

## 뇌 동맥류 수술 후 혈관조영술의 적응증에 대한 분석

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= Abstract =

### Indications of Postoperative Angiography after Surgical Treatment of Intracranial Aneurysms

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**Objective** : Subarachnoid hemorrhage(SAH) is still one of the most serious disease with high morbidity and mortality in the neurosurgical field. Clipping of the aneurysmal neck is the gold standard of the surgical treatment of aneurysmal SAH. The purpose of this study was to investigate the role of the postoperative angiography and to assess the risk factors related to the incomplete clipping.

**Materials and Methods** : From July 1995 to June 1998, the pre - and postoperative angiography were performed in 50 patients among total 81 patients who have underwent the aneurysmal surgery. We reviewed the various contributing factors including age, sex, Hunt - Hess grade, Fisher grade and the premature rupture of aneurysm during operation retrospectively. Careful evaluation of pre - and postoperative angiography focusing on the size, shape, and remnant neck of the aneurysms and vasospasm was performed. According to the angiographic findings, the patients were divided into two groups ; a complete clipping group and an incomplete clipping group. The data were analyzed by using unpaired independent sample *t* test after F - test to compare the significance between two groups.

**Results** : Incomplete clipping of aneurysms was found in 6(12%) patients through the evaluation of postoperative angiography. Among them, three cases were located on the middle cerebral artery territory. Whereas the patient age, sex, Hunt - Hess grade, and Fisher grade were not significant( $p>0.05$ ), an intraoperative premature rupture had a statistical significance( $p<0.05$ ). A severe vasospasm occurred in 24(48%) cases and one patient with anterior communicating aneurysm was reoperated due to residual sac.

**Conclusion** : According to our experience, the surgeons' judgement is the most reliable factor in deciding the postoperative angiography. During the aneurysmal surgery, the premature rupture always disturbs a complete clipping of aneurysms. Therefore, the temporary clipping of parent arteries is considered essential for a successful clipping. We believe that the postoperative angiography has a role in decreasing the re - bleeding risk due to clip migration and an inaccurate clipping only in the selected cases.

**KEY WORDS** : Postoperative cerebral angiography · Incomplete clipping · Re - bleeding · Vasospasm.

서 론

(20~30%)

(50~60%),

가

18)25)27).

1960

(clip)



## 결 과

### 1. 성별 및 연령

44 (88%), 6 (12%)  
 21 (42%), 29 (58%)  
 53.4 (30~80 ) 6  
 3  
 53 , 54.5  
 (p>0.05)(Table 1).

### 2. 동맥류의 위치 및 크기

50 가 15 (30%)  
 가 , 14 (28%),  
 10 (20%), 가 5 (10%)  
 , 2 , 1 , 1  
 2 , 1 , 1  
 6 가 3  
 10 30%  
 가 1  
 (Table 2).

**Table 1.** Analysis of risk factors related to incomplete clipping

Risk factors	Clipping		p values†
	Complete	Incomplete	
Age(year)	53.0	54.5	0.833
Gender(female)	15(68%)	3(50%)	0.672
GCS* score	14.1	13.3	0.361
Hunt-Hess grade	2.5	2.8	0.331
Fisher grade	3.0	3.3	0.402
Aneurysm size(mm)	8.4	8.8	0.796
Atherosclerosis(+)	29(66%)	4(67%)	0.971
Premature rupture(+)	9(22%)	4(67%)	0.015

\* : GCS=Glasgow coma scale † : p value by <sup>2</sup> test

8.4mm, 8.8mm  
 가  
 (p>0.05)(Table 1).

### 3. 술 전 신경학적 상태 및 뇌 지주막하 출혈량

Glasgow (coma scale)<sup>30)</sup>  
 14.0 , 14.1 ,  
 13.3  
 (p>0.05). Hunt - Hess 2.5,  
 2.8  
 가 (p>0.05). Fisher  
 3.0 3.3  
 가  
 (p>0.05)(Table 1).

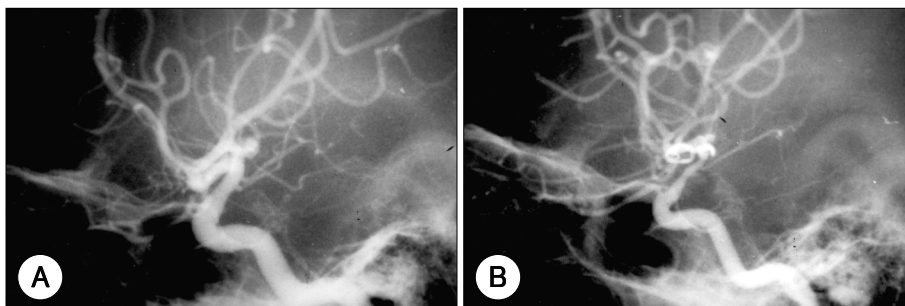
### 4. 동맥경화증 및 수술중 동맥류 파열

가 6  
 4 (67%) 9 (21%)

**Table 2.** Distribution of aneurysms between complete and incomplete clipping groups

Location	Clipping		Total(No.)
	Complete	Incomplete	
ACoA	14	1	15
PCoA	13	1	14
MCA	7	3	10
ICA	5		5
AChA	2		2
DACA	1	1	2
SCA	1		1
BA	1		1
Total(No.)	44	6	50

ACoA : anterior communicating artery  
 PCoA : posterior communicating artery  
 MCA : middle cerebral artery ICA : internal carotid artery,  
 AChA : anterior choroidal artery DACA : distal cerebral artery  
 SCA : superior cerebellar artery BA : basilar artery



**Fig. 2.** Lateral view of cerebral angiograms in a 56-year-old patient A : preoperative angiogram which performed on the 1st hospital day, demonstrating a moderate degree of vasospasm on the proximal supraclinoid ICA and saccular aneurysm on the ICA bifurcation. B : postoperative angiogram performed on the 14th postoperative day, demonstrating a severe vasospasm throughout proximal ICA, ACA, and MCA territories and disappearance of previous aneurysm.

(p<0.05). 가 80% (18)27). 0.38~0.79%  
 66% 가 , ,  
 67% 가 (dome)가  
 (Table 1). 11).

**5. 뇌혈관 연속 및 주 혈관 폐쇄**

42 (84%) , 24 (48%) 1%  
 50% 20)28), 21)  
 7%  
 12% 가 ,  
 1 (2%) ,  
 (Fig. 2). 가  
 가

**고 찰**

**1. 불완전 결찰 동맥류의 자연경과**

Drake 8)

가 115 43

가

가

Lin 20)

3~5

가

,

가

가

20).

가

**2. 동맥류 경부 결찰술의 실패요인 및 술후 뇌혈관 조영술의 목적**

가

가

가

(fusiform)

5)8)9).

가

2)4)7)8)9)11).

가 12mm

가

8)20)24),

5),

가

2).

가

가 8.8mm

가

가

6

40%

16)18),

가

가 , 30~40 Kammes <sup>16)</sup>  
 , 가  
 , 가  
 , 가 1%  
 가 , 가 1% <sup>19)</sup> 70~80% <sup>16)28)</sup>  
 가 , 가  
 , 가  
 2)22)23)

**3. 술 후 뇌혈관 조영술의 적응증 및 비용대비효율(cost-benefit ratio)**

Kassell <sup>17)</sup> 가 , 가  
 , 가  
 , 가  
 가  
 , 가  
 mes <sup>16)</sup> 가  
 , 가  
 Kall-

**4. 뇌혈관 조영술의 시행 시기**

Drake  
 1~2  
 8)11),  
 1~2%  
 1)13)14)16),  
 4% 20% 가 8 54  
 3)8)11)22)26)29),  
 가 1)5)13)23)24), Macdonald <sup>22)</sup> 가 1% <sup>20)</sup>  
 , Drake <sup>8)</sup> 가 , 2  
 7.0%  
 1  
 가 \$500~2500 <sup>16)</sup>

- : 2000 6 14
  - : 2001 5 21
  - :  
471 - 701 249 - 1
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