

Takotsubo Cardiomyopathy in Subarachnoid Hemorrhage: A Risk Factor for Cerebral Infarction after Symptomatic Vasospasm

Nobutake Sadamasa; Ichiro Nakahara; Shoji Matsumoto; Ryota Ishibashi; Masanori Gomi; Makoto Saka; Takuya Okata; Haruka Miyata; Hidehisa Nishi; Kazutaka Sonoda; Junpei Koge; Sadayoshi Watanabe; Izumi Nagata
Department of Neurosurgery, Kokura Memorial Hospital, Kitakyusyu, Fukuoka, Japan



Introduction

Cardiac injury and dysfunction after subarachnoid hemorrhage (SAH) is a well-recognized phenomenon. Takotsubo cardiomyopathy (TTC) is characterized by reversible apical hypokinesia without obstructive coronary artery lesions. The incidence, characteristics, and outcome of TTC have not been well documented. The aim of this study was to elucidate the incidence, characteristics, and outcome after TTC followed by SAH.

Methods

We retrospectively reviewed 274 consecutive acute SAH cases who admitted to the Kokura Memorial Hospital between 2005 to 2014. The patients received electrocardiogram and echocardiography for the diagnosis of cardiac changes. The diagnosis of TTC was made by cardiologists. We collected the data including age, gender, location of the ruptured aneurysm, ejection fraction, presence of symptomatic vasospasm and delayed cerebral infarction from the medical records.

	Gender	Age	Location of rupture	WFNS	H&K	Fisher
1	Female	58	MCA	1	1	3
2	Female	58	ICPC	1	1	3
3	Female	89	Basilar	2	1	4
4	Female	82	Acom	2	3	4
5	Female	51	VA	4	3	3
6	Female	50	MCA	5	5	3
7	Female	83	Not evaluated	5	5	3
8	Female	47	Acom	5	5	3

Table 1. Summary of the SAH patients with tako-tsubo cardiomyopathy. Acom: anterior communicating artery, H&K: Hunt and Kosnik, ICPC: internal carotid-posterior communicating artery, MCA: middle cerebral artery, VA: vertebral artery, WFNS: World Federation of Neurological Surgeons

Table 1. (continued)

	LVEF on Admission	Method	LVEF %u	Interval (day)	ECG Rhythm	ECG change	T inversion	QTc elongation
1	40.7	MOD	50	8	sinus	ST elevation	Y	
2	46	MOD	52.6	2	sinus			Y
3	70.9	Teichholz	78.4	5	sinus	ST elevation	Y	Y
4	-				sinus		Y	
5	32.5	MOD	49.7	15	sinus			Y
6	70.8	Teichholz	63.3	18	sinus		Y	Y
7	-				sinus	ST elevation		Y
8	-				sinus		Y	Y

LVEF: left ventricular ejection fraction, MOD: modified Simpson's

Table 1. (continued)

	Type of surgery	DIND	DCI	ICU stay for h/d	Hydrocephalus	Ext. decomp.	LOE (day)	mRS
1	Clipping			Y			22	0
2	Endovascular						43	0
3	Endovascular	Y	Y				9	6
4	Clipping			Y	Y		54	3
5	Endovascular	Y	Y	Y	Y	Y	67	4
6	Clipping				Y	Y	53	4
7	(-)						9	6
8	Clipping	Y	Y				35	3

DCI: delayed cerebral infarction, DIND: delayed ischemic neurological deficit, h/d heart disease, ICU: intensive care unit, LOE: length of stay

Results

Of 276 patients, Eight (2.9%) were diagnosed as TTC (mean age±standard deviation:64.8±17.0). All patients were female. Location of the aneurysm was as follows: two in anterior communicating artery, two in middle cerebral artery, one in internal carotid-posterior communicating artery. All cases exhibited sinus rhythm in the initial electrocardiogram. QT interval prolongation was observed in 6 cases (75.0%). Four out of 5 patients who received the follow-up echocardiogram showed recovery of the ejection fraction. Three patients needed intensive care for the recovery of cardiac function. Symptomatic vasospasm was observed in 3 patients and all fell into delayed cerebral infarction.

Conclusions

TTC after SAH might appear mainly in female. Although TTC is a reversible phenomenon, it might negatively impact on cerebral ischemia followed by symptomatic vasospasm. Initial diagnosis and intensive management with cardiologists may improve the outcome after TTC.

References

- Boland TA et al. Crit Care Med 43:686-693, 2015
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Learning Objectives

By the conclusion of this session, participants should be able to describe the importance of collaboration with cardiologists for initial management of TTC after SAH.