

뇌동맥류 파열에 의한 지주막하 출혈 후 수두증 발생의 위험 인자에 대한 임상 연구*

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= Abstract =

Clinical Study on Risk Factors of Hydrocephalus after Aneurysmal Subarachnoid Hemorrhage

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Objective : The authors analyzed the incidence, the cause and the prognosis of hydrocephalus following aneurysmal subarachnoid hemorrhage to evaluate the risk factors of hydrocephalus and to provide the proper treatment method for hydrocephalus following aneurysmal subarachnoid hemorrhage.

Methods : The 505 cases of subarachnoid hemorrhage followed by aneurysmal surgery from January 1990 to May 1999, were divided into shunt group and shunt - free group and we were reviewed for the clinical status, Fisher's grade, brain CT findings and prognosis.

Results : The incidence of acute hydrocephalus was 37.2% of patients and 18.9% to developed chronic hydrocephalus. Shunt surgery due to chronic hydrocephalus was required in 6.5% of patients. We found following variables were significantly related to shunt - dependent hydrocephalus : high Hunt - Hess and Fisher grade, initial CT findings of intraventricular hemorrhage, posterior circulation aneurysm, preoperative rebleeding, delayed ischemic deficits, and initial high ventricular size index. There were no statistically significant relationships between shunt - dependent hydrocephalus and patient age or sex, timing of operation. The previous hypertension was not related to shunt dependent hydrocephalus. Prognosis in shunt group showed poor result.

Conclusion : The risk factors of hydrocephalus following aneurysmal subarachnoid hemorrhage are high Hunt - Hess grade, high Fisher's grade, aneurysms of posterior circulations, preoperative aneurysmal rebleeding, delayed ischemic deficits, initial CT findings of intraventricular hemorrhage and initially increased ventricular size. The patients with these factors should be carefully observed and managed accordingly due to poor prognosis related to hydrocephalus requiring shunt operation.

KEY WORDS : Subarachnoid hemorrhage · Hydrocephalus · Shunt.

서 론

6)22)

6~67%

2)14)18)22)23)

2001

3), 4

2)4)8), 가

5), 33 (6.5%) 15
 - 75, 52.5 ± 10.5

23)

(Table 1).

2. 내원시 Hunt-Hess 등급, Fisher 등급

Hunt - Hess 2 56.8% 가
 0, 1
 2 27.3%, 3 33.3%, 4 30.3%
 Hunt - Hess
 (p<0.001).

Fisher 2 43.6%, 3
 27.1%, 4 20.6%
 2 21.2%, 3 21.2%, 4 54.4%
 Fisher (p<0.001)(Table 2).

대상 및 방법

1990 1 1999 5
 505
 (shunt group)
 (shunt - free group)

(CT) 가
 CT

CT
 가,
 Ventricular Size Index(VSI)
 VSI CT (foramen of Monro)
 (caudate nu-

cleus) bifrontal horn distance
 15.6% (normal), 15.6~20%
 (mild), 20~25% (moderate), 25%
 (severe) 22)23).

Hunt - Hess Fisher
 , VSI,
 Chi - square test
 p - value 0.05

결 과

1. 성별 및 연령 분포

505

Table 1. Age and sex distribution in shunt-free group versus shunt group

Age	Shunt-free group			Shunt group		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
<29	7	3	10(2.1)	-	-	-
30 - 39	23	12	35(7.4)	4	1	5(15.2)
40 - 49	54	69	123(26.1)	5	5	10(30.3)
50 - 59	64	110	174(36.9)	3	4	7(21.2)
60 - 69	28	92	120(25.4)	2	9	11(33.3)
70	3	7	10(2.1)	-	-	-
Total	179(37.9)	293(62.1)	472(100)	14(42.4)	19(57.6)	33(100)

p>0.05

Table 2. Hunt-Hess grade and Fisher's grade in shunt-free group versus shunt group

	Shunt-free group(%)	Shunt group(%)
Hunt-Hess grade*		
0	7(1.5)	-
1	51(10.8)	-
2	268(56.8)	9(27.3)
3	91(19.3)	11(33.3)
4	49(10.4)	10(30.3)
5	6(1.3)	3(9.1)
Fisher's grade*		
	41(8.7)	1(3.0)
	206(43.6)	7(21.2)
	128(27.1)	7(21.2)
	97(20.6)	18(54.5)
Total	472(100)	33(100)

* : p<0.001

3. 뇌동맥류의 위치

32.7%, 25.2%, 34.3%, 39.4%, 39.4%, 9.1%
 14 3 (21.4%)
 (p<0.05)(Table 3).

27 (81.7%), 33 (100%), CT, CT VSI
 가 11 (33.3%), 8 (24.2%)
 가
 (p<0.001)(Table 5).

4. 고혈압 병력, 수술전 재출혈, 지연성 허혈 결손

38.6%, 24.2%, 33.3%, 3.4%
 (p<0.001).
 22.0%, 48.5%
 (p<0.05)(Table 4).

6. 수술 시기

4~13
 가 61.7%, 14
 14.6%, 4~13
 가 48.5%, 14 가 24.2%
 가
 (p>0.05)(Table 6).

5. Ventricular size index(VSI)

505 CT
 가 188 (37.2%), CT
 96 (18.9%)

7. 출혈의 분포

(prepontine cistern) 60.6%, (quadrigeminal cistern) 93.9%
 (p<0.05), (suprasellar cistern) 93.9%
 (sylvian fissure) 87.9%
 가
 13.1%, 54.5%

Table 3. Location of aneurysm in shunt-free group versus shunt group

Location of aneurysm	Shunt-free group(%)	Shunt group(%)
ICA	154(32.7)	13(39.4)
ACA	26(5.5)	1(3.0)
Acom	162(34.3)	13(39.4)
MCA	119(25.2)	3(9.1)
V-B*	11(2.3)	3(9.1)
Total(%)	472(100)	33(100)

* : p<0.05, ICA : Internal carotid artery, ACA : anterior cerebral artery, Acom : Anterior communicating artery, MCA : Middle cerebral artery, V-B : Vertebro-basilar artery

Table 4. History of hypertension, preoperative rebleeding and delayed ischemic deficit in shunt-free group versus shunt group

	Shunt-free group(%)	Shunt group(%)
Hypertension		
No	290(61.4)	25(75.8)
Yes	182(38.6)	8(24.2)
Preoperative rebleeding*		
No	456(96.6)	22(66.7)
Yes	16(3.4)	11(33.3)
Delayed ischemic deficit†		
No	368(78.0)	17(51.5)
Yes	104(22.0)	16(48.5)
Total	472(100)	33(100)

* : p<0.001, † : p<0.05

Table 5. Ventricular size index in shunt-free group versus shunt group

Ventricular size index	Initial*		After aneurysm operation	
	Shunt-free group	Shunt group	Shunt-free group	Shunt group
Normal	311(65.9)	6(18.3)	409(86.6)	-
Hydrocephalus	161(34.1)	27(81.7)	63(13.4)	33(100)
Mild	116(24.6)	8(24.2)	35(7.4)	-
Moderate	28(5.9)	11(33.3)	26(5.6)	-
Severe	17(3.6)	8(24.2)	2(0.4)	33(100)
Total	472(100)	33(100)	472(100)	33(100)

* : p<0.001

Table 6. Timing of operation in shunt-free group versus shunt group

Operation interval(day)	Shunt-free group(%)	Shunt group(%)	Total(%)
3	112(23.7)	9(27.3)	121(24.0)
4 - 13	291(61.7)	16(48.5)	307(60.8)
14	69(14.6)	8(24.2)	77(15.2)
Total	472(100)	22(100)	505(100)

p>0.05

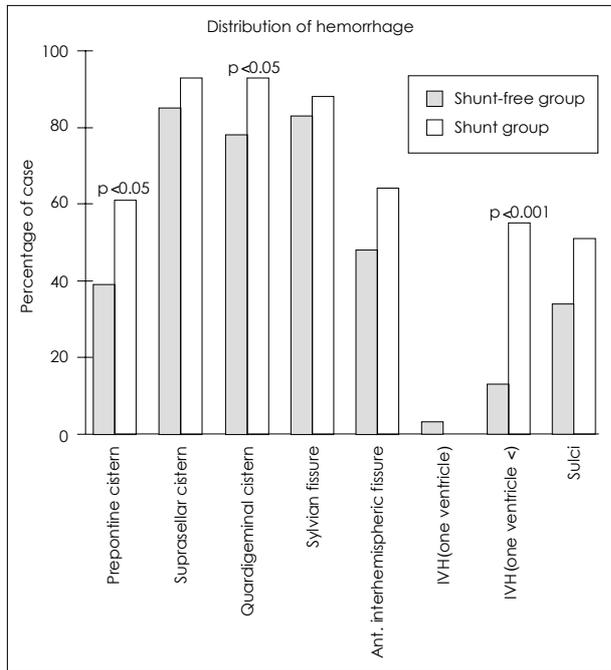


Fig. 1. Distribution of hemorrhage in shunt-free group versus shunt group. Ant. : Anterior, IVH : Intraventricular hemorrhage.

Table 7. Prognosis in shunt-free group versus shunt group

Outcome	Shunt-free group (%)	Shunt group (%)	Total (%)
Good recovery	348(73.7)	10(30.3)	358(70.9)
Moderate disability	68(14.4)	13(39.4)	81(16.0)
Severe disability	24(5.1)	5(15.2)	29(5.7)
Vegetative state	2(0.4)	3(9.1)	5(1.0)
Death	30(6.4)	2(6.1)	32(6.3)
Total	472(100)	33(100)	505(100)

p<0.001

(p<0.001)(Fig. 1).

8. 예 후

good recovery가 73.7%, moderate disability가 14.4%, severe disability가 5.1%, vegetative state가 0.4%, death가 6.4% 였다. Shunt group에서는 good recovery가 30.3%, moderate disability가 39.4%, severe disability가 15.2%, vegetative state가 9.1%, death가 6.1% 였다. (p<0.001)(Table 7).

고 찰

6)22)

4)8)

1)4)6)19)22)

23)
10)11)14)20)22), Black
2)
6~35.4%
30
67%
14%
8~20%
37.2%
1)2)6)18)21)
18.9%
6.5%
2)
Black
62%
6)
가
가
Graff - Radford
가
60 가 33.3%
6)12)19)
48.5%
가
Black 2)
(vasoactive material)
Van Gijn 22)
Milhorat 14)
Saveland 17) Hunt - Hess
Morh 15)
가
Hunt - Hess 3 4
가
가
가

가
 Hassan Tangh⁷⁾
 53%
 가
 가
 2
 가
 가
 Fisher 3 가 7 (21.2%), 4 18
 (54.5%) 27 11
 (33.3%)
 가
 가
 3)¹⁶⁾²³⁾
 14 3 (21.4%)
 175 13 (7.4%), 122 가
 3 (2.5%)
 Kassell⁹⁾
 , Ljunggren¹³⁾
 14
 77 8 (10.3%)

결 론

1990 1 1999 5
 505
 (shunt group)
 (shunt - free group)
 , CT 가

1) 6.5%
 2) Hunt - Hess Fi-
 sher
 3) 가
 가
 4) 가
 5) CT 가
 6) 가
 가
 7) 가
 가
 Hunt - Hess Fisher
 • : 2001 7 2
 • : 2001 9 26
 • :
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References

1) Auer L, Mokry M : *Disturbed cerebrospinal fluid circulation after subarachnoid hemorrhage and acute aneurysm surgery. Neurosurgery 26 : 804-809, 1990*
 2) Black PMcL : *Hydrocephalus and vasospasm after subarachnoid hemorrhage from ruptured intracranial aneurysm. Neurosurgery 18 : 12-16, 1986*
 3) Black PMcL, Tzouras A, Foley L : *Cerebrospinal fluid dynamics and hydrocephalus after experimental subarachnoid hemorrhage. Neurosurgery 17 : 47-62, 1985*
 4) Doczi T, Nemessanyi Z, Szegvary Z, Huszka E : *Disturbance of cerebrospinal fluid circulation during the acute stage of subarachnoid hemorrhage. Neurosurgery 12 : 435-438, 1983*

- 5) Ellington E, Margolis G : *Block of arachnoid villus by subarachnoid hemorrhage. J Neurosurg 30 : 651-657, 1964*
- 6) Graff-Radford NR, Torner J, Adams HP, Kassell NF : *Factors associated with hydrocephalus after subarachnoid hemorrhage. Arch Neurol 46 : 744-752, 1989*
- 7) Hassan D, Tanghe H : *Distribution of cisternal blood in patients with acute hydrocephalus after subarachnoid hemorrhage. Annals Neurol 31 : 374-378, 1992*
- 8) Hildebrandt G, Werner M, Kaps M, Busse O : *Acute non-communicating hydrocephalus after spontaneous subarachnoid hemorrhage. Acta Neurochir (Wein) 76 : 58-61, 1985*
- 9) Kassell NF, Toner JC, Haley EC Jr, Jane JA, Adams HP, Kongable GL, et al : *The international cooperative study on the timing of aneurysm surgery part I, Overall management result. J Neurosurg 73 : 19-36, 1990*
- 10) Kim DS, Huh SK, Choi JU, Lee KC : *Hydrocephalus in ruptured intracranial aneurysms. J Kor Neurosurg Soc 18 : 917-925, 1989*
- 11) Kong MH, Shin YS, Huh SK, Kim DI, Lee KC : *Frequency of shunt surgery according to the timing and method of aneurysm surgery ; analysis in 514 cases with ruptured cerebral aneurysm. J Kor Neurosurg Soc 28 : 486-492, 1999*
- 12) Lee JW, Kim TS, Lim YJ, Kim GK, Lee BA, Leem W : *Symptomatic hydrocephalus after subarachnoid hemorrhage. J Kor Neurosurg Soc 23 : 103-108, 1994*
- 13) Ljunggren B, Brandt L, Kagstorm E : *Result of early operation for ruptured aneurysm. J Neurosurg 54 : 473-479, 1981*
- 14) Milhorat TH : *Acute hydrocephalus after aneurysmal subarachnoid hemorrhage. Neurosurgery 20 : 15-20, 1987*
- 15) Mohr G, Ferguson G, Khan M : *Intraventricular hemorrhage from ruptured aneurysm ; Retrospective analysis of 91 case. J Neurosurg 58 : 482-487, 1983*
- 16) Pietila TA, Heimberger KC, Pallese H, Brock M : *Influence of aneurysm location on the development of chronic hydrocephalus following SAH. Acta Neurochir 137 : 70-73, 1995*
- 17) Saveland H, Hillman J, Brandt L, Edner G, Jakobsson K, Algers G : *Overall outcome in aneurysmal subarachnoid hemorrhage, A prospective study from neurosurgical unit in Sweden during a 1-year period. J Neurosurg 76 : 729-734, 1992*
- 18) Steinke D, Weir B, Disney L : *Hydrocephalus following aneurysmal subarachnoid hemorrhage. Neurol Res 9 : 3-9, 1987*
- 19) Suarez-Rivera O : *Acute hydrocephalus after subarachnoid hemorrhage. Surg Neurol 49 : 562-565, 1998*
- 20) Tapaninaho A, Hernesiemi J, Vapalahti M, Niskanen M, Kari A, Luukkonen M, et al : *Shunt-dependent hydrocephalus after subarachnoid hemorrhage and aneurysm surgery ; timing of surgery is not a risk factor. Acta Neurochir 123 : 118-124, 1993*
- 21) Vale FL, Bradley EL, Fisher III WF : *The relationship of subarachnoid hemorrhage and the need for postoperative shunting. J Neurosurg 86 : 462-466, 1997*
- 22) Van Gijn J, Hijdra A, Vijdicks EFM, Vermeulen M, Crevel HV : *Acute hydrocephalus after aneurysmal subarachnoid hemorrhage. J Neurosurg 63 : 355-362, 1985*
- 23) Vassilouthis J, Richardson AE : *Ventricular dilatation and communicating hydrocephalus following spontaneous subarachnoid hemorrhage. J Neurosurg 51 : 341-351, 1979*