

Supplemental Material

Post-procedural Troponin Elevation and Clinical Outcomes Following Transcatheter Aortic Valve Implantation

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Supplemental Tables

Table S1. Univariate and multivariate predictors of post-TAVI peak troponin levels.

Variable	Univariate analysis		Multivariate analysis	
	Linear Estimate (95% CI)	p-value	Linear Estimate (95% CI)	p-value
Weight (kg)	0.005 (-0.001 to 0.011)	0.099	0.010 (0.005 to 0.014)	<0.001
Diabetes mellitus	0.174 (-0.018 to 0.367)	0.076		
Syntax Score	0.010 (-0.001 to 0.021)	0.075		
History of myocardial infarction	0.549 (0.314 to 0.784)	<0.001	0.216 (0.012 to 0.421)	0.038
History of PCI	0.143 (-0.053 to 0.340)	0.154		
Renal dysfunction	0.131 (0.021 to 0.242)	0.021		
Logistic Euro Score	0.015 (0.009 to 0.021)	<0.001		
STS score	0.086 (0.072 to 0.101)	<0.001	0.089 (0.074 to 0.103)	<0.001
Transapical access	0.266 (0.046 to 0.486)	0.018	0.277 (0.093 to 0.462)	0.003

PCI indicates percutaneous coronary intervention.

Table S2. Invasive hemodynamic characteristics in patients with or without periprocedural myocardial injury.

	cTnT ≤15x UNL n=239	CTnT >15x UNL n=338	p-value
Aortic stenosis severity			
Aortic valve area (cm ²)	0.61 ± 0.26	0.60 ± 0.29	0.82
Peak-to-peak gradient (mm Hg)	55.68 ± 29.90	57.66 ± 28.69	0.42
Mean gradient (mm Hg)	42.54 ± 19.08	43.71 ± 16.63	0.43
Stroke work loss (%)	23.66 ± 8.08	24.64 ± 7.77	0.22
Valvular resistance (dyne.s.cm ⁻⁵)	309.43 ± 185.51	345.99 ± 222.33	0.08
Systemic vascular load			
Systolic arterial pressure (mm Hg)	137.18 ± 27.41	134.91 ± 28.81	0.40
Diastolic arterial pressure (mm Hg)	67.40 ± 13.68	64.27 ± 14.01	0.02
Mean arterial pressure (mm Hg)	95.52 ± 16.99	92.50 ± 18.16	0.07
Systemic vascular resistance (dyne.s.cm ⁻⁵)	1951.37 ± 621.84	1953.49 ± 678.27	0.97
Systemic arterial compliance (mL. mm Hg ⁻¹)	0.44 ± 0.21	0.43 ± 0.17	0.43
LV global afterload			
Valvuloarterial Impedance (mm Hg.ml ⁻¹ .m ²)	7.35 ± 2.56	7.35 ± 2.57	0.99
LV systolic function			
Ejection fraction (%)	52.13 ± 15.46	54.64 ± 14.06	0.045
LV systolic pressure (mm Hg)	188.58 ± 35.77	188.18 ± 33.80	0.90
LV end diastolic pressure (mm Hg)	21.62 ± 7.77	21.34 ± 8.34	0.72
LV stroke work (g.m)	94.70 ± 33.71	90.48 ± 32.34	0.20
Stroke volume (ml)	49.69 ± 14.57	49.48 ± 16.78	0.89
Stroke volume index (ml/m ²)	27.58 ± 7.64	27.89 ± 8.37	0.69
Cardiac output (L/min)	3.84 ± 1.03	3.74 ± 1.02	0.32
Cardiac index (l/(min*m ²))	2.13 ± 0.53	2.11 ± 0.50	0.74
Right sided hemodynamics			
PA systolic pressure (mm Hg)	52.13 ± 16.84	50.95 ± 17.38	0.48
Mean PA pressure (mm Hg)	33.55 ± 11.39	32.77 ± 11.92	0.49
Pulmonary hypertension, n (%)	146 (76)	175 (74)	0.50
Pulmonary vascular resistance (dyne.s.cm ⁻⁵)	316.43 ± 192.90	279.69 ± 189.36	0.20

LV indicates left ventricular; PA: pulmonary artery.

Table S3. Predictors of 30-day mortality.

	Univariate effects		Multivariate effects	
	HR (95% CI)	P-value	HR (95% CI)	P-value
Age (years)	1.09 (1.01-1.18)	0.028	1.06 (0.97-1.14)	0.18
Gender (female)	0.72 (0.35-1.47)	0.361		
COPD	1.65 (0.74-3.67)	0.220		
Renal dysfunction	3.14 (1.10-8.98)	0.033	2.29 (0.96-6.85)	0.13
Atrial fibrillation	1.63 (0.73-3.62)	0.234		
Logistic EuroScore	1.03 (1.01-1.05)	0.010		
STS score	1.07 (1.03-1.11)	<0.001	1.04 (0.99-1.10)	0.14

Model based on all-cause death within 30 days of follow-up, selecting variables with $p < 0.2$ univariable effect on death at 30 days.

Table S4. Sensitivity analysis of 2-year clinical outcomes in relation to post-TAVI troponin >15x ULN vs. ≤15x ULN including patients without renal dysfunction, defined as estimated glomerular filtration rate <60ml/min/1.73m² (n=181).

	cTnT ≤15x UNL n=94	cTnT >15x UNL n=87	Hazard Ratio (95% CI)	p value	Adjusted Hazard Ratio (95% CI)	Adjusted p value
Death, n (%)	14 (15.5)	24 (28.6)	2.02 (1.05-3.91)	0.036	2.14 (1.10-4.16)	0.026
Cardiovascular death, n (%)	7 (8.4)	13 (16.5)	2.19 (0.87-5.49)	0.09	2.41 (0.95-6.09)	0.06
Cerebrovascular events, n (%)	3 (3.7)	5 (7.2)	2.03 (0.49-8.51)	0.33	1.81 (0.42-7.87)	0.43
Major stroke	3 (3.7)	3 (4.1)	1.20 (0.24-5.93)	0.83	0.96 (0.18-5.12)	0.96
Minor stroke	0 (0.0)	1 (1.5)	3.24 (0.13-78.49)	0.48		
Transient ischemic attack	0 (0.0)	1 (1.5)	3.24 (0.13-78.49)	0.48		
Myocardial infarction, n (%)	1 (1.1)	2 (2.8)	2.44 (0.22-26.95)	0.47	2.41 (0.21-27.86)	0.48
Death or major stroke, n (%)	15 (16.5)	28 (33.4)	2.26 (1.21-4.23)	0.01	2.36 (1.25-4.45)	0.008
Death, major stroke, or MI, n (%)	16 (17.6)	29 (34.6)	2.20 (1.20-4.05)	0.01	2.30 (1.24-4.27)	0.008

Depicted are number of first events (% cumulative incidence), hazard ratios (HR) with respective 95% confidence intervals from Cox's regressions. Adjusted HR were obtained after adjusting for age and STS score. Age and STS score had a p<0.2 univariable effect on the primary outcome all-cause death.

Table S5. Sensitivity analysis of 2-year clinical outcomes in relation to post-TAVI troponin >15x ULN vs. ≤15x ULN including patients who did not undergo concomitant PCI (n=486).

	cTnT ≤15x UNL n=202	cTnT >15x UNL n=284	Hazard Ratio (95% CI)	p value	Adjusted Hazard Ratio (95% CI)	Adjusted p value
Death, n (%)	35 (18.0)	86 (31.5)	1.96 (1.32-2.90)	0.001	1.84 (1.23-2.74)	0.003
Cardiovascular death, n (%)	22 (11.6)	59 (22.3)	2.12 (1.30-3.46)	0.003	1.92 (1.17-3.16)	0.01
Cerebrovascular events, n (%)	13 (7.0)	22 (8.8)	1.30 (0.65-2.57)	0.46	1.24 (0.62-2.49)	0.54
Major stroke	7 (3.8)	17 (6.3)	1.84 (0.76-4.44)	0.17	1.83 (0.75-4.46)	0.18
Minor stroke	2 (1.0)	1 (0.5)	0.39 (0.04-4.31)	0.44	0.39 (0.03-4.43)	0.45
Transient ischemic attack	4 (2.2)	3 (1.6)	0.59 (0.13-2.64)	0.49	0.50 (0.11-2.26)	0.36
Myocardial infarction, n (%)	2 (1.1)	9 (3.8)	3.57 (0.77-16.53)	0.10	3.30 (0.69-15.70)	0.13
Death or major stroke, n (%)	39 (20.1)	94 (34.3)	1.93 (1.33-2.81)	0.001	1.84 (1.26-2.69)	0.002
Death, major stroke, or MI, n (%)	39 (20.1)	99 (36.1)	2.07 (1.43-3.00)	0.0001	1.98 (1.36-2.89)	0.0004

Depicted are number of first events (% cumulative incidence), hazard ratios (HR) with respective 95% confidence intervals from Cox's regressions. Adjusted HR were obtained after adjusting for age, renal dysfunction and STS score. Age, renal dysfunction and STS score had a p<0.2 univariable effect on the primary outcome all-cause death.

Table S6. Sensitivity analysis of 2-year clinical outcomes in relation to post-TAVI troponin >15x ULN vs. ≤15x ULN including patients who did not undergo TAVI via the trans-apical route PCI (n=471).

	cTnT ≤15x UNL n=239	cTnT >15x UNL n=232	Hazard Ratio (95% CI)	p value	Adjusted Hazard Ratio (95% CI)	Adjusted p value
Death, n (%)	39 (17.0)	73 (32.6)	2.22 (1.50-3.27)	0.000	2.00 (1.34-2.98)	0.001
Cardiovascular death, n (%)	25 (11.1)	53 (24.5)	2.49 (1.55-4.01)	0.000	2.05 (1.25-3.35)	0.004
Cerebrovascular events, n (%)	14 (6.3)	17 (8.3)	1.37 (0.67-2.78)	0.39	1.17 (0.57-2.42)	0.67
Major stroke	8 (3.6)	13 (5.7)	1.80 (0.74-4.33)	0.19	1.51 (0.62-3.73)	0.37
Minor stroke	2 (0.9)	1 (0.6)	0.58 (0.05-6.38)	0.65	0.60 (0.05-6.87)	0.68
Transient ischemic attack	4 (1.8)	2 (1.4)	0.59 (0.11-3.20)	0.54	0.49 (0.09-2.79)	0.42
Myocardial infarction, n (%)	2 (0.9)	7 (3.5)	4.08 (0.85-19.64)	0.08	3.97 (0.79-20.05)	0.09
Death or major stroke, n (%)	44 (19.1)	77 (34.3)	2.08 (1.43-3.01)	0.000	1.86 (1.27-2.73)	0.001
Death, major stroke, or MI, n (%)	44 (19.1)	80 (35.5)	2.20 (1.52-3.17)	0.000	2.00 (1.37-2.92)	0.000

Depicted are number of first events (% cumulative incidence), hazard ratios (HR) with respective 95% confidence intervals from Cox's regressions. Adjusted HR were obtained after adjusting for age, renal dysfunction and STS score. Age, renal dysfunction and STS score had a p<0.2 univariable effect on the primary outcome all-cause death.

Table S7. Clinical outcomes at 30 days and 2 years in relation to *pre*-TAVI troponin >1x ULN vs. ≤1x UNL.

	cTnT ≤1x UNL n=64	cTnT >1x UNL n=192	Hazard Ratio (95% CI)	p value	Adjusted Hazard Ratio (95% CI)	Adjusted p value
30 Days						
Death, n (%)	0 (0.0)	13 (6.8)	9.05 (0.55-150.10)	0.04		
Cardiovascular death, n (%)	0 (0.0)	13 (6.8)	9.05 (0.55-150.10)	0.04		
Cerebrovascular events	2 (3.1)	6 (3.1)	1.00 (0.20-4.96)	0.99	0.78 (0.15-4.23)	0.78
Major stroke, n (%)	0 (0.0)	5 (2.6)	3.69 (0.21-65.82)	0.34		
Minor stroke, n (%)	1 (1.6)	0 (0.0)	0.11 (0.00-2.67)	0.25		
Transient ischemic attack, n (%)	1 (1.6)	1 (0.5)	0.33 (0.02-5.34)	0.44	0.14 (0.00-4.02)	0.25
Myocardial infarction, n (%)	0 (0.0)	2 (1.1)	1.68 (0.08-34.54)	1.00		
Death or major stroke, n (%)	1 (1.6)	14 (7.3)	4.75 (0.62-36.09)	0.13	4.35 (0.56-33.98)	0.16
Death, major stroke, or MI, n (%)	0 (0.0)	15 (7.8)	10.39 (0.63-171.20)	0.026		
2 Years						
Death, n(%)	7 (11.7)	51 (30.2)	2.86 (1.30-6.31)	0.009	2.52 (1.13-5.63)	0.02
Cardiovascular death, n (%)	3 (4.9)	38 (22.7)	4.87 (1.50-15.80)	0.008	4.10 (1.25-13.48)	0.02
Cerebrovascular events	5 (8.8)	10 (5.9)	0.73 (0.25-2.13)	0.56	0.77 (0.26-2.31)	0.65
Major stroke, n (%)	3 (5.7)	8 (4.5)	1.00 (0.26-3.78)	1.000	1.19 (0.31-4.53)	0.79
Minor stroke, n (%)	1 (1.6)	0 (0.0)	0.11 (0.00-2.67)	0.25		
Transient ischemic attack, n (%)	1 (1.6)	2 (1.4)	0.72 (0.07-7.98)	0.79	0.49 (0.04-6.64)	0.59
Myocardial infarction, n (%)	0 (0.0)	8 (5.1)	5.70 (0.33-97.38)	0.21		
Death or major stroke, n (%)	10 (16.8)	52 (30.6)	2.01 (1.02-3.95)	0.04	1.83 (0.92-3.64)	0.08
Death, major stroke, or MI, n (%)	9 (15.2)	58 (33.8)	2.58 (1.28-5.21)	0.008	2.38 (1.17-4.84)	0.018

Depicted are number of first events (% cumulative incidence), hazard ratios (HR) with respective 95% confidence intervals from Cox's regressions. Adjusted HR were obtained after adjusting for age, renal dysfunction and STS score.

Figure S1. Cumulative event curves for all-cause mortality within 2 years in patients with or without post-TAVI troponin T elevation >15x ULN in the subgroups of patients without renal dysfunction (**A**) and without concomitant PCI during the TAVI procedure (**B**).

