



Subarachnoid hemorrhage without hypertension-patient characteristics and aneurysm location

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Introduction

Hypertension is one of the modifiable risk factors for subarachnoid hemorrhage (SAH). There is no study that focuses on the cases of SAH without hypertension. The aim of this study was to characterize the cases of SAH without hypertension by comparison with those who with hypertension.

Methods

We reviewed 203 consecutive cases with acute SAH. The cases with apparent history of hypertension or those who presented persistent hypertension after discharge were defined as SAH with hypertension. The cases with uncertain past history were excluded. The SAH cases without hypertension were compared with those who with hypertension.

Results

115 SAH cases were with hypertension, and 81 without. Table 1 showed the baseline characteristics of these cases. Mean age was older in the cases with hypertension (68.5 vs 60.6, P=0.0002), but no gender difference was observed. Internal carotid artery (ICA) aneurysm other than internal carotid artery-posterior communicating artery (ICPC) aneurysm was more frequently found in the cases without hypertension (4 vs 12, P=0.0066) There was no difference in WFNS grade, Fisher

modified Rankin scale (mean 2.86 vs 2.09, P=0.042). Multiple logistic regression analysis revealed that age and ICA aneurysm were independently associated to the patients without hypertension (Table 2).

	Hypertension+ (n=115)	Hypertension- (n=81)	P
Age (mean±SD)	68.5±12.9	60.6±15.7	0.0002*
Male	30	27	ns
Location of aneurysm			
Anterior circulation	78	62	ns
IC aneurysm other than ICPC	4	12	0.0066**
IC-Ach	0	6	0.005**
C3	0	3	0.07**
IC top	1	2	
anterior wall	1	1	
C2	2	0	
Posterior circulation	16	8	ns
AVM/AVF	3	3	ns
Unknown	18	8	ns
Multiple aneurysm	15	9	ns

Table 1. Baseline characteristics, treatment, and outcome of 196 subarachnoid hemorrhage cases. *unpaired t-test, **Fisher exact test, ***Wilcoxon rank sum test. AVF: arteriovenous fistula, AVM: arteriovenous malformation, DCI: delayed cerebral infarction, DIND:delayed ischemic neurological deficit, IC: internal carotid artery, IC-Ach: internal carotid artery-anterior choroidal artery, ICPC: internal carotid artery-posterior communicating artery, mRS: modified Rankin Scale, ns: not significant, SD: standard deviation

		Hypertension+ (n=115)	Hypertension- (n=81)	P
WFNS grade				ns
	1	31	30	
	2	34	25	
	3	6	3	
	4	14	12	
	5	30	11	
Fisher group				ns
	1	5	4	
	2	21	13	
	3	68	49	
	4	21	15	
Treatment for aneurysm				ns
Clip		51	47	
Coil		35	18	
DIND		17	10	ns
DCI		9	5	ns
Shunt needed hydrocephalus		18	10	ns
Length of stay		38.5±29.7	33.1±19.6	
mRS (mean)		2.86	2.09	0.04***

Table 1. (continued.)

	p	OR	95% CI	
age	0.0187	1.031	1.005	1.057
male	0.5821	0.798	0.357	1.783
ICA aneurysm	0.0169	0.21	0.058	0.755
hyperlipidemia	0.2627	1.844	0.632	5.384
diabetes mellitus	0.8737	0.89	0.21	3.768
WFNS grade	0.1039	1.249	0.955	1.634
Fisher group	0.4764	0.807	0.447	1.456

Table 2. Independent factors associated with hypertension detected by multiple logistic regression analysis of 196 subarachnoid hemorrhage patients. CI:confidence interval, ICA:internal carotid artery, WFNS:World Federation of Neurological Surgeons.

Discussion

The current study was the first to show the feature of aneurysmal subarachnoid hemorrhage without hypertension. The main result of this study was that ICA aneurysm other than ICPC aneurysm was more frequent in the SAH patients without premorbid hypertension and that this fact was independent with age. Two case-control studies in 1970-80s showed that there was no significant difference in aneurysm location between SAH with history of hypertension and without hypertension. However, in these studies ICA aneurysm was categorized as a conglomerate of ICPC aneurysm and ICA aneurysm other than ICPC aneurysm. We subdivided ICA aneurysm to ICPC aneurysm and other aneurysm, and revealed that ICA aneurysm such as IC-paraclinoid aneurysm and IC-anterior choroidal artery aneurysm were significantly related with SAH without premorbid hypertension.

Worse outcome in hypertension group might be due to older age. The result that there was no sex difference between the two groups was coincided with the previous study.

Limitations of this study included its nonrandomized retrospective design and a small sample size. The definition of premorbid hypertension differs from the other studies. Because of Cushing reflex, the patients frequently show elevated blood pressure in acute phase of SAH, irrespective of premorbid

hypertension. In this study, we assessed the patients at chronic phase to confirm whether they were truly hypertensive, because they would be consistently hypertensive if they have premorbid hypertension.

Conclusions

The results of this study showed that ICA aneurysm other than ICPC aneurysm was more frequent in the SAH patients without premorbid hypertension. Factors other than hypertension might contribute the rupture of ICA aneurysm other than ICPC aneurysm.

Learning Objectives

By the conclusion of this session, participants should be able to describe the characteristics of SAH without hypertension.

References

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