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Society of Korean Endovascular Neurosurgeons

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Sociey of Korean Endovascular Neurosurgeons

ASCENT 2014

June 20(Fri) - 21(Sat) Yeosu Theocean Hotel

대 한 뇌 혈 관 내 수 술 학 회

인 사 말

존경하옵는 대한뇌혈관내수술학회 회원 여러분

의료환경 변화에 따라 뇌혈관질환의 진단과 치료의 패러다임도 무한 경쟁시대에 접어들었습니다. 우리학회는 명실상부한 뇌혈관질환의 "뇌혈관내치료"를 선도하는 전문가 모임으로서, 지난 5월 대한신경중재치료학회 및 대한뇌혈관외과학회와의 합동학회를 각각 성황리에 마쳤습니다. 금년도 ASCENT에서는 이틀간 일정으로 엑스포 도시 여수에서 아래와 같은 유익한 학술 정보와 함께 여유로운 시간을 제공해 드릴 것입니다.

첫째, 심포지엄 주제는 "Technical consideration in the endovascular treatment of anterior circulation aneurysms"으로 동맥류 치료의 부위별 특징과 기술적 어려움의 극복방법에 대하여 Experts로부터 값진 교훈을 얻을 기회가 될 것입니다. 또한 complication, interesting 그리고 complicated 증례발표는 본인의 경험을 참석자들과 솔직하게 토론하고 공유할 수 있는 시간이 될 것입니다.

둘째, 대한의학회 가입을 위한 준비 검토, 금년도 뇌혈관내수술인증의 및 기관 심사결과 발표, 영문홈페이지 소개 등을 통해서 우리학회가 추구하는 방향에 대한 소중한 정보교환과 함께 여러분들의 귀한 의견을 개진하실 수 있습니다.

셋째, 금년 2월부터 시행되어온 월례집담회 및 지회 모임이 산뜻하고 일목요연하게 정리되어 포스터로 전시되며, 이를 통해 학문적 발전을 위한 노력과 회원상호간에 친목을 엿보실 수 있습니다.

금년도 3월호 대한신경외과학회지에 "Standards for Endovascular Neurosurgical Training and Certification of the Society of Korean Endovascular Neurosurgeons 2013"이 출판되었으며 이는 보다 안전하고 표준화된 뇌혈관내수술을 담당하는 의사 수련과 자격을 규정하고자 하는 우리학회의 노력의 결실입니다. 회원 여러분들도 열정을 갖고 훌륭한 창의력을 발휘해 각자의 발전을 도모해 나가시리라 확신합니다.

끝으로 금년 ASCENT 모임을 통해 학문적 성취와 함께 병원을 벗어나서 여유롭게 상호간 교류할 수 있는 시간이 되시길 바랍니다. 그럼 여수에서 뵙겠습니다.

2014년 6월

대한뇌혈관내수술학회 회장 **김 범 태** 드림

임원명단(2014-2015)

상임이사	
회 장	김 범 태
총 무	성 재 훈
학 술	윤 석 만
재 무	신 승 훈
간 행	김 성 림
보 험	박 석 규
홍 보	이 형 중
분과전문의(인증의)	이 호 국
회원관리	조 재 훈
수련교육	권 순 찬
연구(진료지침)	장 철 훈
감사	정 진 영

특별(상임)이사	
전임회장	백 민 우
	김 영 준
	권 도 훈
	안 성 기
	신 용 삼
	권 오 기
회칙개정	강 희 인
대외협력	고 준 석
허혈성뇌졸중 정책	유 도 성
의학회 상대가치 정책	유 승 훈
지회대표	김 태 선
	이 창 영
	고 현 송
	권 순 찬

ASCENT 2014

June 20(Fri) - 21(Sat) Yeosu Theocean Hotel

2014.6.20 (FRI)

	Registration		
14:00-	Opening Ceremony		
14:20-14:30	Opening Remark	김 범 태 회장	
14:30-16:00	**Free Paper Ⅰ Complicated Case Review**	**좌장 : 권 오 기 (서울대)**	
	Intraprocedural aneurysm rupture during unruptured aneurysm embolization	서동호 (순천향대)	_11
	Pseudoaneurysm으로 의심되는 병변이 동반된 sacular aneurysmal subarachnoid hemorrhage에서 코일 색전술을 시행하면서 경험한 매우 끔찍한 결과와 이에 대한 반성	정영진 (영 남 대)	_12
	Delayed fatal intracerebral hemorrhage on next day to stent-assisted coiling of unruptured aneurysm.	변형수 (한 양 대)	_13
	Rebleeding/Regrowing Ruptured Dorsal Wall Aneurysm of Internal Carotid Artery: Embarrassing Experiences in Two Cases	김명진 (가 천 대)	_14
	Complications in Endovascular Treatment for Blood Blister-like aneurysms (BBAs) of the internal carotid artery (ICA)	이호진 (한 림 대)	_15
	Fatal unexpected blindness after stent assisted coiling of unruptured paraclinoid aneurysm	진성철 (인 제 대)	_16
	A case of recurrent subacute in-stent thrombus after carotid balloon angioplasty and stenting	신희섭 (경 희 대)	_17
	Contrast-induced encephalopathy after coil embolization of unruptured intracranial aneurysm -2 cases report-	성승언 (동래봉생병원)	_18
	미파열성 뇌동맥류 코일 색전술 중 원위부 혈관에서 먼저 발견된 혈전색전합병증(thromboembolic complication)	권현조 (충 남 대)	_19
16:00-16:20	*Coffee Break*		
16:20-17:20	**Symposium** Technical consideration in the endovascular treatment of anterior circulation aneurysms	좌 장 : 권 도 훈 (울산대)	
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	2) Pcom aneurysms	신승훈 (관 동 대)	_24
	3) MCA aneurysms	정진영 (동의의료원)	_25
17:20-18:20	**Free Paper Ⅱ Interesting Case Review**	**좌 장 : 이 창 영 (계명대)**	
	Usefulness of the High Resolusion MRI for Endovascular Treatment Planning of Intracranial Vertebral Artery Dissection Aneurysm	김성태 (인 제 대)	_45
	Stent assisted coil embolization of ruptured very small multiple PCA aneurysms associated with AVM	장동규 (가톨릭대)	_46
	Simultaneous ruptured pseudoaneurysm of the internal carotid artery and cerebral infarction as initial manifestation of polycythemia vera: What would you do in this situation?	최규선 (한 양 대)	_47
	Consideration in the Multistage AVM embolization using Onyx (2 cases)	신동성 (순천향대)	_48
	Transvenous injection of n-butyl 2-cyanoacrylate to obliterate the pathologic cavernous sinus for the treatment a cavernous sinus dural arteriovenous fistula	이종영 (한 림 대)	_49
	What is the best decision after IV thrombolysis for each individual patient with acute ischemic stroke?	김영우 (가톨릭대)	_50

18:20-19:00	임시총회	
	- 의학회 가입 준비사항 검토	유 승 훈 이사
	- 2014 인증의 인증서 수여	이 호 국 이사
	- 학회 홈페이지 변경 및 영문화 소개	이 형 중 이사
	- 안건토의	총 무 이 사
19:10-	*Official Dinner*	

2014.6.21 (SAT)

07:00-08:00	Breakfast		
08:00-10:00	Free PaperⅢ Complicated Case Review	좌 장 : 김 태 선 (전남대)	
	Rapid growing ruptured intracranial aneurysm after coil embolization 2cases	오지웅 (연세대)	_53
	A case of In-hospital rupture of Thrombosed giant intracranial aneurysm	김동한 (울산대)	_54
	Microcatheter instability during coil embolization of intracranial aneurysm, Case report	이창주 (유성선병원)	_55
	The endovascular treatment of tiny basilar tip aneurysm: three case reports & technical considerations	김재훈 (을지대)	_56
	The effectiveness of waffle cone technique for complex aneurysm	고정호 (단국대)	_57
	Endovascular treatment of recurrent subarachnoid hemorrhage following previous microsurgical clipping with the Y-double stent assisted coil Embolization	이동훈 (가톨릭대)	_58
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	Subarachonid Hemorrhage Due to Formidable and Unusual Intracranial Artery Dissection	이재일 (부산대)	_60
	The failure of FemoSeal vascular closure device after femoral artery access cerebral angiography : cases report	김태곤 (차의대)	_61
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	Staged Surgical and Endovascular Treatment of Palpebral Arteriovenous Malformation: A Case Report	유찬종 (가천대)	_65
10:00-10:20	Coffee Break		
10:20-10:40	Neuroendovascular company news	좌장 : 성 재 훈 총무이사	
10:40-10:45	Closing Remark	윤 석 만 학술이사	

Free Paper Ⅰ

Complicated Case Review

좌장 : 권 오 기

Intraprocedural aneurysm rupture during unruptured aneurysm embolization

서동호, 윤석만, 박혜란, 배학근, 윤일규

순천향대학교 천안병원 신경외과학교실

Objective : Intraprocedural aneurysm rupture (IPR) is a dreadful complication of cerebral aneurysm embolization. When it occurs during the unruptured aneurysm embolization, most of the endovascular surgeons get in panic. In this situation balloon is a valuable tool to salvage the patient.

Methods : The authors present two cases of IPR during balloon assisted coiling. The first case was a 44 years old female with unruptued right p-com aneurysm (6×4mm) and the second case was a 66 years old female with unruptued right pcom aneurysm (5.5×3mm).

Result : Massive contrast leakage was demonstrated during second coil and first coil packing, respectively. Bleeding was controlled immediately after ballooning in the first case, which resulted in uneventful recovery, however, in the second case bleeding was not stopped after balloon inflation. Rapid coil packing and further ballooning across the aneurysm neck stopped the bleeding. Postoperative CT showed massive SAH, and she regained consciousness after coma therapy for 1 day.

Conclusion : Balloon is a very useful tool in case of IPR.

Keyword : Balloon, intraprocedural rupture

Pseudoaneurysm으로 의심되는 병변이 동반된 sacular aneurysmal subarachnoid hemorrhage에서 코일 색전술을 시행하면서 경험한 매우 끔찍한 결과와 이에 대한 반성

정영진, 김종훈, 장철훈

영남대학교 병원 신경외과

Objective : Pseudoaneurysm을 동반한 aSAH의 경우에는, 치료가 시작되기 이전에 파열이 되거나, 치료 도중 동맥류가 완전치 폐쇄되기 이전에 조기 파열이 일어날수 있는 위험성이 높다. 저자는 pseudoaneurysm이 의심되는 병변을 동반한 상황에서 코일색전술을 시행하면서 경험한 예를 보고하고자 한다.

Methods : aSAH로 내원한 환자 중, 코일 색전술 이전에 pseudoaneurysm을 의심할 수 있는 환자 2명의 코일 색전술을 시행하였고 이 두 환자의 영상학적 소견 및 임상 결과를 보고하고자 한다.

Result : 두 환자 모두 수술 전 또는 수술 중 동맥류의 파열로 인하여 사망하였다. 첫번째 환자는 62세 남자 환자로 PcomA에서 발생한 동맥류로 코일을 시행하였고, 코일 도중에는 특별한 사건이 없었다고 생각하였으나, 수술 후 시행한 CT에서 많은 양의 재출혈을 동반하였다. 두번째 환자는 경련과 의식 소실을 주소로 내원한 42세 여자 환자로 AcomA에서 발생한 동맥류를 코일로 막으려 하였으나, 수술 도중 지속적인 조영제의 누출 소견 등이 관찰되었고 역시 코일 이후 많은 양의 재출혈이 관찰되었다.

Conclusion : Pseudoaneurysm이 의심되는 동맥류의 코일 색전술은 조기 파열의 위험성이 높을 수 있고, 파열되었을 경우 그 처리가 다른 일반적인 동맥류와는 다를 수 있어 임상 결과의 악화를 가져올 수 있다. 따라서 우리는 pseudoaneurysm이 의심되는 angiographic finding등을 잘 알고 이를 처리함에 있어 좀 더 신중한 계획을 세워야 할 것이다.

Keyword : ruptured aneurysm, pseudoaneuryms, endovascular coiling

Delayed fatal intracerebral hemorrhage on next day to stent-assisted coiling of unruptured aneurysm

Hyoung-Soo Byoun, Hyeong-Joong Yi

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Objective : Acute or delayed hemorrhage after endovascular treatment is associated with a high mortality and morbidity. We report an unusual complicated case.

Methods : A 56-year-old woman, Hunt-Hess II, Fisher III, was presented with subarachnoid hemorrhage due to left middle cerebral artery(MCA) aneurysm rupture. CT-angiography & DSA demonstrate aneurysmal sac on bifurcation of the Left MCA(4 * 12.2 * 8.8 mm) and bifurcation of the right internal cerebral artery(ICA) (5.9 * 5.2 * 4.8 mm).

Result : The aneurysm of the left MCA was managed by aneurysmal neck clipping via pterional approach. Her postoperative neurological state was unremarkable. At eighteenth hospital day, we performed stent-assisted coil embolization for the right sided unruptured ICA aneurysm. Loading dose of aspirin and clopidogrel were administered a day ago. On the immediate post-coiling angiography, the aneurysmal sac was partially occluded and the flows of anterior cerebral artery & middle cerebral artery were maintained well. There was no specific abnormal finding on postoperative CT scan as well as her clinical condition. The next morning, the patient complained mild headache, sufficiently controlled with painkiller, but her headache was gradually worsened. Abruptly, her mental status became stupours after several bouts of vomiting. CT scan revealed large volume of hematoma in the right temporoparietal area, adjacent to the coil & stent with severe mid-line shifting. Control angiogram showed no specific leakage of contrast or blood. Emergent craniectomy & hematoma removal was performed. But, hemostasis was not attained satisfactorily. The patient remained unconscious for few days.

Conclusion : The dual antiplatelet therapy increases the risk of acute or delayed hemorrhage in stent-assisted coil embolization possibly due to stretching and leakage form the stent-artery interface, or bleeding from an aneurysm from stretched coil mass. But, the actual cause of our complication case is remained obscure.

Keyword : Complication, Intracerebral hemorrhage, stent-assisted coiling

Rebleeding/Regrowing Ruptured Dorsal Wall Aneurysm of Internal Carotid Artery: Embarrassing Experiences in Two Cases

Myeong Jin Kim, Chan Jong Yoo, Jin Wook Kim

Gachon University Gil Medical Center

Objective : Dorsal wall aneurysm of supraclinoid internal carotid artery (ICA) as blood blister morphology tend to grow into the saccular form within a few weeks and rapidly regrow with or without rebleeding. The treatment modality for the aneurysm is controversial. We report on two patients with a blood blister-like aneurysm (BBA) who underwent the endovascular treatment in unexpected embarrassing situations

Methods : Case 1; A 53-year-old woman was presented with mental change and subarachnoid hemorrhage (SAH) on a brain computed tomography (CT). The angiography demonstrated a small BBA on dorsal wall of right ICA. Endovascular treatment with a stent-within-a stent was performed for the lesion. In hospital days, the patient woke up, but complained blurred vision on ipsilateral side. Ophthalmological examination revealed intraocular vitreous hemorrhage in accordance with Terson's syndrome. Case 2; A 55-year-old man was presented with sudden headache and SAH on a brain CT. The angiography demonstrated a broad neck aneurysm on dorsal wall of right ICA. Stent-assisted coil embolization was performed for the aneurysm. The follow-up angiography showed regrowth and coil compaction of previous aneurysm.

Result : In Case 1, at two weeks after the endovascular treatment, follow up angiography showed recurrence of the BBA. Coil embolization for the recurred lesion was performed. And then, ophthalmological vitrectomy for the intraocular lesion was tried because the decreased vision worse. Unfortunately, the patient had seizure and mental change to comatose state during the ophthalmological surgery. Immediate brain CT showed SAH and angiography showed no definite recurred the BBA without any newly vascular lesion. Finally, the patient had hemiparesis and decreased vision at discharge. In Case 2, unfortunately, the initial control angiography in re-treatment for the recurrent aneurysm showed unexpected in-stent thrombosis with occlusion of ipsilateral posterior communicating artery. Immediate intra-arterial thrombolysis was performed and the recanalization was successful. After three weeks, additional coil embolization and stenting were performed for the regrowing aneurysm. Hereafter the patient was diagnosed with pituitary tumor presented as acromegaly and discharged without any deficit.

Conclusion : The endovascular treatment with multiple stenting and coiling was feasible for the ruptured BBA. However, the ophthalmological correction for Terson's syndrome with ruptured BBA should be undertaken after the acute phase of the SAH even if the treatment of the intracranial vascular lesion was performed completely. In addition, early follow-up is very important in the BBA because it is likely to show rapid configurational change.

Keyword : Blood blister-like aneurysm; Dorsal wall aneurysm; Internal carotid artery; Terson's syndrome; Aneurysmal regrowth; Rebleeding; Stent-assisted coil embolization; In-stent thrombosis

Complications in Endovascular Treatment for Blood Blister-like aneurysms (BBAs) of the internal carotid artery (ICA)

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Objective : To review major complications in procedures for blood blister-like aneurysms (BBAs) of the internal carotid artery (ICA).

Methods : We reviewed retrospectively 1176 patients with aneurysmal subarachnoid hemorrhage at the Hallym Medical Center between January 2001 and January 2012. There were 31 ICA trunk aneurysms: of them, 22 were BBAs and nine were saccular aneurysms including one giant aneurysm. The saccular aneurysms were excluded from this study. The 22 BBA patients underwent clipping (n = 13), trapping (n = 2), endovascular procedures (n = 6), and wrapping (n = 1) treatments.

Result : The average Hunt Hess grade (HHG) was 3.0 and the Fisher grade (FG) was 3.2 in the BBA cases. Procedure-related bleedings occurred in two simple Guglielmi detachable coils (GDCs) cases. The occurrence of symptomatic vasospasm (50%) was very high. The mean GOS was 3.14 and the mortality rate was high, at 31.8%.

Conclusion : All endovascular procedures with simple GDCs during our early learning curve had the risks of rebleeding and regrowth, and were very difficult because most BBAs are small with a fragile wall and a broad neck. Furthermore, in BBAs, vasospasm occurred frequently within 14 days. That is why the use of simple GDCs was changed to a stent-assisted procedure.

Keyword : subarachnoid hemorrhage, blood blister-like aneurysm, internal carotid artery

Fatal unexpected blindness after stent assisted coiling of unruptured paraclinoid aneurysm

Sung-Chul Jin, Sun-Il Lee, Jeong Soo Kim, Hae Yu Kim, Ji Hwan Jang, Sam Yeol Ha
Inje University

Objective : We reported a rare complication of central retinal artery occlusion 10 hours after stent assisted coilng in the unruptured paraclinoid aneurysm.

Methods : A 52 year old female patient who underwent stent asssited coiling for left unruptured paraclinoid aneurysm sufferred from left total blindess10 hours after the coiling procedure. Diffusion MRI showed no high singal related with the symptom. Therefore, conventional angiography was subsequently performed for confirmative diagnosis of central retinal artery occlusion within 1 hours after total blindness developed. The angiogram showed an patent opthalmic arterey with no choroidal blush which had been shown immediately after the coiling. left side vision improved to be capable of finger count immediately after Intra-arterial thromboysis using urokinase 400K unit and aggrastat 750 mcg. total amount of urokinase 500k unit and aggrastat 1000 mcg was used in the intra-arterial thrombolysis. control angiogram showed choroidal blush after intra-arterial thromoblysis. Her left sided vision improved to be capable of daily life without difficulty 7 days after procedure.

Result : In the retrospecive review of our procedure, microcatheter or microwire were selected unintentionally several times into the opthalmic artery without roadmap images to navigate the aneurysm again througth the stent after the microcathter had been disloged from the aneurysm during packing of coils.

Conclusion : In the stent assisted coiling of paraclinoid aneurysm, we should be avoided intentionally to select the opthalmic artery. total blindness after coiling ought to be reminded for central retinal artery occlusion which should be treated by intra-arterial thrombolysis as soon as possible.

Keyword : central retinal artery occlusion, intra-arterial, thrombolysis

A case of recurrent subacute in-stent thrombus after carotid balloon angioplasty and stenting

Hee Sup Shin, Jun Seok Koh, Chang-Woo Ryu, Seung Hwan Lee

Department of Neurosurgery and Radiology Kyung Hee University Hospitalat Gangdong

Objective : We report a case of recurrent thrombus formation at subacute stage after carotid balloon angioplasty and stenting (CAS).

Methods : A 73-year-old male patient was suffered from left side weakness. The magnetic resonance angiogram (MRA) showed severe stenosis of right proximal internal carotid artery (ICA) stenosis, and MR diffusion weighted image (DWI) showed acute multifocal infarction on right frontal cortical and subcortical white matter. We planned CAS for severe proximal ICA stenosis and start dual antiplatelet treatment.

Result : We performed CAS as usual maneuver without any difficulty and intraprocedural complication, and the patient recovered with no newly developed symptom. Five days after CAS, sudden left side weakness was occurred and the digital subtraction angiogram (DSA) showed in-stent thrombus and complete occlusion of previously stent-deployed site. Recanalization of occluded lesion was obtained after mechanical thrombectomy. Because remained thrombus was observed on delayed angiogram, we deployed additional stent and start abciximab intravenously as loading dose. Eleven days after 2nd procedure, left side weakness recurred. The DSA showed re-occlusion of previously stent-deployed site We performed mechanical thrombectomy again, and start low-molecular heparin plus aniplatelet treatment (aspirin+ticagrelor).

Conclusion : We hope to discuss about etiology, rescue therapy and prevention of this case with experienced neuroendovascular surgeons.

Keyword : carotid artery stenosis; stenting; subacute thrombus; antiplatelet therpay

Contrast-induced encephalopathy after coil embolization of unruptured intracranial aneurysm -2 cases report-

Seng Oun Sung

Dongrae Bong Seng Hospital

Objective : Contrast-induced encephalopathy is a rare adverse event of angiography and endovascular treatement.

Methods : We report two patients who suffered from contrast-induced encephalopathy(dysarthria, hemiparesis, seizure) after coil embolization of unruptured intracranial aneurysms.

Result : The patients improved rapidly and fully recovered after 3 days of comservative treatment.

Conclusion : Although this incidence is extremely rare, we propose that endovascular neurosurgeons should be aware of this adverse event in endovascular treatment.

Keyword : contrast induced encephalopathy, aneurysm, coil embolization

미파열성 뇌동맥류 코일 색전술 중 원위부 혈관에서 먼저 발견된 혈전색전합병증(thromboembolic complication)

권현조, 정혜화, 김유미, 변지은, 이창현, 유정부, 고현송

충남대학교병원

Objective : 뇌동맥류 코일 색전술 도중 비교적 자주 발생하는 혈전색전합병증(thromboembolic complication)은 대개 동맥류의 경부와 인근 모혈관에서 처음 발견되며, 항혈소판제제의 동맥내주입 요법으로 대부분 해결할 수 있다. 저자들은 최근 미파열 중대뇌동맥류의 코일 색전술을 마친 후 시행한 최종 내경동맥 혈관조영에서 원위 중대뇌동맥의 색전에의한 폐색소견을 발견하고 이후 10분이 경과한 후 동맥류 인근의 모혈관에서 혈전에 의한 부분폐색소견을 관찰한 1례를 경험하여 보고하고자 한다.

Methods : 뇌동맥류는 최대 직경 5,12mm 경부 3,25mm의 낭형이었고, 코일 색전술은 단일 pre-shaped 'S' 미세도관을 이용하여 54분간 진행되었다. 수술 종료 후 시행한 내경동맥 혈관조영에서 최초 발견되었던 원위중대뇌동맥의 색전소견은 10분 경과 후 시행한 추적검사에서 자연 개통되어 갔으나, 이와 동시에 이전에는 관찰되지 않던 동맥류 인근의 모혈관에서 혈전이 생성된 소견이 새롭게 관찰되었다. 저자들은 Tirofiban 0.2mg을 동맥내 주입하고, Enterprise stent를 설치하여서 혈전의 제거와 재발방지를 도모하였다.

Result : Tirofiban 주입 후 먼저 발견되었던 원위 중대뇌동맥의 색전소견은 완전히 해결되었고, 동맥류 주변 모혈관에서 관찰되었던 혈전도 용해되는 소견이 관찰되었다. 종료 후 heparinization은 시행하지 않았고, DWI에서 최초 색전소견이 관찰되었던 원위 중대뇌동맥 영역에서 high SI가 관찰되었다. 다음날 시행한 추적혈관조영에서는 동맥류 주변 모혈관의 원활한 혈행을 관찰할 수 있었다.

Conclusion : 뇌동맥류의 코일 색전술 중 혈전색전합병증은 대부분 동맥류 인근의 혈관에서 먼저 발견되지만, 본 증례와 같이 원위부 혈관에서 먼저 발견되고 이어 동맥류 인근 모혈관에서 관찰되는 경우도 있으므로, 이러한 사항을 항상 염두에 두고 수술 종료 직전까지 혈관조영 결과를 세심하게 확인하여야 하겠다.

Keyword : 뇌동맥류 코일 색전술 혈전색전증

Symposium

Technical consideration in the endovascular treatment of anterior circulation aneurysms

좌장 : 권 도 훈

Technical consideration in the endovascular treatment of anterior circulation aneurysms: A-com aneurysms

유도성
가톨릭의과대학교 신경외과학교실

1) Incidence of A-com An.

: ACA territory aneurysm are most prevalence site.

2) Unruptured A-com aneurysm management

: NEJM 366;26 nejm.2474 org june 28, 2012 The Natural Course of Unruptured Cerebral Aneurysms in a Japanese Cohort. The UCAS Japan Investigators*

1. overall rate of rupture of cerebral aneurysms was 0.95% annually.
2. unruptured cerebral aneurysms that are larger than 7 mm,
3. located in the anterior communicating or internal carotid-posterior communicating arteries,
4. have a daughter sac are associated with an increased risk of rupture.

The natural course of unruptured cerebral aneurysms depends on the size, specific location, and the shape of individual aneurysms.

3) Technical considerations

a. Aneurysm size & shape

: neck to dome ratio, assisted technique (stent, multiple catheter, balloon)

b. approach route: both A1 and A-com, correlation with parent artery

: patency of both A1 = sacrifice A-com,
good A-com = sacrifice A1 proximal,
large vessel is proper route for assisted technique (across the A-comm),
compression study is essential

c. perforators related with A-com An.

: perforator originate from aneurysm???

d. catheter shape decision

: anterior and inferior direction = straight shape
: inferior and posterior direction = 45 or 90 degree
: superior or dumbbell shaped = "S" or "M" shape + multiple or stent assisted techniqe

e. head positioning.

: lateral head position = not beneficial
: flexion or extension with pillow + oblique X-ray tube + considering overlapped branches
= posterior direction or irregular shaped aneurysm.

Technical consideration in the Endovascular treatment of anterior circulation aneurysm; PcomA aneurysm

신승훈
관동대 분당제생병원

Technical consideration in the endovascular treatment of anterior circulation aneurysms : MCA aneurysms

Jin-Young Jung M.D, Ph.D.
Director, Cerebrovascular center, Dong-Eui Medical Center, Busan, Korea

Backgrounds

Middle cerebral artery (MCA) aneurysms

- **MCA aneurysms account for 18-22% of all intracranial aneurysms**
- **85% located at MCA M1 bifurcation**

Backgrounds

Middle cerebral artery (MCA) aneurysms

- **Considered unsuitable for endovascular coiling because of unfavorable anatomical features**
- **Consequently, the optimal management of MCA aneurysms is still controversial**
- **Endovascular treatment of MCA aneurysms is growing trend due to improvements of the devices and new techniques**

Pitfalls of MCA coiling

1. **Complex angiographic architectures (wide neck, critical side branch)**
2. **Optimal working profile: No**
3. **Needs more adjunctive endovascular techniques**

Complication rates

Coil vs Clip

Complication rates after endovascular treatment of MCA aneurysms

Author	No. of patients	Thromboembolic events	Bleeding events	Total (%)
Vanninen et al [15]	7	0	2	2 (28)
Murayama et al [4]	15	2	0	2 (13)
Richling et al [10]	7	0	1	1 (14)
Debrun et al [1]	9	1	0	1 (11)
Current series	30	1	1	2 (7)
Total	68	4	4	8 (12)

Morbidity and mortality rates after clipping of MCA aneurysms

Author	No. of patients	No. with Hunt-Hess 0-1	Morbidity/mortality Hunt-Hess 0-1 group, n (%)
Ogilvy et al [6]	62	46	5 (11)
Suzuki et al [12]	413	125	20 (16)
Rinne et al [11]	561	175	25 (14)
Nanda and Vannemreddy [5]	18	18	2 (11)
Regli et al [9]	32	32	1 (3)
Pasztor et al [7]	289	129	15 (12)
Deruty et al [2]	29	29	1 (3)
Total	1375	554	55 (10)

M. Horowitz et al. / Surgical Neurology 66 (2006) 167– 171

Published Series Outcomes Summary (unruptured lesions)

- Clipping: 0-33% neurologic complication rate
- Coiling: 11-15% neurologic complication rate
- Problems: Unmatched, non-randomized, varying decades, varying surgeons, etc.

AJNR Am J Neuroradiol 32:259–63 | Feb 2011 |

ORIGINAL RESEARCH

Stent-Assisted Coiling of Complex Middle Cerebral Artery Aneurysms: Initial and Midterm Results

J.-F. Vendrell
V. Costalat
H. Brunel
C. Riquelme
A. Bonafe

EDITOR'S CHOICES

BACKGROUND AND PURPOSE: Clinical outcome and initial and midterm angiographic results of EVT of complex MCA aneurysms by using the stent-assisted coiling technique were retrospectively evaluated in our center where EVT of intracranial aneurysms is the first treatment option.

MATERIALS AND METHODS: From November 2003 to October 2009, 49 patients (27 men, 22 women; mean age, 52 ± 12 years) harboring 52 complex unruptured MCA aneurysms (11 ruptured previously and coiled but recanalized and 41 unruptured) were treated by EVT by using self-expandable intracranial stents. Procedural complications, clinical outcome, and initial and midterm angiographic results were evaluated. Initial treatment status and aneurysm sac size were tested as potential risk factors for recurrence.

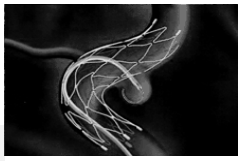
RESULTS: After successful stent deployment, coiling was performed in 50 aneurysms (96.2%) in 47 patients; however, 2 failures (3.8%) occurred in 2 patients. Ten intrastent clot formations (20%) observed on final control angiography induced 2 permanent moderate disabilities (GOS score = 2). Mortality and permanent neurologic morbidity were 0% and 4.3%, respectively. At a mean period of 14 ± 9 months, among 48 aneurysms in 45 patients eligible for follow-up, 34 complete (71%) and 14 partial treatments (29%) were observed, 7 recurrences (14.6%) occurred, and 5 patients (10.4%) needed retreatment. No aneurysm bleeding or symptomatic intrastent stenosis was observed. Aneurysm sac size ≥7 mm and incomplete initial treatment were associated with more recurrences without a statistically significant difference.

CONCLUSIONS: For complex unruptured MCA aneurysms, EVT by using a self-expandable intracranial stent was feasible, safe, and durable and could be considered as the first-option treatment.

Where are we going?

Balloon remodeling technique

2000



Neuroform stent

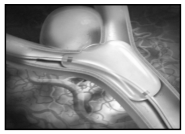
2002 (US)

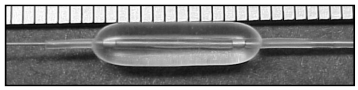
Solitaire AB stent

2009

?

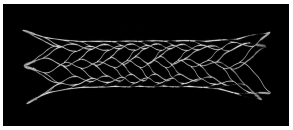
1995 GDC FDA approval





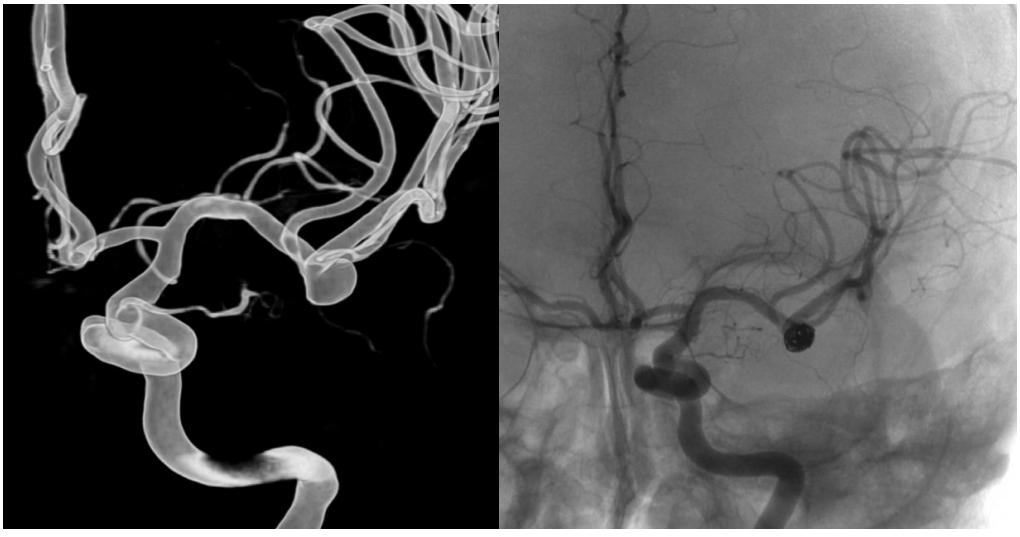
2003 (EU)

Enterprise stent



Simple coiling (single microcatheter technique)

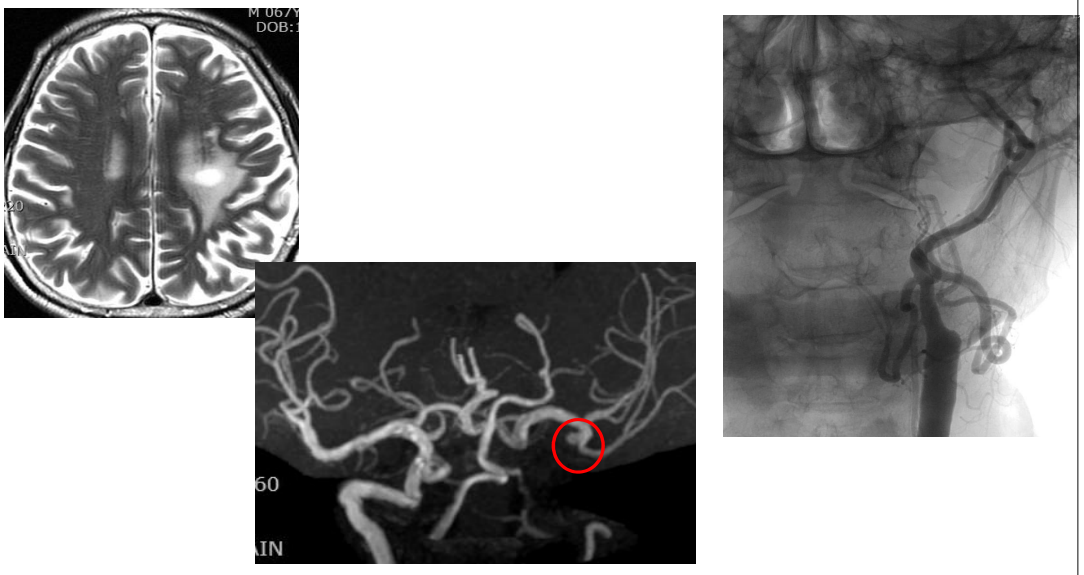
F/74 incidental, old age



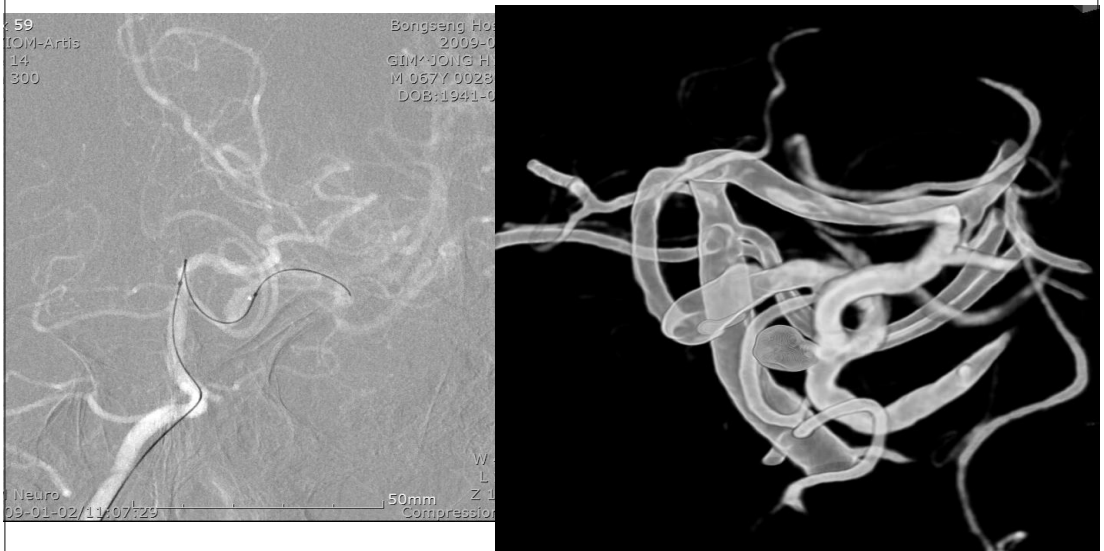
Simple coiling (double microcatheter technique)

F/85, SAH (H-H 4), old age

M/67 incidental, old CVA, ICA occlusion

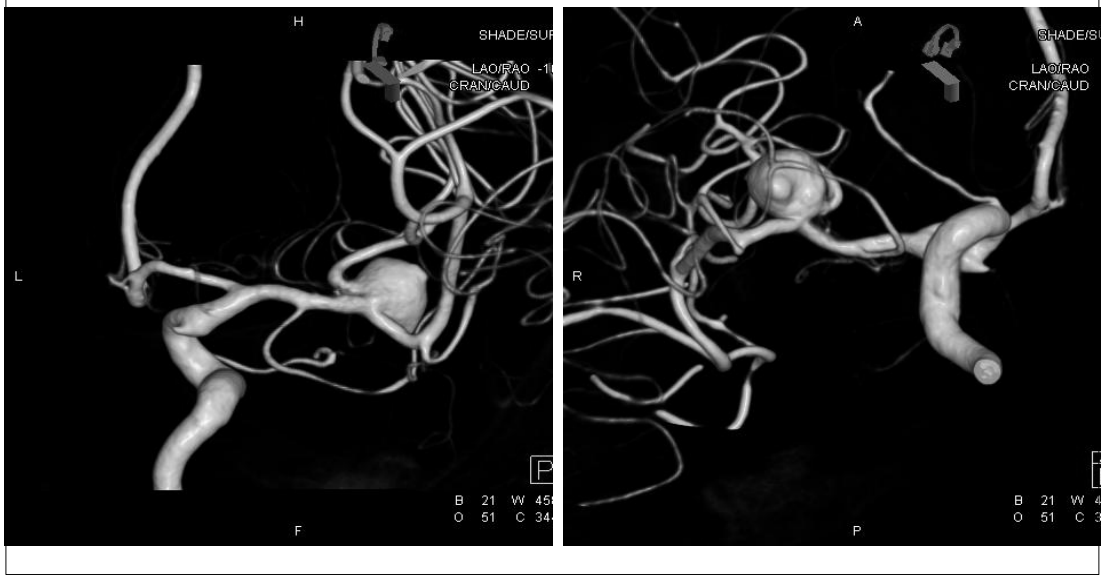


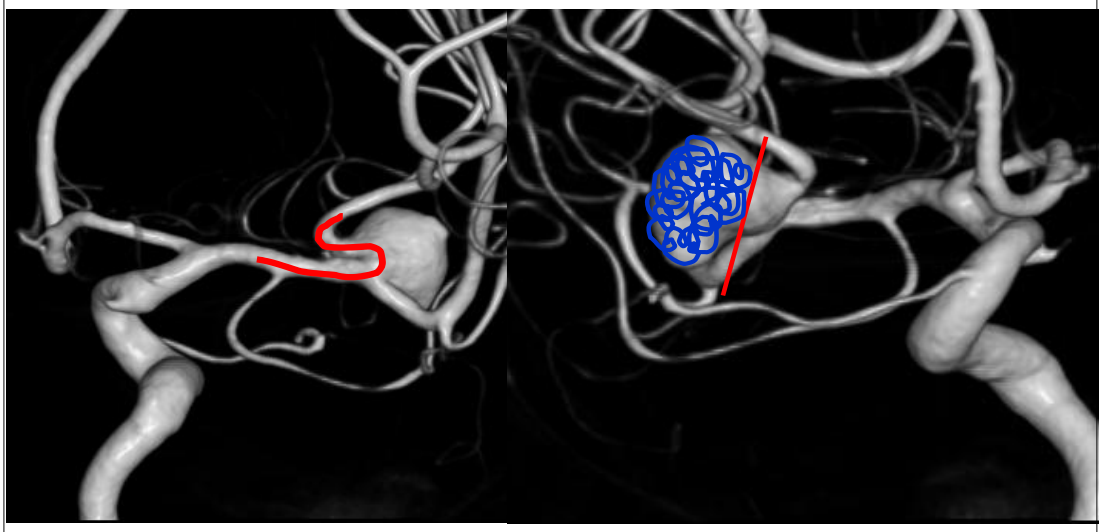
Coiling via Pcom



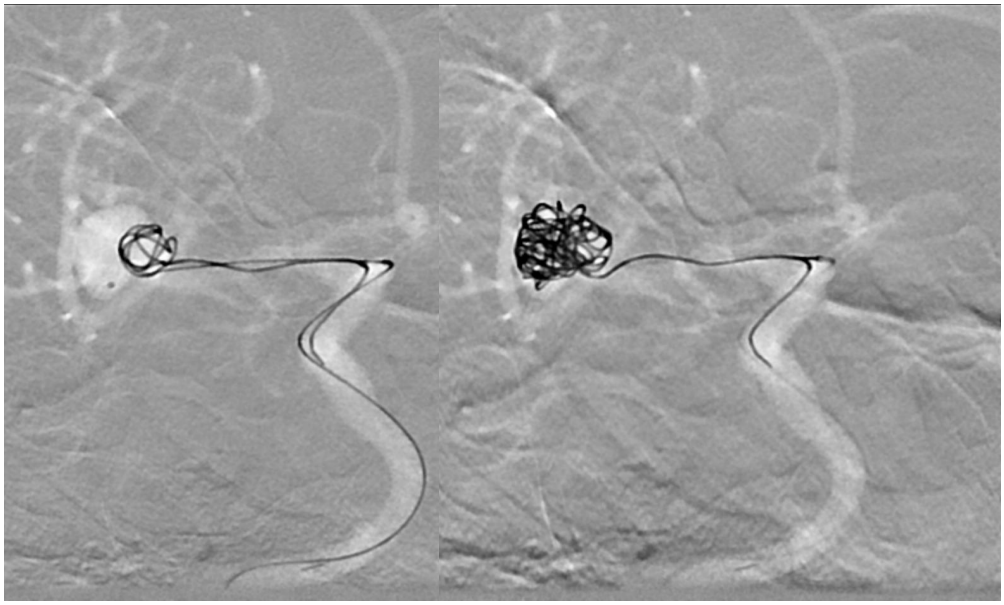
Branch preserving technique using coil (coil protection tech)

F/77, SAH, H-H 3

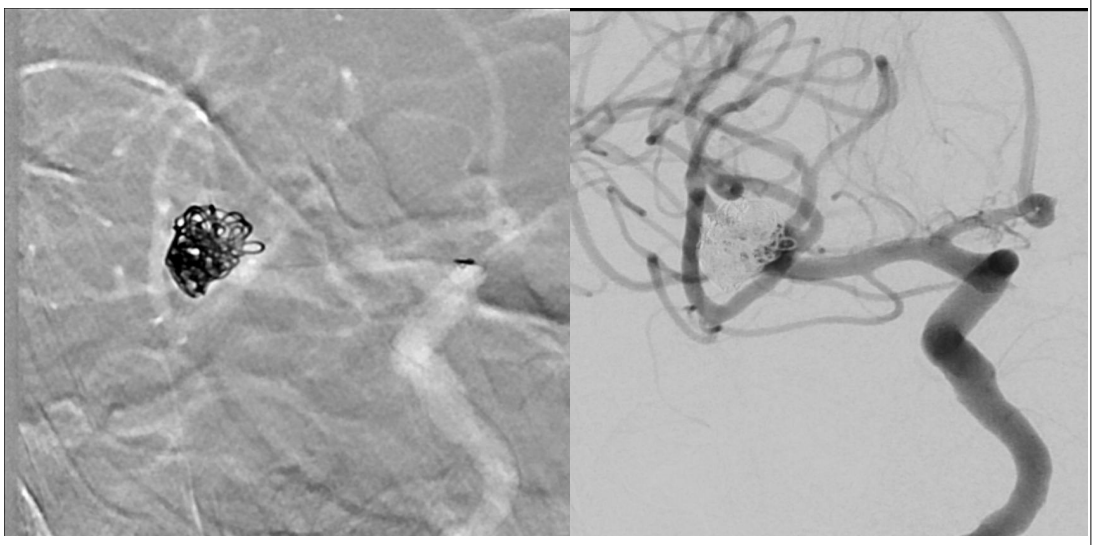




Double microcatheter technique (coil protection)

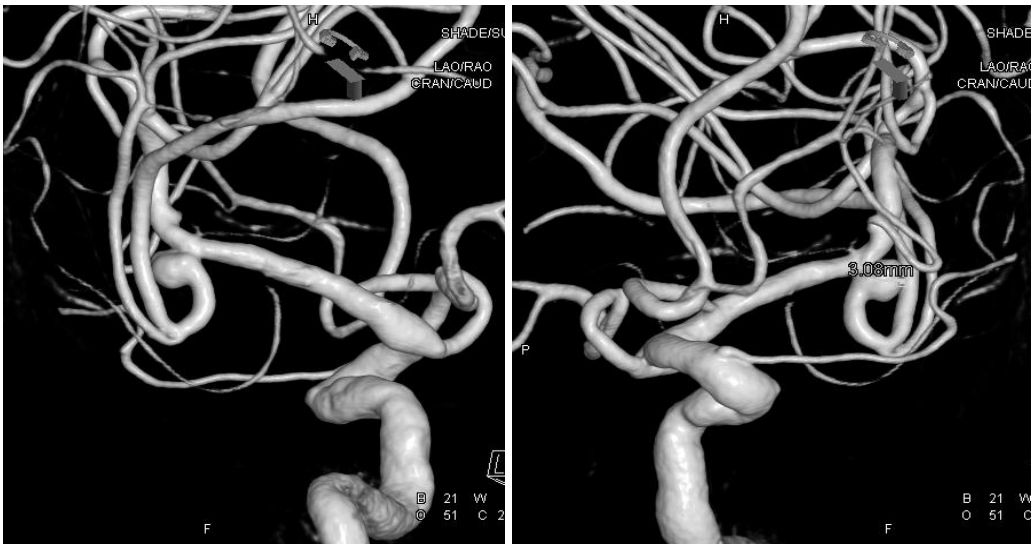


Removal of protection coil

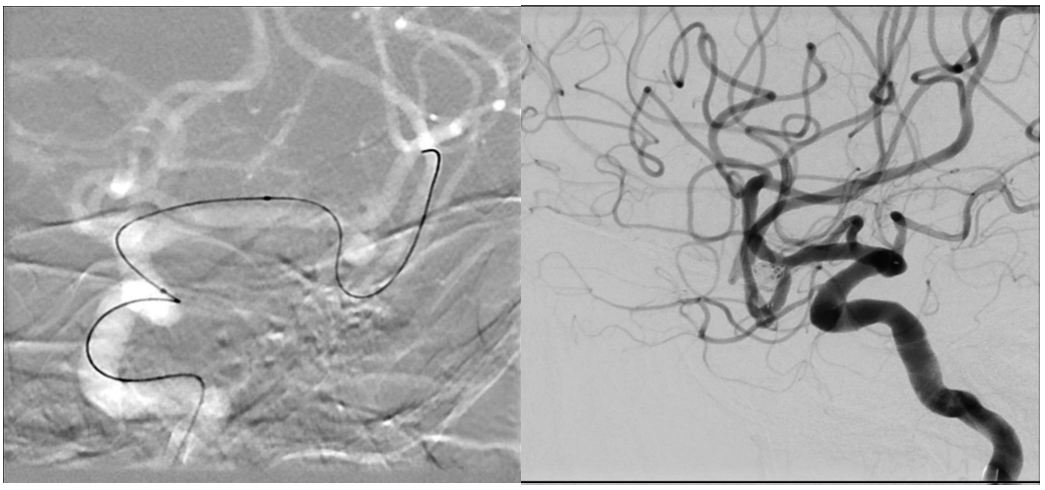


Stent-assisted technique (microcatheter exchange)

F/67, old CVA
right hemiparesis G4, aphasia

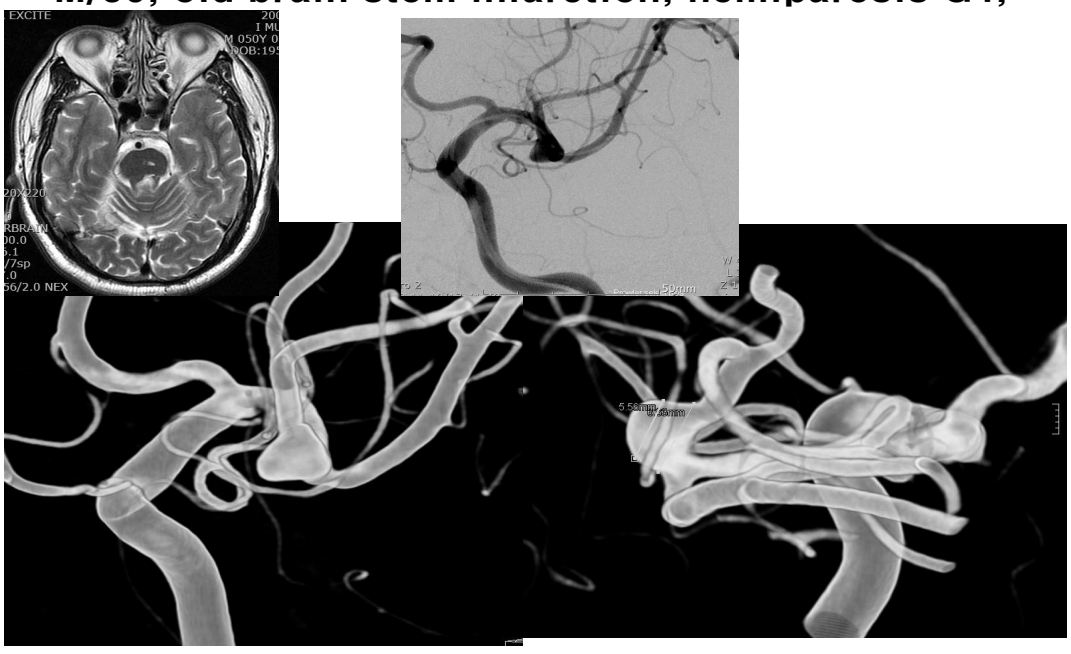


Embolization

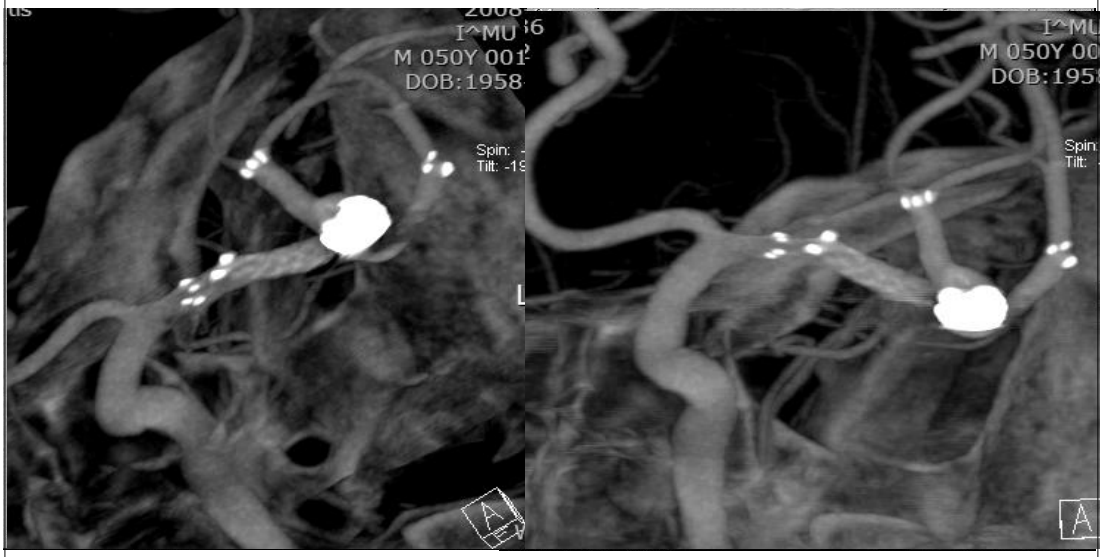


Stent-assisted technique (Y-stenting)

M/50, old brain stem infarction, hemiparesis G4,

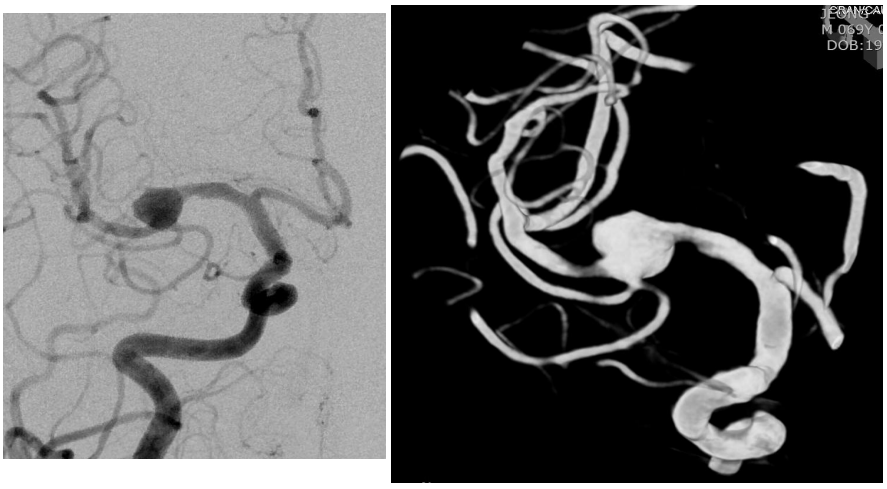


Double barrel technique

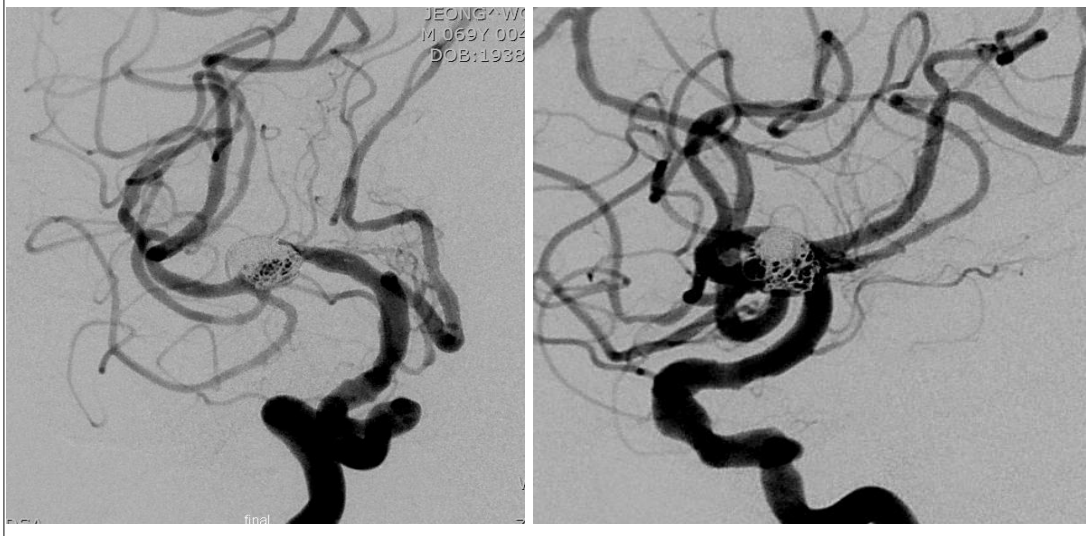


Balloon-in-stent technique

M/69 incidental
Recent infarction (2mo ago), hemiparesis G3

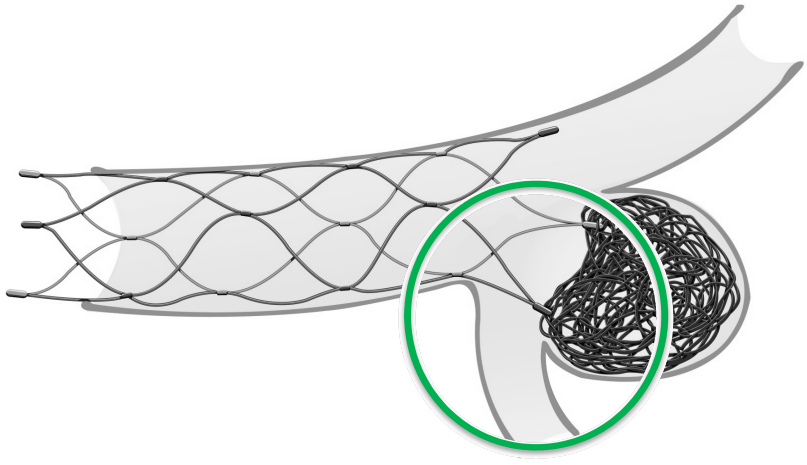


Balloon-in-stent technique

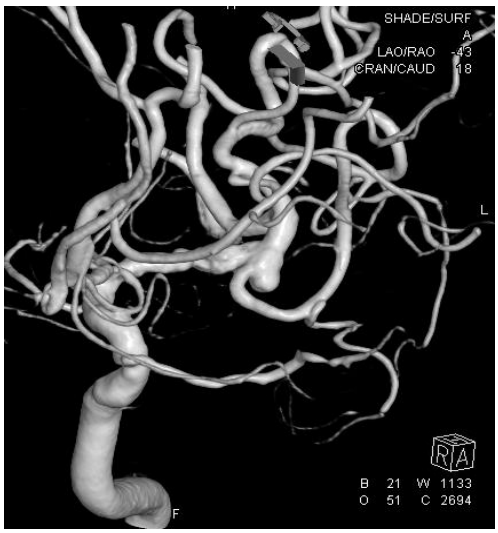


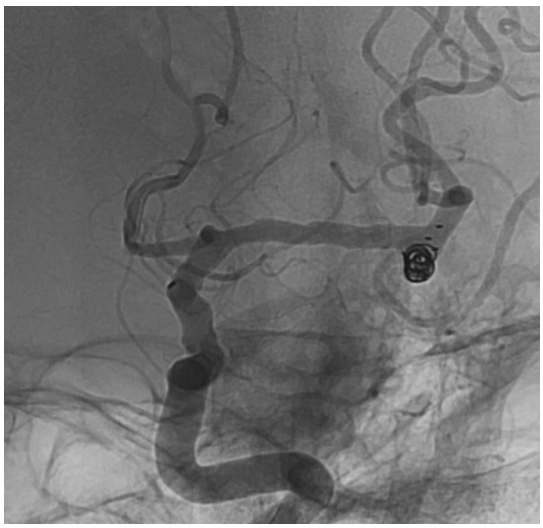
Stent-assisted technique (modified Waffle-cone tech)

Modified waffle cone technique

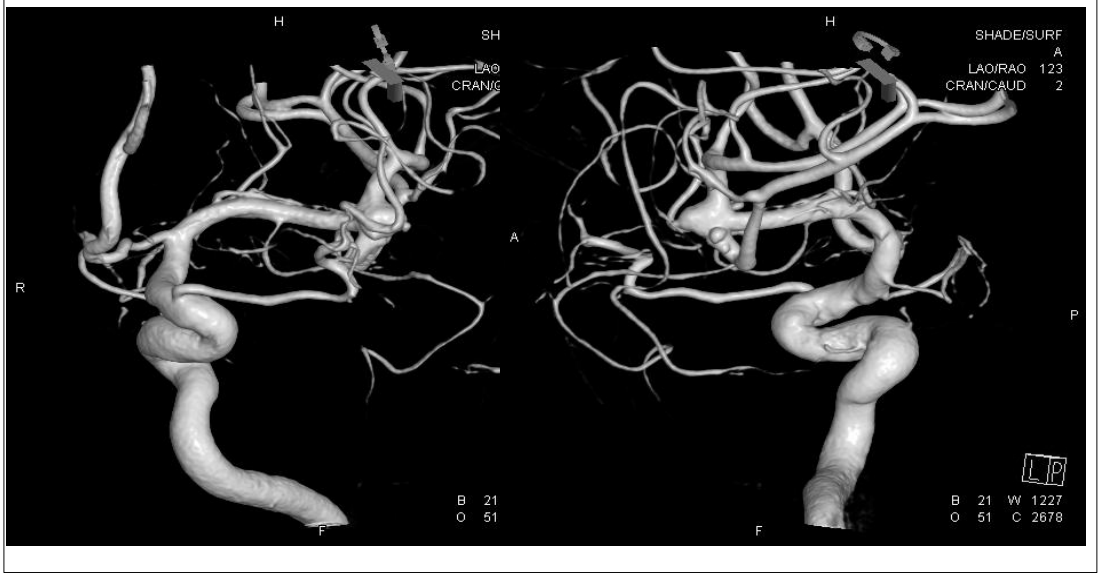


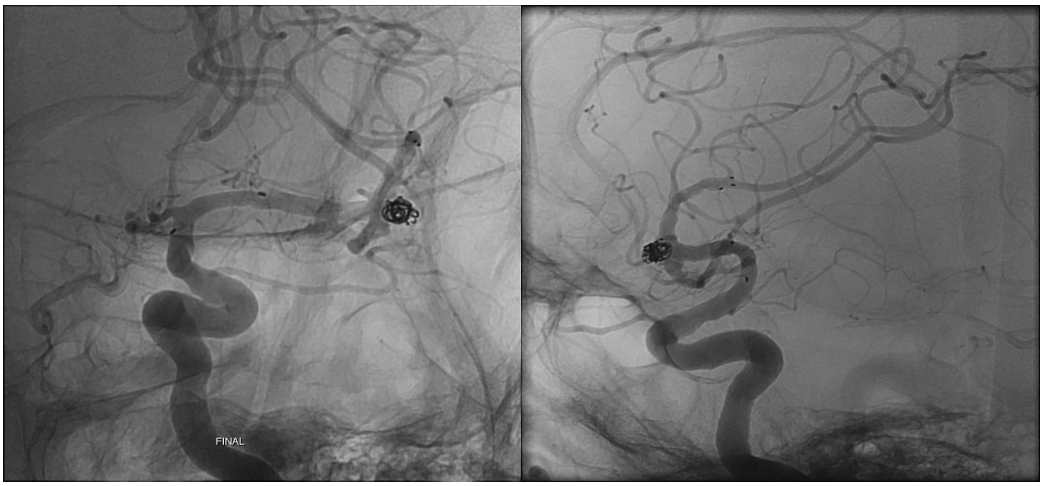
F/65 acute cerebral infarction, G3





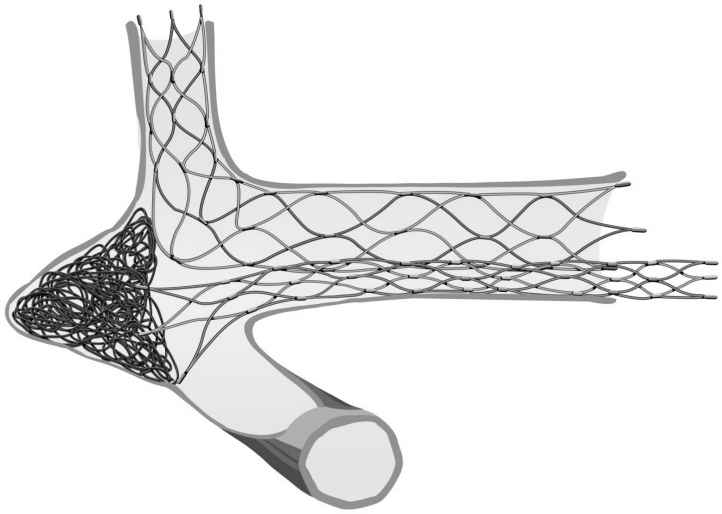
F/77, SAH H-H4, MCA aneurysm




FINAL


H
RES/SHADE/SU
LAO/RAO
CRAN/CAUD
P
F
R
B 25 W
O 36 C 25
H
RES/SHADE/SURF
A
LAO/RAO 132
CRAN/CAUD 9
P
F
LP
B 25 W 1
O 36 C 2581

Modified Waffle cone with Y-stenting (double barrel)



Conclusion

Coil embolization of MCA aneurysms can be carried out with acceptable morbidity

Becoming more amenable to endovascular treatment with development of devices and techniques

Careful preoperative assessment is important comparing surgical clipping

Free Paper Ⅱ

Interesting Case Review

좌장 : 이 창 영

Usefulness of the High Resolusion MRI for Endovascular Treatment Planning of Intracranial Vertebral Artery Dissection Aneurysm

Sung Tae Kim, Young Gyun Jeong, Hae Woong Jeong

Department of Neurosurgery, Busan Paik Hospital, Inje University

Objective : MRI equipment and techniques are evolving fast, development of 3.0 Tesla MRI makes it possible to obtain high resolution image of intracranial vessel wall. We report 2 cases of high resolusion MRI (HRMRI) for endovascular treatment planning of intracranial vertebral artery dissection aneurysm (VADA).

Methods : Case. 1 49-year-old male patient was admitted due to sudden occipital headache. Rt. VADA was detected in MRA and cerebral angiography. In HRMRI, eccentric wall thickening and diffuse wall enhancement were found. Furthermore, hidden pseudolumen and intramural hematoma was detected. Double stenting was performed. After that, he is receiving outpatient treatment with symptom free state. Case. 2 37-year-old male patient was admitted due to sudden occipital headache. Lt. VADA was detected in CTA and cerebral angiography. In HRMRI, eccentric wall thickening was found. Furthermore, hidden pseudolumen and intramural hematoma was detected. Stent assisted coiling was performed. After that, he is receiving outpatient treatment with symptom free state.

Result : Compare with digital subtraction angiography, HRMRI provides better information about length of involved vessel segment, existence of intramural hematoma and information of branching vessel.

Conclusion : HRMRI is useful for endovascular treatment planning of VADA.

Keyword : High resolusion MRI; Vertebral artery dissection aneurysm

Stent assisted coil embolization of ruptured very small multiple PCA aneurysms associated with AVM

Dong-Kyu Jang[1], Dong-Hyuk Nam[2], Sang-Kyu Park[1], Kyung-Sool Jang[1], Young-Min Han[1], Young Sup Park[1], Huh Hoon[1]

[1]Department of Neurosurgery, Incheon St.Mary's Hospital, College of Medicine, The Catholic University of Korea

[2]Department of Neurosurgery, Gimpo Woor iHospital

Objective : Arteriovenous malformation (AVM) related intracranial aneurysms are not rare. However, deep-seated ruptured very small aneurysms arising from a same parent artery which has main feeding arteries of large AVM are still difficult to treat with either endovascular or surgical method. We report here a case treated by stent assisted coil embolization of ruptured small multiple posterior cerebral artery (PCA) aneurysms related with a large AVM at parietooccipital lobe.

Methods : Case Report

Result : A 46-year-old woman arrived at our hospital presenting with subarachnoid hemorrhage at interpeduncular and quadrigeninal cisterns with three very small PCA aneurysms, one internal carotid artery aneurysm, one anterior temporal artery aneurysm, and huge sized AVM at right parietooccipital lobe. AVM has multiple feeders including right PCA, right middle cerebral artery, right anterior cerebral artery, and left middle meningeal artery. Because right PCA was one of main feeders in AVM and one of three PCA aneurysms was considered to the potential rupture point due to hemorrhage distribution, we firstly attempted Onyx embolization throgh right PCA. After deployment of Neuroform stent covering two P1 aneurysms and Enterprise stent covering P2 aneurysm, coil embolization was conducted for most irregular shaped P1 posterior wall aneurysm. After the second stage Onyx embolization of AVM through right MCA, radiosurgery was conducted for the remnant AVM. Her outcome has been good for 10 months.

Conclusion : Endovascular treatment of ruptured very small multiple PCA aneurysms related with AVM is quite challenging but may be a feasible treatment option.

Keyword : PCA aneurysm, arteriovenous malformation, endovascular treatment

Simultaneous ruptured pseudoaneurysm of the internal carotid artery and cerebral infarction as initial manifestation of polycythemia vera: What would you do in this situation?

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Hanyang University Guri Hospital

Objective : The natural history of polycythemia vera (PV) is usually marked by significant risk of thrombotic complications. However, hemorrhagic stroke has been rarely associated with PV.

Methods : We report the case of a patient with intracranial supraclinoid internal carotid artery (ICA) dissection causing cerebral infarction and subsquent subarachnoid hemorrhage due to pseudoaneurysm rupture as clinical onset of PV.

Result : A 59-year-old woman was admitted due to thunderclap headache. DSA demonstrated an irregularly shaped aneurysm arising from supraclinoid ICA with moderate stenosis of proximal region. Moreover, unusual features of aneurysm consisting of delayed opacification and stagnation of contrast medium in the aneurysm sac even during the venous phase were observed. Laboratory evaluation revealed a hemoglobin concentration of 18.3 g/dl with an elevated hematocrit of 59.7 %, white blood cell count of 11.4 × 103/ ㎕, and platelet count of 910 × 103/ ㎕. There was no evidence of head trauma or any systemic infection signs on admission.She received surgical clipping with a vessel wall remodeling technique because pseudoaneurysm might be fragile and associated with a high risk of intraoperative rupture.

Conclusion : This case report discusses the possible mechanism of this extremely rare condition, association between PV and intracranial dissection with pseudoaneurysm formation, and its therapeitic decision making. Although we selected microsurgical option, we want to discuss about multiple strategy of endovascular treatment, too.

Keyword : pseudoaneurysm; polycythemia vera; intracranial dissection; cerebral infarction; subarachnoid hemorrhage

Consideration in the Multistage AVM embolization using Onyx (2 cases)

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Objective : Large size AVM is challengeable field for endovascular and vascular neurosurgeon. However, using single treatment modality make difficult to complete treatment of large AVM. We report to large AVM cases that used multistage treatment strategy.

Methods : 17-year-old female suffered dizziness during 1 week and visit ENT OPD. 2.5cm sized-signal void mass lesion was shown on cerebellar vermis at brain MRI. On the angiography, AVM nidus supplied by bilateral SCA mainly and Lt. PCA and Lt. PICA partially. Endovascular embolization of AVM nidus was performed by Onyx. Microcatheter was Approached Lt. SCA initially and using Rt. SCA route secondly. Minimal sized nidus remained. Residual nidus can't approach through other feeder. Because visible feeder diameter was small and microcatheter pass was impossible. Radiosurgery was performed for residual lesion.

28-year-old female was complained deterioration of consciousness. Brain CT was performed and large ICH was detected. Huge sized AVM was shown on brain CT angiography. Large AVM was located at Rt. Parieto-occipital region, splenium of corpus callosum. Multiple feeders were found on Rt. ACA, MCA, and PCA. Onyx embolization was performed through PCA and ACA feeder. Onyx was injected as much as possible. About 2/3 sizes nidus was occluded by embolization. Second Onyx embolization was performed 3 month later. Near total embolizednidus that feeded by PCA branch on second embolization. We have 3rd treatment plan.

Results : 17-year-old patients achieved complete occlusion of nidus after radiosurgery by Cyberknife. Nidus was disappearing1-year follow up cerebral angiography after radiosurgery. 28-year-old patient had an residual AVM nidus and plan 3rd time treatment.

Conclusion : Onyx embolization was available when single stage treatment of AVM is impossible. Onyx embolization may useful for major or adjuvant treatment modality before 2nd treatment. We discuss the consideration on the multiple Onyx embolizations.

Keyword : Onyx, arteriovenous malformation, embolization

Transvenous injection of n-butyl 2-cyanoacrylate to obliterate the pathologic cavernous sinus for the treatment a cavernous sinus dural arteriovenous fistula

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Objective : Transvenous coil embolization has been considered as a standard strategy for cavernous sinus dural arteriovenous fistula (CS-dAVF) treatment. Considering liquid embolic materials to treat dAVF, transvenous injection of Onyx has recently been used to obliterate pathologic cavernous sinus in cases of dAVF, and it showed good angiographic and clinical outcomes. We present a case of complex cavernous sinus dAVF obliterated pathologic cavernous sinus by using NBCA after reduction of sinus flow via coil embolization without periprocedural complications.

Methods : A 60-year-old female patient with exophthalmos, chemosis of the right eye and diplopia secondary to right third nerve palsy visited. Contrast-enhanced orbital computed tomography (CT) showed a dilated superior ophthalmic vein in the right orbit. Brain magnetic resonance angiography (MRA) revealed prominent heterogenous vascularities at the right cavernous sinus. Diagnostic cerebral angiogram demonstrated a Barrow type D of complex CS-dAVF at the right side of cavernous sinus. The fistula was completely obliterated by using coils, n-butyl 2-cyanoacrylate (NBCA) and Onyx via transvenous approach. Especially, after coil embolization of the pathologic cavernous sinus (CS) which induced decrease of shunt flow rate, transvenous injection of NBCA was done to obliterate residual shunts recruited into CS.

Result : We achieved complete occlusion of the shunt without periprocedural complications. At 4 months the patient's clinical symptoms had resolved completely, and a 12-month follow-up angiogram showed persistent obliteration of the shunt.

Conclusion : NBCA could be an effective liquid embolic material under flow control of pathologic CS using coils to obliterate CS-dAVF. Because multiple injection of NBCA would be impossible, however, operator should decided appropriate concentration of NBCA and injection rate by multiple testing injections under real-time road mapping using various injection rates and different concentration of contrast media.

Keyword : cavernous sinus, dural arteriovenous fistula, transvenous approach, n-butyl 2-cyanoacrylate, Onyx

What is the best decision after IV thrombolysis for each individual patient with acute ischemic stroke?

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Objective : Recent studies showed promising results when a modern stent retriever device like the Solitaire FR or the TREVO was utilized for acute ischemic stroke treatment. However, the use of these devices goes along with the risk of intracranial hemorrhage, but also carries the risks of procedure-related complications such as embolization(s) to new territory, vessel dissection, and vasospasm. We would like to discuss the appropriate treatment of AIS patient who filed IV thrombolysis.

Methods : We present three patients with AIS who failed IV thrombolysis.

Result : They underwent different treatment strategies (mechanical thrombectomy, no mechanical therapy and surgical thrombectomy), resulting in having different outcomes.

Conclusion : A deep understanding of procedural complications in mechanical thrombectomy is necessary for an optimized treatment of AIS patients who receive endovascular therapy. Furthermore, we have to consider the risk-benefit ratio prior to additional therapy.

Keyword : Acute ischemic stroke, IV thrombolysis, mechanical thrombectomy

Free Paper Ⅲ

Complicated Case Review

좌장 : 김 태 선

Rapid growing ruptured intracranial aneurysm after coil embolization 2cases

Jiwoong Oh, Jongyeon Kim, Kum Whang, Chul Hu

Department of Neurosurgery, Wonju College of Medicine, Yonsei University

Objective : Despite technical and diagnostic progress there are still open questions in the understanding of the pathophysiology of intracranial aneurysm growing. We observed 2 cases of rapid growing aneurysm, one is that growing and rebleeding of a previous coiled aneurysm of A1 in a patient with in 42days. The aneurysm was successfully embolized and the patient was well. The other is regrowing basilar tip aneurysm that previous coiled within 26 days. This aneurysm was same course, but patient was expired due to severe brain swelling. Rapid growing aneurysm is need serious caution.

Methods :

Result :

Conclusion :

Keyword : regrowth, cerebral aneurysm

A case of In-hospital rupture of Thrombosed giant intracranial aneurysm

Kim Dong Han, Kwon Soon Chan, Lee Won Joo

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Objective : Still natural history and/or pathophysiology of thrombosed aneurysms is incompletely understood, and there are no general consensus for the indication of active management for thrombosed unruptured aneurysms.

Methods : A 78-year-old man was referred for incidental mass lesion in CT scan. He had history of chronic headache. MRI with MRA and conventional angiography revealed a partially thrombosed giant aneurysms on right ICA. Two-hours later after angiography, his mentality was abruptly deteriorated. On F/U Br-CT showed massive diffuse subarachnoid hemorrhage with mass effect.

Result : We did emergency multiple stent-assisted coil embolization. Ruptured portion of aneurysm was well secured on last angiogram, but coiling looks incomplete. A F/U MRA taken at 10 days later showed partially occluded aneurysm and well preserved distal flows. The patient was discharged with severe neurologic deficit.

Conclusion : We report a painful case of in-hospital rupture of partially thrombosed giant intracranial aneurysm with literature review.

Keyword : rupture, thrombosed intracranial aneurysm

Microcatheter instability during coil embolization of intracranial aneurysm, Case report

이창주
유성선병원

Objective : The most nervous moment of coil embolization of intracranial aneurysm might be the time when selecting the sac with microcatheter. It's because iatrogenic aneurysmal sac rupture is one of the most devastating complications during neurointervention. Especially ruptured aneurysm or very small sized aneurysm could be damaged by a tiny movement of a microcatheter or microwire. What would happen if microcatheter moves to-and-fro about 4mm due to the breathing or a heartbeat? I would like to report a recent case and discuss about the reasons and knowhows to cope with it.

Methods : A 55-year-old man presented himself with a sudden headache that happened 2 days ago. Brain CT angiography revealed 3.5mm sized ruptured aneurysm with daughter sac on right middle cerebral artery. The patient had Hunt-Hess grade 1 and Fisher grade 2. Coil embolization was performed urgently under general anesthesia.

Result : The operation went well without any problem and no neurological deficit has been found after the operation. 7 days after surgery, mild vasospasm has been detected and recovered after continuous nimodipine injection. The patient was discharged 14 days after surgery without any problem.

Conclusion : Tortuosity of parent artery, difference of diameter between parent artery and guiding catheter, position of guiding catheter tip inside the internal carotid artery curve, and rigidity of the guiding catheter seems to be the factors causing instability of microcatheter during neurointervention. To solve this problem, lowering the heart rate or respiration rate, double guiding techinque, and double microcatheter can be used. But appropriate application is needed under consideration of patient's condition.

Keyword : aneurysm, microcatheter, instability

The endovascular treatment of tiny basilar tip aneurysm: three case reports & technical considerations

김재훈, 강희인
을지대학교 을지병원

Objective : to report the endovascular treatment of tiny basilar tip aneurysm

Methods : We investigated three cases of ruptured basilar tip aneurysm in the light of technical considerations during endovascular treatment.

Result : We successfully obliterated ruptured basilar tip aneurysm without neurological sequelaes.

Conclusion : The endovascular treatment of a ruptured tiny aneurysm is promising when combined with stent assistance and careful placement of the microcatheter around the neck of the aneurysm. Long-term follow-up will be needed to prove the durability of the coil embolization.

Keyword : aneurysm, basilar tip, endovascular treatment

The effectiveness of waffle cone technique for complex aneurysm

Jung Ho Ko, Young-Joon Kim, Chun Sung Cho

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복합 뇌동맥류(complex aneurysm)는 중재적 시술 및 기구의 발달에도 불구하고 어려운 난제이다. 이를 극복하기 위한 여러 가지 기술들(techniques) 중 최근 본원에서 치료하여 경험한 13례의 waffle cone technique에 대해 추적 검사의 결과를 분석하여 그 기술의 효용(effectiveness)에 대해 알아 보고자 한다.

Endovascular treatment of recurrent subarachnoid hemorrhage following previous microsurgical clipping with the Y-double stent assisted coil Embolization

Dong Hoon Lee, Joon Huh, Jae Hoon Sung

Catholic University of Korea St. Vincent's Hospital

Objective : We present a case with repeated subarachnoid hemorrhage after aneurysm neck clipping. For avoiding high-risk complication from the repeated craniotomy and clip adjustment, Y-double stent-assisted coil embolization with a double microcatheter technique was performed to preserve parent arteries and effectively treat the aneurysm.

Methods : We present a case of 58-year-old female with subarachnoid hemorrhage (SAH), which revealed the presence of multiple intracranial aneurysms, left posterior communicating artery, anterior choroidal artery, middle cerebral artery bifurcation (MCAB) & anterior communicating artery aneurysms. The patient underwent microsurgical clipping by pterional approach craniotomy. After eight months, the patient was admitted with recurrent subarachnoid and intracranial hemorrhage. Digital subtraction angiography (DSA) revealed regrowth at the previously clipped MCAB aneurysm. The regrown aneurysm had a pyramid shape with wide neck and shallow dome area. For reducing surgical risk, stent assisted coil embolization was planned. Enterprise 4.5 × 22mm stent was deployed, bridging the aneurysm neck, but is not sufficient to provide adequate protection against coil herniation. The coil mass protrudes slightly in the lumen of the superior branch of MCA. So second stent(Enterprise 4.5 × 28mm) was placed in the M1(concentric to the first stent) and superior branch of MCA. After Y-double stent deploy, microcatheter was positioned inside the aneurysm sac, which was treated with coils.

Result : After the intervention, Diffusion weighted image showed tiny dotted embolic infarction at left frontal lobe. The patient looks drowsiness but recovered without any neurological deficits.

Conclusion : Y-stent method for complex intracranial aneurysms appears effective in achieving aneurysm ooclusion with an acceptable safety profile. Especially following previous microsurgical clipping, It allows relatively safer way to achieve parent artery preservation and aneurysm obliteration.

Keyword : Y-double stent

Endovascular treatment of spontaneous vertebral artery dissection : Single-center experience with 16 cases

Hyoung-Soo Byoun, Hyeong-Joong Yi

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Objective : Spontaneous vertebral artery dissection (sVAD) is a rare condition that occurs in relatively young patients, which potentially causes a stroke. Recently, endovascular treatment was introduced as a second to none management for vertebral artery dissection. We reviewed our series of patients with spontaneous VAD that was treated by endovascular method.

Methods : We reviewed the hospital records of patients with sVAD during the last 4 years until May 2014. The characteristics, clinical manifestations, angiographic findings, treatments, and prognosis were collected and compared.

Result : Sixteen patients were identified(12 men and 4 women), and their mean age was 51.18. Nine patients(56%) presented with subarachnoid hemorrhage and the other seven patients with non-hemorrhage. All the dissections were found in V4 segment. Angiographic fusiform lesions(81.2%) were the most common findings. The most common prodromal symptoms were headache(75%). Nine patients were treated by coil embolization only and seven patients were treated by stent-assisted coil embolization. On immediate angiography, complete occlusion was found in eight patients, near complete occlusion in 2 patients and partial occlusion in 6 patients. There was two poor outcomes and the remainders had favorable outcome with no complication.

Conclusion : Spontaneous vertebral aretery dissection is associated with nonspecific symptom such as headace, dizziness, nuchal pain, when found in unruptured form. We should not underestimate these warning symptoms. We suggest that endovascular coil embolization with or without stent-assisted is an effective, safe and endurable treatment modality for spontaneous vertebral artery dissection.

Keyword : Vertebral artery dissection, Spontaneous, endovascular treatment

Subarachonid Hemorrhage Due to Formidable and Unusual Intracranial Artery Dissection

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Pusan National University Hospital

Objective : Subarachnoid hemorrhage (SAH) due to ruptured intracranial artery dissection is a life-threatening disease and most of them are arising from vertebral artery. So majority of neurosurgeons recommend early repair of the affected vessel. Recently such pathology is increasingly recognized as diagnostic image and clinical awareness improved. Investigation of relevant angiographic findings and serial conventional angiographic follow up as well as clinical manifestation could help to determine appropriate treatment modality. But it is always challenging and controversy to treat unusual site dissection or findings of relevant artery (site of numerous perforator such as proximal MCA or pseudoaneurysm), surgically or endovascularlly.

Methods : During recent 3 years, seven consecutive SAH patients with acute intracranial artery dissection (IAD) with unusual sites or findings were seen.

Result : The sites of dissection (include peudoaneurysm) were upper BA and MCA (M1, M2) in two patients each, distal VA, distal ICA to M1 and A1 segment in each one patient. H-H grade at presentation were good (2) in 5 patient, poor (3, 4) in 2 patients. Two of seven cases (one upper BA and one M1 segment) have been treated by multi-session stents and coiling and others conservative treatment with serial conventional angiography follow up. All cases were performed serial conventional angiography (23 times, mean: 6.3 months, range 10 days to 18 months) and their result revealed stable remodeling of the disease segment in six and no interval change in one patient. No recurrent hemorrhage or stroke was observed during follow up period after initial one month.

Conclusion : Conventional angiographic findings are often uncertain for dissecting rupture or unusual findings, serial angiographic follow up or microcatheter angiography are mandatory to detect the pathology. Close observation with or without stenting is an alternative treatment modality of unusual site or findings of IAD.

Keyword : Subarachnoid hemorrhage, Arterial dissection

The failure of FemoSeal vascular closure device after femoral artery access cerebral angiography : cases report

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Objective : The use of vascular closure device (VCD) has increased in frequency over recent years for the management of femoral access after cerebral angiography or intervention. This report describes a few cases of FemoSeal vascular closure device failure after femoral artery access cerebral angiography.

Methods : Case 1 : A 40-year-old woman was referred to neurointervention department for the preoperative embolization of brain tumor at right frontal area. Endovascular tumor embolization was performed with Marathon catheter and polyvinyl alcohols through the right middle meningeal artery and right superficial temporal artery. After successful embolization, the closure of femoral access was tried with FemoSeal VCD. After detachement of the outer locking disc, removal of FemoSeal device and cutting the multifilament, the hemostasis was not accomplished. The movement of the inner seal in the femoral artery was noted by ultrasonography. We made a larger incision and dissected the subcutaneous tissue to find the multifilament. When we found the multifilament, we pulled the multifilament with the inner seal and outer locking disc. The femoral access was compressed and the wound was closed layer by layer.

Result : Case 2 : A 72-year-old woman was referred to neurointervention department for the management of unruptured right internal cerebral artery paraclinoid aneurysm. Endovascular coil embolization assisted by stent was successfully performed. After the embolization, the closure of femoral access was tried with FemoSeal VCD. After detachement of the outer locking disc and removal of FemoSeal device, the hemostasis was not accomplished. The hemostasis depended on pulling the multifilament. We pulled and tied the multifilament to the skin with a sticking plaster. On the next day, we performed the ultrasonography on femoral artery and found the attachment of the inner seal to the vessel wall. We cut the multifilament below skin level and hemostasis was verified. Case 3 : A 51-year-old woman was referred to neurointervention department for the management of ruptured cerebral arteriovenous malformation(AVM). Endovascular AVM embolization was partially performed. After the embolization, the closure of femoral access was tried with FemoSeal VCD. After detachement of the outer locking disc and removal of FemoSeal device, the hemostasis was not accomplished. The hemostasis depended on pulling the multifilament. We pulled the multifilament through the small long hard catheter to push the outer locking disc. After pushing the outer locking disc, the hemostasis was accomplished. We cut the multifilament below skin level and hemostasis was verified.

Conclusion : We experienced the failure cases of FemoSeal VCD for the femoral hemostasis after cerebral angiography or intervention. The outer locking disc sometimes could not be deployed completely, which might be from any obstacles such as fat or fibrous tissue between the outer locking disc and outer vessel wall. These conditions can be resolved by the methods that were performed in the case 2 or 3. And full

dilatation of the subcutaneous tissues with dilator might be helpful for the prevention of the incomplete detachment of the outer locking disc.

Keyword : Femoseal Vascular Closure Device

Initial Clinical Experience of Pipeline Stents

Seong-Rim Kim, Young-Woo Kim, Hoon Kim, Ik-Seong Park, Min-Woo Baik

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Objective : The authors report our initial clinical experience of pipeline stents for the treatment of intracranial aneurysms.

Methods : Case I A 53-year-old woman presented with headache. Initial studies revealed a giant right cavernous ICA aneurysm. She underwent pipeline stent placement. Immediate postoperative angiogram showed stagnation of the contrast media in the aneurysmal sac. Three months after the procedure, she presented with ipsilateral 6th nerve palsy. Follow-up angiogram, taken 9 months after the procedure, revealed not only complete obliteration of the treated aneurysm, but also a de-novo large aneurysm just distal to the implanted stent. She underwent EC-IC bypass surgery and endovascular ICA trapping subsequently. 6-month follow-up studies after ICA trapping showed sustained hemodynamic stability and complete occlusion of the ipsilateral ICA. Case II A 57-year-old man presented subarachnoid hemorrhagy. Initial studies revealed ruptured left MCA, unruptured right MCA, and unruptured right V4 aneurysm. Both MCA aneurysms were saccular and the right V4 aneurysm was dissecting. He underwent clipping to treat the both MCA aneurysm. The pipeline stent was implanted to treat the right V4 aneurysm and immediate postoperative angiogram revealed near-complete obliteration of the aneurysm. Follow-up CT angiogram, taken 3 months after the procedure, revealed complete obliteration of the aneurysm and sustained luminal integrity. Case III A 67-year-old woman presented with headache. Initial studies revealed a giant left distal ICA aneurysm. The pipeline stent was deployed with additional coil deployment to prevent stent invagination into the aneurysmal sac. She didn't undergo follow-up studies.

Result : In the authors' initial clinical experience, procedure-related complications were not observed.

Conclusion : Postoperative course after pipeline stents implantation may be variable. Pipeline stents can be a treatment option for selected cases. More clinical experience is mandatory.

Keyword : aneurysm, pipeline stent

Rescue carotid endarterectomy in case of retrieval failure of embolic protection device - a case report -

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Objective : Authors experienced retrieval failure of the distal embolic protection device during carotid angioplasty and stenting, followed by carotid endarterectomy as a rescue theapy.

Methods : A 79-year-old man with 20 years hypertension history presented with right-sided hemiparesis and mild confusion was referred. Magnetic resonance imaging and angiography (MRI & MRA) showed multifocal infarction on left middle cerebral artery borderzone, stenosis on left common carotid artery (CCA) and left internal carotid artery (ICA). After administration of intraventous tissue plasminogen activator (t-PA), patient's neurologic deficit had been recovered. We decided to perform carotid angioplasty and stenting on 10 days after admission.

Result : Initial diagnostic angiography showed tandem lesions correlated with the symptoms. The left CCA stenosis with ulceration and the left proximal ICA stenosis (NASCET critetra 75%). Embolic protection device(SpiderFX™ 5mm filter -eV3) was placed in distal ICA without difficulty while filterwire was floating on ICA. Proximal ICA was predilated with balloon catheter (Submarine rapido 5/30 balloon-Medtronics) followed by placement of stent (Protege® RX 7-10/40 stent-eV3). And then stent was deployed on CCA without ballooning. The retrieval sheath catheter was advanced but could not be passed through the stent on ICA. We could not retrieve it despite curving and torquing the sheath, head rotation, coughing, using Davis diagnostic catheter(Davis Angio cathether-A&A medical) as a retrieval sheath. The stent was kinked and the Filterwire seems to be distorted after numerous trial. Finally we performed emergency carotid endarterectomy with removal of stent on ICA and the filter device. Neurologic deficit was not found after the surgery.

Conclusion : Neurointerventionists should keep it mind that carotid endarterectomy could be an alternative option as rescue therapy in case of retrieval failure of embolic protection device.

Keyword : carotid stenosis, endarterectomy

Staged Surgical and Endovascular Treatment of Palpebral Arteriovenous Malformation: A Case Report

Chan Jong Yoo, Jin Uk Kim, Myeong Jin Kim

Department of Neurosurgery, Gil Medical Center, Gachon University

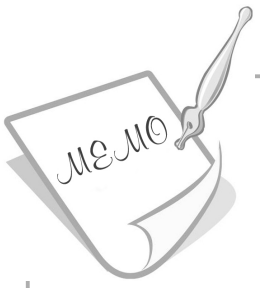
Objective : A 66-year-old woman presented with right palpable neck mass and tinnitus.

Methods : Magnetic resonance imaging and CT angiogram showed tortuous dilated vascular lesion in the right carotid bulb, parapharyngeal space & posterior pharyngeal wall (8.13cm × 5.8 cm). Cerebral angiography showed nonspecific ECA artery supplying aneurysmal dilatation(3.7cm × 3.0 cm) between right-sided external carotid artery-proximal internal carotid artery and occipital artery supplying the AVM. The palpable neck mass, which turned out to be an aneurysmal dilatation, was surgically removed, and the occipital artery supplying AVM was treated by embolization due to severe tinnitus.

Result : Postoperatively, the patient presented with swallowing difficulty which showed relief during the follow up period. The tinnitus was also alleviated after embolization of the occipital artery.

Conclusion : Nonspecific ECA artery supplying aneurysmal dilatation and occipital artery supplying the AVM considered staged surgical and endovascular treatment.

Keyword : Palpebral neck mass, Staged Surgical and Endovascular Treatment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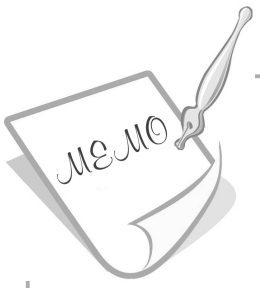
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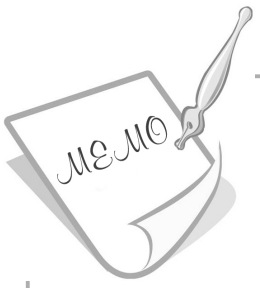
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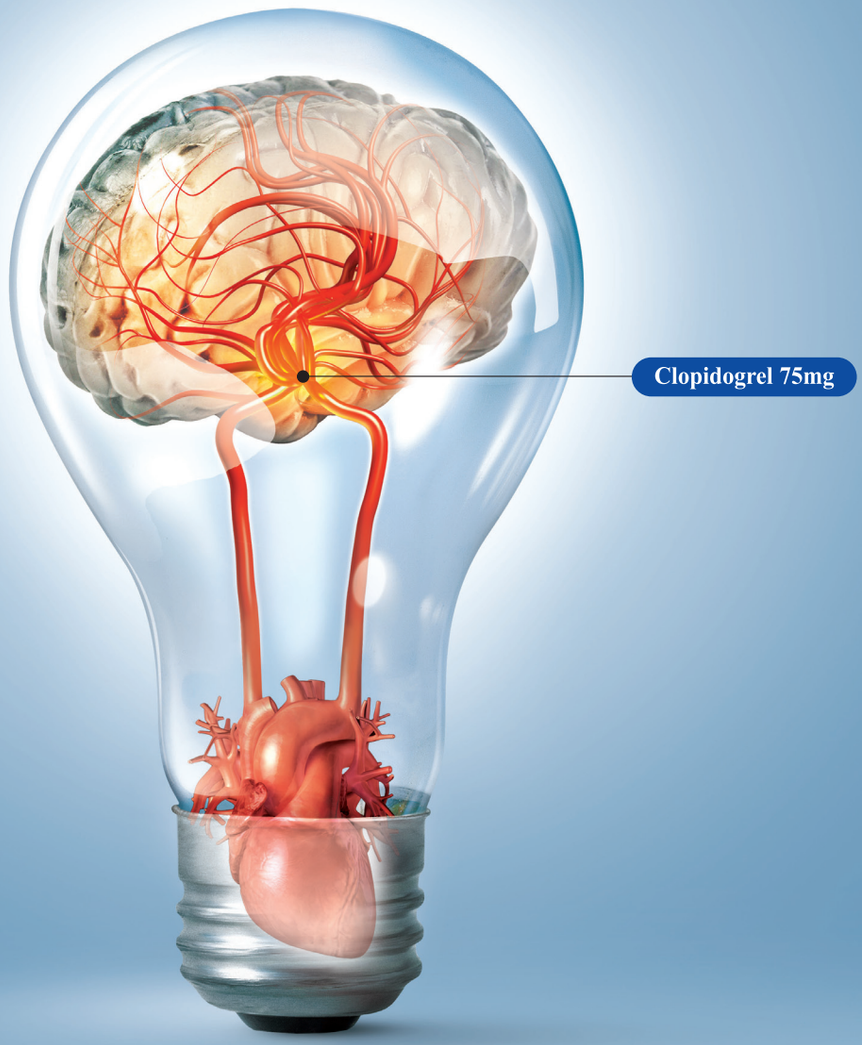

강력한 효과 : 혈소판을 활성화 시키는 ADP 수용체를 억제시키고, 혈소판 응집을 증폭시키는 GPⅡb/Ⅲa 수용체의 활성을 억제하는 일련의 작용을 통해 강력한 혈소판 응집 억제효과를 나타냅니다.

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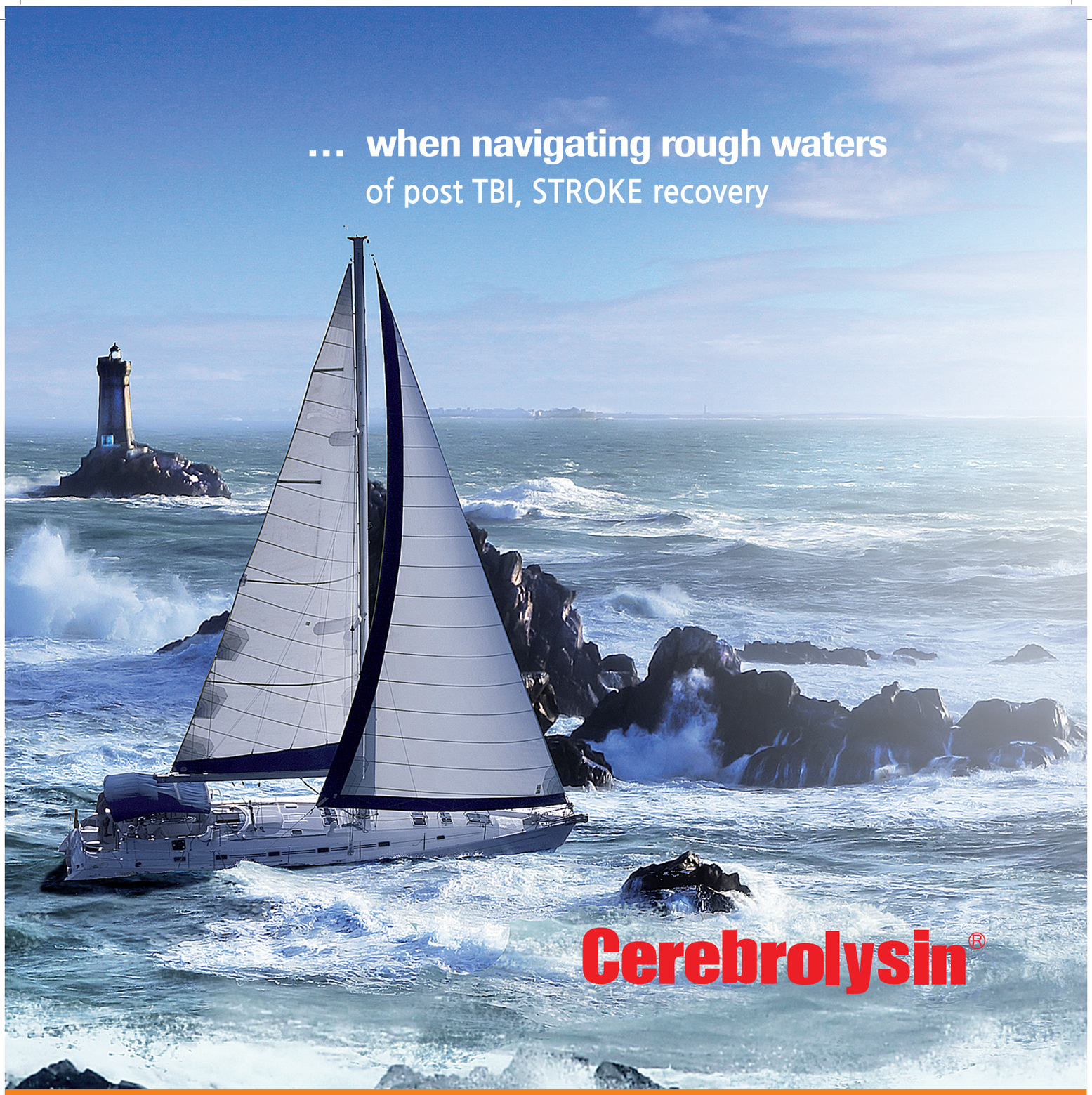
【성상】 이약은 분홍색의 원형 필름 코팅정입니다 **【성분】** 황산수소클로피도그렐(U.S.P) – 97.875mg(클로피도그렐로서 75mg) **【효능·효과】** 1. 뇌졸중,심근경색 또는 말초동맥성질환에서 죽상동맥경화성 증상의 개선 2. 급성관상동맥증후군이 있는 환자에서 죽상동맥경화성 증상의 개선 **【용법·용량】** 1. 뇌졸중, 심근경색 또는 말초동맥성질환이 있는 환자분, 1일 1회 1정(75mg)을 투여합니다. 2. 급성관상동맥증후군이 있는 환자분에게 투여시 이 약 300mg을 초회 투여하고, 이후에 1일 1회 1정(75mg)을 유지 용량으로 투여합니다.



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