A Novel Predictor for Delayed Cerebral Infarction During Subarachnoid Hemorrhage Using Vasospasm Scoring System

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Introduction

The prediction of cerebral vasospasm and delayed cerebral infarction after the onset of subarachnoid hemorrhage (SAH) is one of the most challenging issues in clinical situations, but its pathogenesis has not fully been elucidated.

Methods

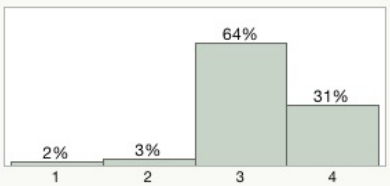
We retrospectively studied 114 consecutive cases of subarachnoid hemorrhage(SAH) which were treated in our department from 2013 to 2016. Among them, 64 patients were enrolled in this study. We developed a novel cerebral vasospasm scoring system(VSS), and the severity of vasospasm was categorized as none/mild(0-2points), moderate(3-5points), and severe(6-10 points), respectively. In MRA imaging, over 25% narrowing of vessels were deifined as cerebral vasospasm.Delayed cerebral infarction(DCI) was screened by diffusion weighted image(DWI). Symptomatic vasospasm(SVS) was defined as the occurrence of paralysis, aphasia or detereorated response during vasospasm period prolonged for over 2 hours. The VSS and DCI, SVS, WFNS classification, Fisher group, age was analyzed and p value less than 0.05 was determined as statistically significant.

Results

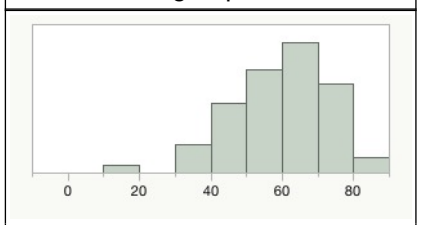
Of 64 cases, 50 cases (78.1%) of patients were diagnosed as cerebral vasospasm. 14 cases(21.9%) and 13 cases (20.3%) developed SVS and DCI, respectively. 2 cases of patient with DCI were asymptomatic. The none-mild, moderate, severe vasospasm group developed DCI 10.3%, 30% and 60% respectively. The vasospasm scoring was statistically significant in the DCI group than none-DCI group. Bivariate analysis revealed that DCI is correlated with SVS, vasospasm (VSS>3) and hydrocephalus.

Discussions

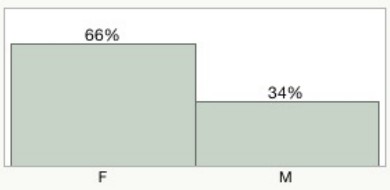
Previously, the detection of delayed cerebral infarction(DCI) was reported using MRI-DWI. MRA has also been reported in detection of vasospasm for its high sensitivity and specificity, but only a few reports are seen so far. We developed 10-point system of cerebral vasospasm scoring system (VSS) with MRI/MRA on around SAH Day7 expecting for early detection of DCI and vasospasm which is less invasive than angiography or 3DCTA.



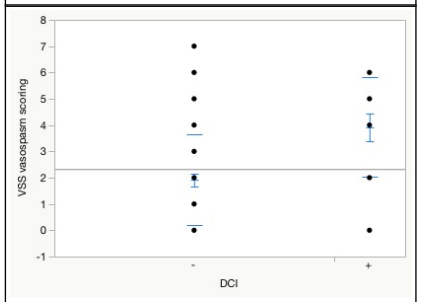
patients characteristic-Fisher group-



patient characteristics-age-



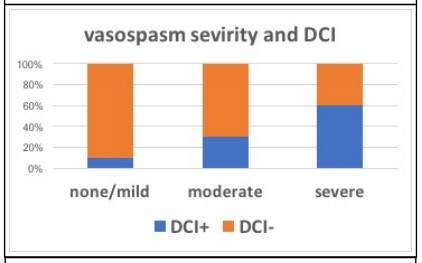
patients characteristic -sex-



the vasospasm scoring and delayed cerebral infarction(DCI)

	Bivariate analysis OR (95%CI)	P
age>70	0.62(0.16-2.40)	0.48
sex	0.28(0.056-1.41)	0.19
Fisher>3	-	1
WFNS>4	3.41(0.97-12.01)	0.09
SVS	20.7(4.64-92.43)	<0.001
VSS>3	4.92(1.32-18.39)	0.023
hydrocephalus	16.88(3.94-73.0)	<0.001

Table Bivariate analysis for characteristics associated with delayed cerebral infarction



	severity of vasospasm			
DCI	none/mild	moderate	severe	total
Yes	4	6	3	13
No	35	14	2	51
total	39	20	5	64

the vasospasm seviriity and DCI

	Rt	Lt
ICA		
M1		
M2		
A1-A2		
Pcom/P1-P2		

the vasospasm scoring system

Learning Objectives

magnetic resonance angiography, cerebral vasospasm, delayed cerebral infarction

Conclusions

Our Novel vasospasm scoring system using MRA-TOF images may have a good potential for the detection of cerebral infarction after SAH. But the artifact in MRA images around the clip has still remain. More number of cases are needed for future study.

References

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