# Preoperative Cardiac Troponin I Predicts Early Outcomes in Surgery for Acute Type A Aortic Dissection

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## Background

TABLE 26	Clinical Evidence of Malperfusion ("Malperfusion Syndrome")						
End Organ	Clinical Findings						
Cardiac	Electrocardiographic changes of ischemia or infarction, troponin elevation, myocardial dysfunction						
Cerebral	Stroke and neurologic deficits, coma and altered mental status						
Spinal	Paraplegia						
Mesenteric	Abdominal pain, bowel ischemia, lactic acidosis, elevation of liver function test results						
Renal	Acute kidney injury, oliguria						
Extremity	Loss of pulses in $\geq$ 1 extremity, sensory or motor dysfunction						

- Malperfusion syndrome in ATAAD
  - Electrocardiographic changes of ischemia
  - Troponin elevation
  - Myocardial dysfunction

 In our center, ATAAD patients with cardiac malperfusion especially high cardiac troponin I (cTnl) were postponed for surgery, which guaranteed a better outcome.

No exact value of cTnl elevation was determined.

#### **Methods**

Single-center retrospective cohort study

• A total of 535 patients with ATAAD were enrolled in this study.

Primary endpoint: in-hospital mortality after surgery

Second endpoint: stroke, paraplegia, cardiac dysfunction, acute

kidney injury, intensive care unit stay, and in-hospital stay.

### Baseline characteristics according to the cTnl value

Variable	cTnl<0.02 ng/mL	cTnl≥0.02 ng/mL	P-value	Clinical features at present	ation⊄			Laboratory tests↩	Ę	Ċ,	¢
	(n=372)⊱	(n=163) ←		Time from onset to	12 (6. 24)↩	16 (8, 30)↩	0.015↩	D dimar>0 E a/m1/1		162 (00 40/)/]	0 202/
Demographics <sup>, 그</sup>	¢	Ę	Ę		(-))	(-) )		D-aimer20.5 g/mL⇔	303 (97.0%)♥	162 (99.4%)	0.283
Male⊲	274 (73.7%)↩	125 (76.7%)↩	0.459↩	admission (h)↩				NT-proBNP (pg/mL)⇔	198.85 (75.95,	732.30 (259.10,	< 0.001
Age (years)⇔	51.7±12.02↩	51.7±11.72⊄ <sup>⊐</sup>	0.975↩	Chest pain <sup>(그</sup>	304 (81.7%)⇔	120 (73.6%)	0.033↩		502.85)↩	1776.10)↩	
BMI€	26.6±4.09	26.4±4.37	0.596↩	Syncope⊲	13 (3.5%)↩	13 (8.0%)	0.027↩	aum ().			0.000
Medical history	¢J	Ę	¢	Lauran limb main/1	12 (c - 20)/1	10/11 00/1/1	0.052/1	ALT (u/L)←	19.00 (13.00,	21.00 (15.00, 42.00)↩	0.002
Hypertension←	310 (83.3%)↩	136 (83.4%)	0.977↩	Lower limb pain	23 (0.2%)≪	18 (11.0%)~	0.052		29.00)<⊐		
Coronary artery disease⇔	74 (19.9%)⊱	40 (24.5%)은	0.227↩ᄀ	Imaging examination	Ę	Ę	Ę	ΔST (μ/Ι)/⊒	23 00 (17 25	30 00 (22 00 47 00)	<0.001
Diabetes <sup>,</sup>	14 (3.8%)	7 (4.3%)↩	0.771↩	LVEF (%)↩	60.7±4.17↩	60.4±4.79↩	0.454↩		23.00 (17.23,	30.00 (22.00) 47.00/*	0.001
Chronic renal dysfunction	3 (0.8%)<⊐	7 (4.3%)↩	0.017↩	Aortic regurgitation	94 (25.3%)↩	59 (36.2%)↩	0.010↩		31.00)		
COPD←	4 (1.1%)↩	2 (1.2%)↩	1.000↩	(modewate /leves)/1				sCr (µmol/L)↩	83.37 (68.89,	90.03 (74.34,	< 0.001
Marfan syndrome <sup>(그</sup>	13 (3.5%) <b></b> <⊐	4 (2.5%)↩	0.528↩	(moderate/large)~					00.02	100 101/2]	
History of cerebrovascular accident ${}^{\!$	24 (6.5%)<⊒	16 (9.8%)↩	0.173↩	Coronary artery	17 (4.6%)↩	17 (10.4%)	0.011↩		99.03	123.13/~	
Smoking⇔	150 (40.3%)	75 (46.0%)⇔	0.220↩	involvement on CTA			÷	CRP (mg/L)	10.35 (4.23, 60.65)	20.90 (8.71, 74.60)⇔	<0.001

### Intraoperative data

Variable<⊐	cTnl<0.02 ng/mL	cTnl≥0.02 ng/mL	P-value←
	(n=372)⊱ੋ	(n=163) ←	
Main surgery< <sup>□</sup>	تې	Ę	Ę
TAR with FET <sup>∠⊐</sup>	312 (83.9%)⊱ੋ	135 (82.8%)⊱⊐	0.763↩ᄀ
Partial aortic arch	12 (3.2%)⊱⊐	4 (2.5%)<⊐	0.836⊱⊐
replacement←			
Hybrid aortic repair <sup>(□</sup>	44 (11.8%)	20 (12.3%)⊲	0.885⊱⊐
Concomitant surgery	Ę	Ę	Ę
Bentall procedure <sup>&lt;⊐</sup>	82 (22.0%)⊲ੋ	48 (29.4%)⊲	0.066←
David procedure	7 (1.9%)⊱	5 (3.1%)	0.592⊱ੋ
CABG←	79 (21.2%)↩	55 (33.7%)⊲	0.002⊱⊐
CPB time (min)	190.6±69.86	211.1±85.18<⊐	0.004<⊐
Aortic cross-clamp time	114.6±39.89	132.2±79.41€ <sup>□</sup>	0.008<⊐

(min)↩

## **Early outcomes**

Variable↩	cTnl<0.02 ng/mL	cTnl≥0.02 ng/mL	P-value
	(n=372)<⊐	(n=163) ←	
ICU stay (h)<⊐	96.0 (70.4, 144.0)↩	120.0 (84.0, 192.0)↩	0.001<⊐
In-hospital stay (d)↩	13.0 (9.3, 17.0)	13.0 (10.0, 17.0)	0.831↩ᄀ
In-hospital mortality	5 (1.3%)⊱	6 (3.7%)<⊐	0.155↩
Stroke←	14 (3.8%)<⊒	7 (4.3%)⊱ੋ	0.771↩
Paraplegia↩	14 (3.8%)<⊒	5 (3.1%)⊱ੋ	0.689€
cardiac dysfunction↩	4 (1.1%)↩	4 (2.5%)⊱⊐	0.411↩
AKI←	279 (75.0%)↩	128 (78.5%)⊱⊐	0.379↩
Grade I ←	209 (56.2%)⊲	101 (62.0%)	0.213↩
Grade ∏ <i>←</i>	58 (15.6%)↩	31 (19.0%)↩	0.327←
Grade Ⅲ<□	44 (11.8%)↩	32 (19.6%)<⊐	0.017↩ᄀ



### **Multivariable analysis**

#### Preoperative cTnl level was an independent risk factor of in-hospital mortality and longer ICU stay.

Variable⊲	OR⊲	95% Cl←	P-value↩ ↩	
In-hospital mortality	$\leftarrow$	۲		
<u>CTnl</u> ←	4.025↩	1.780-9.100←	0.001	
Sex (male as reference)<⊐	5.695<⊐	1.060-30.607	0.043⊲	
Age⇔	1.034<⊐	0.961-1.113↩	0.366<⊐	
COPD← <sup>□</sup>	2.796<⊐	0.041-192.349↩	0.634<⊐	
Hybrid aortic repair<⊐	5.776<⊐	0.951-35.081⊲	0.057<⊐	
CPB time<⊐	1.012↩□	1.006-1.018<□	<0.001↩	

### ICU stay coefficient ← 95% CI ←

P-value

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Variabies	coemeient	5576 61		
cŢnl↩	36.133	10.951 - 61.315	0.005↩ᄀ	
Age⇔	1.439↩ᄀ	0.410 - 2.469	0.006	
Diabetes⇔	44.807	-16.169 - 105.784<-	0.149<⊐	
Marfan syndrome<⊐	-40.214↩	-108.973 - 28.544<-	0.251↩	
listory of	18.026	-26.978 - 63.030€	0.432€⊃	
erebrovascular				
iccident				
eft ventricular	-2.795<⊐	-5.4660.125	0.040	
jection fraction				
oronary artery	73.202	23.901 - 122.502↩	0.004	
nvolvement on CTA<⊐				
IT-proBNP⊖	0.002←ੋ	-0.002 - 0.007	0.345↩	
<u>Cr</u> <□	0.388	0.064 – 0.007	0.019↩	
CABG←	15.832	-14.092 – 45.755<⊐	0.299∜	
CPB time	0.236↩ᄀ	0.047 - 0.424	0.015↩	
Aortic cross-clamp	0.017↩ᄀ	-0.271 - 0.237	0.895↩	
time⇔				

#### **Receiver-operating characteristic curve analysis**



Cut-off value: 0.28 ng/mL

#### Take home message

Preoperative cTnl was an independent risk factor of inhospital mortality and the cut-off value was 0.28 ng/ml.

 Preoperative cTnI was independently associated with longer ICU stay.

Preoperative cTnI helped identify patients with high risk and provided information about prognosis.