

# Surgical Outcome of Acute Type A Aortic Dissection Requiring Preoperative Cardiopulmonary Resuscitation without Patient Selection

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# Objective

## Acute aortic dissection (AD) type A requiring preoperative cardiopulmonary resuscitation (CPR) – multicenter databases

### STS

DISEASES OF THE AORTA  
ORIGINAL ARTICLE

WILEY Journal of Thoracic and Cardiovascular Surgery

**Contemporary management and outcomes of acute type A aortic dissection: An analysis of the STS adult cardiac surgery database**

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**CPCR 5.2%**

**Early mortality OR 4.24**

**P < 0.0001**

Abstract  
 Acute aortic dissection (AAD) is challenging and associated with high mortality. The purpose of this study was to describe contemporary surgical strategies and outcomes for AAD. **Methods:** Between July 2011 and September 2012, 2982 patients with AAD were included in the STS Adult Cardiac Surgery Database (STS ACD) to describe contemporary surgical strategies and outcomes for AAD. **Results:** Among 640 patients who underwent surgery, the median perfusion and cross-clamp times were 47 and 100 minutes, respectively. The lowest temperature on bypass showed significant variation. Hypothermic circulatory arrest (HCA) was used in 78% of cases. **Conclusions:** These data describe contemporary patient characteristics, operative strategies, and outcomes for AAD in North America. Mortality and morbidity for AAD remain high.

KEYWORDS  
 aortic dissection

### NORCAAD

Resuscitation

EUROPEAN RESUSCITATION COUNCIL

journal homepage: www.elsevier.com/locate/resuscitation

Short paper

**Outcome after type A aortic dissection repair in patients with preoperative cardiac arrest**

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Abstract  
 Background: Preoperative cardiac arrest (CPR) is associated with a poor prognosis, but limited data is available. We used a large database to evaluate the outcome of AAD patients with a cardiac arrest before surgery. **Methods:** We evaluated 1154 surgically treated AAD patients from the Nordic Consortium for Acute Type A Aortic Dissection (NORCAAD) database between 2005 and 2014. Patients with (n=44, 3.8%) and without preoperative cardiac arrest were compared and variables univariably associated with mortality in the cardiac arrest group were identified. Median follow-up time was 2.7 years (interquartile range 0.5–5.5). **Results:** Thirty-day mortality in the arrest and non-arrest group was 43.2% and 16.6%, respectively (odds ratio [OR] 3.83, CI 2.06–7.09; P < 0.001). In the non-patients with ongoing cardiopulmonary resuscitation who cardiopulmonary bypass was initiated, five died intraoperatively and one died after 65 days. In patients surviving the operation, stroke was significantly more common in the arrest group (48.4% vs 18.2%; OR 4.21, CI 2.05–8.67; P < 0.001). In total, 50.0% (22/44) of the arrest patients survived to the end of follow-up. Non-survivors in the arrest group more often had DeBakey type I dissection, cardiac tamponade, cardiac malperfusion and higher preoperative serum lactate (all P < 0.05).

### GERAADA

Mortality in patients with acute aortic dissection type A: analysis of pre- and intraoperative risk factors from the German Registry for Acute Aortic Dissection Type A (GERAADA)

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**CPCR 5.9%**

**Early mortality 52.4%**

Abstract  
**OBJECTIVES:** Acute aortic dissection type A (AADA) is an emergency with excessive mortality if surgery is delayed. Knowledge about independent predictors of mortality in surgically treated AADA patients is scarce. Therefore, this study was conducted to identify pre- and intraoperative risk factors for mortality in AADA patients. **METHODS:** The German Registry for Acute Aortic Dissection Type A (GERAADA) is a multicenter, prospective German Registry for Acute Aortic Dissection Type A (GERAADA), presenting preoperative status, operative strategies, postoperative outcomes and AADA-related risk factors for death. Multiple logistic regression analysis was performed to identify the influence of different parameters on 30-day mortality. **RESULTS:** Overall 30-day mortality (16.9%) increased with age (adjusted odds ratio (OR) = 1.121) and among patients who were comatose (adjusted OR = 3.501) or those who underwent cardiopulmonary resuscitation (adjusted OR = 3.751; all P < 0.0001). The higher the number of organs that were transplanted, the higher the death rate was (adjusted OR for one organ = 1.851, two organs = 2.916, three organs or more = 3.395, P < 0.0001). Mortality increased with longer operating times (total, cardiopulmonary bypass, cardiac, aortic, and circulatory arrest; all P < 0.02). Arterial cannulation site for extracorporeal circulation, operative techniques and arch interventions had no significant impact on 30-day mortality (all P > 0.1). No significant risk factors, but relevant increases in mortality, were determined in patients suffering from paraparesis pre- and postoperatively (each P < 0.01), and in patients experiencing paraparesis after surgery (P < 0.02). **CONCLUSIONS:** GERAADA could detect significant disease- and surgery-related risk factors for death in AADA, influencing the outcome of surgically treated AADA patients. Comatose and resuscitated patients have the poorest outcome. Cannulation sites and operative techniques did not seem to affect mortality. Short operative times are associated with better outcomes.

Keywords: Aorta · Death · Ischaemia · Shock · Surgery

**INTRODUCTION**  
 Fifty percent of patients suffering acute type A aortic dissection are dead within 48 h<sup>1</sup> and a conventional wisdom has evolved that AADA carries a “1% per hour” mortality<sup>2</sup> are classical statements in the literature about the natural course of acute aortic dissection type A (AADA)<sup>1, 2</sup>. In the management of AADA patients, survival is strongly dependent on a sufficient operative strategy and emergency surgery for AADA has become the gold standard, but the major influencing factors on mortality still remain uncertain. The preoperative status of the patient with its non-modifiable endogenous factors (e.g. vigilance, shock, extension of dissection and malperfusion disorders) might not only play a pivotal role on the outcome of surgery for AADA, but also potentially modifiable.

The first two authors contributed equally to this work.

# Objective

- **Surgical indication** for acute type A aortic dissection with preoperative cardiopulmonary resuscitation remain **controversial**
- Surgical outcomes for these patients shows **dismal outcomes** and consequently often the surgery is regarded as futile
- We report our surgical outcomes **without abandonment** in the setting

# Methods

From May 2019 through Aug. 2023

174 consecutive patients  
underwent ATAAD repair

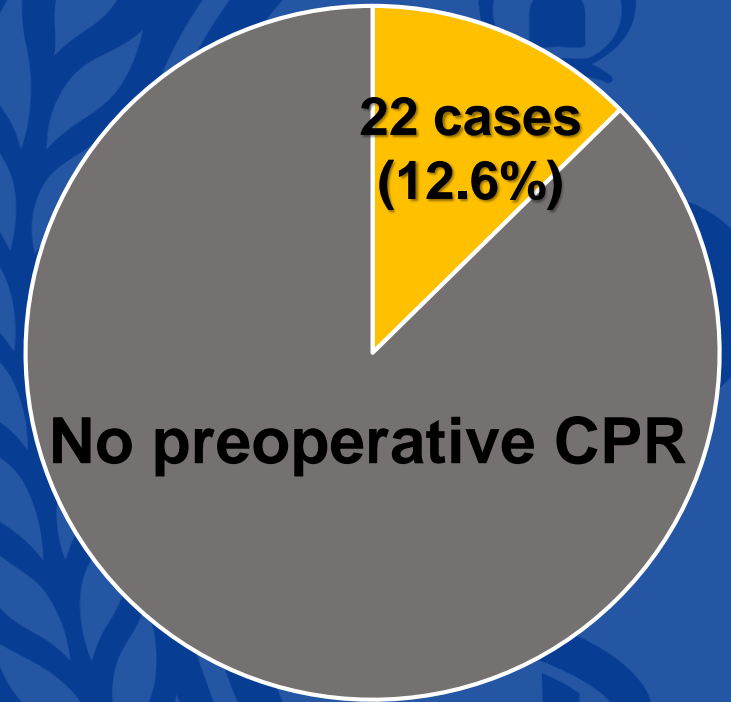
Exclusion, N=152  
Surgery without  
preoperative CPR

N = 22 (12.6%)

Survival  
N = 13

Non-survival  
N = 9

## Preoperative CPR



- Proceed surgery regardless of ROSC
- ECMO was actively applied in patients without ROSC (31.8%)

# Methods

- Comparison of preoperative demographics

- Clinical outcomes

- Major adverse events

- Cause of death

- Discharge place

- Cerebral performance category scale\* at discharge

\* Cerebral performance category

		Cerebral Performance Category (CPC)	
Positive Outcomes	CPC 1	<i>Good cerebral performance</i>	
	CPC 2	<i>Moderate cerebral disability</i>	
Negative Outcomes	CPC 3	<i>Severe cerebral disability</i>	
	CPC 4	<i>Coma or vegetative state</i>	
	CPC 5	<i>Brain death</i>	

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# Results

**Table 1. Baseline summary**

<b>Variables</b>	<b>Overall n=22</b>	<b>Survival n=13</b>	<b>Non-survival n=9</b>	<b>P value</b>
<b>Age (year)</b>	<b>65.3 ± 13.9</b>	<b>64.5 ± 14.5</b>	<b>66.3 ± 13.7</b>	<b>0.773</b>
<b>Female gender, n(%)</b>	<b>15 (68.2)</b>	<b>10 (76.9)</b>	<b>5 (55.6)</b>	<b>0.554</b>
<b>Diabetes, n(%)</b>	<b>6 (27.3)</b>	<b>4 (30.8)</b>	<b>2 (22.2)</b>	<b>1.000</b>
<b>Hypertension, n(%)</b>	<b>14 (63.6)</b>	<b>9 (69.2)</b>	<b>5 (55.6)</b>	<b>0.838</b>
<b>Creatinine clearance</b>	<b>52.7 ± 34.0</b>	<b>52.7 ± 40.3</b>	<b>52.7 ± 24.4</b>	<b>0.999</b>
<b>CKD stage ≥ 4, n (%)</b>	<b>5 (22.7)</b>	<b>3 (23.1)</b>	<b>2 (22.2)</b>	<b>1.000</b>

# Results

Table 2. CPR-related profile

Variables	Overall n=22	Survival n=13	Non-survival n=9	P value
Time from ER to OR (hr)	84.0 [60.0;187.0]	103.0 [83.0;187.0]	60.0 [59.0;83.0]	0.133
CPR at ER	14 (63.6)	7 (53.8)	7 (77.8)	0.486
CPR duration (min)	5.0 [4.0;9.0]	5.0 [4.0;6.5]	7.0 [4.5;10.0]	0.453
Preoperative ECMO	7 (31.8)	5 (38.5)	2 (22.2)	0.735
<b>Arterial blood analysis</b>				
Lactic acid (mmol/L)	9.6 ± 3.8	10.1 ± 3.0	9.0 ± 4.9	0.520
pH	7.2 ± 2.0	7.2 ± 0.2	7.2 ± 0.2	0.627
Base excess	-12.5 ± 7.6	-11.8 ± 7.5	-13.6 ± 8.1	0.601
EuroSCORE II	67.0 [43.9;80.9]	65.2 [30.5;74.5]	74.7 [51.8;83.1]	0.385
Preoperative neurologic deficit	3	0	3 (33.3)	0.081



# Results

**Table3. Operative profile**

<b>Variables</b>	<b>Overall n=22</b>	<b>Survival n=13</b>	<b>Non-survival n=9</b>	<b>P value</b>
<b>Procedure, n (%)</b>				
<b>Root replacement</b>	<b>8 (36.4)</b>	<b>4 (30.8)</b>	<b>4 (44.4)</b>	<b>0.838</b>
<b>Total arch replacement</b>	<b>7 (31.8)</b>	<b>4 (30.8)</b>	<b>3 (33.3)</b>	<b>1.000</b>
<b>Hemiarch replacement</b>	<b>15 (68.0)</b>	<b>9 (69.2)</b>	<b>6 (66.7)</b>	
<b>Cabrol patch apply</b>	<b>8 (36.4)</b>	<b>4 (30.8)</b>	<b>4 (44.4)</b>	<b>0.838</b>
<b>Cardiopulmonary bypass time</b>	<b>146.5 [107.0;241.0]</b>	<b>119.0 [104.0;247.0]</b>	<b>149.0 [136.0;172.0]</b>	<b>0.764</b>
<b>Aortic cross clamp time</b>	<b>99.0 [71.0;150.0]</b>	<b>85.0 [69.0;161.0]</b>	<b>100.0 [90.0;121.0]</b>	<b>1.000</b>
<b>Total circulatory arrest</b>	<b>17 (77.3)</b>	<b>11 (84.6)</b>	<b>6 (66.7)</b>	<b>0.638</b>



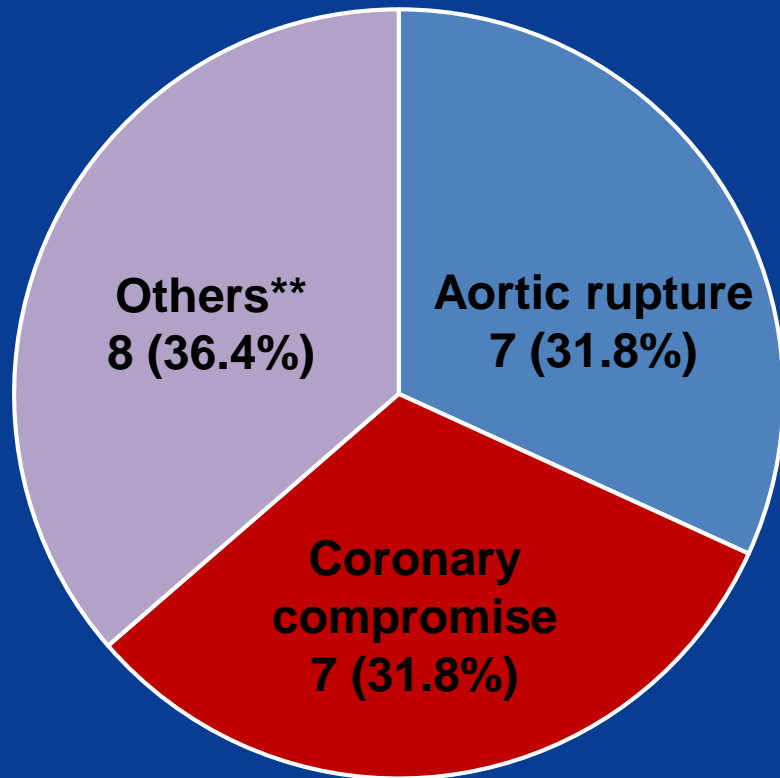
# Results

**Table 4. Early clinical outcomes**

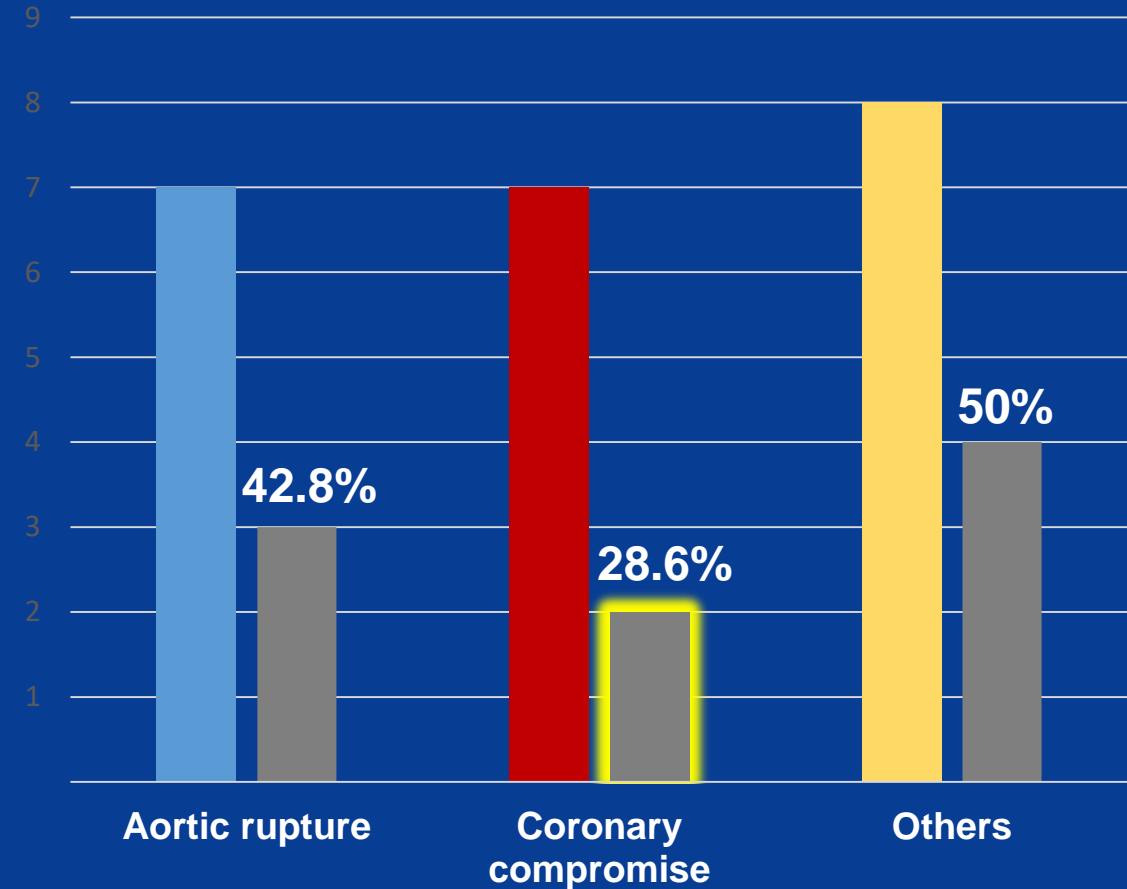
Variables	Overall n=22	Survival n=13	Non-survival n=9	P value
<b>Renal failure</b>	<b>7 (31.8)</b>	<b>1 (7.7)</b>	<b>6 (66.7)</b>	<b>0.014</b>
Re-exploration for bleeding	3 (13.6)	1 (7.7)	2 (22.2)	0.730
Need for postoperative ECMO	2 (9.1)	1 (7.7)	1 (11.1)	1.000
ICU stay (hr)	108.0 [51.0;552.0]	93.0 [47.5;575.5]	148.0 [51.0;552.0]	0.972
Hospital stay (days)	10.0 [7.0;23.0]	15.0 [9.0;22.0]	6.0 [3.0;23.0]	0.133
<b>Cause of mortality</b>				
Myocardial failure	3 (13.6)	0	3 (30.0)	
Brain stem failure	2 (9.1)	0	2 (22.2)	
Sepsis	2 (9.1)	0	2 (22.2)	
Bowel necrosis	2 (9.1)	0	2 (22.2)	

# Results

- Cause of preoperative cardiac arrest



- Mortality rate by cause of arrest

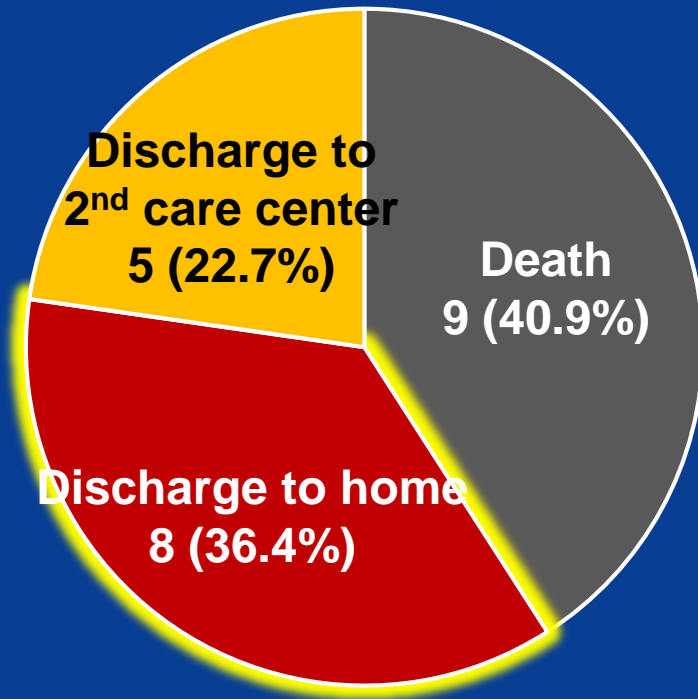


## Others\*\*

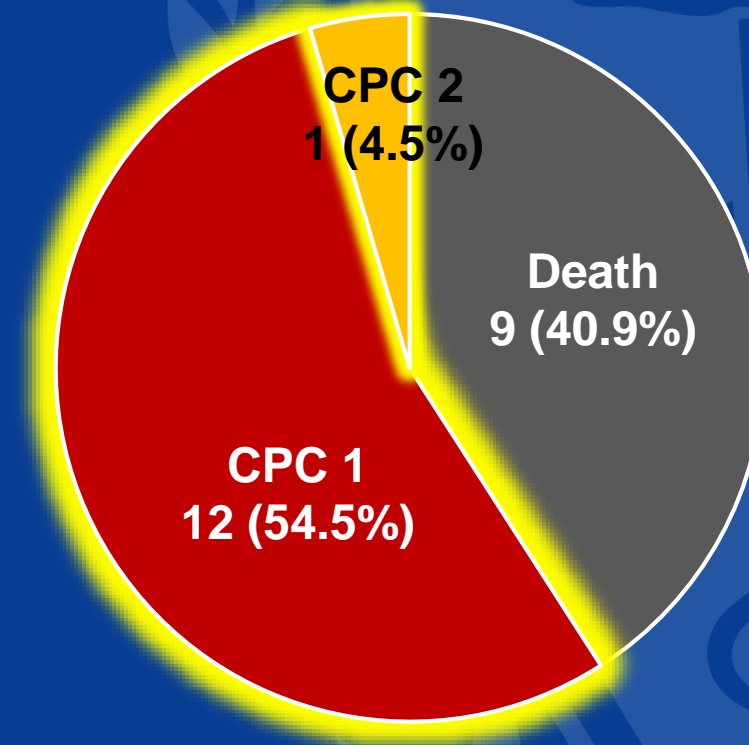
- Acute pulmonary thromboembolism combined with acute AD (N = 1)
- Cardiac tamponade (N = 5)
- Massive cerebrovascular accident due to carotid mal-perfusion (N = 2)

# Results

- Discharge place



- CPC scale at discharge



# Conclusion

- More than half of the patients with ATAAD requiring preoperative CPR survived and **discharged home with full cerebral performance**
- Predicting post-surgery survival solely from preoperative conditions seems challenging especially in preoperative CPR
- **More aggressive operation are needed**