Basic NeuroEndovascular Training Course 3

(BNET Course)

BNET 3rd : Advanced Treatment Strategies for aneurysm (Flow diverter & disruptor)

일시 : 2024년 5월 11일(토)

장소 : 대웅제약본사 별관 베어홀 (지하1층)
(서울 강남구 봉은사로 114길 12)

주최 : 대한뇌혈관내치료의학회

주관 : 대한신경외과학연구재단

INVITATION

회원 여러분 안녕하십니까?

2024년 유례없는 의료파국 직전의 상황에서, 현 의료사태를 고려하여 BNET-1 (2024.03.16)과 BNET-2 (2024.04.20) 행사를 취소하였으나, 세 번째 course는 많은 전임의 및 Juior staff 선생님들이 신청 하시어 학회 수련교육 중요성을 감안, 개최하게 되었습니다.

BNET-3는 학회의 후반기 교육행사인 ANTE (Advanced Neuroendovascular Technique Education)에 앞서, Flow diverter 및 Flow disruptor를 강의 및 hands-on으로 접해 보는 좋은 기회가 될 것입니다.

대한민국 의료 파국을 막기 위하여 불철주야 진료에 힘쓰고 계시는 교수님들께 경의를 표합니다.

감사합니다.

2024년 5월 11일

대한뇌혈관내치료의학회 회 장 권순찬
부회장 박석규
총무이사 하성곤
교육수련이사 김영우, 박중철

PROGRAM

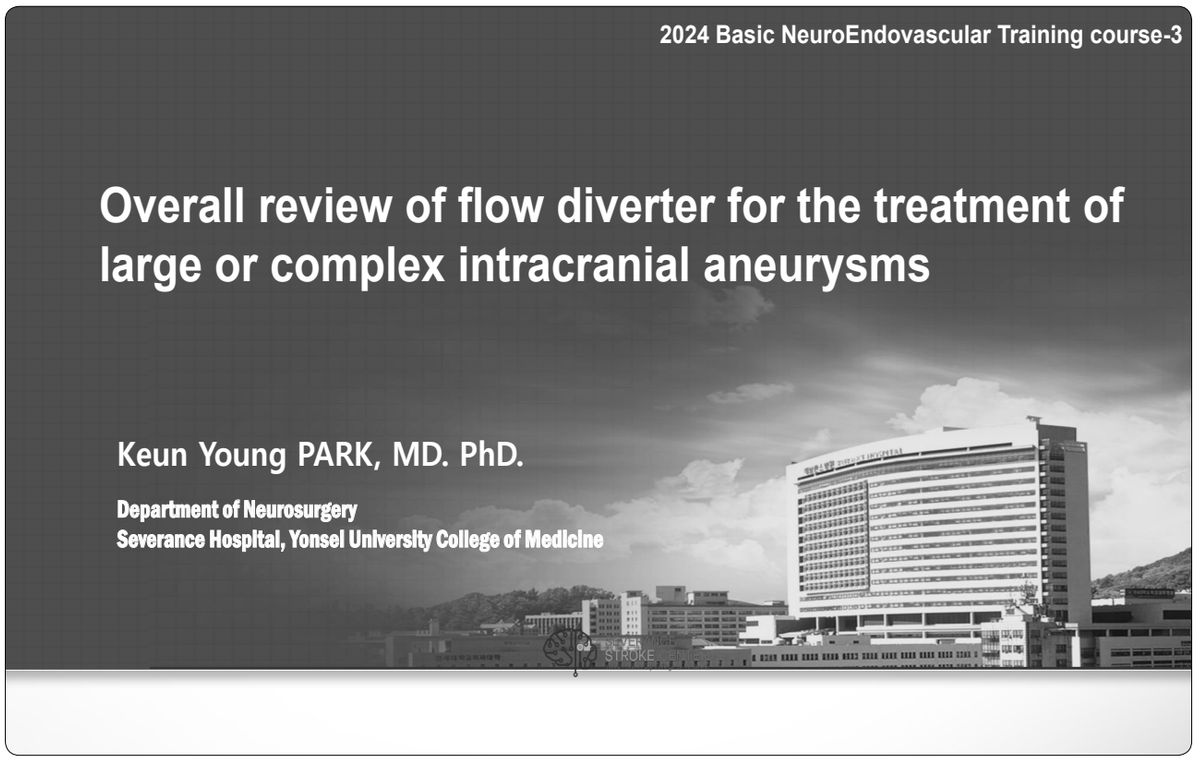
일시 : 2024년 5월 11일(토)

장소 : 대웅제약본사 별관 베어홀

08:30-08:50	Registration			
08:50-09:00	Course Introduction	김영우	KoNES 교육수련이사	
	Welcome Address	권순찬	KoNES 회장	
09:00-09:30	Flow diverter: devices review	박근영	연세대 신촌세브란스병원	07
09:30-10:00	Flow diverter: technique and complication	정영진	영남대병원	31
10:00-10:45	Flow distruptor	정준호	연세대 강남세브란스병원	61
10:45-11:00	Break			
11:00-12:00	Hands-on			
12:00-13:00	Lunch			
13:00-	Closing & Photo time	하성곤	KoNES 총무이사	

Flow diverter: devices review

박 근 영
연세대 신촌세브란스병원



Disclosures

- ✓ **Microvention: Proctorship**
- ✓ **Balt: Proctorship**
- ✓ **Stryker: Research grants**

Contents

- Introduction of Stent
- Introduction of FD
- Each Characteristic

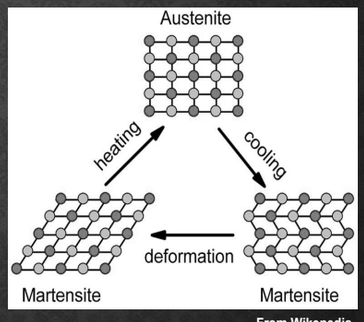
Stent materials

✓Biocompatible
✓Fatigue tolerance
✓Corrosion resistance

✓ Nitinol: Nickel + Titanium
  • Shape-memory alloy; self-expanding
  • Superelasticity

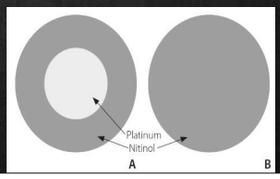
✓ Co-Cr: Cobalt + Chrome
  • High wear resistance
  • Radiopaque
  • Balancing visibility and radial strength

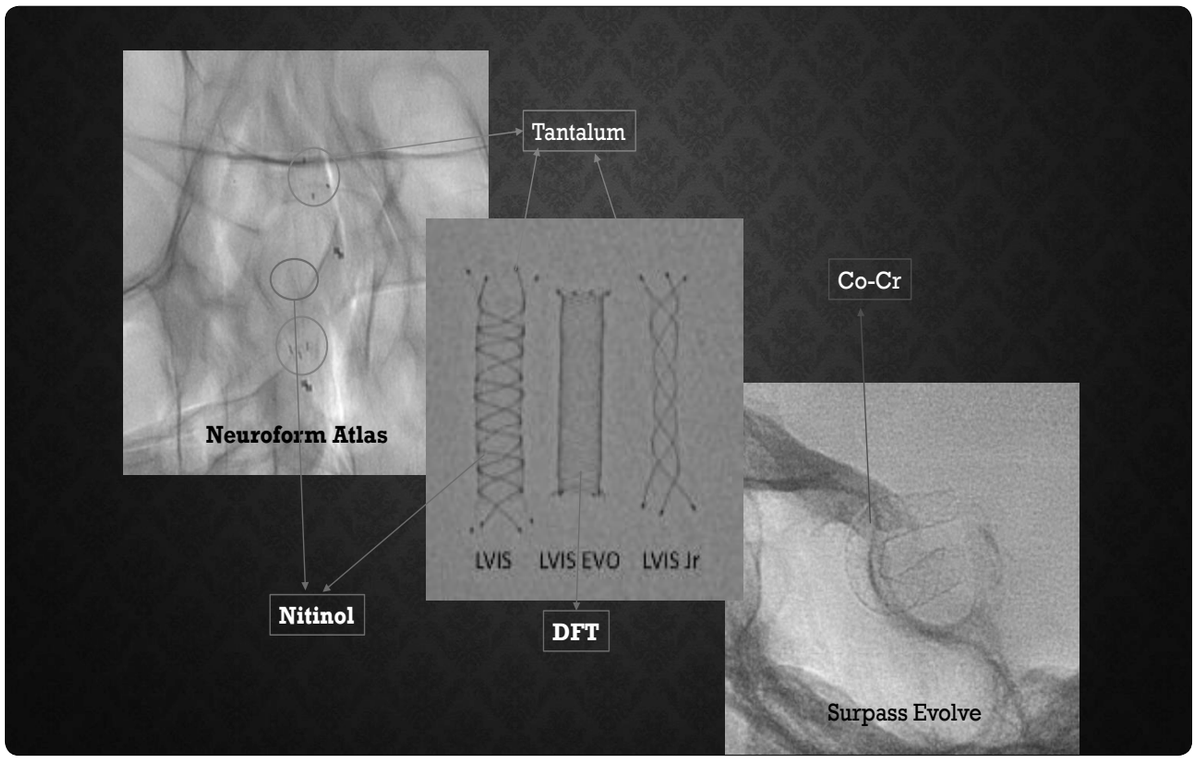
✓ Radiopacity: Tantalum or Platinum



From Wikepedia

DFT (Drawn Filled Tubing)





Laser cutting vs Wire braiding

LASER cutting

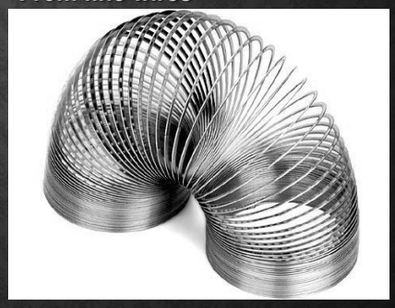
✓ From Nitinol tube

✓ Less shortening
✓ More chronic outward force (COF)
✓ Lower Metal coverage

Neuroform Atlas, Enterprise, Acclino

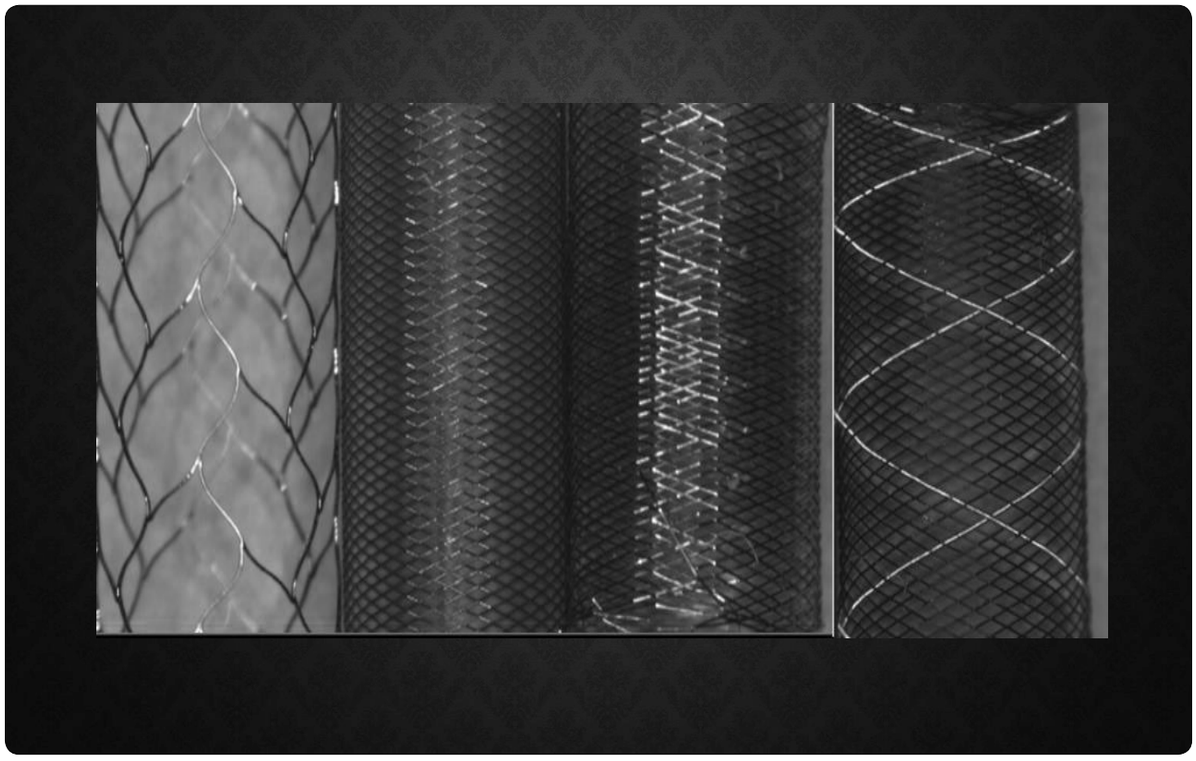
Wire braiding

✓ From fine wires



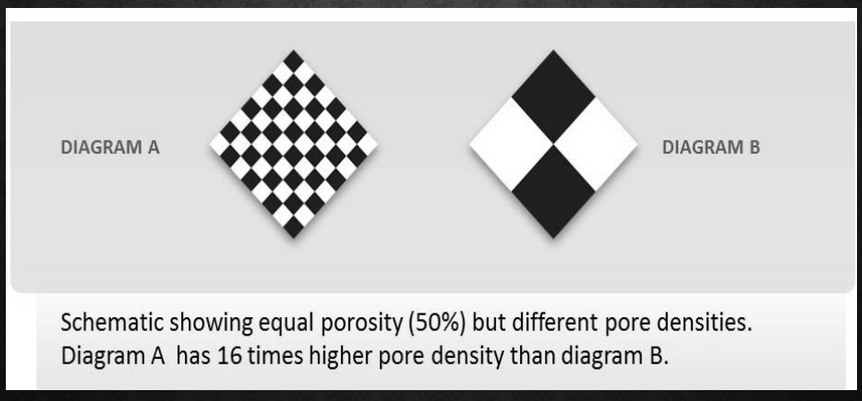
✓ More shortening
✓ Less chronic outward force (COF)
✓ Higher metal coverage

LVIS, Accero, Flow Diverters



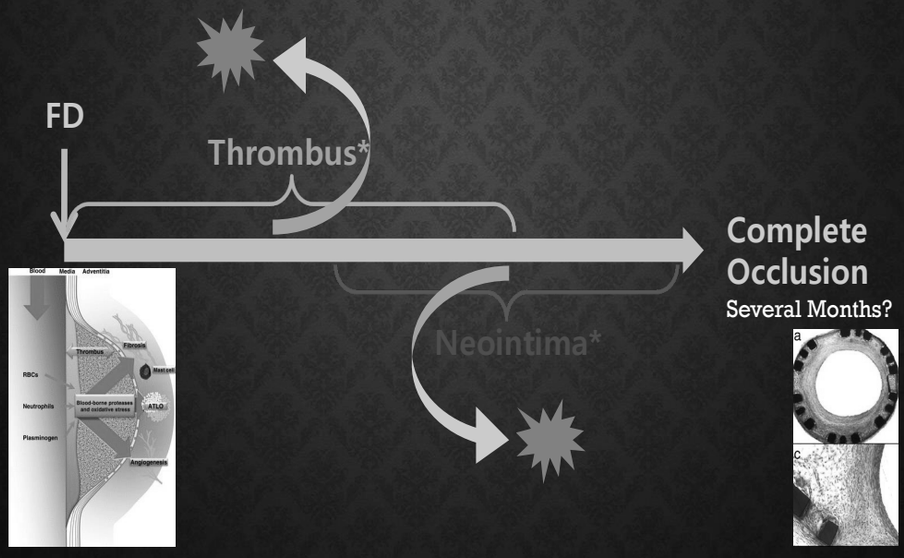
Concept of FD

Porosity: Ratio of metal free surface area in a stented vessel
Pore Density: Number of pores per unit surface area



Schematic showing equal porosity (50%) but different pore densities.
Diagram A has 16 times higher pore density than diagram B.

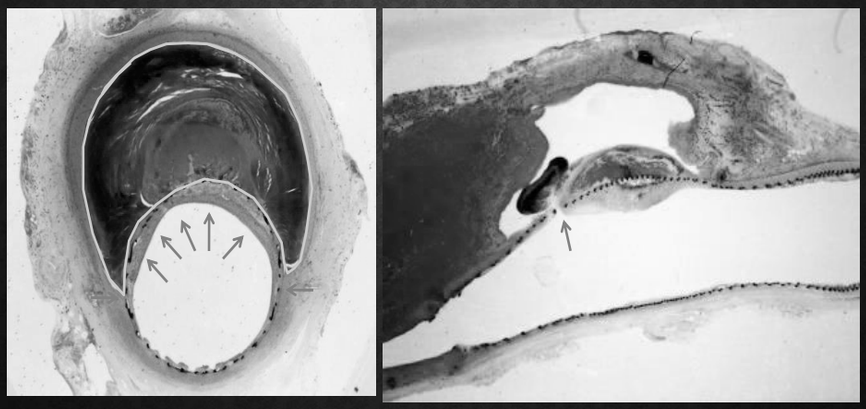
Concept of FD



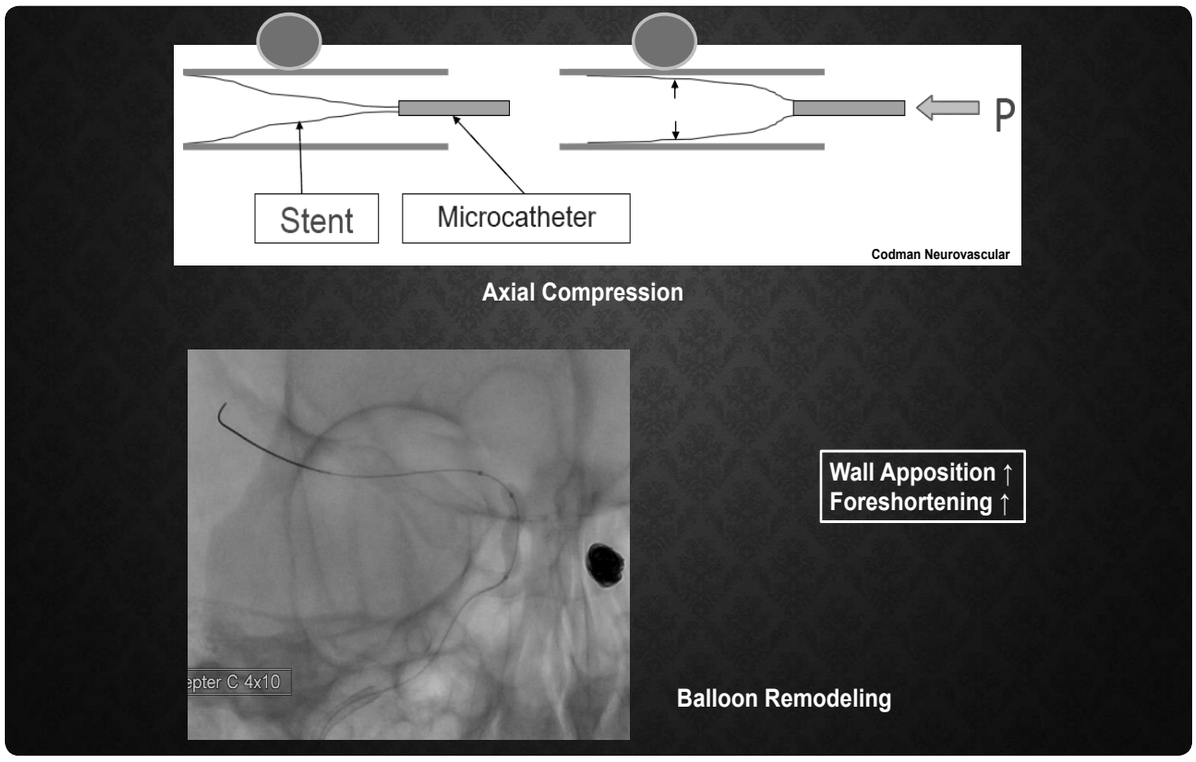
Thrombus can be a main cause of proteolytic activities.

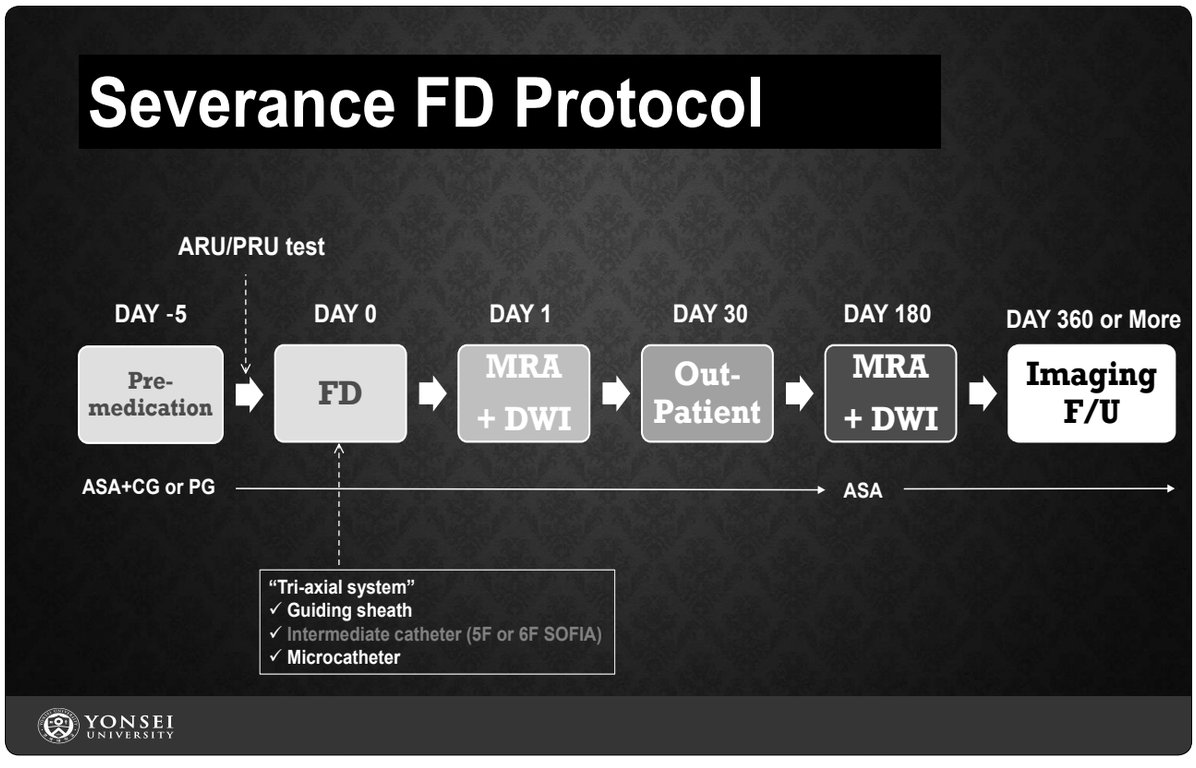
Concept of FD

In Animal study: "Organizing Thrombus & "Neointima"

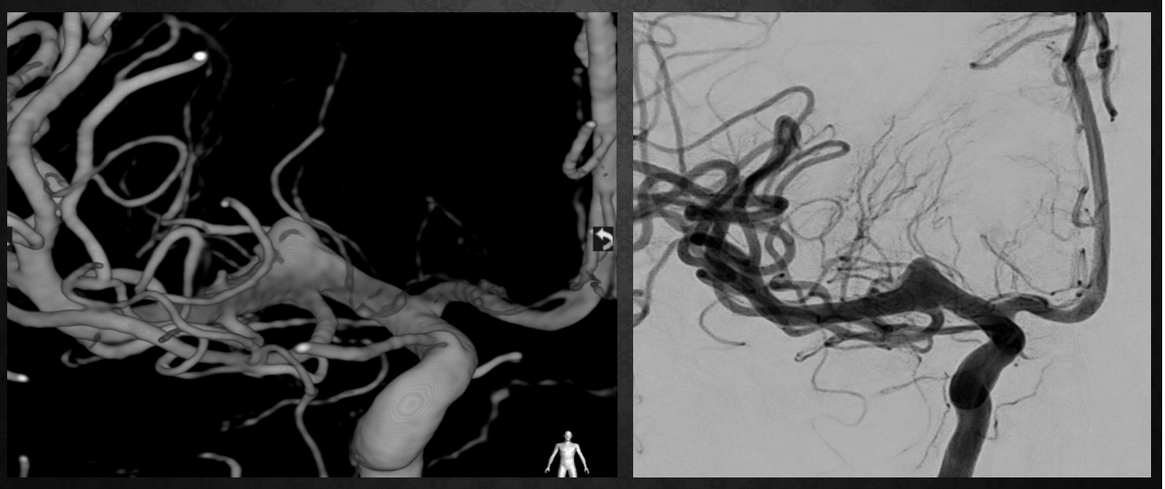


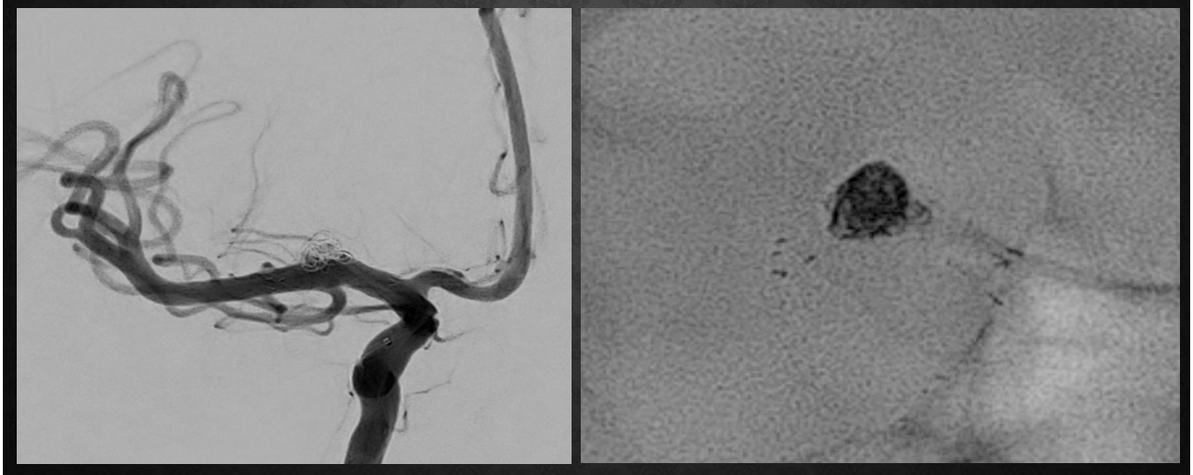
Courtesy of Lee JY

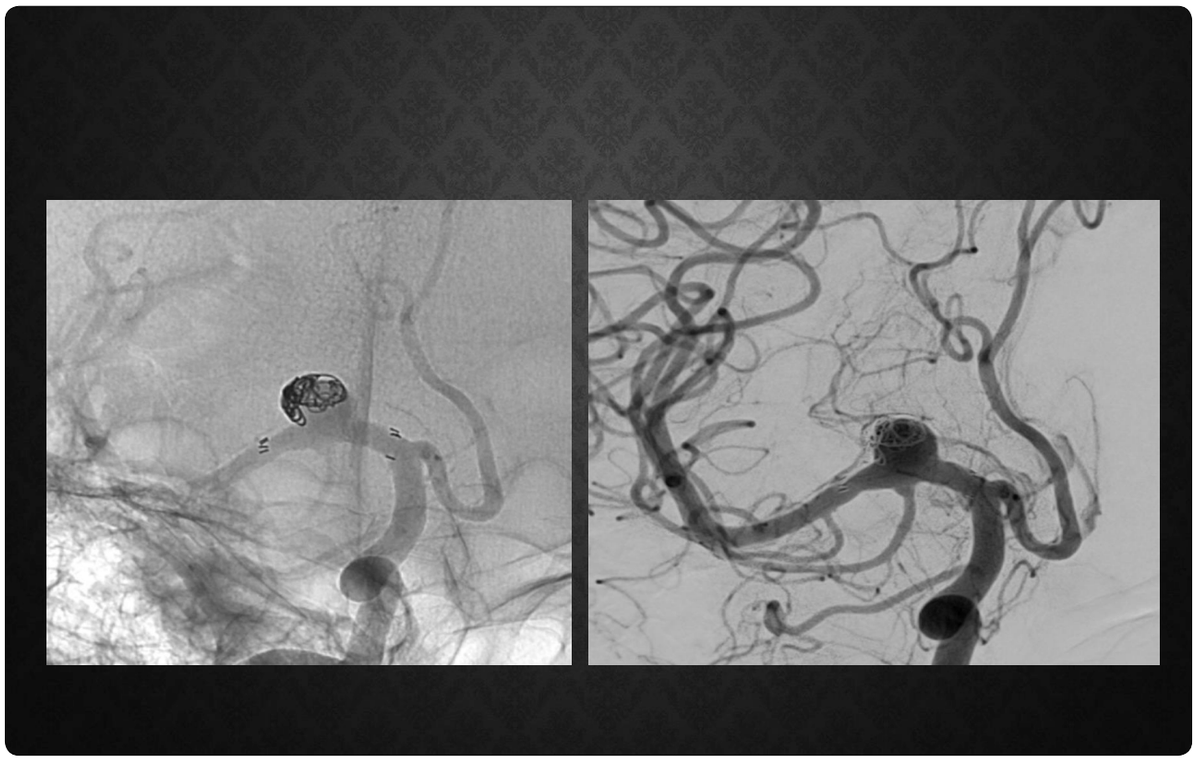

P
Stent
Microcatheter
Codman Neurovascular
Axial Compression
Wall Apposition ↑
Foreshortening ↑
Balloon Remodeling

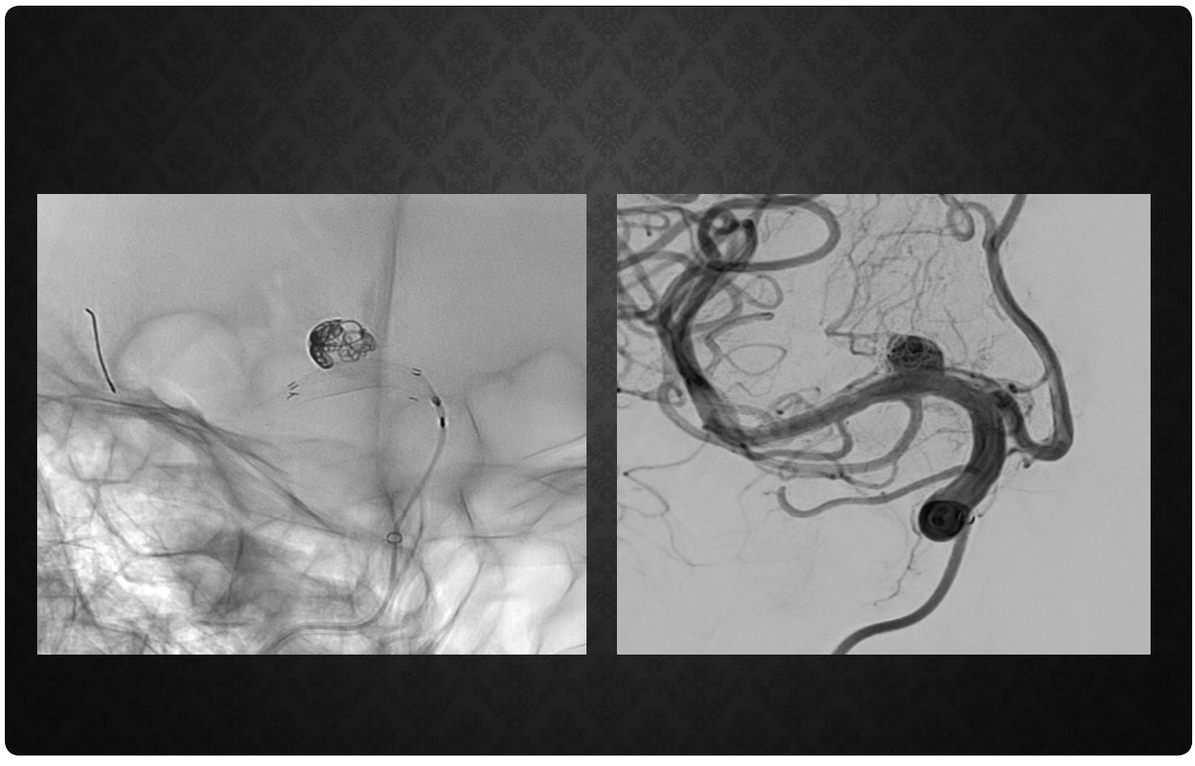

Severance FD Protocol
ARU/PRU test
DAY -5
DAY 0
DAY 1
DAY 30
DAY 180
DAY 360 or More
Pre-medication
FD
MRA + DWI
Out-Patient
MRA + DWI
Imaging F/U
ASA+CG or PG
ASA
"Tri-axial system"
✓ Guiding sheath
✓ Intermediate catheter (5F or 6F SOFIA)
✓ Microcatheter
YONSEI UNIVERSITY

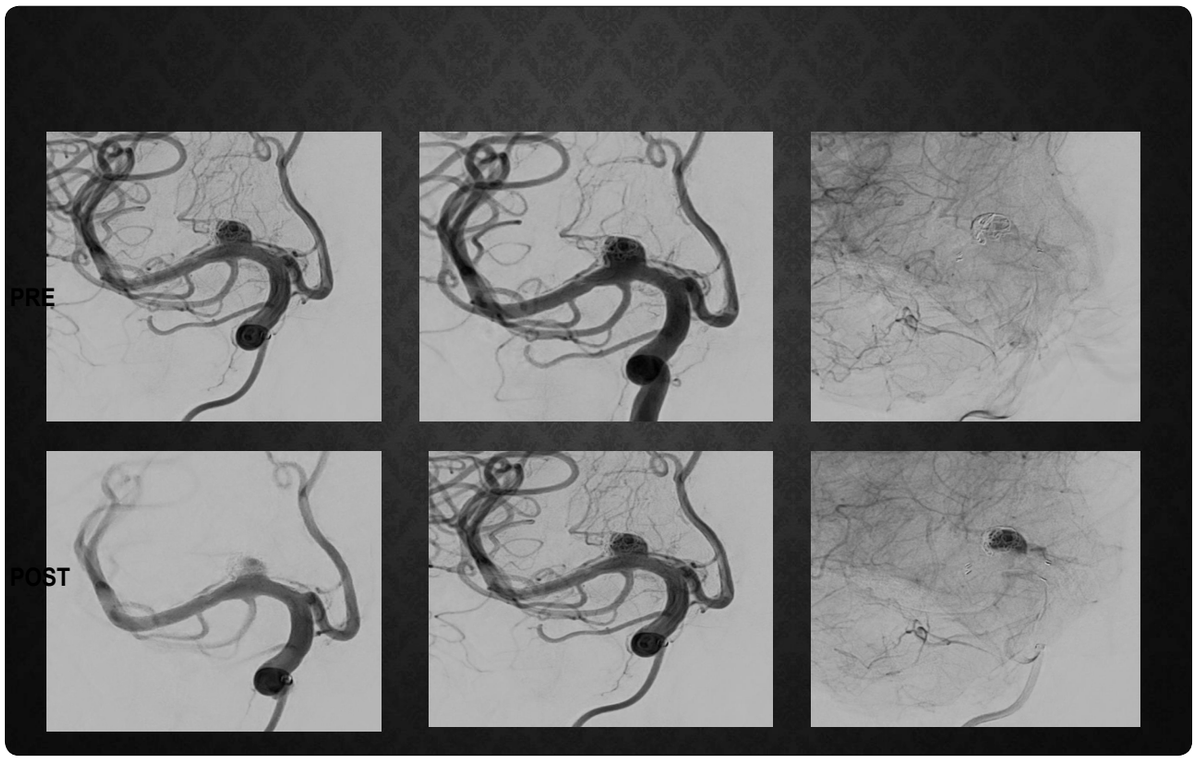
M/40, Rt MCA dissection

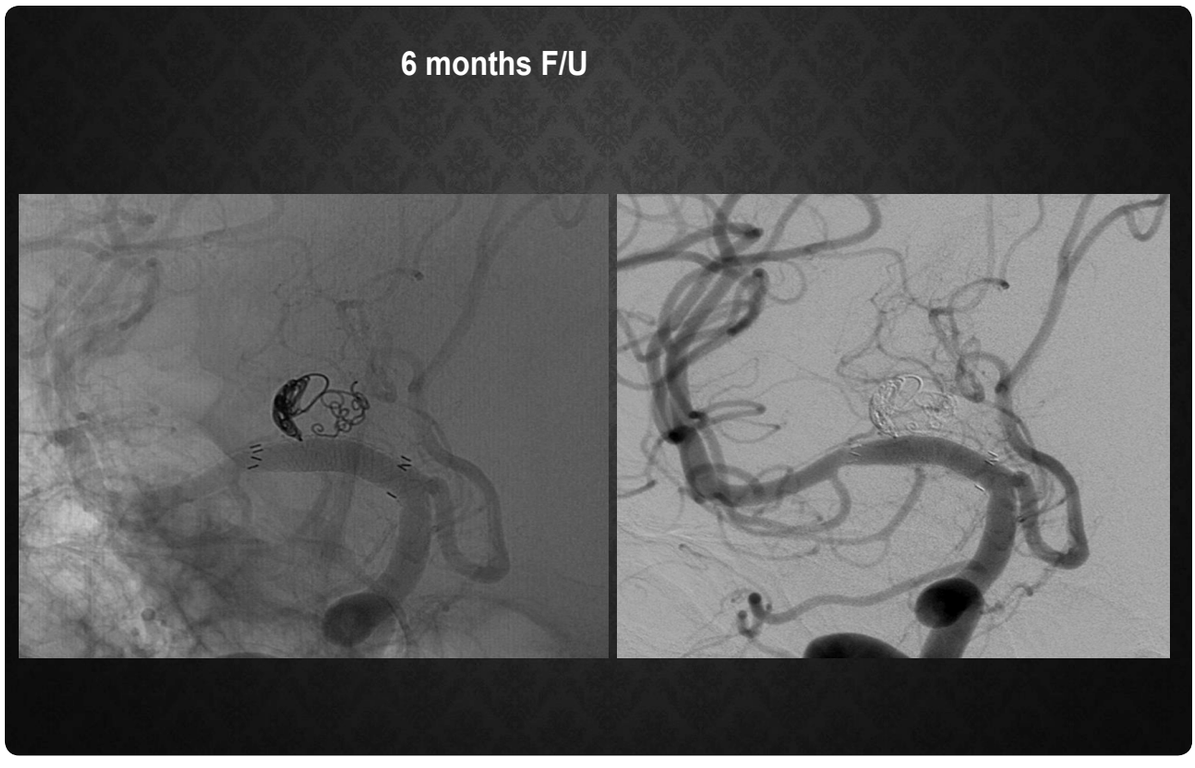


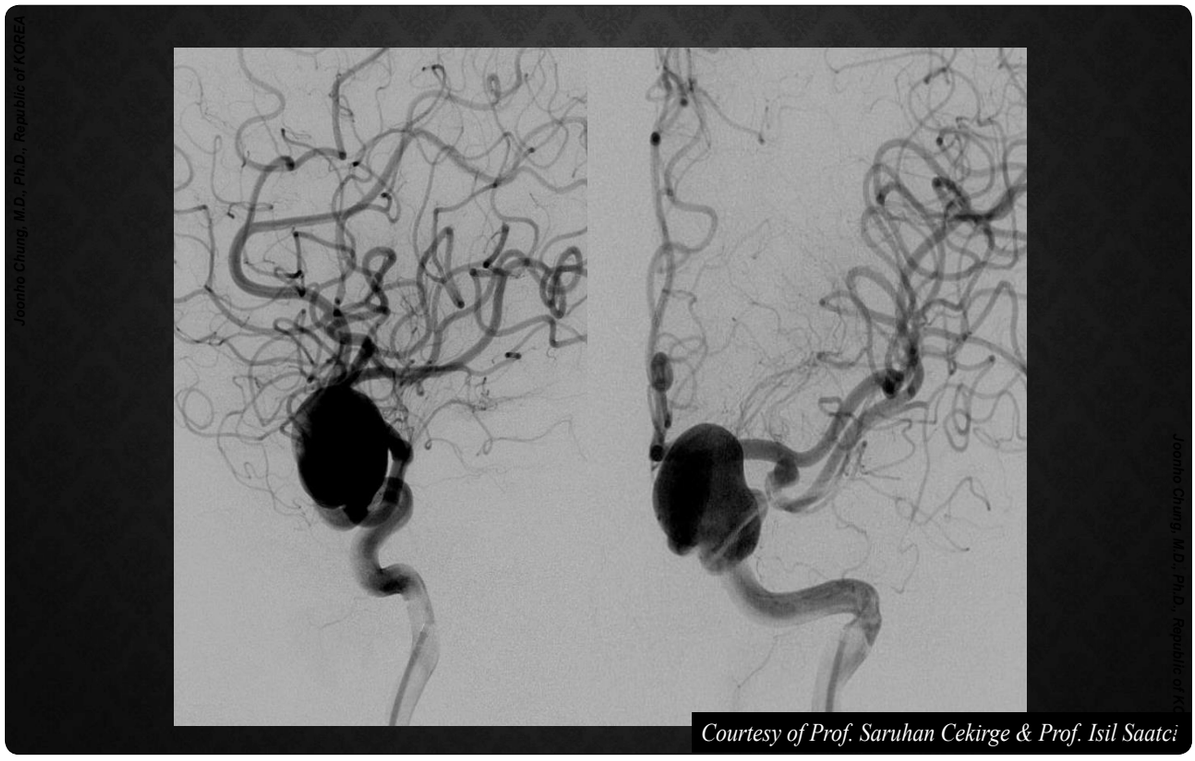


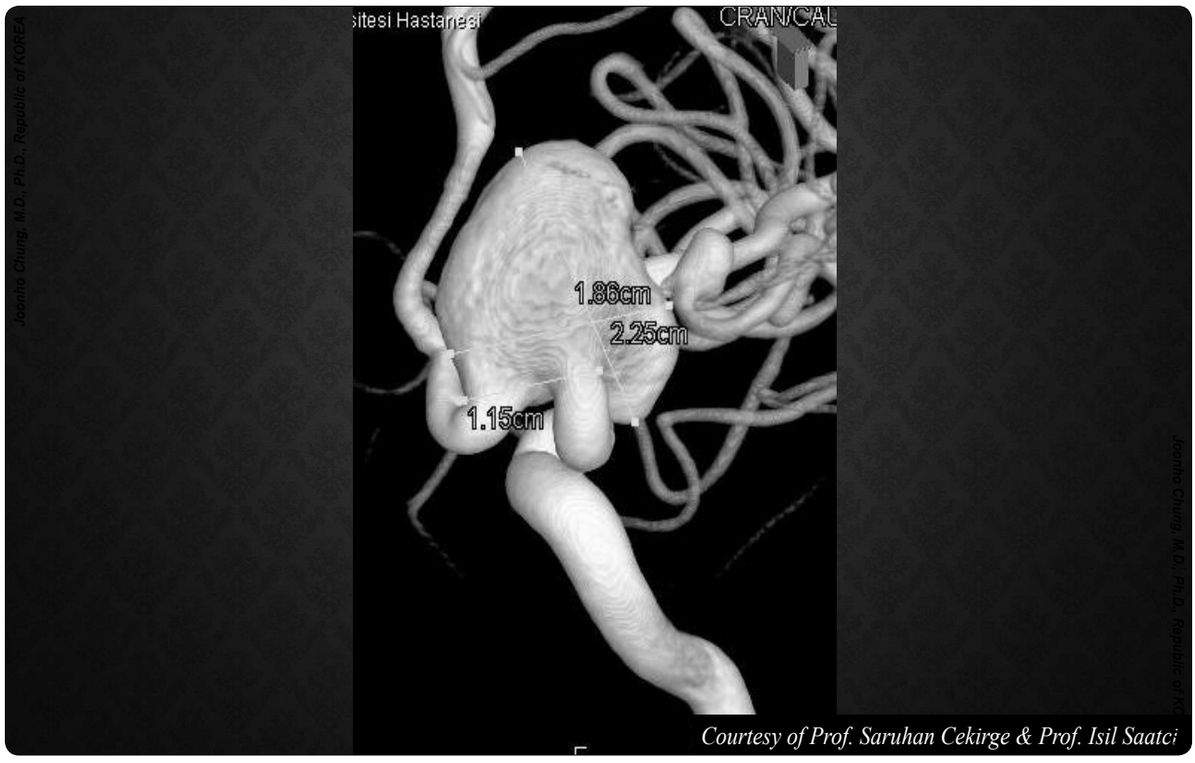


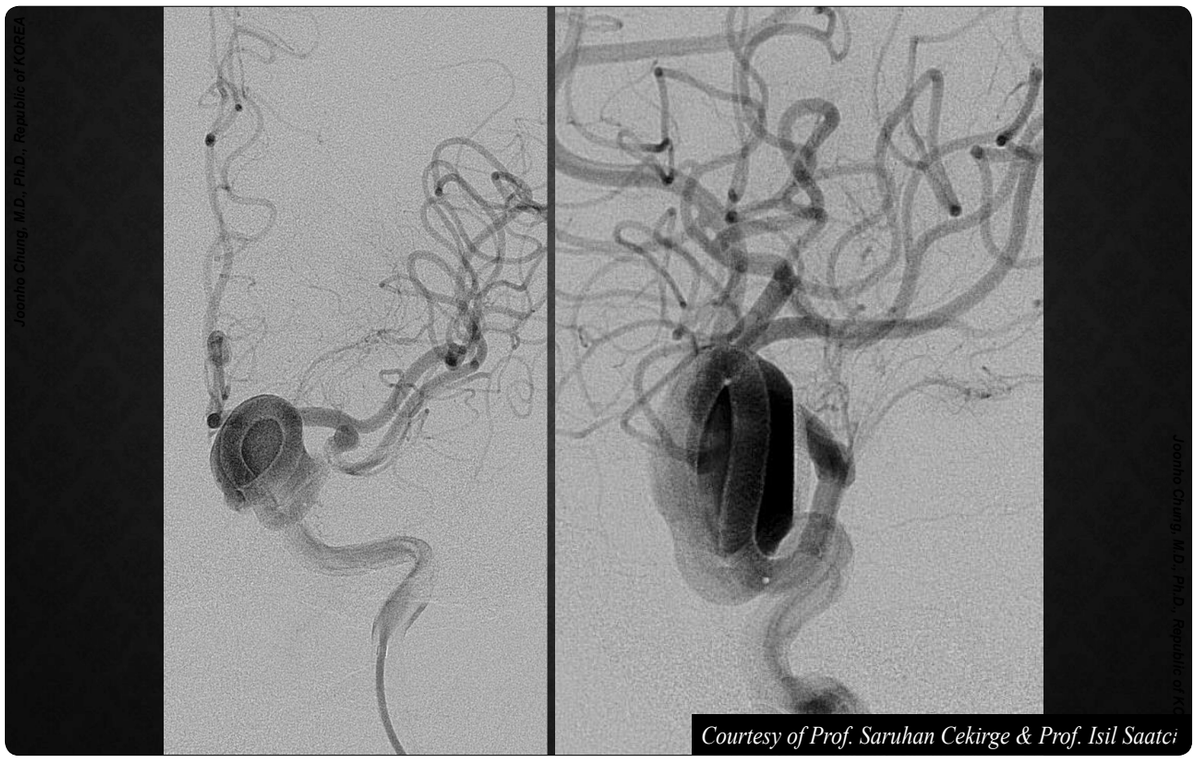


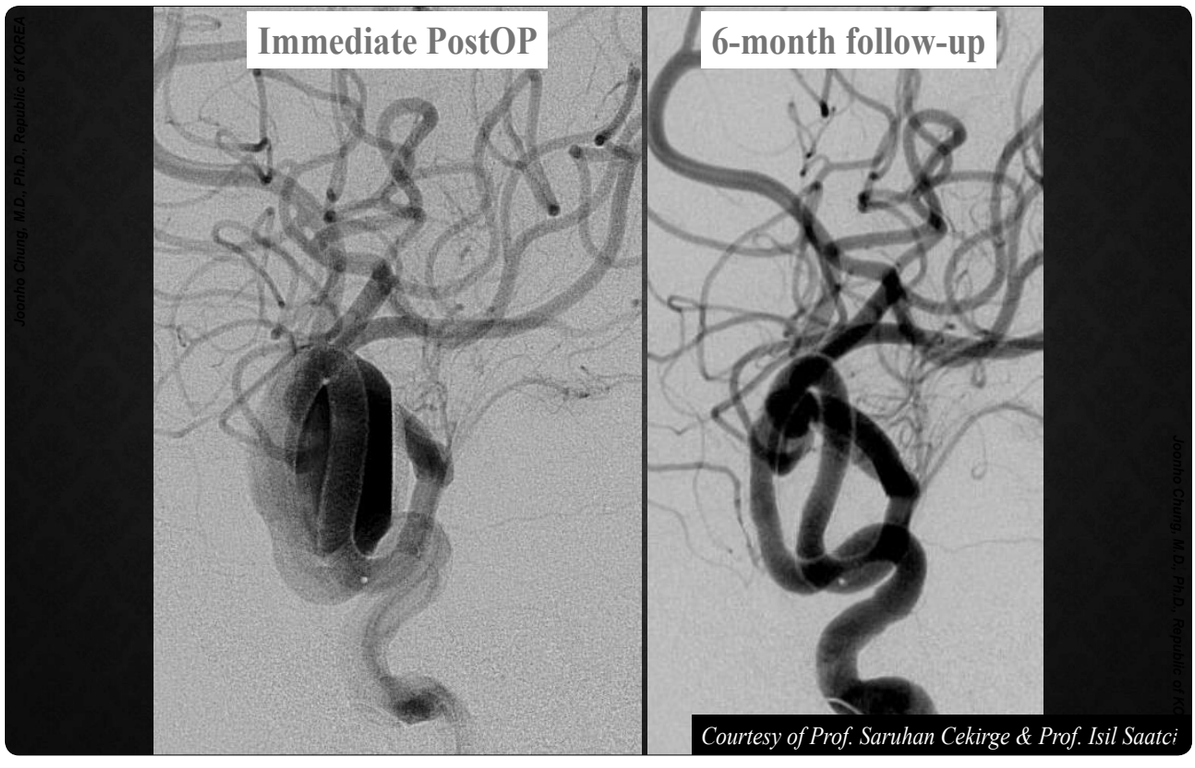

PRE
POST


6 months F/U


Joonho Chung, M.D., Ph.D., Republic of KOREA
Courtesy of Prof. Saruhan Cekirge & Prof. Isil Saatci


Joonho Chung, M.D., Ph.D., Republic of KOREA
1.86cm
2.25cm
1.15cm
Courtesy of Prof. Saruhan Cekirge & Prof. Isil Saatci


Joonho Chung, M.D., Ph.D., Republic of KOREA
Courtesy of Prof. Saruhan Cekirge & Prof. Isil Saatci


Immediate PostOP
6-month follow-up
Joonho Chung, M.D., Ph.D., Republic of KOREA
Courtesy of Prof. Saruhan Cekirge & Prof. Isil Saatci

Pipeline,

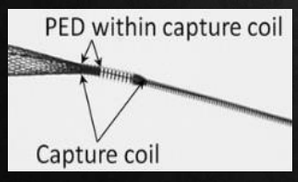
Phosphorylcholine (PC)
- : Naturally abundant on the surface of RBCs
- : Coating or treating a device surface with a PC-containing polymer results in physiologic mimicry of the cell membrane
- : Surface modification where a synthetic PC polymer is covalently bonded to the strands that make up the Pipeline braid

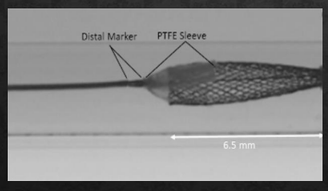
Courtesy of Chung, J

✓ Phosphorylcholine covalently bonding

PED classic → **Flex** → **Flex with Shield**

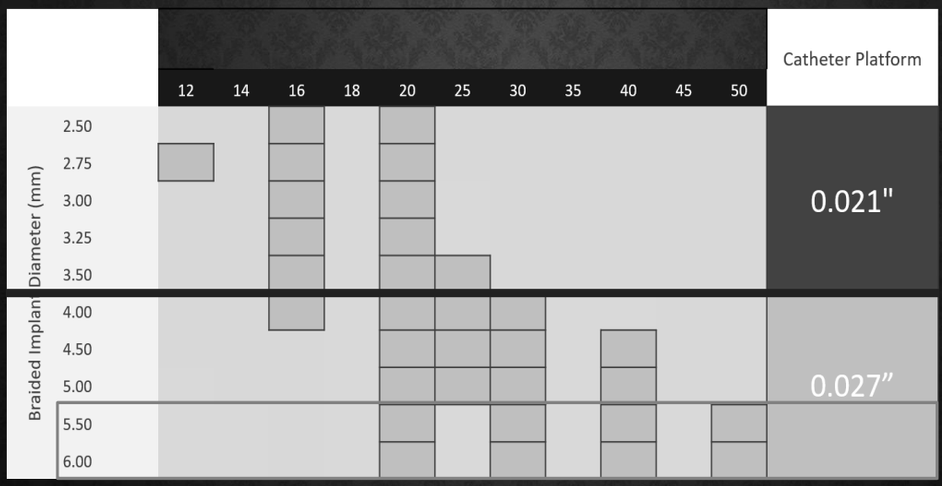
- ✓ Co-Cr
- ✓ Resheathing Pad
- ✓ Capture coil→PTFE sleeve





PED vantage

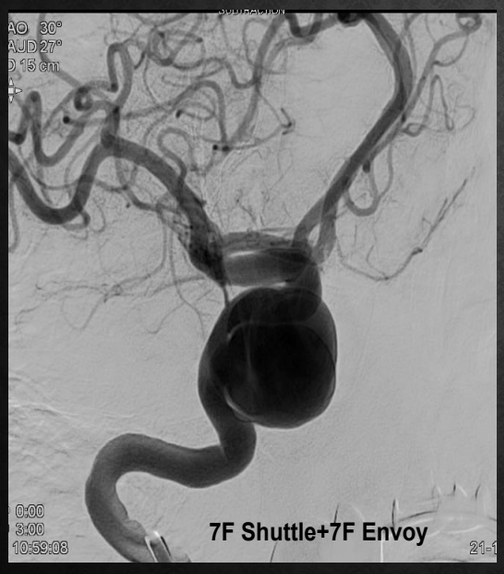
- ✓ Low profile
- ✓ 64 wires
- ✓ DFT
- ✓ 44% thin PTFE sleeve

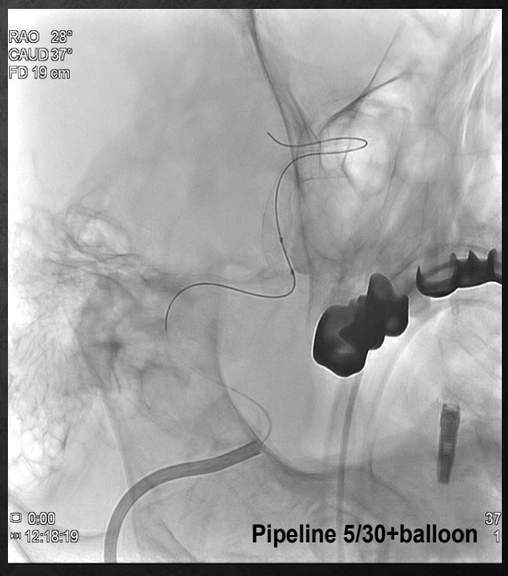


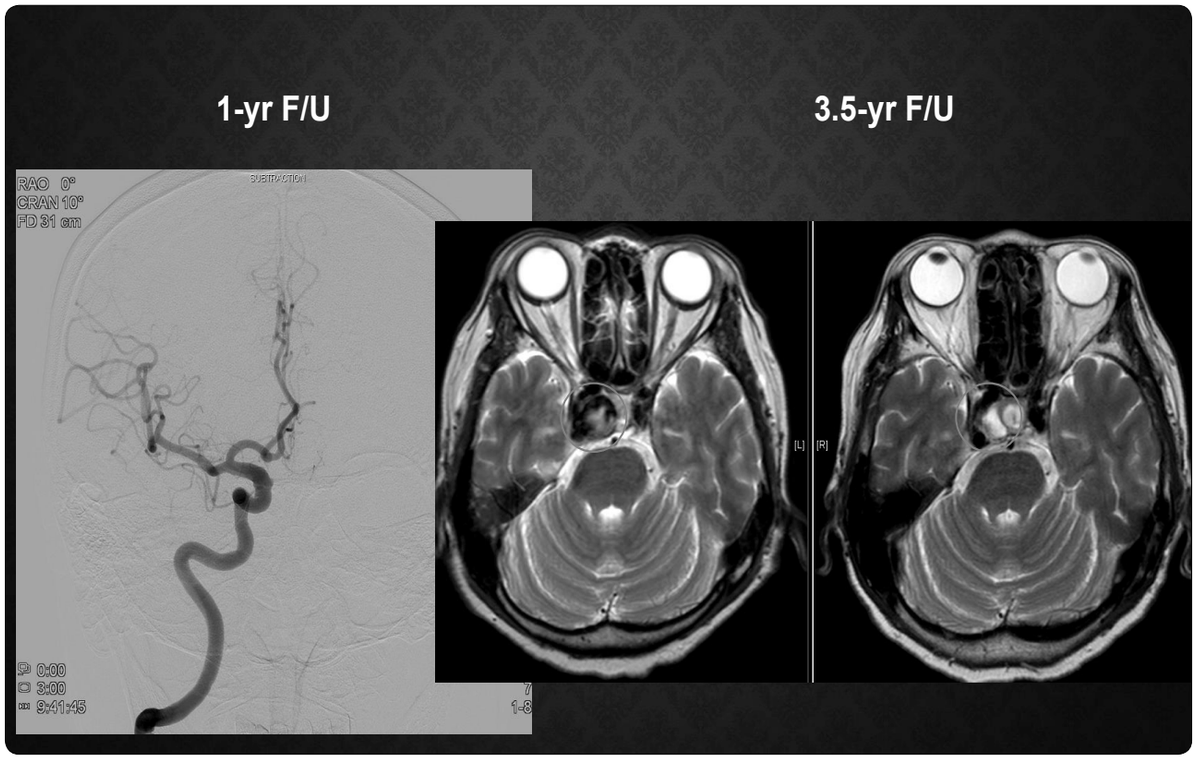
F/68, ICA-cavernous aneurysm, growing

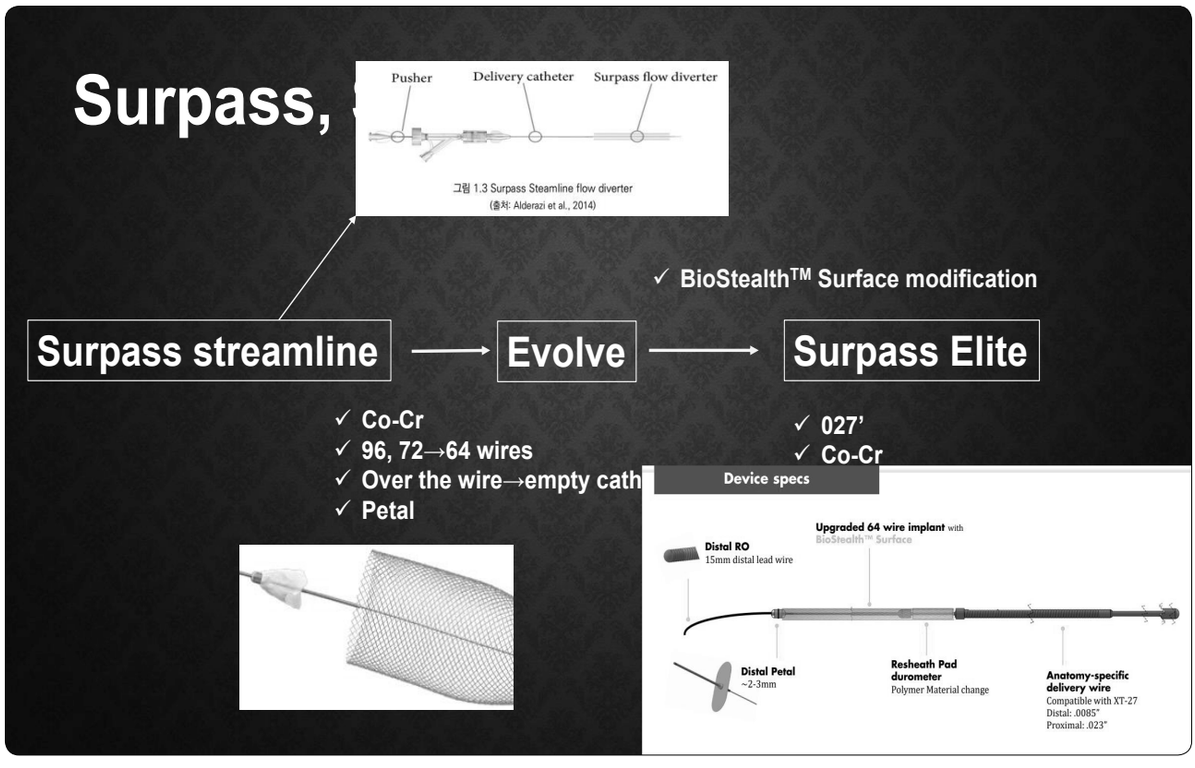
1. Stent-assisted coiling
2. Proximal Occlusion
3. Trapping & EIAB
4. Covered stent
5. Flow diverter

F/68, ICA-cavernous aneurysm, growing





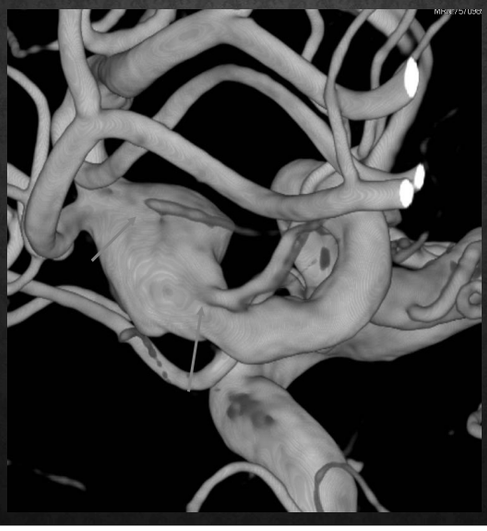

1-yr F/U
3.5-yr F/U
RAO 0°
CRAN 10°
FD 31 cm
SUBTRACTION
[L]
[R]

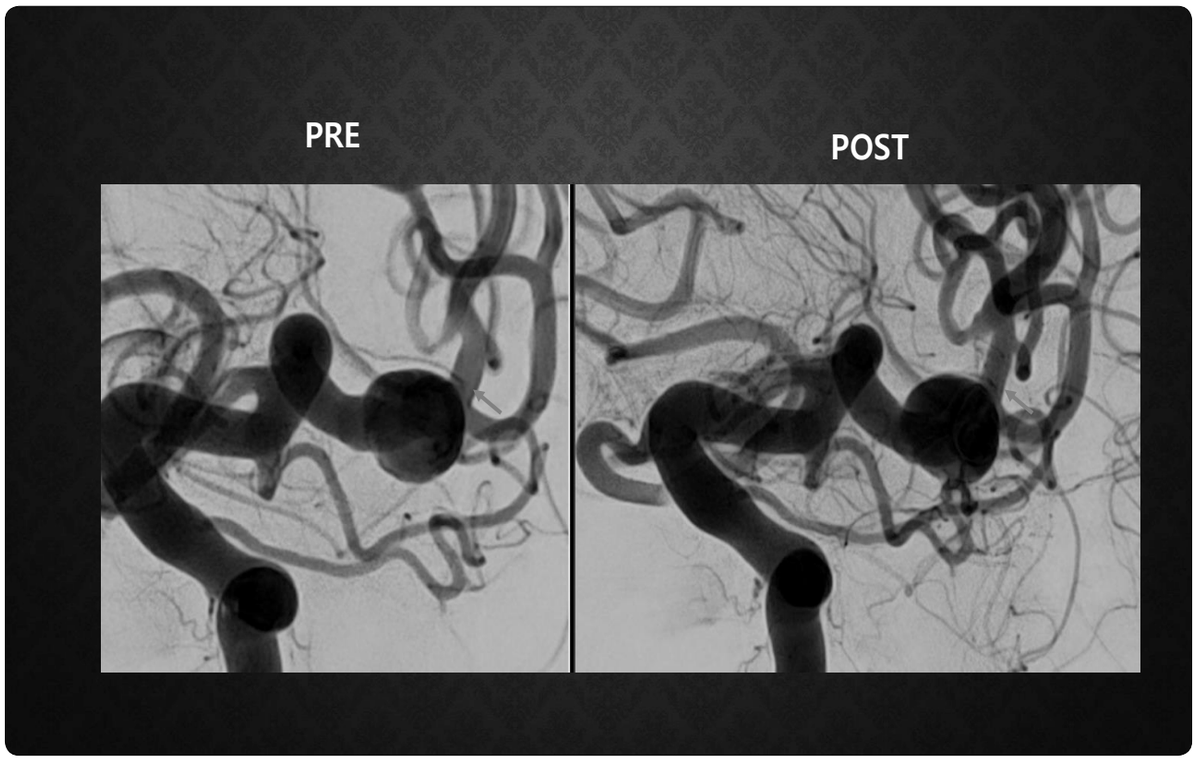

Surpass,
Pusher
Delivery catheter
Surpass flow diverter
그림 1.3 Surpass Steamline flow diverter
(출처: Alderazi et al., 2014)
✓ BioStealth™ Surface modification
Surpass streamline
Evolve
Surpass Elite
✓ Co-Cr
✓ 96, 72→64 wires
✓ Over the wire→empty cath
✓ Petal
✓ 027'
✓ Co-Cr
Device specs
Upgraded 64 wire implant with BioStealth™ Surface
Distal RO
15mm distal lead wire
Distal Petal
~2-3mm
Resheath Pad durometer
Polymer Material change
Anatomy-specific delivery wire
Compatible with XT-27
Distal: .0085"
Proximal: .023"

		Labeled diameters (mm)					
		2.5	3.25	4.0	4.5	5.0	5.25
Unconstrained diameter		2.7	3.7	4.2	4.7	5.2	
Recommended parent vessel diameter		2.0-2.5	>2.5-3.25	>3.25-4.0	>4.0-4.5	>4.5-5.0	
# of wires		48	64				
Length (mm)	12						
	15						
	17						
	20						
	25						
	30						
	40						
	50						

Incorporating artery or perforators

LT M1 fusiform aneurysm incorporating LSA





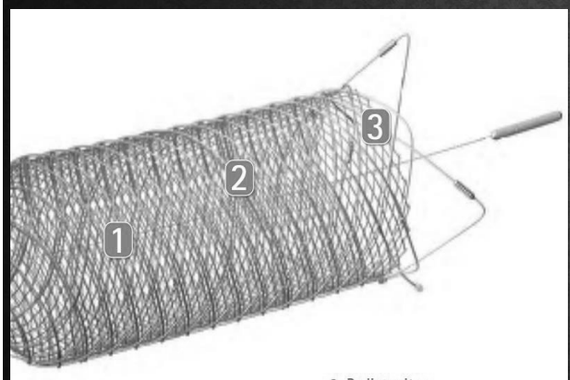
FRED, Microvention

FRED/FRED Jr. → **FRED X**

- ✓ Nitinol+Tantalum
- ✓ Flare end
- ✓ FRED: available in 027' MC
  *Dual layer
  - Outer 16: higher radial force
  - Inner 48: better flow diversion
- ✓ FRED Jr. : available in 021' MC
  *Dual layer
  - Outer 16: higher radial force
  - Inner 36: better flow diversion

- ✓ Nitinol+Tantalum
- ✓ Flare end
- ✓ X-technology

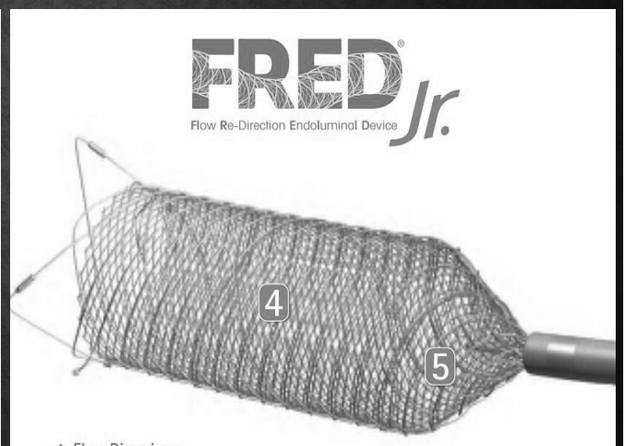
FRED & FRED Jr.



1. Flow Diversion:
Effective Metal Surface Area %
*FRED® device inner layer provides an average of 37% effective metal surface area**

2. Radiopacity:
Tantalum helical strands *throughout device and flared ends allow visible tracking and confirms successful deployment*

3. Device Opening:
High Radial Force *due to integrated nitinol design*



4. Flow Diversion:
Effective Metal Surface Area %
*FRED® Jr. device inner layer provides an average of 30% effective metal surface area**

5. Shorter Tip:
Designed with a shorter delivery wire for smaller vessels

FRED X

Bare Device | Other Surface Treated Device | FRED X

Delivery wire tip	FRED X 27 has a 5mm distal delivery wire tip FRED X 21 has a delivery wire set in the center of device
Immediate withdrawal of pusher wire upon full deployment	No need to re-cross deployed FRED X Device with the microcatheter
Smooth delivery with low delivery forces[1]	Allows for easier tracking through tortuous anatomies

	Diameter	Working Length / Total Length
FRED X 21	2.5mm	8 / 13
		13 / 18
		20 / 25
		26 / 30
	3.0mm	9 / 13
		14 / 19
		21 / 27
		27 / 32
FRED X 27	3.5mm	7 / 13
		11 / 17
		16 / 22
		24 / 31
		36 / 40
	4.0mm	7 / 13
		12 / 18
		17 / 23
		26 / 32
		38 / 44
	4.5mm	8 / 15
		13 / 20
		18 / 25
		28 / 34
		39 / 45
	5.0mm	9 / 15
		14 / 21
		19 / 26
		29 / 36
	5.5mm	14 / 22
		26 / 32

Derivo, Acandis

Derivo/Derivo mini → **Derivo II**

- ✓ DFT (Nitinol)
- ✓ Closed end
- ✓ BlueXide surface finishing
- ✓ Derivo: available in 027' MC
- ✓ Derivo mini : available in 021' MC

Low profile

Diameter [mm]	2.5	3.0	3.5	3.5	4.0	4.5	5.0	5.5	6.0
Length [mm]	10, 15, 20, 25*			30, 40	15, 20, 25, 30, 40		15, 20, 25, 30, 40, 50		
Delivery catheter Inner diameter	0.017"			0.027"					
Outer diameter	2F			3F					

	DERIVO® 2										DERIVO® mini			DERIVO®	
Diameter [mm]	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	2.5	3.0	3.5	3.5	4.0, 4.5, 5.0, 5.5, 6.0
Amount of wires (in total)	**48**					**52**			**64**		**28**		**32**	**36**	**48**
Wire diameter [mm]	**0.030 mm** 24 wires		**0.038 mm** 24 wires			**0.042 mm** 26 wires			**0.046 mm** 32 wires		**0.035 mm** 20 wires **0.043 mm** 8 double wires		**0.035 mm** 24 wires **0.043 mm** 8 double wires	**0.035 mm** 34 wires **0.043 mm** 2 double wires	**0.035 mm** 46 wires **0.043 mm** 2 double wires
Braiding angle middle segment	**70°**	**75°**							Not available in Korea		**70°**			**75°**	
Porosity upper IU [%]	62	63	66	64	67	64	67	69	64	65	62	67	77	68	63-72
lower IU [%]	66	72	77	74	77	75	77	79	75	76	65	73	81	77	73-81
X-ray Visibility	- Platinium Nitinol composite wires with higher platinium rate in wire core (30%) - Transport wire tip										- Platinium Nitinol composite wires (10% platinium) - Double wires (20% platinium) - Transport wire tip - Three platinum Iridium markers on each end				
Transport wire	**1 tip configuration** 2F: 10-25mm with short straight tip 3F: 15/20/25/30mm with j-tip and 40/50 mm w/o tip 4F: 20/25/30mm with j-tip and 40/50 mm w/o tip										**2 tip configurations** for 20/25mm with j-tip and w/o tip			**1 tip configuration** 15/20/25/30 mm with j-tip and 40/50 mm w/o tip	
Material	NiTi														
BlueXide®	Yes														
Resheatable	Yes														

제조사	Medtronic	Stryker	Microvention	Acandis
제품명	Pipeline Vantage	Surpass Elite	FRED X	Derivo II
재질	DFT (Co-Cr)	Co-Cr & Pt/tungsten	Nitinol/Tantalum	DFT (Nitinol)
Wire수	2.5~3.5: 48 4.0~6.0: 64	64	2.5, 3.0 : - Outer 16 - Inner 36 3.5~5.5 : - Outer 16 - Inner 48	2.5~4.5: 48 5.0, 6.0: 52
Size(mm)	OD : 2.5~6.0 Length: 12~50	OD : 2.5~5.25 Length : 12~50	2.5~5.5 Length : 13~45	2.5~6.0 Length : 10~50
마이크로 카테터(inch)	2.5~3.5: 0.021 4.0~6.0: 0.027	0.027	2.5, 3.0 : 0.021 3.5~5.5 : 0.027	2.5~3.5 : 0.017 3.5~6.0 : 0.027
Surface modification	Phosphorylcholine	BioStealthTM	X-technology	BlueXide
그 외 특징	44% thin PTFE sleeve	Petal	Dual layer Little delivery wire tip	Low profile

급여 기준

1. 직경 10 mm 이상의 비파열성 뇌동맥류
2. 직경 10 mm 미만의 비파열성 뇌동맥류
   (1) 내경동맥 원위부의 수포성 뇌동맥류
   (2) 방추형 뇌동맥류
   (3) 척추동맥의 박리형 뇌동맥류
   (4) 두개강내 내경동맥에 발생한, 인접한 다발성 뇌동맥류로서 직경의 합이 10 mm 이상인 경우

* 급여개수 : 1개
* 코일 병용: 직경 15 mm 이상의 뇌동맥류인 경우 최대 5개 인정

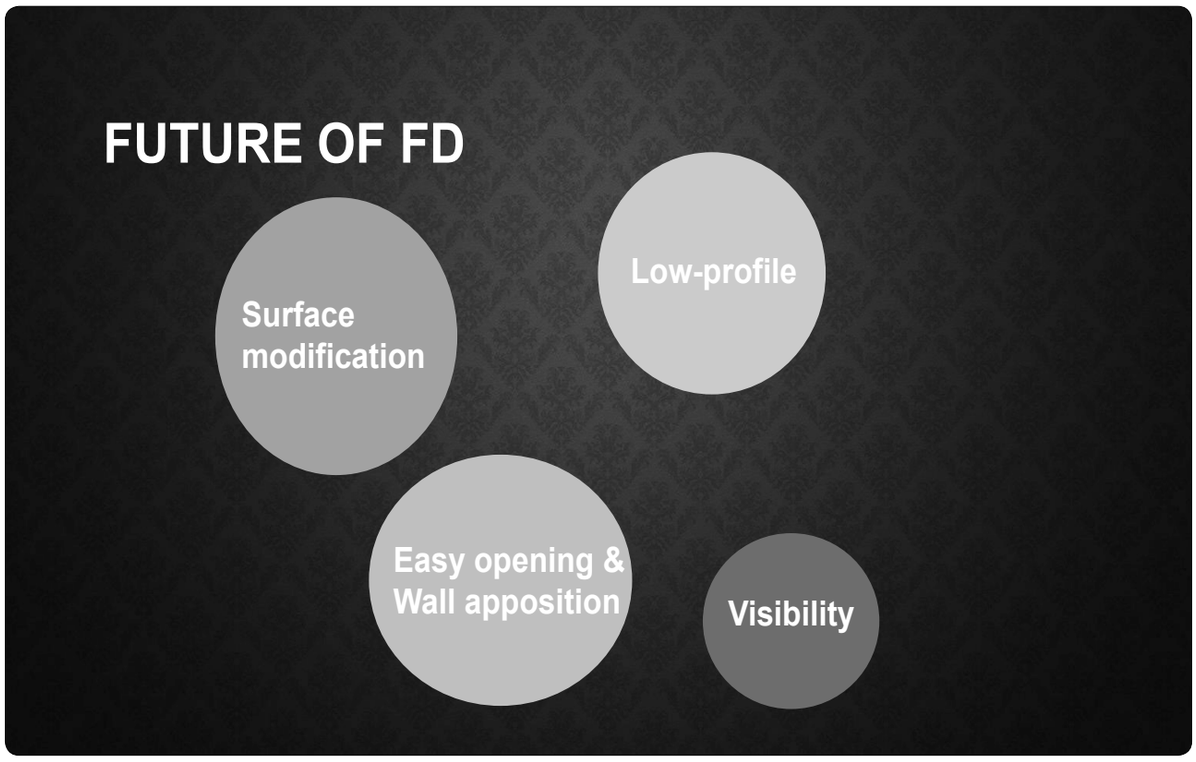
Joonho Chung, M.D., Ph.D., Republic of KOREA

Joonho Chung, M.D., Ph.D., Republic of KOREA

Expanded Off-Label Indications

1. Beyond to the circle of Willis
   (distal, small, bifurcation)
2. Acutely ruptured aneurysms
3. Posterior circulation
4. Recurrent aneurysms
5. Carotid-cavernous fistula

Joonho Chung, M.D., Ph.D., Republic of KOREA



SUMMARY

- FD is a safe and effective treatment modality for Large or complex intracranial aneurysms.
- Development of FD could be promising.

MEMO

Flow diverter: technique and complication

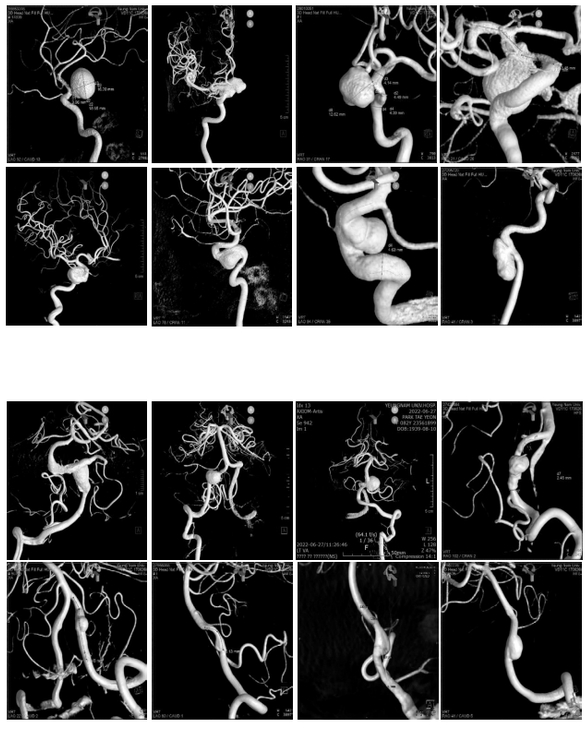
정 영 진
영남대병원

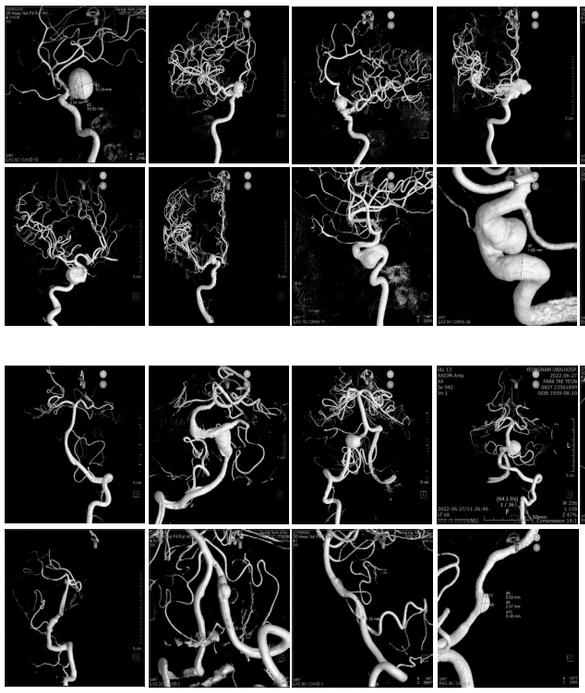
How to Prevention, Avoid, Minimize & Escape COMPLICATIONS of the FLOW DIVERSION

정영진

CCH, JH KIM

Neurosurgery, Stroke Center, YUMC, Daegu, S. Kore





Unruptured aneurysms, all

Postoperative Complications?

Complications of the FD

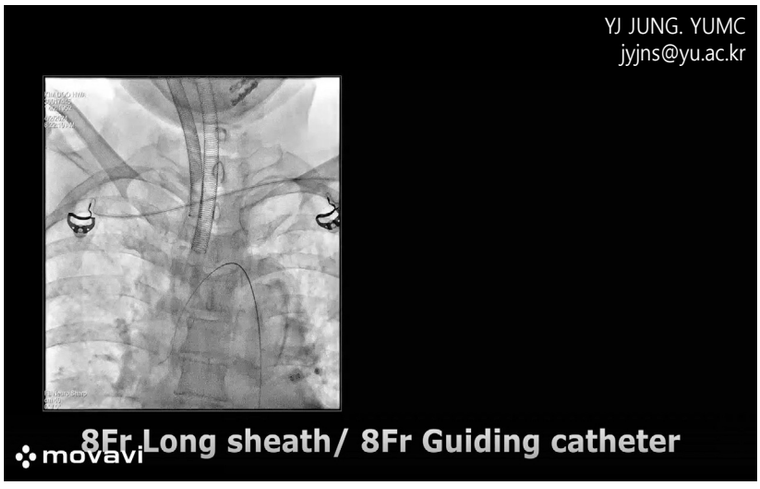
1. **Pre FD**
   1. Delivery Failure d/t unstable guiding system/ Proximal support
   2. Delivery Failure d/t guiding system fracture
2. **During FD**
   1. Not fully expand, Pipeline Distal end d/t PTFE sleeves
   2. Not fully expand, FD d/t fibrin mesh ??
   3. Stent migration/ displacement
   4. Vessel perforation or injury
3. **After FD**
   1. Hemorrhagic cx.
   2. Ischemic cx. : Perforator injury, TEC, Occlusion
   3. Recurred
4. **Unexpected**

Complications of the FD

1. Pre FD

1. Delivery Failure d/t unstable guiding system/ Proximal support
   : Multiple Axis (8Fr sheath) (Sofia 5Fr/ 27 MC, beyond the lesion)
2. Delivery Failure d/t guiding system fracture
   : Axis offset catheter/ MC exchange

Delivery Failure d/t guiding system fracture
: Axis offset catheter/ MC exchange



Delivery Failure d/t

Unstable Guiding system/ Proximal support

: Multiple Axis (8Fr sheath) (Sofia 5Fr/ 27 MC, beyond the lesion)

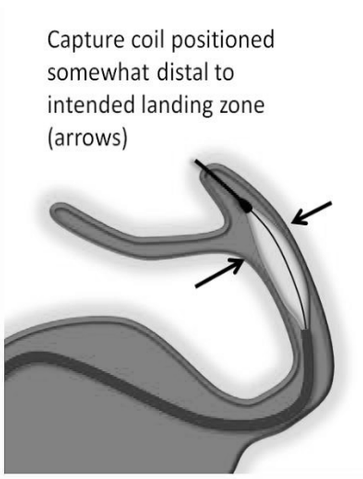
Complications of the FD

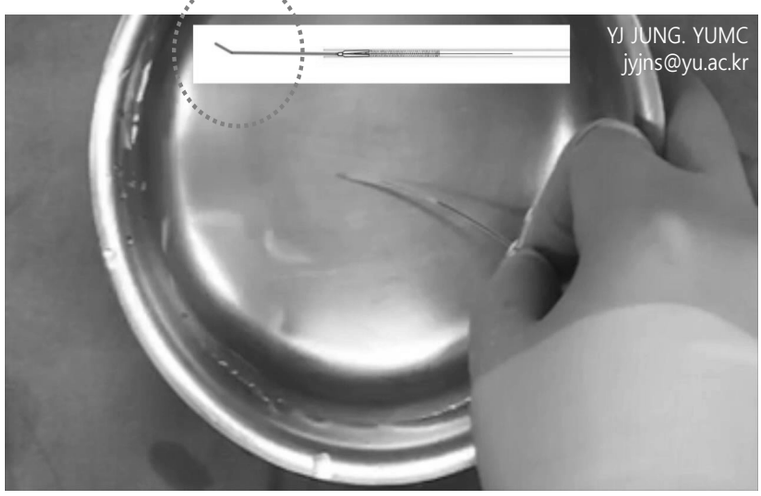
2. During FD

1. Not fully expand, Pipeline Distal end d/t PTFE sleeves
   : Ex-vivo release the PTFE sleeves (Not necessary after PED vantage, Derivo)
2. Not fully expand, FD d/t fibrin mesh ??
   : Reasonably quick delivery (minimal push & pull)
3. Stent migration/ displacement
   : proper anchoring both distal end ~~(2~3mm??)~~
4. Vessel perforation or injury
   : caution the distal tip

Not fully expand, Pipeline Distal end d/t PTFE sleeves

: Ex-vivo release the PTFE sleeves (Not necessary after PED vantage, Derivo)

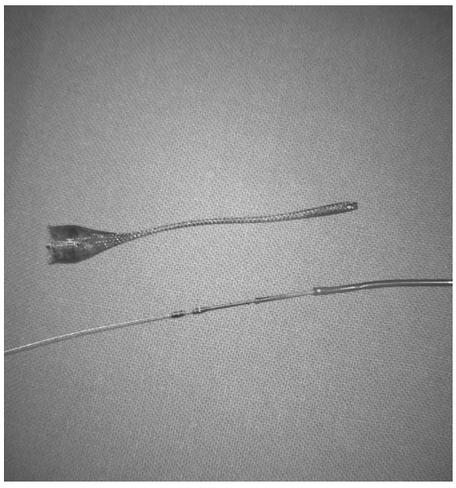


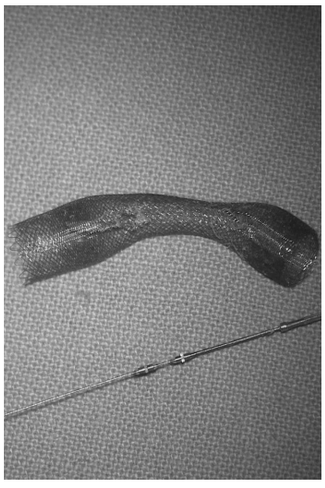


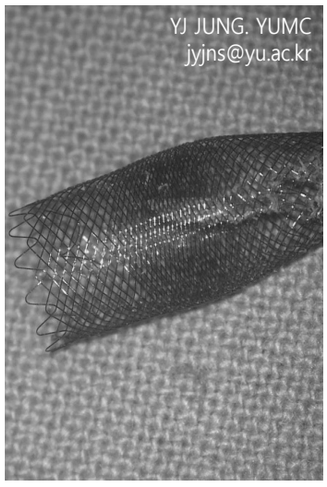
https://neuroangio.org/pipeline-device/pipeline-classic/

Not fully expand, FD d/t fibrin mesh ??

: Reasonably quick delivery (minimal push & pull)

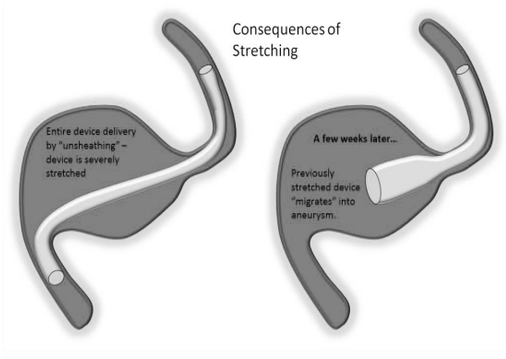






Stent migration/ displacement
: proper anchoring ~~(2~3mm??)~~

Vessel perforation or injury
: caution the distal tip



https://neuroangio.org/pipeline-device/pipeline-classic/

Complications of the FD

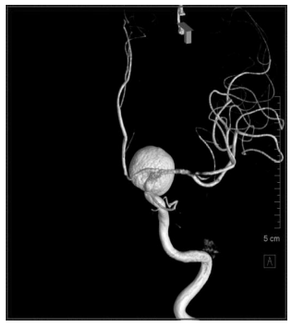
3. After FD

1. Hemorrhagic cx.
   : Jet flow, Unstable an. (wall enhanced, thrombosed)
2. Ischemic cx. : Perforator injury, TEC, Occlusion
   : Medication, Wall apposition (Balloon angioplasty),
3. Recurred
   : Additional FD, Proximal occlusion c/w bypass

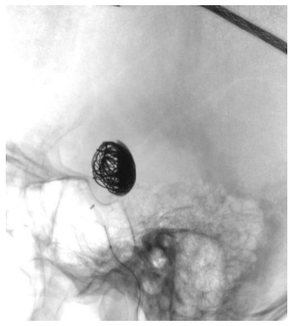
Hemorrhagic cx.

: Jet flow, Unstable an. (wall enhanced, thrombosed)

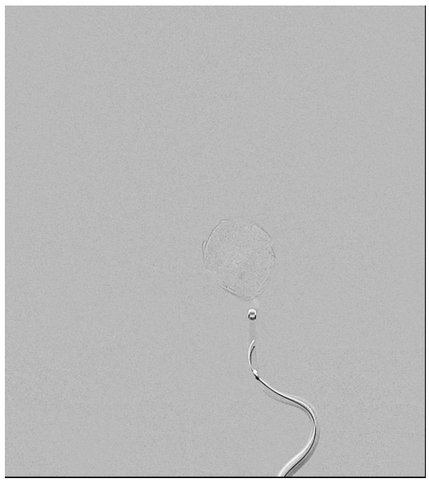
: Multiple FD, Steroid, ABR

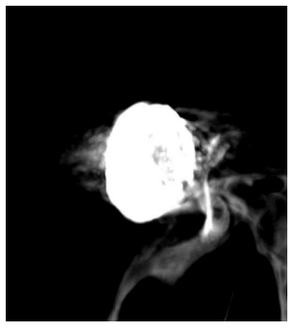


Case 1,
51 YOF, UIA, HA
2020.12.23



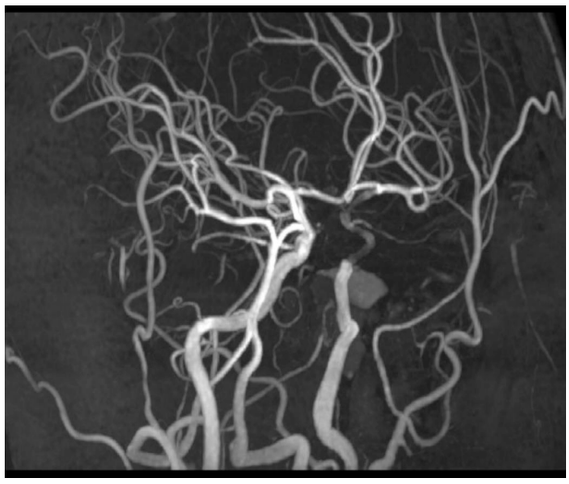
First, Coils



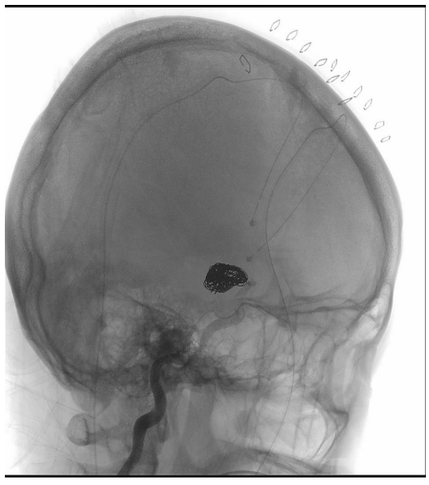


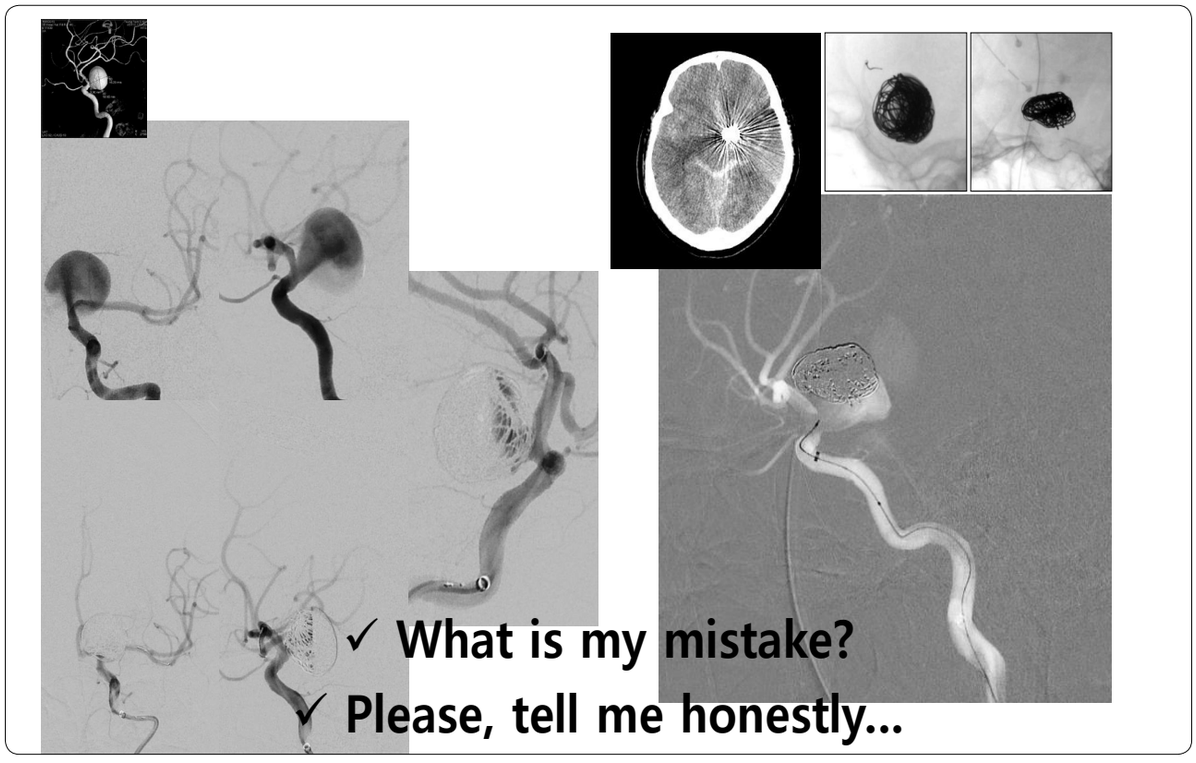
Then, PED

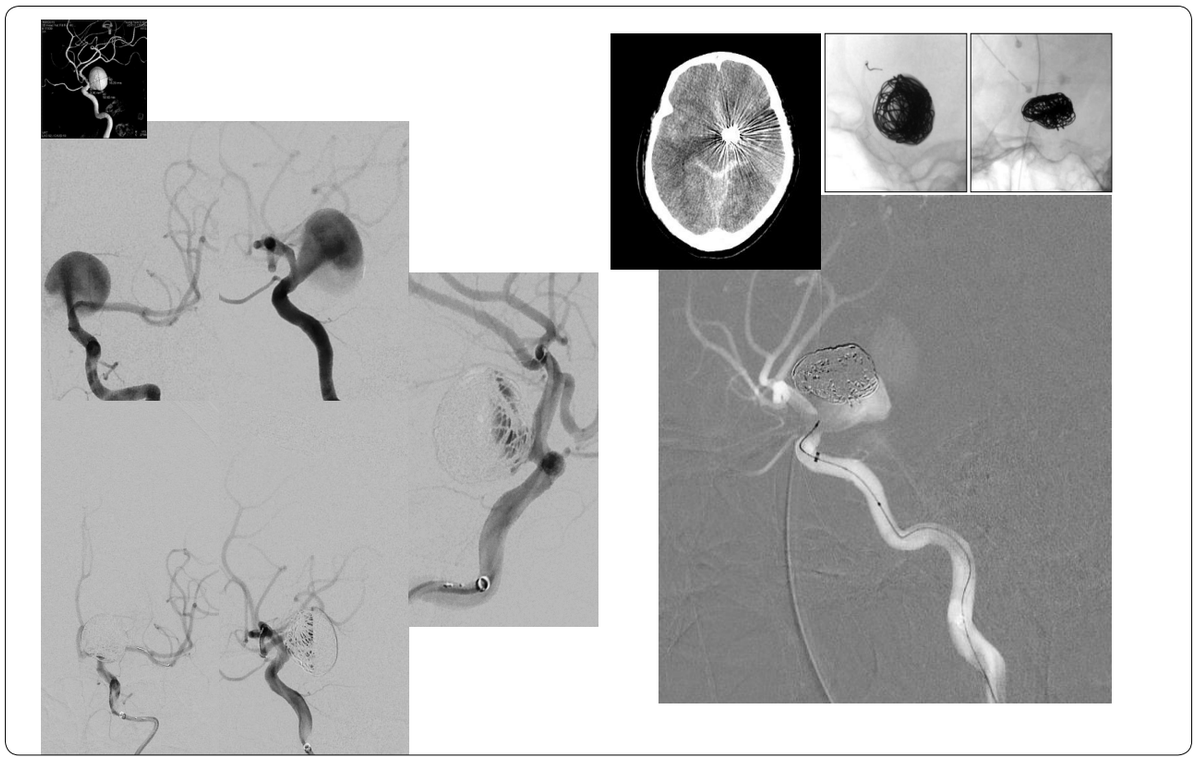
51 YOF, UIA, HA
2020.12.23, #POD 0d



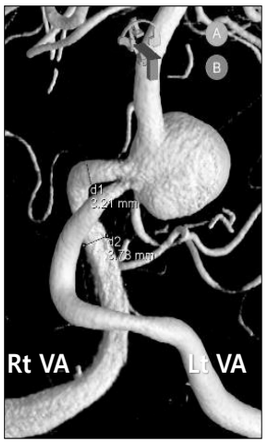
51 YOF, UIA, HA
2020.12.24, #POD 1day

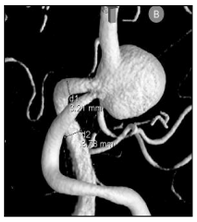


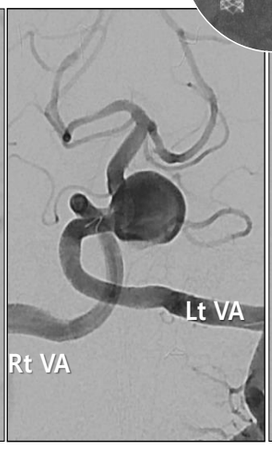

✓ What is my mistake?
✓ Please, tell me honestly...



Case 2
23561899, 81 YOF, UIA
FD (Surpass) & Trapping



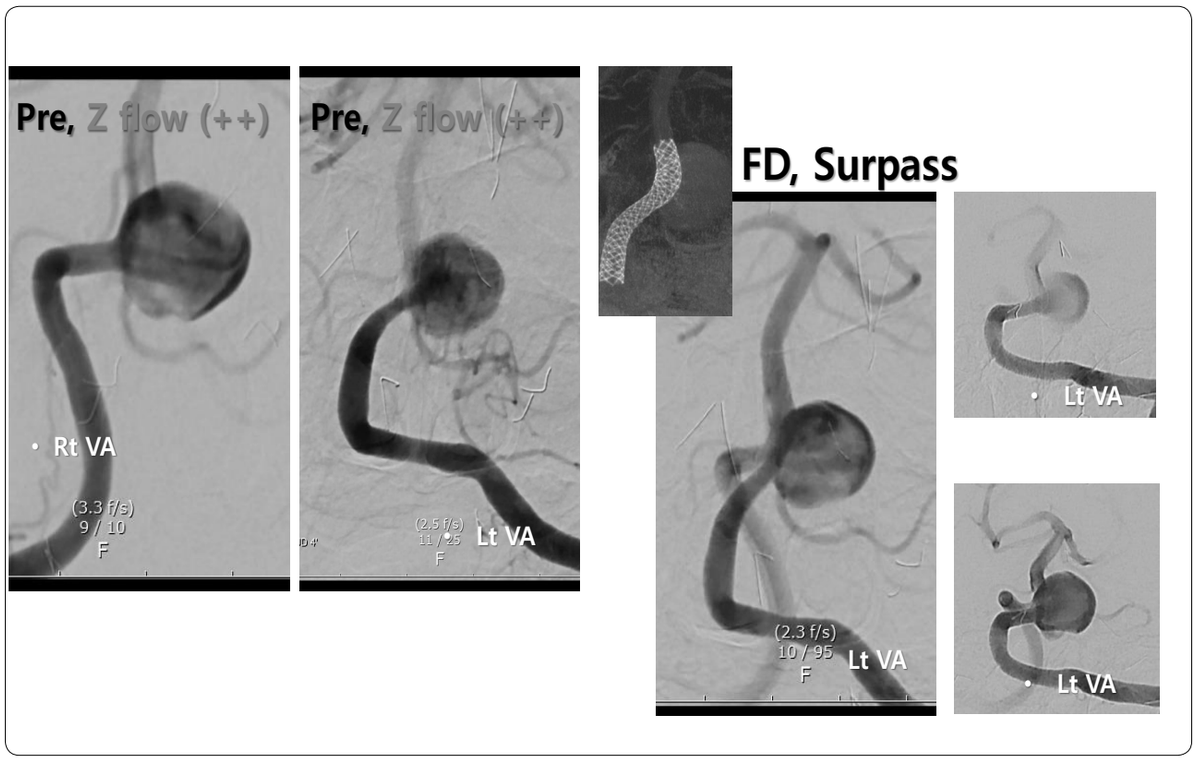


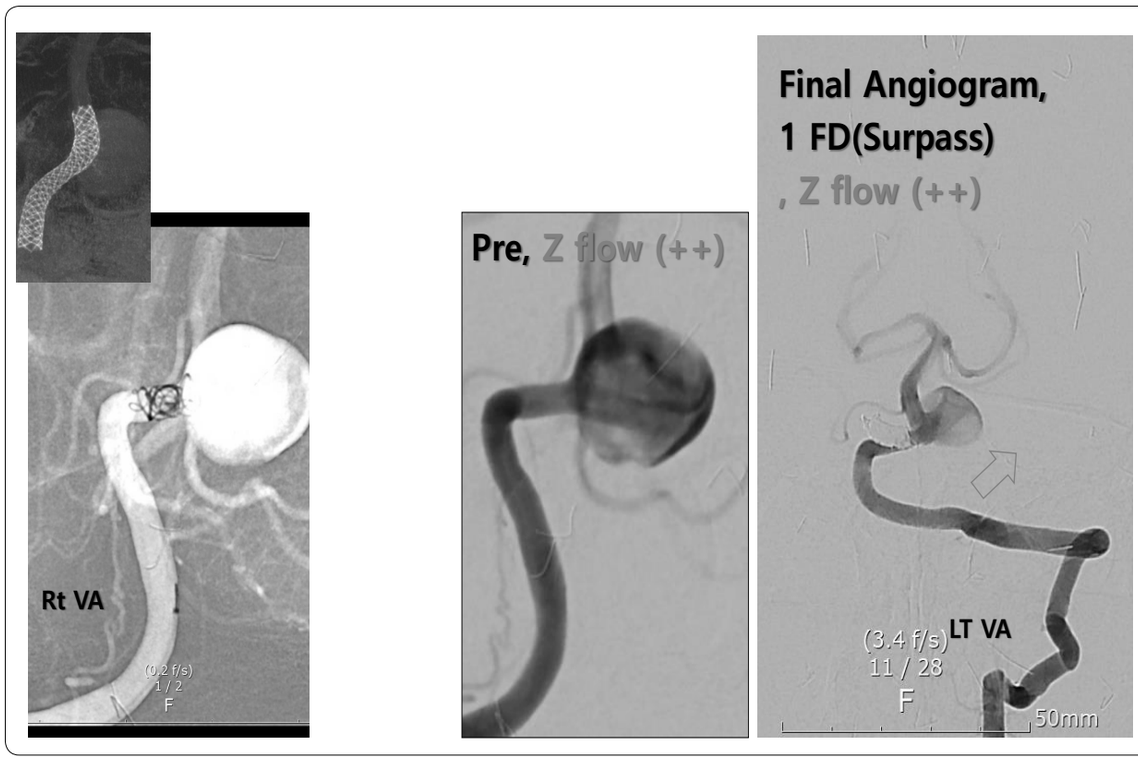


Post OP, FD (+)

Post OP, FD (+)
& Rt VA Trap (+)

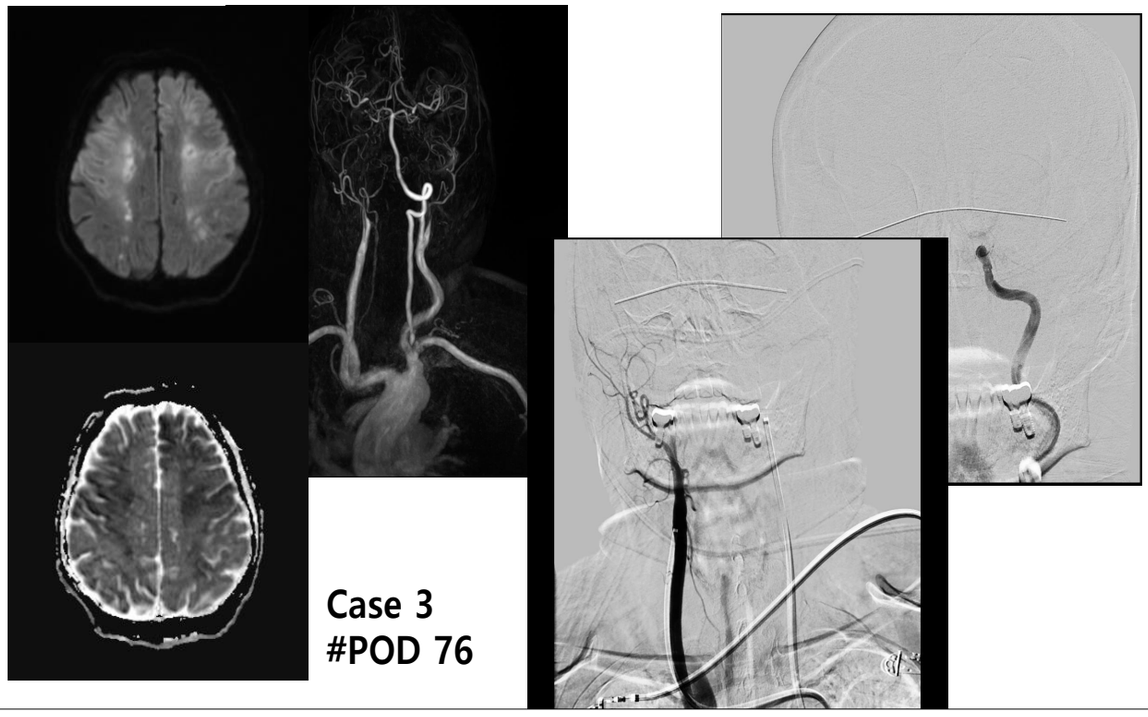
#POD 5, After Bleeds

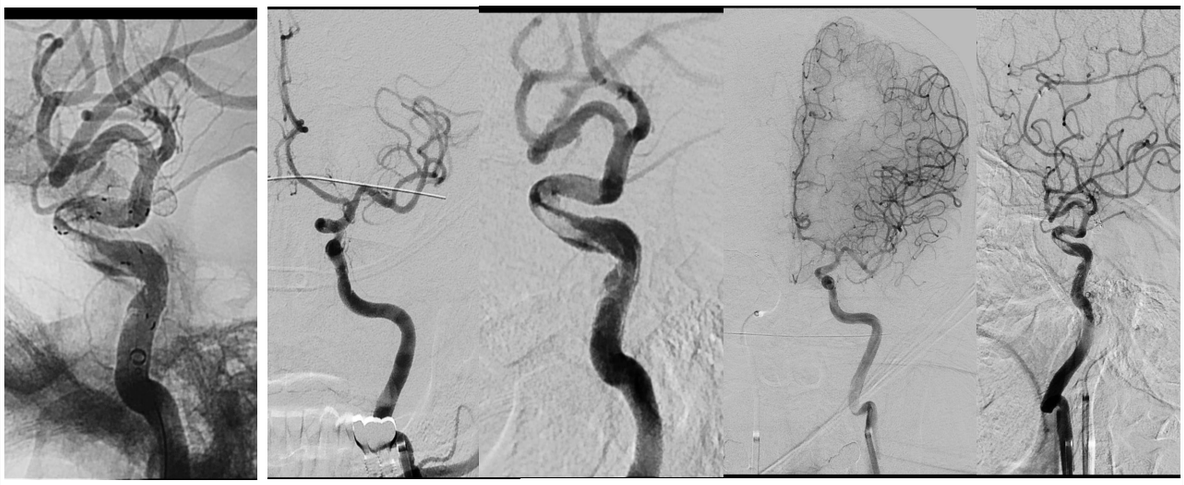

Pre, Z flow (++)
• Rt VA
(3.3 f/s)
9 / 10
F
Pre, Z flow (++)
(2.5 f/s)
11 / 25
F
Lt VA
FD, Surpass
(2.3 f/s)
10 / 95
F
Lt VA
• Lt VA
• Lt VA


Rt VA
(0.2 f/s)
1 / 2
F
Pre, Z flow (++)
Final Angiogram,
1 FD(Surpass)
, Z flow (++)
(3.4 f/s)
11 / 28
F
LT VA
50mm

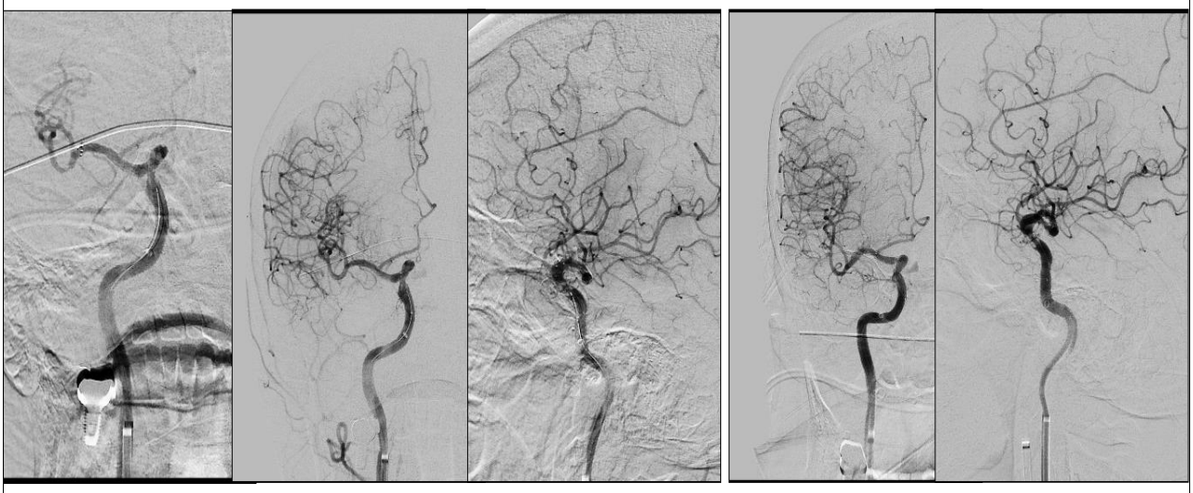
Ischemic cx. : Perforator injury, TEC, Occlusion

: Medication, Wall apposition (Balloon angioplasty)



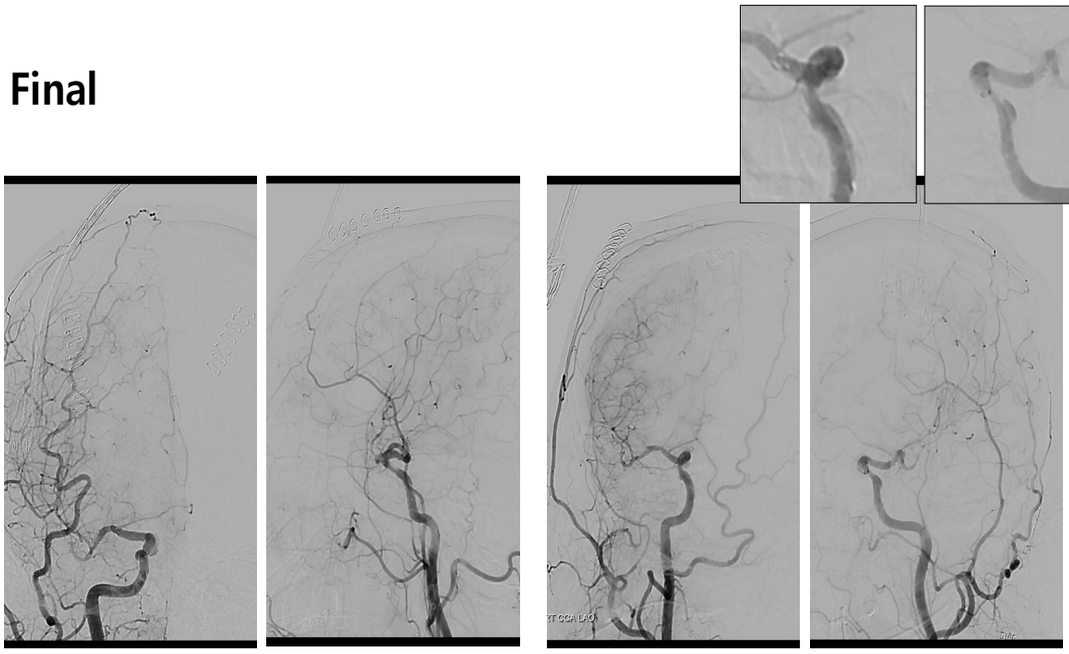


LT, FIRST | SRT (6*40), iA tirofiban (Little thrombus) | Final

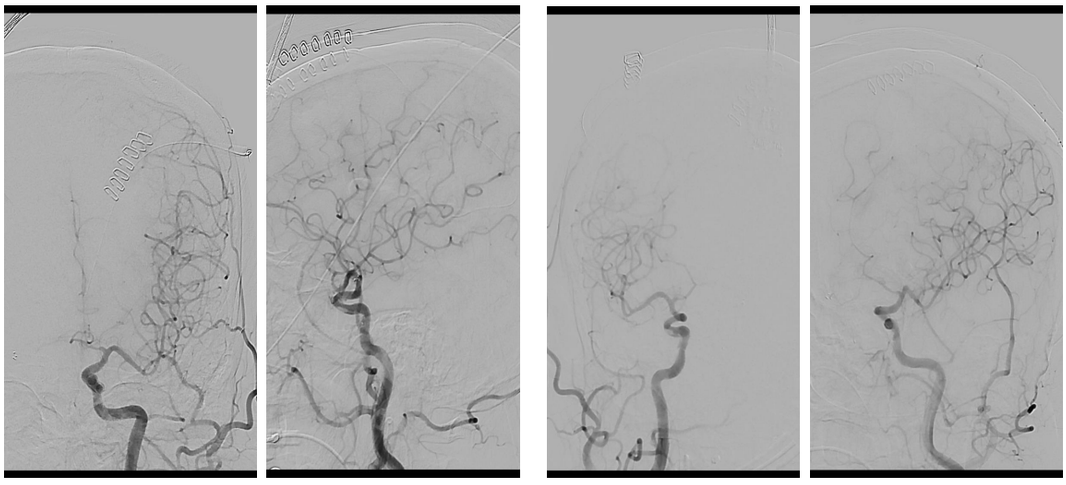


RT, Second | FRESH(Stenting + iA tirofiban) | Final

Final



F/U



Review of Previous FD

Rt

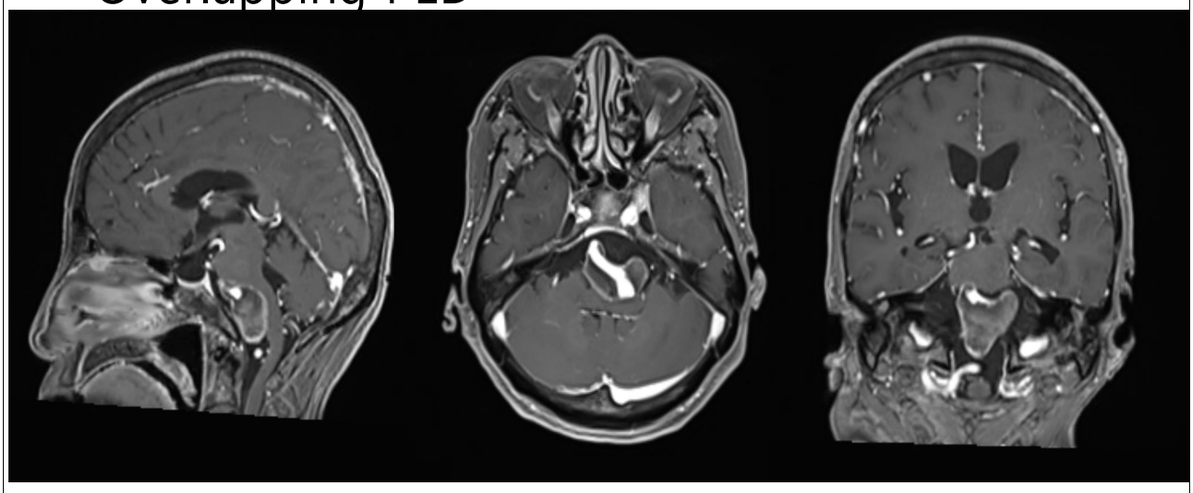
Lt

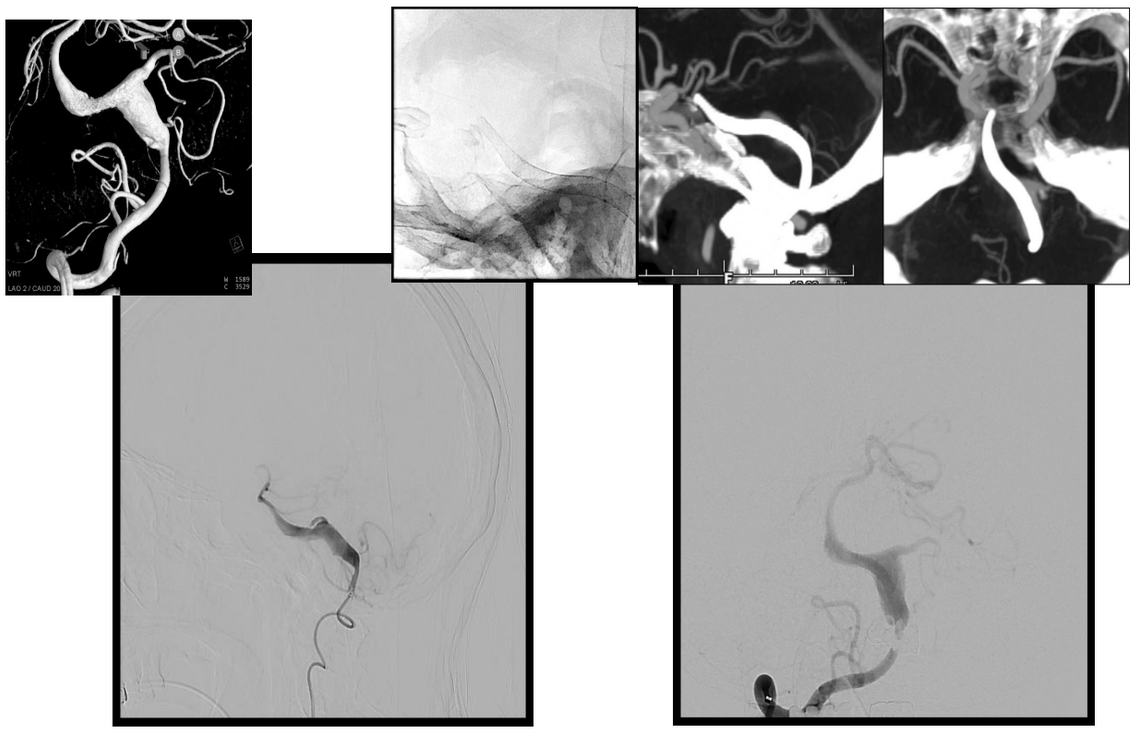
Recurred

: Mass effects,

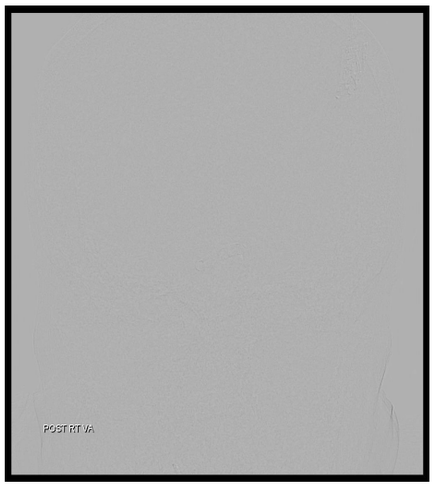
: Additional FD, Proximal occlusion c/w bypass

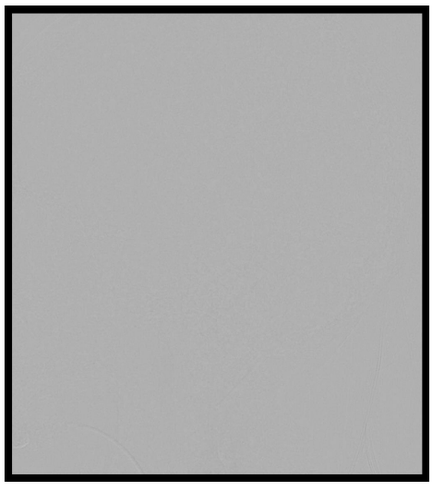
Case 4
70 YOF, 19566839
Overlapping PED

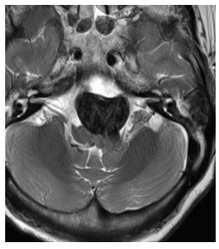




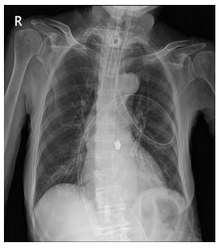
Post OP





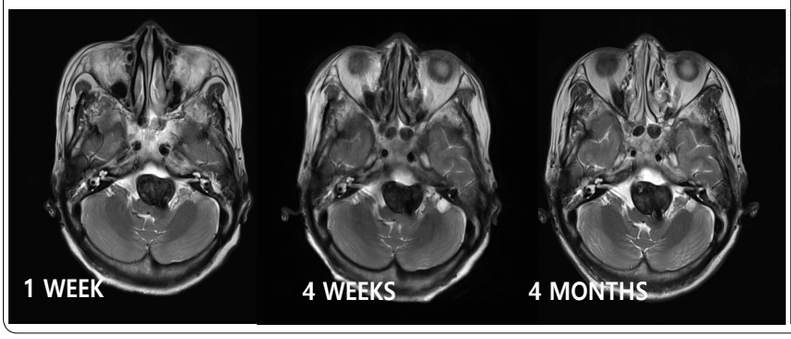


INITIAL

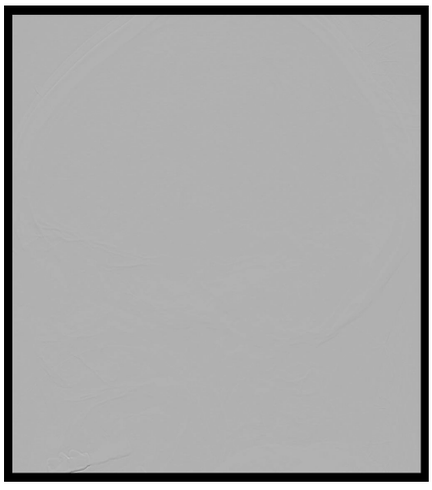


OTL...

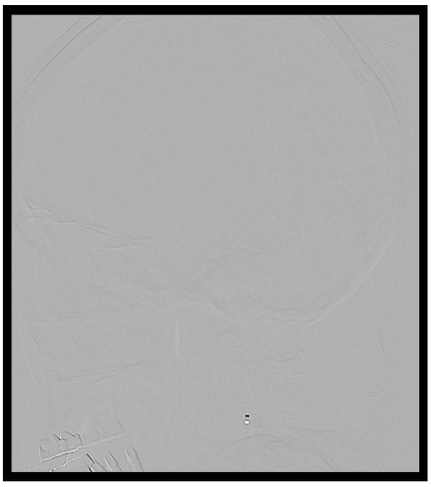
***Aggravation, Gait disturbance**

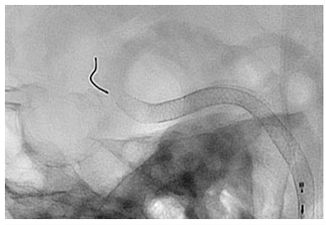


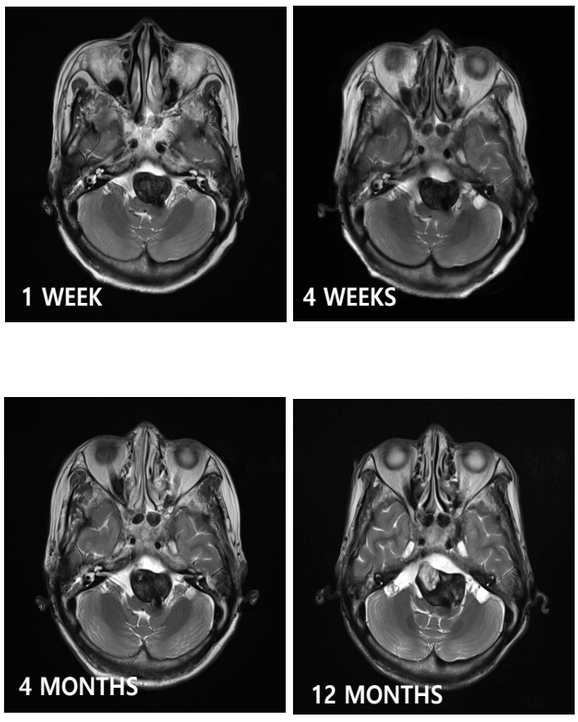
12 Months, F/U



2nd PED, (#POD 12M)

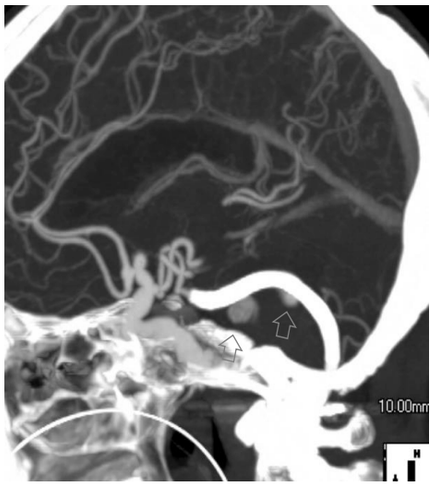






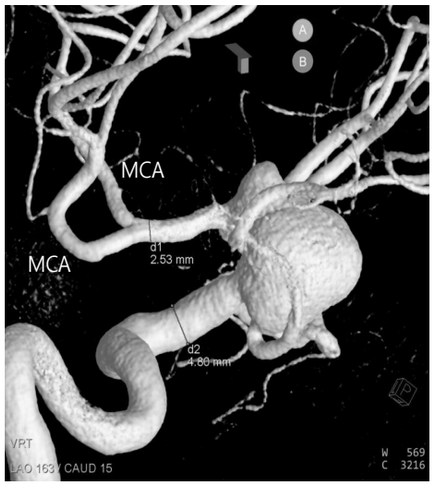
*No, Sx improved

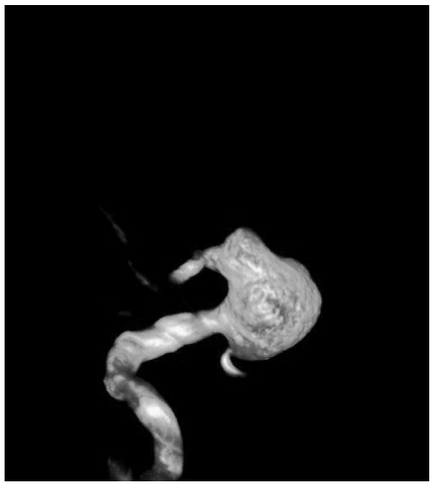
2nd PED 3 M/15 MONTHS f/u



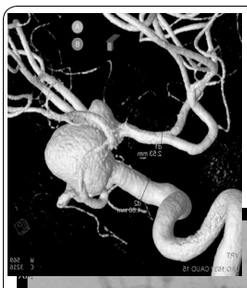
How to Reduce,

30017445 73 YOF UIA, H/A

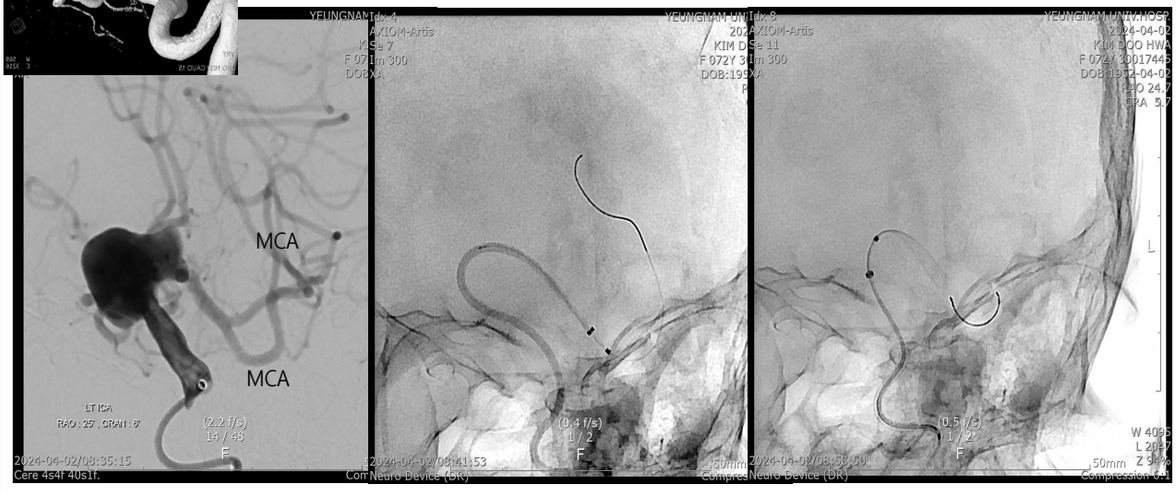


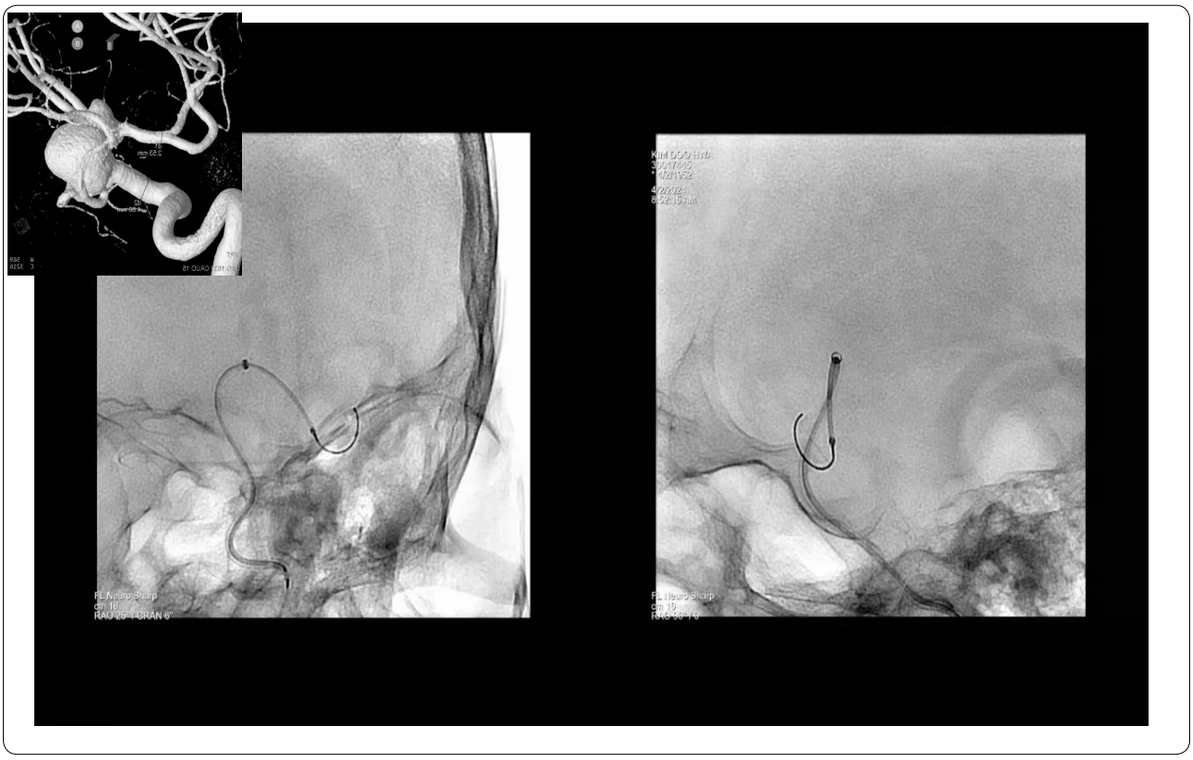


2024.04.02.

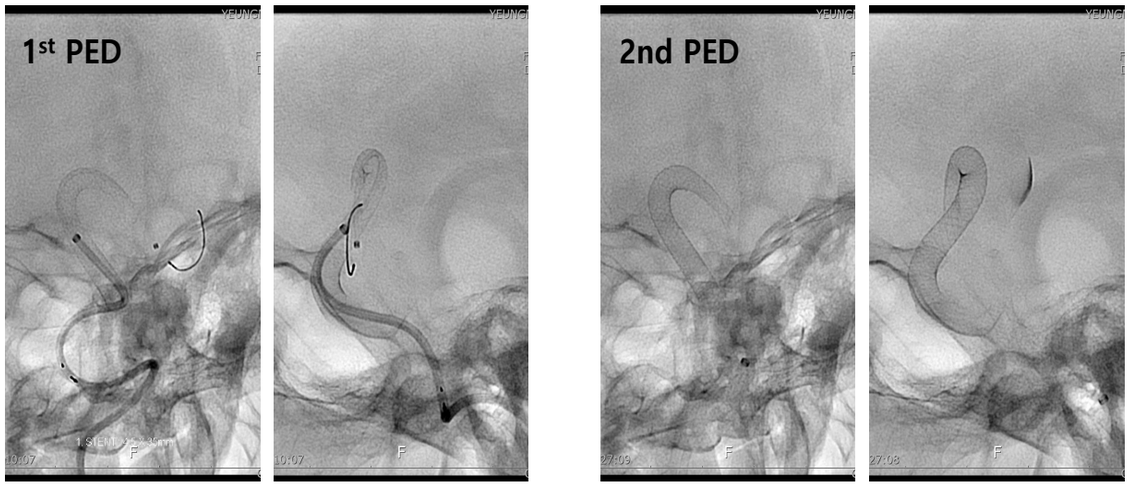


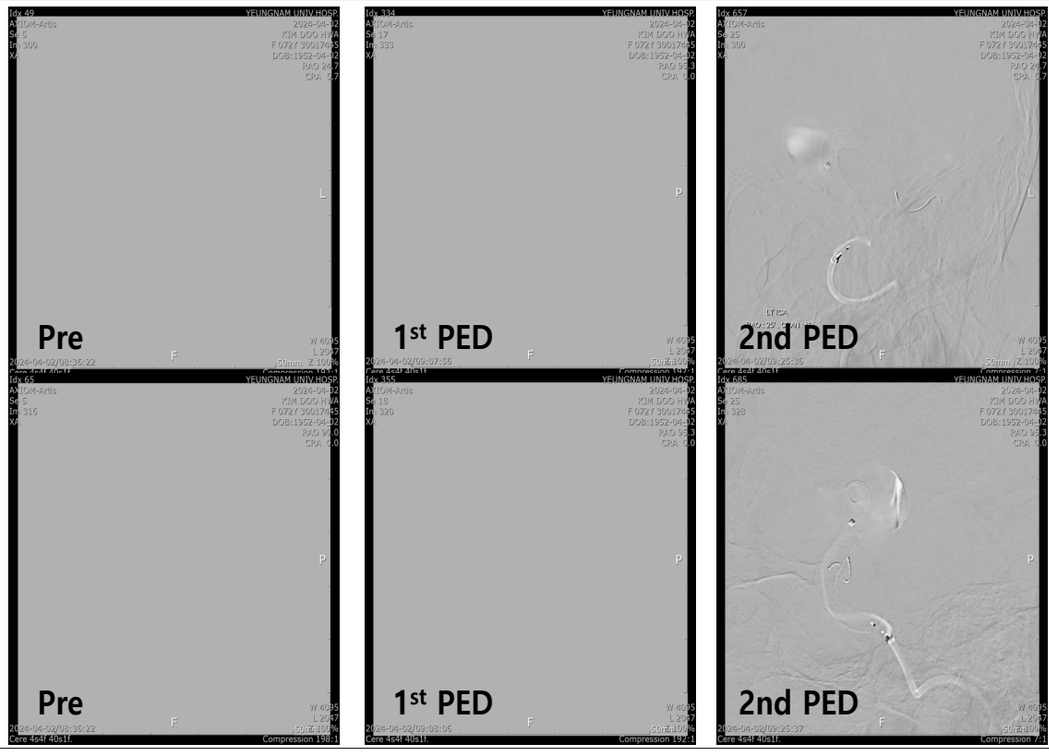
Working view (04.02)

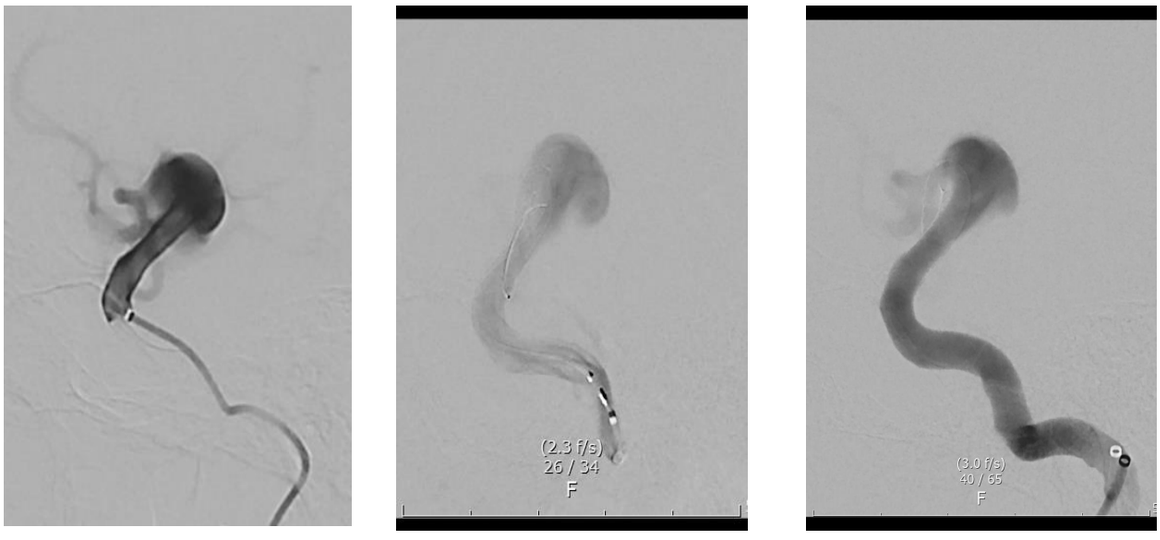




Working view (04.02)



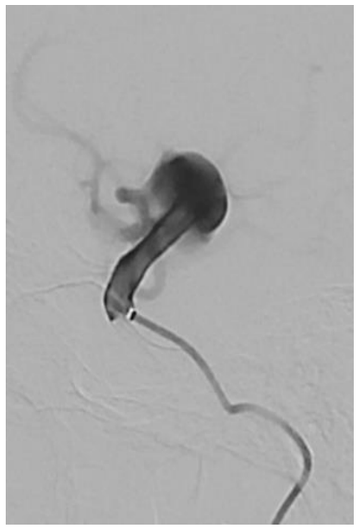




Initial
: Z flow

1st PED
: z flow

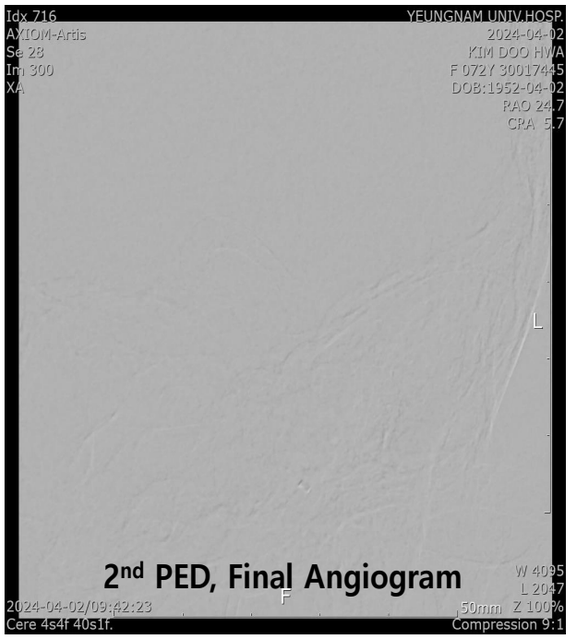
2nd PED
: wide z flow

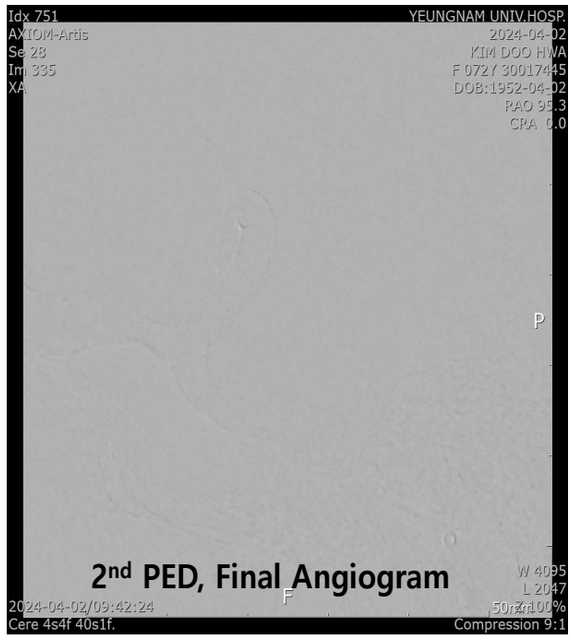


Initial
: Z flow

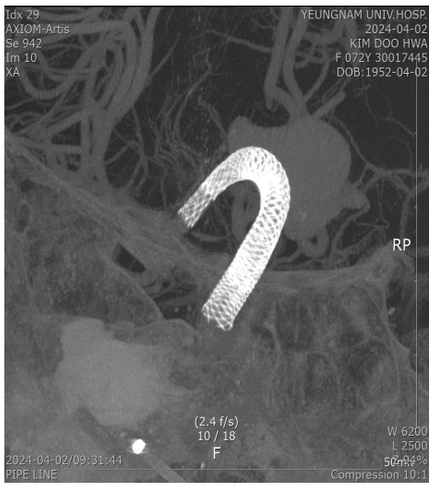
1st PED
: z flow

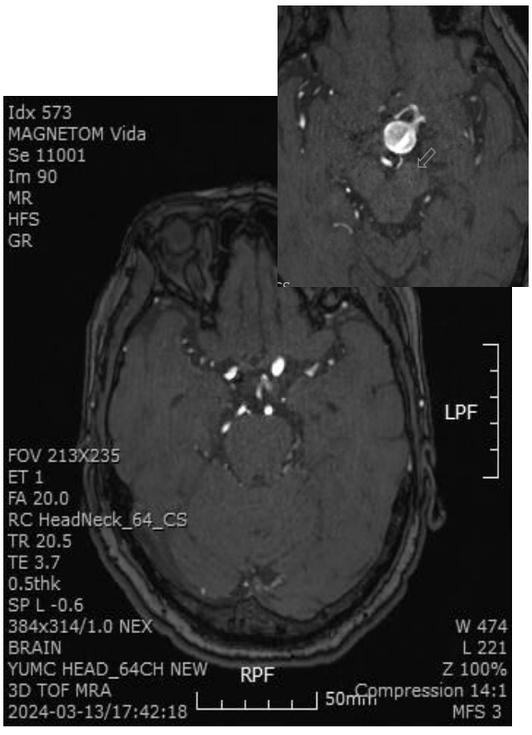
2nd PED
: wide z flow

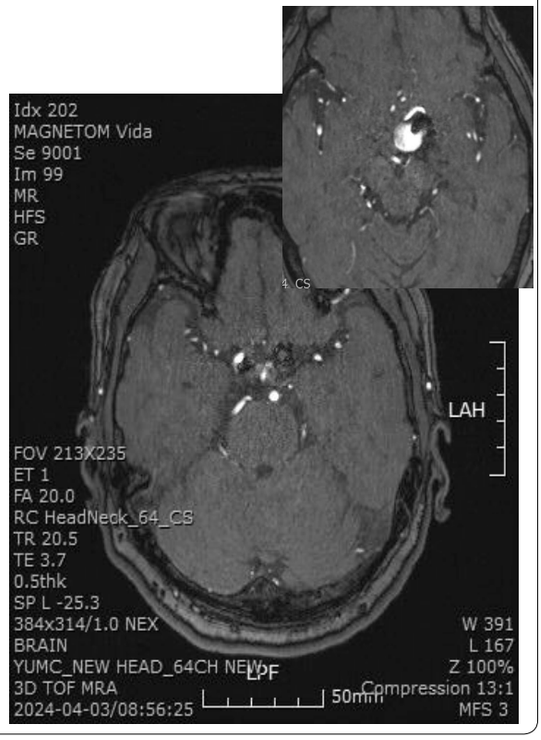




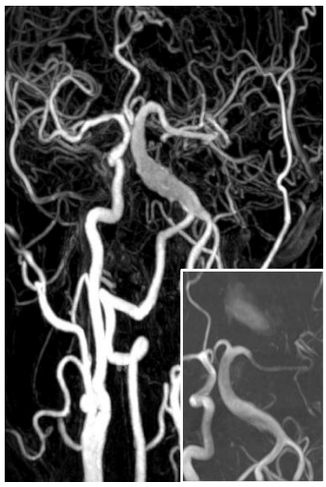
2nd PED, Final Angiogram (삭감???)







Take home massage



MEMO

Flow distruptor

정 준 호
연세대 강남세브란스병원

BNET-3. May 11, 2024.

Flow-Disruptor

Advanced Treatment Strategy for IAs

Joonho Chung, M.D., Ph.D.

Associate Professor

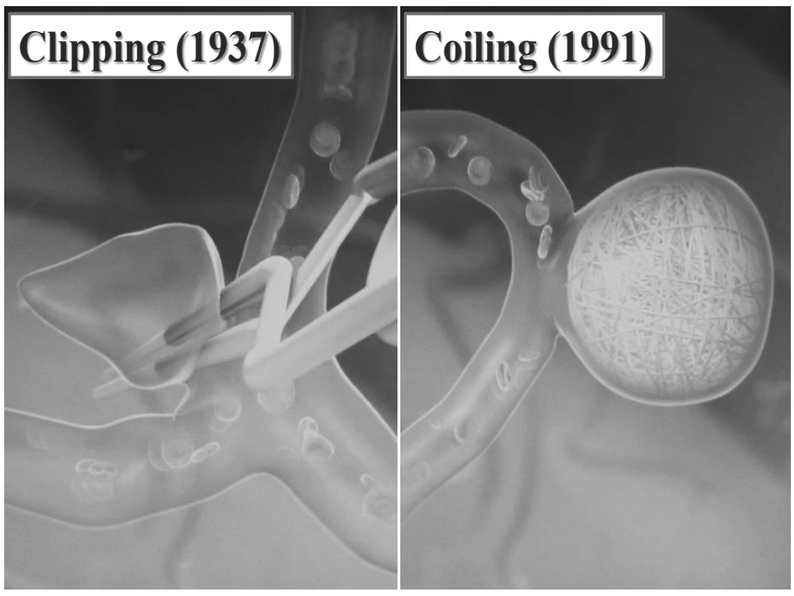
Department of Neurosurgery

Gangnam Severance Hospital

Yonsei University College of Medicine

대한뇌혈관내치료의학회 KoNES Korean NeuroEndovascular Society

Prevention of Rebleeding from aneurysm



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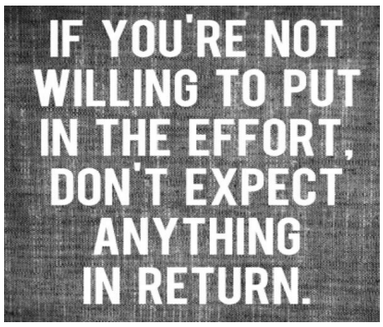
WHY ?

한 개인의 철학은 자세를 결정하고,
자세는 행동을 결정하며,
행동에 따라 결과가 결정되므로
결국 자세는 인생을 결정한다.

Innate Talent
&
Acquired Skills



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Simple
Short
Safe

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Endovascular Devices

Be Aware with Complete Understanding

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Evidences in EVT
(Intracranial aneurysms)

ARTICLES

Articles

Lancet 2002; **360:** 1267–74

International Subarachnoid Aneurysm Trial (ISAT) of neurosurgical clippin
ruptur

Internationa

At 1 year,

Survival free of disability

Coiling > Clipping

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Evidences in EVT
(Intracranial aneurysms)

International subarachnoid aneurysm trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysms: a randomised

Lancet 2005;366:809-17

izures,

ternational Subarachnoid

At 1 year,

Dead or Dependent

Coiling 23.5%

Clipping 30.9%

Absolute risk reduction 7.4%

(P = 0.0001)

Evidences in EVT
(Intracranial aneurysms)

Risk of recurrent subarachnoid haemorrhage, death, or dependence and standardised mortality ratios after clipping or coiling of an intracranial aneurysm in the International Subarachnoid Aneurysm Trial (ISAT): long-term follow-up

Lancet 2009;8:427-33

Andrew J Moly

At 5 year, Risk of death

Significantly Lower in Coiling Group

(RR = 0.77; p = 0.03)

Evidences in EVT
(Intracranial aneurysms)

AHA/ASA Guideline Stroke 2012;43:1711-37

Guidelines for the Management of Aneurysmal Subarachnoid Hemorrhage

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Surgical and Endovascular Methods of Treatment of Ruptured Cerebral Aneurysms: Recommendations

1. Surgical clipping or endovascular coiling of the rup-

Endovascular Treatment ≧ Microsurgery

4. For patients with ruptured aneurysms judged to be technically amenable to both endovascular coiling and neurosurgical clipping, endovascular coiling should be considered *(Class I; Level of Evidence B).* (Revised recommendation from previous guidelines)

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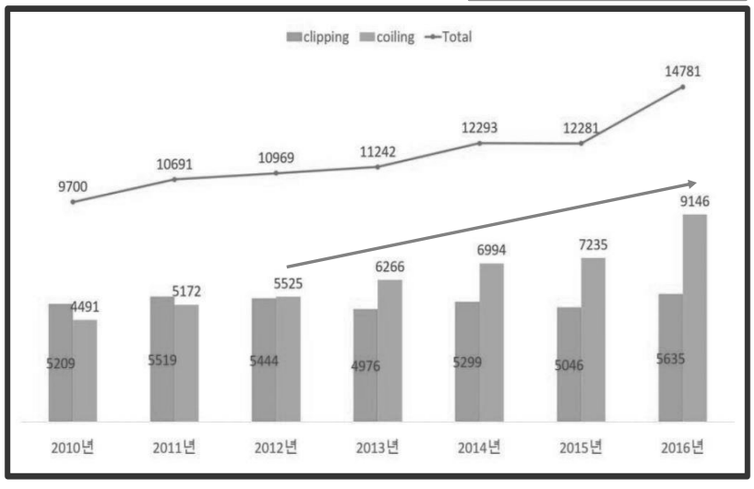
Neurointervention 2017;12:77-82
https://doi.org/10.5469/neuroint.2017.12.2.77
ISSN (Print): 2093-9043 ISSN (Online): 2233-6273



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EVIDENCES

Ruptured Aneurysm

The durability of endovascular coiling versus neurosurgical clipping of ruptured cerebral aneurysms: 18 year follow-up of the UK cohort of the International Subarachnoid Aneurysm Trial (ISAT)

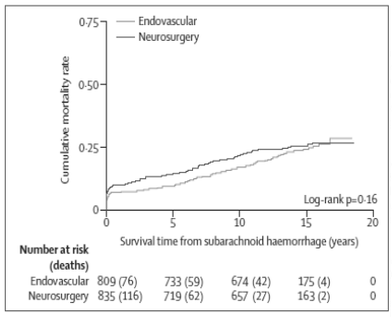

Figure 2: **Kaplan-Meier plot of cumulative mortality**
Patients observed for 10–18·5 years in 22 UK centres.

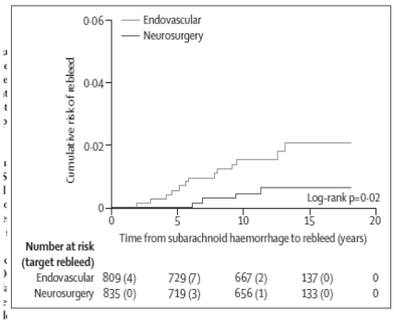

Figure 1: **Kaplan-Meier plot of cumulative risk of rebleeding from target (treated) aneurysm later than 1 year after subarachnoid haemorrhage**

Interpretation Although rates of increased dependency alone did not differ between groups, the probability of death or dependency was significantly greater in the neurosurgical group than in the endovascular group. Rebleeding was more likely after endovascular coiling than after neurosurgical clipping, but the risk was small and the probability of disability-free survival was significantly greater in the endovascular group than in the neurosurgical group at 10 years.

Neuroradiology Research Unit, Nuffield Department of Surgical Sciences, University of Oxford, Oxford OX3 9DU, UK
andy.molyneux@nds.ox.ac.uk

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Intracranial Arteries....

1. Lack of Adventitia
2. Lack of Supportive Tissue
3. Very Tortuous
4. Importance of Perforators

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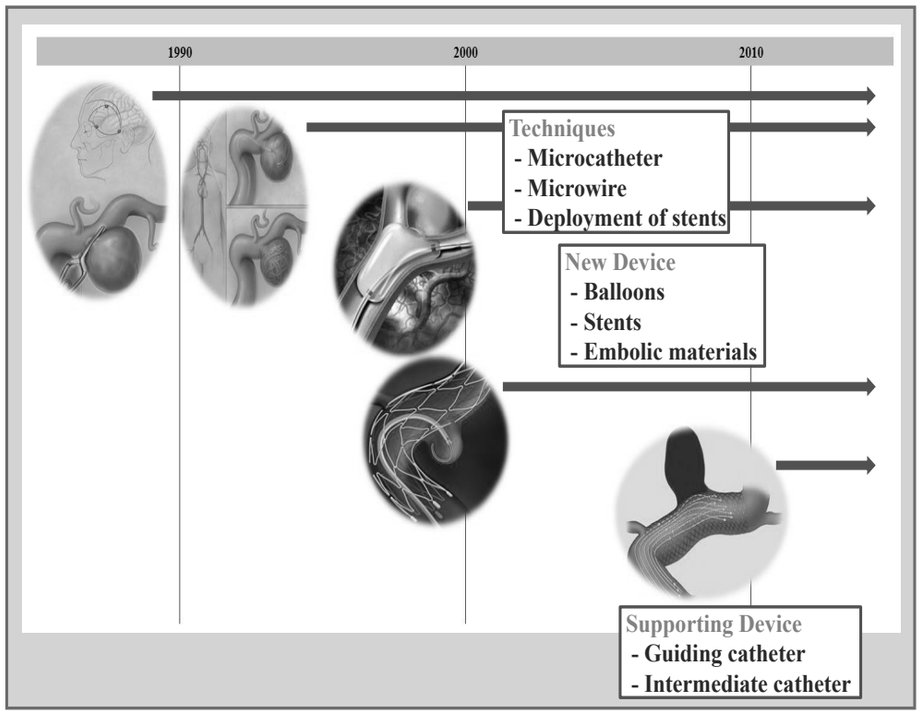

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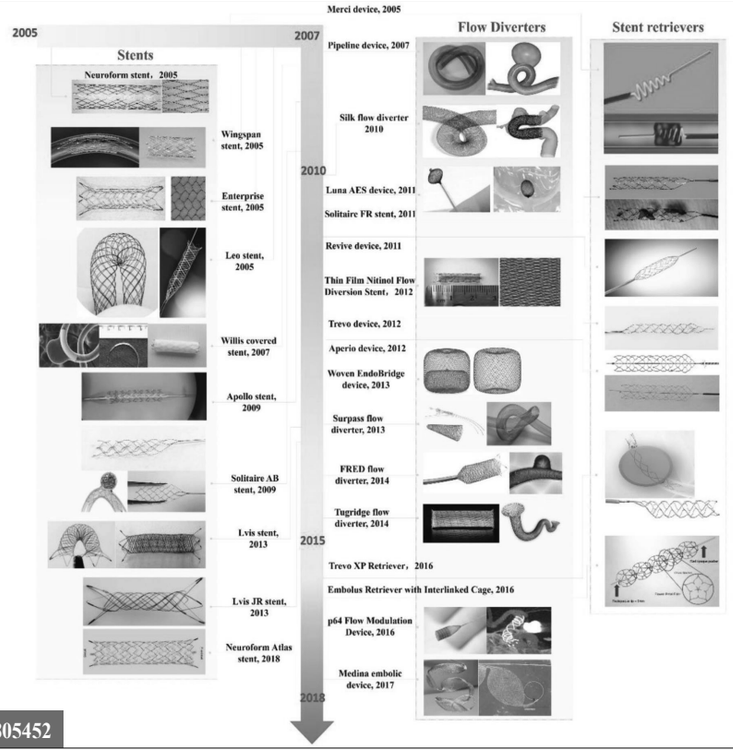

Adv Mater 2019;31(8):e1805452

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Limitations

1) Giant aneurysm
2) ICA blister aneurysms
3) Recurrent aneurysm after EVT
4) Technical difficulties
   - Complex shape
   - Very small aneurysm
   - Branch incorporated
   - Fusiform aneurysm

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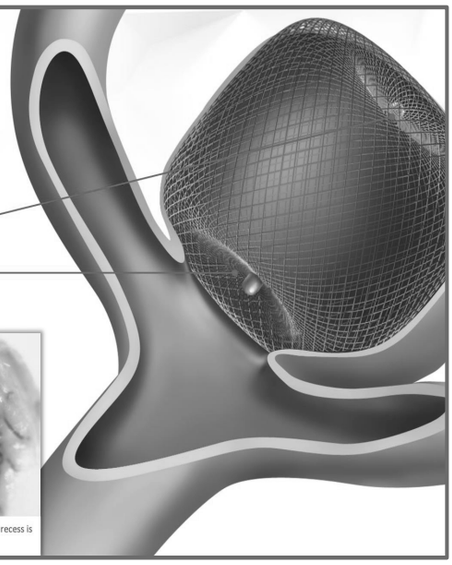
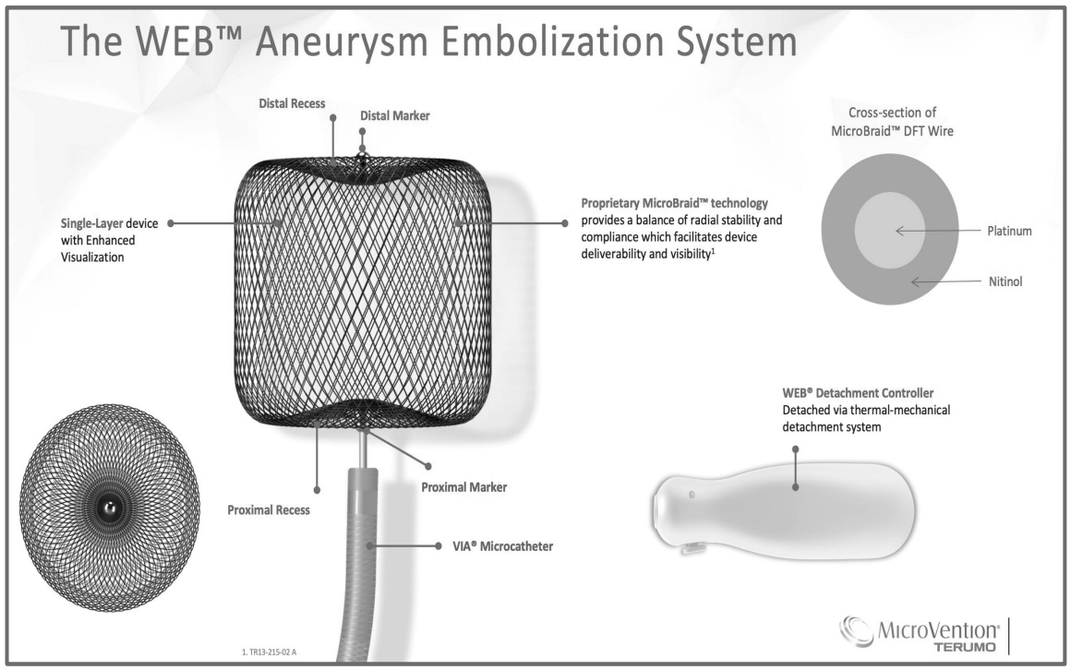
Mechanism of Action

MicroBraid™ Technology is designed to seal the neck and protect the dome[1]:

- ~60% metal coverage at the neck and the dome of the aneurysm provides two layers of flow disruption
- Proximal recess limits vessel encroachment
- Nitinol surface provides scaffold for endothelialization around the aneurysm neck, sidewalls, and dome

Canine explant 2 months after treatment. Marker recess is filled with dense fibrous tissue[2]





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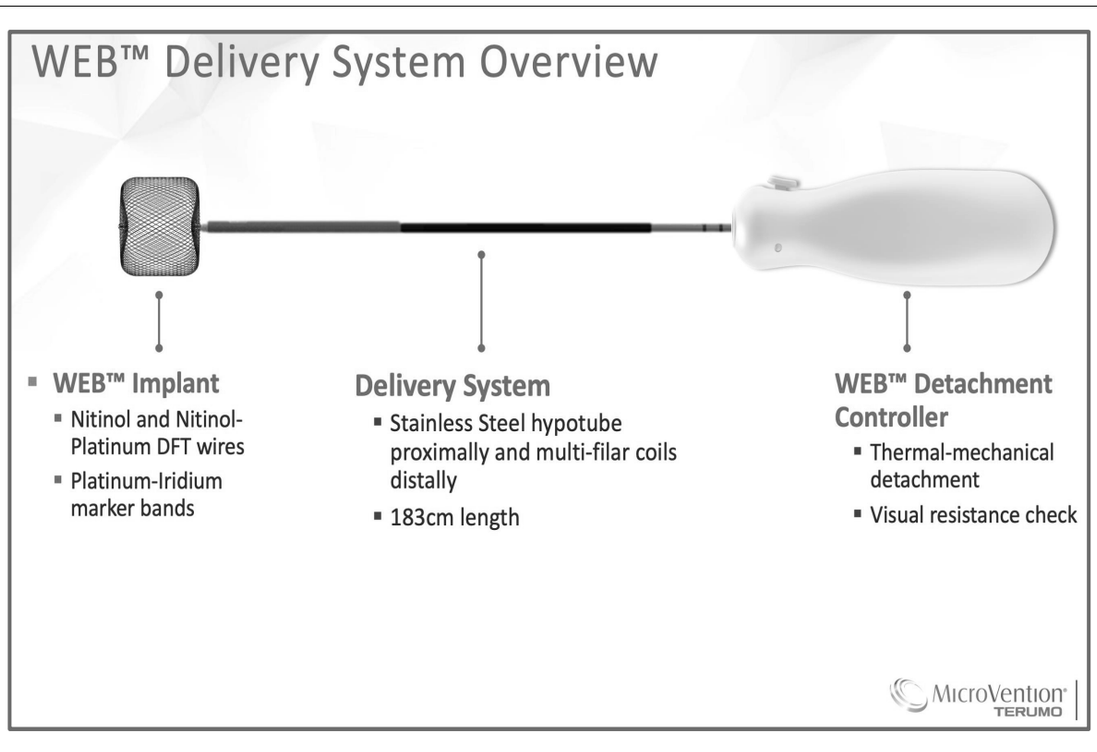

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보험 급여 기준

급여가격	WEB **10,579,770원*** (선별급여 공단 50%/본인부담 50%) * 심평원 환율기준 1단계로 적용된 금액
세부 인정 기준	가.급여대상:아래의 조건을 **모두 충족한** 뇌동맥류: 1) **뇌동맥류 위치** 가)중대뇌동맥 분지(MCA bifurcation) 나)내경동맥 말단(ICA terminus) 다)전교통동맥 복합체(AComm complex)또는 뇌저동맥(Basilar Aertery)첨부(Apex) 2) **뇌동맥류 모양** : 낭상동맥류(Saccular aneurysm) 3) **뇌동맥류 크기** : 직경3~10mm이고,경부4mm또는Dome-to-neck ratio 1~2인 경우 나. 급여개수: **1개** 다.뇌동맥류 색전술용 **Micro Coil 및 STENT의 병용사용**이 불가피하게 필요한 경우,의사소견서 및 진료기록부 등 관련 자료를 첨부하여야 하며 제출된 관련 자료를 참조하여 **사례별로 인정**

Contradictions

The WEB™ Aneurysm Embolization System is contraindicated for patients with known bacterial infection that may interfere with or negatively affect the implantation procedure and patients with known hypersensitivity to nickel

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

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Single Layer

Single Layer Sphere

Portfolio Overview	
Shapes	▪ Single Layer (SL) ▪ Single Layer Sphere (SLS)
Sizes	▪ Diameter: 3 – 11mm ▪ Height: 2 – 9mm
Implant Construction	
Metallic Components	▪ Pt-Ir Marker Bands ▪ Pt-Ir Coupler ▪ Nitinol and Nitinol-DFT wire
Non-Metal Components	▪ PET Tether ▪ Epoxy
Number of Wires	▪ 3 – 7mm (17 system): 72-108 ▪ 8-11mm (27/33 system): 180 – 216
Wire Sizes	▪ 0.00075” – 0.00125”
% Metal at Neck	▪ 59% – 62%

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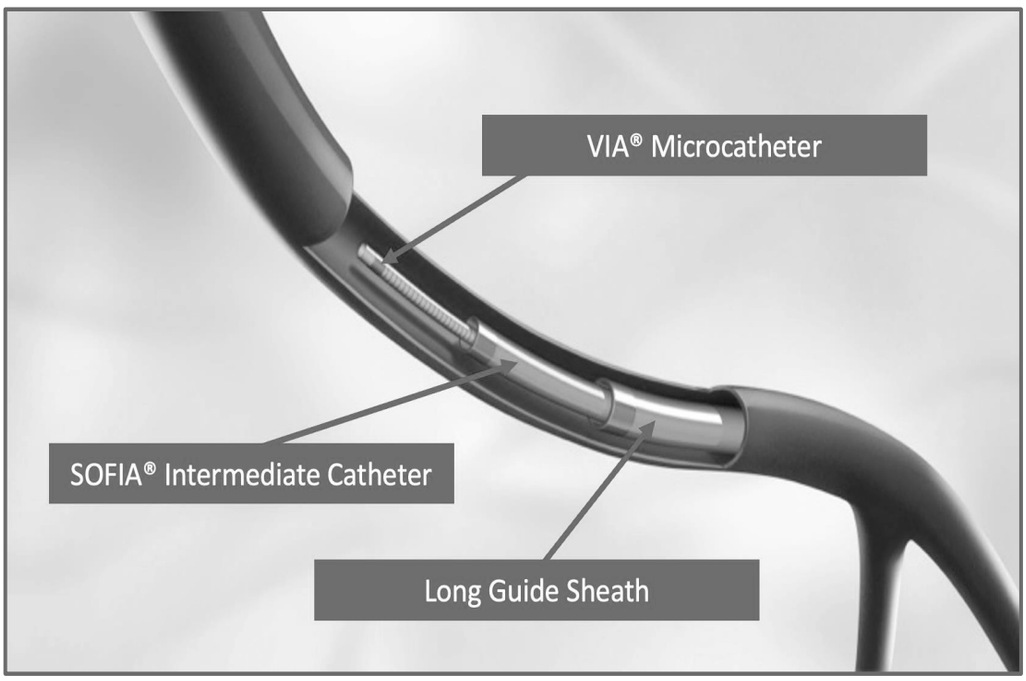

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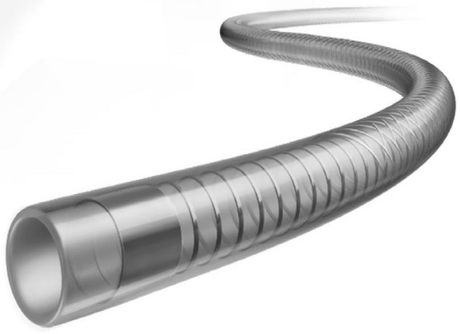
VIA™ Microcatheter—Features & Benefits



Designed for optimal delivery, deployment, and retrieval of braided devices like the WEB® Device

- **Smooth Device Delivery**

  Flat braid & coil design with lubricious PTFE liner maximizes lumen ID, providing smooth, low friction device delivery

- **Controlled Device Deployment**

  Gradual shaft transitions and hybrid braid/coil design provide optimal catheter support for precise and uniform device deployment

- **Reliable Device Retrieval**

  Balanced shaft transitions and robust column strength minimize tip movement, providing reliable device retrieval

MicroVention® TERUMO

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Access Devices Compatibility

WEB® SL/SLS Device Width (mm)	VIA® Microcatheter (Delivery Catheter)	Intracranial Support Catheter	Long Sheath
3 – 7	**VIA® 17** ID: 0.0175" / 1.3F / 0.44 mm Distal OD: 2.6F / 0.029" / 0.074 mm vs. 1.7F Headway 17 Proximal OD: 2.5F /0.032" / 0.81 mm Length: 154 cm	SOFIA® 5F or 6F 115cm	6F: 80 / 90 cm long
8 – 9	**VIA® 27** ID: 0.027" / 2.1F / 0.69 mm Distal OD: 3.0F / 0.039" / 0.99 mm vs. 2.6F Headway 27 Proximal OD: 3.2 F / 0.042" / 1.07 mm Length: 154 cm	SOFIA 6F 115cm	6F: 80 / 90 cm long
10 – 11	**VIA® 33** ID: 0.033" / 2.5F / 0.84 mm Distal OD: 3.4F / 0.045" / 1.14 mm Proximal OD: 3.8F / 0.050" / 1.27 mm **Length: 133 cm**	SOFIA® 6F 115cm	6F: 80 / 90 cm long

WEB™ Device Selection—3 Step Process

STEP 1: Measure Aneurysm
Measure the size *(Width, Height, and Neck)* of the aneurysm in two orthogonal projections.

STEP 2: Select Shape
Select the appropriate WEB™ device shape: SL *(Single Layer)* or SLS *(Single Layer Spherical)*

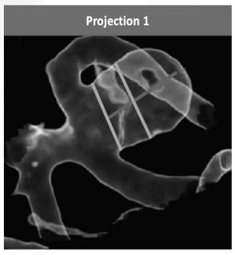
STEP 3: Select WEB Size
Refer to the corresponding WEB™ Device Selection Table to determine the correct WEB™ device size

MicroVention TERUMO

STEP 1: Measure

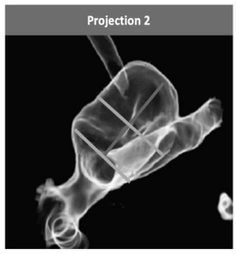
- Measure the Aneurysm in Two Orthogonal Projections

Projection 1



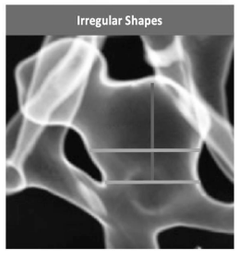
Measure the: NECK, WIDTH, HEIGHT

Projection 2



Measure the: NECK, WIDTH, HEIGHT

Irregular Shapes



Exclude blebs and secondary lobes.

Since the WEB™ device does not need to conform all the way to the rounded or narrowed dome, there is no need to measure the height to the top of the aneurysm.

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STEP 2: Select

- Choose WEB™ SL *(Single Layer)* or WEB™ SLS *(Single Layer Spherical)* Device

Measuring and identifying the neck type of the aneurysm will help to determine the best WEB™ device shape to better seal the aneurysm neck and protect daughter vessels.

WEB® SL (Single Layer)

The WEB™ SL implant is the device of choice in most wide-neck bifurcation aneurysms.

WEB® SLS (Single Layer Spherical)

The WEB™ SLS implant is the device of choice in most narrowed-neck bifurcation aneurysms.

If the WEB™ SLS device is selected, but the aneurysm height is shorter than the suggested device, then the WEB™ SL device is recommended.

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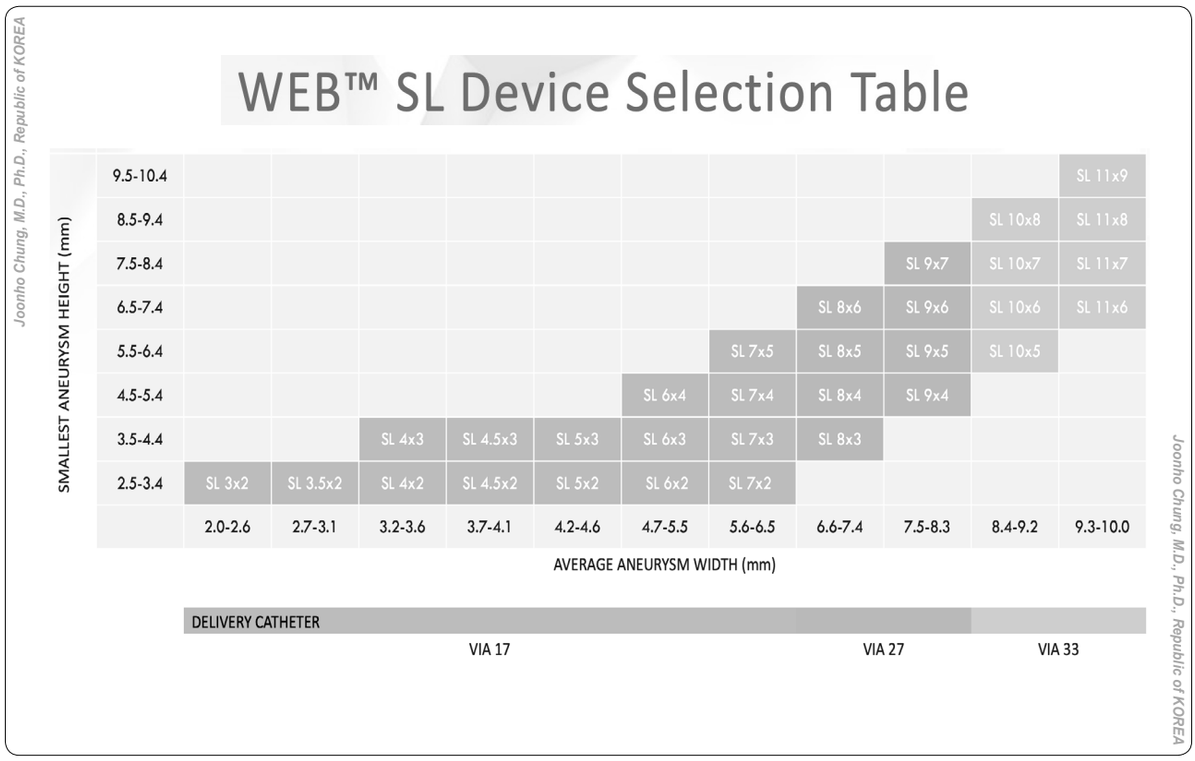
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WEB™ SL Device Selection Table
SMALLEST ANEURYSM HEIGHT (mm)
9.5-10.4
8.5-9.4
7.5-8.4
6.5-7.4
5.5-6.4
4.5-5.4
3.5-4.4
2.5-3.4
SL 11x9
SL 10x8
SL 11x8
SL 9x7
SL 10x7
SL 11x7
SL 8x6
SL 9x6
SL 10x6
SL 11x6
SL 7x5
SL 8x5
SL 9x5
SL 10x5
SL 6x4
SL 7x4
SL 8x4
SL 9x4
SL 4x3
SL 4.5x3
SL 5x3
SL 6x3
SL 7x3
SL 8x3
SL 3x2
SL 3.5x2
SL 4x2
SL 4.5x2
SL 5x2
SL 6x2
SL 7x2
2.0-2.6
2.7-3.1
3.2-3.6
3.7-4.1
4.2-4.6
4.7-5.5
5.6-6.5
6.6-7.4
7.5-8.3
8.4-9.2
9.3-10.0
AVERAGE ANEURYSM WIDTH (mm)
DELIVERY CATHETER
VIA 17
VIA 27
VIA 33
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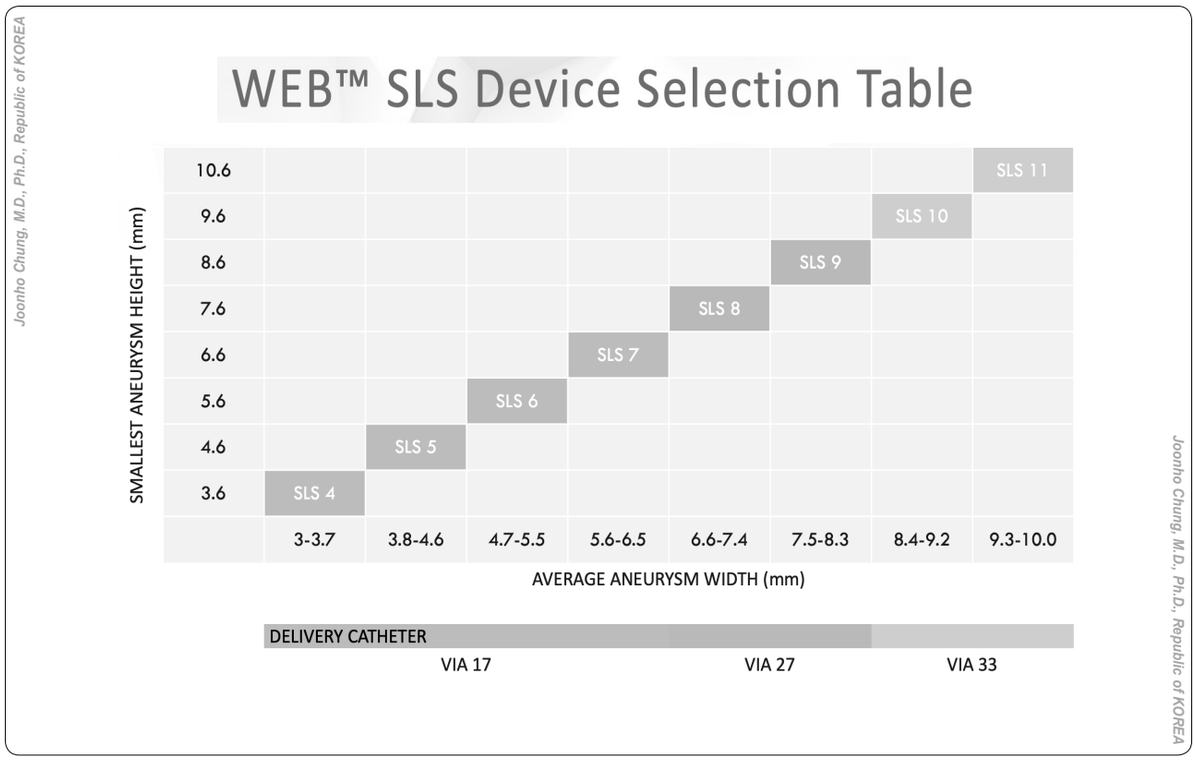
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WEB™ SLS Device Selection Table
SMALLEST ANEURYSM HEIGHT (mm)
10.6
9.6
8.6
7.6
6.6
5.6
4.6
3.6
SLS 11
SLS 10
SLS 9
SLS 8
SLS 7
SLS 6
SLS 5
SLS 4
3-3.7
3.8-4.6
4.7-5.5
5.6-6.5
6.6-7.4
7.5-8.3
8.4-9.2
9.3-10.0
AVERAGE ANEURYSM WIDTH (mm)
DELIVERY CATHETER
VIA 17
VIA 27
VIA 33
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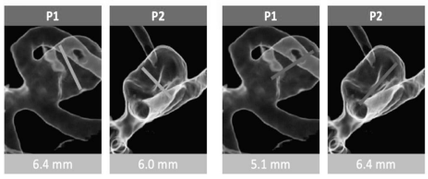
Choose WEB™ SL Device using the WEB™ SL Device Selection Table

A. Width Determination

Determine the average Aneurysm Width from 2 orthogonal projections



6.2 mm Average Width

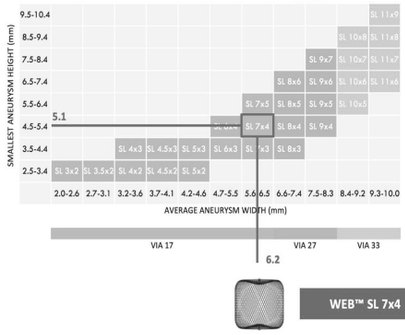
B. Height Determination

Take the smallest Aneurysm Height from 2 orthogonal projections

5.1 mm Smallest Height

(6.4 mm + 6.0 mm)/2 = 6.2 mm

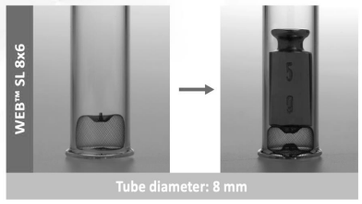
C. Device Selection



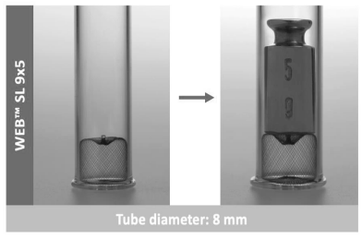
WEB™ SL 7x4

MicroVention TERUMO

Size Selection Impacts Device Stability



Inadequate Wall Apposition:
The WEB™ device may collapse under pressure.
UNDERSIZED DEVICE.



Good Wall Apposition:
The WEB™ device resists compression, it is stable and durable.
CORRECTLY SIZED DEVICE.

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VIA® Microcatheter Positioning

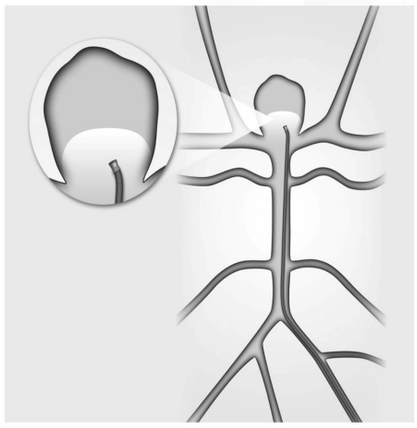
Reposition the tip of the microcatheter so that it sits just at the neck of the aneurysm.

Do not insert the microcatheter completely inside the aneurysm.

⚠ **The VIA® microcatheter extends an additional 1mm beyond the marker tip.**

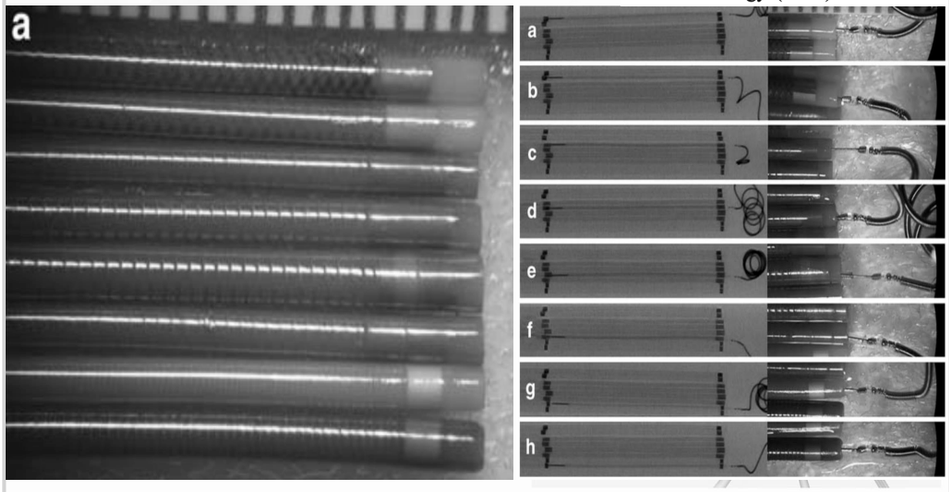
Carefully advance the device until the distal end of the device reaches the last marker on the microcatheter.

Maintain visualization of the microcatheter tip during device delivery.



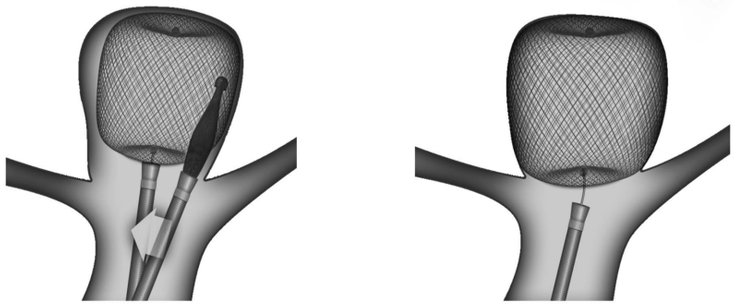
VIA® Microcatheter Positioning

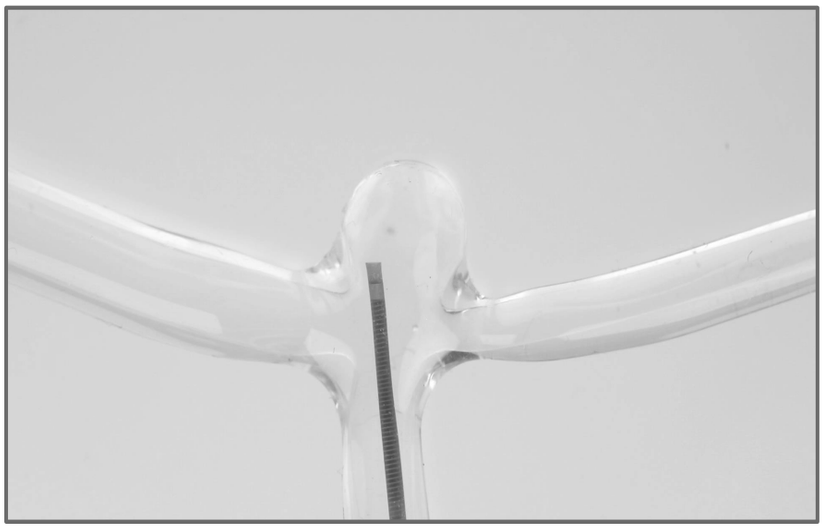
Neuroradiology (2008) 50:423–427



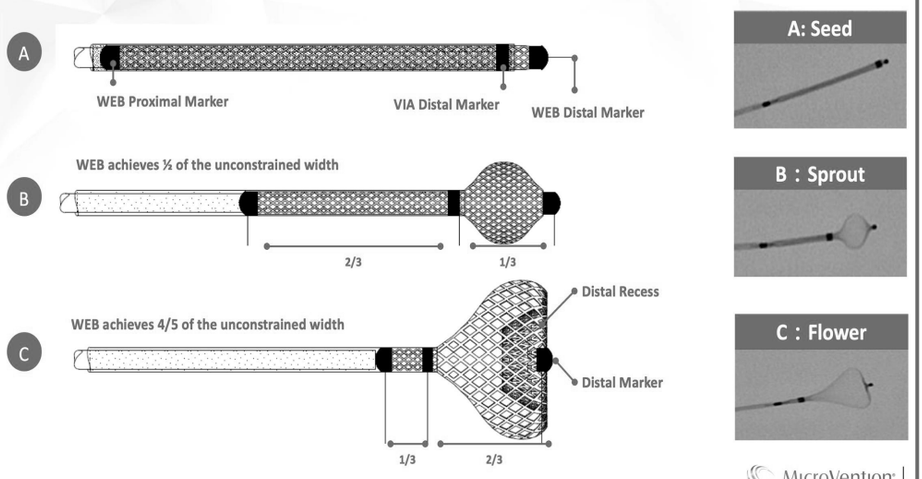
Deployment Considerations: Off-Center Catheter

- An off-center catheter position can be self-correcting upon deployment

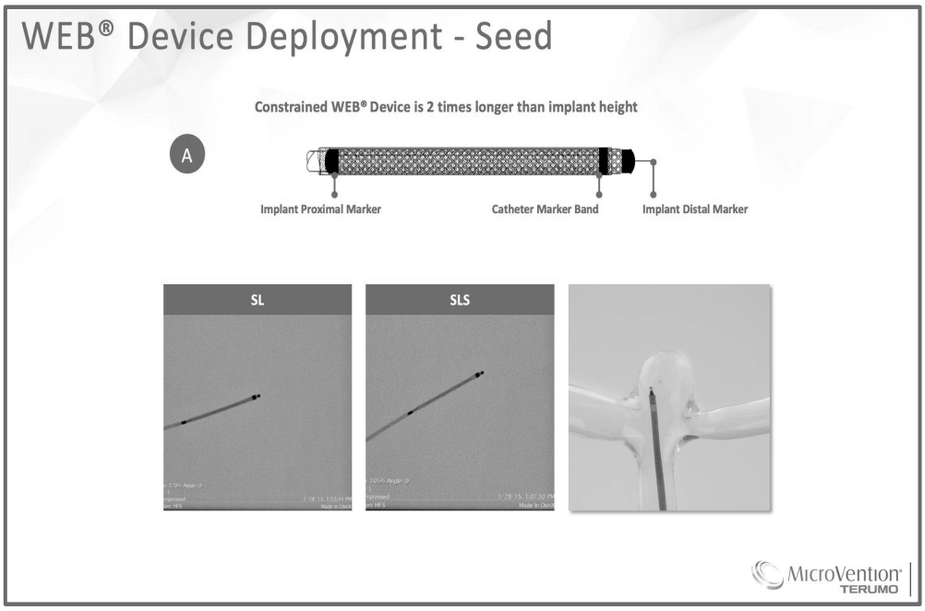




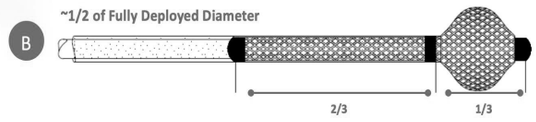
Different Shapes of the WEB For Deployment

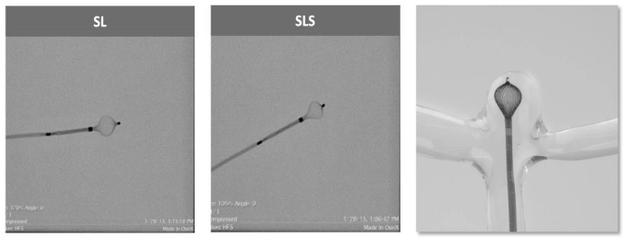


WEB® Device Deployment - Seed



WEB® Device Deployment - Sprout





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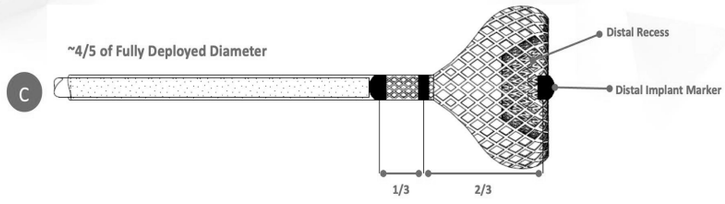
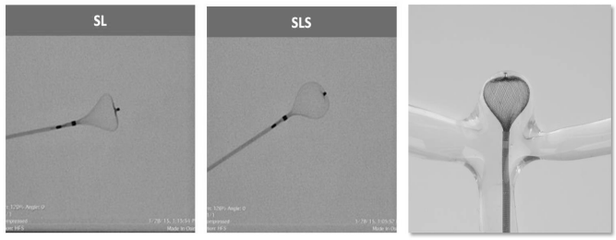
WEB® Device Deployment - Flower





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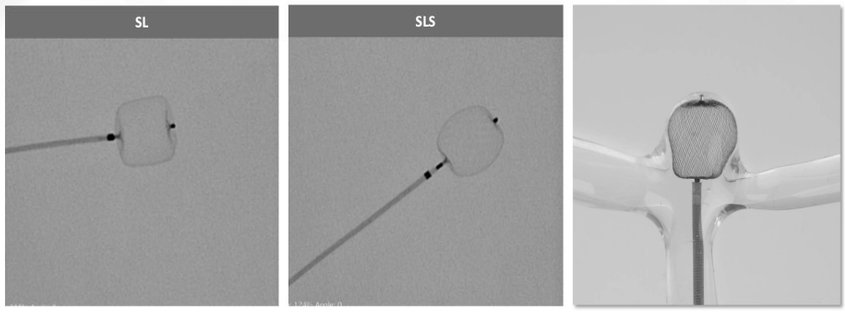
WEB® Device Fully deployed



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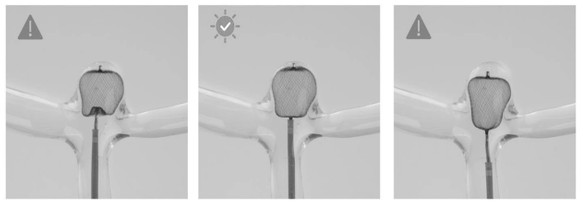
Post-Deployment Assessment: **NEUTRAL SYSTEM**

- Verify that the distal portion of the delivery device is not under tension or compression prior to detachment.

7 SLS Device



Compression
Too much load on the device pusher wire

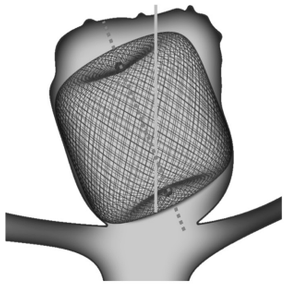
Neutral

Tension
Too much tension on device pusher wire

MicroVention TERUMO

Post-Deployment Assessment: **POSITION**

- The device should be placed to seal the aneurysm neck and protect daughter vessels
- To achieve optimum alignment of the WEB® Device, the device should be placed with **minimal angulation relative to the axis of the aneurysm**
- Off-axis deployment may result in a poor seal of the neck and persistent neck remnant



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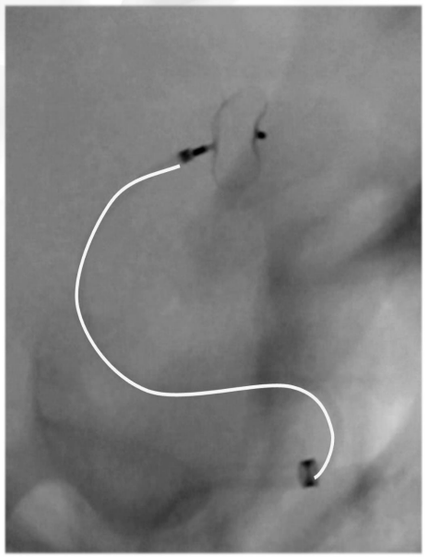
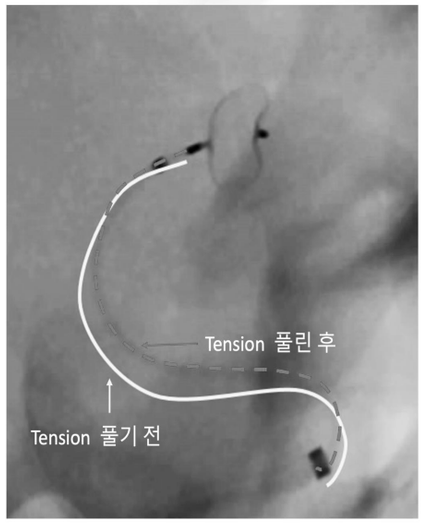
Unloading before detachment





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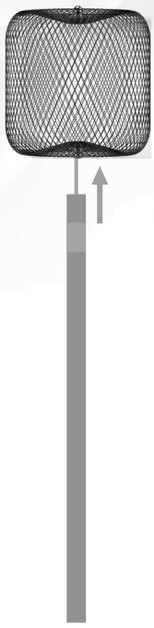
Sticky Detachment



1. Carefully bring the VIA microcatheter over the detachment zone to the base of the WEB device to brace against the WEB device. In some instances, this manipulation is sufficient to completely detach the WEB device.
2. Push the WEB device very gently forward with pusher wire. This manipulatio n can sever the tether if there is a true sticky detachment
3. Bring the pusher wire very slowly into the VIA microcatheter
4. Carefully retract the VIA microcatheter to ensure that the proximal marker of the WEB device does not get caught in the lip of the VIA microcatheter. This is more likely when there is a notable entry angle into the aneurysm.

MicroVention TERUMO

WEBable ?

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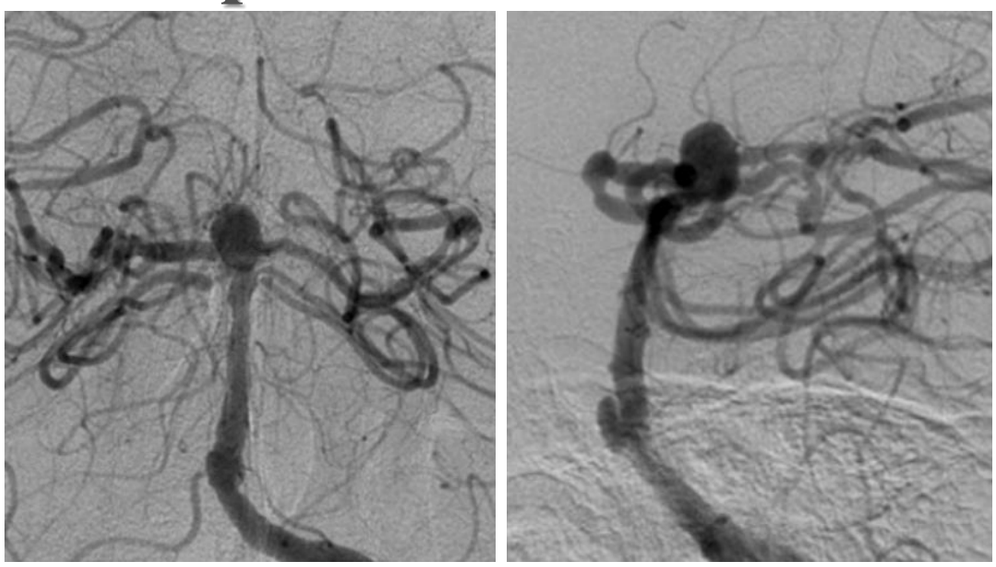
WEBable ?

1. Shape
2. Size
3. Axis

1. Shape



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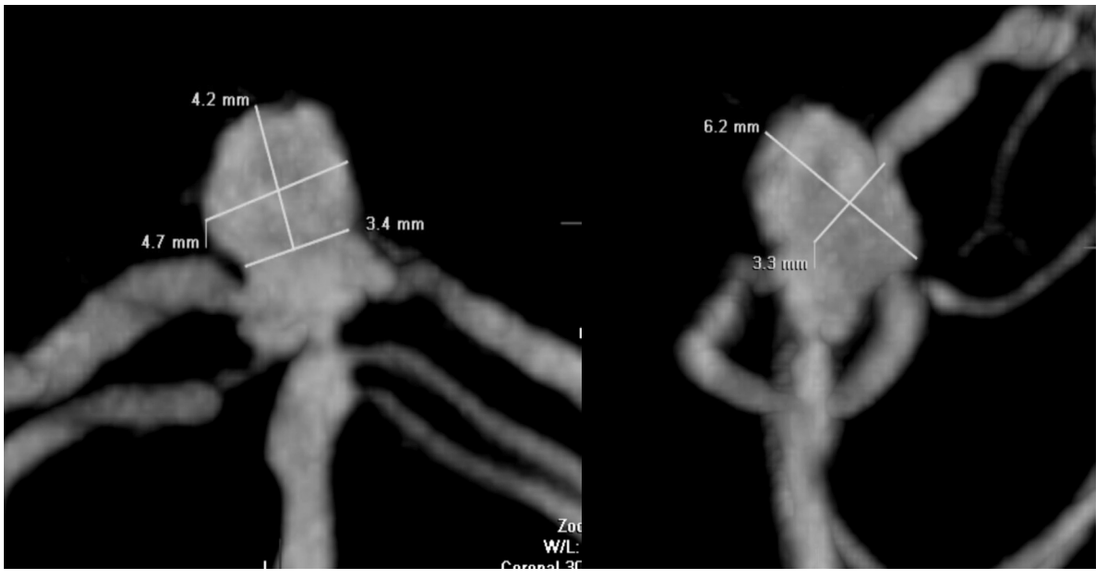

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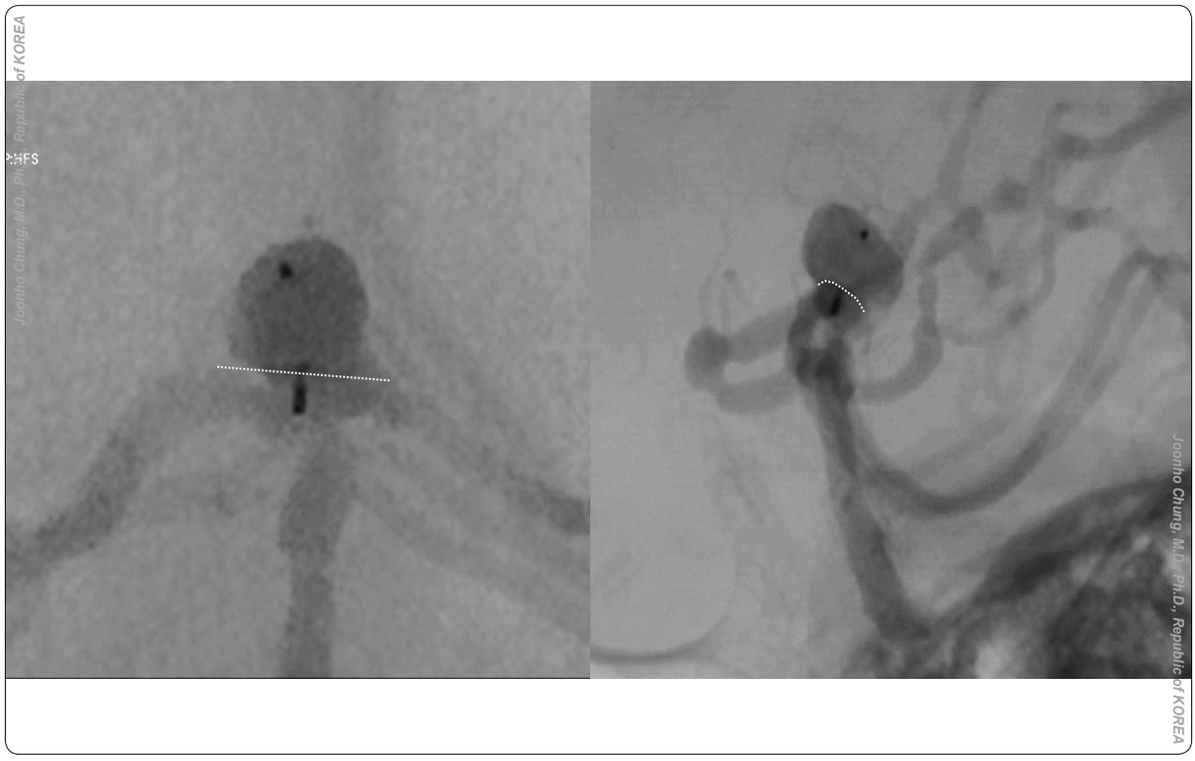
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PP:HFS
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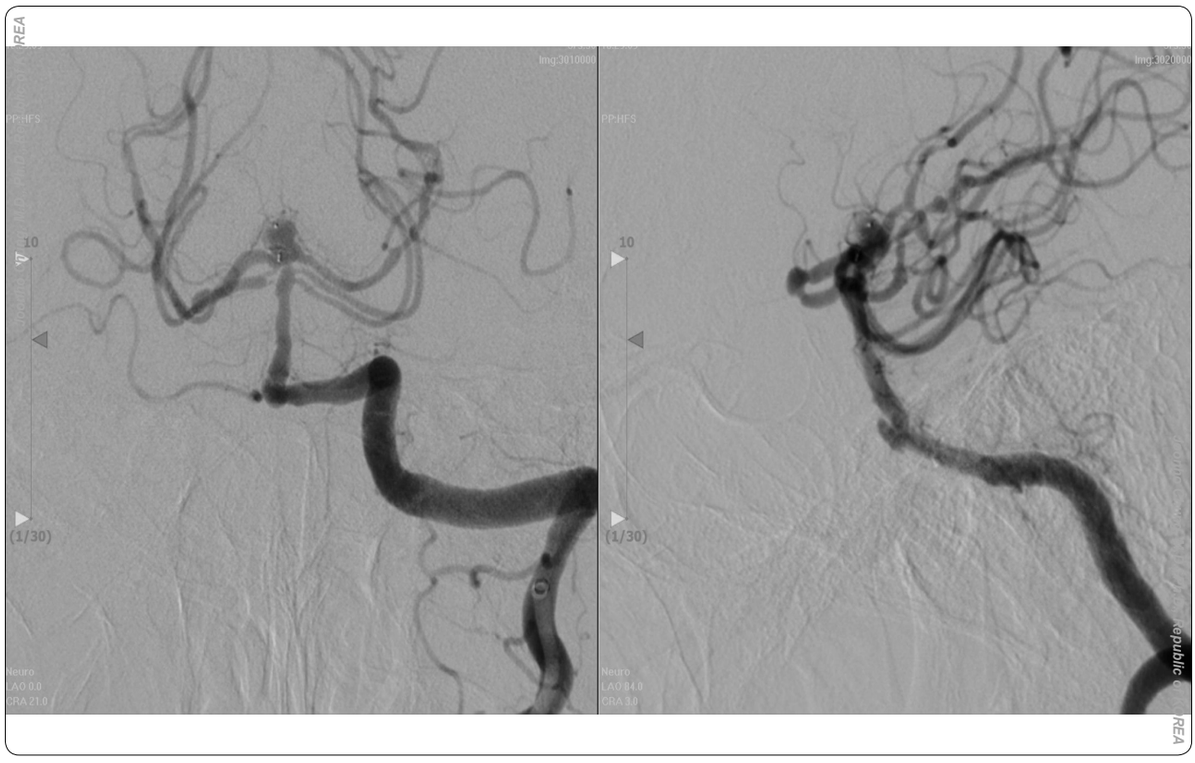
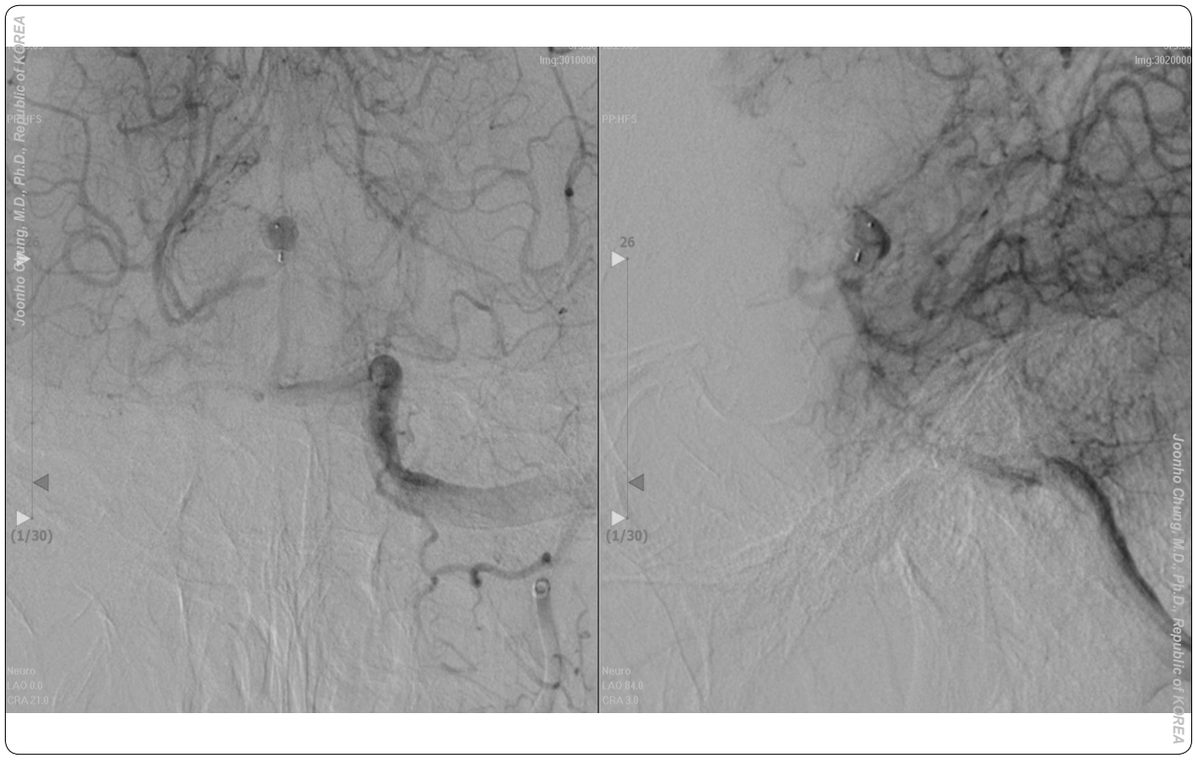
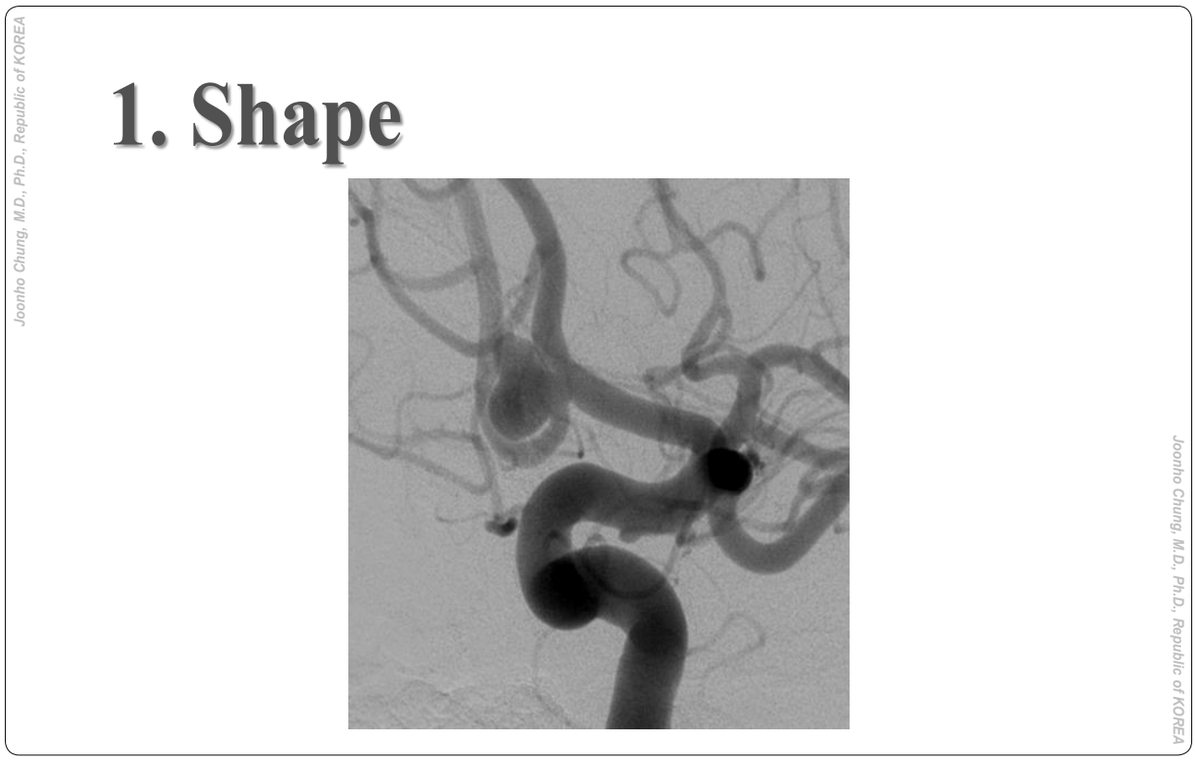

PP:HFS
10
(1/30)
Neuro
LAO 0.0
CRA 21.0
PP:HFS
10
(1/30)
Neuro
LAO 84.0
CRA 3.0


Joonho Chung, M.D., Ph.D., Republic of KOREA
PP:HFS
26
(1/30)
Neuro
LAO 0.0
CRA 21.0
Joonho Chung, M.D., Ph.D., Republic of KOREA
PP:HFS
26
(1/30)
Neuro
LAO 84.0
CRA 3.0
Joonho Chung, M.D., Ph.D., Republic of KOREA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1. Shape
Joonho Chung, M.D., Ph.D., Republic of KOREA


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Quick Measurement 1
Quick Measurement 2
8.10 mm
5.40 mm
Quick Measurement 1
Quick Measurement 2
7.91 mm
5.81 mm
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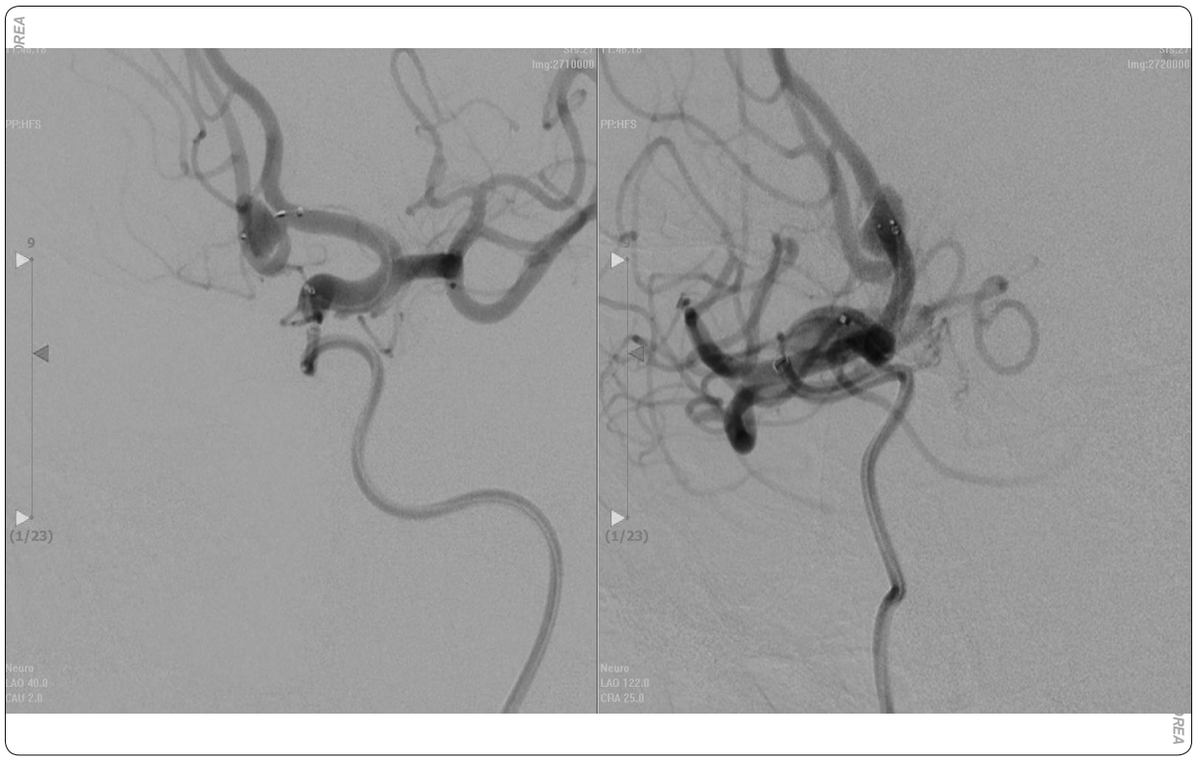
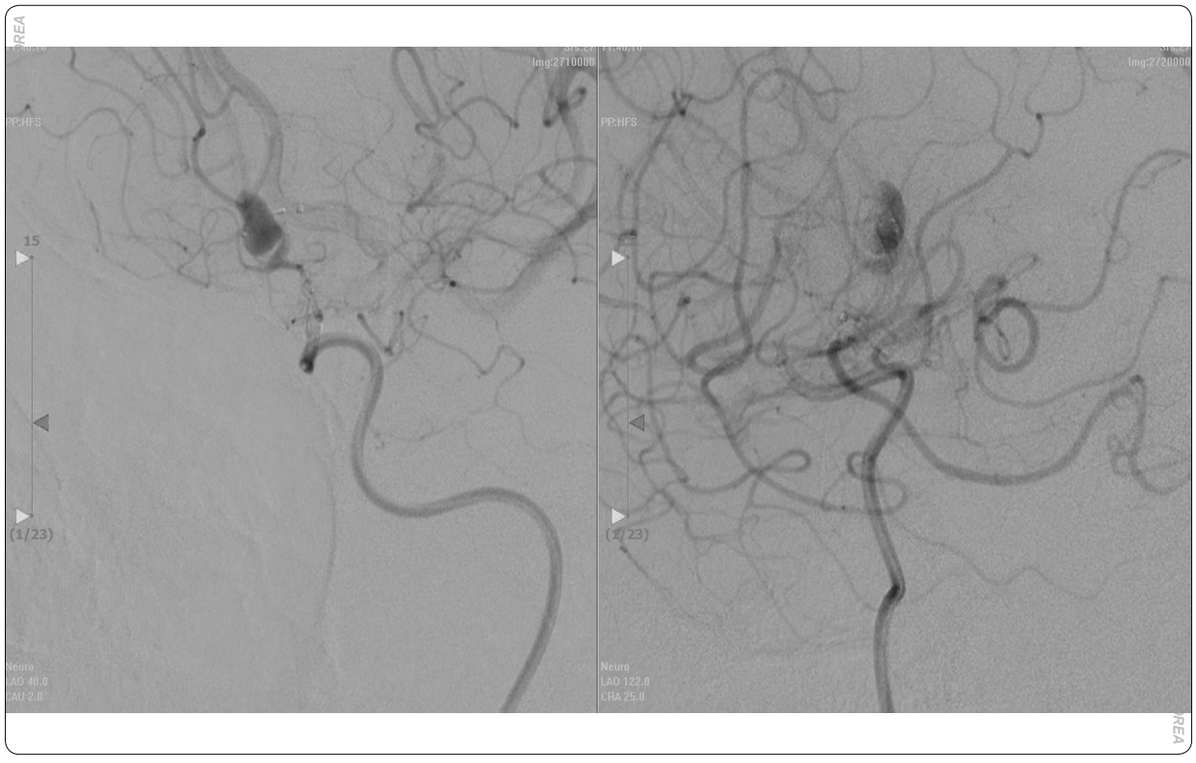
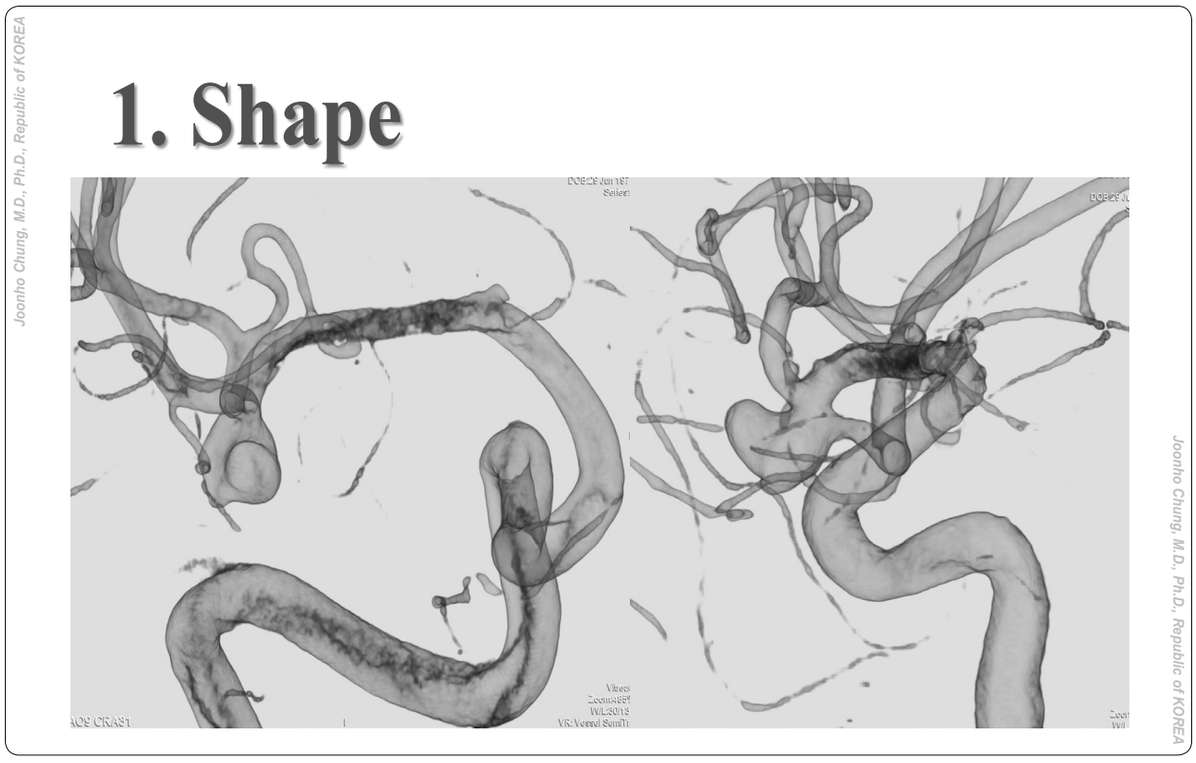
PP:HFS
(1/22)
Neuro
PP:HFS
(1/22)
Neuro


img:2510000
PP:HFS
Neuro
LAO 40.0
img:2520000
PP:HFS


img:2710000
PP:HFS
9
(1/23)
Neuro
LAO 40.0
img:2720000
PP:HFS
(1/23)
Neuro
LAO 122.0
CRA 25.0


PP:HFS
15
(1/23)
Neuro
LAO 40.0
CAU 2.0
PP:HFS
(1/23)
Neuro
LAO 122.0
CRA 25.0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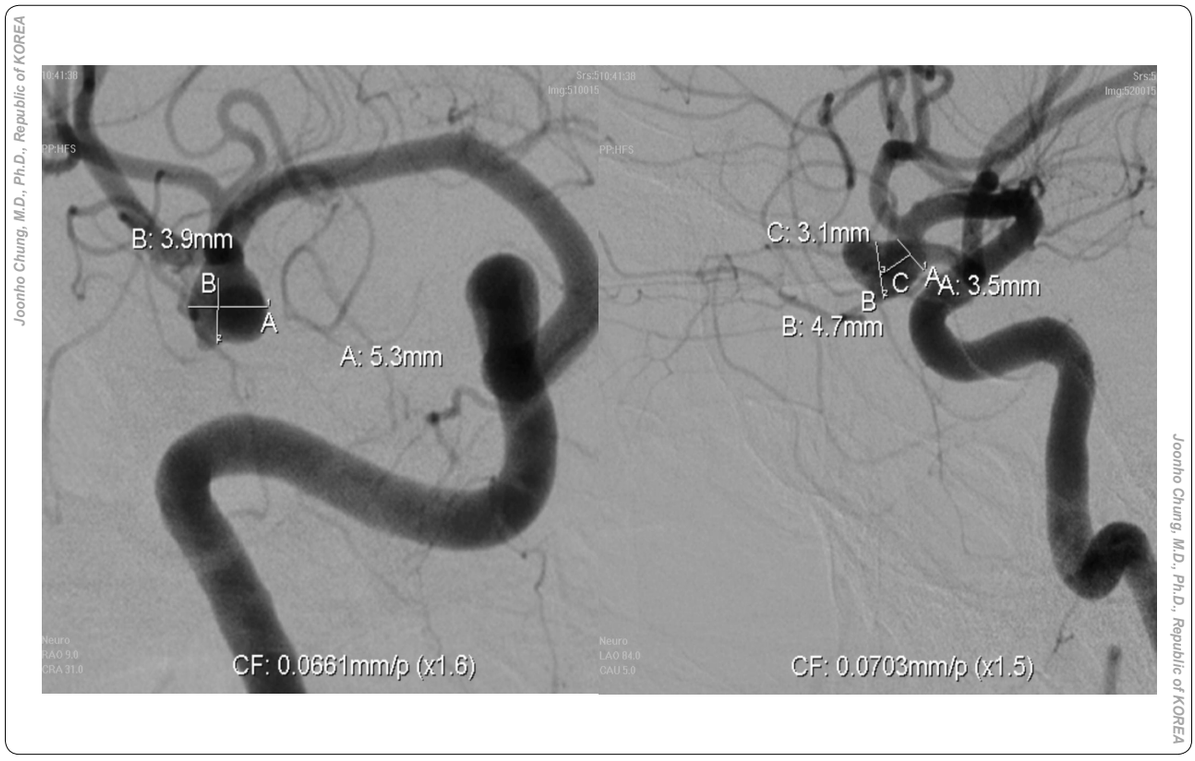
1. Shape
Joonho Chung, M.D., Ph.D., Republic of KOREA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B: 3.9mm
B
A
A: 5.3mm
CF: 0.0661mm/p (x1.6)
C: 3.1mm
C
A
A: 3.5mm
B
B: 4.7mm
CF: 0.0703mm/p (x1.5)
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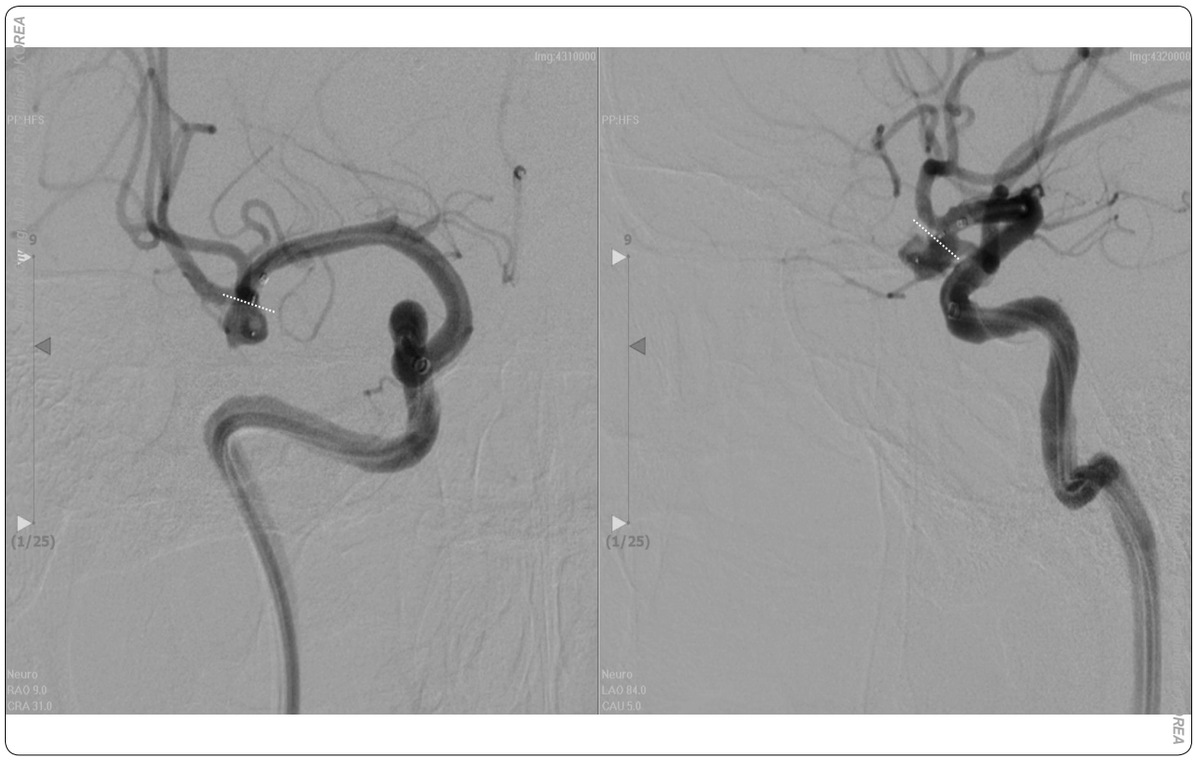
(1/25)
(1/25)


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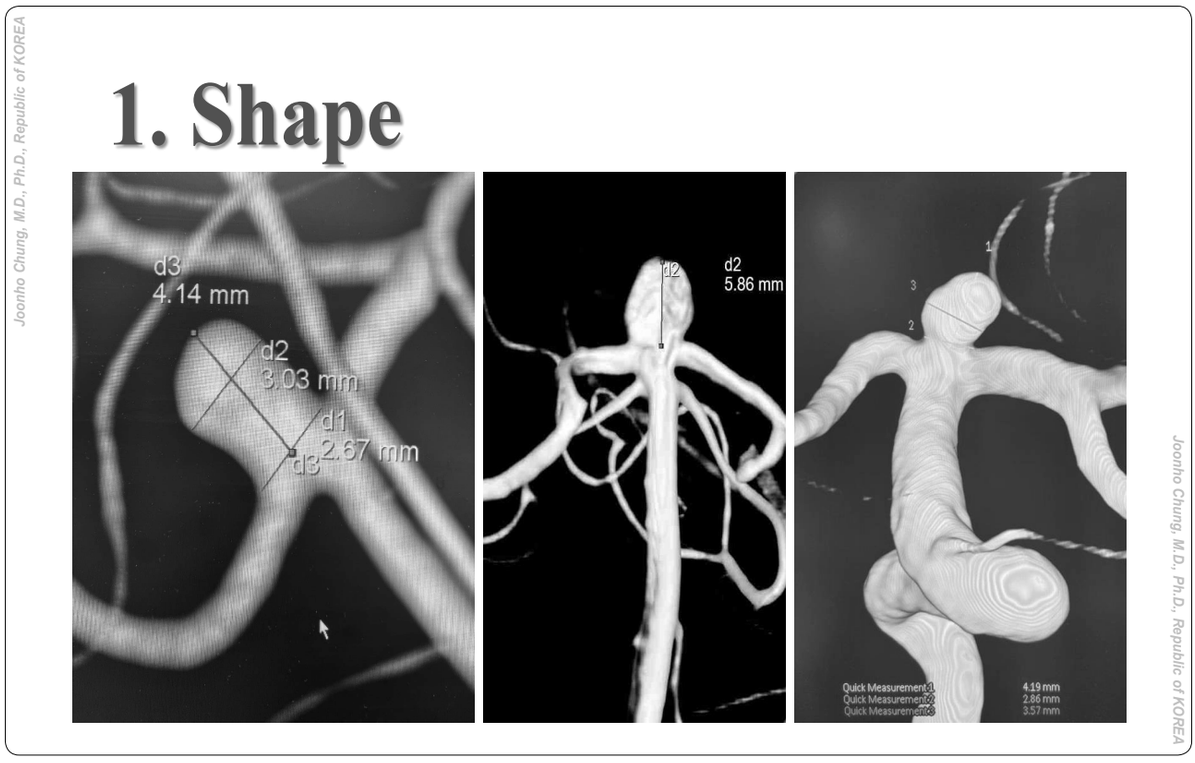
Img:5010000
PP:HFS
(1/29)
Neuro
RAO 9.0
CRA 31.0
Img:5020000
PP:HFS
(1/29)
Neuro
LAO 84.0
CAU 5.0
Joonho Chung, M.D., Ph.D., Republic of KOREA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1. Shape
d3
4.14 mm
d2
3.03 mm
d1
2.67 mm
d3
d2
d2
5.86 mm
1
3
2
Quick Measurement1
Quick Measurement2
Quick Measurement3
4.19 mm
2.86 mm
3.57 mm
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1. Shape

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1. Shape

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1. Shape

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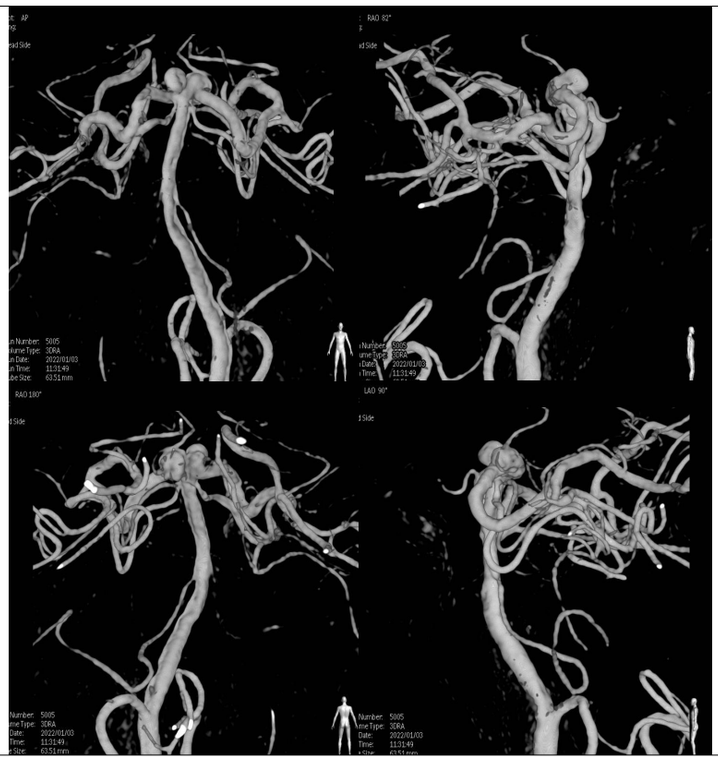

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Joonho Chung, M.D., Ph.D., Republic of KOREA

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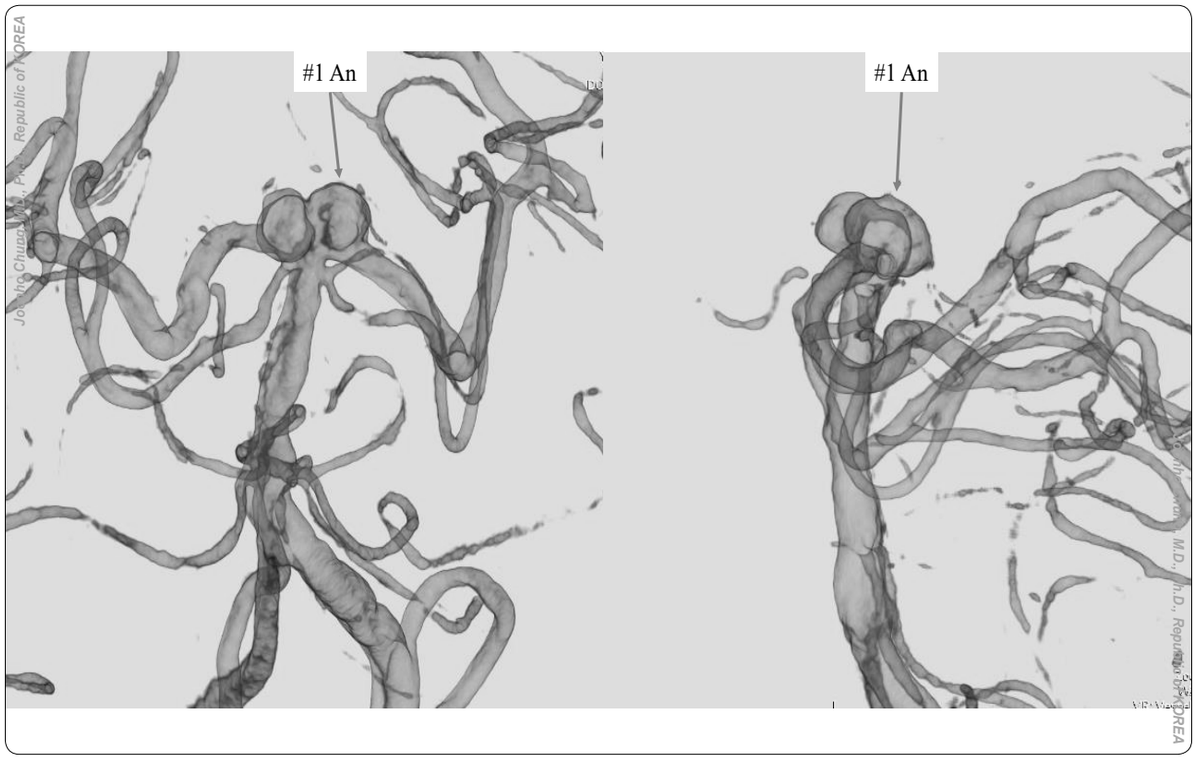
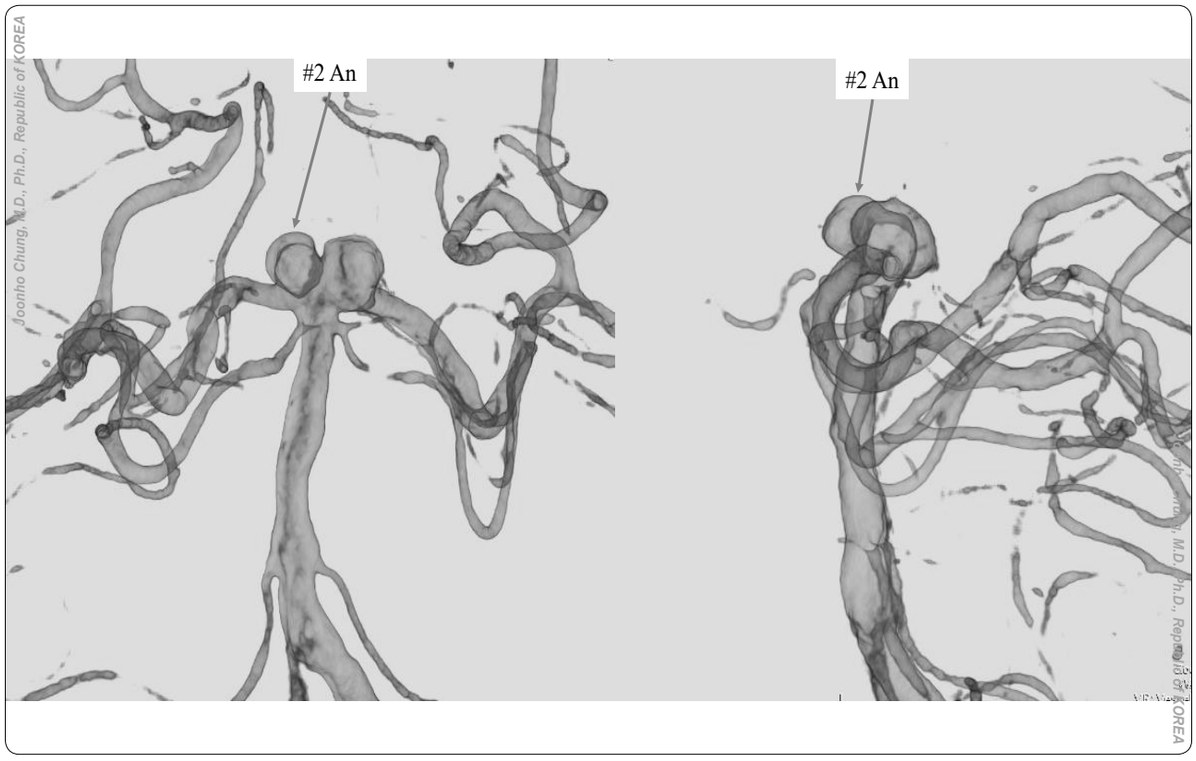

#1 An
#1 An


4.6 mm
4.0 mm
3.7 mm
6.1 mm
Coronal


#2 An
#2 An
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DOB:28
3.7 mm
3.9 mm
4.0 mm
4.9 mm
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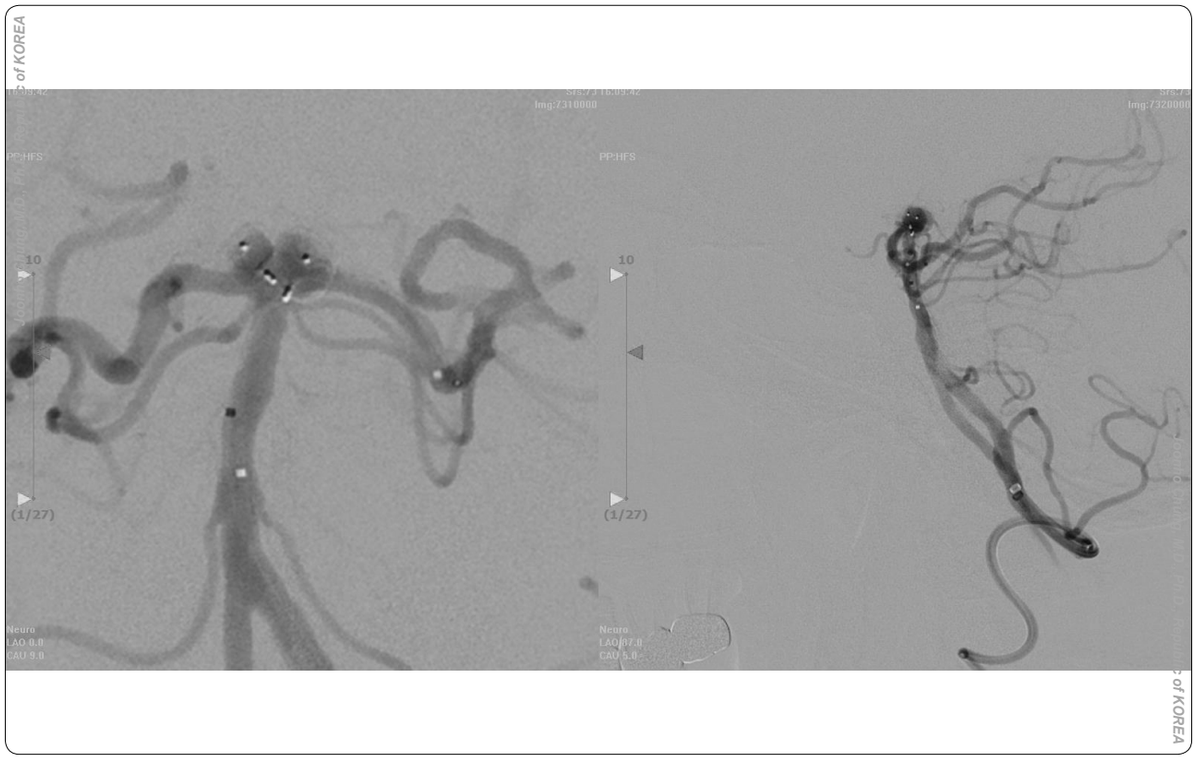
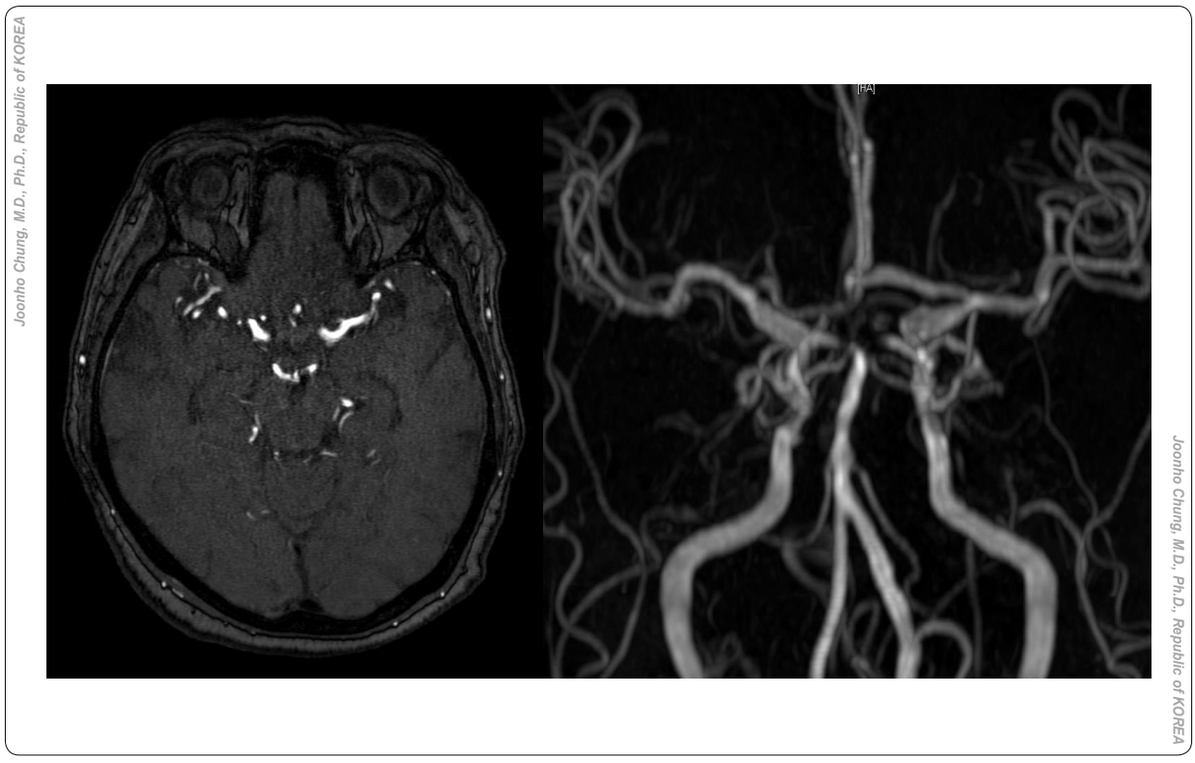

PP:HFS
10
(1/27)
PP:HFS
10
(1/27)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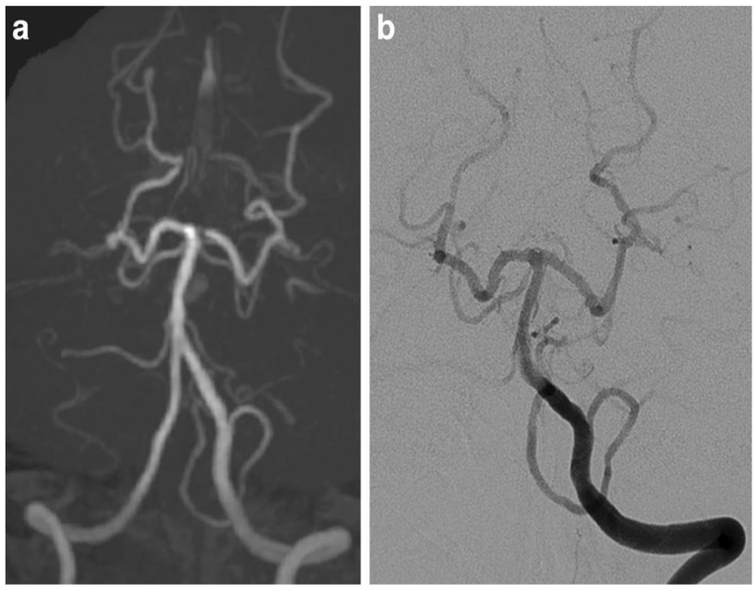

Fig. 3 **a** On 6-month follow-up magnetic resonance angiography and **b** 12-month follow-up digital subtraction angiography, the aneurysm was completely occluded

Clinical Neuroradiology
https://doi.org/10.1007/s00062-024-01405-3

CORRESPONDENCE

Check for updates

Endovascular Treatment of a Wide-necked Bilobulated Bifurcation Aneurysm using the Woven EndoBridge (WEB) Device

A Kissing WEB Technique

Junhyung Kim[1] · Sang Kyu Park[1] · Joonho Chung[1]

Received: 9 January 2024 / Accepted: 13 March 2024

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2. Size

Device size
3-11 mm

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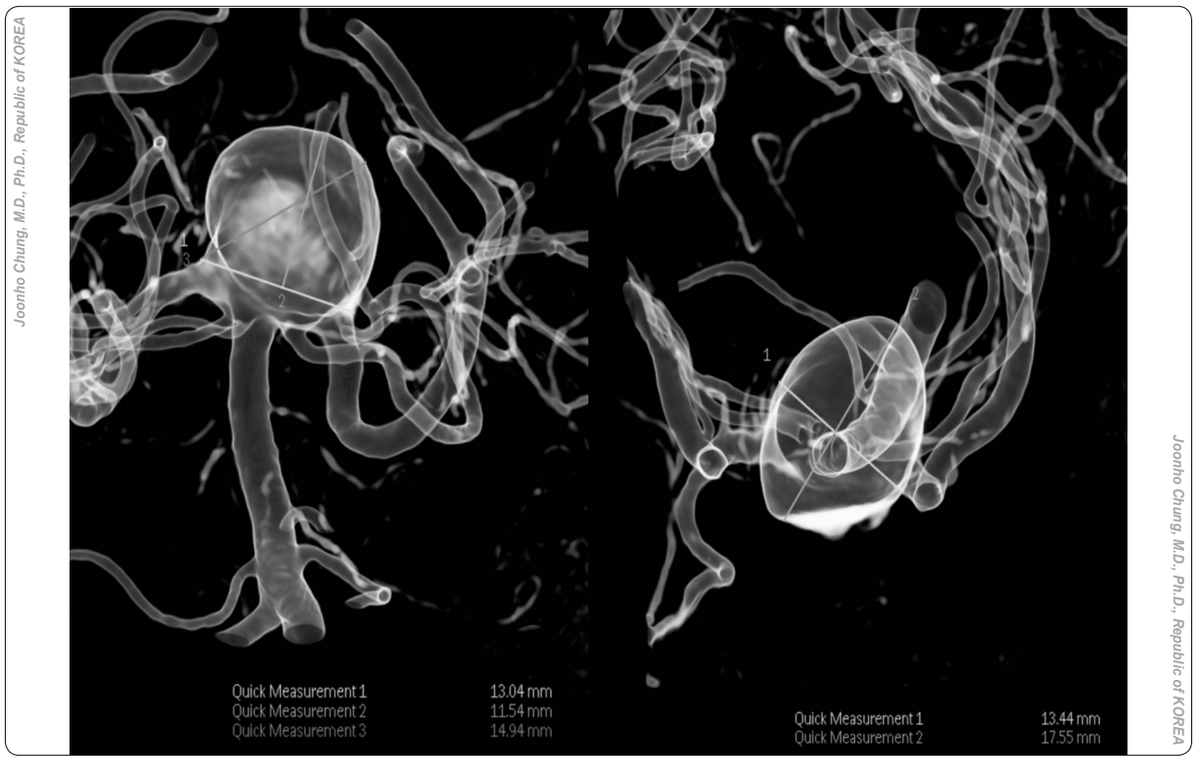
Joonho Chung, M.D., Ph.D., Republic of KOREA
Quick Measurement 1 13.04 mm
Quick Measurement 2 11.54 mm
Quick Measurement 3 14.94 mm
Quick Measurement 1 13.44 mm
Quick Measurement 2 17.55 mm
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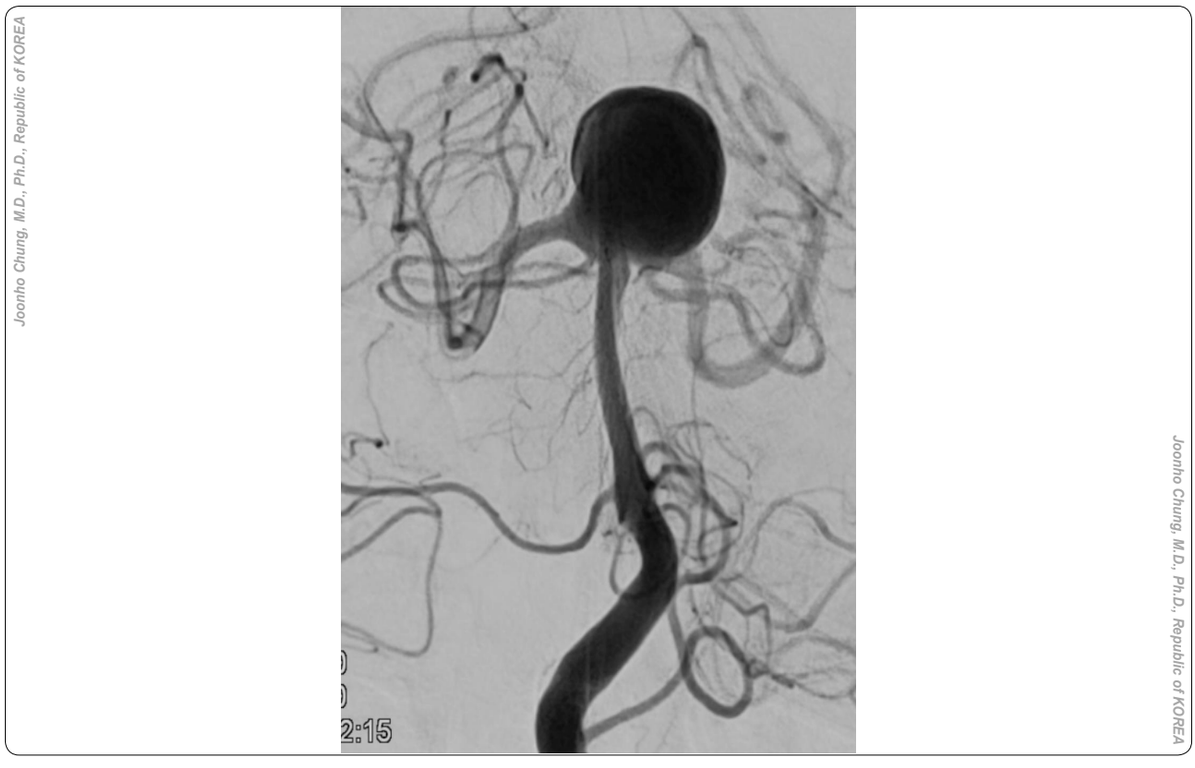
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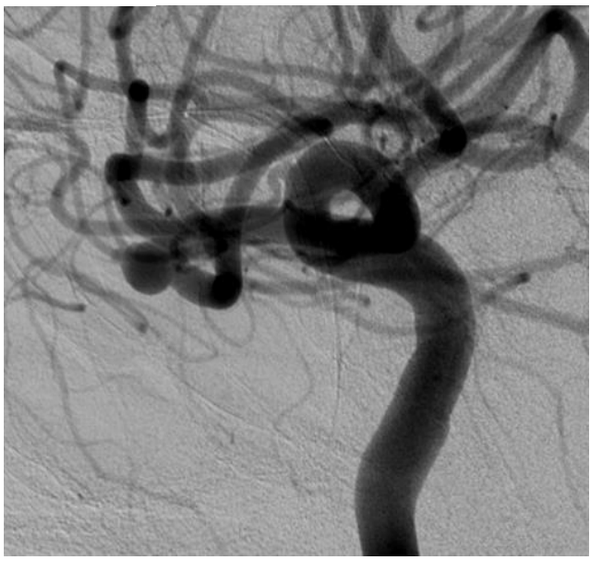
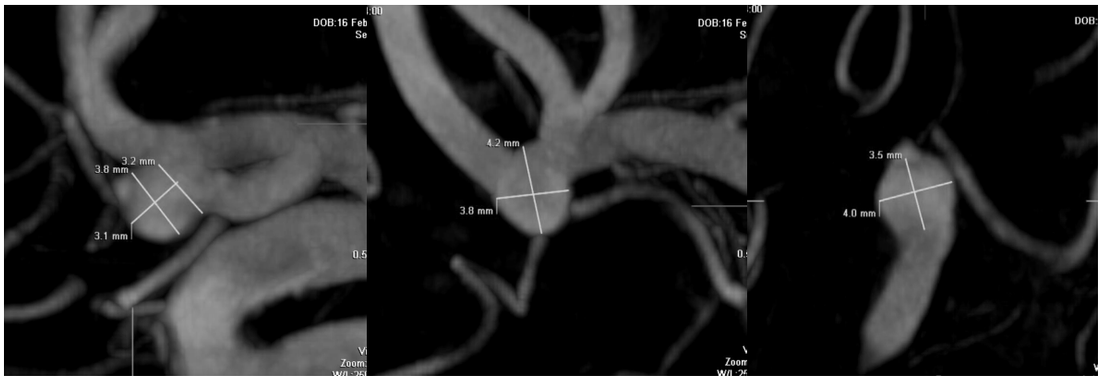
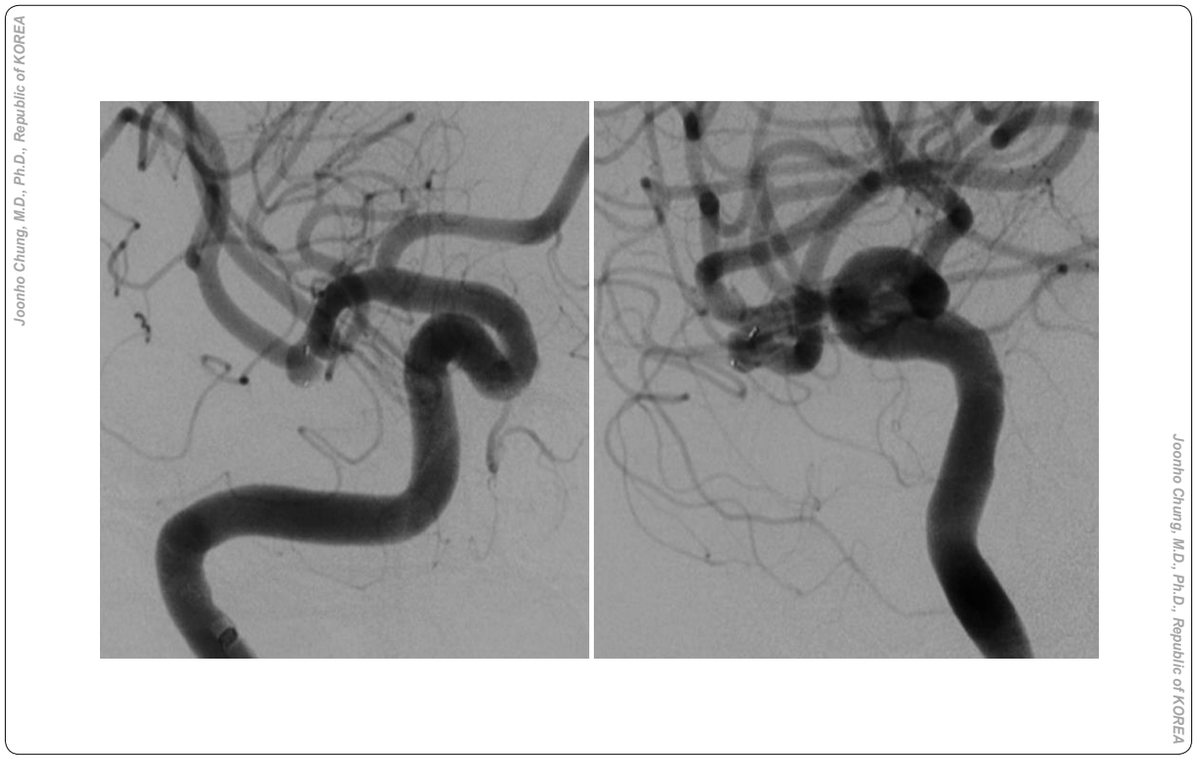
2. Size



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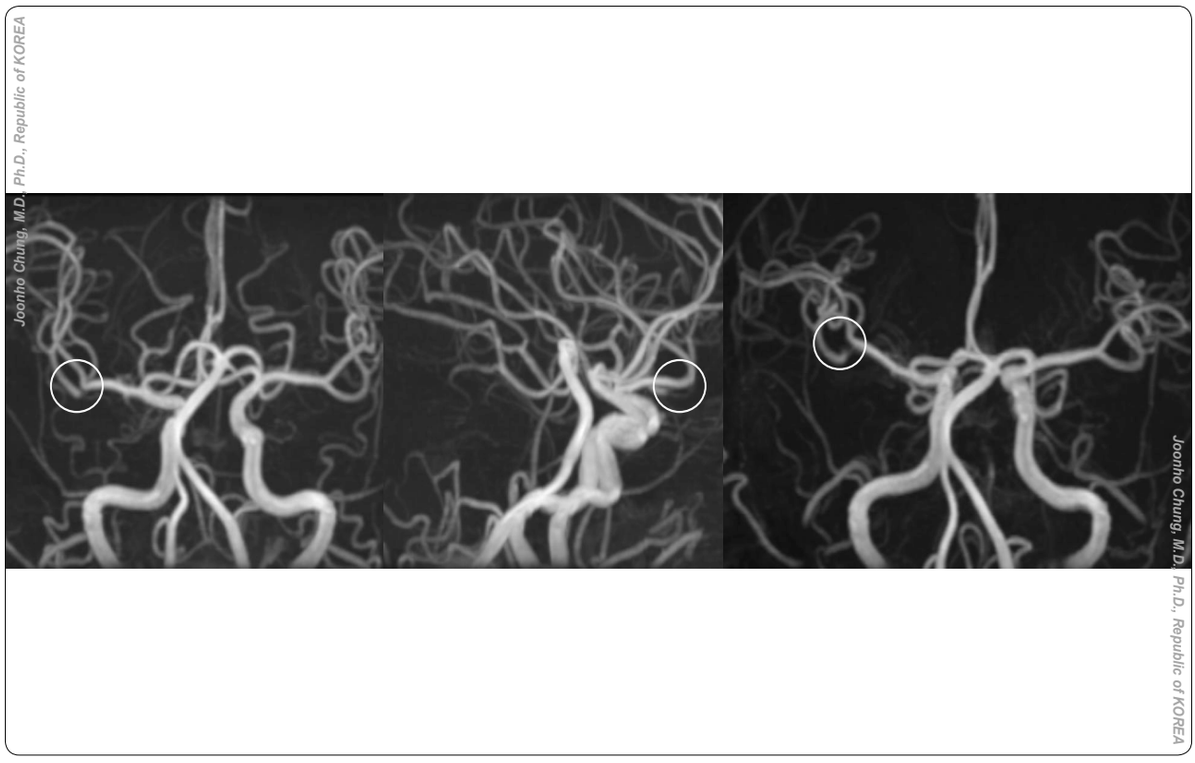
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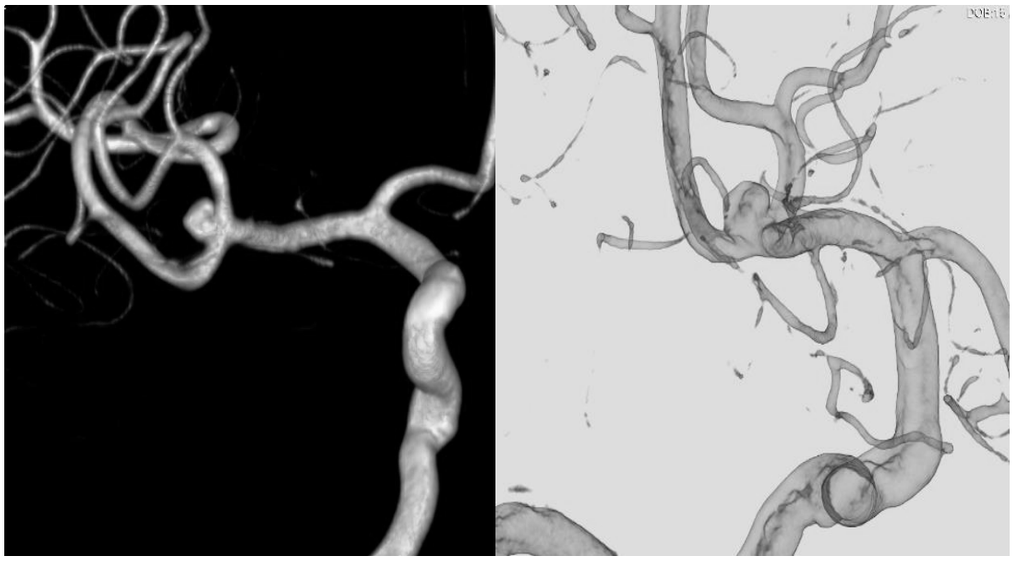

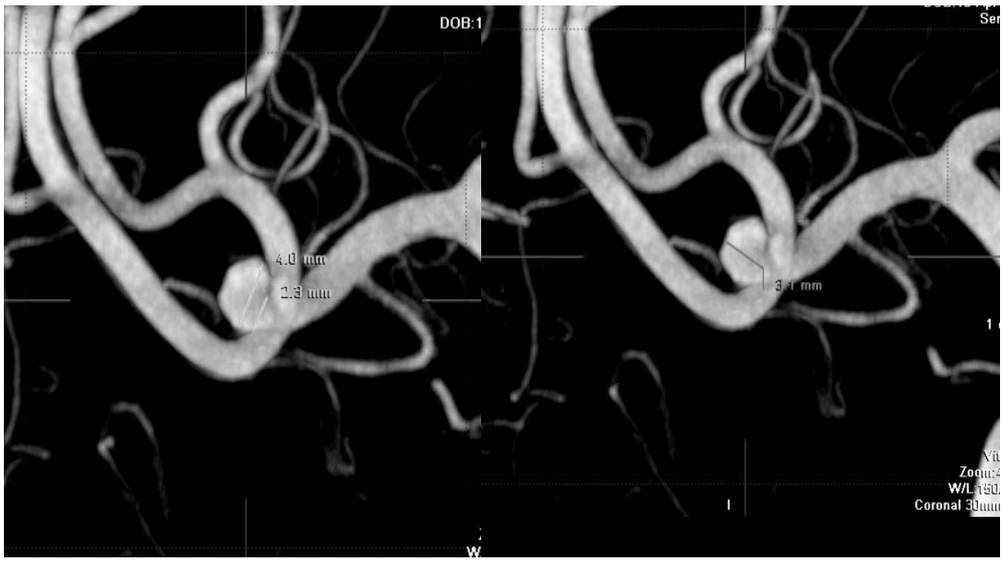

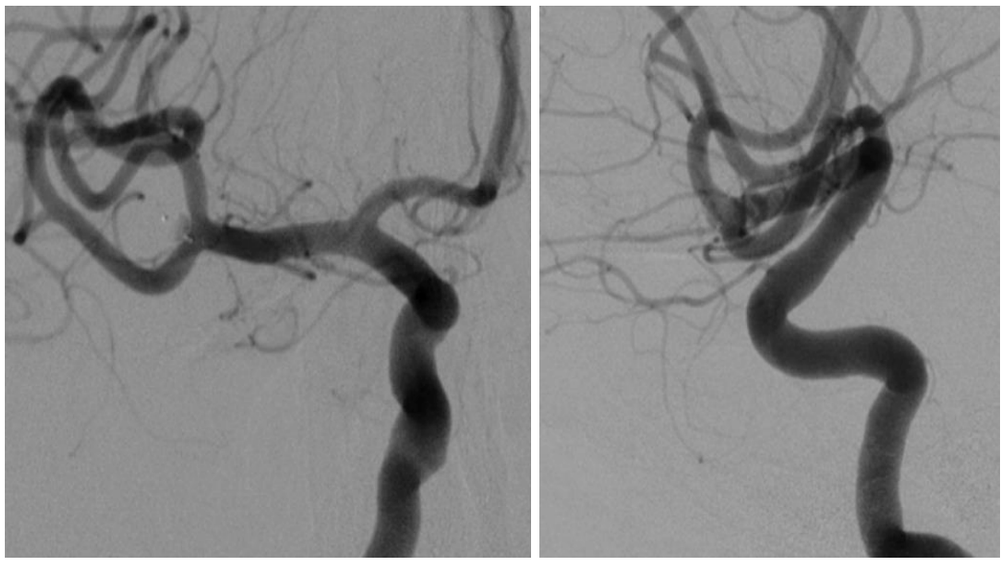

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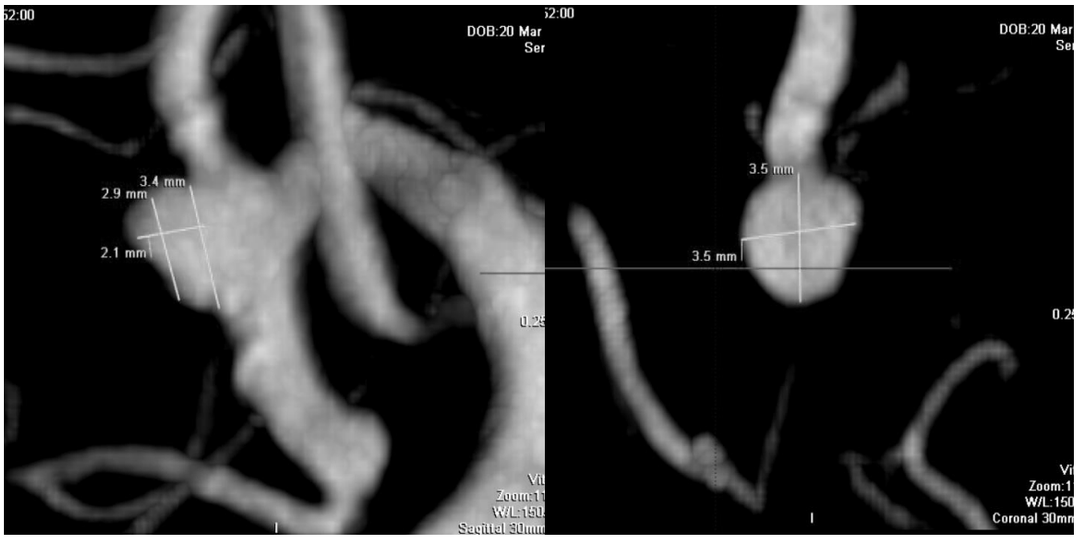

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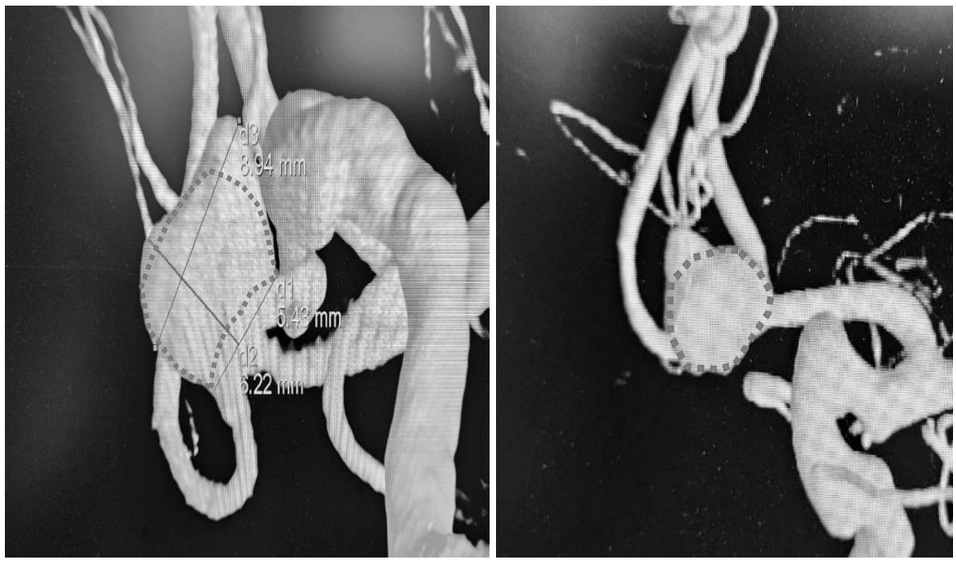
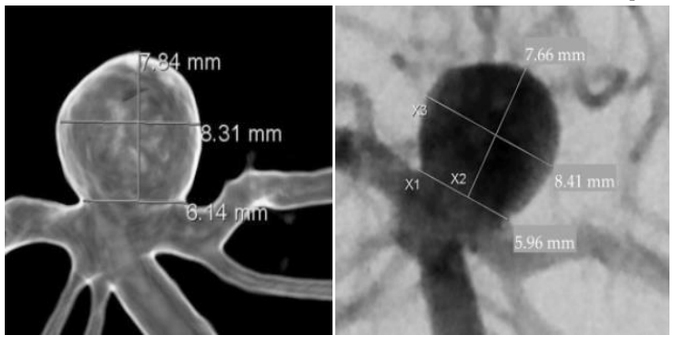


2. Size → Device selection

1. **Basic "+1" and "-1" rule** → Lateral compression



2. **Automated Volumetric Software**

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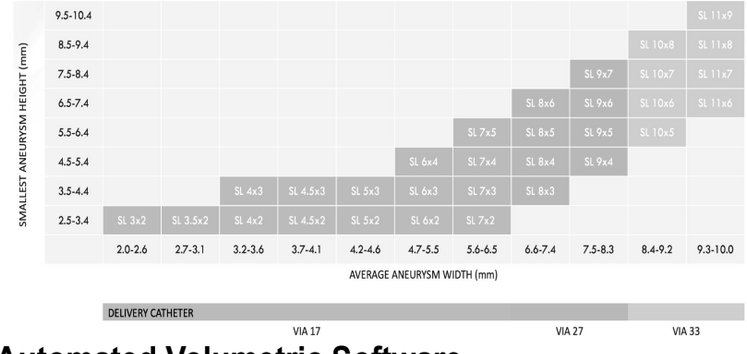
2. Size → Device selection

1. **Basic "+1" and "-1" rule** → Lateral compression



2. **Automated Volumetric Software**

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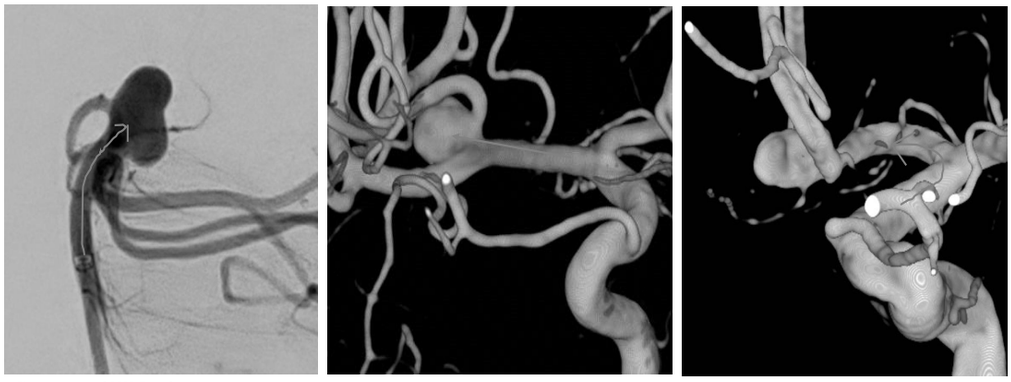
3. Axis (angioarchitecture)



Courtesy of KY Park

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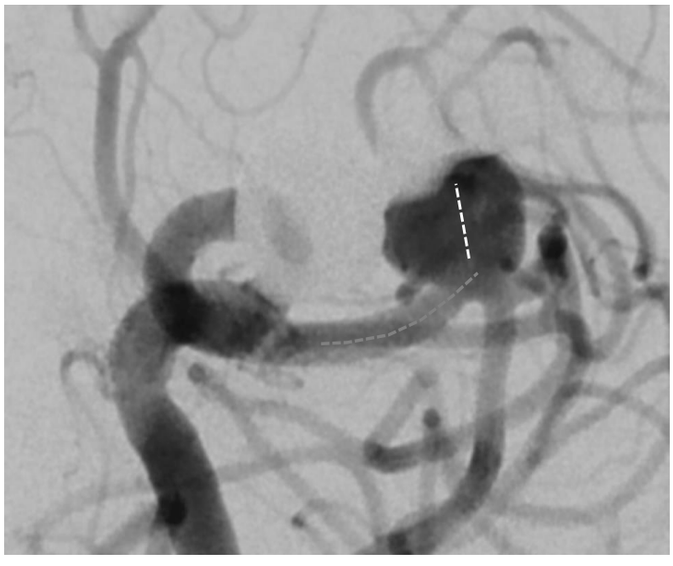
3. Axis (angioarchitecture)



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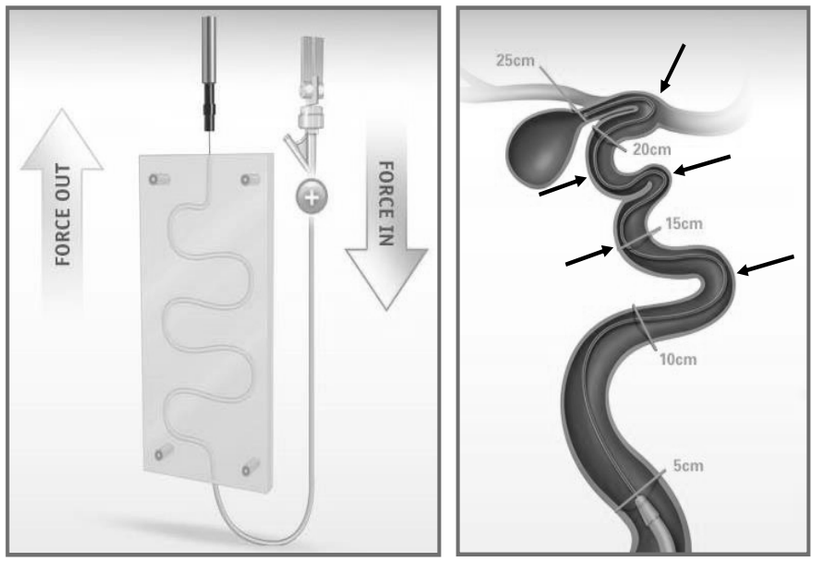

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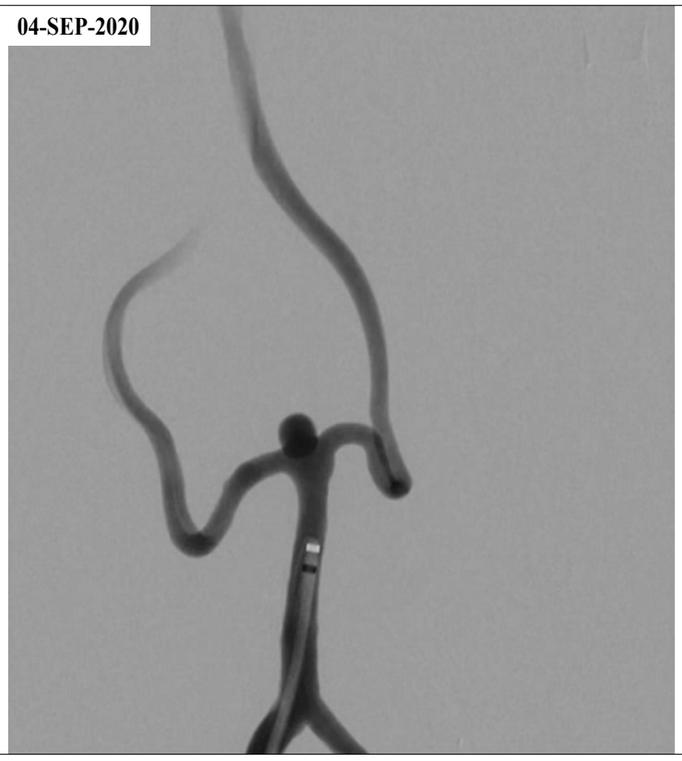

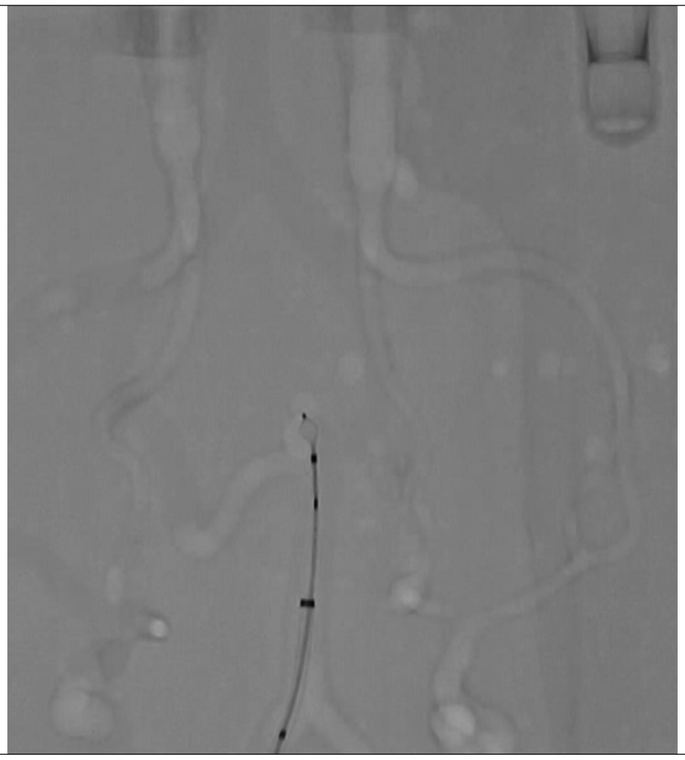

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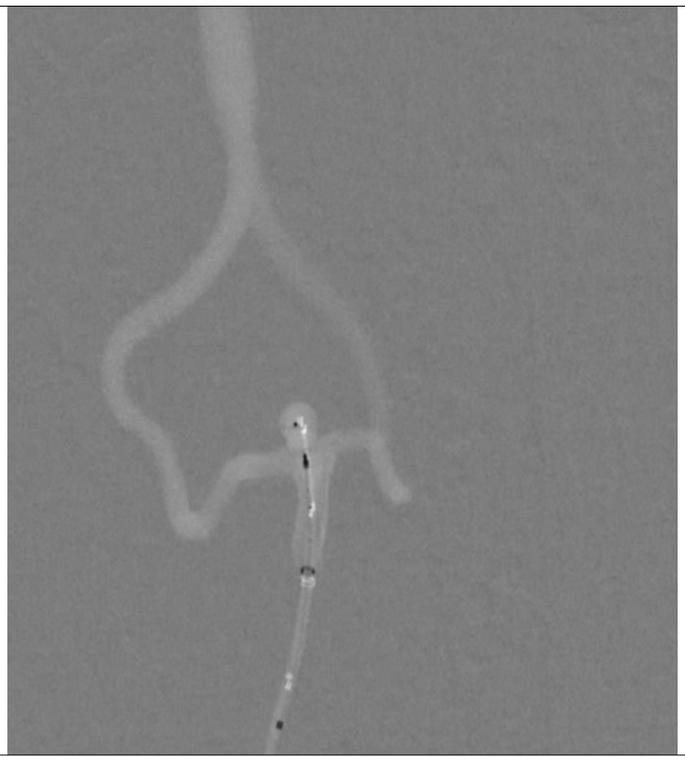

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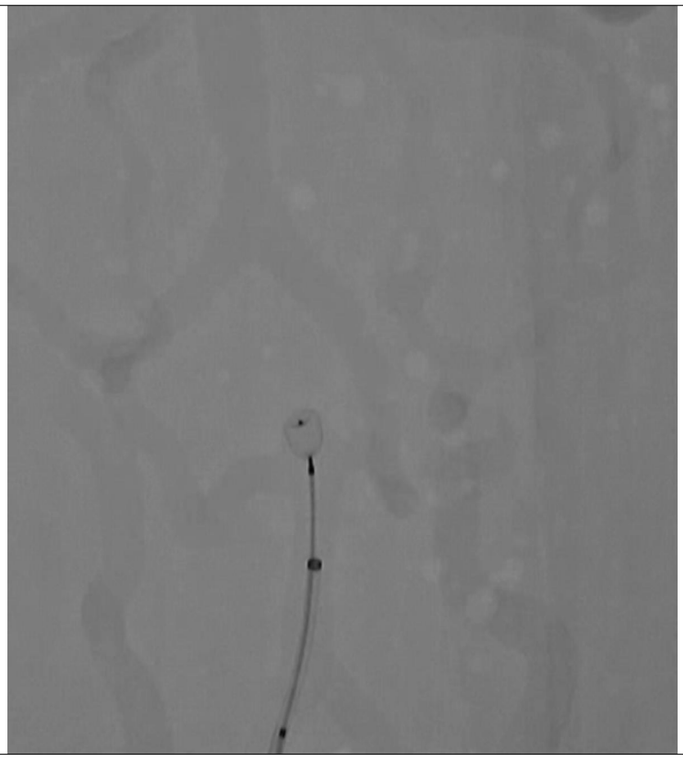

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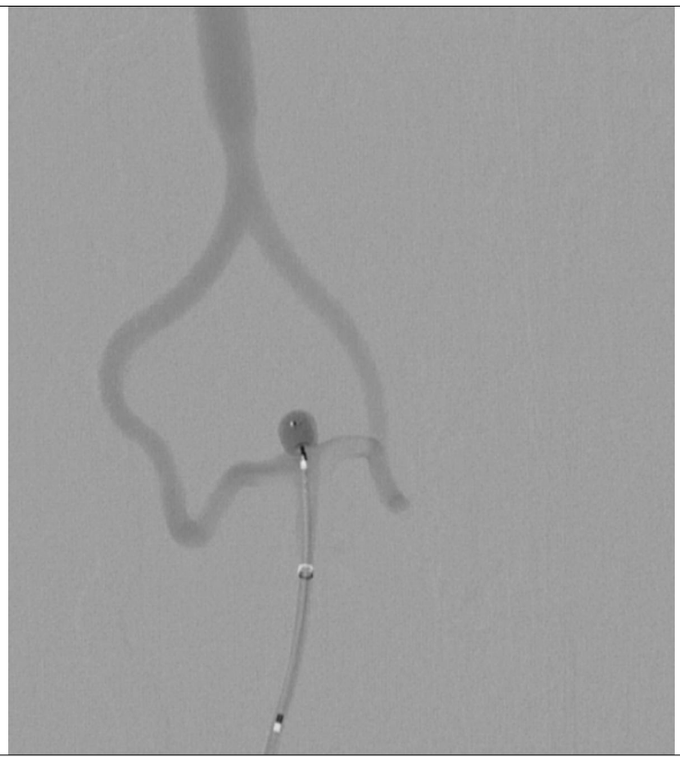

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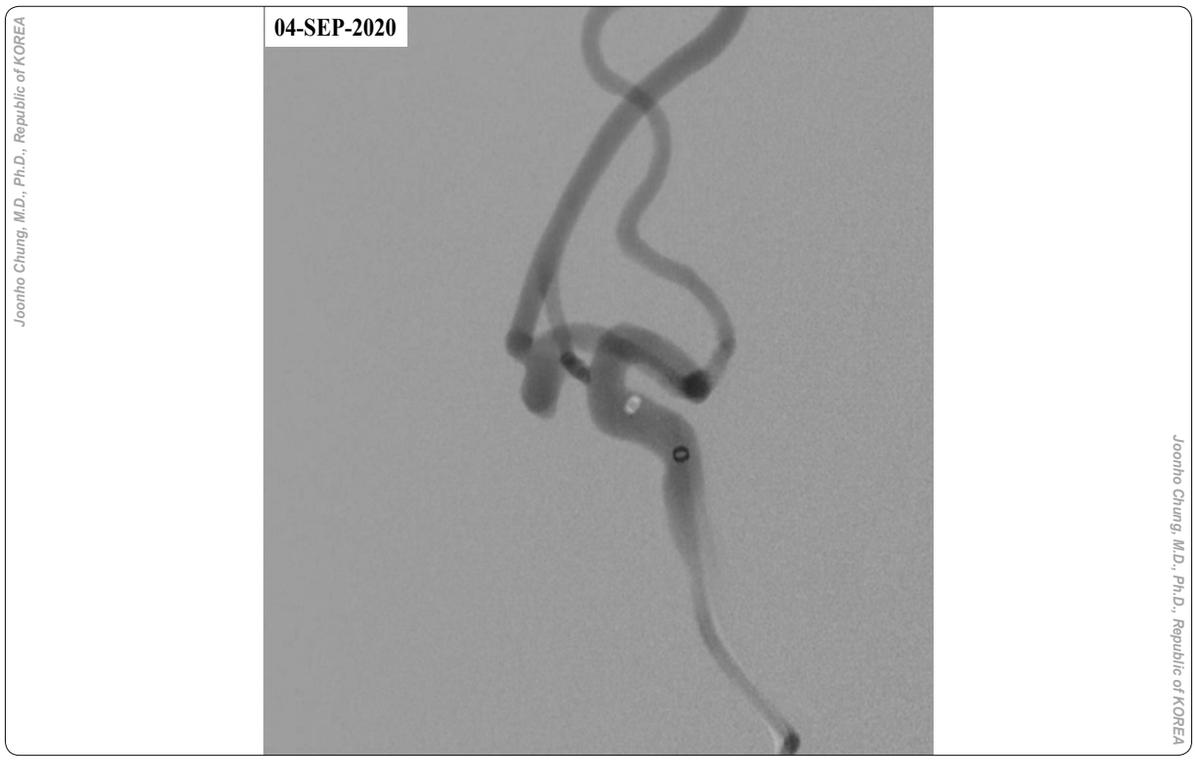
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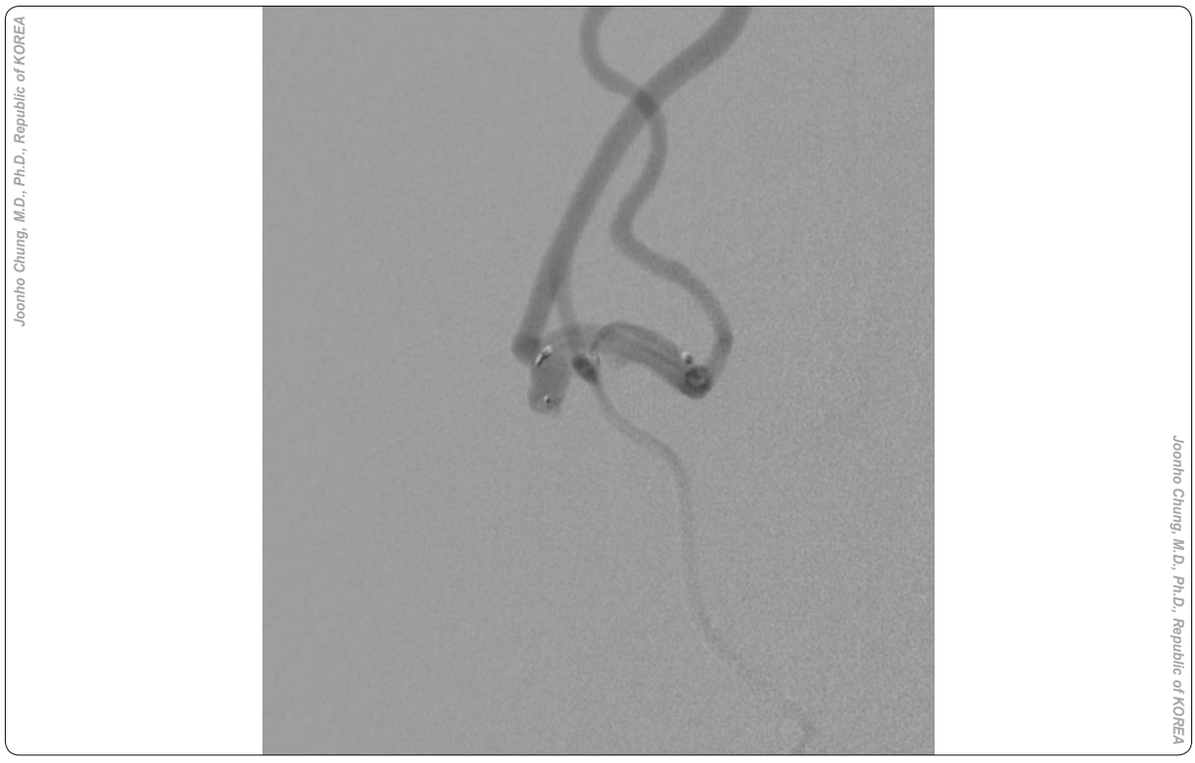
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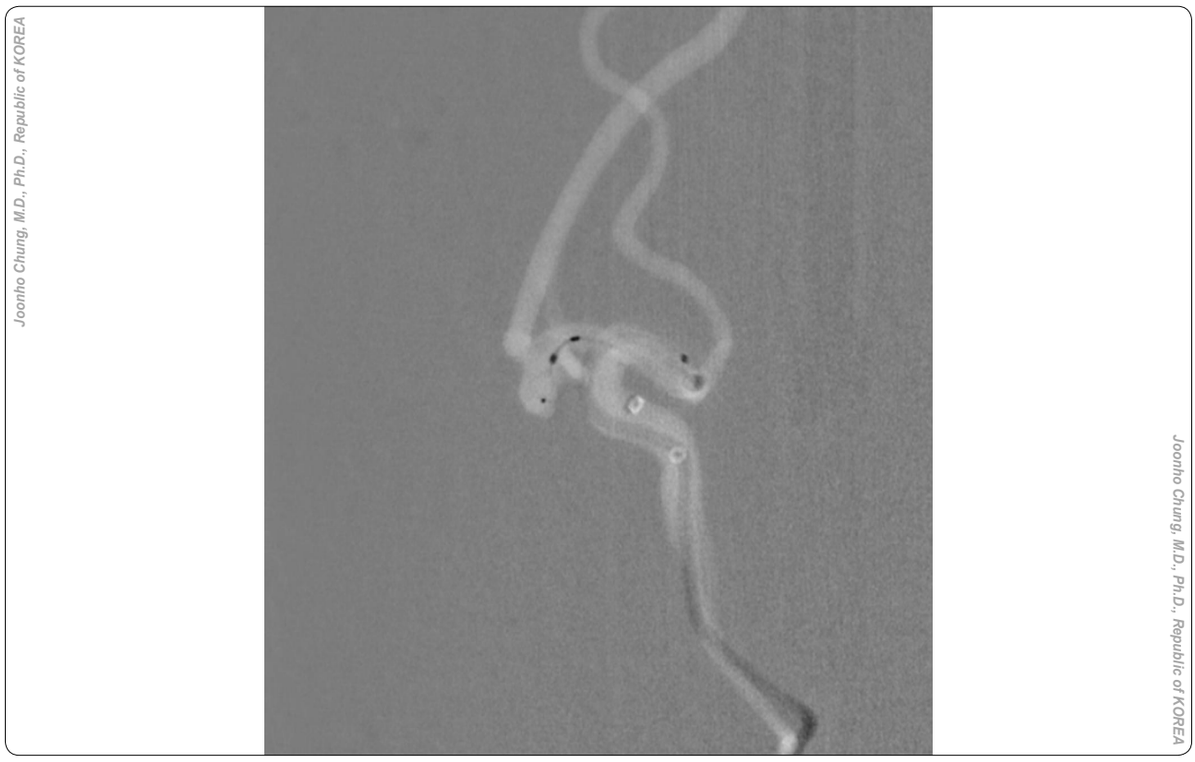
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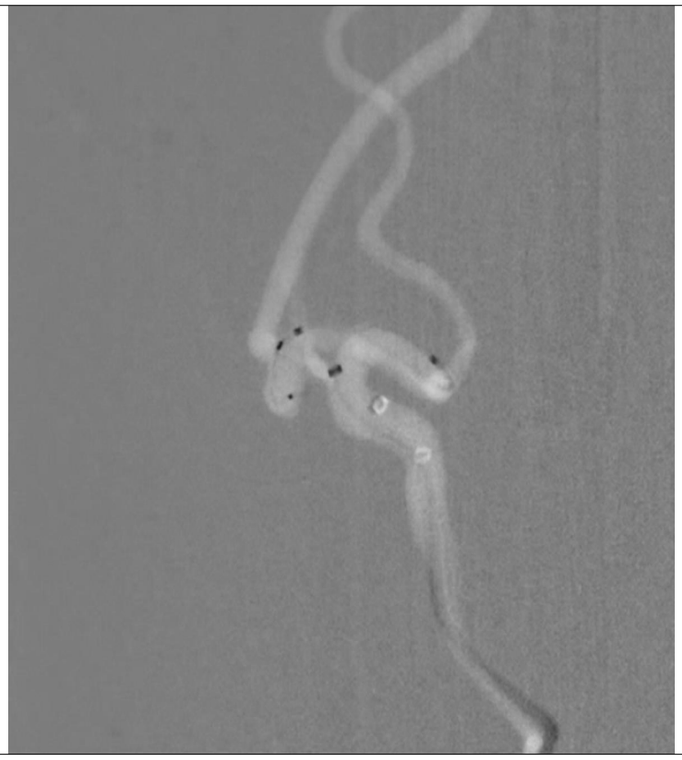

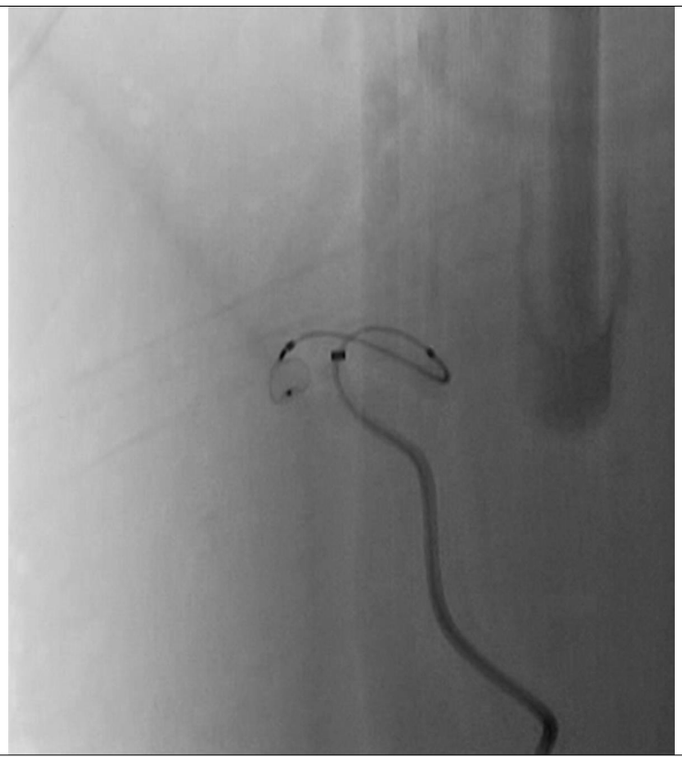

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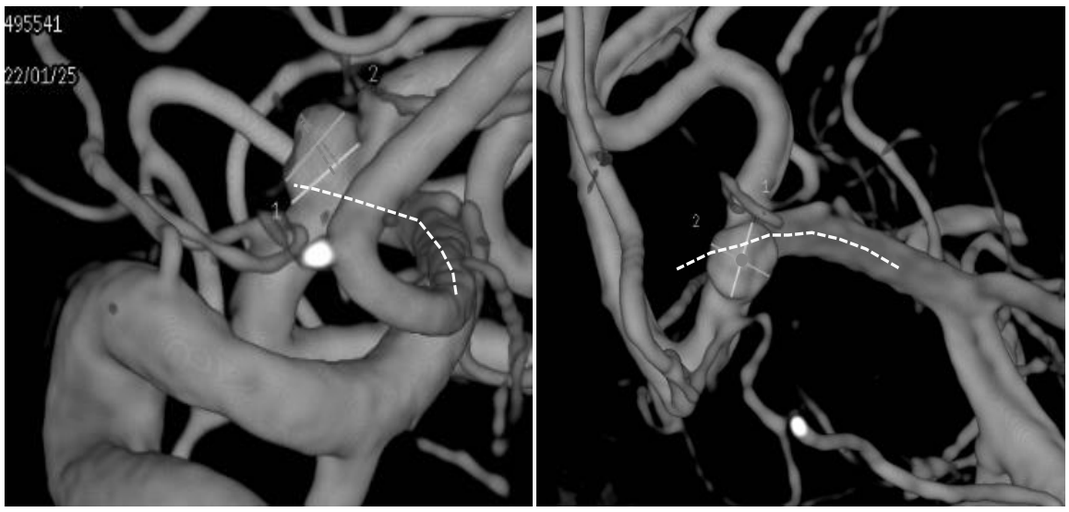

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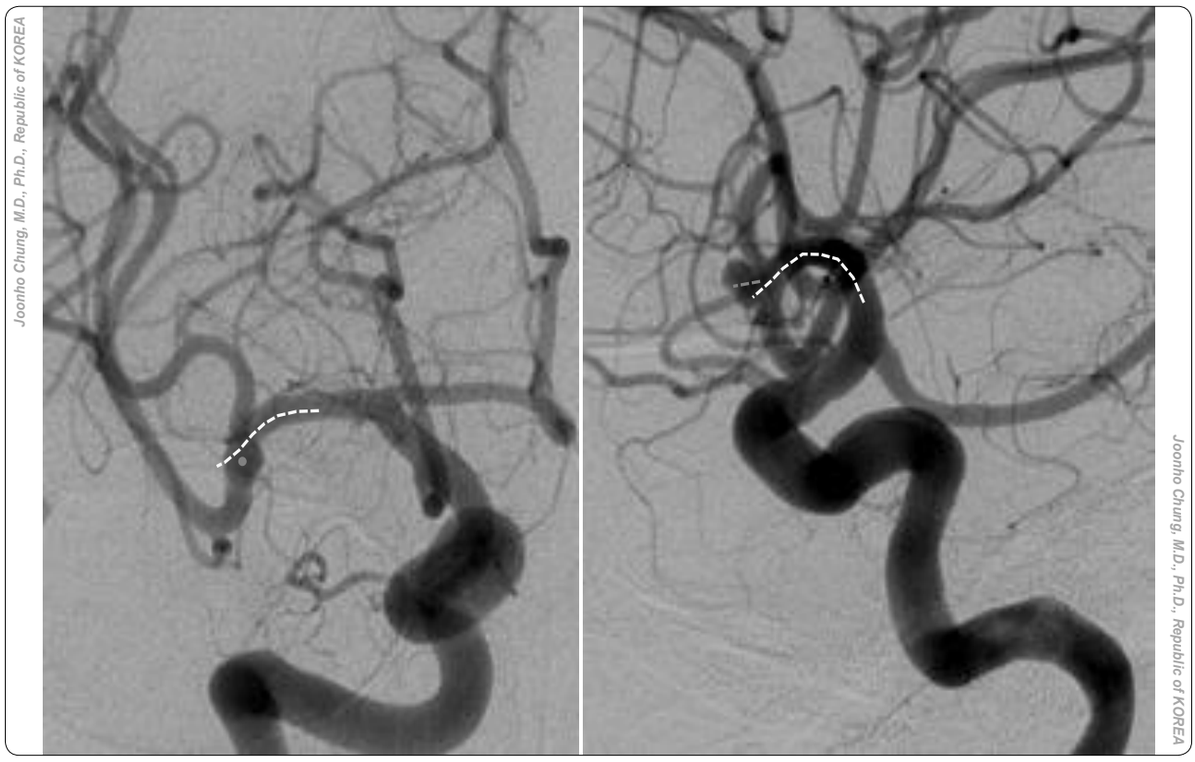
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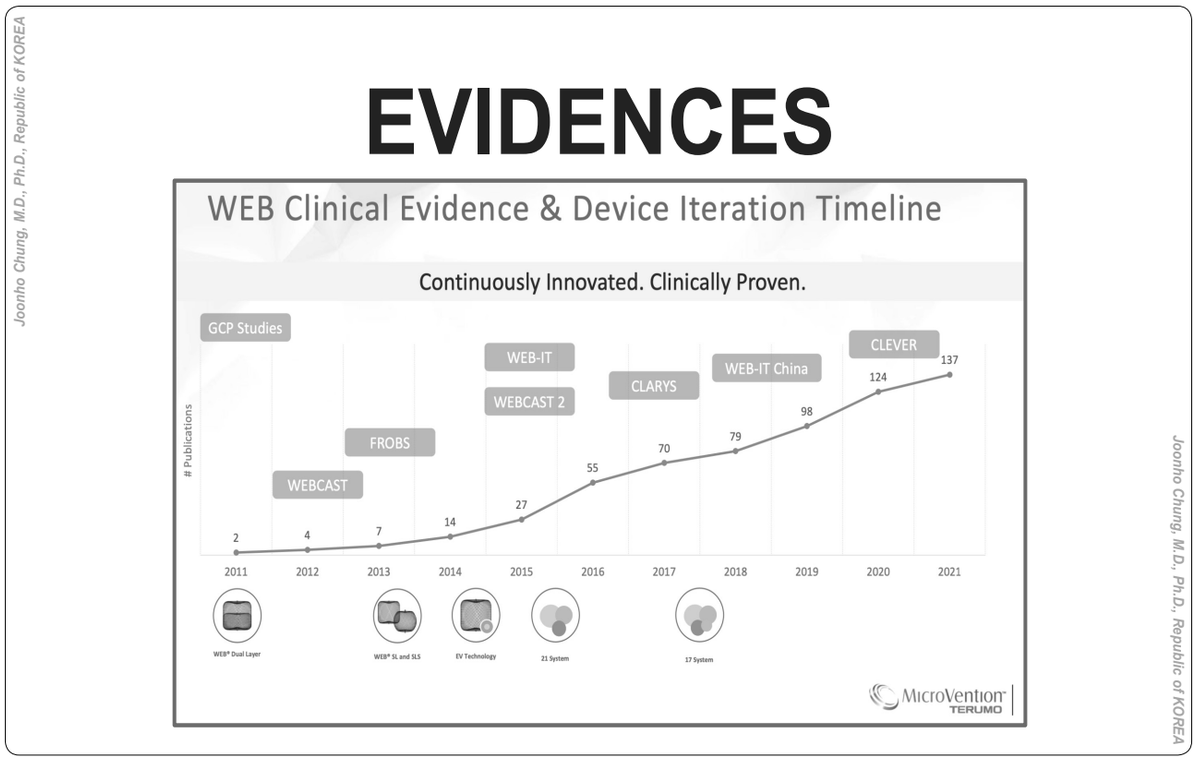
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EVIDENCES
WEB Clinical Evidence & Device Iteration Timeline
Continuously Innovated. Clinically Proven.
GCP Studies
WEBCAST
FROBS
WEB-IT
WEBCAST 2
CLARYS
WEB-IT China
CLEVER
Publications
2
4
7
14
27
55
70
79
98
124
137
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
WEB® Dual Layer
WEB® SL and SLS
EV Technology
21 System
17 System
MicroVention
TERUMO
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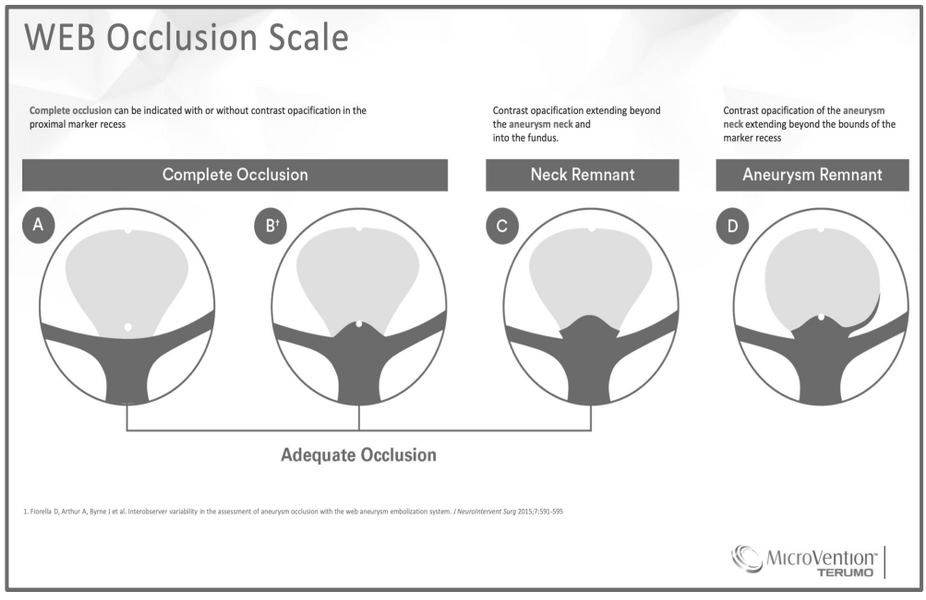
		European GCP Studies		
	WEB-IT US IDE Study[1]	(1 year)[2] *WEBCAST, WEBCAST-2, and FROBS*	(5 Year)[3] *WEBCAST, WEBCAST-2*	CLARYS Ruptured Aneurysm Study[4]
Number of patients	150	168	100	60
Number of aneurysms	150	169	95	60
▪ Basilar Apex	39.3% (59/150)	17.8% (30/169)	17.9% (17/95)	11.7% (7/60)
▪ ICA Terminus	4.0% (6/150)	10.1% (17/169)	9.5% (9/95)	1.7% (1/60)
▪ MCA Bifurcation	30.0% (45/150)	50.9% (86/169)	51.6% (49/95)	38.3% (23/60)
▪ Acomm Complex	26.7% (40/150)	21.3% (36/169)	21.1% (20/95)	43.3% (26/60)
▪ Other	0	0	0	5.0% (3/60)
Average aneurysm diameter	6.4 mm	7.6 mm	7.3 ± 2.6mm	6.6 mm
Ruptured aneurysms	6.0% (9/150)	8.3% (14/169)	7.4% (7/95)	100%
Devices/Procedures Evaluated	WEB DL (12.8%) WEB SL/SLS (87.2%)	WEB DL (47.9%) WEB SL/SLS (52.1%)	WEB DL (46.3%) WEB SL/SLS (53.7%)	WEB SL/SLS



Angiographic Follow-Up

		European GCP Studies		
	WEB-IT US IDE[1,*]	(2 Year)[2] WEBCAST, WEBCAST-2, and FROBS	(5 Year)[3] WEBCAST, WEBCAST-2	CLARYS Ruptured Aneurysm Study[4]
Angiographic Follow-up	1 year	2 years	5 years	1 year
Complete Occlusion	53.8% (77/143)	51.2% (62/121)	51.6% (49/95)	41.3% (19/46)
Neck Remnant	30.8% (44/143)	29.8% (36/121)	26.3% (25/95)	45.7% (21/46)
Aneurysm Remnant	10.5% (15/143)	19.0% (23/121)	22.1% (21/95)	13.0% (6/46)
Adequate Occlusion	84.6% (121/143)	81.0% (98/121)	77.9% (74/95)	87.0% (40/46)
Retreatment (A)(B)(C)	5.6% (8/143)	9.2% (14/152)	11.6% (11/95)	11.5% (6/52)

		European GCP Studies		
	WEB-IT US IDE Study[1]	(2 Year)[2] WEBCAST, WEBCAST-2, and FROBS	(5 Year)[3] WEBCAST, WEBCAST-2	CLARYS Ruptured Aneurysm Study[4]
Morbidity	1.4% (2/143)	1.4% (2/138)	1.0%*	9.6% (5/52)*
Mortality	0% (0/143)	0.7% (1/138)	7.0%*	3.8% (2/52)*
Re-Bleeding or Bleeding during follow-up period	0%	0%	0%	0%
Time Period	1 year	2 years	5 years	1 year

	WEB-IT US IDE Study[1]	European GCP Studies[2]	CLARYS Ruptured Aneurysm Study[3]
Technical Success	98.7% (148/150)	96.4% (163/169)	93.3% (56/60)
Adjunctive Devices Implanted	1.4% (2/148)	7.4% (12/163)	3.6% (2/56)
Fluoroscopy Time	30.2 ± 15.7 min	NR	27.0 ± 16.0 min
WEB Device Time*	20.9 ± 21.2 min	NR	NR
Total Procedure Time	NR	NR	75.3 ± 42.7 min

Hemorrhagic stroke

OPEN ACCESS

Original research

Safety and effectiveness of the Woven EndoBridge (WEB) system for the treatment of wide necked bifurcation aneurysms: final 5 year results of the pivotal WEB Intra-saccular Therapy study (WEB-IT)

David Fiorella ,[1] Andy Molyneux,[2] Alex Coon,[3] Istvan Szikora ,[4] Isil Saatci ,[5] Feyyaz Baltacioglu,[6] Mohammad A Aziz-Sultan,[7] Daniel Hoit,[8] Josser E Delgado Almandoz ,[9] Lucas Elijovich ,[10] H Saruhan Cekirge ,[11,12] James Byrne,[13] Joachim Klisch,[14] Adam S Arthur [10,15]

ABSTRACT

Introduction The US Woven EndoBridge Intra-saccular Therapy (WEB-IT) study is a pivotal, prospective, single arm, investigational device exemption study to evaluate the safety and effectiveness of the WEB device for the treatment of wide neck bifurcation aneurysms (WNBAs). We present complete 5 year data for the cohort of 150 patients.

Methods 150 patients with WNBAs were enrolled at 21 US and six international centers. Imaging from the index procedure, 6 month, 1 year, 3 year, and 5 year follow-up were reviewed by a core laboratory. Adverse events were reviewed and adjudicated by a clinical events adjudicator.

Results 83 patients had 5 year follow-up imaging and 123 had clinical follow-up. No ruptured (0/9) or unruptured aneurysm (0/141) rebled or bled during follow-up. No new device or procedure related adverse events or serious adverse events were reported after 1 year. At 5 years, using the LOCF method, complete occlusion was observed in 58.1% and adequate occlusion in 87.2% of patients. For patients with both 1 year and 5 year occlusion statuses available, 76.8% (63/82) of aneurysms remained stable or improved with no retreatment. After 1 year, 18 aneurysms were retreated, 11 of which were adequately occluded at 1 year, and 15 of which were retreated in the absence of any deterioration in occlusion grade.

Conclusions Five year follow-up data from the WEB-IT study demonstrated that the WEB device was safe and effective when used in the treatment of WNBAs. Aneurysm occlusion rates achieved at 1 year follow-up were durable, with rates of progressive thrombosis far exceeding rates of recurrence over time.

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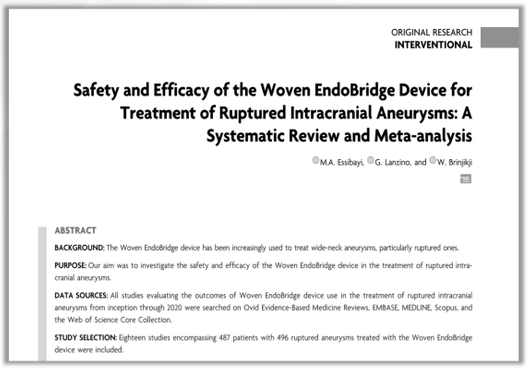
0% Rebleeding Rate in Multiple Studies

	CLARYS[1]	Single Center Ruptured Aneurysm Series (van Rooij et al)[2]	US Multicenter Ruptured Aneurysm Experience (Cortez at al)[3]	WEB-IT US IDE[4]	Cumulative WEB GCP Studies[5]
GCP Study	✓			✓	✓
Ruptured Aneurysms	100% (60/60)	100% (100/100)	100% (94/94)	6.2% (9/143)	8.3% (14/169)
Aneurysms / Patients	60	100	94 / 91	143	169/168
Aneurysm Re-Rupture	0% (1 year)	0% (3 months)	0% (3 months)	0% (1 year)	0% (1 year)

1. Spelle, L., et al. (2021). "Clinical Assessment of WEB device in Ruptured aneurYSms (CLARYS): results of 1-month and 1-year assessment of rebleeding protection and clinical safety in a multicenter study." J Neurointerv Surg.
2. van Rooij SBT, van Rooij WJ, Peluso JP, et al. WEB Treatment of Ruptured Intracranial Aneurysms: A Single-Center Cohort of 100 Patients. AJNR Am J Neuroradiol 2017;38:2282-7.
3. Cortez GM, Akture E, Monteiro A, et al. Woven EndoBridge device for ruptured aneurysms: perioperative results of a US multicenter experience. J Neurointerv Surg 2021.
4. Arthur SA, Molyneux A, Coon AL. et al. The safety and effectiveness of the Woven Endobridge (WEB) system for the treatment of wide-necked bifurcation aneurysms: final 12-month results of the pivotal WEB intrasaccular Therapy (WEB-IT). J Neurointervent Surg 2019;11:924-930
5. Pierot L, Moret J, Barreau X, et al. Safety and efficacy of aneurysm treatment with WEB in the cumulative population of three prospective, multicenter series. J Neurointerv Surg 2018 ; 10: 553-559.

MicroVention TERUMO

Ruptured Aneurysm Treatment



ORIGINAL RESEARCH
INTERVENTIONAL

Safety and Efficacy of the Woven EndoBridge Device for Treatment of Ruptured Intracranial Aneurysms: A Systematic Review and Meta-analysis

M.A. Essibayi, G. Lanzino, and W. Brinjikji

ABSTRACT

BACKGROUND: The Woven EndoBridge device has been increasingly used to treat wide-neck aneurysms, particularly ruptured ones.

PURPOSE: Our aim was to investigate the safety and efficacy of the Woven EndoBridge device in the treatment of ruptured intracranial aneurysms.

DATA SOURCES: All studies evaluating the outcomes of Woven EndoBridge device use in the treatment of ruptured intracranial aneurysms from inception through 2020 were searched on Ovid Evidence-Based Medicine Reviews, EMBASE, MEDLINE, Scopus, and the Web of Science Core Collection.

STUDY SELECTION: Eighteen studies encompassing 487 patients with 496 ruptured aneurysms treated with the Woven EndoBridge device were included.

Ruptured Aneurysm Meta-Analysis
Essiyabi et al. 2021.

- 487 patients | 496 aneurysms
- 1.1% Rebleeding after procedure
  - in-line with coiling alone and balloon-assisted coiling
- DAPT not required

- 2.1% procedure-related mortality
- 3.2% overall clinical complication rate related to WEB

- 87.3% adequate occlusion
- 5.1% retreatment

MicroVention TERUMO

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Opinion

- **Feasibility: Excellent**
- **Efficacy: Good, but not easy**
- **Safety: Good, but not easy**
- **Durability: Good (longer term results ?)**
- **Comparative Clinical Trials**

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Simple
Short
Safe

Precision Medicine

NE
AND
DONE

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Simple	Selection
Short	Selection
Safe	Selection

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Joonho Chung, M.D., Ph.D., Republic of KOREA
Thank You
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MEMO

MEMO

Basic NeuroEndovascular Training Course 3
(BNET Course)

인 쇄: 2024년 5월 11일
발 행: 2024년 5월 08일
발행처: 대한뇌혈관내치료의학회
(06631) 서울 서초구 서초대로 350 (서초동, 동아빌라트2타운) 407호
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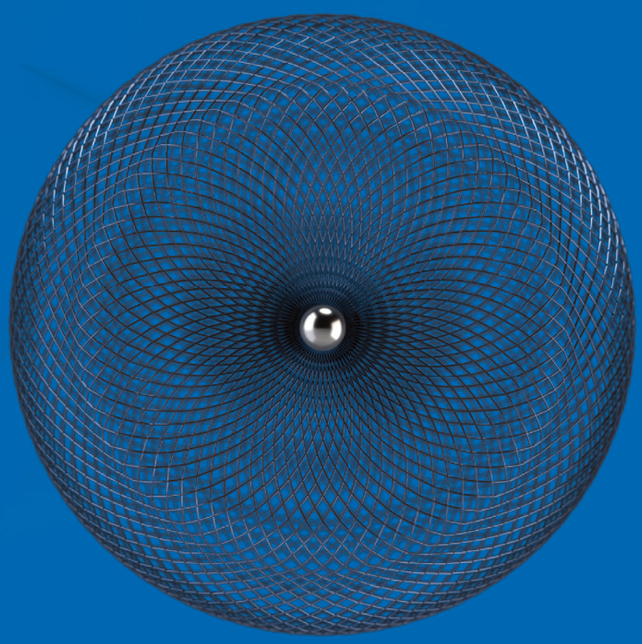
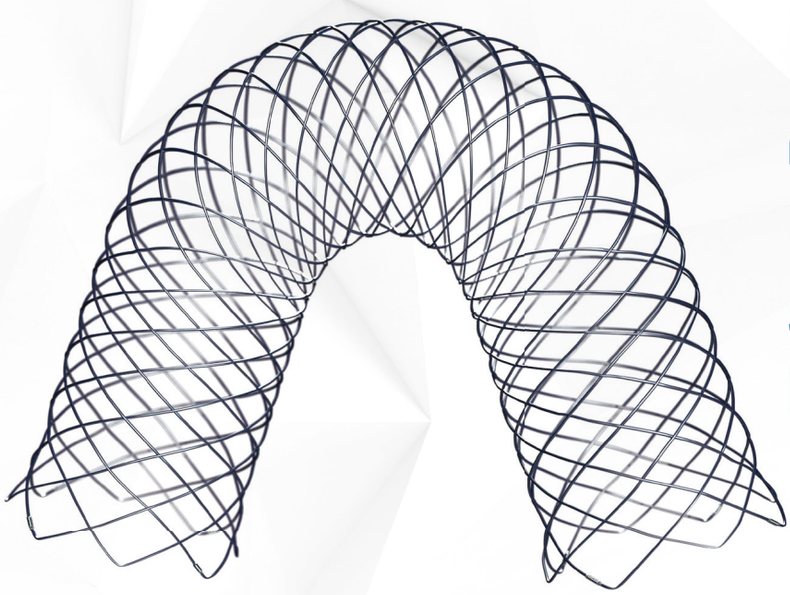
Aneurysm Embolization System

LEADING THE WAY IN INTRASACCULAR FLOW DISRUPTION





LVIS™ EVO™
Intraluminal Support Device

SEEING IS BELIEVING

MicroVention™
TERUMO

Indications for Use:

The LVIS EVO device is intended for use with embolic coils for the treatment of intracranial neurovascular diseases.

The WEB Aneurysm Embolization System is intended for the endovascular embolization of ruptured and unruptured intracranial aneurysms and other neurovascular abnormalities such as arteriovenous fistulae (AVF). The WEB Aneurysm Embolization System is also intended for vascular occlusion of blood vessels within the neurovascular system to permanently obstruct blood flow to an aneurysm or other vascular malformation. The device should only be used by physicians who have undergone training in all aspects of the WEB Aneurysm Embolization System procedures as prescribed by Sequent Medical, Inc.

The VIA™ Catheter is intended for the introduction of non-liquid interventional devices (such as coils/stents/flow diverters) and infusion of diagnostic (such as contrast media) or non-liquid therapeutic agents into the neuro, peripheral, and coronary vasculature.

For Healthcare Professional Intended Use Only. Please refer to IFU for the full list of risks, contraindications, warnings, and precautions.

RX Only: Federal law restricts this device to sale by or on the order of a physician.

Class III - CE0297

Please note: not all products displayed are available for sale or distribution in all regions