

## 동맥류성 뇌지주막하 출혈후의 수두증에 대한 중판 개구의 효과\*

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= Abstract =

### The Effect of Opening Lamina Terminalis on the Development of Hydrocephalus after Aneurysmal Subarachnoid Hemorrhage

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**Objective :** A retrograde clinical study was undertaken to determine the effect of opening lamina terminalis on the development of hydrocephalus after aneurysmal subarachnoid hemorrhage(SAH). We compared the incidence ratios of the development of hydrocephalus with and without opening lamina terminalis during operation after aneurysmal SAH.

**Patients and Methods :** From Oct. 1996 to Sep. 1998, we performed 138 aneurysm surgery for 122 patients. In 98 cases, the lamina terminalis was opened to make direct cerebrospinal fluid flow from the third ventricle to subarachnoid space for prevention of delayed hydrocephalus. We compared the incidence of hydrocephalus after opening lamina terminalis to those without opened lamina terminalis.

**Results :** In 95 cases, the hydrocephalus was noticed in 2 cases(2.2%). It is significantly lower in the group with opening lamina terminalis than the group without opening lamina terminalis(about 10%).

**Conclusion :** It is simple and easy procedure to open the lamina terminalis during aneurysm surgery. With this maneuver, we could reduce the incidence of hydrocephalus after aneurysmal spontaneous SAH. Thus, it is considered that the opening lamina terminalis is one of the effective methods for preventing the development of hydrocephalus after aneurysmal spontaneous SAH.

**KEY WORDS :** Hydrocephalus · Subarachnoid hemorrhage · Lamina terminalis.

서 론

4)6)15)18)22)23)26)28)30)32)

( 3 ), (4  
57),

14 ) (14 )

가

4).

6 34%

1999 4 17

(leptomeningeal reaction)

10)13)27)33)

가  
1, 7,  
22)26), 14  
Ventricular Size  
Index(VSI) . VSI 15.6%  
5)7), (mild) 15.6 20%, (moderate) 20  
25%, (severe) 25% 27)33).  
2  
가 (basal cisterns)  
가 (lamina ter-  
minalis) 3  
가  
95  
대상 및 방법

1. 연구 대상

1996 10 1998 9 2

125

(Computed Tomographic Angiography)

122

3

5

10

6

98 가

3 가

95 가

2

2. 수술 방법

(Pterional Approach)

가

가

3. 만성 수두증의 판정

4. 자료분석

95

Hunt - Hess

Fisher

결 과

1. 연령 및 성별

29

77

50 가

32

33.7%

가

52.3

가

33

가

62

가

(Table 1).

2. 내원시 의식의 정도와 출혈 양

Hunt -

Hess grade

grade 가

45

47.4%

가

(Table 2, 3),

Fisher grade

가 47

49.5%

가

(Table 4).

Table 1. Age and sex distribution of the patients with lamina terminalis opening

| Age     | Sex |    | Total(%)  |
|---------|-----|----|-----------|
|         | M   | F  |           |
| 21 - 30 | 1   |    | 1( 1.0%)  |
| 31 - 40 | 7   | 4  | 11(11.6%) |
| 41 - 50 | 9   | 21 | 30(31.6%) |
| 51 - 60 | 10  | 22 | 32(33.7%) |
| 61 - 70 | 6   | 11 | 17(17.9%) |
| 71 -    |     | 4  | 4( 4.2%)  |
| Total   | 33  | 62 | 95(100%)  |

**Table 2.** Hunt-Hess grade of the patients(post-admission day 1)

| Grade | No. | %     |
|-------|-----|-------|
|       | 14  | 14.7  |
|       | 45  | 47.4  |
|       | 23  | 23.2  |
|       | 7   | 7.4   |
|       | 6   | 6.3   |
| Total | 95  | 100.0 |

**Table 3.** Hunt-Hess grade of the patients(pre-operation)

| Grade | No. | %     |
|-------|-----|-------|
|       | 15  | 15.7  |
|       | 45  | 47.4  |
|       | 28  | 29.5  |
|       | 6   | 6.3   |
|       | 1   | 1.1   |
| Total | 95  | 100.0 |

**Table 4.** Fisher grade of the patients

| Grade | No. | %     |
|-------|-----|-------|
|       | 11  | 11.6  |
|       | 23  | 24.2  |
|       | 47  | 49.5  |
|       | 14  | 14.7  |
| Total | 95  | 100.0 |

3. 동맥류의 위치

가  
가 (Table 5)  
가 가

4. 발병에서 수술까지의 시간과 술후 치료 결과

58 72  
7 28 , 9 86  
7 3

Hunt - Hess grade

Excellent( 가  
가 가 ), Good(  
가 가 ), Poor(  
가 )  
95 Excellent가 63 , Good 25 , Poor가

**Table 5.** Aneurysm sites of the patients

| Site      | Sex |    | Total | %     |
|-----------|-----|----|-------|-------|
|           | M   | F  |       |       |
| A-com.    | 16  | 19 | 35    | 36.8  |
| ICA       | 5   | 17 | 22    | 23.2  |
| MCA       | 7   | 14 | 21    | 22.1  |
| V-Basilar | 1   | 3  | 4     | 4.2   |
| Multiple  | 4   | 9  | 13    | 13.7  |
| Total     | 33  | 62 | 95    | 100.0 |

\*A-com. : Anterior communicating artery  
ICA : Internal carotid artery  
MCA : Middle cerebral artery  
V-Basilar : Vertebro-basilar artery

**Table 6.** The patients who developed hydrocephalus after clipping of the aneurysm

|              | Patient |                      |
|--------------|---------|----------------------|
|              | M 52yrs | F 72yrs              |
| H-H grade    |         |                      |
| Fisher grade |         |                      |
| AN. site     | A-com.  | Lt. MCA. bifurcation |
| OP. time     | PAD 4   | PAD 2                |
| VSI          | severe  | moderate             |
| Shunt day    | POD 104 | POD 36               |

\*M : male, F : female, H-H : Hunt & Hess, AN : aneurysm  
A-com : anterior communicating artery, Lt : left, MCA : middle cerebral artery, OP : operation, PAD : post-admission day, VSI : ventricular size index, POD : post-operation day

7 .

5. 만성수두증의 발생빈도

95  
16)19)  
2 2.2%  
52 72  
(Table 6), 52 Excellent

가  
, 72 poor

. 2 -  
고 찰  
10  
18)22),



가

- : 1999 6 4
  - : 1999 9 14
  - :
- 601 - 723 68 - 11
- : 051) 640 - 4604, : 051) 631 - 8054  
 E - mail : hongf15e@thrunet.com

가

References

95

2.2%

2

8%

transforming

growth factor - 1

가

1

transforming growth factor -

- 1) Bagley C Jr : *Blood in the cerebrospinal fluid. Resultant functional and organic alternations in the central nervous system. A Experimental data. Arch surg Chicago* 17 : 39, 1928
- 2) Black PM : *Idiopathic normal pressure hydrocephalus. Result of shunting in 62 patients. J Neurosurg* 52 : 371-372, 1980
- 3) Blaylock RL, Kempe LG : *Hydrocephalus associated with subarachnoid hemorrhage. Neurochirurg* 21 : 20-28, 1978
- 4) Brackett CE and Morantz RA : *Special problems associated with subarachnoid hemorrhage : Neuological Surgery edited by JR Youmans. Saunders, 1982, Vol. 3, pp1207-1874*
- 5) Fernando L, Edwin L, Winfield S : *The relationship of subarachnoid hemorrhage and the need for postoperative shunting. J Neurosurg* 86 : 462-466, 1997
- 6) Galera GR, Greitz T : *Hydrocephalus in the adult secondary to the rupture of intracranial arterial aneurysms. J Neurosurg* 32 : 634-641, 1970
- 7) Graff-Radford NR, Torner J, Adams HP Jr : *Factors associated with hydrocephalus after subarachnoid hemorrhage. A report of the cooperative aneurysm study. Arch Neurol* 46 : 744-752, 1989
- 8) Gunasekara L, Richardson AE : *Computerized axial tomography in idiopathic hydrocephalus. Brain* 100 : 749-754, 1977
- 9) Hollin SA, Decker RE : *Effectiveness of microsurgery for intracranial aneurysms. Postoperative angiographic study of 50 cases. J Neurosurg* 39 : 690-693, 1973
- 10) Kibler RF, Couch RSC, Crompton MR : *Hydrocephalus in the adult following spontaneous subarachnoid hemorrhage. Brain* 84 : 45-61, 1961
- 11) Kim D.S., Huh S.K., Choi J.U : *Hydrocephalus in ruptured intracranial aneurysm. J. Korean Neurosurg.* 18 : 917-925, 1989
- 12) Kitazawa, K : *Elevation of transforming growth factor-B1 level in cerebrospinal fluid of patients with communicating hydrocephalus after subarachnoid hemorrhage. Stroke*, 25, 1400-1404, 1994
- 13) Knibestol M, Karadayi A, Tovi D : *Echo-encephalographic study of ventricular dilatation after subarachnoid hemorrhage with special reference to the effect of antifibrinolytic treatment. Acta Neurol Scand* 54 : 57-70, 1976
- 14) Kolluri VRS, Sengupta RP : *Symptomatic hydrocephalus*

결 론

1996 10 1998 9

1) 2 2.2%

2)

- following aneurysmal subarchnoid hemorrhage. Surg Neurol* 21 : 402-404, 1984
- 15) Krayenbuhl, H., Luthy, F : *Hydrocephalus als spatfolge geplatzter basaler hirnaneurysmen. Schweiz Arch. Neurol. Neurochir. Psychiatr* 61, 7-21, 1948
  - 16) Kunst H, Quenzer R : *Echoenzephalographische Untersuchungen bei Blutungen in den subarchnoidealraum. Fortschr Neurok Psychiatr* 39 : 367-378, 1971
  - 17) Larsson A, Moonen M, Bergh AC : *Predictive value of quantitative cisternography in normal pressure hydrocephalus. Acta Neurol Scand* 81 : 327-332, 1990
  - 18) Macdonald RL, Weir B : *Pathophysiology and clinical evaluation of subarchnoid hemorrhage. : Neurological Surgery edited by JR Youmans, Saunders, 1996, Vol 2, pp 1226*
  - 19) Mizukami M, Kin H, Araki G : *Communicating hydrocephalus following the rupture of intracranial aneurysms. Neurol Surg* 4 : 33-41, 1976 (Jpn)
  - 20) Mori K, Murata T, Nakano Y, et al : *Periventricular lucency in hydrocephalus on computerized tomography. Surg Neurol* 8 : 337-340, 1977
  - 21) Pertuiset B, Heutteville B, Margent P : *Dilatation ventriculair, precoce et hydrocephalie constictives a la rupture d'aneurysmes arteriels sus-tentoriels. Neurochirurgia* 15 : 113-126, 1977
  - 22) Raimondi AJ and Torres H : *Acute hydrocephalus as a complication of subarchnoid hemorrhage. Surg Neurol* 1 : 23-26, 1973
  - 23) Spallone A and Gagliardi FM : *Hydrocephalus following aneurysmal SAH. Zbl Neurochir* 44 : 141-150, 1983
  - 24) Steinke D, Weir B, Disney L : *Hydrocephalus following aneurysmal subarchnoid hemorrhage. Neurol Res* 9 : 3-9, 1987
  - 25) Tada T, Kanaji M & Kobayashi S : *Induction of communicating hydrocephalus in mice by intrathecal injection of human recombinant transforming growth factor- 1. J Neuroimmunol* 50 : 153-158, 1994
  - 26) Theander S, Granholm L : *Sequelae after spontaneous subarchnoid hemorrhage, with special reference to hydrocephalus and Korsakoffs syndrome. Acta Neurol Sand* 43 : 479-488, 1967
  - 27) Vassilouthis J, Richardson AE : *Ventricular dilatation and communicating hydrocephalus following spontaneous subarchnoid hemorrhage. J Neurosurg* 51 : 341-351, 1979
  - 28) Wilkinso HA, Wilson RB, Patel PP : *Corticosteroid therapy of experimental hydrocephalus after intraventricular subarchnoid hemorrhage. J Neurol Neurosurg Psychiatry* 37 : 224-229, 1974
  - 29) Wood JH, Bartlet D, James AE Jr : *Normal pressure hydrocephalus : Diagnosis and patient selection for shunt surgery. Neurology (Minneap)* 24 : 517-526, 1974
  - 30) Yasargil MG, Yonekawa Y, Zumstein B ; *Hydrocephalus following spontaneous subarchnoid hemorrhage. Clinical features and treatment. J Neurosurg* 39 : 474-479, 1973