Clinical Outcomes of Limited-repair Strategy and Conservative Approach for the Elderly With Acute Type A Aortic Dissection

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Abstract

Background

There is controversy regarding surgical indication and surgical procedure of acute type A aortic dissection for the elderly. We examined surgical outcomes for the elderly.

Methods

From January 2012 to December 2019, 174 patients underwent surgical repair for acute type A aortic dissection. We compared the surgical outcomes between the elderly group (≥ 80 years old) and the non-elderly group (≤ 79 years old). Additionally, we compared the surgical treatment group with the conservative treatment group.

Results

The primary entry was found in the ascending aorta in 51.6% of the elderly group and in 32.8% of the non-elderly group ($p = 0.049$). In the elderly group, ascending or hemiarch replacement was performed in all cases, while in the non-elderly group, ascending or hemiarch replacement was performed in 57.3% ($p < 0.001$). The hospital mortality was similar in both groups. The 5-year survival rate was $48.4 \pm 10.3\%$ in the elderly group and $86.7 \pm 2.9\%$ in the non-elderly group ($p < 0.001$). The rates of freedom from aortic event at 5 years was $86.9 \pm 8.7\%$ in the elderly group and $86.5 \pm 3.9\%$ in the non-elderly group ($p = 0.771$). The 5-year survival rate of conservative treatment group was $19.2 \pm 8.0\%$ in the elderly. There was no significant difference from the surgical treatment group ($p = 0.103$).

Conclusions

The surgical approach may not always be the reasonable treatment of choice for the elderly because the significant survival merit was not achieved compared with the conservative approach.

Background

Although the surgical results of acute type A aortic dissection have improved recently, there are still many problems. Now that we are in an aging society, surgical indication and procedure selection of surgical treatment for elderly are important issues. The same issues apply to surgical treatment of acute type A aortic dissection in elderly. In the surgical treatment of acute type A aortic dissection, it has been reported that even elderly patients should have surgical indications as well as non-elderly patients [1–3], while elderly patients should carefully decide on the surgical indication [4]. There is also a report that elderly patients should select partial arch replacement or hemiarch replacement as a surgical procedure [5, 6]. There is also a report that surgical outcomes have been the same between the elderly and non-elderly patients [7]. On the other hand, elderly patients are not only prone to dementia and bedridden after surgery but may also increase the burden on their families [8–10].

For the past few years, we have selected the ascending aortic replacement (including hemiarch replacement) as the surgical procedure for acute type A aortic dissection in patients aged 80 years or older regardless of the primary entry site. The aim of this study was to examine the adequacy of our strategy.

Methods

All operations and data collection were performed in Ise Red Cross Hospital, Ise, Japan. Clinical outcome data was obtained from the hospital's patient records or information from the patient's family doctor.

From January 2012 to December 2019, 174 patients underwent surgical repair for acute type A aortic dissection at our institution. We divided these patients into the elderly group ($n = 31, \geq 80$ years old) and the non-elderly group ($n = 143, \leq 79$ years old). We compared the surgical results of both groups. At the same time, the cases of acute aortic dissection who chose conservative treatment because of comorbidities or refusal of surgical treatment were also divided into the elderly group and the non-elderly group. In both the elderly and non-elderly groups, we compared the outcomes between the surgical treatment group and the conservative treatment group.

The Institutional Review Board approved the present study and all the subjects gave informed consent.

Operative Techniques

The operation was performed through a median sternotomy in all patients. Arterial cannulation sites (femoral artery alone or right axillary artery combined) were determined according to the patient's status, preoperative organ malperfusion and the preference of the surgeon. A two-stage venous cannula was inserted into the right atrium and cardiopulmonary bypass (CPB) was established. Systemic cooling to 25°C in pharynx was applied. The left ventricle was vented through the right superior pulmonary vein. After the distal ascending aorta was clamped, the ascending aorta was opened and cold cardioplegia was delivered directly in the coronary ostia. Subsequent myocardial protection was performed by retrograde infusion. Hypothermic arrest was obtained at pharynx temperature less than 25°C, and then the aortic arch was opened and assessed. The cerebral perfusion was achieved by the antegrade selective cannulation to orifices of all arch branches. However, when the right axillary artery was used as a cannulation site for the CPB, the right axillary artery cannula was substituted for antegrade cerebral perfusion, and the proximal part of the brachiocephalic artery was clamped.

Open distal anastomosis was performed regularly under moderate hypothermic circulatory arrest (25°C) and antegrade selective cerebral perfusion.

Regarding the extent of graft replacement, we have decided as follows: In the elderly group, ascending or hemiarch replacement was performed regardless of the primary entry site. In the non-elderly group, if the primary entry was located on the ascending aorta or lesser curvature of the aortic arch, then ascending or hemiarch replacement was selected. If the primary entry was located beyond the left subclavian artery or

greater curvature of the aorta, total arch replacement (TAR) was principally performed. In patients undergoing TAR, all distal anastomosis was performed using a conventional elephant trunk (ET) or frozen elephant trunk (FET) [11] depending on the age and patient situation.

In patients undergoing ascending or hemiarch replacement, reinforcement of the distal anastomosis was performed by improving the conventional adventitial inversion technique [12]. In brief, after BioGlue® was applied to obliterate the false lumen, the redundant adventitia was inverted into the aortic lumen and the Teflon felt to which TachoSil® (fibrinogen/thrombin-based collagen fleece) was attached was placed on the outer wall of the aorta, and tacked to the luminal surface of the intima using polypropylene mattress sutures. As described above, anastomotic site of the aorta was performed.

After the distal anastomosis, whole body circulation was resumed through the branch of the prosthesis, and the patient was fully rewarmed to 35°C. The ascending aorta was transected at a level 1 to 2cm distal to the sinotubular junction. The proximal reinforcement and anastomosis were performed in modified adventitial inversion technique as in the above mentioned distal.

A single-branch prosthesis (J Shield Neo; Japan Life Line) was used in ascending aortic or hemiarch replacement, a 4-branch prosthesis (J Shield Neo; Japan Life Line) was used in TAR. FET prosthesis (J graft Frozenix®, Japan Life Line, Tokyo) was used in FET technique.

Definitions

Preoperative shock was defined as systolic blood pressure lower than 80 mmHg, cardiac tamponade was defined as a shock caused by cardiac effusion observed in preoperative echocardiography. Malperfusion was defined as a symptom due to disruption of blood flow to end-organ systems classified as a central nervous system, coronary, viscera, or extremities. Central nervous system disorders caused by malperfusion were classified as a transient or persistent according to the duration of the clinical presentation. Stroke was defined as a central neurologic deficit after surgery and confirmed by computed tomography (CT) or magnetic resonance imaging (MRI). Hospital mortality was defined as death within the hospital.

We defined the location of the primary entry using intraoperative findings. Regarding the classification of the entry site, we defined the ascending aorta up to the brachiocephalic artery bifurcation. The proximal arch was defined as the brachiocephalic artery bifurcation to the left common carotid artery bifurcation, and the distal arch was defined as the left common carotid artery bifurcation to the left subclavian artery bifurcation. The descending aorta was defined from the bifurcation of the left subclavian artery. In addition, if the entry was not found from intraoperative findings, it was set as unknown.

In order to evaluate ADL status at discharge, it was defined as follows according to JACVSD (Japan national clinical database), severely compromised: Modified Rankin scale [13] grade 5, moderately compromised: Modified Rankin scale grade 4, not affected: Modified Rankin scale grade 0–3.

In order to evaluate the postoperative false lumen patency rate, contrast-enhanced CT within 6 months after surgery was used and classified as follows, fully thrombosed, thoracic aorta patent, thoracic and abdominal aorta patent, abdominal aorta patent and unknown.

Statistical analysis

All statistical analysis was performed using statistical software: EZR (Easy R) on R commander[14]. Continuous variables were presented as mean $\pm$ standard deviation and were compared using a Student t-test. Categorical variables were presented using numbers and percentages and were compared using a χ^2 test. Multivariate Cox proportional hazard regression was performed for the analysis of hospital mortality. Kaplan-Meier survival curves were created to assess difference in survival between the elderly patients' group and the non-elderly patients' group, between the surgical treatment group and the conservative treatment group. Survival distributions were compared with the long-rank test. P values of $< .05$ were considered significant.

Results

Table 1 shows the preoperative characteristics. DeBakey type II was significantly more common in the elderly group, and type I was significantly more common in the non-elderly group. Complete thrombosis of the false lumen was significantly more common in the elderly group. The 30 days operative mortality of the Japan score did not differ between the two groups.

Table 2 shows the intra-operative data. The primary entry was found in the ascending aorta in 51.6% of the elderly group and in 32.8% of the non-elderly group, a significant difference ($p = 0.049$). Primary entry resection rates did not differ between the two groups (87.0% elderly group, 82.5% non-elderly group, $p = 0.535$). Regarding the surgical procedure, in the elderly group, ascending or hemiarch replacement was performed in all cases, while in the non-elderly group, 57.3% performed ascending or hemiarch replacement, and a significant difference was observed between two groups ($p < 0.001$). Operation time, CPB time and selective cerebral perfusion time were significantly longer in the non-elderly group than those in the elderly group. Intraoperative blood loss was significantly lower in the elderly group ($p = 0.023$).

Table 3 shows the postoperative data. Stroke was found in 25.8% of the elderly group and 27.2% of the non-elderly group. There were 5 hospital deaths in the elderly group (mortality 16.1%). The causes of death were stroke ($n = 3$), sepsis ($n = 1$), rupture of residual aorta ($n = 1$). There were 11 hospital deaths in the non-elderly group (mortality 7.6%). The causes of death were stroke ($n = 8$), postoperative bleeding ($n = 2$), rupture of residual aorta ($n = 1$). The home discharge rate was 41.9% in the elderly group, which was significantly lower than 63.6% in the non-elderly group ($p = 0.025$). Regarding to ADL status at discharge, not affected group was significantly more common in the non-elderly group ($p = 0.002$), and severely compromised group was significantly more common in the elderly group ($p = 0.010$). Regarding to postoperative false lumen patency, complete thrombosis of the false lumen was significantly more

common in the elderly group ($p = 0.021$). Thoracic and abdominal aorta patent of the false lumen was significantly more common in the non-elderly group ($p < 0.001$). As late aortic events, TEVAR (thoracic endovascular aortic repair), descending aorta rupture, descending aorta replacement, anastomotic pseudoaneurysm and others were recognized as shown in Table 3.

At the same time, there were 45 cases of acute type A aortic dissection in the elderly who chose conservative therapy because of comorbidities or refusal of surgical treatment. The details of why treatment became conservative were as follows. There were 21 cases in which the patients and their families refused surgery, 12 cases in which ADL decreased, 7 cases in which thrombosis and reducing of the false lumen and 5 cases in advanced dementia. Table 4 shows a comparison between the surgical treatment group and the conservative treatment group in elderly patients with acute type A aortic dissection. Dementia and activities of daily living (ADL) decrease to the extent that it was impossible to walk on its own were significantly higher in the conservative treatment group. Dissection related status did not differ between two groups. The length of hospital stay was significantly shorter in the conservative treatment group. There was no significant difference in ADL status at discharge between the surgical group and the conservative group.

Multivariate Analysis for Hospital Mortality

To identify risk factors associated with hospital mortality, we performed a multivariate logistic regression analysis (Table 5). Significant risk factors were age, preoperative intubation, CPB time and postoperative stroke.

Long-Term Mortality

The overall mean follow-up period was 30.3 ± 28.3 (median 21, range 0.03-93) months. The mean follow-up period was 19.3 ± 25.6 (median 6, range 0.03-86) months in the elderly surgical group. The mean follow-up period was 17.0 ± 23.4 (median 10, range 0.03-93) months in the elderly conservative group. The mean follow-up period was 36.8 ± 27.9 (median 32, range 0.03-93) months in the non-elderly surgical group. The mean follow-up period was 30.8 ± 28.7 (median 24, range 0.03-91) months in the non-elderly conservative group. The 5-year survival rate was 48.4 ± 10.3 % in the elderly group and 86.7 ± 2.9 % in the non-elderly group, which was significantly different ($p < 0.001$, Fig. 1A). Although, the rates of freedom from aortic events at 5 years was 86.9 ± 8.7 % in the elderly group and 86.5 ± 3.9 % in the non-elderly group, which was not significantly different ($p = 0.771$, Fig. 1B). The 5-year survival rate of conservative treatment group was 19.2 ± 8.0 % in the elderly at the same time. There was no significant difference from the surgical treatment group ($p = 0.103$, Fig. 2A). We compared the 5-year survival rate of the surgical and conservative groups even in non-elderly patients. The prognosis was significantly better in the surgical group ($p = 0.024$, 86.7 ± 2.9 % in surgical group, 63.5 ± 9.6 % in conservative group, Fig. 2B).

Discussion

In recent years, the surgical outcome of acute type A aortic dissection has improved, but various complications occur after surgery, and it remains a fatal disease. In the present age of the aging society, there are increasing opportunities to experience acute type A aortic dissection cases in the elderly. In particular, Japan is one of the world's longest-lived countries, and it is thought that there are many opportunities to encounter such situations.

There are many reports of surgical outcomes in elderly patients for acute type A aortic dissection. The surgical mortality rate was 3.7–35% [2–4, 9, 10, 15–18]. Regarding the surgical procedure for acute type A aortic dissection, TAR has been reported to have a higher mortality and morbidity than ascending or hemiarch replacement [19], while it has been reported that CPB, aortic clamp and circulatory arrest times were longer, there is no difference in mortality and morbidity between hemiarch replacement and TAR [20]. There are reports that all surgical procedures for acute type A aortic dissection in elderly patients were ascending or hemiarch replacement [2, 9], and nearly 90% were ascending or hemiarch replacement [3, 10, 17, 19]. In other words, there are many reports that elderly patients avoid TAR as a surgical procedure for acute type A aortic dissection. We have strategy that we have selected the ascending or hemiarch replacement as the surgical procedure for acute type A aortic dissection in patients over 80 years old regardless of the primary entry site. Then, there is a problem that if the primary entry cannot be resected, does it affect the prognosis? Non-resection of the primary entry was a predictor of survival and distal aortic events [21]. It has been reported that aggressive primary entry resection enhances the false lumen thrombosis and reduces aortic reoperation [22]. On the other hand, there is also a report that aortic events do not change even if the entry is not resected by careful follow-up [23]. In our study, the entry resection rate in the elderly group was 87%, and all patients in the elderly selected ascending or hemiarch replacement as the surgical procedure. Elderly patients did not differ in entry resection rate and long-term aortic events compared to non-elderly patients. Descending aorta replacement, TEVAR and rupture of the descending aorta as late aortic events occurred in 2 cases in the elderly group and 8 cases in the non-elderly group (Table 3). Of these, both of the 2 cases in the elderly group were able to undergo entry resection and 5 cases in the non-elderly group were able to undergo entry resection. Therefore, even if the entry can be resected, if there is a reentry in the residual aorta, aortic remodeling may proceed, and careful follow-up is required. In addition, in our multivariate analysis of postoperative hospital mortality, advanced age and longer CPB time were risk factors. CPB time can be shortened by selecting ascending or hemiarch replacement for the elderly. From the above, selecting ascending or hemiarch replacement without sticking to the entry resection and shortening the operation time may contribute to the surgical outcomes in the elderly with acute type A aortic dissection.

The location of the primary entry tear in patients with acute type A aortic dissection significantly influences early outcomes, short and long-term survival of patients [24]. In general, the intimal tear is frequently found in segments exposed to the greatest shear stress, namely the right lateral wall (opposite the main pulmonary artery) of the ascending aorta or in the proximal segment of the descending aorta [25]. In our study, primary entry was likely to occur in the ascending aorta and DeBakey type I dissection was likely to occur in elderly patients. There are other reports like this [3, 4]. Elderly patients may be more

likely to be stressed by the ascending aorta due to the prognosis of arteriosclerosis. Therefore, the primary entry is common in the ascending aorta in the elderly patients.

Next, we would like to discuss the indication for surgery and postoperative course in the elderly. Although the general condition before surgery affects the surgical outcome, advanced age alone should not be considered as a contraindication to acute type A aortic dissection repair [2, 3, 6]. The age 80 years or older was the risk factor for hospital mortality in operation for acute type A aortic dissection [4]. Hata and colleagues described [9] that the elderly patient after surgery had complications such as cerebral damage, depression, pneumonia, or renal failure and ultimately became bedridden, causing the family significant mental, physical, and economic stress. Aoyama and colleagues described [19] that patients of acute type A aortic dissection aged 80 years or older were compared in the surgical treatment group and in the conservative treatment group, the home discharge rate was significantly higher for the conservative treatment group (52.8% conservative treatment group, 42.8% surgical treatment group, $p < 0.01$). Furthermore, the hospital length of stay and ICU length of stay were significantly longer in the surgical treatment group, and the medical expenses were also significantly higher in the surgical treatment group than in the conservative treatment group. In our study, the ADL status at discharge was significantly worse in the elderly, also, the home discharge rate was 41.9% in the elderly group, which was significantly lower than 63.6% in the non-elderly group. In addition, of the 12 patients who were transferred to the rehabilitation hospital after surgery in the elderly group, 4 died, and all died of pneumonia or heart failure within one year after surgery. In addition, when comparing the surgical treatment group and the conservative treatment group of the elderly, there was no difference in 5-year survival between the two groups. In the elderly, even if life can be saved, it may lead to a decrease in quality of life and may not benefit from surgical treatment in long-term prognosis.

Based on the above, surgical indication for elderly patients with acute type A aortic dissection should be carefully considered. Elderly patients are apt to fall into irreversible physical deterioration after surgery, and may progress to dementia, or be bedridden at worst. In such a situation, the burden and stress on the family will increase. Post intensive care syndrome (PICS) [26, 27] should be fully considered. It is necessary to work together for postoperative rehabilitation as a united team of cardiac surgery in order to be discharged home as much as possible.

In our study, postoperative stroke was found to be more frequent in both the elderly group and the non-elderly group. Four out of 8 cases of postoperative stroke in the elderly had persistent CNS malperfusion before surgery. And 14 out of 39 cases of postoperative stroke in the non-elderly had persistent CNS malperfusion before surgery. Therefore, the cases with postoperative stroke may include cases in which stroke has occurred before surgery. On the other hand, postoperative stroke is a major risk factor affecting hospital mortality, as shown by our study. Stroke was the most common cause of postoperative death in both elderly and non-elderly patients. Stroke reduction is the most important factor to improving surgical results. The effectiveness of axillary artery cannulation has been reported to prevent strokes after aortic arch replacement [28–30]. To reduce postoperative neurological damage, we are currently trying to actively introduce and improve cannulation from the right axillary artery in the CPB.

Limitations

The present study is limited due to its retrospective, single-center design. It is hard to say a clear conclusion because of the small numbers of cases, there was no difference in hospital death and long-term survival between the surgical treatment group and the conservative treatment group of the elderly. In the future, as the number of cases increase, it may be possible to obtain results that the hospital death is significantly reduced in the surgical treatment group. Therefore, the superiority of surgical treatment for acute type A aortic dissection may increase even in the elderly. Although not in this study, we have recently been collecting data to assess pre and postoperative ADL using the Barthel index. It may help predict postoperative outcomes in the elderly.

Conclusions

In the elderly patients, primary entry due to acute type A aortic dissection is likely to occur in the ascending aorta and DeBakey type I dissection is likely to occur, which is consistent with the selection of ascending or hemiarch replacement as the surgical procedure. Because elderly patients are prone to irreversible physical deterioration after surgery, it may not be possible to take advantage of surgical treatment. The surgical approach may not always be the reasonable treatment of choice for the elderly because the significant survival merit was not achieved compared with the conservative approach. This point should be fully explained to the family and the indication for surgery should be decided.

Abbreviations

TAR = total arch replacement

ET = elephant trunk

FET = frozen elephant trunk

CT = computed tomography

MRI = magnetic resonance imaging

ICU = intensive care unit

AVR = aortic valve replacement

CABG = coronary artery bypass grafting

CNS = central nervous system

CPB = cardiopulmonary bypass

ADL= activities of daily living

TEVAR = thoracic endovascular aortic repair

Declarations

Ethics approval and consent to participate

This study has been approved by Institutional Review Board for Observation and Epidemiological Study of Ise Red Cross Hospital and all the subjects gave informed consent.

Consent for publication

The patients gave permission for the publication of this study.

Availability of data and materials

Please contact corresponding author for data request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

YM designed the study and wrote the initial draft of the manuscript.

YM and TT contributed to the analysis and interpretation of the data and assisted in the preparation of the manuscript

MM, BN, RI, RH and KH contributed to the clinical management of patients.

YM and TT performed the surgery of patients.

YM and TT revised the manuscript critically and approved the modified text.

All authors read and approved the final manuscript.

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Tables

Table 1. Preoperative characteristics

	Elderly group (n= 31)	Non-elderly group (n= 143)	p value
Age	83.6±2.8	64.0±10.4	< 0.001
Male sex	10(32.2)	74(51.7)	0.073
Hypertension	19(61.2)	88(61.5)	0.979
Hemodialysis	0	2(1.3)	0.507
Coronary artery disease	0	4(2.7)	0.346
Cerebrovascular disease	2(6.4)	14(9.7)	0.559
Dissection related status			
DeBakey			
I	16(51.6)	108(75.5)	0.007
II	15(48.4)	32(22.3)	0.003
III	0	3(2.1)	0.415
Fully thrombosed false lumen	14(45.1)	33(23.0)	0.012
Preoperative shock	8(25.8)	36(25.1)	0.941
Tracheal intubation	2(6.4)	15(10.4)	0.492
Cardiac tamponade	9(29.0)	33(23.0)	0.482
Pericardial drainage	8(25.8)	20(13.9)	0.104
Organ malperfusion	6(19.3)	48(33.5)	0.121
CNS	6(19.3)	37(25.8)	0.445
Transient	1(3.2)	15(10.4)	0.204
Persistent	5(16.1)	22(15.3)	0.917
Japan Score			
30 days operative mortality	9.6±6.7	10.9±13.7	0.296

CNS: central nervous system

Table 2. Intra-operative data

	Elderly group (n= 31)	Non-elderly group (n= 143)	p value
Entry site			
Ascending aorta	16(51.6)	47(32.8)	0.049
Proximal arch	8(25.8)	33(23.0)	0.745
Distal arch	5(16.1)	40(27.9)	0.172
Descending aorta	0	10(6.9)	0.129
Unknown	2(6.4)	13(9.0)	0.635
Entry resection	27(87.0)	118(82.5)	0.535
Procedures			
Ascending / Hemiarch replacement	31(100)	82(57.3)	< 0.001
Total arch replacement	0	61(42.7)	< 0.001
Concomitant procedures			
AVR	0	4	
CABG	2	7	
Root replacement	1	3	
Operative data			
Duration, minutes			
Operation	347.1±92.2	425.1±123.6	< 0.001
Cardiopulmonary bypass	206.8±52.0	245.2±69.3	0.002
Circulatory arrest	58.0±9.4	55.2±14.5	0.151
Cardiac arrest	153.7±33.0	160.5±39.1	0.184
Selective cerebral perfusion	57.5±16.4	99.8±58.5	< 0.001
Blood loss, mL	1489.7±686.4	2046.7±1517.5	0.023

AVR: aortic valve replacement CABG: coronary artery bypass grafting

Table 3. Postoperative data

	Elderly group (n= 31)	Non-elderly group (n= 143)	p value
Mechanical ventilation time $\geq$ 48 hours	9(25.0)	35(24.4)	0.596
Renal replacement therapy	3(9.6)	10(6.9)	0.606
Stroke	8(25.8)	39(27.2)	0.867
Length of ICU stay, days	8.0 $\pm$ 8.6	6.5 $\pm$ 6.6	0.170
Length of hospital stay, days	25.3 $\pm$ 23.3	27.2 $\pm$ 22.1	0.332
ADL status at discharge			
not affected	12(38.7)	97(67.8)	0.002
moderately compromised	8(25.8)	27(18.8)	0.383
severely compromised	6(19.3)	8(5.5)	0.010
Discharge to home	13(41.9)	91(63.6)	0.025
Hospital death	5(16.1)	11(7.6)	0.140
Postoperative false lumen patency			
Fully thrombosed	16(51.6)	43(30.0)	0.021
Thoracic aorta patent	2(6.4)	5(3.4)	0.447
Thoracic and abdominal aorta patent	4(12.9)	67(46.8)	p<0.001
Abdominal aorta patent	1(3.2)	13(9.0)	0.276
Unknown	8(25.8)	15(10.4)	0.022
Late aortic events			
TEVAR	1	5	
Descending aorta rupture	1	1	
Descending aorta replacement		2	
Anastomotic pseudoaneurysm		2	
Others		2	

ICU: intensive care unit ADL: activities of daily living TEVAR: thoracic endovascular aortic repair

Table 4. Characteristics of surgical group and conservative group in elderly patients

All patients over 80 years of age			
	Surgical group (n= 31)	Conservative group (n= 45)	p value
Age	83.6±2.8	85.4±3.5	0.013
Male sex	10(32.2)	14(31.1)	0.915
Preoperative status			
Dementia	1(3.2)	10(22.2)	0.020
Cerebrovascular disease	2(6.4)	4(8.8)	0.698
ADL decline	0	13(28.8)	0.001
Dissection related status			
DeBaKey			
I	16(51.6)	28(62.2)	0.357
II	15(48.4)	14(31.1)	0.127
III	0	1(2.2)	0.403
unknown	0	2(4.4)	0.234
Fully thrombosed false lumen	14(45.1)	23(51.1)	0.610
Pericardial drainage	8(25.8)	7(15.5)	0.269
ADL status at discharge			
not affected	12(38.7)	11(24.4)	0.183
moderately compromised	8(25.8)	13(28.8)	0.767
severely compromised	6(19.3)	7(15.5)	0.665
Hospital death	5(16.1)	14(31.1)	0.138
Length of hospital stay, days	25.3±23.3	14.9±12.0	0.006
Discharge home	13(41.9)	11(24.4)	0.106

ADL: activities of daily living

Table 5. Multivariate logistic regression analysis for risk factors associated with hospital mortality

variable	Odds ratio	95% Confidence interval	p value
Age	9.38	1.64-53.6	0.01
Malperfusion	1.07	0.28-4.09	0.91
CNS (transient)	0.52	0.06-4.34	0.55
CNS (persistent)	0.67	0.13-3.54	0.64
Preoperative intubation	14.0	2.47-79.0	p<0.01
CPB long ($\geq$ 240 minutes)	6.40	1.12-36.5	0.03
TAR	1.98	0.32-12.0	0.45
Postoperative stroke	10.8	2.62-44.6	p<0.01

CNS: central nervous system CPB: cardiopulmonary bypass TAR: total arch replacement

Figures

Figure 1

A: The 5-year survival rate was $48.4 \pm 10.3\%$ in the elderly group and $86.7 \pm 2.9\%$ in the non-elderly group, which was significantly different. B: The rates of freedom from aortic events at 5 years was $86.9 \pm 8.7\%$ in the elderly group and $86.5 \pm 3.9\%$ in the non-elderly group, which was not significantly different.

Figure 2

A: The 5-year survival rate was $48.4 \pm 10.3\%$ in the surgical treatment group of the elderly and $19.2 \pm 8.0\%$ in the conservative group of the elderly, which was not significantly different. B: The 5-year survival rate was $86.7 \pm 2.9\%$ in the surgical treatment group of the non-elderly and $63.5 \pm 9.6\%$ in the conservative group of the non-elderly, which was significantly different.