

## 전 교통 동맥 동맥류 치료의 예후인자

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= Abstract =

### Prognostic Factors in the Treatment of Anterior Communicating Artery Aneurysms

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**Objective** : The anterior communicating artery(ACoA) is known to be the most frequent location of intracranial aneurysms, but the complex arterial anatomy of the ACoA region makes this aneurysm among the most difficult one to treat. In the treatment of ACoA aneurysms, the direction of aneurysmal fundus is known to be very important in the surgical tactics. All ACoA aneurysms in our series were classified according to its direction, and analyzed the clinical features in order to investigate the prognostic factors influencing upon the surgical outcome.

**Methods** : The authors reviewed 236 cases of ruptured ACoA aneurysms that were operated from 1990 to 1997, were classified according to Pia's classification.

**Results** : The incidence rate of the ACoA aneurysm was 35.1%(236/672). Ventral group was more common than dorsal group, especially in ventro - caudal projection subgroup(36.0%). Poor preoperative clinical grade(Hunt - Hess grade IV and V) patients were more common in dorsal group(13.1%) than ventral group(2.6%). Rebleeding and intracerebral hematoma were more commonly seen in ventral group. However, vasospasm, hydrocephalus, hyponatremia, and intraventricular hemorrhage were observed more frequently in dorsal group. Worse outcome was more common in dorsal group than ventral group, especially in dorso - caudal projection subgroup. Also, poor outcome was identified in patients with intracerebral hematoma, intraventricular hemorrhage, hyponatremia, and hypertension, although statistically insignificant. In cases with the A1 dominancy, there was no difference in surgical outcome between the right and left side approach. The higher the aneurysmal neck from the planum sphenoidale, the worse outcome via pterional approach.

**Conclusion** : It seems that the preoperative clinical grade, aneurysmal direction, and the height of aneurysmal neck, especially in the pterional approach, would be the major prognostic factors, and that intracerebral hematoma, intraventricular hemorrhage, hyponatremia, hydrocephalus and the intraoperative aneurysmal rupture would be the minor prognostic factors.

**KEY WORDS** : Anterior communicating artery · Intracranial aneurysm · Prognostic factor.

서 론

가 <sup>12)19)26)27)</sup>. 1939 Russel<sup>21)</sup>

25~38%

가 <sup>1)14)26)27)</sup>,

(obliteration)

(microsurgical technique)가

가

8)24)29)

13)

3)8)9)19)26)

### 대상 및 방법

1990 1997

672

pterional approach  
236

(intracerebral hematoma)  
(intraventricular hemorrhage)

of aneurysmal neck),  
(dominancy)

(hyponatremia)  
Hyodo<sup>9)</sup>

(planum sphenoidale)

Saito<sup>22)</sup>  
40%

Hunt - Hess

Fults Kelly<sup>6)</sup>

Pia<sup>20)</sup>

(height  
1 (A1)

dorsal group

ventro - caudal, dorso - cranial,

ventral  
ventro - cranial,  
dorso - caudal

Kruskal - Wallis one - way ANOVA test, Chi -  
square test Mann - Whitney rank sum test

## 결 과

### 1. 연령 및 성별 분포

35.1%

가 48.2 (22~72 )

1.4 : 1

### 2. 뇌혈관 조영술 소견

ventral group 191 (80.9%), dorsal  
group 45 (19.1%) , ventro - cau-  
dal subgroup 가 , dorsal subgroup  
가 (Table 1). 4~6mm 94  
(39.8%), 7~10mm 115 (48.7%), 11~24mm 31 (13.  
1%) 7~10mm가 가 , 25mm

6mm

가 95 (40.2%), 7~12mm 121 (51.3%), 13mm  
20 (8.5%) 7~12mm가 가

1 (A1) 가 75 (31.  
8%), 149 (63.1%),

12 (5.1%)

A1 (hypoplasia) 161 (68.2%)

A1 75 46  
(61.3%) A1

A1 149 115 (77.2%) A1

A1 (Chi -  
square test ; p<0.05).

### 3. 수술 전 임상 등급

Hunt - Hess grade IV/  
V ventral group 5 (2.6%), dorsal group 6

Table 1. Aneurysm direction

	No.	%
Ventral	191	80.9%
Ventral	31	
Ventro-cranial	76	
Ventro-caudal	84	
Dorsal	45	19.1%
Dorsal	2	
Dorso-cranial	22	
Dorso-caudal	15	
Caudal	6	

(13.3%), grade I/II ventral group 147 (77%), dorsal group 26 (57.8%) dorsal group (Table 2).

#### 4. 합병증의 분석

236 20 (8.5%), ventro - cranial subgroup 가 가 , ventral group 17 (8.9%), dorsal group 3 (6.7%) ventral group (Table 3). 41 (17.4%), ventral group 31 (16.2%), dorsal group 10 (22.2%) dorsal group (Table 3). 29 (12.3%), dorso - caudal subgroup 26.7% 가 가 , ventral group 20 (10.5%), dorsal group 9 (20%) dorsal group 가 (Table 3). 35 (14.8%), ventro - cranial subgroup 32.9% 가 가 , ventral group 32 (16.8%), dorsal group 3 (6.7%) ventral group

**Table 2.** Preoperative Hunt-Hess grade

	I/II	III	IV/V	Total
Ventral	147(77.0%)	39(20.4%)	5( 2.6%)	191
Ventral	26	3	2	31
Ventro-cranial	54	20	2	76
Ventro-caudal	67	16	1	84
Dorsal	26(57.8%)	13(28.9%)	6(13.3%)	45
Dorsal	1	1		2
Dorso-cranial	14	4	4	22
Dorso-caudal	8	5	2	15
Caudal	3	3		6
Total	173	52	11	236

(Mann-Whitney rank sum test ; p>0.05)

**Table 3.** Rebleeding, vasospasm, hydrocephalus, ICH, IVH, and hyponatremia

	Rebleeding	Vasospasm	Hydro-cephalus	ICH	IVH	Hypo-natremia
Ventral	17/191	31/191	20/191	32/191	18/191	13/191
Ventral	4/ 31	3/ 31	1/ 31	1/ 31	1/ 31	0/ 31
Ventro-cranial	10/ 76	15/ 76	10/ 76	25/ 76	16/ 76	9/ 76
Ventro-caudal	3/ 84	13/ 84	9/ 84	6/ 84	1/ 84	4/ 84
Dorsal	3/ 45	10/ 45	9/ 45	3/ 45	7/ 45	4/ 45
Dorsal	0/ 2	0/ 2	0/ 2	0/ 2	0/ 2	0/ 2
Dorso-cranial	0/ 22	4/ 22	5/ 22	3/ 22	2/ 22	3/ 22
Dorso-caudal	3/ 15	4/ 15	4/ 15	0/ 15	3/ 15	1/ 15
Caudal	0/ 6	2/ 6	0/ 6	0/ 6	2/ 6	0/ 6
Total	20/236	41/236	29/236	35/236	25/236	17/236

(Table 3). 25 (10.6%), caudal subgroup 33.3% 가 가 , ventral group 18 (9.4%), dorsal group 7 (15.6%) dorsal group (Table 3). 17 (7.2%), ventral group 13 (6.8%), dorsal group 4 (8.9%) dorsal group (Table 3).

#### 5. 수술 결과 분석

pterial approach . A1 75 , 12 , 149 , 137 , 12 . (clipping) 236 226 (95.8%) , good 184 (78.0%), fair 19 (8.1%) 86% , 10 (4.2%) 2 , 2 , 2 , (intr-aoperative rupture, premature rupture) 2 , 1 , 가 1 .

**Table 4.** Hunt-Hess grade and outcome

	Good	Fair	Poor	Dead	Total
I/II	149 (93.1%)	12 (6.9%)	10 (6.9%)	4	173
III	34 (76.9%)	6 (23.1%)	8 (23.1%)	2	52
IV/V	1 (18.2%)	1 (81.8%)	5 (81.8%)	4	11
Total	184	19	23	10	236

(Kruskal-Wallis one-way ANOVA on ranks ; p>0.05)

(perforator) ,  
 Hunt - Hess I/II 173 161 (93.1%),  
 III 52 40 (76.9%), IV/V 11 2 (18.2%)  
 (Table 4).  
 , ventral group 24 (12.6%), dorsal group 9 (20%)  
 dorsal group 가  
 , dorso-caudal subgroup 15  
 4 (27%)가 (Table 5).  
 , 17 가 13  
 (76.5%), 가 4 (23.5%)  
 가  
 (Table 6, Mann - Whitney rank sum test ; p>0.05).  
 35 가 29  
 (82.9%), 가 6 (17.4%) ,  
 , 25 가 21 (84%),  
 가 4 (16%)  
 (Table 6, Mann -

**Table 5.** Surgical outcome according to the aneurysmal direction

	Good	Fair	Poor	Dead	Total
Ventral					191
Ventral	26	1	2	2	31
Ventro-cranial	60	5	8	3	76
Ventro-caudal	69	6	6	3	84
	167(87.4%)		24(12.6%)		
Dorsal					45
Dorsal	1	1			2
Dorso-cranial	17	2	3	1	22
Dorso-caudal	8	3	3	1	15
Caudal	3	2	1		6
	36(80%)		9(20%)		
Total	184	19	23	10	236

**Table 6.** Surgical outcome according to the other factors

	Good	Fair	Poor	Dead	Total(%)
Hyponatremia	11(64.7)	2(11.8)	3(17.6)	1(5.9)	17(100)
ICH	25(71.4)	4(11.4)	5(14.3)	1(2.9)	35(100)
IVH	15(60.0)	6(24.0)	3(12.0)	1(4.0)	25(100)
Hypertension	69(75.0)	6(6.5)	13(14.1)	4(4.3)	92(100)
Intraop. rupture	13(62.0)	2(9.5)	4(19.0)	2(9.5)	21(100)
Temporary clip	92(79.3)	10(8.6)	10(8.6)	4(3.4)	116(100)
Rt. side approach	9(75.0)	1(8.3)	2(16.7)	0(0.0)	12(100)
Lt. side approach	109(79.6)	10(7.3)	12(8.8)	6(4.4)	137(100)

Whitney rank sum test ; p>0.05).

(>145/95mmHg)  
 , 92 (39.0%)  
 , 가 75 (81.5%),  
 가 17 (18.5%)  
 (Table 6, Mann - Whitney rank sum test ;  
 p>0.05). 21 (  
 8.9%) , 가 15 (71.4%),  
 가 6 (28.6%) ,  
 (Table 6, Mann -  
 Whitney rank sum test ; p=0.05). (parent  
 artery) (temporary clip) 116 ( 49.  
 2%) , 102 (87.9%) ,  
 14 (12.1%)  
 (Table 6, Mann - Whitney rank sum test ;  
 p>0.05). A1  
 12  
 10 (83.3%) , 137 119  
 (86.9%)  
 (Table 6, Mann - Whitney rank sum test ;  
 p>0.05). 가  
 6mm 95 86 (90.5%) , 7~12mm  
 121 103 (85.1%)  
 , 13mm group 20 14 (70%)  
 , 가 13mm  
 가 12mm  
 (Kruskal - Wallis  
 one - way ANOVA on ranks ; p=0.01, Table 7).

## 고 찰

(media)

**Table 7.** Surgical outcome according to the height of aneurysmal neck

	Good	Fair	Poor	Dead	Total
<6mm	82 (90.5%)	4	8 ( 9.5%)	1	95
7 - 12mm	92 (85.1%)	11	11 (14.9%)	7	121
>13mm	10 (70%)	4	4 (30%)	2	20

(Kruskal-Wallis one-way ANOVA on ranks ; p=0.01)

(internal elastic lamina) 가 2 5mm 가

가 1)4)5)12)14)16)19)23)25)26) 7~10mm가 115 (48.7%) 가

(duplication), (triplcation), , 4~6mm 94 (39.8%)

(fenestration), 가 (bridging) 가 28) 40% 7)22),

1 (A1) 50% 17.4% . Loc-

12)19)23), 68.2% ksley<sup>14)</sup> 41%

. Andrews <sup>1)</sup> 42% , Graf <sup>7)</sup> 28.9%, Aoy-

agi <sup>2)</sup> 20.6% 12

A1 가 , 가

A1 . Baik <sup>3)</sup>

A1 (suprasellar cistern)

A1 가 (gyrus rectus)

(apex) 가 가 ,

가 가

(transfer) 1)4)5)12)19)25)26).. 가

1), (softening)

가 ,

. Park <sup>18)</sup>

가

24). Baik <sup>3)</sup>

가

A1 ,

가 가 A1 (do- , Graf <sup>7)</sup>

minancy) 1)4)5)12)19)25)26) A1 가

가 (premature rup- . Perlmutter <sup>19)</sup> 가

ture) 가 A1 , 10~15mmHg

19)26) .

A1 (perforator)

가 가 8.9%

McCormick <sup>16)</sup>

가  
 Russel<sup>21)</sup> 1930  
 , McKissock<sup>17)</sup>  
 가  
 cooperative study  
 34.2%  
 Graf<sup>7)</sup>  
 , Lougheed<sup>15)</sup>  
 (microsurgical technique)  
 가  
 (functional survival rate)  
 8)24)26)29)  
 5% 8)24)29)  
 13)  
 , , , , , orbitofron-  
 tal cortex, mesial hemisphere 가  
 가  
 (perforating artery)  
 , 가  
 12)19)26)27)  
 , , ,  
 가  
 3)8)19)26)

3)19)  
 Hunt - Hess  
 Kim<sup>11)</sup>  
 가  
 Ito<sup>10)</sup> anterior  
 interhemispheric approach(AIH)가 , 1)  
 pterio-  
 nal approach (rectus gyus)  
 가 , 2) interhemispheric  
 fissure, (suprasellar cistern)  
 AIH가  
 Hyodo<sup>9)</sup>  
 (planum sphenoidale) pte-  
 rional approach 가  
 가 12mm  
 (mobiliza-  
 tion) pterio-  
 nal approach가 13mm  
 AIH가  
 , pterional approach , 12mm  
 13mm  
 pterional approach  
 가

가 가 29), Baik<sup>3)</sup>  
 Baik<sup>3)</sup> 77%, Kim<sup>11)</sup>  
 (ventral  
 53% group) 가 80.9%  
 가  
 가  
 가

**결 론**

1990 1997  
 236  
 1) 35.1% 가  
 48.2 , 1.4 : 1  
 2) ventral group 191 (80.9%), dorsal  
 group 45 (19.1%) , ventro - caudal subgroup  
 가 Hunt - Hess grade가 IV/V  
 가 ventral group 2.6%, dorsal group

13.3% dorsal group  
 3) (intracerebral hematoma) ventral group, dorsal group  
 4) ventral group, dorsal group, dorso-caudal subgroup 가  
 5) (afferent artery) 가 149 (63.1%)  
 (planum sphenoidale) 가 pterional approach  
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