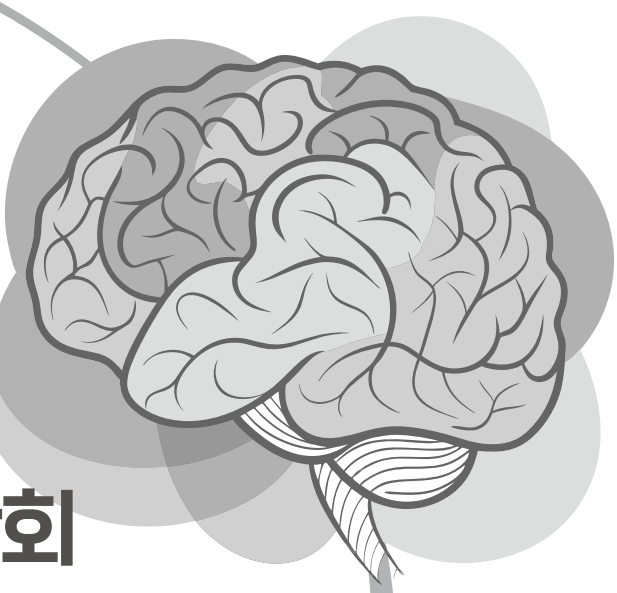

2024
대한뇌혈관내치료의학회
정기학술대회 및 총회

Theme **Stay Strong Together**

일시: 2024년 11월 29일 (금)

장소: 인천 파라다이스시티호텔 그랜드볼룸

주최 _ 대한뇌혈관내치료의학회

주관 _ 대한신경외과학연구재단

대한뇌혈관내치료의학회
KoNES
Korean NeuroEndovascular Society

인사말

존경하는 대한뇌혈관내치료의학회 회원 여러분 안녕하십니까?

대한뇌혈관내치료의학회 회장 권순찬입니다.

2024년 대한뇌혈관내치료의학회 (KONES) 정기학술대회를 11월29일, 인천파라다이스시티호텔에서 개최합니다.

2023년 11월에 제14대 임원진이 시작되어, 임기를 수행한지도 벌써 1년이 되었습니다. 회원님들의 노력과 헌신으로 저희 학회는 의료계의 많은 혼란속에서도 지난 1년간 많은 성장을 하였습니다. 처음 경험해 보는 어려운 현재의 의료 상황에서도 진료와 연구에 힘쓰신 여러 회원님들의 노고에 진심으로 감사와 경의를 표합니다.

저희는 지난 1년 동안 많은 계획을 세웠고, 진행을 하였으며, 이제 1년을 마무리하는 정기학술대회를 통해 지난 1년을 마무리하고자 합니다. 이번 정기 학술대회의 주제는 “Stay Strong Together”로 정했는데, 우리가 비록 어려움 가운데 있지만 함께 노력해서 극복하자는 의지를 담았습니다. 학술적으로는 드물게 접하지만 치료에 고민이 많은 Partially Thrombosed Giant Aneurysm에 대한 임상적인 내용과 새로운 flow diverter에 대한 소개 및 보험정책에서의 새로운 변화 등을 준비하였습니다.

본 정기학술대회를 통해서 학술적인 교류만이 아니라, 회원님들 간의 소통 및 친교가 더욱 깊어지기를 바랍니다.

이번 정기학술대회를 준비하느라 수고하신 하성곤 총무이사, 김태곤 학술이사를 포함한 임원진들과, 항상 학회 발전을 위해 노력과 염려를 해 주시는 많은 회원분들 및 기업 회원분들께 다시 한번 감사를 드립니다.

2024년 11월, 멋진 인천 신도시에서 뵙겠습니다.

감사합니다.

2024년 10월

대한뇌혈관내치료의학회 회장 **권 순 찬**

2023~2025 14대 대한뇌혈관내치료의학회 임원진

상임이사

직위	성명	소속
회장	**권순찬**	울산대학교병원
부회장	**박석규**	순천향대학교 서울병원
총무	**하성곤**	고려대학교 안산병원
학술	**김태곤**	차의과대학교 분당차병원
정책	**신승훈**	차의과대학교 분당차병원
	하상우	조선대학교병원
재무	**김훈**	가톨릭대학교 부천성모병원
수련교육	**김영우**	가톨릭대학교 의정부성모병원
	박중철	울산대학교 서울아산병원
간행	**이종영**	한림대학교 강동성심병원
보험	**정준호**	연세대학교 세브란스병원
	조동영	이화여자대학교 서울병원
	박근영	연세대학교 세브란스병원
	이성호	서울대학교병원
대외협력	**장철훈**	영남대학교병원
	임용철	아주대학교병원
국제교류	**박근영**	연세대학교 세브란스병원
법제윤리	**김성림**	가톨릭대학교 부천성모병원
	정영진	영남대학교병원
홍보	**윤원기**	고려대학교 구로병원
	양구현	울산대학교 강릉아산병원
전산정보	**신동성**	순천향대학교 부천병원
	신희섭	강동경희대학교병원
회원관리	**고준경**	부산대학교병원
진료지침	**오재상**	가톨릭대학교 의정부성모병원
연보·학회사편찬	**심숙영**	명지성모병원
진료심의	**강현승**	서울대학교병원
여의사회	**김소연**	가톨릭관동대학교 국제성모병원
	조수희	울산대학교 강릉아산병원
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	전우열	대구굿모닝병원
	김희섭	청주효성병원
별정직 이사 (학술지편집)	**김대원**	원광대학교병원
별정직 이사 (인증관리)	**성재훈**	가톨릭대학교 성빈센트병원
	오인호	중앙보훈병원
	김창현	계명대학교 동산의료원

2023~2025 14대 대한뇌혈관내치료의학회 임원진

직위	성명	소속
별정직 이사 (다기관임상)	**황교준**	분당제생병원
	김영수	에스포항병원
별정직 이사 (ASTRO)	**권현조**	충남대학교병원
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	옥민수	울산대학교 예방의학과
뇌신경마취	**박희평**	서울대학교병원 마취통증의학과
의료기기 연구	**양수근**	인하대학교 의생명학과
뇌신경재활	**김수아**	순천향대학교 천안병원 재활의학과
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	김기훈	고려대학교 안산병원 재활의학과
다학제연구	**이학승**	원광대학교병원 신경과
	정용안	가톨릭대학교 인천성모병원 핵의학과
	이아름	순천향대학교 부천병원 영상의학과
	김광준	연세대학교 세브란스병원 노년내과
특별이사 (대외협력)	**김범태**	순천향대학교 부천병원
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특별이사 (정책)	**권오기**	분당서울대학교병원
특별이사 (연보, 학회사편찬)	**고준석**	강동경희대학교병원
특별이사 (의학회)	**윤석만**	순천향대학교 천안병원
특별이사 (신의료기술/장비/재료)	**강동훈**	경북대학교병원
특별이사 (WFITN 준비이사)	**최재호**	가톨릭대학교 서울성모병원
	이중구	가톨릭대학교 서울성모병원
특별이사 (회칙관리)	**이동훈**	가톨릭대학교 성빈센트병원
특별이사 (KSCVS)	**이재환**	연세대학교 용인세브란스병원
특별이사 (CME)	**반승필**	분당서울대학교병원
특별이사 (ASTRO)	**진성철**	인제대학교 해운대백병원
특별이사	**장인복**	한림대학교 평촌성심병원
	장경술	진주한일병원
	정진영	참포도나무병원
	조준성	단국대학교병원
	남택균	중앙대학교병원
	장동규	가톨릭대학교 인천성모병원
	백진욱	제주한라병원
	김명진	가천대학교 길병원
광주/전라지회	**김대원**	원광대학교병원
대구/경북지회	**홍대영**	에스포항병원

2023~2025 14대 대한뇌혈관내치료의학회 임원진

직위	성명	소속
대전/충청지회	**임정욱**	세종충남대학교병원
부산/울산/경남지회	**최재형**	동아대학교병원
인천지회	**유찬종**	가천대학교 길병원

감사 (2명)

직위	성명	소속
감사	**김창현**	양산부산대학교병원
	박정현	한림대학교 동탄성심병원

간사 (3명)

직위	성명	소속
회장 간사	**김성태**	인제대학교 부산백병원
총무 간사	**김훈**	가톨릭대학교 부천성모병원
학술 간사	**김정재**	연세대학교 세브란스병원

명예회장 (3명)

직위	성명	소속
명예회장	**백민우**	인봉의료재단 뉴고려병원
	권도훈	울산대학교 서울아산병원
	김영준	한림대학교 강남성심병원

전임회장단 (10명)

직위	성함	소속
초대, 제2대	**백민우**	인봉의료재단 뉴고려병원
제3대	**김영준**	한림대학교 강남성심병원
제4, 5대	**권도훈**	울산대학교 서울아산병원
제6대	**안성기(작고)**	(전) 한림대학교 성심병원
제7대	**신용삼**	가톨릭대학교 서울성모병원
제8대	**권오기**	분당서울대학교병원
제9대	**김범태**	순천향대학교 부천병원
제10대	**성재훈**	가톨릭대학교 성빈센트병원
제11대	**고준석**	강동경희대학교병원
제12대	**윤석만**	순천향대학교 천안병원
제13대	**장철훈**	영남대학교병원

초청연자

신 나 영

Clinical Associate Professor
Department of Radiology, Yonsei University, College of Medicine

Education

1999.03.01-2006.02.28	M.D, Yonsei University College of Medicine, Seoul
2008.03.01-2011.02.28	Master, Graduate School of Yonsei University, Seoul
2012.09.01-2016.08.26	Ph.D, Graduate School of Yonsei University, Seoul

Experience

2006-2007	Internship: Yonsei University Health System, Severance Hospital, Seoul, Korea
2007-2011	Residency: Radiology Yonsei University Health System, Severance Hospital, Seoul, Korea
2011-2012	Fellowship: Neuroradiology Yonsei University Health System, Severance Hospital, Seoul, Korea
2012-2013	Clinical research assistant professor: Neuroradiology Yonsei University College of Medicine, Severance Hospital, Seoul, Korea
2013-2015	Clinical assistant professor: Neuroradiology Yonsei University College of Medicine, Severance Hospital, Seoul, Korea
2015-2017	Assistant professor: Neuroradiology Ewha Womans University School of Medicine, Mokdong hospital, Seoul, Korea
2017-2018	Clinical assistant professor: Neuroradiology The Catholic University of Korea, Seoul St. Mary's Hospital, Seoul, Korea
2018-2019	Assistant professor: Neuroradiology The Catholic University of Korea, Seoul St. Paul's Hospital, Seoul, Korea
2019-2021	Assistant professor: Neuroradiology The Catholic University of Korea, Seoul St. Mary's Hospital, Seoul, Korea
2021-2023	Associate professor: Neuroradiology The Catholic University of Korea, Seoul St. Mary's Hospital, Seoul, Korea
2023-present	Clinical Associate professor: Neuroradiology Yonsei University College of Medicine, Severance Hospital, Seoul, Korea

프로그램

09:00-09:45	Registration		
09:45-10:00	Opening Remark	권순찬(대한뇌혈관내치료의학회 회장)	
	Congratulatory Remark	김대현(대한신경외과학회 회장) 안재성(대한뇌혈관외과학회 회장)	
10:00-11:21	**Free Paper I. Aneurysm**	좌장: 성재훈(가톨릭대), 윤석만(순천향대)	
10:00-10:09	Crossing Y-stent Assisted Coil Embolization using Neuroform Atlas in Complex or Wide-Neck Intracranial Bifurcation Aneurysms: technical nuances	조병래(가톨릭대)	12
10:09-10:18	Safety of discontinuation of antiplatelet medication in patients with stent-assisted coil embolization: multicenter, prospectively enrolled, non-interventional study	조영대(서울대)	13
10:18-10:27	Headache after coil embolization for unruptured intracranial aneurysms (non-stented versus stent-assisted): A prospective comparative cohort study	반승필(서울대)	14
10:27-10:36	Clinical and radiologic outcomes of unruptured intracranial aneurysms with incorporated branches after flow diverter treatment	한현진(연세대)	15
10:36-10:45	Endovascular coil embolization of very small aneurysm using the Marathon microcatheter	이종민(울산대)	16
10:45-10:54	Overcoming Difficult Aneurysms Using the MC Pulled Back Technique and New Braided Stent (Accero)	정영진(영남대)	17
10:54-11:03	In-silico Analysis for WEB Sizing and Comparison with Clinical Outcome	유재민(연세대)	18
11:03-11:12	Safety of Stent-Assisted versus Non-Stent Coil Embolization in Ruptured Aneurysms: Comparative Study	서동욱(순천향대)	19
11:12-11:21	Reappraisal of Dual Lumen Balloon assisted Embolization of Intracranial Aneurysm	윤원기(고려대)	20
11:21-12:20	**보험심포지움 : 보험정책의 변화**	좌장: 권순찬(울산대), 박석규(순천향대)	
11:21-11:41	자율형 분석심사의 경과	정준호(연세대)	22
11:41-12:01	3차 상대가치 개편 및 뇌혈관질환 관련 수가 현황	박석규(순천향대)	23
12:01-12:20	부당 삭감의 문제점과 해결방안 모색	박근영(연세대)	24
12:20-12:30	Coffee Break		
12:30-13:30	**Luncheon Symposium**	좌장: 신용삼(가톨릭대), 장철훈(영남대)	
12:30-12:40	Pipeline Vantage™: R&D behind story for ideal flow diverter	박선욱(메드트로닉)	26
12:40-13:00	Clinical application of Pipeline Vantage	정영진(영남대)	28
13:00-13:10	Introduction of FRED X	이철규(테루모 뉴로)	32
13:10-13:30	Clinical application of FRED X	박석규(순천향대)	34

13:30-14:40	**Plenary Session : Partially Thrombosed Giant Aneurysm** 좌장: 권오기(서울대), 김성림(가톨릭대)		
13:30-14:00	Pathophysiology of Partially Thrombosed Giant Aneurysm	강현승(서울대)	36
14:00-14:20	Radiologic diagnosis of Partially Thrombosed Giant Aneurysm	신나영(연세대 신촌세브란스 영상의학과)	37
14:20-14:40	Endovascular treatment of Partially Thrombosed Giant Aneurysm	이종민(울산대)	43
14:40-15:00	Photo Time & Coffee Break		
15:00-16:00	**학술상 및 연구비지원 학술연구발표** 좌장: 김범태(순천향대), 황교준(분당제생병원)		
15:00-15:15	명지성모병원 남천학술상 Translation research in cerebrovascular disease	오재상(가톨릭대)	54
15:15-15:30	에스포항병원 학술상 Comparison of Neuroform Atlas stent assisted coiling and coiling alone in ruptured intracranial aneurysms: A propensity score matching analysis (Neurosurgery 92(3):p 607–614, March 2023)	이호준(순천향대)	55
15:30-15:45	蔦宅(위택) 권도훈 명예회장 학술상 New Morphological Parameter for Intracranial Aneurysms and Rupture Risk Prediction based on Artificial Neural Network (J NeuroIntervent Surg 2023;15:e209–e215)	조광천(연세대)	56
15:45-16:00	COMparision of clinical and radiological outcomes between suction asPiration method and combination mEthod of intra-arterial Therapy (IAT) in largE artery occlusion(COMPETE trials): Prospective Multicenter Trials: Interim Results of COMPETE Trials	진성철(인제대)	57
16:00-17:20	**Free Paper II. Ischemia & etc.** 좌장: 권현조(충남대), 김영우(가톨릭대)		
16:00-16:10	Pan-immune-inflammation value predict delayed cerebral ischemia in patients with aneurysmal subarachnoid hemorrhage	이호준(순천향대)	60
16:10-16:20	Long-Term follow-up Outcome of Emergent Intracranial Stenting with 'Neuroform Atlas Stent' in Patients Underwent Mechanical Thrombectomy	송승윤(가톨릭대)	61
16:20-16:30	Stent Assisted Coil Embolization for High-riding Jugular Bulb Diverticulum for Symptomatic Pulsatile Tinnitus	심재현(PMC 박병원)	62
16:30-16:40	Rescue Stenting for Refractory Vertebro-Basilar Artery Occlusion : A Single Center Experience	김재호(조선대)	63

16:40-16:50	Hybrid operating room surgery for arteriovenous malformation: Setup, implementation, and single hospital experience	구자호(이화여대)	64
16:50-17:00	Dural AVF treated with burr hole and direct transverse sinus puncture	윤기용(순천향대)	65
17:00-17:10	Introduction to the PWI-DWI Recalculation Program	김영수(에스포항병원)	66
17:10-17:20	토론		
17:20-17:30	정기총회 및 학술상 시상	하성곤(대한뇌혈관내치료의학회 총무이사)	
17:30	Closing Remark	권순찬(대한뇌혈관내치료의학회 회장)	

2024
대한뇌혈관내치료의학회
정기학술대회 및 총회

Theme **Stay Strong Together**

일시: **2024년 11월 29일 (금)**
장소: **인천 파라다이스시티호텔 그랜드볼룸**

Free Paper I. Aneurysm

(10:00-11:20)

좌장: **성재훈** (가톨릭대)
윤석만 (순천향대)

FP1-1

Crossing Y-stent Assisted Coil Embolization using Neuroform Atlas in Complex or Wide-Neck Intracranial Bifurcation Aneurysms: technical nuances

Byung-Rae Cho, Dong-Kyu Jang, Dong-Sub Kim, Young-Hoon Choi

Department of Neurosurgery, College of Medicine, The Catholic University of Korea

Objective: Various methods are employed to treat wide-neck aneurysms, but numerous considerations pose challenges to effective treatment. Recently, stent-assisted coil embolization has become common; however, there are cases where using a single stent is inadequate. Therefore, we aim to explore Y-stent assisted coil embolization as an alternative.

Methods: From October 2018 to Oct 2024, we performed Y-stent assisted coil embolization using two Atlas stents in a total of 49 patients with 50 unruptured aneurysms. We retrospectively reviewed patient characteristics, aneurysm details, procedure-related complications, radiographic outcomes, and clinical results.

Result: The procedure was successfully completed in all 49 patients with 50 unruptured aneurysms. Of these, 35 were female and 15 were male, with a mean age of 63.73 years (±9.34). The average dome and neck sizes were 5.43±2.95 mm and 4.33±1.93 mm. The average packing density was 35.89±13.06%, and the average procedure time was 135.06±41.61min. Post-procedure, 35 patients achieved a Raymond-Ray occlusion classification of 1. Asymptomatic embolism was detected in 18 patients (36%) on diffusion-weighted MRI at 24 hours post-procedure, and symptomatic infarction occurred in one patient (2%). This patient underwent mechanical thrombectomy as rescue treatment, resulting in symptom improvement. The average angle of the aneurysm, excluding the branch artery angle, was 186.25±37.06 degrees, and there was no difference in procedure time or results depending on the angle. At one year post-procedure, all 42 patients had a modified Rankin Scale (mRS) score of 0, indicating no significant complications.

Conclusion: Y-stent assisted coil embolization, utilizing two Atlas stents, is an effective and safe treatment method for patients with wide-neck aneurysms.

FP1-2

Safety of discontinuation of antiplatelet medication in patients with stent-assisted coil embolization: multicenter, prospectively enrolled, non-interventional study

Chang Hyun Kim, Young Dae Cho

Department of Neurosurgery, Seoul National University Hsopital

Objective: Antiplatelet maintenance is essential to avoid postoperative ischemia following stent-assisted coiling (SAC). However, the indications for antiplatelet medcation discontinuation (AMD) remain controversial and even the optimal timing of discontinuation has not been determined. Therefore, we investigated the safety of AMD in patients treated with SAC through multicenter, prospectively enrolled, and non-interventional study.

Methods: Data were retrieved from a prospectively enrolled database of 532 consecutive patients from 10 institutions who discontinued antiplatelet therapy from 2021 to 2023 after SAC. The maintenance duration and discontinuation of antiplatelet agent were determined at the discretion of the physician, considering the clinical status of each patient. The authors investigated clinical outcomes for at least 6month after AMD.

Result: The majority of patients with AMD (n=316, 59.4%) were not at high risk for ischemia. The mean time taken to AMD was 19.1±12.1 months after SAC. The most common location of treated aneurysms was internal carotid artery (n=362, 68.0%), followed by ACA (n=100, 18.8%) and MCA (46, 8.6%). A laser-cut open-cell stent was most commonly applied (n = 319, 60.0%), followed by laser-cut closed-cell stents (n = 127, 23.9%) and braided closed-cell (n = 86, 16.1%). Double-stenting was performed in four patients. Despite the inclusion of 40.6% of the high-risk group, there were no ischemic patients associated with AMD.

Conclusion: This study suggests that AMD is safe in patients who are not at high risk for ischemia after the SAC procedure. In addition, recommended timing of AMD appears to be about 18 months after the procedure.

FP1-3

Headache after Coil Embolization for Unruptured Intracranial Aneurysms (Non-stented Versus Stent-assisted): A Prospective Comparative Cohort Study

Seung Pil Ban, O-Ki Kwon, Young Deok Kim, Hwan Seok Shim

Department of Neurosurgery, Seoul National University Bundang Hospital

Objective: It is known that worsening of headaches or the occurrence of new headaches can develop after coil embolization. Although the frequency of headaches is reported to be higher when a stent is used, it is not well understood. The authors evaluate the incidence of headache in patients with non-stent versus stent-assisted coil embolization for unruptured intracranial aneurysms (UIAs).

Methods: This prospective comparative cohort study enrolled patients treated with coil embolization for UIAs in our institution between June 1, 2018 and March 31, 2022. Subjects were classified by treatment technique: non-stent or stent-assisted. Considering the difference in frequency between stent-assisted and non-stent methods, enrollment was conducted at a 1.5:1 ratio. Intensity of the headache was assessed by the numeric rating scale (NRS) score. Cox proportional hazards regression was used to evaluate the headache incidence after coil embolization. Changes in headache intensity over time were assessed an adjusted linear mixed model.

Result: Of total enrolled190 patients, 4 patients were excluded (3 patients experienced periprocedural complication and 1 patient died due to unrelated condition). Among 186 included patients, 111 (59.7%) were treated with stent-assisted technique, and 75 (40.3%) were treated with non-stent technique. A total of 61 patients had headaches prior to the procedure (22 in the non-stent group and 39 in the stent-assisted group), with an average NRS score of 0.78. One hundred thirty-two patients experienced a headache (NRS score, 2.8±2.4) at 5.9±9.5 hours. All headaches resolved within an average of 15.51 hours The incidence of headaches after the procedure was significantly higher in the stent-assisted group (non-stent group: 46 of 75 [61.3%]; stent-assisted group 86 of 111 [77.5%]; HR, 1.56 [95% CI, 1.09-2.26]; p=0.02). Other 3 factors were significantly associated with a higher post-coiling headache risk: female sex (HR 2.31, 95% CI, 1.23-4.36, p=0.01), cilostazol (HR 2.08, 95% CI, 1.26-3.43, p0.05).

Conclusion: The incidence of headaches after coil embolization of UIAs was higher in the stent-assisted coiling group compared to the non-stent coiling group. Additionally, the study showed that the risk of developing headaches after coil embolization was higher in females, those taking cilostazol, and previous headache history.

FP1-4

Clinical and Radiologic Outcomes of Unruptured Intracranial Aneurysms with Incorporated Branches after Flow Diverter Treatment

Hyun Jin Han, Keun Young Park, Byung Moon Kim

Department of Neurosurgery, Severance Hospital, Yonsei University College of Medicine

Objective: The aim of this study was to present the clinical and radiologic outcomes of unruptured intracranial aneurysms with incorporated branches after flow diverter treatment.

Methods: Our investigators retrospectively collected data from 5 multi-centers, which the patients was diagnosed an unruptured intracranial aneurysm treated with flow diverter stent. The study outcome were total aneurysm occlusion assessed by angiography at 12 months and last follow-up, death or stroke, patency of incorporated branches.

Result: A branch arising from the sac was observed in 65 patients with 65 aneurysms. Median imaging follow-up duration was 26 months (Interquartile range: 6-50 months). Cumulative complete occlusion was found in 35 of 65 aneurysms at 12 months (53.8%) and in 45 of 52 aneurysms at final follow-up over 48 months (86.5%). At last follow-up radiologic evaluation, 50 branches were preserved (77.0%), and 15 branches were totally occluded (23.0%). There were 4 cases of a relevant territory ischemic stroke during follow-up periods, of which 3 cases was occurred after anti-platelet de-escalation.

Conclusion: Aneurysms with incorporated branches are less likely to be occluded compared with the occlusion rate of previous studies. It takes a longer time for mine gallery remodeling within aneurysm, and thromboembolic risk is co-incident in this period. Therefore, long-term anti-platelets usage and follow-up imaging studies are required in these cases.

FP1-5

Endovascular Coil Embolization of Very Small Aneurysm Using the Marathon Microcatheter

Jong Min Lee, Soon Chan Kwon

Department of Neurosurgery, Ulsan University Hospital

Objective: Endovascular coil embolization of very small aneurysms is controversial because of its high procedural rupture risk and technically difficulty. And sometimes, factors such as distal and tortuous vasculature further increase the difficulty of treatment. However, endovascular treatment is progressively advancing toward more difficult and hard-to-reach areas, thanks to remarkable developments in devices. Herein, we would like to present two cases of treating a very small aneurysm using a Marathon microcatheter and the i-ED coil.

Methods: We did stent assisted coil embolization for two patients using a marathon catheter and i-ED coil. Both patients had intracranial aneurysms, and the aneurysms were located in the anterior cerebral artery.

Result: Both two patients were successfully treated using the Marathon microcatheter and i-ED coils

Conclusion: The marathon microcatheter is a viable delivery catheter. Its flexibility and flow-directed delivery characteristics allow for safer navigation.

FP1-6

Overcoming Difficult Aneurysms Using the MC Pulled Back Technique and New Braided Stent (Accero)

Youngjin Jung

Department of Neurosurgery, Yeungnam University Medical Center

Objective: The treatment of cerebral aneurysms has transitioned from clipping to coiling, with recent trends favoring the use of flow diverters and flow disruptors that do not require catheterization inside the aneurysm. Despite these advancements, a significant number of aneurysms continue to be treated using coiling with or without stent. Aneurysms of moderate size or those with suitable morphology can often be treated with minimal complications. However, difficult aneurysm (small sized (≤3mm), aspect ratio <1.5, or a K-ratio <1.3) present significant challenges for endovascular treatment, potentially increasing the risk of complications. This study aims to explore methods and tools that can reduce complications during endovascular procedures for challenging aneurysms.

Methods: A retrospective study was conducted on patients treated by a single physician at a single center from July 2023 to October 2024. Among a total of 87 cases, 69 were classified as difficult cases (N=69, SAH=9, UIA=60). The locations of the lesions included ACA (n=13), MCA (n=16), ICA (n=34), BA (n=1), and VA (n=5).

Result: In 61 cases, new braided stent (ACCERO)-assisted coil embolization was performed, while in 8 cases, stenting was performed without coils. For very small aneurysms (≤3mm), the microcatheter (MC) pulled back technique (reverse parking technique) was employed to position the MC inside the aneurysm, with some cases utilizing a modified version of this technique. Immediate angiographic results showed complete occlusion with n=32, remnant neck with n=8, and remnant sac with n=19. No intraoperative rupture (IOR) occurred, and the thromboembolic complication (TEC) rate was 5.8% (4/69; 1 case of SAH and 3 cases of UIA). TEC was resolved using intra-arterial tirofiban without additional neurological damage.

Conclusion: In conclusion, even aneurysms deemed difficult for endovascular coil embolization can be treated with a low complication rate using safer techniques and advanced tools. Particularly for very small aneurysms with low height where catheter access is challenging, the pulled back technique offers the safest and most stable positioning of the microcatheter. The newly developed braided stent (ACCERO) allows for intuitive real-time assessment of the relationship between the stent, parent artery, and aneurysm, facilitating the use of small coils without the risk of herniation. In cases where coiling is not feasible, flow diversion effects can still be expected.

FP1-7

In-silico Analysis for WEB Sizing and Comparison with Clinical Outcome

Jaemin Yu[1], Yong Bae Kim[1], Keun Young Park[1], Jung-Jae Kim[1], Hyun Jin Han[1], Je Hoon Oh[2]

[1]*Department of Neurosurgery, Yonsei University*
[2]*Mechanical Engineering and BK21 FOUR ERICA-ACE Center, Hanyang University, Korea*

Introduction: The Woven Endobridge (WEB) device is a recently developed endovascular tool designed to treat intracranial aneurysms, particularly bifurcation and wide-neck aneurysms. Numerous studies have indicated that both angiographic and clinical outcomes of WEB treatment are closely linked to the accurate sizing of the device. However, methods to predict the optimal size of the WEB device are currently limited. This study utilized in-silico analysis to explore the correlation between WEB sizing and occlusion rates.

Methods: The study evaluated the clinical outcomes of nine patients who received the WEB treatment, based on one-year follow-up cerebral angiography. The patients were divided into two groups: the complete occlusion group (WEB Occlusion Scale A & B) and the incomplete occlusion group (WEB Occlusion Scale C & D). ANSYS software was used to simulate the deployment of the WEB device for these nine cases, using the size of the WEB used. The in-silico analysis assessed the area of contact between the WEB and the aneurysm wall, as well as the contact pressure in the affected area.

Result: In the complete occlusion group, the average contact area of the WEB with the aneurysm wall was 45.0%, and the average contact pressure was 8.45 Pa. In contrast, the incomplete occlusion group had an average contact area of 19.6% and a contact pressure of 5.90 Pa. None of the difference was statistically significant.

Conclusion: Although the results did not reach statistical significance, our in-silico analysis of WEB deployment suggests that incomplete occlusion is associated with a smaller contact area and lower contact pressure. he limited sample size likely contributed to the weak statistical power, suggesting additional studies with larger number of cases are required. Regardless, these findings support the potential value of in-silico experiments in determining the appropriate size of the WEB device for effective aneurysm treatment.

FP1-8

Safety of Stent-Assisted versus Non-Stent Coil Embolization in Ruptured Aneurysms: Comparative Study

Dongwook Seo, Sukh Que Park

Department of Neurosurgery, Soonchunhyang University Seoul Hospital

Research on stent-assisted coil embolization for ruptured aneurysms has produced varied results, with no definitive conclusion on its safety and efficacy. Key issues include the use of stents without adequate preparation and the increased bleeding risk associated with dual antiplatelet therapy. This study reports the outcomes of treatment at our institution concerning these issues.

We analyzed patients with ruptured aneurysms who underwent stent-assisted coil embolization or coil embolization without stent, between 2019 and 2023. In some cases. In some cases, dual antiplatelet therapy was administered before coil embolization, considering stent use. In others, the decision to use a stent was made during coil embolization, with dual antiplatelet therapy initiated postoperatively. Depending on the surgeon's judgment, intravenous heparin or intra-arterial tirofiban injections were administered during the procedure. Various stents, including Neuroform Atlas, Enterprise, LVIS, LVIS Junior, and LVIS EVO, were used.

We compared 31 patients who underwent stent-assisted coil embolization with 43 patients who received coil embolization without stent assistance. No statistically significant differences were observed in aneurysm size (measured by maximum diameter, neck width, and height); however, the mean dome-to-neck ratio was significantly different between the two groups, with values of 1.35 and 1.79, respectively ($p = 0.004$). Thrombus formation during treatment occurred in 5 cases (16.7%) in the stent-assisted group and in none of the non-stent group, showing a statistically significant difference ($p = 0.009$). In all thrombus cases, intra-arterial tirofiban administration successfully resolved the thrombus. Symptomatic cerebral infarction following endovascular treatment was identified in 3 cases (10.3%) in the stent-assisted group and in none of the non-stent group, though this difference was not statistically significant ($p = 0.073$). Additionally, asymptomatic cerebral infarction detected on brain MRI occurred in 11 cases (37.9%) in the stent-assisted group and 24 cases (55.8%) in the non-stent group, with no statistically significant difference ($p = 0.156$).

Stent use in ruptured aneurysms may be associated with ischemic complications, necessitating careful management. The potential for hemorrhagic complications related to dual antiplatelet therapy also requires vigilant monitoring.

Keyword: Subarachnoid hemorrhage, ruptured aneurysm, stent-assisted coil embolization

FP1-9

Reappraisal of Dual Lumen Balloon assisted Embolization of Intracranial Aneurysm

Wonki Yoon

Department of Neurosurgery, Guro Hospital, Korea University

Background and Purpose: The advent of neck remodeling stents has overshadowed balloon-assisted treatments for intracranial aneurysms due to lower rates of complete aneurysm occlusion and increased risks of hemorrhagic and thromboembolic complications. To enhance the radiologic and clinical outcomes of aneurysm embolization, we employed dual lumen balloon catheters (DLB, Scepter C and XC) in various configurations. This study shares our experience with DLB and evaluates its feasibility and safety.

Materials and Methods: Among 108 cases of intracranial aneurysm embolization performed between January 2024 and October 2024, 32 aneurysms in 29 patients were treated using DLB. A retrospective analysis focused on the technique and radiologic and clinical outcomes.

Result: Of the patients, 21 were female, and 29 aneurysms were unruptured. Mean aneurysm dimensions were 6.8 mm in length (range: 2.0–12.0 mm), 4.1 mm in neck size (range: 1.7–15.9 mm), 4.5 mm in height (range: 1.8–8.4 mm), and an aspect ratio of 1.24 (range: 0.17–2.63). Pure DLB-assisted embolization was performed in 7 cases, with the remaining cases using stents: 21 with the stent-through-DLB technique, and 4 with additional stent assistance. LVIS EVO stents were used in 18 cases and Atlas stents in 7 cases. Modified Raymond-Roy class 1 occlusion was achieved in 28 cases (87.5%), class 2 in 3 cases (9.4%), and class 3 in 1 case (3.1%). Major complications included one intraoperative rupture managed with temporary balloon occlusion and coil packing and one postoperative symptomatic infarction, without definitive arterial occlusion. Most patients (93.1%) were discharged with a modified Rankin Scale score of 0. The DLB proved beneficial for neck protection, catheter stabilization, anatomical verification, and complication management.

Conclusion: DLB catheters, when used with diverse techniques, may improve radiologic and clinical outcomes in intracranial aneurysm treatment. These findings support further research into advanced DLB applications to enhance safety and efficacy in embolization procedures.

2024
대한뇌혈관내치료의학회
정기학술대회 및 총회

Theme **Stay Strong Together**

일시: **2024년 11월 29일 (금)**
장소: **인천 파라다이스시티호텔 그랜드볼룸**

보험심포지움 : 보험정책의 변화

(11:20-12:20)

좌장: 권순찬 (울산대)
박석규 (순천향대)

뇌혈관질환 자율형 분석심사 경과

정준호
강남세브란스병원

2021년부터 시행되고 있는 자율형 분석심사의 목적, 대상범위, 대상기준을 설명하고, 그 중 뇌혈관질환에서의 자율형 분석심사에 대한 진료성과 지표, 자율관리 성과평가, 운영 현황(참여기관 현황, 분석심사 청구 현황, 분석심사 참여 전후 현황 등)에 대한 경과를 보고한다. 또한, 추후 건강보험심사평가원의 자율형 분석심사에 대한 향후 계획 및 진행 방향에 대해 고찰하고 장단점을 파악하여 회원들의 추가 참여 여부 결정에 정보를 제공하고자 한다.

3차 상대가치 개편 및 뇌혈관질환 관련 수가 현황

박석규
순천향대

지난 2017년 2차 상대가치점수 고시 이후 6년 만에 진행된 3차 상대가치점수 개편 추진 방향은 필수의료 소생과 외과계 부활로 지목됐다. 소아청소년과와 산부인과, 외과로 대변되는 필수의료 몰락이 이 같은 변화에 불을 지폈다. 외과계는 의료수가에 직접적 영향을 미치는 상대가치점수가 외과 의사들 업무량, 위험도 등을 제대로 반영하지 못하고 있다고 문제를 제기했다. 이를 반영하였다고 하나 이번 개편이 여전히 만족스럽지 못하였으며, 복지부는 현장 적용 후 지속적으로 모니터링하여 개선하겠다는 입장이다. 한편, 의료대란 이후에 급격히 변화하는 의료현장의 목소리를 반영하여 외과계 수가 개선을 위한논의가 있었으며, 최근 "뇌혈관분야 수가개선"을 위한 협의가 진행되었다. 하지만 뇌혈관내수술 분야는 제외되면서 불만은 여전한 상태이다.

이에 이번 상대가치점수 개편 내용 및 뇌혈관 수가 관련 현황을 분석하고 향후 대응을 고민하고자 한다.

부당 삭감의 문제점과 해결방안 모색

박근영
연세대

2024
대한뇌혈관내치료의학회
정기학술대회 및 총회

Theme **Stay Strong Together**

일시: **2024년 11월 29일 (금)**
장소: **인천 파라다이스시티호텔 그랜드볼룸**

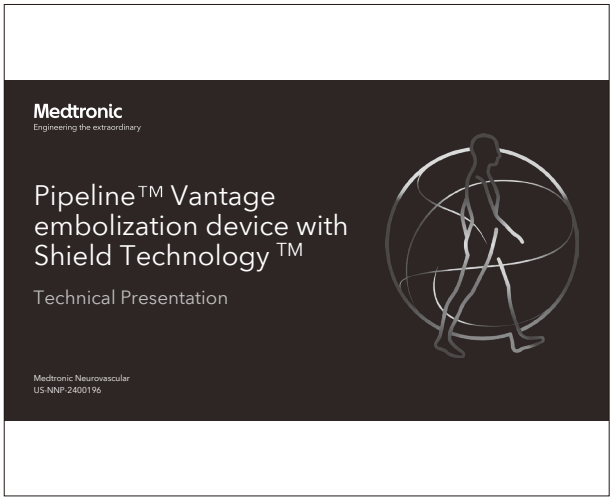
Luncheon Symposium

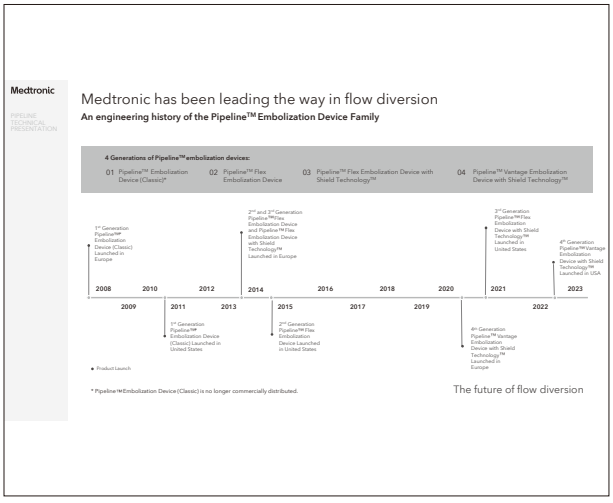
(12:30-13:30)

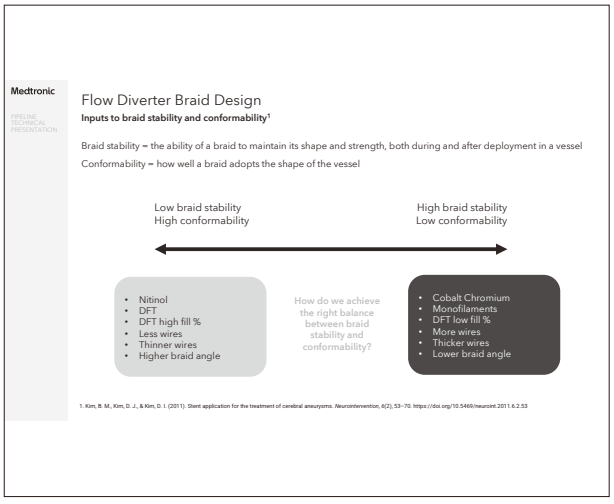
좌장: 신용삼 (가톨릭대)
장철훈 (영남대)

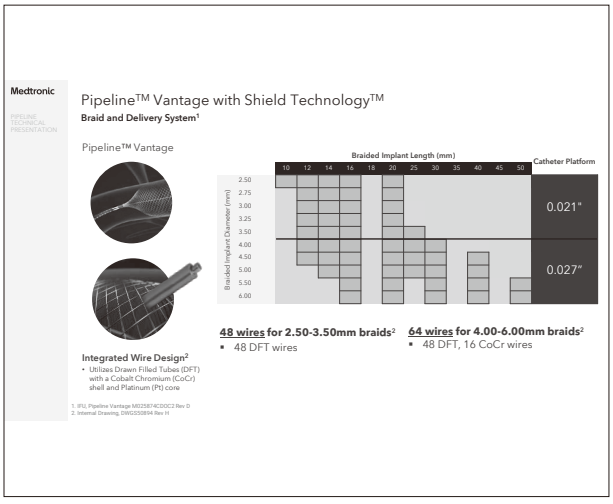
Pipeline Vantage™: R&D behind story for ideal flow diverter

박선욱
메드트로닉









Medtronic

PIPELINE TECHNICAL PRESENTATION

Braid Behavior

Optimizing Design Tradeoffs

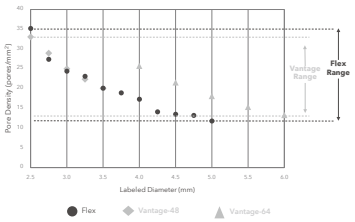
Braid Design Inputs

- Braid Angle/Pore Size
- Wire Diameter
- Wire Material
- Number of wires

Mechanical Outputs

- Delivery Force
- Metal Coverage
- Distal Opening
- Chronic Outward Force
- Radial Resistive Force

Pore Density Comparison[1]



1. Based on internal report, TR-NV1416B Rev. C. Maverick2x Braid Calculations

Medtronic

PIPELINE TECHNICAL PRESENTATION

Measuring braid stability and conformability

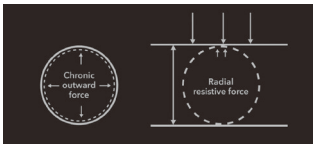
Chronic outward force (COF) and radial resistive force (RRF)

What is COF?

Chronic outward force is the continuous force the stent exerts outwards in **all directions** both as it **expands to its nominal diameter and after deployment.** The more a stent is oversized, the higher the COF.[1]

What is RRF?

Radial resistive force is the force the stent exerts in **one direction** as it **resists squeezing/crimping** by constriction of the vessel.



What is the clinical relevance?

Both COF and RRF impact braid stability and conformability.

RRF indicates how well the FD will resist compressive forces from the vessel after deployment.

COF indicates how well the braid will anchor in position. The higher the COF, the better the wall apposition during deployment.[2] However, too much COF risks damage to the vessel.[3]

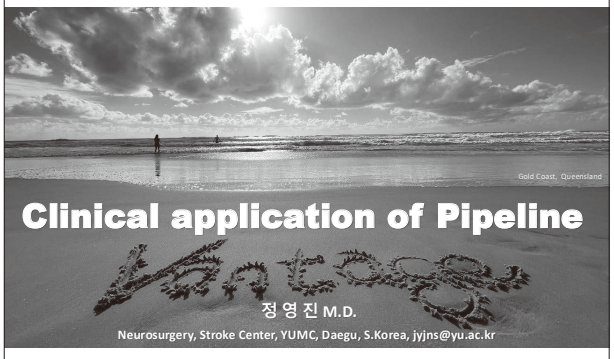
1. https://evtoday.com/articles/2018-sept-supplement/how-self-expanding-bare-metal-stent-design-can-affect-procedural-results
2. A. Rouchaud et al, Wall apposition is a key factor for aneurysm occlusion following flow-diversion: A histological evaluation in 41 rabbits. AJNR Am J Neuroradiol. 2016 Nov; 37(11): 2087–2091
3. Cabrera, M. S., Oomens, C. W., & Baaijens, F. P. (2017). Understanding the requirements of self-expandable stents for heart valve replacement: Radial force, hoop force and equilibrium. *Journal of the mechanical behavior of biomedical materials*, *68*, 252–264. https://doi.org/10.1016/j.jmbbm.2017.02.006

Key Takeaways

We hope this allowed you to further understand the engineering choices behind our flow diverters and the design philosophy behind our latest generation device, Pipeline™ Vantage with Shield Technology™, so that ultimately, you feel more confident in your choice of flow diverter.

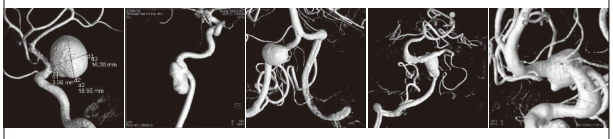
Clinical application of Pipeline Vantage

정영진
영남대



Personal Experience of FD (N=31)

• 2018.02~2024.05	PED Flex © Shield	N=26
• 2024.5~	PED Vantage © Shield	N=2
• (2023.04~12	Derivo	N=3)



Improvement Points of the PED Vantage

- **Predictable delivery**
  - Distal braid release form ePTFE (44% thinner)
  - Delivery force (Singe core wire design 21/27 MC)
  - Ease of deployment and resheathing (ARM)
- **Promote flow diversion effect**
  - Reimagined wire design (DFT with CoCr shell/Pt core)
  - Optimized wire count
    - 48 wires for 3.5mm/ 64 wires for 4.0~6.0mm:48DFT+16 CoCr wires
  - Engineered Scaffold
    - Pore density (increased)
    - Implant wall thickness (thin)
    - Metal coverage (similar to PED FLEX Shield)
    - Chronic outward force/radial resistive force (increased)
    - Wall apposition (improved)

PED Vantage with Shield vs Older

	1st PED (N=1092/1221)	2nd PED Flex (N=879/901)	3rd PED Flex c Shield (N=NA/572)	4th PED Vantage c Shield (N=392/439) (DFT)
Braid	CoCr+Pt Tungsten	CoCr+Pt Tungsten	CoCr+Pt Tungsten	CoCr shell+Pt core
Success rate		99.3%		99.0%
Balloon AP				17.0%
Adjunctive coiling			37.2%	28.0%
Major N. Cx.	5.7%	1.8%	11.1%	3.5%
Mortality	3.3%	0.8%	0.7%	0.3%
Complete occlusion	75.0% (3mo) 85.8% (12mo)		73.9% (6mo) 80.9% (12mo)	75.7% (7mo)
In-stent stenosis	39%			8.1% (4.5-11.8%)

Pipeline Vantage Embolization Device for the treatment of intracranial aneurysms: A systematic review and meta-analysis
Interv Neuroradiol 2024 Jul 25

PED Vantage vs. Others

	p64/ p48 (N=1781/1957)	FRED (N=NA/1729)	Silk (N=1021/NA)	Derivo (N= NA/481)	Surpass (N=464)	4th PED Vantage c Shield (N=392/439)
Braid	Nitinol	Dual, Nitinol	Nitinol+Pt (DFT)	Nitinol+PT(DFT)	CoCr+Pt Tung.	DFT (CoCr+Pt)
Success rate		99.3%		99.0%		
Balloon AP				12.7%		17.0%
Adjunctive coiling	7%/ 4%			25.6%		28.0%
Major N. Cx.	2%/ 3%	3.9%	7.7%	4.9%	9.5%	3.5%
Mortality	0.49%/ 2.0%	1.4%	2.8%	2.1%	4.6%	0.3%
Complete occlusion	77%/ 67% (2-14.5mo)	75.1% (7-12mo) 86.6% (>12mo)	80.4% (NA)	81% (9-18mo)	73.4% (6-12mo)	75.7% (7mo)
In-stent stenosis			38.0%			8.1%

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Interv Neuroradiol 2024 Jul 25

Trapping

18 YOF Dizziness, 2012

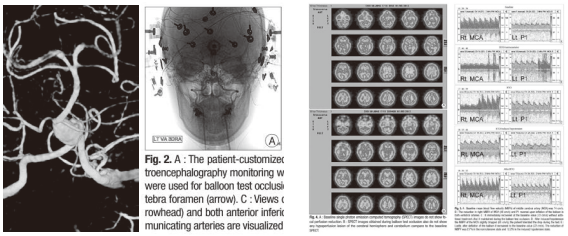
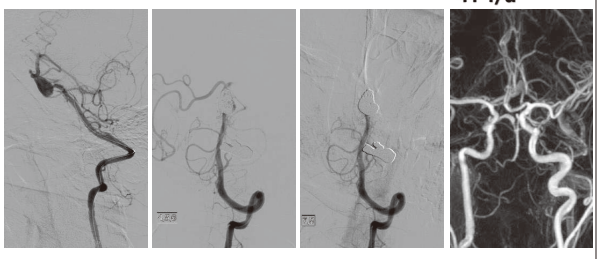


Fig. 2. A : The patient-customized troencephalography monitoring w were used for balloon test occlusi tebra foramen (arrow). C : Views o rowhead) and both anterior inferio municating arteries are visualized

Trapping

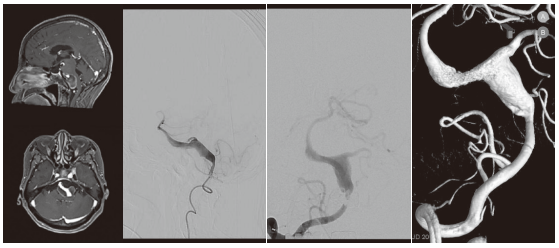
2012.01.09 Trapping after BTO

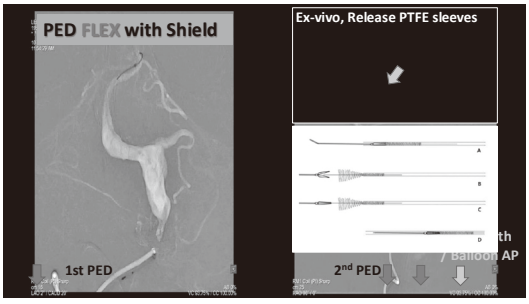
4Y f/u

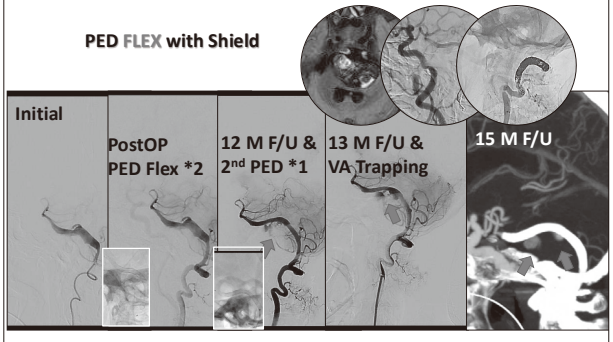


PED FLEX with Shield

70 YOF Mass effect







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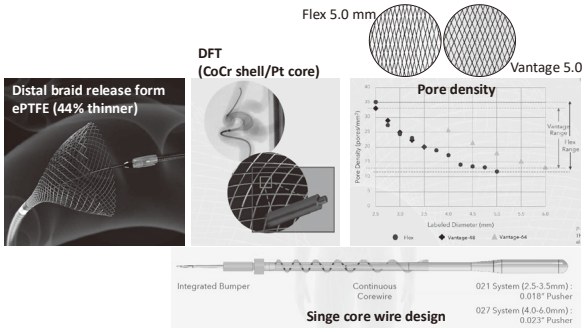
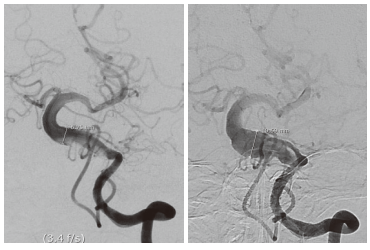


PED Vantage c Shield

49 YOM, ischemic stroke, 10years ago

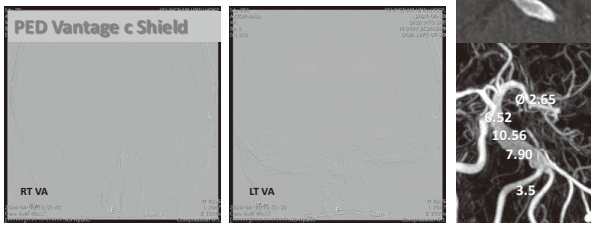


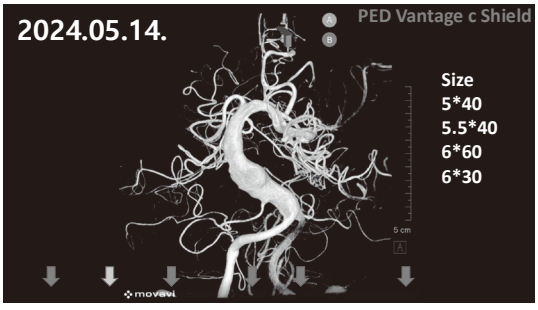
- **Diameter**
- **6.75-> 10.69mm**
- **Pre. Aspirin/Plavix 7days**
- **P2Y12 5%/PRU 167**

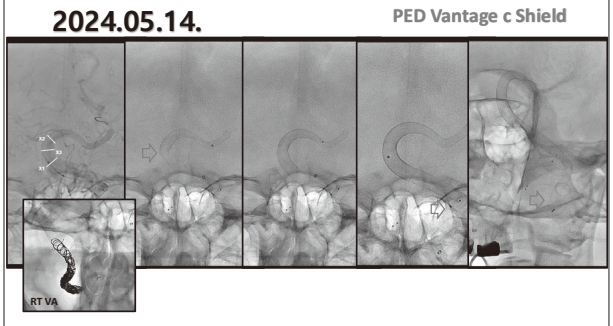
✓**Asp 100/Effient 30mg loading (+)**
✓**Aspirin 100mg+Effient 10mg**

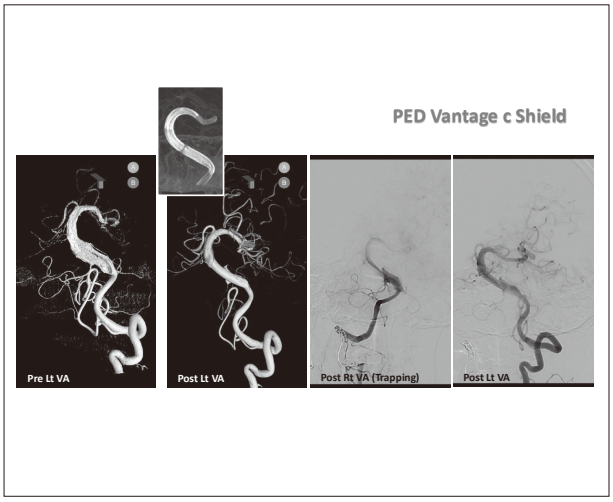
- **Steroid iv/po 7days**

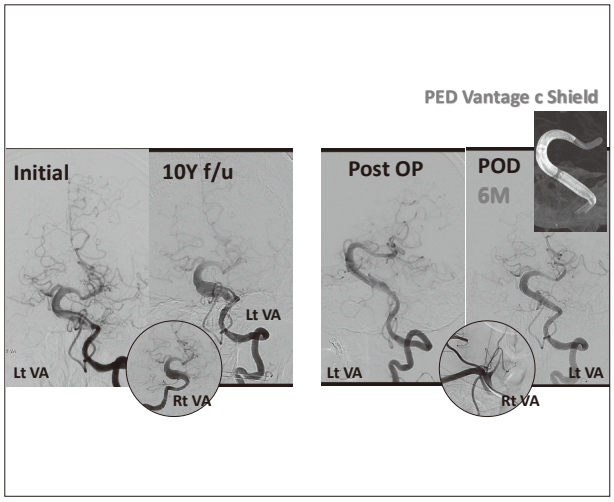
2024.04.30 49 YOM (10Y later)

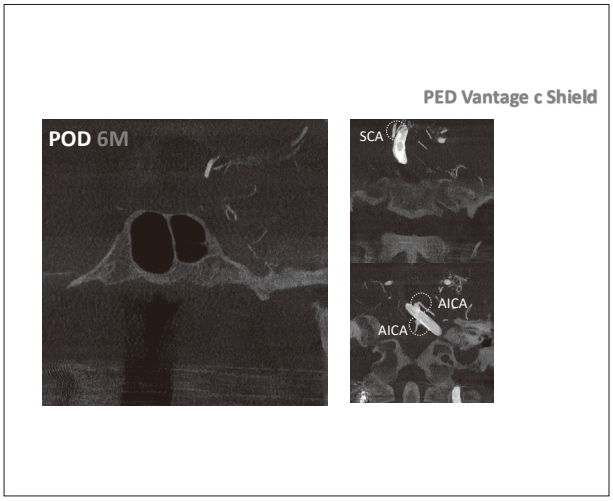


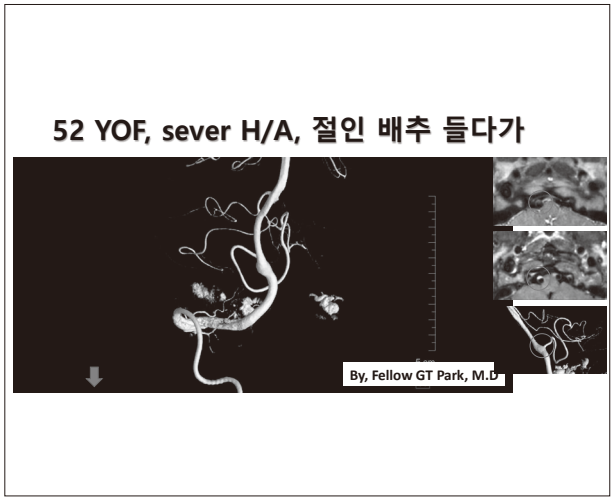


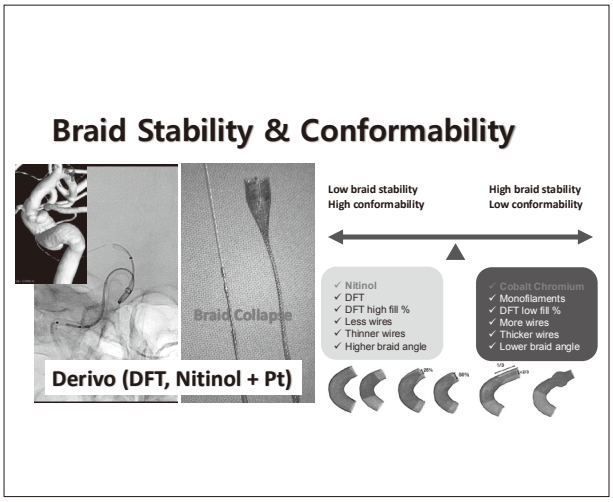


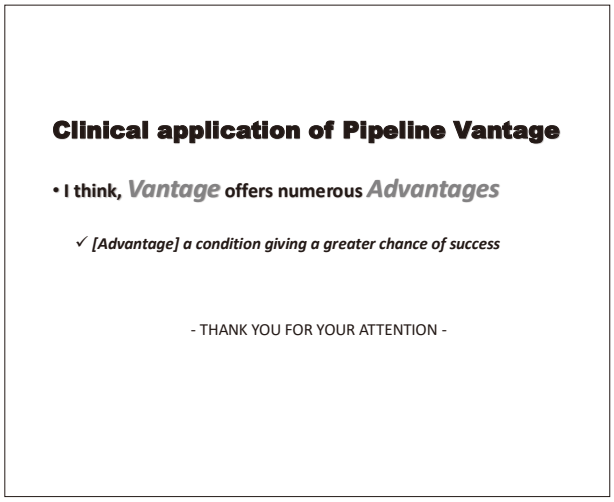

PED Vantage c Shield
Pre Lt VA
Post Lt VA
Post Rt VA (Trapping)
Post Lt VA


PED Vantage c Shield
Initial
10Y f/u
Lt VA
Rt VA
Post OP
POD
6M
Lt VA
Lt VA
Rt VA


PED Vantage c Shield
POD 6M
SCA
AICA
AICA

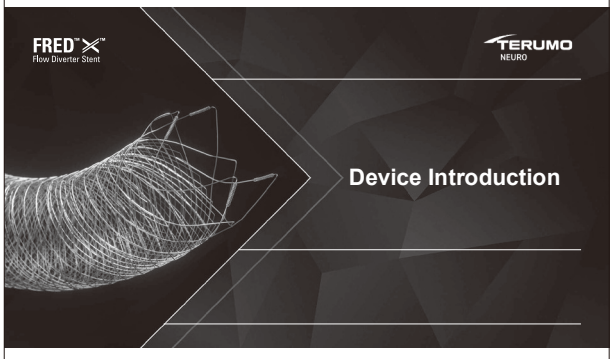

52 YOF, sever H/A, 절인 배추 들다가
By, Fellow GT Park, M.D

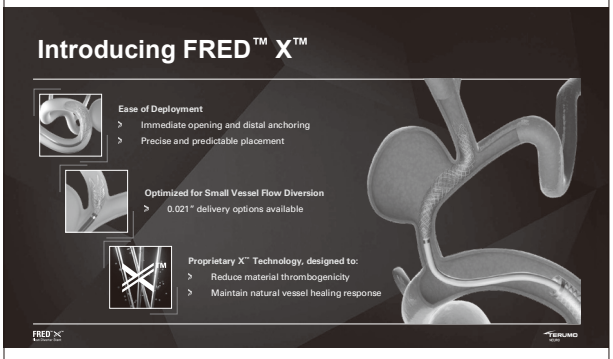

Braid Stability & Conformability
Braid Collapse
Derivo (DFT, Nitinol + Pt)
Low braid stability
High conformability
High braid stability
Low conformability
✓ Nitinol
✓ DFT
✓ DFT high fill %
✓ Less wires
✓ Thinner wires
✓ Higher braid angle
✓ Cobalt Chromium
✓ Monofilaments
✓ DFT low fill %
✓ More wires
✓ Thicker wires
✓ Lower braid angle

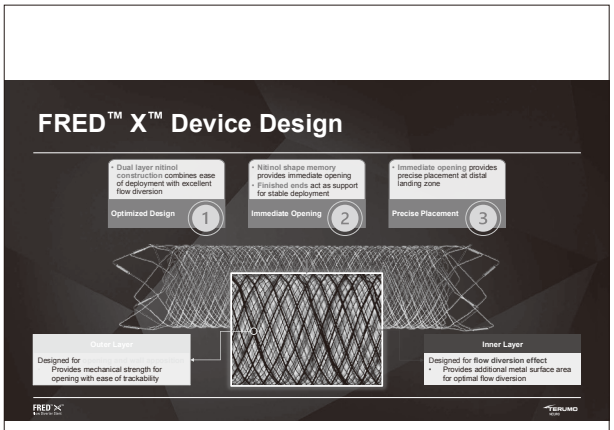

Clinical application of Pipeline Vantage
• I think, Vantage offers numerous Advantages
✓ [Advantage] a condition giving a greater chance of success
- THANK YOU FOR YOUR ATTENTION -

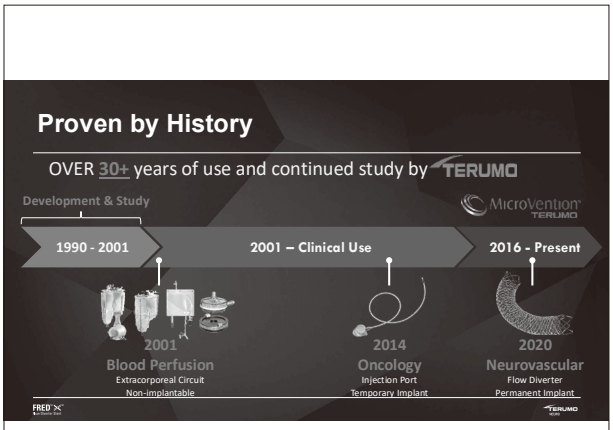
Introduction of FRED X

이철규
테루모 뉴로

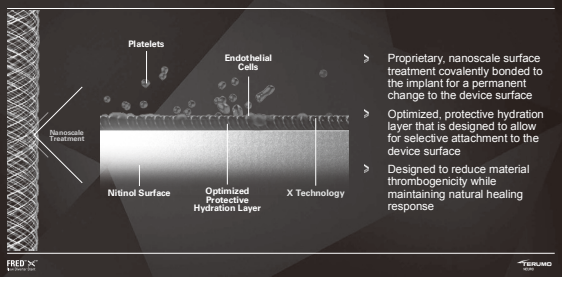








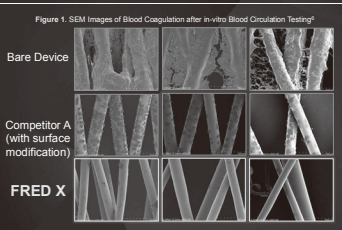
What is X™ Technology?



- Proprietary, nanoscale surface treatment covalently bonded to the implant for a permanent change to the device surface
- Optimized, protective hydration layer that is designed to allow for selective attachment to the device surface
- Designed to reduce material thrombogenicity while maintaining natural healing response

Reduction of Thrombogenicity

Figure 1. SEM Images of Blood Coagulation after in-vitro Blood Circulation Testing[2]

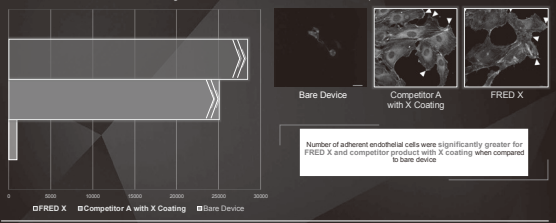


No thrombotic deposits were observed on FRED X for any donor.

Fewest blood cell-like deposits were found on FRED X surface.

Endothelial Cell Growth

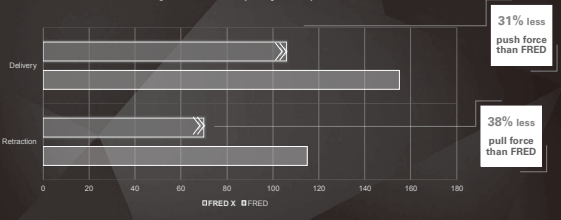
Figure 2. Number of Endothelial Cells Adhered to Each Sample



Number of adherent endothelial cells were **significantly greater** for FRED X and competitor product with X coating when compared to bare device

Improved Pushability

Figure 3. In-vitro Trackability Testing on Delivery & Retraction Forces [14]



31% less push force than FRED

38% less pull force than FRED

[1]Data on file at MicroVention.

FRED™ X

Flow Diverter Stent

TERUMO NEURO

THANK YOU.

FRED™ X System Product Indications:
The Flow Re-Direction Endoluminal Device (FRED) System is indicated for use in the internal carotid artery from the petrous segment to the terminus for the endovascular treatment of adult patients (22 years of age or older) with wide-necked (neck width ≥ 4 mm or dome-to-neck ratio < 2) saccular or fusiform intracranial aneurysms arising from a parent vessel with a diameter ≥ 2.0 mm and ≤ 5.0 mm.

Contraindications:
Patients with known hypersensitivity to nickel-titanium
Patients in whom angiography demonstrated inappropriate anatomy that does not permit passage or deployment of the FRED X System
Patients in whom anticoagulant, antiplatelet therapy or thrombolytic drugs are contraindicated

For complete indications, contraindications, potential complications, warnings, precautions, and instructions, see instructions for use (IFU provided in the device).

For Professional Use Only
Rx Only: Federal (FDA) law restricts this device to sale by or on the order of a physician.

MicroVention Worldwide
Innovation Center
35 Enterprise
Aliso Viejo, CA 92656 USA
Customer Service 1.800.990.8356
Web microvention.com

Clinical application of FRED-X

박석규
순천향대

The use of Flow Diverters (FDs) in the treatment of intracranial aneurysms has become an established treatment option for many aneurysms. The mechanism of operation of FDs is based on the use of a tightly woven mesh stent structure to divert flow through the aneurysm within the target vessel and eventually occlude the aneurysm. Compared to conventional intracranial stents, the relatively high metal coverage of the vessel wall can lead to thrombosis during and after FD treatment. This is considered a fatal complication that can lead to distal thromboembolism and stent occlusion, resulting in ischemic stroke.

One of the emerging trends in FD treatment is the use of FDs with specific antithrombotic coatings, which aim to reduce the risk of these potentially harmful complications. The Flow-Redirection Intraluminal Device (FRED; Terumo Neuro) is one of the most widely used FDs worldwide. The safety and efficacy of this device have been demonstrated in numerous studies over the past few years. Following the publication of the pivotal clinical trial results for FRED, it received US FDA approval in 2020. The recently introduced FRED X is a new version of FRED, and what sets this successor apart is its application of a specific antithrombotic surface treatment called X-technology to the stent.

In this presentation, we would like to share our experience using FRED-X, which has just been introduced in Korea.

2024
대한뇌혈관내치료의학회
정기학술대회 및 총회

Theme **Stay Strong Together**

일시: **2024년 11월 29일 (금)**
장소: **인천 파라다이스시티호텔 그랜드볼룸**

Plenary Session:

Partially Thrombosed Giant Aneurysm

(13:30-14:40)

좌장: **권오기** (서울대)
김성림 (가톨릭대)

Pathophysiology of Partially Thrombosed Giant Aneurysm

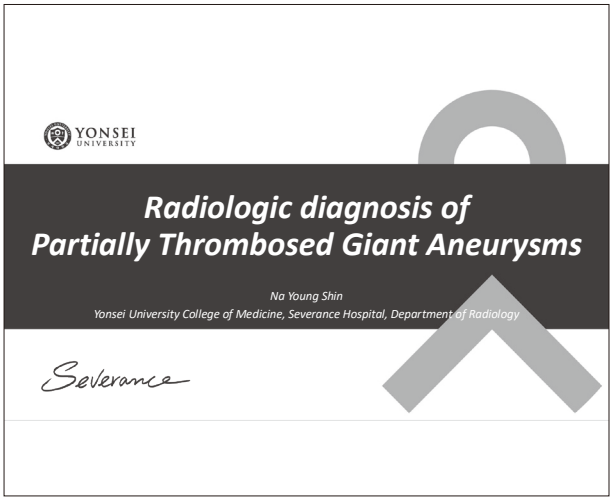
강현승
서울대

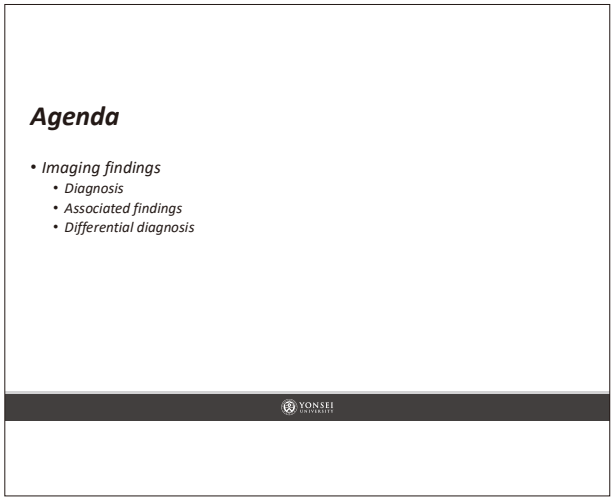
A partially thrombosed giant aneurysm (PTGA) is a rare, complex aneurysm with a solid mass and organized intraluminal thrombus. PTGAs have a different natural history than saccular aneurysms, and they can continue to grow even after being excluded from the flow.

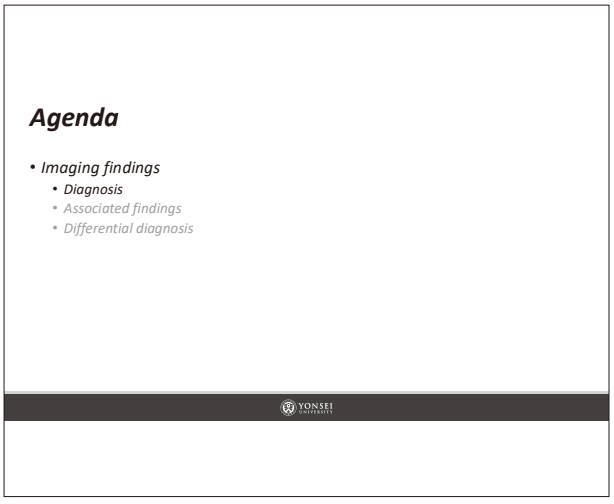
Histological examinations of a thrombosed giant aneurysm demonstrate more recent hemorrhage between old thrombus and the aneurysm wall with clefts of fresh blood present, indicative of a dissection of the aneurismal wall by blood flow. Intrathrombotic vascular channels have endothelial lining and proliferating smooth muscle cells. A proliferation of newly formed capillaries within the thrombus of the aneurysm might be the cause of the intramural hemorrhage that lead to subsequent aneurysm growth. Macrophages are present in the aneurysm wall, especially near the periphery of the thrombus. Macrophages positive for a key enzyme in the inflammatory pathway, i.e. the 5-lipoxygenase (5-LO), are found to be localized to the adventitia of diseased arteries in areas of neoangiogenesis and that these cells constitute a main component of aneurysms. This adventitial inflammation leads to a weakening of the media by release of proinflammatory factors that invade the media and lead to a dilation that subsequently results in aneurysm formation. Vasa vasorum also seem to play an important role in the development of PTGA.

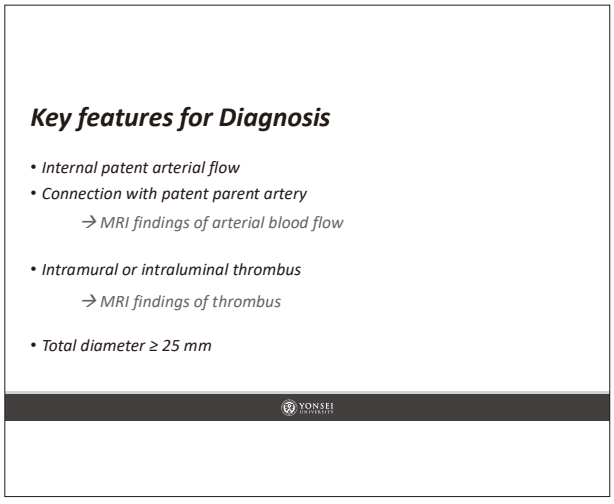
Radiologic diagnosis of Partially Thrombosed Giant Aneurysm

신나영
연세대 신촌세브란스 영상의학과

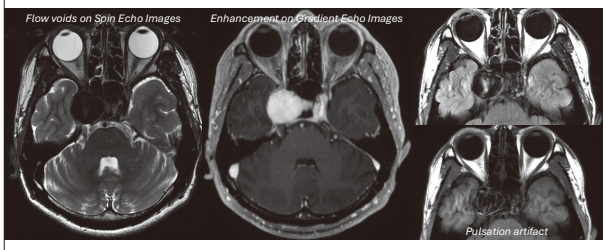




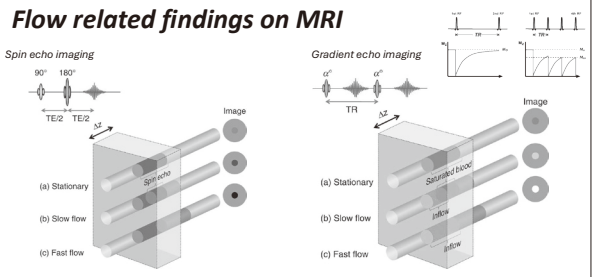




MRI findings of Arterial Blood flow

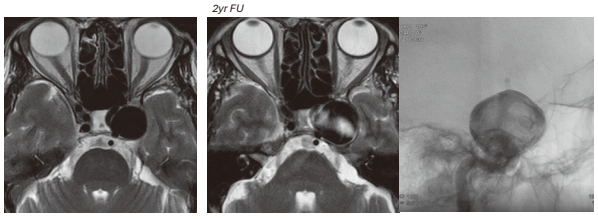


Flow related findings on MRI

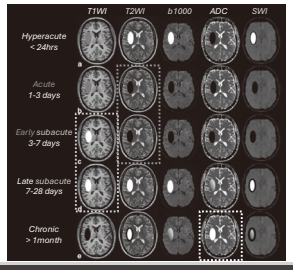


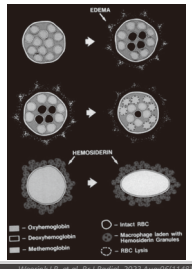
Donald W. et al. MRI from Picture to Proton

Flow artifact



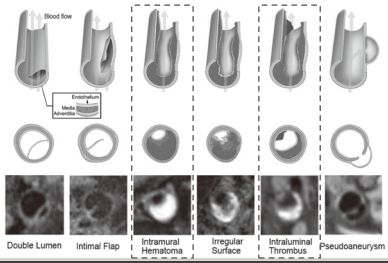
Hematoma evolution on MRI





Weerink LB, et al. Br J Radiol. 2023 Aug;96(1148):20220304.
Grossman RI, et al. Radiographics. 1988 May;8(3):441-54.

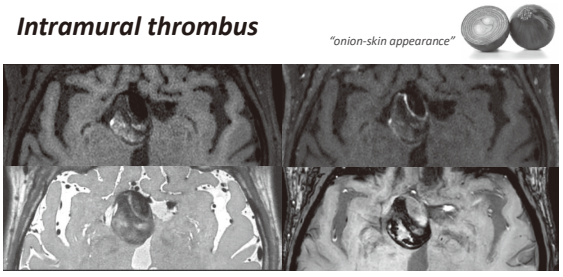
Intramural vs. intraluminal thrombus



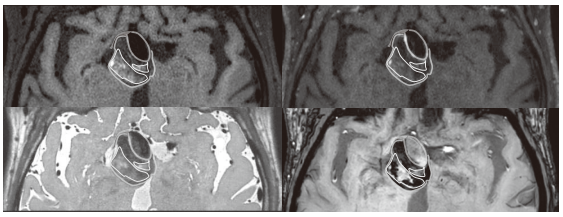
Wu Y. et al. Stroke. 2019 Nov;50(11):3101-3107

Intramural thrombus

"onion-skin appearance"



Intramural thrombus



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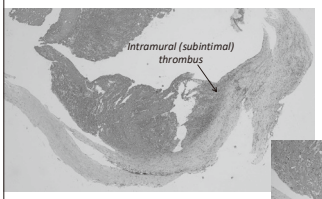

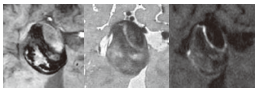

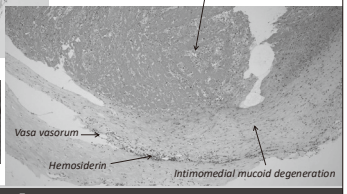

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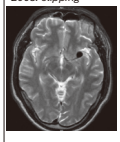
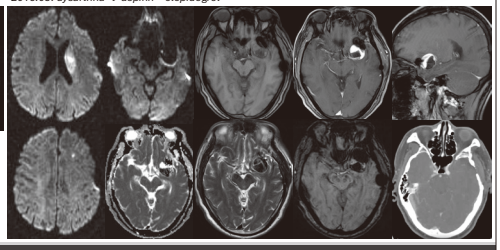
Intraluminal thrombus

2003. clipping



2019.05. dysarthria → aspirin + clopidogrel



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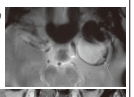
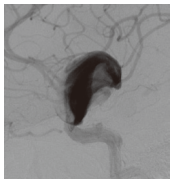
Intraluminal thrombus

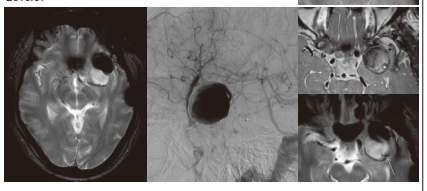
2019.10



2019.06



2019.07



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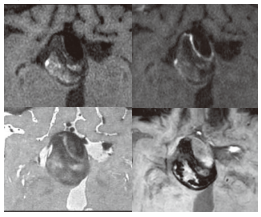
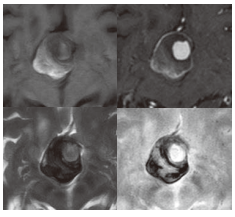
Intramural thrombus

2022.04



2022.08



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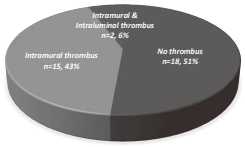
Partially thrombosed aneurysm

GIANT ANEURYSM IN SEVERANCE HOSPITAL
N=35, 2010-2024



"Aneurysm with intramural thrombus"

YONSEI UNIVERSITY

Krings T, et al. Interv Neuroradiol. 2007 Jun;13(2):117-26.

Agenda

- Imaging findings
  - Diagnosis
  - Associated findings
  - Differential diagnosis

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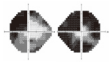
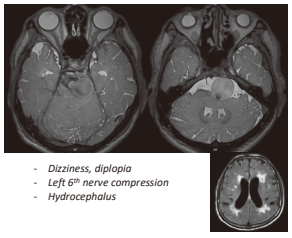
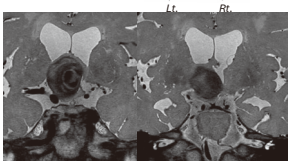
Mass effect





- Dizziness, diplopia
- Left 6th nerve compression
- Hydrocephalus



- Visual field defect
- Optic chiasm/tract compression and edema
- Hydrocephalus

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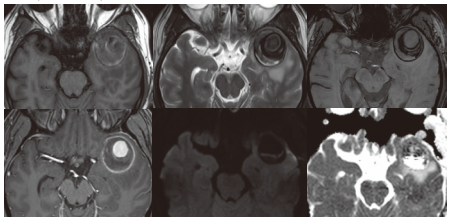
Perianeurysmal edema

M/33, GTC seizure, LOC



In Severance hospital

- all aneurysms with perianeurysmal edema (n=7) had intramural/intraluminal thrombus and wall enhancement
- seizure (n=1), VFD (n=1), VFD and diplopia (n=1), weakness (n=3), headache (n=1)

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Perianeurysmal Edema

- Associated with acute symptom development
- Possible mechanisms
  - Mass effect on brain parenchyma → venous system compression → vasogenic edema
  - Water hammer effect on adjacent brain structures
  - Thrombosis → triggering and boosting adventitial inflammation → promoting neoangiogenesis → increased supply of inflammatory cells to the artery wall → increased BBB permeability → vasogenic edema

Onafrj V, et al. Neurointervention. 2021 Mar;16(1):70-77.

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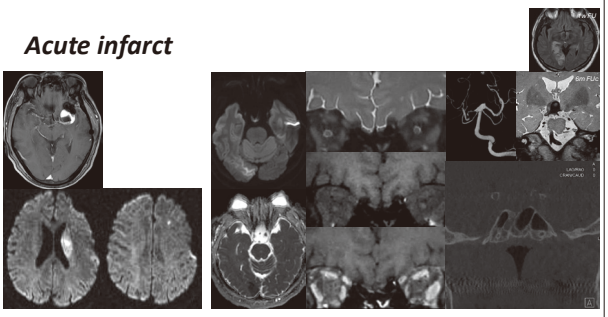
Acute infarct



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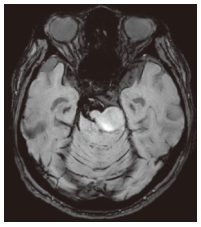
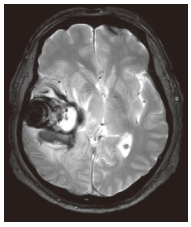
SAH / ICH





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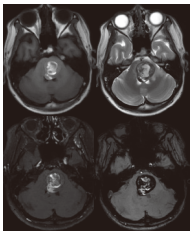
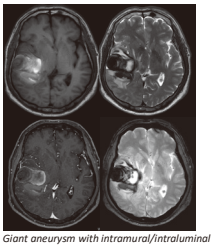
Agenda

- Imaging findings
  - Diagnosis
  - Associated findings
  - Differential diagnosis

Differential diagnosis

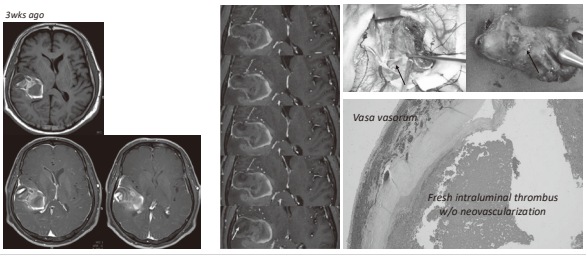


Cavernous malformation

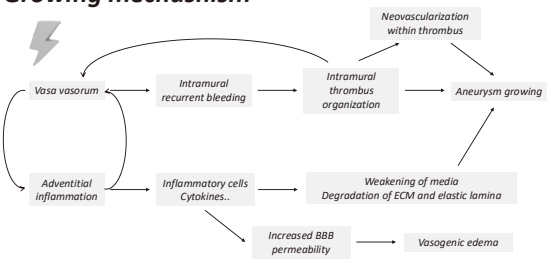


Giant aneurysm with intramural/intraluminal thrombus and parenchymal hematoma

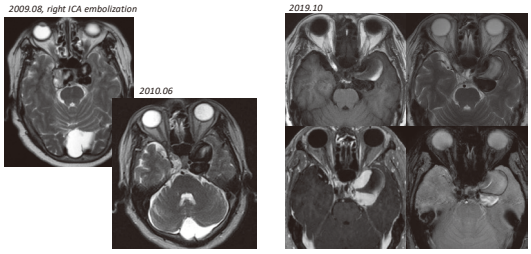
Find the connection with the artery!!



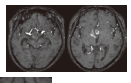
Growing mechasnism



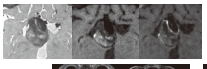
Growing aneurysm with intramural thrombus



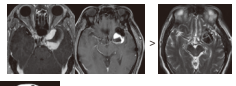
Recommended imaging sequences



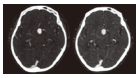
- Connection with parent artery
  - TOF MRA
  - Thin section 2D or 3D black blood images (PD, T2, T1WI)
  - Thin section 2D or 3D gradient echo CE T1WI
  - CTA



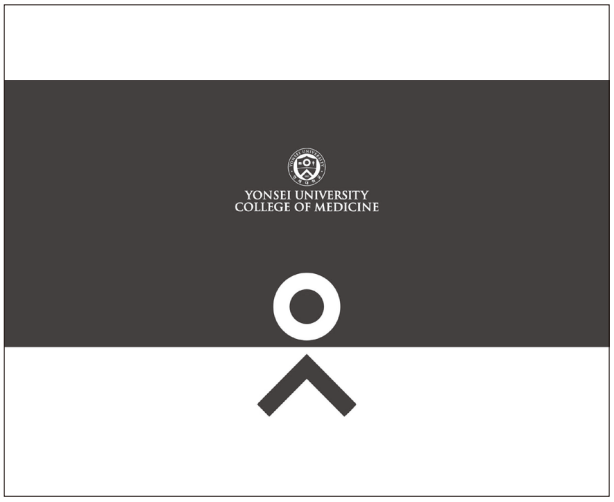
- Intramural thrombus
  - T1WI (TOF), T2WI (FLAIR), GRE/SWI



- Patent aneurysmal lumen / intraluminal thrombus
  - Gradient echo CE T1WI
  - CTA

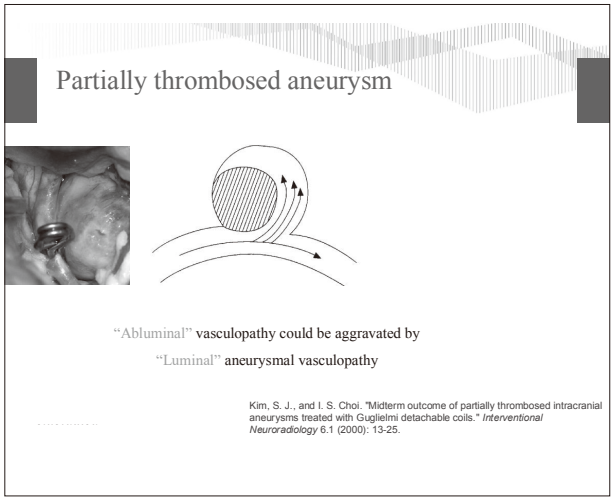


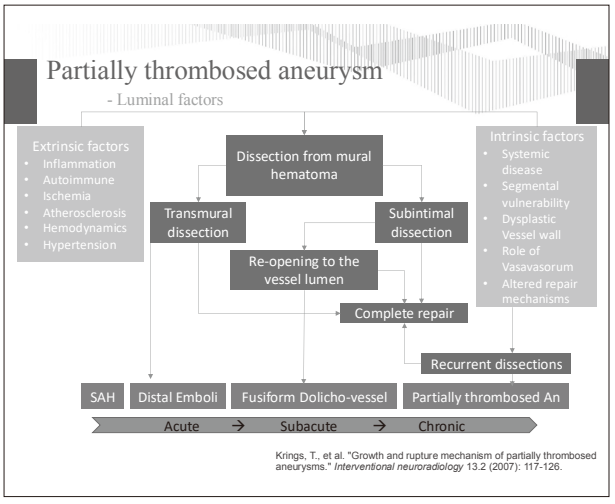
- Vasa vasorum/adventitial inflammation
  - CE T1WI
  - FLAIR (T2WI)
  - Delayed enhanced CT

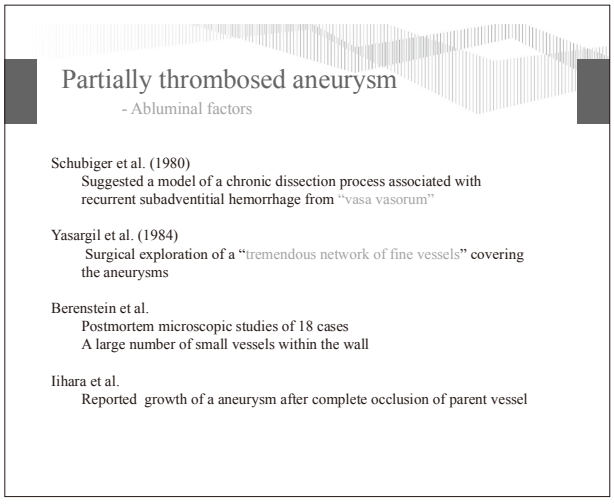

YONSEI UNIVERSITY
COLLEGE OF MEDICINE

Endovascular treatment of Partially Thrombosed Giant Aneurysm

이종민
울산대





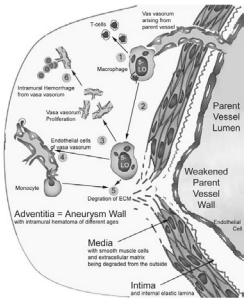


Neuroradiology (2005) 47: 931–937
DOI 10.1007/s00234-005-1438-9

INTERVENTIONAL NEURORADIOLOGY

Timo Krings
Ronie L. Piske
Pierre L. Lasjaunias

Intracranial arterial aneurysm vasculopathies: targeting the outer vessel wall

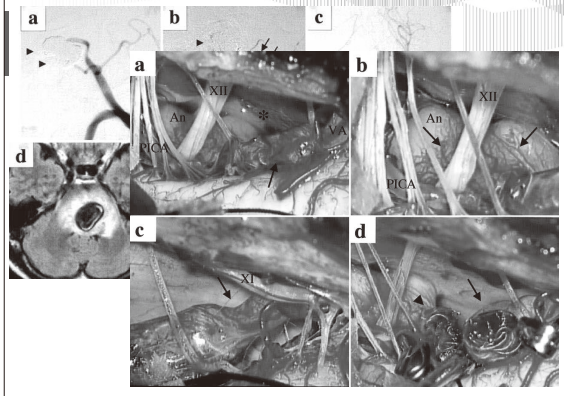


"Luminal" factors VS "Abluminal" factors

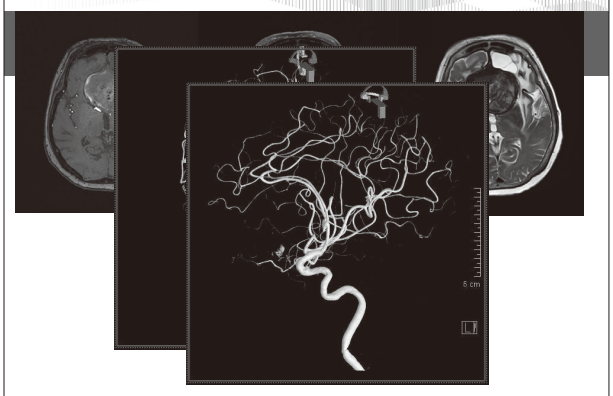
3 Stages

1. Abluminal damage is reversible by reducing luminal stress (intra-aneurysmal flow disruption)
2. Abluminal damage is reversible by Parent Artery Occlusion (PAO)
3. Abluminal damage is irreversible, continue to grow even after PAO "aneurysmectomy" is recommended

Abe, Toshi, et al. "Partially Thrombosed Vertebral Artery Aneurysm With Wall Enhancement Treated by Stent-Assisted Coil Embolization—Case Report—." *Neurologia medico-chirurgica* 51.6 (2011): 431-433.



Iihara, Koji, et al. "Continued growth of and increased symptoms from a thrombosed giant aneurysm of the vertebral artery after complete endovascular occlusion and trapping: the role of vasa vasorum: case report." *Journal of neurosurgery* 98.2 (2003): 407-413.

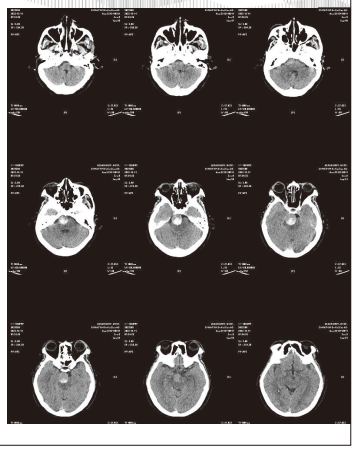


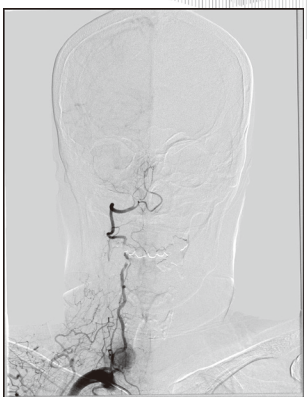
"Luminal" factors VS "Abluminal" factors

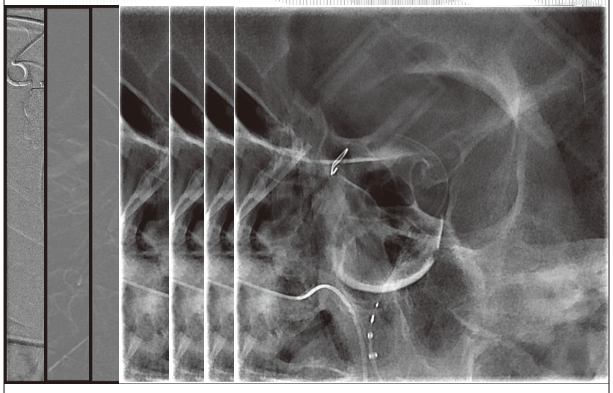
- Coil embolization
- Parent artery occlusion
- Flow diversion
- Flow disruption
- Flow redirection

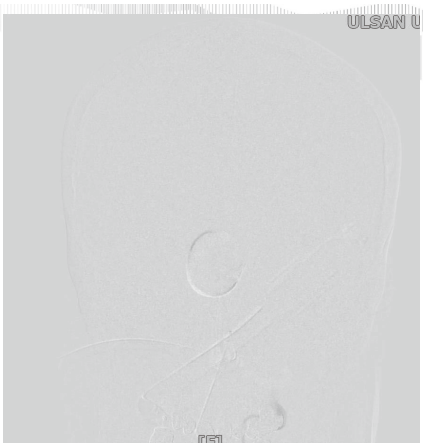
"Vasa vasorum"
- Endothelialization using Stent
- Parent artery occlusion
- Super-selective embolization (if possible)
- Surgery (advanced stage)

Case 1
68/F, Dysarthria

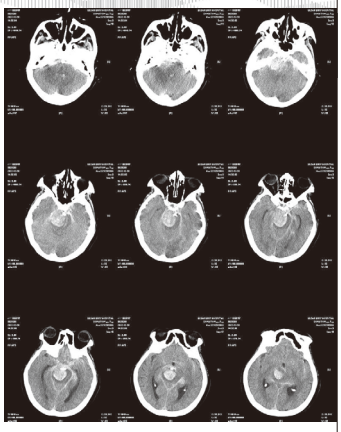








POD 19 days

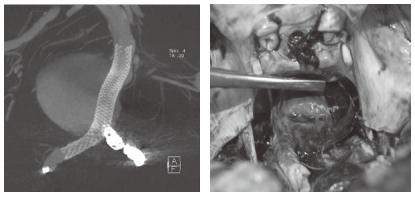


Hemorrhagic stroke

CASE REPORT

Rupture of giant vertebrobasilar aneurysm following flow diversion: mechanical stretch as a potential mechanism for early aneurysm rupture

Benjamin Fox,[1] William Edward Humphries,[2] Vinodh T Doss,[3] Daniel Hoit,[4] Lucas Elijovich,[5] Adam S Arthur[6]

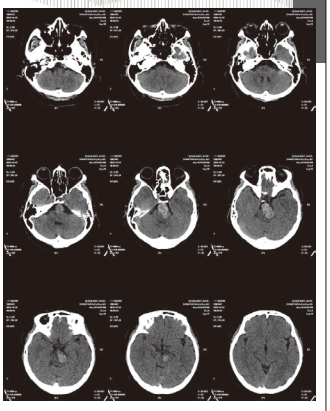


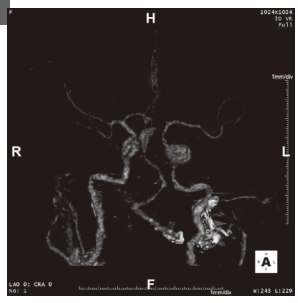
~~"Luminal" factors~~ VS "Abluminal" factors

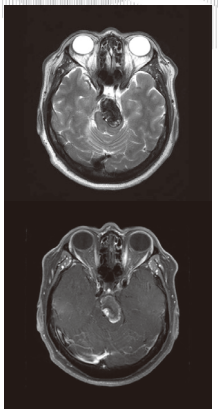
- Coil embolization
- Parent artery occlusion
- Flow diversion
  "Fail to blocking inflow"
- Flow disruption
- Flow redirection

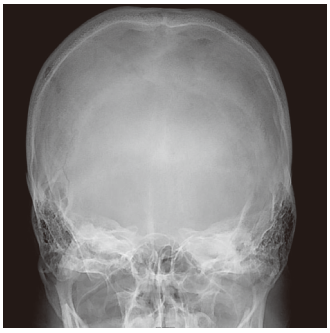
"Vasa vasorum"
- Endothelialization using Stent
- Parent artery occlusion
- Super-selective embolization (if possible)
- Surgery (advanced stage)

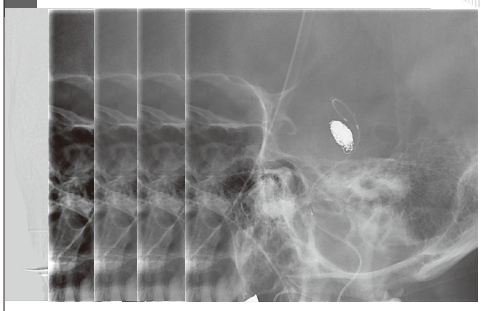
Case 2
53/F, Rt.arm weakness











8yrs f/u angiography

"Luminal" factors VS "Abluminal" factors

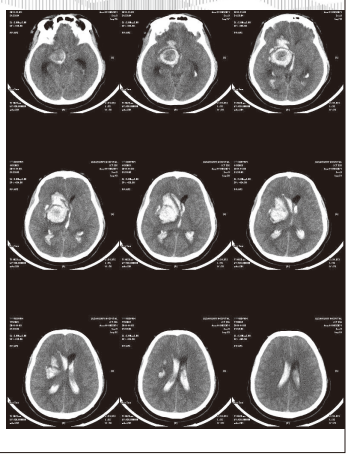
- Coil embolization
- Parent artery occlusion
- Flow diversion
- Flow disruption
- Flow redirection

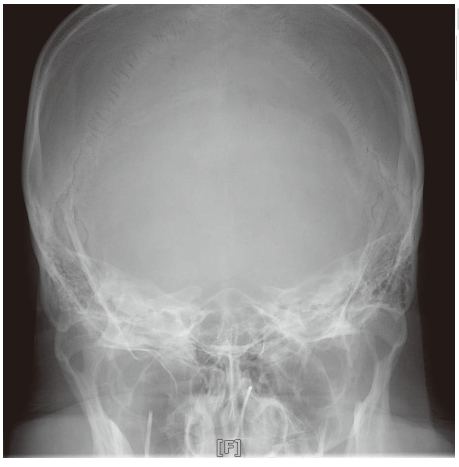
"Vasa vasorum"

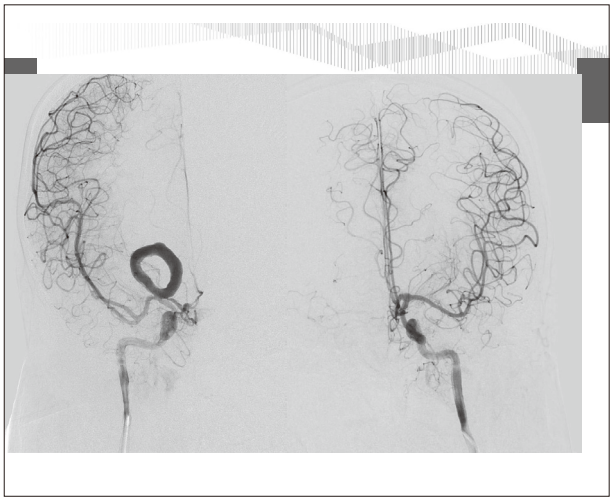
- Endothelialization using Stent
- Parent artery occlusion
- Super-selective embolization (if possible)
- Surgery (advanced stage)

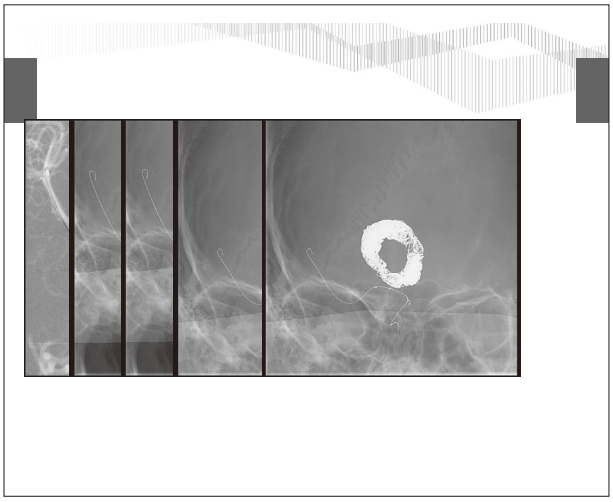
Case 3

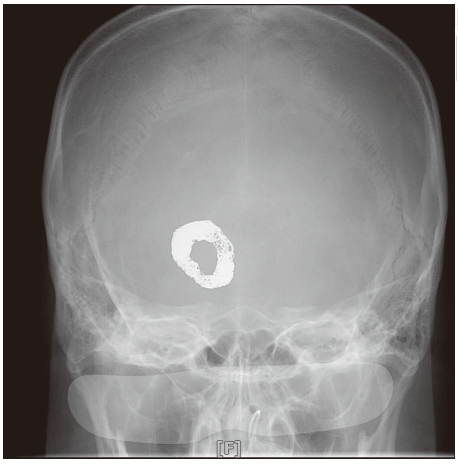
30/M, Altered mentality









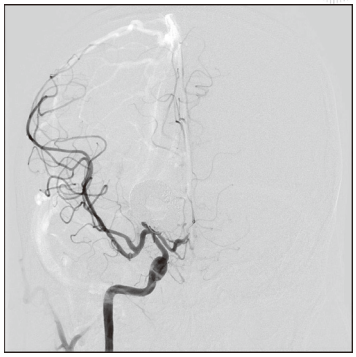


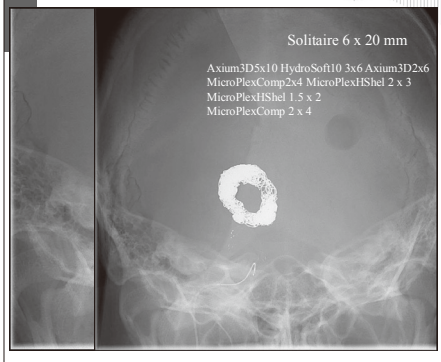
"Intraluminal" factors VS "Extraluminal" factors

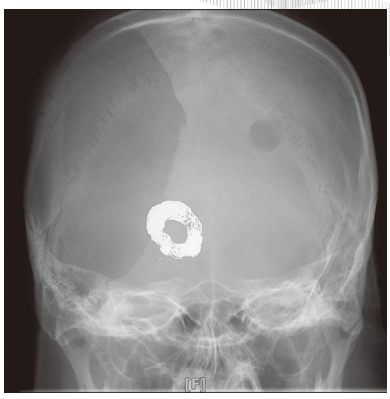
- Coil embolization
- Parent artery occlusion
- Flow diversion
- Flow disruption
- Flow redirection

"Vasa vasorum"
- Endothelialization using Stent
- Parent artery occlusion
- Super-selective embolization (if possible)
- Surgery (advanced stage)

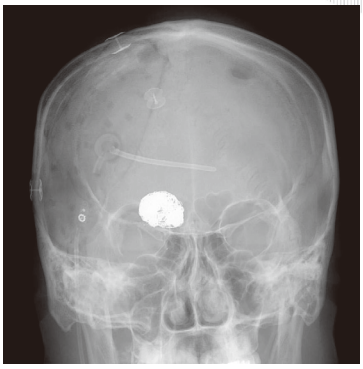
1 month f/u angiography



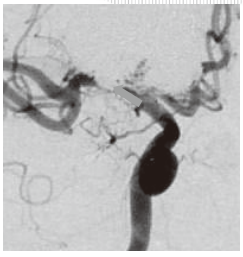




1 yr f/u angiography



9yr f/u enhanced MRA



"Adjunctive effect" for luminal factor

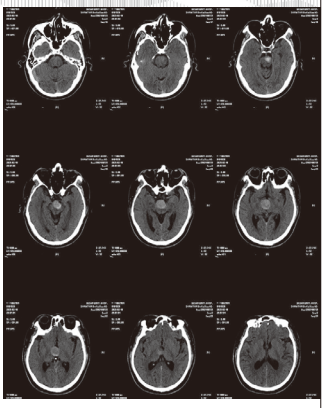
"Intraluminal" factors VS "Extraluminal" factors

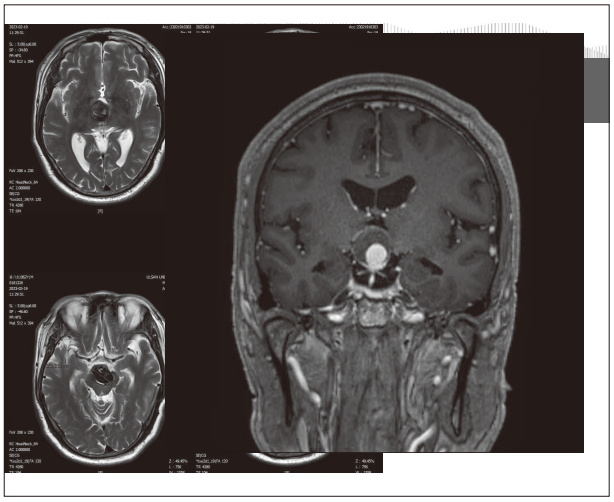
- Coil embolization
- Parent artery occlusion
- Flow diversion
- Flow disruption
- Flow redirection

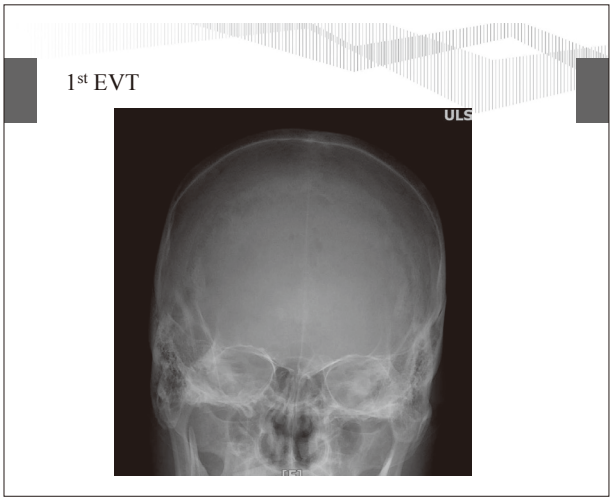
"Vasa vasorum"

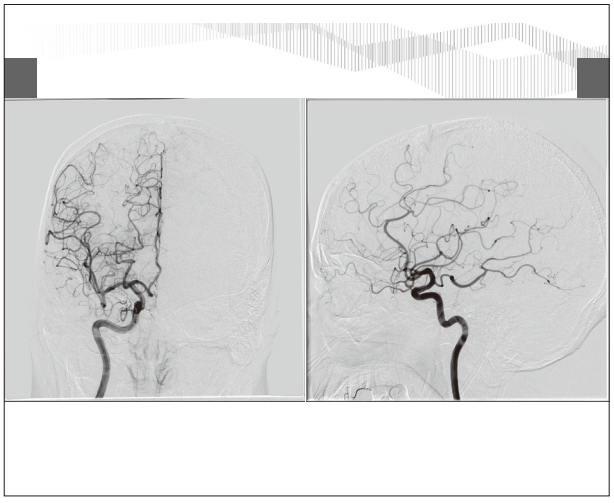
- Endothelialization using Stent
- Parent artery occlusion
- Super-selective embolization (if possible)
- Surgery (advanced stage)

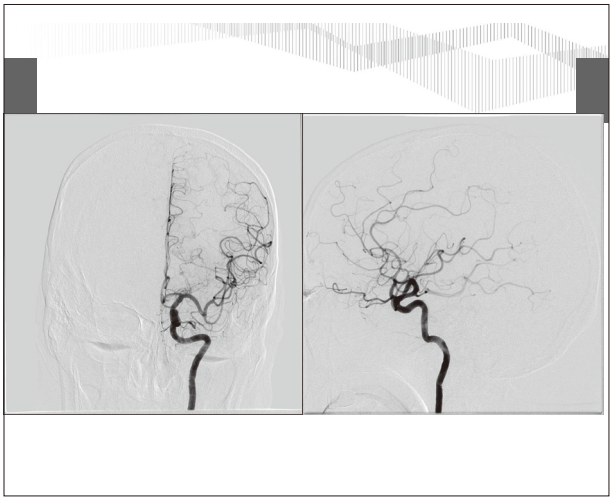
Case 4
60/M, Lt side motor weakness

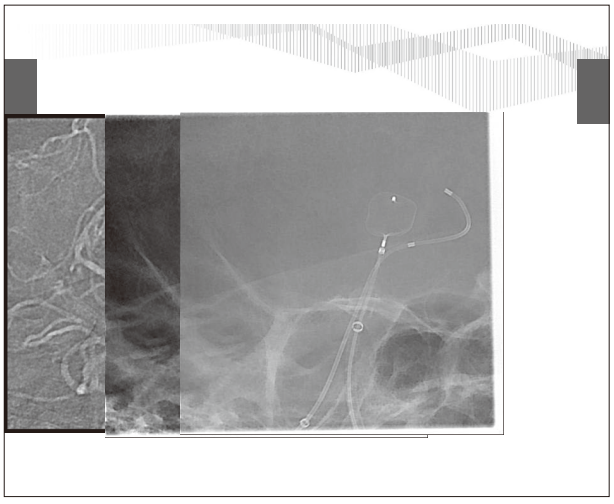


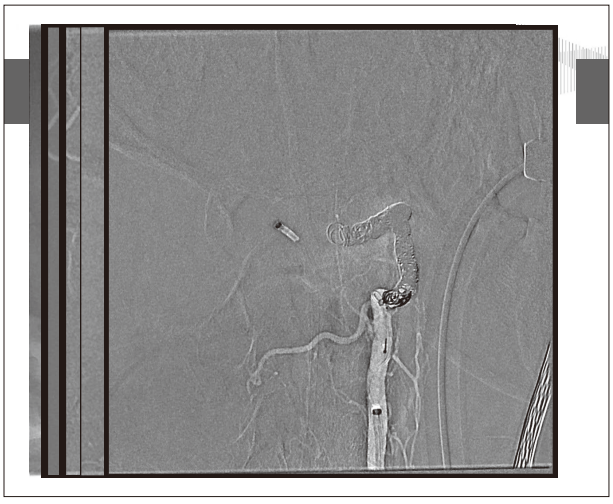



1st EVT









2nd EVT (2wks after 1st Tx)

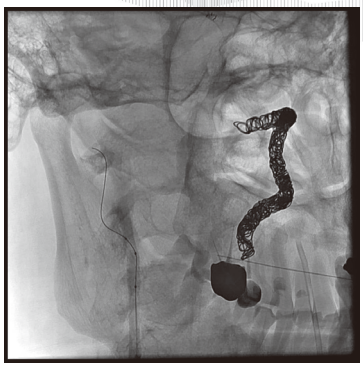
- Awake status
- Ready for IOM (intraoperative monitoring, SSEP, MEP)

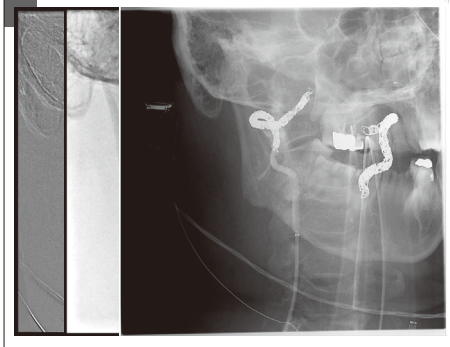
Treatment plan

1. Balloon occlusion Test
2. General anesthesia
3. Parent artery occlusion under IOM

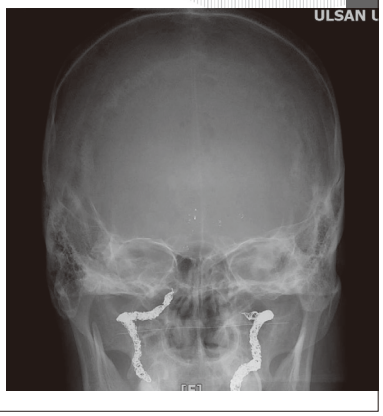
BOT for 15 min

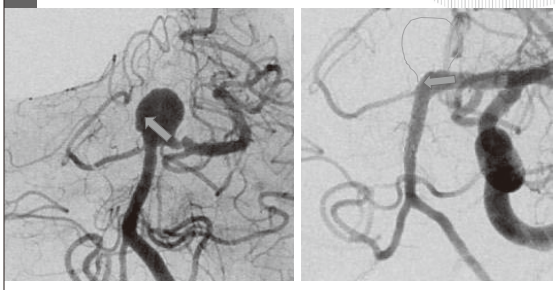
N/Ex : intact
no lateralizing sign





6m f/u TFCA





"Adjunctive effect" for luminal factor

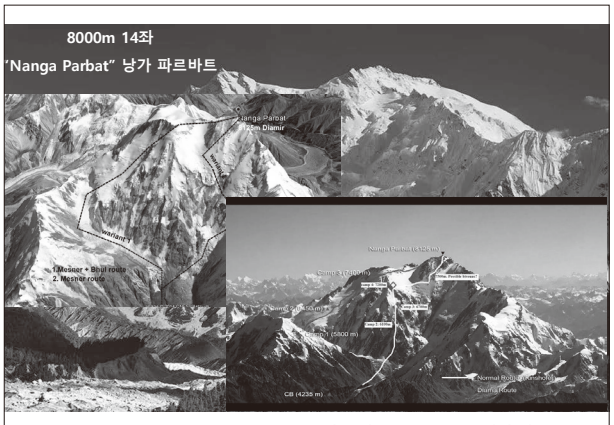
"Intraluminal" factors VS "Extraluminal" factors

- Coil embolization
- Parent artery occlusion
- Flow diversion
- Flow disruption (WEB)
- Flow redirection (Stent, PAO)

"Vasa vasorum"
- Endothelialization using Stent
- Parent artery occlusion
- Super-selective embolization (if possible)
- Surgery (advanced stage)

Conclusion

- The pathophysiology and effective treatment of partially thrombosed aneurysm have not been established
- It is crucial to consider both luminal and abluminal factors in treatment of partially thrombosed aneurysms
- It is important how you achieve control over the pathologies, not just confined to use of device



등반중 사망률 1990년대 이전 : 77%
현재 : 22.3%

Thank you for your attention !!!

2024
대한뇌혈관내치료의학회
정기학술대회 및 총회

Theme **Stay Strong Together**

일시: **2024년 11월 29일 (금)**
장소: **인천 파라다이스시티호텔 그랜드볼룸**

학술상 및 연구비지원 학술연구발표

(15:00-15:50)

좌장: 김범태 (순천향대)
황교준 (분당제생병원)

명지성모병원 남천학술상

Translation research in cerebrovascular disease

오재상
가톨릭대

에스포항병원 학술상

Comparison of Neuroform Atlas stent assisted coiling and coiling alone in ruptured intracranial aneurysms: A propensity score matching analysis *(Neurosurgery 92(3):p 607-614, March 2023)*

이호준
순천향대

蔦宅(위택) 권도훈 명예회장 학술상

New Morphological Parameter for Intracranial Aneurysms and Rupture Risk Prediction based on Artificial Neural Network *(J NeuroIntervent Surg 2023;15:e209–e215)*

조광천
연세대

COMparision of clinical and radiological outcomes between suction asPiration method and combination mEthod of intra-arterial Therapy (IAT) in largE artery occlusion(COMPETE trials): Prospective Multicenter Trials: Interim Results of COMPETE Trials

Sung-Chul Jin[1], Yunhyeok Choi[1], Joonwon Lee[2], Hae-Won Koo[3], Duck-Ho Goh[4], Sang-Young Kim[4], Won Deog Seo[4], Yeon-Ju Choi[5], YoungJin Lee[6], YoungJin Jung[7], Seung Hun Sheen[8], Chang-Hyun Kim[9], Eun-Oh Jeong[10], Hyon-Jo Kwon[10], Dongkeun Hyun[11], yu shik shim[11], Jinwoo bae[11], Soon Chan Kwon[12], Jong Min Lee[12]

[1]Departement of Neurosurgery, [2]Department of Neurology, Inje university, Haeundae Paik Hospital,
[3]Department of Neurosurgery, Ilsan Paik Hospital
[4]Department of Neurosurgery, Daegu Goodmorning Hospital
[5]Department of Neurosurgery, Pohang Stroke and Spine Hospital,
[6]Department of Neurosurgery, Pohang SM christianity Hospital
[7]Department of Neurosurgery, Yeungnam University Medical Center
[8]Department of Neurosurgery, Bundang CHA Hospital
[9]Department of Neurosurgery, Keimyung University Dongsan Hospital
[10]Department of Neurosurgery, Chungnam National University Hospital
[11]Department of Neurosurgery, Inha University Hospital
[12]Department of Neurosurgery, Ulsan university hospital

Objective: Comparision of clinical and radiological outcomes between suction aspiration method and combination method of intra-arterial Therapy (IAT) in large artery occlusion(COMPETE) is a prospective multi-centered randomization trial evaluating the non-inferiority of successful recanalization using suction aspiration as primary modality to that of combination method. This interim analysis reports outcomes for the first 103 patients enrolled in COMPETE trial.

Methods: Primary endpoint is a successful recanalization rate after thrombectomy including first pass recanalization rate. Secondary endpoints include failure rate, and procedural morbidity and mortality.

Result: First pass recanalization rate was not significant different between suction aspiration and combination modality (n=21 (40.4%) vs. n=28 (54.9%), p=0.201). total number of thrombectomy trials was not significant different between suction aspiration and combination modality (median [IQR];n=2 [1-2.3] vs n=1 [1-2]). Multivariable logistic regression analysis showed that first pass recanalization was independently associated with stroke etiology of cardioembolism (adjusted OR, 3.04 [95% CI, 1-9.27]; p=0.05).

Conclusion: These interim results provide preliminary evidence of non-inferiority of suction aspiration to combination method in large artery occlusion feasible to both modalities including suction aspiration and combination method

2024
대한뇌혈관내치료의학회
정기학술대회 및 총회

Theme **Stay Strong Together**

일시: **2024년 11월 29일 (금)**
장소: **인천 파라다이스시티호텔 그랜드볼룸**

Free Paper II. Ischemia & etc.

(16:00-17:20)

좌장: **권현조** (충남대)
　　김영우 (가톨릭대)

FP2-1

Pan-Immune-Inflammation Value Predict Delayed Cerebral Ischemia in Patients with Aneurysmal Subarachnoid Hemorrhage

Ho Jun Yi, Dong-Seong Shin, Bum-Tae Kim

Department of Neurosurgery, Soonchunhyang University Bucheon Hospital

Objective: Inflammatory reaction and immune dysregulation are known as components contributing to delayed cerebral ischemia (DCI) in patients with following aneurysmal subarachnoid hemorrhage (aSAH). The objective of this study was to investigate the role of pan-immune-inflammation value (PIV) as a novel comprehensive inflammatory marker in predicting the DCI development following aSAH.

Methods: A total of 1028 participants with aSAH were enrolled. There were 296 patients with DCI and 732 patients without DCI. Various inflammatory markers were analyzed using peripheral blood sample obtained at admission. Receiver operating characteristic (ROC) analysis was performed to identify the optimal cutoff value of PIV for distinguishing DCI. Multivariate analysis was used to determine independent predictors for DCI.

Result: Mean PIV was significantly higher in the DCI (+) group than in the DCI (-) group (437.6 ± 214.7 vs 242.1 ± 154.7, P = 0.007). In ROC analysis, the optimal cutoff value of PIV was 356.7 for predicting DCI (area under the curve [AUC] 0.772, 95 % confidence interval [CI] 0.718–0.816; P < 0.001). Multivariate analysis showed that high Hunt-Hess grade (odds ratio [OR] 1.70, 95 % CI 1.38–2.22; P = 0.007), thick SAH (OR 1.82, 95 % CI 1.44–2.32; P = 0.005), and elevated PIV (≥356.7) (OR 1.42, 95 % CI 1.10–1.74; P = 0.013) were independent predictors of DCI after aSAH.

Conclusion: PIV is a potent predictor of DCI in patients with aSAH. Elevated PIV is associated with more DCI development. Thus, PIV has predictive value for DCI

FP2-2

Long-Term follow-up Outcome of Emergent Intracranial Stenting with 'Neuroform Atlas Stent' in Patients Underwent Mechanical Thrombectomy

Seung Yoon Song, Shin Ho Park, Sol Hooy Oh, Dong Hoon Lee, Jae Hoon Sung

Department of Neurosurgery, St. Vincent's Hospital, The Catholic University

Objective: Several stents have been used for rescue stenting after failure of mechanical thrombectomy (MT) for acute large artery occlusion. This study aimed to assess the efficacy of using the Neuroform Atlas stent for emergent intracranial stenting (ICS) in long-term follow-up.

Methods: Between January 2015 and December 2022, 89 patients underwent intracranial stenting (ICS) with prior Gateway balloon angioplasty following the failure of conventional mechanical thrombectomy (MT). During this period, 54 patients were treated with Neuroform Atlas stents and 21 with Enterprise stents. We analyzed the angiographic outcomes for both stent groups with short-term and long-term follow-ups.

Result: According to the findings from both stent groups, the recanalization success rate achieved approximately 90% (Neuroform Atlas 48/54, 88.9% vs. Enterprise 19/21, 90.5%, p=1.000). Among the patients who successfully recanalized, there were six cases in the Neuroform Atlas group and three in the Enterprise group with in-stent occlusion within 24 hours, with no statistical difference between the two groups (Neuroform Atlas 6/48, 13.0% vs. Enterprise 3/18, 16.7%, p=0.703). Although the results failed to reach statistical significance due to the high rate of follow-up loss, the radiologic evaluation at approximately one year indicated a good patency of around 80% in both groups (Neuroform Atlas 13/16, 81.3% vs. Enterprise 4/5, 80.0%, p=1.000).

Conclusion: Neuroform Atlas stenting is an effective rescue treatment for ICAS patients who have failed MT due to its high recanalization rate and acceptable long-term patency.

FP2-3

Stent Assisted Coil Embolization for High-riding Jugular Bulb Diverticulum for Symptomatic Pulsatile Tinnitus

Jaehyun Shim

Department of Neurosurgery, PMC General Hospital

Objective: Tinnitus is a common condition affecting daily life, with symptoms ranging from insomnia to hearing difficulties. Pulsatile tinnitus is often associated with vascular conditions at the skull base. In this case report, we present a patient with pulsatile tinnitus due to a high-riding jugular bulb diverticulum.

Methods: A 58-year-old male, who had undergone intracranial stenting of the right M1 segment for severe M1 stenosis 16 months prior, experienced worsening pulsatile tinnitus in his right ear. He reported that the tinnitus began immediately after the stenting procedure. His symptoms decreased when he applied firm pressure to his neck, compressing the common carotid artery, and worsened when he applied gentle pressure, compressing the internal jugular vein. Temporal bone CT and MR venography revealed a 7x8 mm jugular bulb diverticulum with middle ear protrusion on the right side.

Result: We planned stent-assisted coil embolization for treatment. A Neuron Max guiding catheter was advanced through the right distal internal jugular vein to the horizontal segment of the sigmoid sinus for stent delivery. A Precise 10/40 carotid stent was successfully placed over the acute angle between the jugular bulb and the sigmoid sinus using the Neuron Max catheter. The stent was deployed, and an SL-10 straight microcatheter was advanced through the stent struts into the jugular bulb diverticulum, where coil embolization was performed. The patient's symptoms resolved immediately without complications.

Conclusion: Jugular bulb diverticulum extending toward the middle ear can cause pulsatile tinnitus. Stent-assisted coil embolization of the jugular bulb diverticulum may be a valuable treatment option.

FP2-4

Rescue Stenting for Refractory Vertebro-Basilar Artery Occlusion : A Single Center Experience

Jae Ho Kim, Hak Sung Kim, Sang Woo Ha

Department of Neurosurgery, Chosun University Hospital, Gwangju, Korea

Objective: Intracranial atherosclerotic stenosis (ICAS) is one of the most common causes of ischemic stroke, and the prevalence is reported to be up to 50% in Asia. The failed mechanical thrombectomy of large vessel occlusions was reported up to 20%, and the causes are vascular tortuosity and underlying intracranial stenosis. Our aim is to evaluate the clinical efficacy and safety of angioplasty and stenting in refractory vertebra-basilar artery (VBA) stenosis.

Methods: Between July 2016 and December 2022, we enrolled the patients who underwent mechanical thrombectomy due to acute occlusion of VBA and classified into 2 groups; ICAS-related occlusion group and non-ICAS occlusion group. And we divided the ICAS-related occlusion group into percutaneous transluminal angioplasty and stenting(PTAS) and non-PTAS groups. We retrospectively analyzed medical records and images of our tertiary medical center and compared the clinical and radiologic outcomes of the two groups.

Result: Seventy-eight patients with acute occlusion of VBA were enrolled in this study (male:female = 51:27, mean age = 17.94 years old) among 952 patients of entire mechanical thrombectomy of large vessel occlusion. (78/952, 8.2%) The ICAS-related occlusion group was 51 patients (65.4%), while the non-ICAS occlusion group was 27 (34.6%). Rescue angioplasty and/or stenting were performed in 39 patients (39/51, 76.5%). The ICAS-related occlusion group had more hypertension and diabetes and less atrial fibrillation than non-ICAS occlusion group significantly. The good clinical outcomes at three months with the above two modified Rankin Scores were not significantly different between PTAS and non-PTAS groups (13/39 (33.33%) vs. 3/12 (25%), p=0.590). The mortality rate (8/39, 20.51% vs. 5/12, 41.67%, p=0.145) and symptomatic intracranial hemorrhage (6/39, 16.66% vs. 2/12, 16.67%, p=0.916) were not significantly different.

Conclusion: Stenting for VBA stenosis may be an effective treatment for rescue treatment of refractory occlusions with no significant increase in risk compared to conservative treatment.

FP2-5

Hybrid operating room surgery for Arteriovenous Malformation : Setup and Implementation in a Single Hospital Experience

Ja Ho Koo, Dong Young Cho, Eui Kyo Seo

Department of Neurosurgery, Ewha Womans University Seoul Hospital

Objective: to introduce the fundamental considerations for setting up a hybrid operating room(OR) and to provide useful insights for institutions preparing to establish and operate such facilities. Additionally, it highlights the effectiveness of hybrid ORs in AVM surgeries.

Methods: This topic is based on a retrospective study of AVM patients treated over the past year since our institution opened its hybrid OR in June 2023. We evaluated the initial design plans and components of the operating room by applying them to actual surgical cases.

Result: The operating room was primarily designed with cardiovascular and neurovascular procedures in mind. The placement of the biplane and ceiling-mounted monitors, as well as the surgeon's position, were key factors in determining the location of the OR lights. Additionally, the locations of the ventilator wiring system, aspiration system, and electrical sockets were carefully planned. Over the past year, we performed one-stage AVM hybrid surgeries on four patients, all of whom achieved favorable outcomes with an mRS score ≤1. As a representative case, a 28-year-old female presented with recurrent syncope and headaches. Diagnostic workup revealed an unruptured AVM in the right frontal lobe, classified as Spetzler-Martin Grade II. The treatment process involved performing a preoperative digital subtraction angiography (DSA) to assess the AVM. Under general anesthesia, Onyx embolization was carried out, followed by transitioning to a surgical setting for open AVM removal. Before concluding the surgery, an intraoperative DSA was performed to confirm the absence of any residual AVM nidus, after which the procedure was finalized.

Conclusion: Hybrid ORs are highly effective for neurovascular surgeries, and it is crucial to set them up efficiently and in a surgeon-friendly manner.

FP2-6

Dural AVF treated with burr hole and direct transverse sinus puncture

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Objective: Transvenous coil embolization is a preferred treatment modality in patient with dural arteriovenous fisulta (dAVF) involving transverse sigmoid (TS) sinus, if the sinus in not functioning. However, in isolated sinus with cortical venous reflux, access to the isolated sinus is difficult or impossible via usual transvenous approach. In this patient, both combined surgical and endovascular approach, including burr hole over the isolated sinus using neuronavigation and direct puncture of isolated sinus under roadmap guidance, can result in successful obliteration of dAVF on TS sinus. We experienced two cases of TS sinus dAVF treated with both surgical and endovascular approach.

CASE 1: A 70 year old female was transferred from NR department for the treatment of dAVF, which was incidentally discovered to evaluate dementia on MRI and MRA. Cerebral angiogram showed Cognard type III dAVF on right TS sinus. Feeding artery was petrosal branch of middle meningeal artery (MMA), occipital artery (OA). Cortical venous reflux was marked from isolated right TS sinus. Because transarterial onyx injection via MMA seems to be less favorable, direct access to the isolated sinus was planned following burr hole trephination. Coil embolization was performed under general anesthesia with IONM neuromonitoring. Complete obliteration of dAVF was achieved with both coil packing and onyx injection.

CASE 2: A 35 year old male patient was referred to our hospital after failure of 3 times transarterial coil embolization of dAVF in other hospital, which was diagnosed due to seizure. DAVF was on the left TS sinus feeding from meningohypophyseal trunk, OA, MMA, post auricular artery and drained into the right cortical vein via superior sagittal sinus. Both TS sinus was not patent. Transvernous coil embolization is not possible. Thus, navigation guided burr hole trephination and direct sinus puncture was performed. Complete obliteration of dAVF was achieved with multiple coil packing

Result: Complete obliteration of dAVF was achieved in both patients.

Conclusion: Burr hole and direct puncture of sinus is very effective and safe treatment modality in case of dAVF with inaccessible sinus.

FP2-7

Introduction to the PWI-DWI Recalculation Program

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Objective: To introduce a novel recalculation program for Perfusion-Weighted Imaging (PWI) and Diffusion-Weighted Imaging (DWI) aimed at enhancing the accuracy of stroke imaging analysis, particularly in identifying the penumbra and infarct core. The program addresses limitations in current imaging techniques by providing a more tailored and precise assessment of brain perfusion, thereby improving clinical decision-making in acute stroke management.

Methods: The PWI-DWI Recalculation Program employs simple algorithms to recalibrate perfusion maps based on patient-specific data. The program integrates directly with raw imaging data inputs (PWI and DWI) and applies preprocessing, recalibration, and mismatch calculation steps to generate improved perfusion maps. Validation was performed through a retrospective analysis of over 100 stroke cases, comparing the recalculated perfusion maps with standard clinical interpretations. Sensitivity, specificity, and accuracy were the primary metrics assessed.

Result: The recalculation program demonstrated acceptable differences in the identification of the CVV, CVF, MTT, and TTP compared to conventional analysis methods.

Conclusion: The PWI-DWI Recalculation Program offers a promising advancement in the field of stroke clinical research. By addressing the limitations of current standard forms, this program could benefit researchers and physicians by allowing future research to be conducted at no cost. Additional studies are underway to apply this program to larger patient populations and incorporate additional imaging modalities.