

20

1

2 2 2

: 95 8 97 12
 18 20
 Hunt-Hess I 3 , II가 1 , III
 3 , IV가 10 , V가 1 5.2 (, 1-18
) MDS(medical detachable spirals)
 GDC(Guglielmi detachable coils) . 20 6.2mm
 가 17 가 3 10 10
 3 11 5-27 Glasgow
 가
 : 20 16 (80%) 4 2
 가 , 1
 (2.5mm), 1
 16 13 (100%), 2 (95-100%), 1 (95%)
 가 1
 7.1%(1/18) . Hunt-Hess I-III 5
 3 Glasgow 가 1 2 가 2 . Hunt-
 Hess IV-V 9 4 (3) 2
 3

:

Congrad (10) 132
 (ballon embolization)(1- 6% 2%
 3) (microcoil)(4-6) 가 (detachable coil)
 가
 1991 Guglielmi detachable coils(GDC)가
 (7).

GDC 가
 (8-12). Vinuela
 (9) 403 95 8 97 12
 8.9% 1.7% 18 20
 , 18

1 12 가 6 53.6 22-77 가
 2 1 3 가
 1999 1 5 1999 3 11
 Hunt-Hess (13)

I 3 , II가 1 , III 3 ,
IV가 10 , V가 1 .
5.2 48 가 7 , 3 6
4 , 7-10 6 , 18 .
20 6.2mm 4-10mm
가 17 , 10mm 가 3 .
10 (anterior commu-
nicating artery) 2 , (superior hypophyseal
artery) 2 , (posterior communicating artery) 2
, (internal carotid artery bifurcation)가 1 ,
가 3 . 10
(basilar tip)가 3 , (superior cerebellar
artery) 2 , (vertebro-basilar junction),
, (anterior inferior cerebellar
artery), (posterior inferior cerebellar artery)
1 .
가 12 ,
가 가 5 ,
가 1 .
7
biplane, Digital subtraction angiog-
raphy(DSA), road map 가 Advantx LCN(GE Medical

system, Milwaukee, WI, U.S.A.) . Guiding
5-6F Envoy(Cordis corporation, Miami, FL, U.S.A.)
Tracker 10 Tracker 18(Target
Therapeutics, CA, U.S.A.) .
mechanical detachable spirals(MDS ; Balt Extrusion,
Montmorency, France) Guglielmi
detachable coils(GDC ;Target Therapeutics, Fremont, CA,
U.S.A.) . GDC 3.3
(, 2-7) 1 DSA
3,000-4,000IU bolus
2,500-3000IU
ACT(activated coagulation time) 2.5-3
3 aPTT(activat-
ed partial thromboplastin time) 60-80msec
가 (total,100%),
(subtotal,95-99%), (incomplete, less
than 95%)
가 ,
가
가
3 11 5-27

Table 1. Summary of Successful Intravascular Embolization of 16 Acutely Ruptured Aneurysms in 14 Patients

No of Patients	Sex/Age	Hunt-Hess Grade at Treatment	Aneurysmal Location*	Size (mm)	Occlusion Degree + at Embolization	Occlusion Degree First F/U Angiogram after Embolization	Occlusion Degree at Second F/U Angiogram after Embolization	Final Results	Glasgow Outcome Scale†
1	F/40	II	AICA	5.0	Incomplete (70%)	Incomplete (70%)	Incomplete (50%)	Incomplete (50%)	1
2	F/57	III	PICA	3.0	Total	Total	Total	Total	2
3	M/42	IV	A-COM	5.0	Total			Total	4
4	F/70	IV	Basilar tip	6.0	Total			Total	4
5	M/59	IV	PCA,P2/P3 junction	6.6	Total	Total	Total	Total	3
6	F/22	IV	Basilar tip	4.7	Total	Total		Total	3
7	M/62	IV	ICA, P-COM	19.0	Total	Total		Total	5
8	F/54	V	ICA bifurcation	5.3	Total			Total	5
			Rt MCA bifurcation	3.6	Total			Total	
			Lt MCA Bifurcation	5.1	Total			Total	
9	M/61	IV	Vertebro-basilar Junction	3.8	Total			Total	3
10	F/51	III	Superior hypophyseal ICA	3.4	Total	Total		Total	1
11	F/34	IV	Superior hypophyseal ICA	15.0	Total	Total		Total	3
12	F/76	IV	SCA	4.0	Subtotal			Subtotal	5
13	M/54	III	Basilar tip	7.6	Total			Total	2
14	M/75	I	ICA, P-COM	12.0	Subtotal			Subtotal	1

*A-COM : Anterior communicating artery, AICA : Anterior inferior cerebellar artery, ICA : Internal carotid artery,

MCA : Middle cerebral artery, PCA : Posterior cerebral artery, P-COM : Posterior communicating artery,

SCA : Superior cerebellar artery, + Occlusion degree: Total (100%), Subtotal (95-99%), Incomplete (less than 95%)

† Glasgow outcome scale: 1 : Good recovery without neurologic deficit, 2 : Moderate disability, 3 : Severe disability,

4 : Vegetative state, 5 : Death

Patient 1 was treated with MDSs and the others with GDCs

Glasgow (14)

1

가

(Fig. 2).

7

4

3 , 2 6 , 1 16

20

16 (80%)

2 4

10

8

1

1

4

28

(2.5mm), 1

(parent artery)

1

가 70% 50%

(Fig. 2)

2

가

8

2

2

. 1 (1)

가

가

가 가

CT

Table 1

16

16

(1) (Fig. 2). 1 (4)

13

(Fig. 1), 2

, 1

DSA

roadmap

(70%)

8

가

8

, 1

, 1

, 1

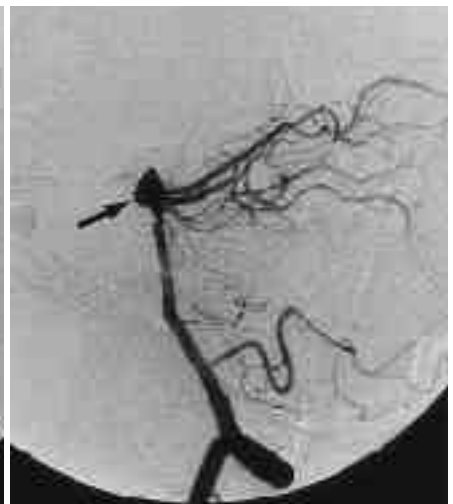
7.1%(1/18)



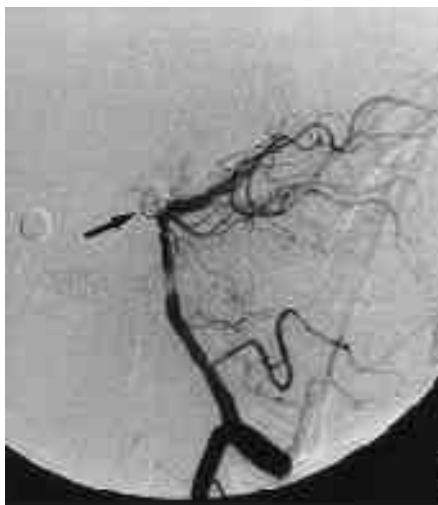
A



B



C



D



E

Fig. 1. Case 13. A 54 year-old man with ruptured basilar tip aneurysm (Hunt-Hess grade II).

A. Axial CT scan shows subarachnoid hemorrhage.

B,C. Vertebral angiograms obtained in the frontal (B) and lateral (C) projections show a small, saccular basilar tip aneurysm (arrow).

D,E. Postembolization vertebral angiograms obtained in the frontal (D) and lateral (E) projections show complete occlusion of the aneurysm with GDCs (arrow). Patient had good clinical outcome (Glasgow outcome scale 2) during 5 months follow up period.

Hunt-Hess	I-III	5	3	(3)	2	3
Glasgow	가	1	2	가	2	1, 4, 12	
Hunt-Hess	IV-V	9	4				



A



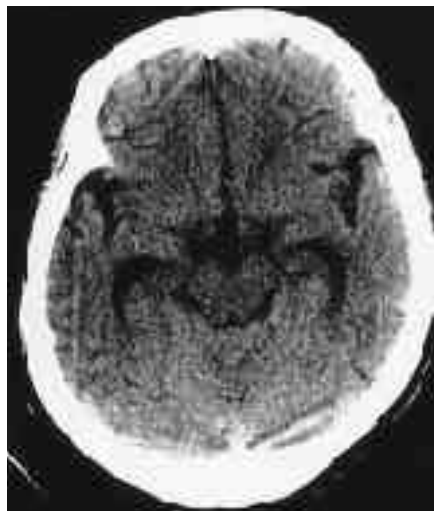
B



C



D



E



F



G

Fig. 2. Case 1. A 40 year-old woman with ruptured anterior inferior cerebellar artery (AICA) aneurysms with subarachnoid hemorrhage (Hunt-Hess grade II). A. Axial CT scan shows subarachnoid hemorrhage (SAH). B. Vertebral angiograms obtained in the frontal projection shows a small, saccular aneurysm at the origin of the right AICA (arrow). complete occlusion of the aneurysm was not possible because right AICA (curved arrow) originates from the aneurysmal neck. C. Postembolization vertebral angiogram obtained in the frontal projection shows incomplete occlusion (70%) of the aneurysm with mechanical detachable spirals (MDS) (arrow). D. During embolization guide wire passed the aneurysmal sac and leakage of the contrast material was seen. postembolization axial CT scan (D) shows massive SAH. E, F. Follow up axial CT scans obtained 12 days later shows complete resolution of SAH and beam hardening artifact of coils (arrow). G. Follow-up vertebral angiogram obtained 4 months later shows recanalization of aneurysm (50% occlusion) at the level of neck (arrow). Patient had good clinical outcome (Glasgow outcome scale 1) during 27 months follow up period.

Table 2. Outcome of Successful GDC Embolization of Ruptured Aneurysms in 14 Patients.

Hunt-Hess Grade	Glasgow Outcome Scale				
	1	2	3	4	5
I (n= 1)	1				
II (n= 1)	1				
III (n= 3)	1	2			
IV (n= 8)			4	2	2
V (n= 1)					1

(Table 2).

(proximal ligation of parent artery),
wrapping, . 1980
Debrun (15) Berenstein (16)

(1-3). Heishima

(17)

HEMA (hydroxyethyl metacrylate)

27a

(geometry) 71

, HEMA ,

. Higashida (2) 215

127 (59.1%)

88 (40.9%)

9.8%,

7.4%

10.2%,

18.2%

(4-6)

가

1991 1992 Guglielmi (7,8)
(detachable platinum microcoil)

(18) 4mm

가

4mm

16% (8/50)

가

가 가

가

가

remodeling

. Vinuela (9)

70.8%,

35%,

가

가

가

7.1%(1/14)

Vinuela (9) 2.7%(11/403)		8.9-29%	
15	Cognard	(24-26).	
(10) 4.5%(6/132)		Vinuela (9) 9.6%	6.1%
		Nichols (27)	3.8%
(19-22). Vinuela (9)	GDC가		
	가		
1	가		(retraction)
	가		(cortical vein)
Vinuela (9) 2.5%, Cognard (10) 4%		가	
48		가	
	48	가	
	가		
(9).	3,000-4,000IU		
bolus	2,500-3000IU		
	ACT(activated coagulation		
time)	2.5-3	3	가
	aPTT 60-80msec		
Vinuela (9) 3%			
1			
	Vinuela (9)		
	(lenticulostriate		
artery)	(perforating artery)		
	(balloon angioplasty)		
	가	가	Vinuela (9)
Hunt-Hess I 92.7%, II 91.4%,			
III 83.5%, IV 79.7%, V			
53.8%	가		
Congrad (10) Hunt-Hess I 88.2%			
Glasgow 가 1 II-III 53.6%			
Glasgow 가 1 Hunt-Hess			
가	Hunt-Hess I-III 5		
3 Glasgow 가 1 2			
가 2			
Batjer (19) 307			
22%	16%		
Yasargil (20) 3%			
6%	Seiler (23)		
153	14%	27%	
	Vinuela (9)		
8.9%	1.7%		
Congrad (10) 6%	2%		

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Endovascular Treatment of 20 Acutely Ruptured Cerebral Aneurysms with Detachable Coils¹

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Purpose : To evaluate the preliminary results of endovascular coil treatment of acutely ruptured aneurysms.

Materials and Methods : Between August 1995 and December 1997, 18 patients with 20 ruptured aneurysms were treated. They were classified as Hunt and Hess grade I (n= 3), grade II (n= 1), grade III (n= 3), grade IV (n= 10) or grade V (n= 1). Endovascular treatment was performed at mean 5.2 (range, 1-18) days. The first aneurysm was treated with mechanical detachable spirals (MDS) and the others with Guglielmi detachable coils (GDC). Aneurysm size was categorized as small (n= 17) or large (n= 3). Ten aneurysms were located in the anterior circulation, and ten in the posterior circulation. Using the Glasgow outcome scale (GOS), clinical outcome was evaluated 5 to 27 months after treatment in 11 patients. Three patients had already died.

Results : In 14 of the 18 patients (16 of 20 aneurysms : 80%), treatment was successful. Four aneurysms failed due to unsuccessful catheter placement (n= 2), small aneurysm (n= 1) or occlusion of the parent vessel (n= 1). Total occlusion was observed in 13 aneurysms; 95-99%, or subtotal occlusion, in two, and less than 95%, or incomplete occlusion, in one. Technical complications included passing of wire (n= 1) and unintentional parent artery occlusion (n= 1). There was a 7.1%(1/14) morbidity rate, but no mortality related to the technique. Six patients with Hunt and Hess grade I-III had good clinical outcome (3 with GOS 1, and 2 with GOS 2). Four of the nine patients who were grade IV-V showed clinical improvement (GOS 3); two patients were clinically unchanged (GOS 4), and three died from the severity of primary hemorrhage.

Conclusion : Endovascular coil treatment is a reasonable alternative for patients who are not candidates for conventional surgical treatment or in whom such treatment has failed.

Index words : Aneurysm, intracranial

Aneurysm, rupture

Aneurysm, therapy

Brain, hemorrhage

Cerebral blood vessel, therapeutic blockade

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