Severe coronary artery stenosis is associated with poor neurological outcome in cardiac arrest survivors: a multi-center retrospective cohort study

Chih-Wei Sung¹ ; Joyce Tay² ; Meng-Che Wu¹ ; Jia-How Chang¹ ; Chien-Hua Huang² ; Wen-Jone Chen² ; Wei-Tien Chang² ; Min-Shan Tsai^{1,2}

¹ Department of Emergency Medicine, National Taiwan University Hospital Hsin-Chu Branch, Hsinchu, Taiwan ; ² Department of Emergency Medicine, National Taiwan University Medical College and Hospital, Taipei, Taiwan

PURPOSE

The association of coronary artery stenosis and poor neurological outcome is unknown. The aim of the study is to find the association between the coronary artery stenosis and the neurological outcome in patients with cardiac arrest.

METHODS

A total of 273 non-traumatic adult cardiac arrest patients who achieved return of spontaneous circulation (ROSC) and underwent emergent coronary angiography (CAG) during the period from 2011 to 2017 were retrospectively recruited from three hospitals. The severity of coronary artery lesion during CAG, percutaneous coronary intervention, baseline characteristics and events of cardiopulmonary resuscitation were collected and compared between patients with and without favorable neurological outcome, which was classified by cerebral performance scale (CPC).

RESULTS

A total of 273 patients was divided into four groups based on their vessel number of coronary artery stenosis. One hundred and ten patients out of 135 patients (81%) with poor neurological outcome (CPC = 3~5). had at least 1-vessel coronary artery severe stenosis ($\geq 70\%$ stenosis). The baseline characteristic of these groups was shown in Table 1. When compared with those with patent coronary artery, the patients with coronary artery stenosis had a significant higher risk for poor neurological outcome which positively correlated with the number of vessels (1-vessel: adjusted HR 1.29, 95% CI 0.62–2.66, $p = 0.081$; 2-vessel: adjusted HR 2.33, 95% CI 1.09–4.94, $p = 0.028$; 3-vessel: adjusted HR 3.99, 95% CI 1.84–8.68, $p < 0.001$).

CONCLUSIONS

The severity of coronary artery stenosis is associated with neurological outcome in cardiac survivors.

CONFLICT OF INTEREST

The authors declared that they have no conflict of interest, like financial interests, activities, and affiliations.

FIG 1. PATIENT SELECTION

TABLE 1. BASELINE CHARACTERISTICS

	Vessel number of coronary artery stenosis					p
	total patients	0	1	2	3	
	n(%)	n(%)	n(%)	n(%)	n(%)	
	273	72 (26.37%)	74 (27.116%)	57 (20.88%)	70 (25.64%)	
Age (years)	60.84±13.27	56.69±15.54	61.05±13.15	61.84±11.86	63.67±10.97	0.012
Gender(Male)	208 (76.19%)	41 (56.94%)	59 (79.73%)	46 (80.70%)	62 (88.57%)	<0.001
Smoking	68 (24.91%)	21 (29.17%)	17 (22.97%)	10 (17.54%)	20 (28.57%)	0.417
Hypertension	154 (56.41%)	35 (48.61%)	38 (51.35%)	37 (64.91%)	44 (62.86%)	0.136
Diabetes mellitus	108 (39.56%)	23 (31.94%)	24 (32.43%)	23 (40.35%)	38 (54.29%)	0.021
Dyslipidemia	57 (20.88%)	13 (18.06%)	15 (20.27%)	13 (22.81%)	16 (22.86%)	0.869
Coronary artery disease	97 (35.53%)	14 (19.44%)	33 (44.95%)	22 (38.60%)	28 (40.00%)	0.006
Myocardial infarction	10 (3.66%)	3 (4.17%)	2 (2.70%)	0 (0.00%)	5 (7.14%)	0.188
Cardiac arrhythmia	21 (7.69%)	4 (5.56%)	7 (9.46%)	5 (8.77%)	5 (7.14%)	0.784
Chronic kidney disease	49 (17.95%)	11 (15.28%)	8 (10.81%)	12 (21.05%)	18 (25.71%)	0.108
Witnessed collapse	222 (81.92%)	61 (84.72%)	63 (85.14%)	44 (77.19%)	54 (79.41%)	0.526
Bystander CPR	199 (73.43%)	56 (77.78%)	52 (70.27%)	44 (77.19%)	47 (69.12%)	0.649
Initial shockable rhythm	114 (41.76%)	36 (50.00%)	26 (35.14%)	27 (47.37%)	25 (35.71%)	0.193
Heart rate at ROSC	101±26	100±29	99±28	103±25	102±23	0.707
ECMO	102 (37.36%)	17 (23.61%)	27 (36.49%)	27 (47.37%)	31 (44.29%)	0.018

TABLE 2. NEUROLOGICAL OUTCOME

Poor neurological outcome		Unadjusted HR (95% CI)	p	Adjusted HR (95% CI)	p
Vessel number of coronary artery stenosis					
0	25 (18.52%)	Reference		Reference	
1	28 (20.74%)	1.22 (0.62, 2.39)	0.564	1.29 (0.62, 2.66)	0.081
2	32 (23.70%)	2.51 (1.23, 5.11)	0.011	2.33 (1.09, 4.94)	0.028
3	50 (37.04%)	4.90 (2.41, 9.94)	<0.001	3.99 (1.84, 8.68)	<0.001