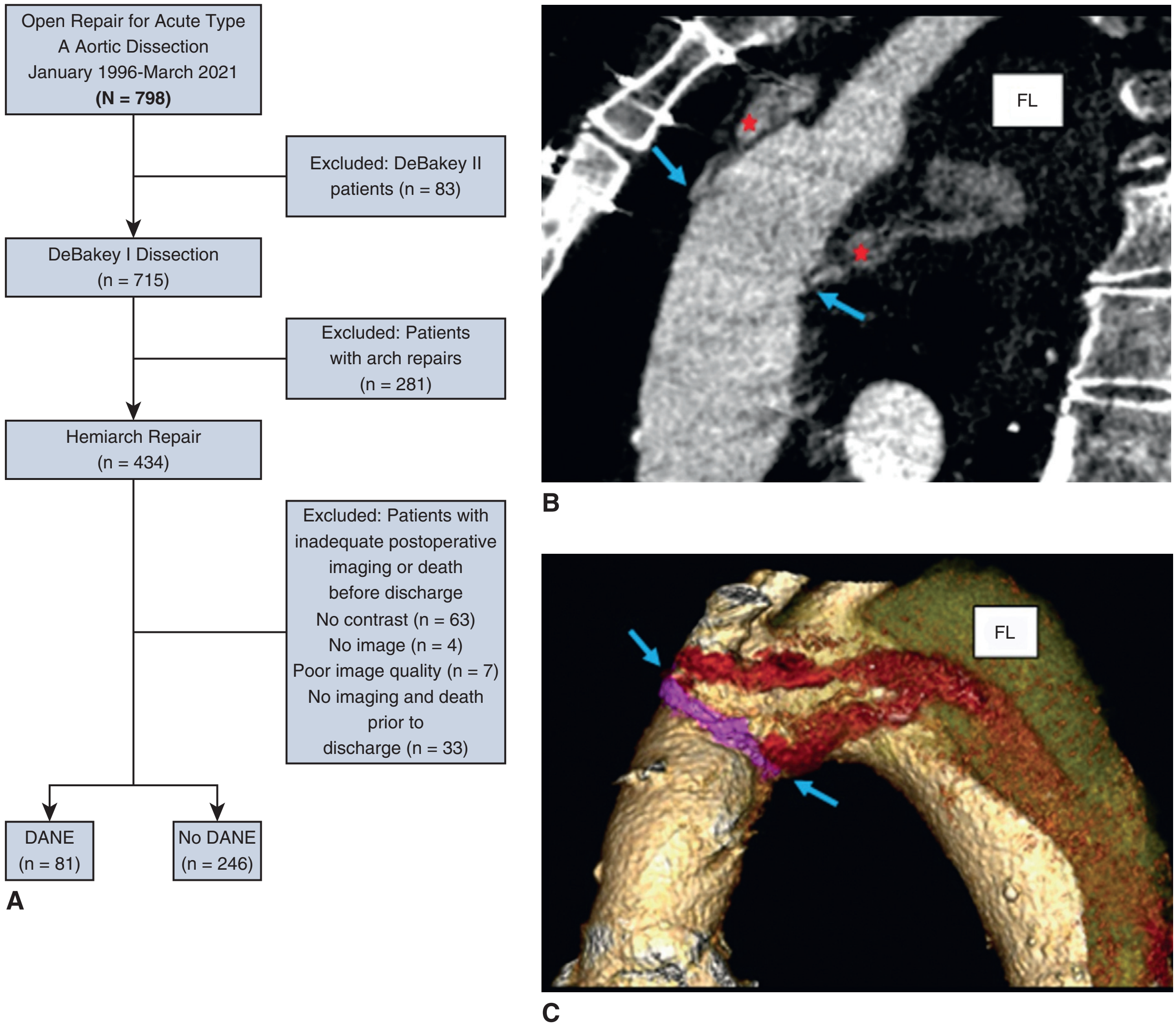

FIGURE 1. A, Cohort selection. B, Case demonstrating 2 distal anastomosis new entry tears (*DANEs*) (*blue arrows*) on contrast-enhanced computed tomography angiography (*left panel*), occurring immediately beyond the distal ascending anastomosis. The multiplanar reformats permit visualization of the contrast-enhanced communication between the true lumen and proximal residual false lumen (*FL*) in this area (*red stars*). C, 3-dimensional reconstructed model (*right panel*) demonstrates flow of blood (*red*) through DANEs (*blue arrows*) at the distal anastomosis (*purple*).

Midterm Outcomes

The median time to obtaining the postoperative images used for DANE analysis was 3.4 months (IQR, 2.2-4.6 months) in the DANE group and 2.6 months (IQR, 3.3-4.8 months) in the no-DANE group. The median follow-up to reoperation or death was 6.3 years (IQR, 3.2-11 years) in the DANE group and 7.0 years (IQR, 3.9-11 years) in the no-DANE group, with 95% completeness to follow-up with a study end date of February 8, 2023. Ten-year and 15-year survival were similar in the 2 groups (Figure 2).

The 10-year cumulative incidence of distal aortic reoperation was higher in the DANE group compared to the no-DANE group (30% vs 12%; $P = .0001$) (Figure 2, *B*). Reoperations in the 23 patients in the DANE group included open thoracotomy (11 patients), thoracic endovascular aortic repair (TEVAR; 9 patients), sternotomy for distal arch aneurysm (2 patients), and endovascular repair for an abdominal aortic aneurysm (1 patient). For the 31 patients in the no-DANE group, reoperations included open thoracotomy (15 patients), TEVAR (12 patients), sternotomy for distal arch aneurysm (1 patient), and endovascular repair for an abdominal aortic aneurysm (3 patients).

Multivariable regression analysis for DANE, distal aortic reoperation, and midterm mortality. DANE was an independent risk factor for distal aortic reoperation, with an HR of 2.28 ($P = .005$) (Table 4). A sensitivity analysis did not find the missingness in DANE data of the 100

TABLE 1. Demographics and preoperative comorbidities

Parameter	No-DANE (N = 246)	DANE (N = 81)	P value
Patient age, y, median (IQR)	60 (50-69)	58 (49-68)	.33
Male sex, n (%)	165 (67)	61 (75)	.16
Decade, 1996-2010, n (%)	48 (20)	18 (22)	.60
BMI, kg/m^2, median (IQR)	28 (25-32)	30 (26-33)	**.03**
Preexisting comorbidities, n (%)			
Hypertension	183 (74)	59 (73)	.78
Diabetes	18 (7.3)	6 (7.4)	.98
Smoking status			
Never	101 (41)	32 (40)	.81
Former	67 (27)	25 (31)	.53
Current	78 (32)	24 (30)	.73
CAD	42 (17)	16 (20)	.58
COPD	26 (11)	2 (2.5)	**.02**
History of MI	11 (4.5)	6 (7.4)	.39
History of renal failure	11 (4.5)	1 (1.2)	.31
History of CVA	11 (4.5)	2 (2.5)	.53
PVD	53 (22)	23 (28)	.21
Connective tissue disorder	10 (4.1)	4 (4.9)	.75
Previous cardiac surgery	14 (5.7)	9 (11)	.10
Preoperative aortic insufficiency, n (%)			
None	60 (25)	21 (27)	.79
Trace	23 (9.6)	12 (15)	.17
Mild	59 (25)	15 (19)	.30
Moderate	45 (19)	6 (7.6)	**.02**
Severe	52 (22)	25 (32)	.08
Ejection fraction, %, median (IQR)	55 (55-65)	55 (55-62)	.36
Acute MI, n (%)	8 (3.3)	4 (4.9)	.50
Acute stroke, n (%)	14 (5.7)	3 (3.7)	.58
Acute renal failure, n (%)	22 (8.9)	9 (11)	.56
Acute paralysis, n (%)	3 (1.2)	2 (2.5)	.60
Cardiogenic shock, n (%)	25 (10)	6 (7.4)	.46
Cardiac tamponade, n (%)	33 (13)	7 (8.6)	.26
Preoperative creatinine, mg/dL, median (IQR)	1 (0.8-1.3)	1 (0.8-1.4)	.21
Malperfusion, n (%)	51 (21)	20 (25)	.45
Coronary	7 (2.8)	4 (4.9)	.48
Cerebral	13 (5.3)	3 (3.7)	.77
Spinal cord	2 (0.8)	1 (1.2)	.58
Celiac	5 (2.0)	4 (4.9)	.23
Mesenteric	21 (8.5)	7 (8.6)	.98
Renal	17 (6.9)	7 (8.6)	.60
Lower extremity	19 (7.7)	8 (9.9)	.54
Endovascular fenestration stenting	28 (11)	11 (14)	.60

(Continued)

TABLE 1. Continued

Parameter	No-DANE (N = 246)	DANE (N = 81)	P value
Preoperative aortic diameters, mm, median (IQR)			
Root	44 (40-50)	45 (41-50)	.68
Ascending	50 (45-55)	50 (47-57)	.50
Arch	43 (37-46)	40 (36-43)	.23
Branch dissection, n (%)	116 (48)	55 (69)	**.001**

Bold type indicates statistical significance. *DANE*, Distal anastomosis new entry tear; *IQR*, interquartile range; *BMI*, body mass index; *CAD*, coronary artery disease; *COPD*, chronic obstructive pulmonary disease; *MI*, myocardial infarction; *CVA*, cerebrovascular accident; *PVD*, peripheral vascular disease.

patients to have any impact on the analysis for distal aortic reoperation. A total of 12 surgeons operated on the 327 ATAAD cases with a hemiarch technique over the 25-year study period (Figure 3), including 5 dedicated aortic surgeons with an annual ATAAD case volume of >10 and 7 cardiac surgeons with annual ATAAD case volume <10.

TABLE 2. Intraoperative characteristics

Characteristic	No-DANE (N = 246)	DANE (N = 81)	P value
Aortic root procedure, n (%)			
Root repair	140 (57)	41 (51)	.32
Root replacement	86 (35)	34 (42)	.26
Aortic valve replacement	5 (2.0)	0 (0)	.34
Aortic valve repair	14 (5.7)	6 (7.4)	.60
Frozen elephant trunk, n (%)	30 (12)	13 (16)	.37
Concomitant procedures, n (%)			
CABG	11 (4.5)	5 (6.2)	.56
Mitral valve	1 (0.4)	0 (0)	1
Tricuspid valve	3 (1.2)	0 (0)	1
CPB time, min, median (IQR)	210 (170-260)	220 (180-260)	.20
Cross-clamp time, min, median (IQR)	130 (110-180)	160 (110-210)	.06
HCA, n (%)	246 (100)	81 (100)	1
HCA time, min, median (IQR)	30 (23-37)	31 (23-39)	.59
Cerebral perfusion, n (%)			
None	1 (0.4)	0 (0)	1
Antegrade	110 (45)	36 (44)	.97
Retrograde	112 (46)	39 (48)	.68
Both antegrade and retrograde	23 (9.3)	6 (7.4)	.59
Lowest temperature, °C, median (IQR)	18 (18-23)	18 (18-21)	.50
PRBC units, median (IQR)	2 (0-5)	2 (0-5)	.85

DANE, Distal anastomosis new entry tear; *CABG*, coronary artery bypass grafting; *CPB*, cardiopulmonary bypass; *IQR*, interquartile range; *HCA*, hypothermic circulatory arrest; *PRBC*, packed red blood cell.

TABLE 3. Postoperative outcomes

Outcome	No-DANE (N = 246)	DANE (N = 81)	*P* value
Reoperation for bleeding, n (%)	16 (6.5)	4 (4.9)	.79
Tamponade, n (%)	4 (1.6)	1 (1.2)	1
Deep sternal wound infection, n (%)	3 (1.2)	2 (2.5)	.60
Sepsis, n (%)	10 (4.1)	1 (1.2)	.30
Postoperative MI, n (%)	3 (1.2)	0 (0)	1
Atrial fibrillation, n (%)	94 (38)	28 (35)	.56
Cerebrovascular accident, n (%)	14 (5.7)	3 (3.7)	.58
New-onset paraplegia, n (%)	1 (0.4)	0 (0)	1
Acute renal failure, n (%)	38 (15)	15 (19)	.52
Requiring dialysis, n (%)	18 (7.3)	4 (4.9)	.46
Permanent, n (%)	9 (3.7)	1 (1.2)	.46
Gastrointestinal complications, n (%)	28 (11)	3 (3.7)	**.04**
Pneumonia, n (%)	42 (17)	14 (17)	.97
Prolonged ventilation (>24 h), n (%)	133 (54)	38 (47)	.26
Duration of intubation, h, median (IQR)	37 (21-92)	33 (19-91)	.28
Reintubation, n (%)	12 (4.9)	1 (1.2)	.20
Tracheostomy, n (%)	5 (2.0)	1 (1.2)	1
Postoperative LOS, d, median (IQR)	10 (7-17)	11 (7-16)	.67
Total LOS, d, median (IQR)	11 (8-19)	12 (7-16)	.67
Operative mortality, n (%)*	4 (1.6)	0 (0)	.58
New postoperative arch tear, n (%)	35 (16)	76 (94)	**<.001**

Bold type indicates statistical significance. *DANE*, Distal anastomosis new entry tear; *MI*, myocardial infarction; *IQR*, interquartile range; *LOS*, length of stay. *Operative mortality includes 30-day mortality and/or in-hospital mortality.

A multivariable logistic regression analysis of all ATAAD patients showed that operation by an aortic surgeon was protective against the development of DANE compared to a nonaortic surgeon and identified preoperative branch dissection as a risk factor for DANE. There was no collinearity between the occurrence of DANE, preoperative branch dissection, and malperfusion for distal aortic reoperation.

DISCUSSION

In our study, 25% of the ATAAD patients with adequate imaging after hemiarch repair had a DANE, comparable to the 20% to 70% rates of DANE reported in the literature.[5,7-9] We found that ATAAD patients with a DANE have a significantly higher distal aortic reoperation rate compared to patients without DANE. A multivariable regression model showed that aortic surgery specialization and the presence of a preoperative branch dissection were predictive factors for the occurrence of a DANE ($P < .05$), whereas suture bore size and connective tissue disease were not associated with DANE.

The main goals of ATAAD repair are to resect the primary intima tear, direct the blood flow into the true lumen to treat dynamic malperfusion, and prevent expansion of the false lumen. In a DANE, the new intimal tear at the distal anastomosis (Figure 1, *B* and *C*) reintroduces blood flow into the false lumen proximally and defeats the goal of ATAAD repair. When there is persistent proximal flow through the false lumen, the false lumen may be pressurized, especially when the distal reentry tear is small or nonexistent. This results in false lumen expansion of the distal aorta, including the descending thoracic aorta and abdominal aorta.[10] It was not surprising that the patients with a DANE had more than double the cumulative incidence of distal aortic reoperation (Figure 2, *B*). Similarly, Tamura and colleagues[5] reported 5-year reoperation rates of 34% for patients with both a DANE and a patent false lumen, compared to 17% for patients without a DANE and a patent false lumen. With every 1-mm increase in the diameter of the entry tear, there is a 1.2 increase in the HR for dissection-related events, including reoperation.[8]

We previously identified arch branch vessel dissection as a risk factor for reoperation.[11] The present study reconfirms that finding and found a HR of 1.8 for branch vessel dissection for distal aortic reoperation ($P = .051$). We also identified branch vessel dissection as a significant risk factor for DANE, with an odds ratio of 2.42 ($P = .002$). The mechanism remains unknown. We speculate that patients with branch vessel dissection have more severe aortopathy, which could result in a more fragile dissection flap and easier tearing of the dissection flap at the distal anastomosis. These findings support considering a more aggressive approach to arch replacement for young and healthy patients with arch branch vessel dissection, aiming to reduce the need for future distal reinterventions, provided that the surgical team has experience with such procedures.

Interestingly, the presence of a DANE was not associated with any significant difference in the main perioperative outcomes or midterm survival after ATAAD repair. It is conceivable a small persistent proximal flow from the true lumen to the false lumen was not life-threatening perioperatively. The increased rate of reoperation in the DANE group did not affect their mid-term survival. This confirmed the main causes of death as organ failure from malperfusion, the impact of acute aortic dissection to the organ system, paraplegia, and progression of severe comorbidities, such as chronic kidney disease or coronary artery disease, that existed prior to the ATAAD (Table 4). Peak oxygen consumption was 16 $\text{mL} \cdot \text{kg}^{-1}\ \text{min}^{-1}$ in a group of volunteers after ATAAD repair, indicating the severe impact of ATAAD and its required operation on cardiopulmonary function.[12]

DANE is mainly a surgical technical issue in ATAAD repair regardless of whether a hemiarch or aggressive arch

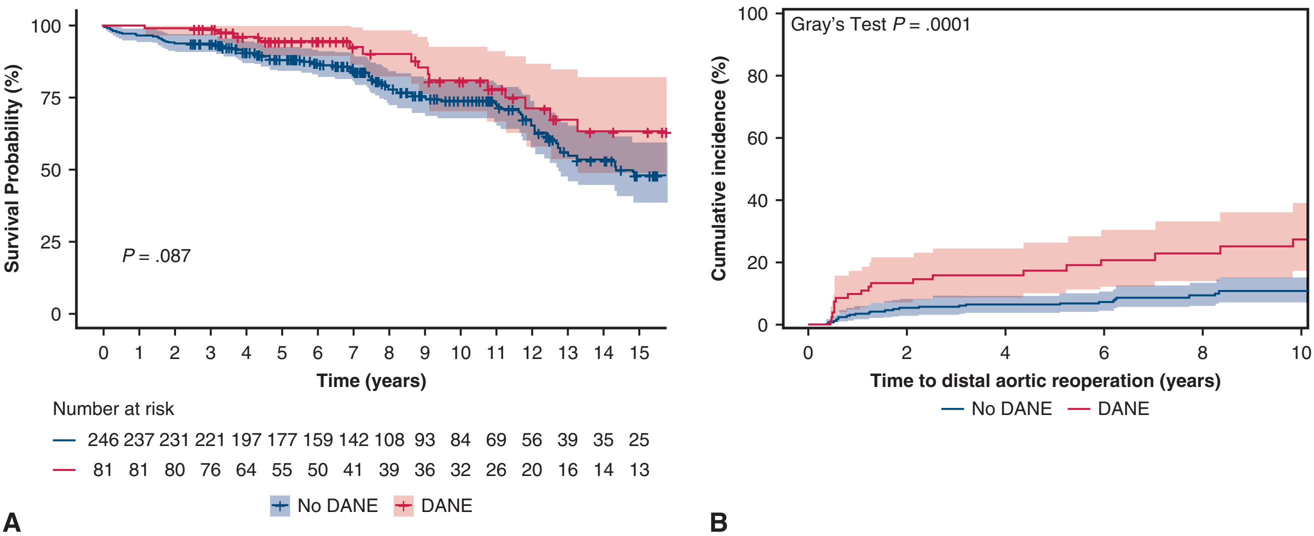

FIGURE 2. A, The 15-year survival was similar in the distal anastomosis new entry tear (*DANE*) and no-DANE groups (63% vs 48%; $P = .09$). B, The 10-year cumulative incidence of distal aortic reoperation was higher in the DANE group compared to the no-DANE group (30% [95% confidence interval (CI), 19%-42%] vs 12% [95% CI, 7.7%-17%]; $P = .0001$).

TABLE 4. Multivariable regression analysis for distal aortic reoperation and midterm mortality

Variable	OR/HR (95% CI)	P value
DANE*		
Age	0.99 (0.98-1.02)	.78
Female sex	0.78 (0.41-1.44)	.44
Aortic surgeon (vs nonaortic)	0.29 (0.08-1.00)	**.05**
Other aortic surgeons (vs aortic surgeon 1)	2.83 (1.17-8.03)	**.03**
Fine suture, 5-0	1.11 (0.60-2.00)	.74
Branch dissection	2.42 (1.39-4.35)	**.002**
Connective tissue disease	0.40 (0.14-2.91)	.68
Distal aortic reoperation†		
Age	1.00 (0.98-1.03)	.92
Female sex	0.70 (0.34-1.46)	.35
DANE	2.28 (1.28-4.06)	**.005**
Branch dissection	1.82 (1.00-3.36)	.051
Previous cardiac surgery	0.23 (0.03-1.70)	.15
Malperfusion syndrome	1.39 (0.73-2.65)	.31
Connective tissue disease	0.82 (0.23-2.94)	.76
Midterm mortality†		
Age	1.04 (1.02-1.06)	**<.001**
Female sex	1.24 (0.77-1.98)	.37
DANE	0.67 (0.39-1.15)	.15
Previous cardiac surgery	1.44 (0.71-2.93)	.31
Chronic renal failure	2.64 (1.14-6.08)	**.02**
COPD	0.91 (0.45-1.84)	.79
Coronary artery disease	1.81 (1.09-2.98)	**.02**
Malperfusion syndrome	0.91 (0.54-1.53)	.73

Bold type indicates statistical significance. *OR*, Odds ratio; *HR*, hazard ratio; *CI*, confidence interval; *DANE*, distal anastomosis new entry tear; *COPD*, chronic obstructive pulmonary disease. *OR for DANE. †HR for distal aortic reoperation and midterm mortality.

replacement is performed. Surgeon 1 had the lowest occurrence of DANE (10%), significantly lower than other aortic surgeons (Figure 3, Table 4). The occurrence of DANE also was significantly lower in cases performed by aortic surgeons compared to cases performed by nonaortic surgeons. Based on Surgeon 1's experience, it is important to prevent DANE by gently handling the dissected aorta including after suturing, using perpendicular and even bites of the suture line, and telescoping the Dacron graft into the true lumen of the dissected aorta. Teflon felt was used for the distal anastomosis before 2011 but not after 2011. The lowest rate of DANE was seen in the aortic surgeon who did not use any felt or biological glue for the anastomosis. We did not believe that using Teflon felt would prevent DANE. Compared to nonaortic surgeons, aortic surgeons were a protective factor against DANE (HR, 0.29) (Table 4). This result further supports ATAAD repair should be performed by aortic surgeons, as we reported in our previous study.[13]

Total arch replacement with frozen elephant trunk (FET) moves the DANE to the more distal aorta. FET can achieve thrombosis of the false lumen in 90% of cases[14]; however, a recent study by Gobel and colleagues showed no difference in long-term mortality or aortic reoperation rates between ATAAD patients who underwent proximal aortic repair and those who received an FET procedure.[15] Furthermore, a propensity score–matched analysis by Yoshitake and colleagues[16] found similar rates of distal aortic intervention in FET recipients and non-FET recipients, although more patients in the no FET group underwent open repair compared to TEVAR. A meta-analysis found that FET was associated with an increased the rate of false lumen thrombosis but no decrease in the rate of reoperation.[17] Given that FET has not

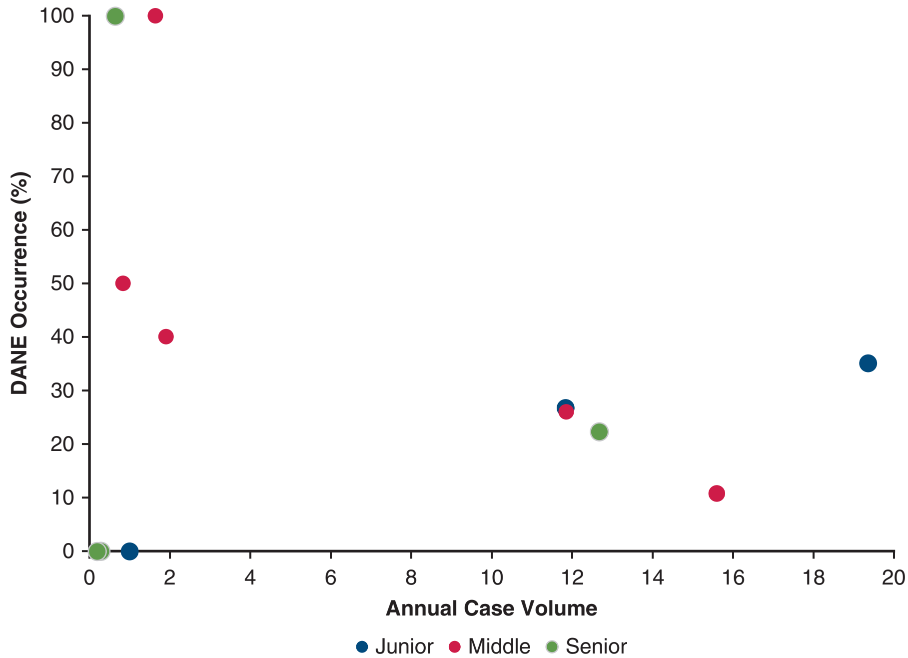

FIGURE 3. Scatterplot showing the association between distal anastomosis new entry tear (*DANE*) occurrence and annual acute type A aortic dissection (*ATAAD*) case volume for each of the 12 surgeons. Different colors denote junior (≤5 years), middle (6-10 years), and senior (>10 years) surgeons.

been shown to consistently decrease the distal reoperation rate in ATAAD, whether the better seal of the FET has clinical significance in preventing a DANE and reoperation is questionable. Moreover, total arch with FET is a much more complex operation than hemiarch and carries a much higher operative mortality in general.[18]

The Ascyrus medical dissection stent (AMDS) is a relatively new device. One study found a significantly lower incidence of DANE in ATAAD patients who underwent hemiarch repair with the AMDS (12%) compared to those who underwent hemiarch repair alone (43%).[19] However, in that study, the median follow-up time was only slightly longer than 5 months in both groups, and the sample size was small. The use of AMDS decreased false lumen patency rates from the aortic arch to the proximal descending aorta, but there was no difference in aortic growth rate between the two groups. It will be interesting to see whether reoperation rates are different once more long-term data are available.

Finally, in this study, a new aortic arch tear was defined as an arch tear that was not present on the preoperative CT scan and was >2 cm away from the suture line of the distal anastomosis on the postoperative CT scan. The DANE group had a significantly higher incidence of new arch tears (94% vs 16%) (Table 3), indicating that patients with a DANE likely had more fragile aortic tissue and an aortic dissection flap, which could be another reason for the occurrence of DANE.

Limitations of our study include the inherent features of a single-center retrospective study. Almost 25% of the patients were not analyzed for DANE after hemiarch repair, because of death or lack of adequate imaging. This could have impacted the mid-term survival outcomes in the DANE and no-DANE groups, but not reoperations, as the sensitivity test showed. In addition, the sample size of the DANE group was relatively small, which could have resulted in a type II error.

CONCLUSIONS

The occurrence of a DANE was associated with an increased need for a distal aortic reoperation. Surgeons should try their best to prevent DANEs from a technical aspect during ATAAD repair.

Webcast

You can watch a Webcast of this AATS meeting presentation by going to: https://www.aats.org/resources/distal-anastomosis-reentry-tea-7055.

Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

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