SYMTAS2019 III INTERNATIONAL SYMPOSIIUM

MECHANICAL THROMBECTOMY
IN ACUTE STROKE THERAPY

Drug Eluting balloons for the treatment of symptomatic intracranial atherosclerosis Initial experience with Elutax 3 Neuro

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DISCLOSURES

- CMO of World Medica
- CEO Endovascular Intervention of World Medica

INTRODUCTION

- Symptomatic intracranial Arteriosclerotic disease (ICAD) accounts for approximately 10% of ischemic strokes in the Western population (Sacco 1995, White 2005).
- Globally it is considered the first cause of stroke, in Asia approximately 40% of cases and is more prevalent in African Americans and Hispanics.
- Among the most known risk factors are age, hypertension and Diabetes.
- ICAD is characterized by having a high rate of recurrence compared to other lesions such as intracranial dissection (Shin 2018) or other strokes, reaching 12.2% during the first year despite the best medical treatment (SAMMPRIS) and between 20-38% at the 2 year follow-up (WASID, GESICA).

THE STATUS OF THE ENDOVASCULAR TREATMENT CONTROVERSY

Endovascular treatment has not shown superiority in randomized trials vs medical treatment with double antiplatelet therapy and statins (SAMMPRIS, VISSIT).

Periprocedural complications (arterial dissection or rupture, cerebral hemorrhage including post-reperfusion syndrome, reocclusion, and stent migration):

- 14.7% vs. 5.8% in SAMMPRIS
- 23.7% vs. 9.4% in VISSIT

Complications during the 1-year follow-up period:

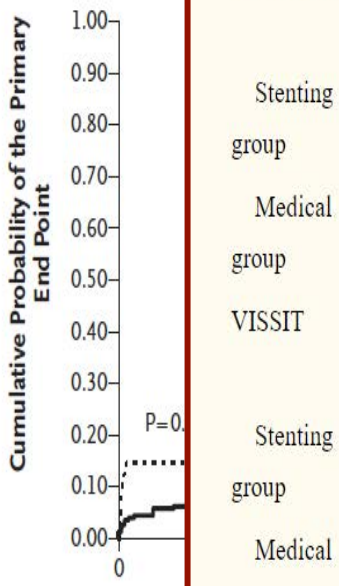
- 23% vs. 15% in SAMMPRIS
- 36.2% vs. 15.1% in VISSIT

SAMMPRIS ⟵ Randomized Trials ⟶ VISSIT

The NEW ENGLAND JOURNAL of MEDICINE

Stenting versus
for Intra

Marc I. Chimowitz, M.B.,



No. at Risk

Medical management group	227					
PTAS group	224	182	153	125	98	83

Original Investigation

JAMA
Journal of the American Medical Association

Effect of a Balloon-Expandable Intracranial Stent
vs Medical Therapy on Risk of Stroke in Patients
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, MD; Zhigang Wang, MD; Monika Killer-Oberpfalzer, MD;

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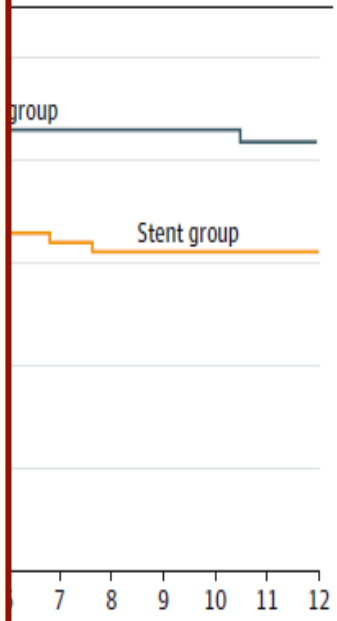


Medical group	53	44	43	43	41	40	39	38	38	38	38	33	20
Stent group	57	42	40	38	38	38	36	35	34	33	33	31	21

Results of the two randomised trials on intracranial stenting

	Symptomatic disease	Number of patients	30-day events	Long-term events beyond 30 days	Withdrew	Lost to follow-up
SAMMPRIS	70%–99% stenosis			32.4 months		
Stenting group		224	33 (14.7%)	52 (23%)	3 (1.3%)	7 (3.1%)
Medical group		227	13 (5.8%)	34 (15%)	13 (5.7%)	11 (4.8%)
VISSIT	70%–99% stenosis			12 months		
Stenting group		59	14 (23.7%)	21 (36.2%)	3 (5.1%)	1 (1.7%)
Medical group		53	5 (9.4%)	8 (15.1%)	3 (5.7%)	6 (11.3%)

THE STATUS OF THE ENDOVASCULAR TREATMENT CONTROVERSY

"Weaknesses" of SAMMPRIS and VISSIT trials

- Patients included in the study had stable symptoms (Amin Aghaebrahim, 2018)
- Absence of primary angioplasty in the procedures (Qureshi Al, 2012)
- Poor recruitment in hospitals (Marks M, 2012)*
- Lack of experience among interventional neurorradiologists (Chaudrhy SA, 2012)*

**1.9 intracranial stent-PTA per year in SAMMPRIS centers*

High complication rate (14%)

THE STATUS OF THE ENDOVASCULAR TREATMENT CONTROVERSY

Other "Weaknesses" of SAMMPRIS and VISSIT

- Supramaximal angioplasty was performed, especially in terretories rich in small narrow arteries (Gao P, 2016)
- The Procedures were performed within 2 weeks from onset of symptoms (Gao P, 2016)
- The Restenosis rate*.

*Up to 39% of the cases (Fields JD, 2010), especially common in patients treated with urgency, in addition to, the hemorrhagic risk of the double antiplatelet treatment in patients treated with intravenous thrombolysis in the context of urgent mechanical thrombectomy.

THE STATUS OF THE ENDOVASCULAR TREATMENT CONTROVERSY

The rate of major complications (death, stroke, TIA, Cerebral hemorrhage) in SAMMPRIS and VISSIT trials is in contrast with the results of prospective registries and single center trials

Autor & Año	N	Éxito técnico (%)	Tasa complicaciones 30d (%)	Tasa recurrencia a largo plazo (%)
SAMMPRIS, 2011	224		**14.7**	**20 (1 año)**
VISSIT, 2015	59	54	**23.7**	**36 (1 año)**
Marks MP, 2006	120		5.8	10.1 (1 año)
Nguyen TN, 2011	74	92	5	8.5 (3 meses)
Okada H, 2015	47	95.7	6.38	9.4 (1 año)
Dumont TM, 2014	24		0	5.5 (1 año)
Aghaebrahim A, 2018	101	84	7.9	17.1 (3 meses)
Peng G, 2018	133	97	6.8	9 (1 año)

THE STATUS OF THE ENDOVASCULAR TREATMENT CONTROVERSY

The rate of major complications (death, stroke, TIA, Cerebral hemorrhage) in SAMMPRIS and VISSIT trials is in contrast with the results of prospective registries and single center trials

Study	No. of lesions	Inclusion period (months)	No. of centers	Treatment/ center/year	Clinical and angiographic follow-up rate (%)	Rate of ISR (%)	Primary endpoint rate (%)		
							<30 days	>30 days	cumulative
SAMMPRIS medical arm	227	29	-	-	-	-	5.8%	6.4%	**12.2%**
SAMMPRIS PTAS arm	224	29	50	1.9	49%	n.a.	14.7%	5.8%	**20.5%**
NIH Registry	129	11	16	8.8	40%	25%	9.6%	4.4%	**14%**
US Multicenter Registry	168	21	5	19.2	80%	31%	5.7%	10%	**15.7%**
Jiang et al. [Jiang 2011]	105	25	1	50.4	42%	26.7%	5%	4%	**9%**
Enterprise + PTA w. conventional balloon	209	38	1	66	83%	24.7%	7.6%	2.3%	**9.9%**
Enterprise + PTA w. drug-eluting balloon	54	22	1	29.5	61%	3%	5%	0%	**5%**

"THE REAL LIFE"

Challenges in the medical management of symptomatic intracranial stenosis in an urban setting

Rajbeer S. Sangha, MD, **Andrew M. Naidech, MD**, **Carlos Corado, BS**, **Sameer A. Ansari, MD, PhD**, **Shyam Prabhakaran, MS, MD**

Background and Purpose—Since the SAMMPRIS trial, aggressive medical management (AMM), which includes dual antiplatelet therapy (DAPT) and high-dose statin (HDS) therapy, is recommended for patients with symptomatic ICAD. However, limited data on the "real-world" application of this regimen exist. We hypothesized that recurrent stroke risk among patients treated with AMM is similar to the medical arm of the SAMMPRIS cohort.

Methods—Using a prospective registry, we identified all patients admitted between August 2012 and March 2015 with 1) confirmed ischemic stroke (IS) or transient ischemic attack (TIA); 2) independently adjudicated symptomatic ICAD; and 3) follow-up at 30 days. We analyzed 30-day risk of recurrent IS stratified by treatment: 1) AMM: DAPT plus HDS therapy, 2) HDS alone, and 3) DAPT alone. We also assessed 30-day risk among patients who met prespecified SAMMPRIS eligibility criteria.

Results—Among 99 patients who met study criteria (51.5% male, 54.5% black, mean age 68.2 ± 11.2 years), 49 (48.5%) patients were treated with AMM, 69 (69.7%) with DAPT, and 73 (73.7%) with HDS therapy. At 30 days, 20 (20.2%) patients had recurrent strokes in the territory of stenosis. Compared to the risk in the medical arm of SAMMPRIS (4.4%), the 30-day risk of recurrent stroke was 20.4% in AMM patients, 21.5% in HDS patients, 22.4% in DAPT patients, and 23.2% in SAMMPRIS-eligible patients (all $p<0.001$).

Conclusions. Recurrent stroke risk within 30 days in patients with symptomatic ICAD was higher than that observed in the medical arm of SAMMPRIS even in the subgroup receiving aggressive medical management. Replication of the SAMMPRIS findings requires further prospective study.

Role of Stenting for Intracranial Atherosclerosis in the Post-SAMMPRIS Era

Dale Ding, Robert M. Starke, R. Webster Crowley, and Kenneth C. Liu

Introduction. The initial promise of endovascular stenting for the treatment of intracranial atherosclerotic disease (ICAD) has been tempered by the results of the SAMMPRIS trial which demonstrated better outcomes with medical management compared to stenting for symptomatic ICAD.We review post-SAMMPRIS ICAD stenting outcomes.

Methods. A comprehensive literature search was performed using PubMed to identify all ICAD stenting series published after the SAMMPRIS in September 2011. The type and design of the stent, number of patients and lesions, inclusion criteria, and clinical and angiographic outcomes were noted.

Results. From October 2011 to August 2013, 19 ICAD stenting series were identified describing the interventional outcomes for 196 patients with 314 lesions. Of the 38 different stents used, 87% were balloon-expandable stents (BESs) and 13% were self-expanding stents. The median minimum stenosis was 50%. The median rates of technical success rate, **postprocedural ischemic events, and symptomatic in-stent restenosis (ISR)** were 98% (range 87–100%), **9.4% (range 0–25%), and 2.7% (range 0–11.1%)**, respectively. The median follow-up durations were one to 67 months.

Conclusions. The management of severe ICAD remains controversial. Future trials are needed to define the optimal patient, lesion, and stent characteristics which will portend the best outcomes with intervention.

TAILORED ANGIOPLASTY AND/OR STENTING

J Neurointerv Surg. 2015 May ; 7(5): 331–335. doi:10.1136/neurintsurg-2014-011109.

Outcomes of tailored angioplasty and/or stenting for symptomatic intracranial atherosclerosis: a prospective cohort study after SAMMPRIS

Zhongrong Miao1, **Ligang Song**1, **David S Liebeskind**3, **Liping Liu**2, **Ning Ma**1, **Yilong Wang**2, **Dapeng Mo**1, **Feng Gao**1, **Xingquan Zhao**2, **Kehui Dong**2, **Dong Zhang**4, and **Peiyi Gao**5

1Department of Interventional Neuroradiology, Beijing Tiantan Hospital, Capital Medical University, Beijing, China
2Departments of Neurology, Beijing Tiantan Hospital, Capital Medical University, Beijing, China
3Department of Neurology, UCLA Stroke Center, Los Angeles, California, USA
4Departments of Neurosurgery, Beijing Tiantan Hospital, Capital Medical University, Beijing, China
5Departments of Neuroradiology, Beijing Tiantan Hospital, Capital Medical University, Beijing, China

Background and purpose: High periprocedural complication rate is a key limitation of endovascular treatment of intracranial atherosclerotic disease (ICAD), despite potential risk reduction of recurrent stroke. Taking lessons from the Stenting and Aggressive Medical Management for Preventing Recurrent Stroke in Intracranial Arterial Stenosis (SAMMPRIS) trial, targeting a selected patient population, we prospectively evaluated the feasibility and safety of tailored angioplasty and/or stenting for patients with ICAD.

Methods: From November 2011 to October 2012, 158 patients with symptomatic ICAD caused by hypoperfusion combined with poor collateral flow were consecutively recruited into a prospective single center study. Patients were divided into three groups based on arterial access and lesion morphology: balloon mounted stent group (group BS) for smooth access and Mori A lesion, angioplasty plus self-expanding stent group (group AS) for tortuous access and Mori B or C lesion, and angioplasty group (group AG) for tortuous access and Mori A lesion. The primary endpoints were successful procedure rate and any vascular event within 30 days.

Results: Overall technical success rate was 96.3% (154/158). There were significant differences in the technical success rate: 89.7% (35/39) in group AG compared with 97.5% (79/81) in group BS and 100% (38/38) in group AS (p=0.042). The 30 day composite stroke, myocardial infarction, or death rate was 4.4% (7/158). Stroke within 30 days occurred in four patients in group BS and in three patients in group AS.

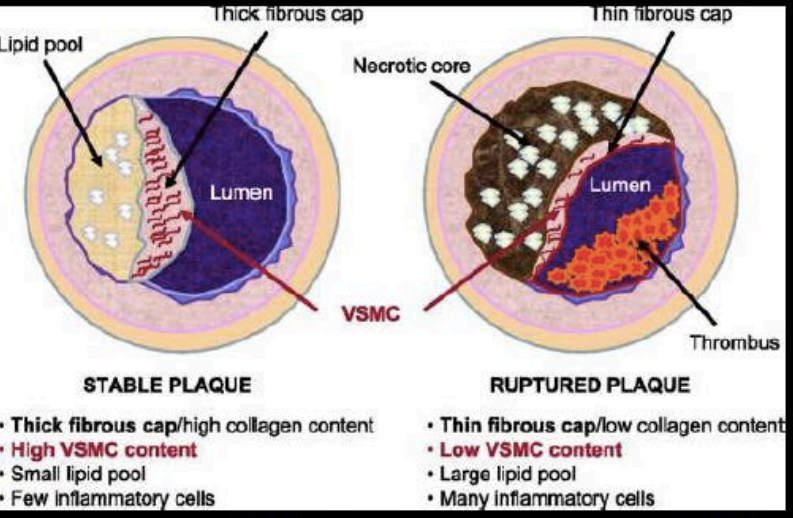
Conclusions: Individualized treatment of ICAD using tailored devices according to arterial access and lesion morphology was feasible and safe in symptomatic patients caused by hypoperfusion with poor collateral flow.

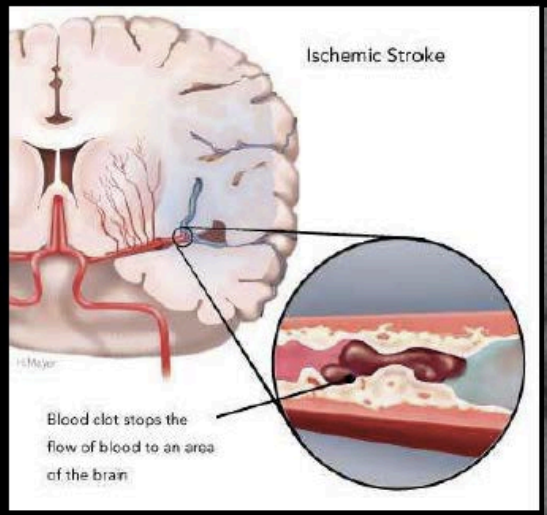
TAILORED ANGIOPLASTY AND/OR STENTING

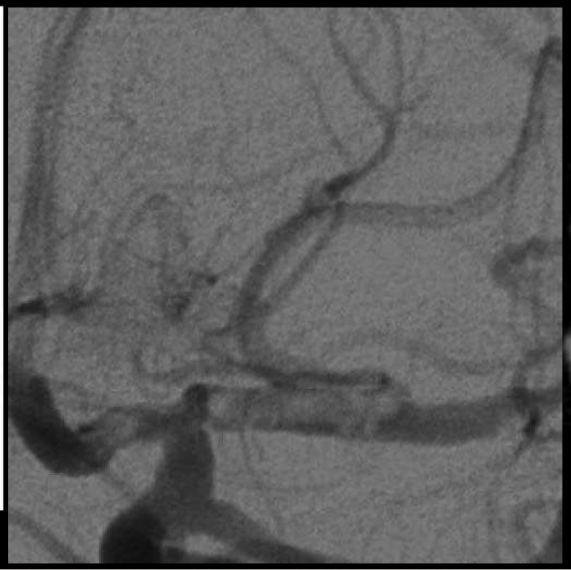
I. Unstable plaque >> thrombus >> embolization

II. Propagation of plaque/thombus into perforators

III. Haemodynamic failure







Sgarra et al. Am J Physiol Endocrinol Metab 2012

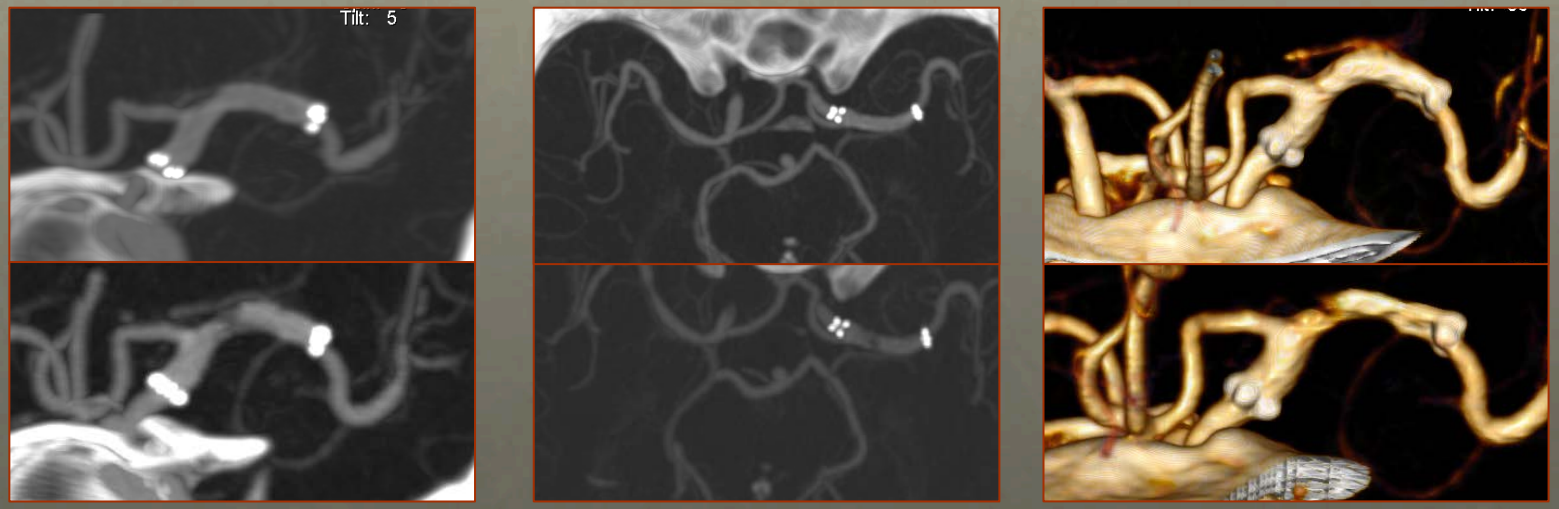
Conclusions: **Individualized treatment of ICAD using tailored devices according to arterial access and lesion morphology was feasible and safe in symptomatic patients caused by hypoperfusion with poor collateral flow.**

SUMMARY OF THE CONTROVERSY

- The role of endovascular treatment is discussed
- Failure of randomized studies
- **The best medical treatment may not be sufficient**
  - Double Antiplatelet + Statins
  - WASID: anticoagulation therapy is as effective as AAS but risk of more severe hemorrhages (8.3 vs 3.2%)
- Frequent Reetenosis: ~30-40%

1m FU

6m FU



CURRENT JUSTIFICATION FOR ENDOVASCULAR TREATMENT WITHOUT ETHICAL CONFLICT

Considering the disparity of results in randomized trials the treatment of ICAD is currently contemplated in patients with unstable symptoms in which medical treatment fails, in relation to a stenosis ≥ 70%, in the following scenarios:

1. ICAD and strokes that worsen or the symptoms progress despite double antiplatelet or anticoagulation regimes

2. **ICAD discovered whilst performing mechanical thrombectomy** (complete occlusion).

3. ICAD existence with stroke despite double antiplatelet or anticoagulation.

ENDOVASCULAR TREATMENT TECHNIQUES

- PTA+ Self expandable stent (SAMMPRIS).
  Progressively less popular
- Balloon expandable stent (VISSIT).
  Withdrawn from the market
- PTA + Remodeling stent (used for the treatment of wide neck cerebral aneurysms)
- Simple balloon angioplasty

ENDOVASCULAR TREATMENT TECHNIQUES

Feng *et al. BMC Neurology* (2015) 15:187
DOI 10.1186/s12883-015-0443-9

BMC Neurology

RESEARCH ARTICLE Open Access

CrossMark

Enterprise stent for the treatment of symptomatic intracranial atherosclerotic stenosis: an initial experience of 44 patients

Zhengzhe Feng†, Guoli Duan†, Ping Zhang, Lei Chen, Yi Xu, Bo Hong, Wenyuan Zhao, Jianmin Liu

PTA + Remodeling stent (used for the treatment of wide neck cerebral aneurysms)

Journal of NeuroInterventional Surgery

To cite: Duan G, Feng Z, Zhang L, *et al. J NeuroIntervent Surg* 2016;**8**:680–684.

ORIGINAL RESEARCH

Solitaire stents for the treatment of complex symptomatic intracranial stenosis after antithrombotic failure: safety and efficacy evaluation

Guoli Duan,[1] Zhengzhe Feng,[1] Lei Zhang,[1] Ping Zhang,[2] Lei Chen,[2] Bo Hong,[1] Yi Xu,[1] Wenyuan Zhao,[1] Jianmin Liu,[1] Qinghai Huang[1]

ENDOVASCULAR TREATMENT TECHNIQUES

- PTA+ Self expandable stent (SAMMPRIS).
  Progressively less popular
- Balloon expandable stent (VISSIT).
  Withdrawn from the market
- PTA + Remodeling stent (used for the treatment of wide neck cerebral aneurysms)
- **Simple balloon angioplasty**

Angioplasty without stenting in symptomatic stenosis of the MCA can be carried out with a high rate of success and a low risk of complications

Primary Angioplasty without Stenting for Symptomatic, High-Grade Intracranial Stenosis with Poor Circulation.
Wang Y, Ma Y, Gao P, Chen Y, Yang B, Jiao L. AJNR, 2018 Aug;39(8):1487-1492. dol:10.3174/ajnr.A5708. Epub 2018 Jul 5.

Materials and methods:
All cases with high-grade, symptomatic intracranial stenosis and poor antegrade flow treated with intracranialangioplasty without stent placement at Xuanwu Hospital, Capital Medical University, from January 2010 to December 2016, were retrospectively reviewed. The main outcomes included the changes in antegrade flow and residual stenosis and any stroke or death within 1 month. We also evaluated functional outcomes, stroke, and restenosis in patients on follow-up.

Results:
Thirty-five patients (mean age, 64.3 years) were included, and the mean follow-up time was 9.7 months. The average preprocedural stenosis was 88.4%. The immediate, average postprocedure stenosis rate was 25.3%, and the average postprocedural stenosis rate at last angiographic follow-up was 34.7%. The primary end point of major stroke or death at 30 days was observed in 1 patient (1/35, 2.9%), and no patient had intraprocedural complications. The incidence of stroke or death at the last follow-up was 2.9%, which was superior to the results of the medical and stent-placement arms of the SAMMPRIS study. Severe restenosis was observed in 3 (3/25, 12%) patients but without any symptoms.

Conclusions:
In this retrospective series, primary balloon angioplasty was an effective treatment option for symptomatic intracranialstenosis with a high risk of stroke

Long-Term Outcome of Balloon Angioplasty Without Stenting for Symptomatic Middle Cerebral Artery Stenosis
Toshihiro Ueda, MD, PhD; Tatsuro Takada, MD; Shinji Nogoshi, MD; Tomohide Yoshie, MD, PhD; Satoshi Takaishi, MD, PhD; Takayuki Fukano, MD

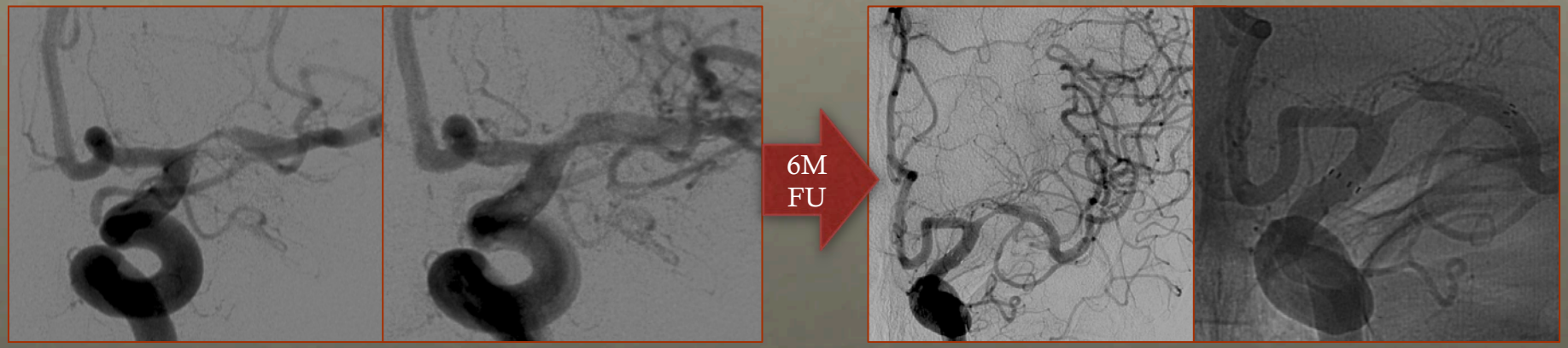
Methods
We retrospectively analyzed the clinical data of 72 patients (mean age, 58.9 years old) with 84 balloon angioplasties without stenting for high-grade (>70%) atherosclerotic stenosis of the main trunk of the MCA. All patients had experienced recurrent transient ischemic attack or minor stroke resistant to medical treatment. We assessed perioperative and long-term outcomes such as restenosis and the recurrence of strokes. The followup period was a median of 63 months (range, 6-171 months).

Results
Balloon angioplasty was successful in 97% of procedures. During the 30-day perioperative period, a total of 3 patients suffered from stroke (4.2%) without death. A total of 23 (31.9%) patients had restenosis at a time point that varied from 6 to 111 months. Diabetes mellitus (DM) was noted significantly more often in the restenosis group (39%) than in the nonrestenosis group (13%). Multivariate logistic regression analysis revealed DM (odds ratio, 4.84; 95% confidence interval, 1.196-19.62; P = .027) as an independent predictor of restenosis. Restenosis and DM were indicated as independent predictors of the recurrence of ischemic stroke and transient ischemic attack.

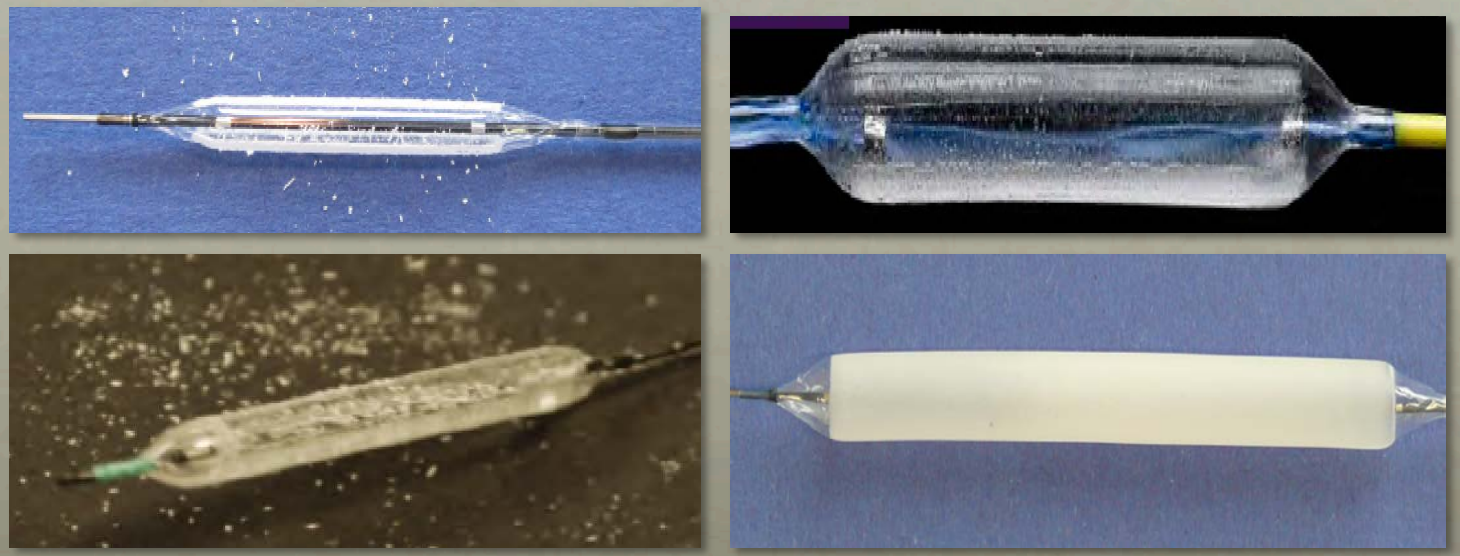
Conclusions
Balloon angioplasty without stenting for symptomatic MCA stenosis can be performed with a high successful rate and a low risk of complications. Long-term outcome data suggest that this procedure reduces the risk of further strokes.

CONCLUSIONS

- Uncertainty about best treatment in patients with symptomatic intracranial stenosis, especially in unstable patients despite better medical therapy
- Unreliable randomized studies
- Mainly retrospective studies, disparity in revascularization techniques
- High rates of relapse and reocclusions ↑ ↑ that usually coincide with thrombectomy and/or posterior circulation



Drug eluting devices for the treatment of arterial stenosis in other territories have demonstrated better effectiveness and efficacy compared to devices that have not been impregnated with drugs (1-3)



1. S cheller B, Hehrlein C, Bocksch W, et al. Treatment of coronary in-stent restenosis with a paclitaxel-coated balloon catheter. N Engl J Med 2006;355:2113–24.
2. Kufner S, Cassese S, Valeskini M, et al. Long-term efficacy and safety of paclitaxeleluting balloon for the treatment of drug-eluting stent restenosis: 3-year results of a randomized controlled trial. JACC Cardiovasc Interv 2015;8:877–84.
3. S cheller B, Clever YP, Kelsch B, et al. Long-term follow-up after treatment of coronary in-stent restenosis with a paclitaxel-coated balloon catheter. JACC Cardiovasc Interv 2012;5:323–30.

Taking into account previous experience in the coronary circulation, the use of paclitaxel-coated balloons could potentially decrease the incidence of symptomatic restenosis in patients with ischemic stroke and avoid the compulsory use of a stent including double anti-platelet treatment. This is particularly interesting in patients with stroke and treated urgently with mechanical thrombectomy.

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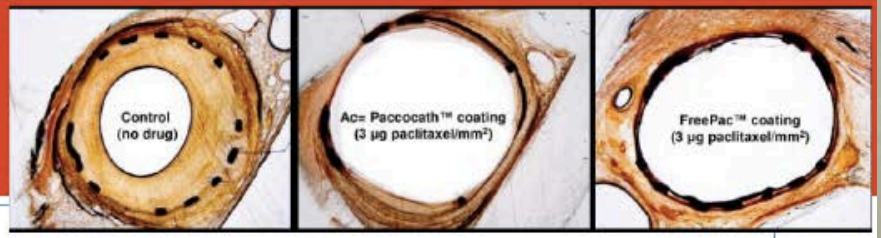


N Engl J Med. 2006 Nov 16;355(20):2113-24. Epub 2006 Nov 13.

Treatment of coronary in-stent restenosis with a paclitaxel-coated balloon catheter.

Scheller B[1], Hehrlein C, Bocksch W, Rutsch W, Haghi D, Dietz U, Böhm M, Speck U.

Author information

Abstract

BACKGROUND: Treatment of coronary in-stent restenosis is hampered by a high incidence of recurrent in-stent restenosis. We assessed the efficacy and safety of a paclitaxel-coated balloon in this setting.

METHODS: We enrolled 52 patients with in-stent restenosis in a randomized, double-blind, multicenter trial to compare the effects of a balloon catheter coated with paclitaxel (3 microg per square millimeter of balloon surface area) with those of an uncoated balloon catheter in coronary angioplasty. The primary end point was late luminal loss as seen on angiography. Secondary end points included the rates of restenosis (a binary variable) and major adverse cardiac events.

RESULTS: Multivessel disease was present in 80% of patients in both groups. Quantitative coronary angiography revealed no significant differences in baseline measures. At 6 months, angiography showed that the mean (+/-SD) in-segment late luminal loss was 0.74+/-0.86 mm in the uncoated-balloon group versus 0.03+/-0.48 mm in the coated-balloon group (P=0.002). A total of 10 of 23 patients (43%) in the uncoated-balloon group had restenosis, as compared with 1 of 22 patients (5%) in the coated-balloon group (P=0.002). At 12 months, the rate of major adverse cardiac events was 31% in the uncoated-balloon group and 4% in the coated-balloon group (P=0.01). This difference was primarily due to the need for target-lesion revascularization in six patients in the uncoated-balloon group (P=0.02).

CONCLUSIONS: Treatment of coronary in-stent restenosis with paclitaxel-coated balloon catheters significantly reduced the incidence of restenosis. These data suggest that the inhibition of restenosis by local drug delivery may not require stent implantation and sustained drug release at the site of injury. (ClinicalTrials.gov number, NCT00106587 [ClinicalTrials.gov].).

Compared to the medical arm of the SAMPRIS, the "of label use" of eluting coronary balloons has obtained better results in terms of safety, efficacy, and restenosis rate.

Drug-coated balloons for the treatment of symptomatic intracranial atherosclerosis: initial experience and follow-up outcome. Ju Han, Jun Zhang, Xiao Zhang, Jinping Zhang, Yun Song, Wei Zhao, Meimei Zheng, Lili Sun, Wei Wang. J Neurointerv Surg. Received 3 July 2018; revised 21 September 2018; accepted 2 October 2018.

Background
The optimal treatment for patients with symptomatic severe intracranial atherosclerotic disease is not well established. Angioplasty and stenting have been attempted, with controversial results, mainly attributed to perioperative complications and a high incidence of restenosis or in-stent restenosis. Drug-coated balloons (DCBs) have shown encouraging results for coronary and peripheral artery disease, without convincing data for intracranial vasculature.

Objectives
To assess the feasibility, clinical and angiographic outcomes of DCBs for patients with intracranial de novo atherosclerotic disease.

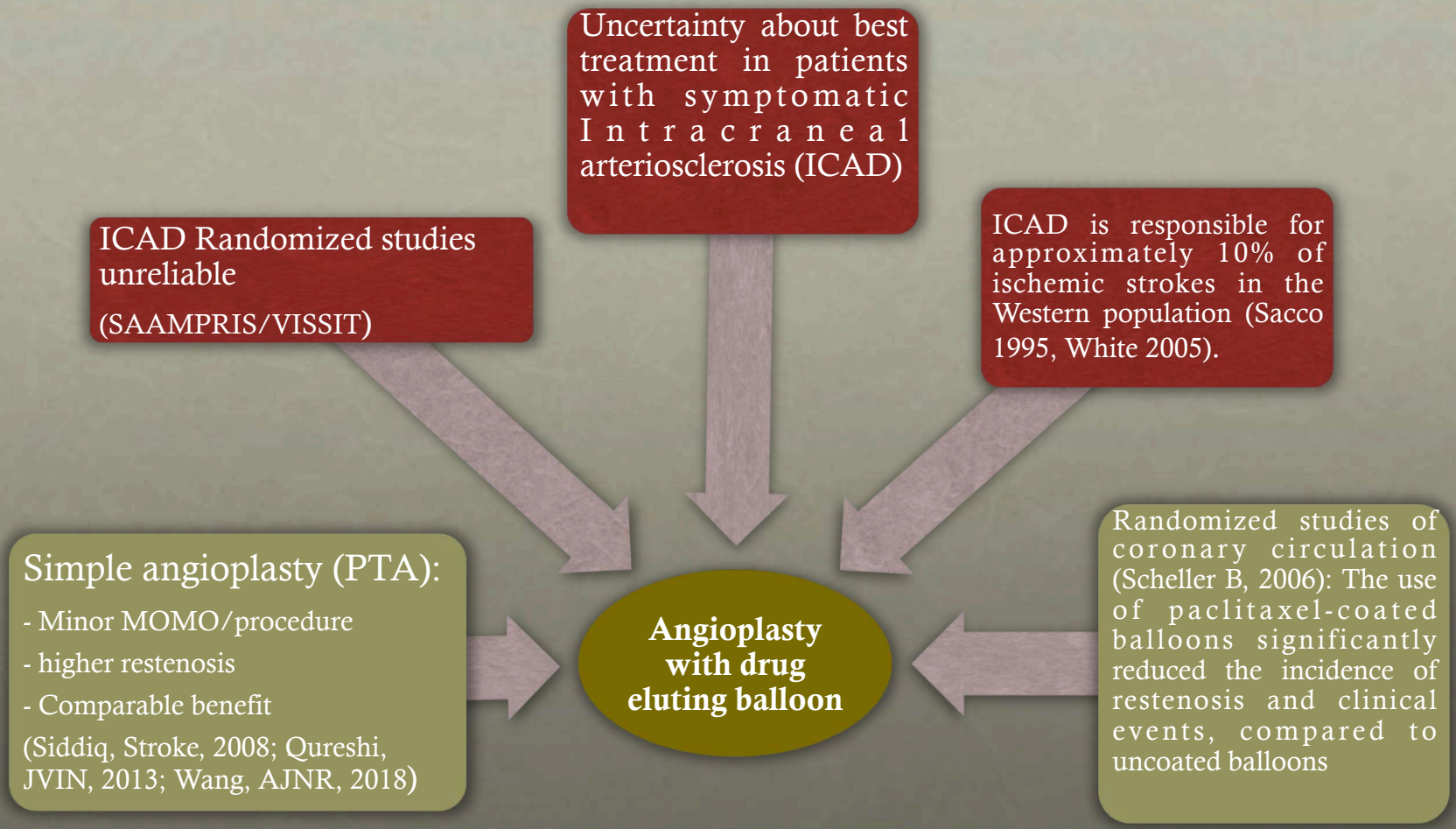
Methods
Between September 2016 and September 2017, details of 30 patients with 31 arteries treated withDCBs* for symptomatic severe intracranial atherosclerotic disease (≥70% stenosis or chronic total occlusion) were retrospectively collected in our centre. All lesions were predilated with conventional balloons. Periprocedural complications and clinical and vascular imaging followup outcomes were analysed.

Results
A ll arteries were successfully dilated with DCBs and 29 (93.5%) arteries achieved good antegrade perfusion, with remedial stenting for two arteries. **Two patients presented with new ischemic stroke after the procedure. Over a mean follow-up of 9.8±2.6 months, no patient had recurrent ischemic symptoms.** Repeat vascular imaging was performed at 7.0±1.1 months, with cerebral angiography in 24 patients (25 arteries) and MR angiography in six patients (six arteries). Only one (3.2%) artery presented with angiographic asymptomatic restenosis.

Conclusions
This study suggests that DCB dilatation may be a safe and effective alternative for intracranial de novo atherosclerotic disease.

*Paclitaxel-coated coronary DCB (SeQuent Please, B. Braun, Berlin, Germany)

ENDOVASCULAR TREATMENT TECHNIQUES "ONE MORE STEP"



THE AVAILABLE TOOL

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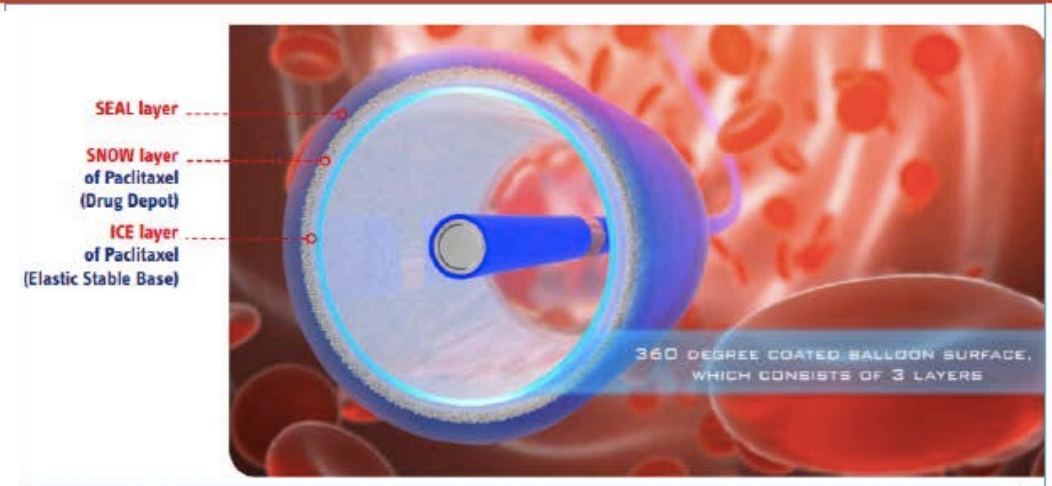
THE AVAILABLE TOOL

ELUTAX 3

Paclitaxel-coated balloon certified for use and navigation in cerebral arteries ***(it is the only drug eluting balloon indicated for the use in intracranial arteries with CE mark in the market)***

- Homogenous coating (360°)
- Hydrophilic coating
- Rapid Exchange
- Minimal drug loss during maneuver
- The first drug dose is around 250 micromol/ml
- Prolonged drug release of up to 30 days



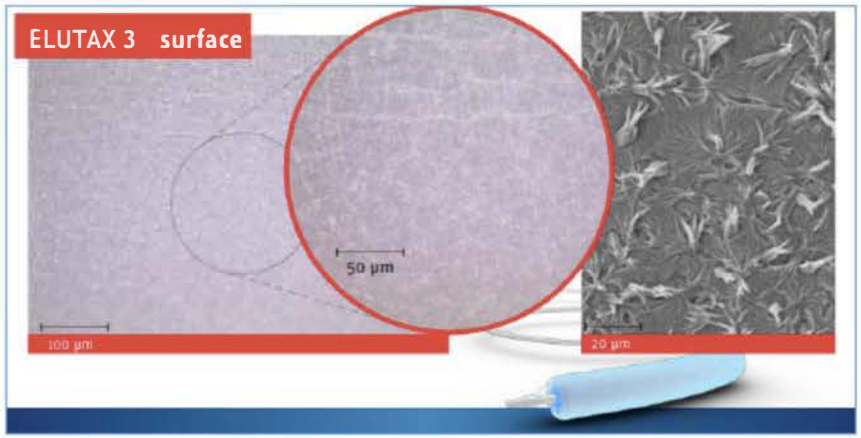
Paclitaxel Tissue levels of different Drug eluting Balloons over 30 days

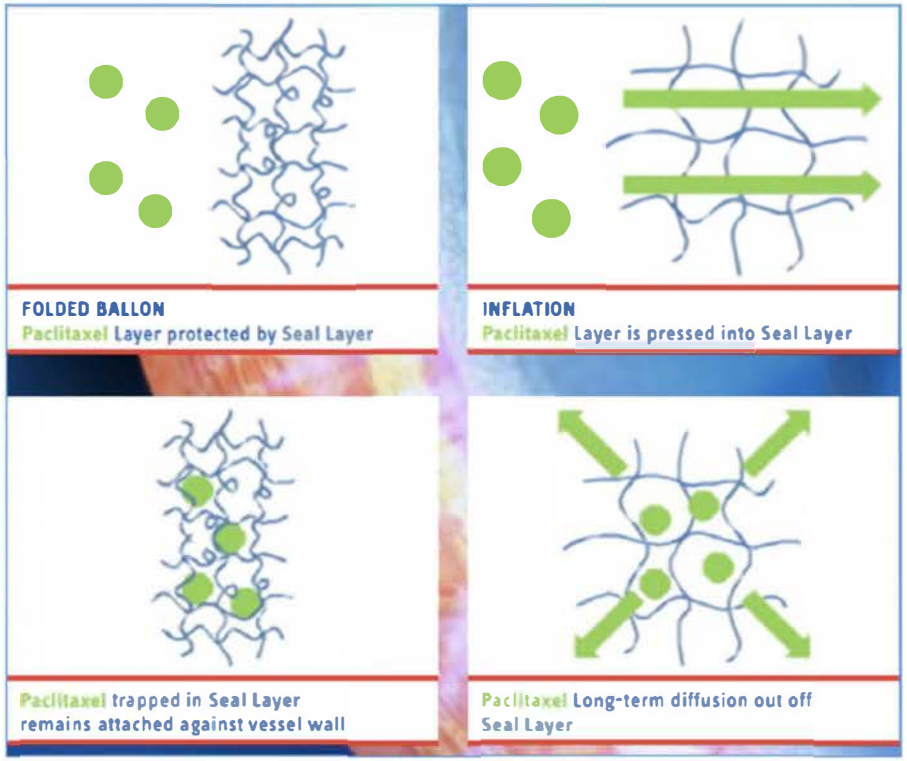
Coronary PORCINE	Elutax SV	Competitor A	Competitor B
uniform coating	yes	no	no
360 degree	yes	no	no
Drug Dose 1 hour Drug Dose 7 days Drug Dose 30 days	~ 250 µmol/ml ~ 70 µmol/ml ~5-10 µmol/ml	~ 200 µmol/ml ~ 0 µmol/ml ~0 µmol/ml	~ 200 µmol/ml ~ 10 µmol/ml ~0,1 µmol/ml
Drug lost during maneuver	max 5%	high	up to 30% every 10 sec.

THE AVAILABLE TOOL

ELUTAX 3

Paclitaxel-coated balloon certified for use and navigation in cerebral arteries ***(it is the only drug eluting balloon indicated for the use in intracranial arteries with CE mark in the market)***





THE AVAILABLE TOOL

Paclitaxel Tissue levels of different Drug eluting Balloons over 30 days

Coronary PORCINE	Elutax SV	Competitor A	Competitor B
uniform coating	yes	no	no
360 degree	yes	no	no
Drug Dose 1 hour	~ 250 µmol/ml	~ 200 µmol/ml	~ 200 µmol/ml
Drug Dose 7 days	~ 70 µmol/ml	~ 0 µmol/ml	~ 10 µmol/ml
Drug Dose 30 days	~5-10 µmol/ml	~0 µmol/ml	~0,1 µmol/ml
Drug lost during maneuver	max 5%	high	up to 30% every 10 sec.

ELUTAX 3

AR Baltic Medical

WorldMedica
BRINGING TOOLS FOR EXCELLENCE

NEURO

length mm	10	13	15	20	25	30
1.50	10150	13150	15150	20150	25150	30150
2.00	10200	13200	15200	20200	25200	30200
2.25	10225	13225	15225	20225	25225	30225
2.50	10250	13250	15250	20250	25250	30250
2.75	10275	13275	15275	20275	25275	30275
3.00	10300	13300	15300	20300	25300	30300
3.25	10325	13325	15325	20325	25325	30325
3.50	10350	13350	15350	20350	25350	30350
3.75	10375	13375	15375	20375	25375	30375
4.00	10400	13400	15400	20400	25400	30400

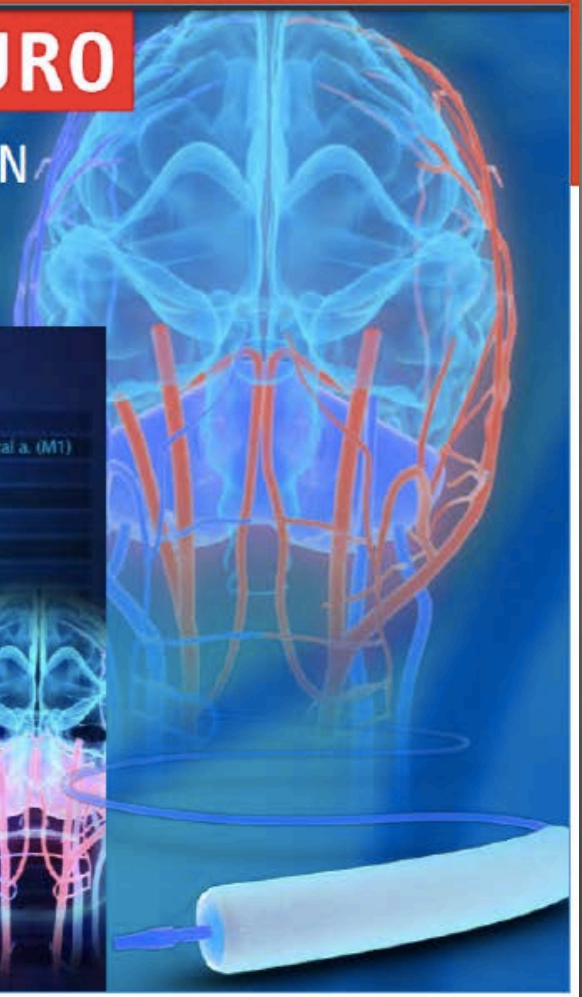
diameter

SUPRA AORTIC NEURO

THE ONLY DRUG ELUTING BALLOON CERTIFIED FOR THE TREATMENT OF SUPRA-AORTIC LESIONS.

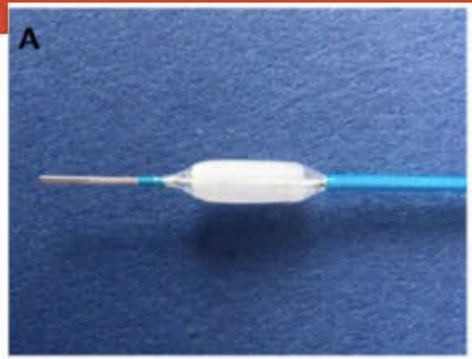
NEURO

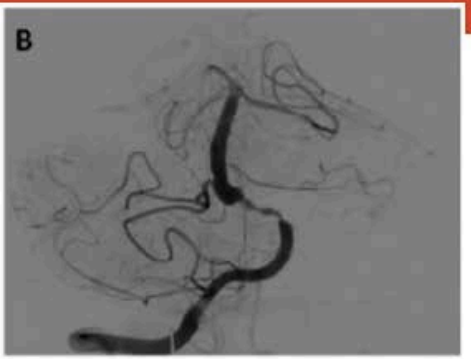
Purpose:	Supraaortic lesions
Lesion location (if not to tortuous):	carotid a., vertebral a., basilar a., middle cerebral a. (M1)
Tip:	flexible, soft, 0,017"
MAX Catheter profile:	less than 1 mm
Catheter design:	RX
Catheter material:	Pebax /Nylon
Usable catheter length:	Minimum 144 cm
GW length:	Recommended 180-250 cm
Max. recommended GW:	0,014"
Introducer sheath compatibility:	4F
Guiding catheter compatibility:	Minimum 5F - recommended 6 F
Balloon characteristic:	semi compliant
Balloon nominal diameter:	1,5-4,0 mm
Balloon nominal length:	10-30 mm
Balloon coating:	3 layers
Nr. of folds:	3
Crossing profile:	less than 1mm
Inflation time minimal:	10 sec
Inflation time recommended:	15-30 sec
Nominal pressure:	6 atm
RBP:	14 atm
Need of predilatation:	NO

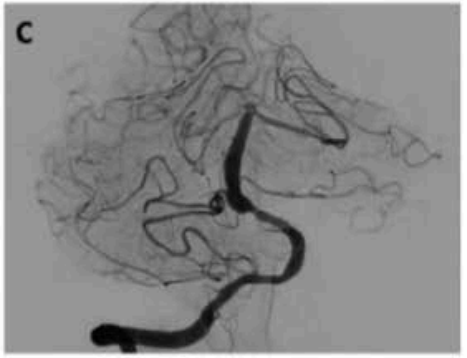


INITIAL EXPERIENCE

"CONS" { *Retrospective study*
Small sample size "n"







Journal of
NeuroInterventional Surgery

ORIGINAL RESEARCH

Neuro Elutax SV drug-eluting balloon versus Wingspan stent system in symptomatic intracranial high-grade stenosis: a single-center experience

Philipp Gruber,[1,2] Carlos Garcia-Esperon,[2] Jatta Berberat,[1] Timo Kahles,[2] Martin Hlavica,[1] Javier Anon,[1] Michael Diepers,[1] Krassen Nedeltchev,[2] Luca Remonda[1]

INITIAL EXPERIENCE

Characteristics	Elutax (n=8)	Wingspan (n=11)	P value
Gender, female, n (%)	3 (38%)	6 (55%)	0.47
Age (years), median (IQR)	68.5 (52–76)	67 (59–73)	0.86
Clinical follow-up (months), median (IQR)	9.5 (4.5–27)	10 (6–58)	0.36
NIHSS score on admission, median (IQR)	0 (0–4)	2 (0–6)	0.28
Vascular risk factors			
Hypertension, n (%)	6 (75%)	8 (73%)	0.81
Diabetes, n (%)	1 (13%)	4 (36%)	0.26
Dyslipidemia, n (%)	3 (38%)	7 (64%)	0.28
Coronary artery disease, n (%)	4 (50%)	3 (27%)	0.53
Smoking, n (%)	1 (13%)	2 (18%)	0.74
Peripheral artery occlusive disease, n (%)	0 (0%)	1 (9%)	0.39
Atrial fibrillation, n (%)	1 (13%)	1 (9%)	0.82
History of stroke, n (%)	3 (38%)	4 (36%)	0.96
Medication on admission			
Aspirin, n (%)	3 (38%)	7 (64%)	0.27
P2Y12 inhibitor, n (%)	1 (13%)	1 (9%)	0.82
Dipyridamole, n (%)	0	1 (9%)	0.39
Dual antiplatelet therapy, n (%)	1 (13%)	1 (9%)	0.81
Vitamin K antagonist, n (%)	1 (13%)	0 (0%)	0.24
NOAC, n (%)	1 (13%)	0 (0%)	0.24
Anti-lipid agent, n (%)	6 (75%)	6 (55%)	0.51
Severity of stenosis			
Degree of stenosis (%) before intervention, median (IQR)	81% (72.5–92.5)	80% (72–100)	0.87
Degree of stenosis (%) after intervention, median (IQR)	37.5% (20–60)	10% (10–50)	0.23
Localization of target lesions			
Internal carotid artery, n (%)	0 (0%)	1 (9%)	0.39
Middle cerebral artery, n (%)	3 (38%)	5 (45%)	0.74
Vertebral artery, n (%)	3 (38%)	3 (27%)	0.64
Basilar artery, n (%)	2 (25%)	2 (18%)	0.73

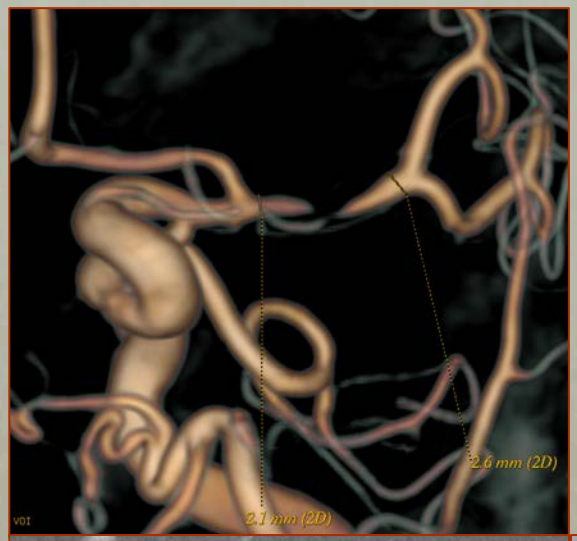
IQR, interquartile range; mRS, modified Rankin Scale; NIHSS, National Institute of Health Stroke Scale; NOAC, novel oral anticoagulant.

Patients treated with simple angioplasty using Elutax 3 had the tendency of minor restenosis rates and reduced clinical events compared to conventional treatment with Wingspan (SAMPRIS).

Table 2 Clinical and technical outcome measures

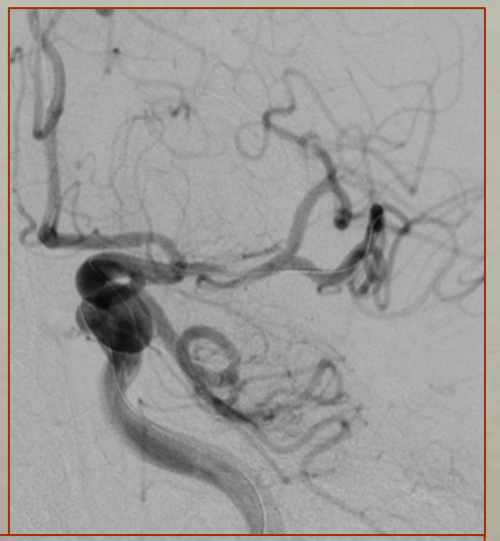
Outcome measures	Elutax (n=8)	Wingspan (n=11)	P value
Good clinical outcome (mRS score ≤2) at follow-up	5 (63%)	9 (82%)	0.36
mRS score on follow-up, median (IQR)	1 (0-3)	1 (0-2)	0.95
Stroke or death within 30 days, n (%)	1 (13%)	0 (0%)	0.24
Technical success*, n (%)	5 (63%)	7 (64%)	0.96
Transient ischemic attack, n (%)	6 (75%)	5 (45%)	0.21
Compound recurrence rate, n (%)	1 (13%)	7 (64%)	0.03
Clinical re-event, n (%)	0 (0%)	5 (45%)	0.03
Restenosis, n (%)	1 (13%)	6 (55%)	0.068
Specific complications, n (%)	0 (0%)	2 (18%)	0.21
Generic complications, n (%)	0 (0%)	1 (9%)	0.39
Technical failure, n (%)	1 (13%)	0 (0%)	0.24
Number of devices used, median (IQR)	1 (1–2)	3 (2–4)	0.003

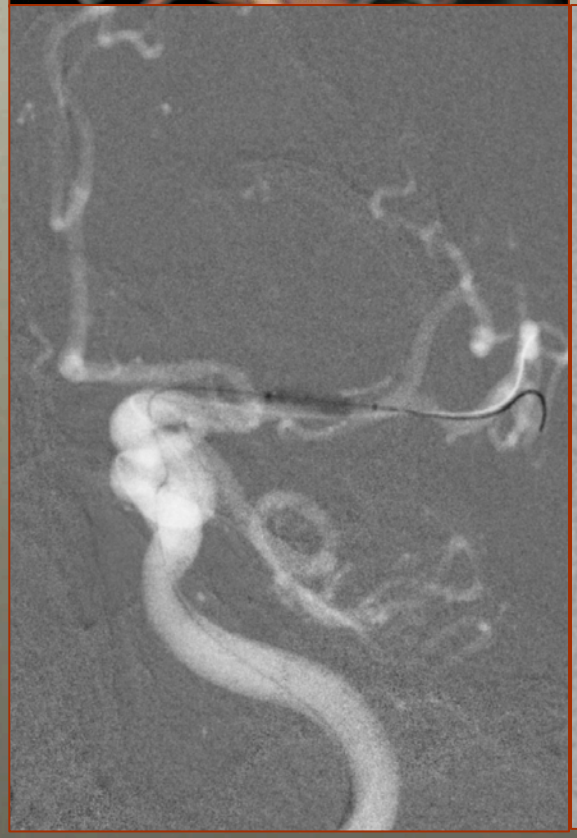
*Technical success; defined as <50% residual stenosis at the end of the intervention.
mRS, modified Rankin Scale.

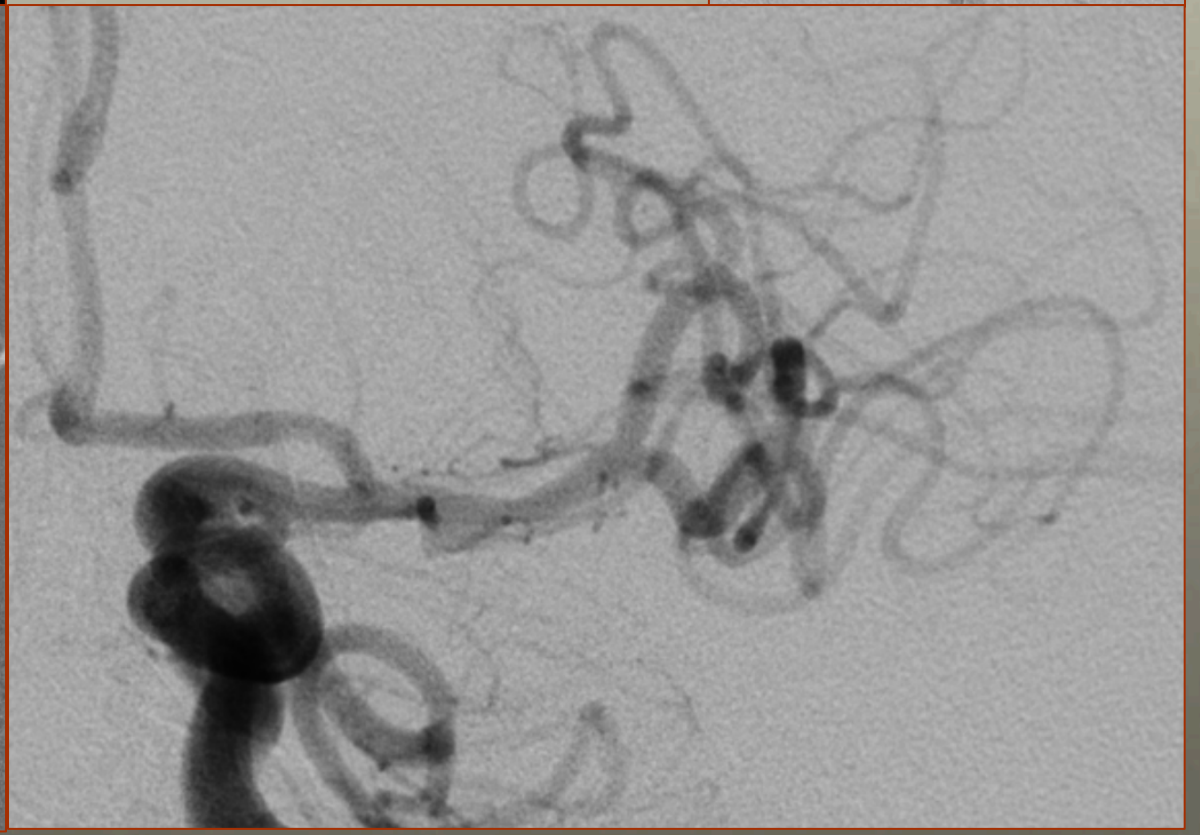


HOW I DO IT?

Neuron 0,088 (±Navien/5F)
Microwire: Asahi 0.014
Submaximal Inflation time: 20´´
(1 or 2)



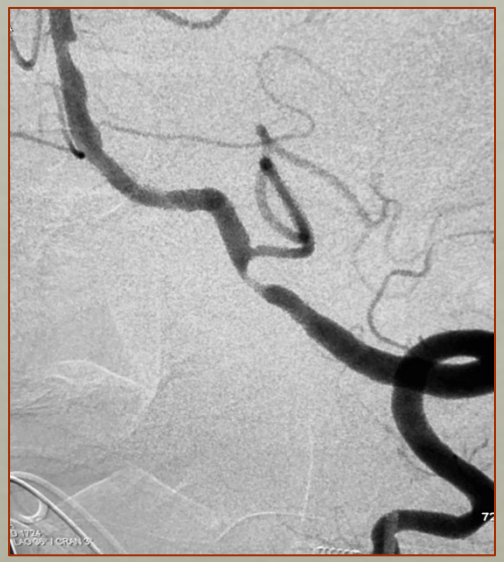


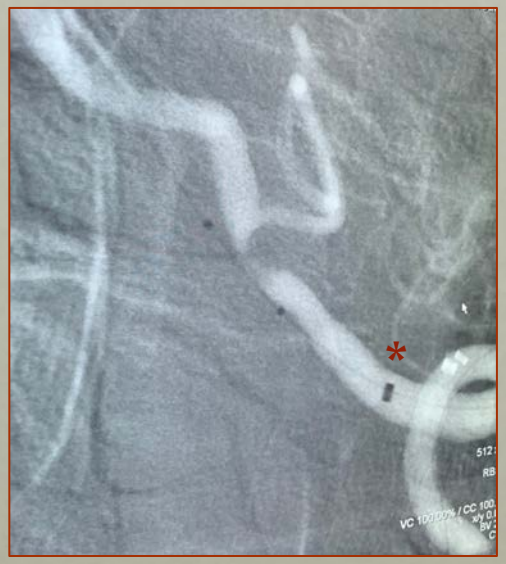


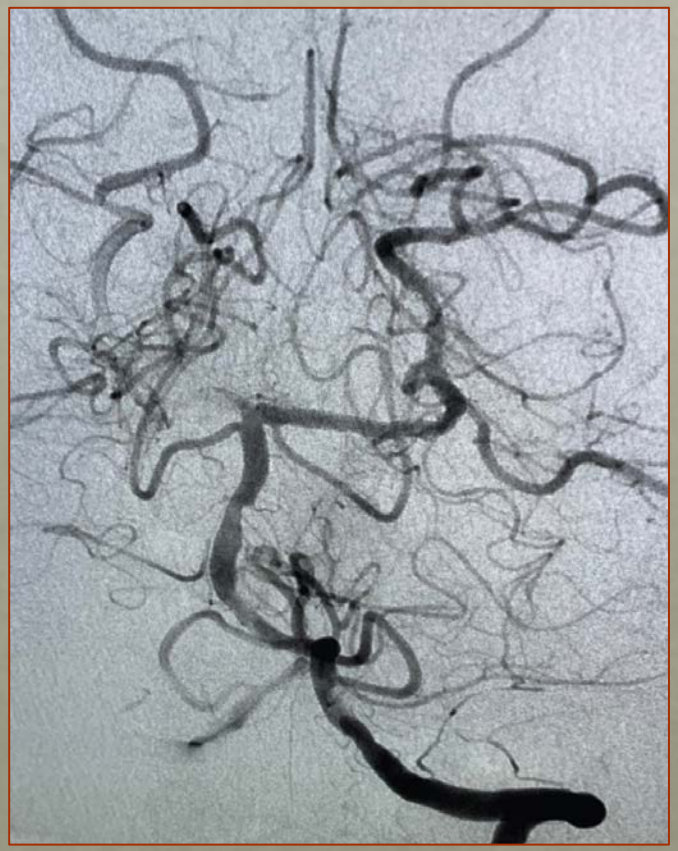
HOW I DO IT?

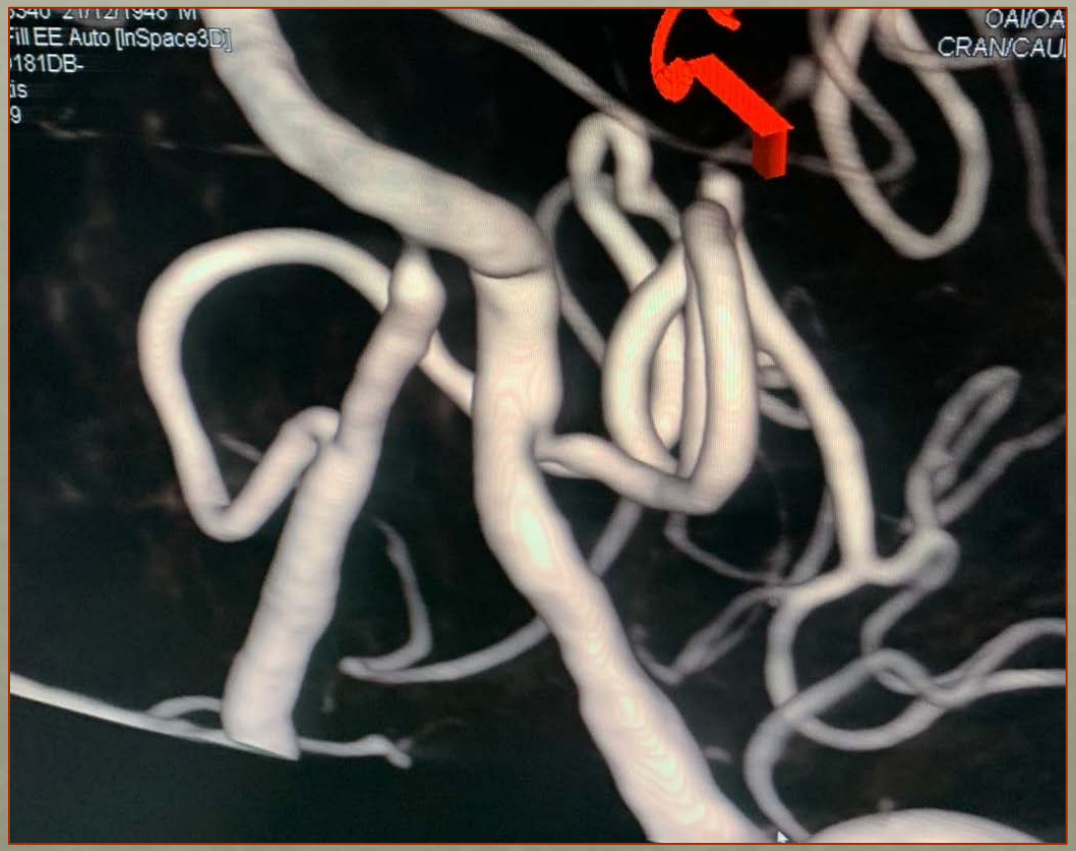
Neuron 0,088+Navien 5F*
Microwire: Asahi 0.014
Inflation time: 20´´(1 or 2)

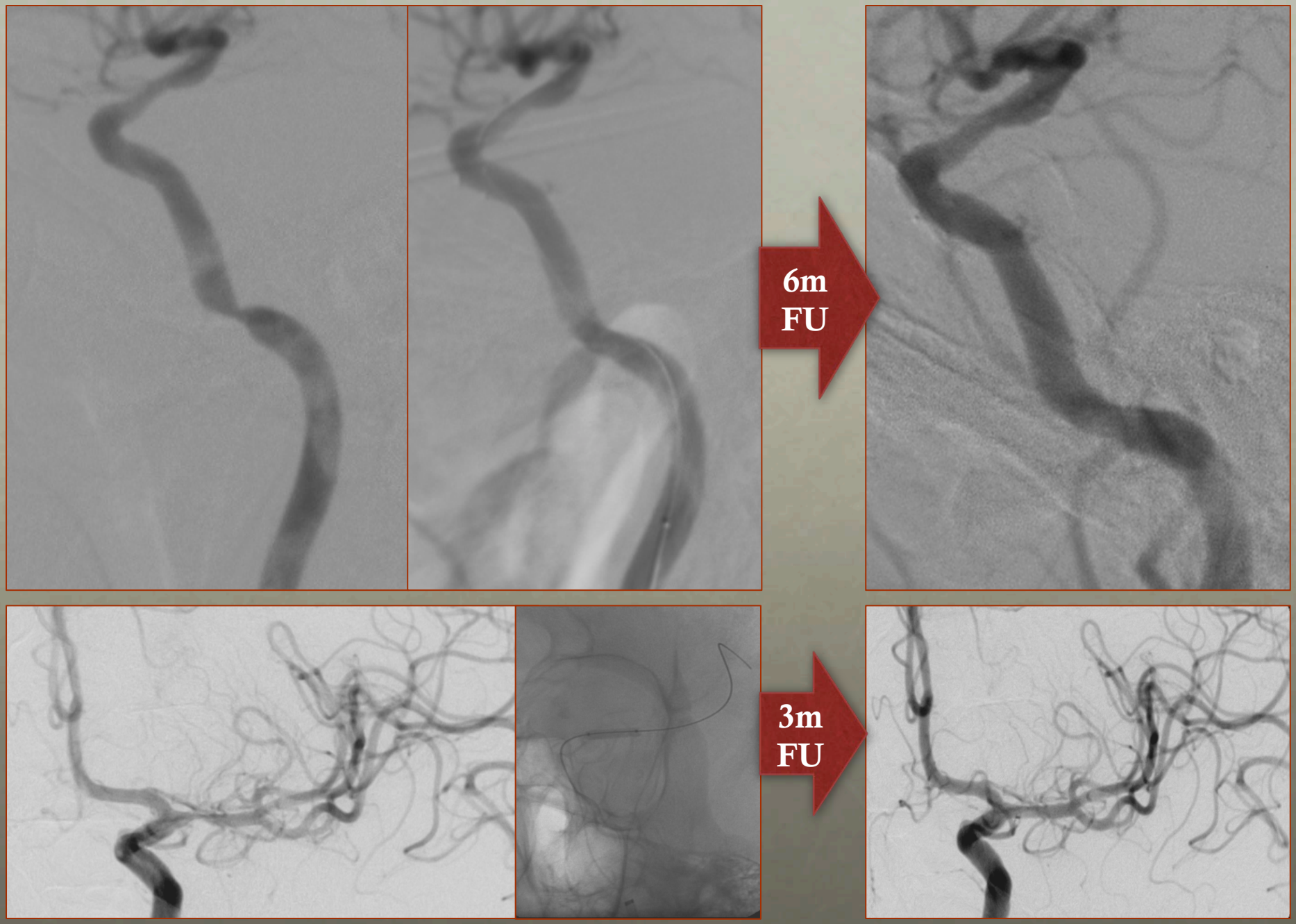
Courtesy case of Dr Rodríguez Benitez HPM of Cádiz (Spain)





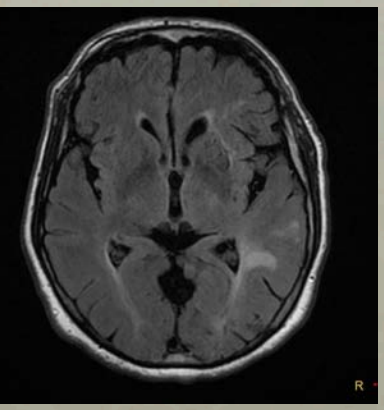


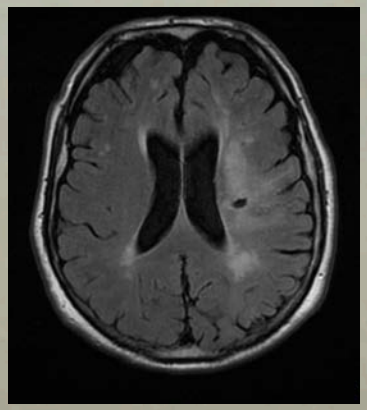


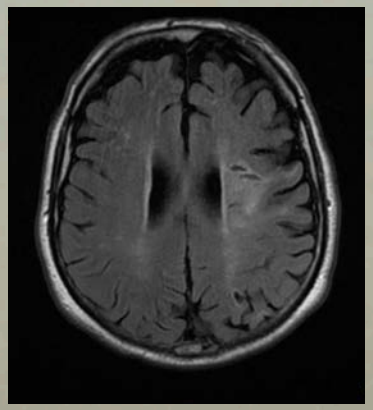

6m
FU
3m
FU

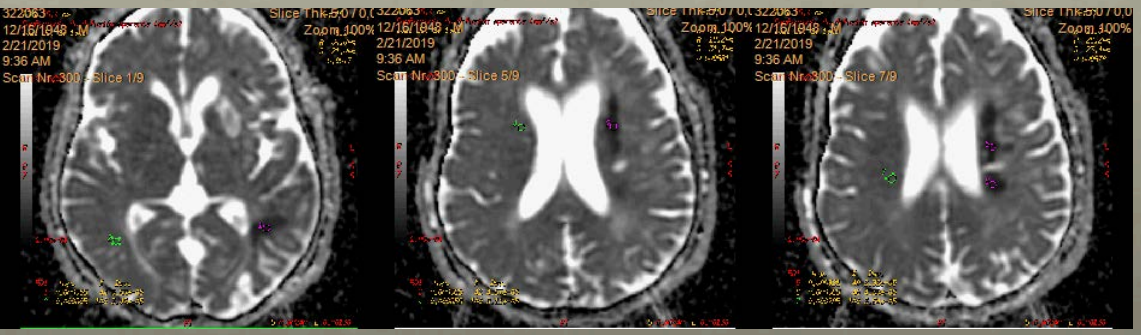
Male 70 years of age

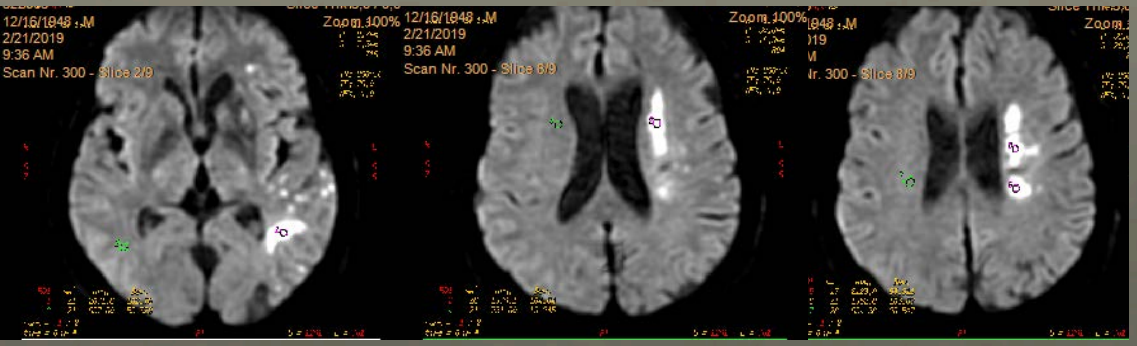
AP: Left ACV on August 2018 (mechanical thrombectomy in Denmark). Hypertension and dislipidemia. He goes to the ER of another Hospital with clinical symptoms right hemiparesis and aphasia (NIHSS 15) on awakening (contribution of the study images).

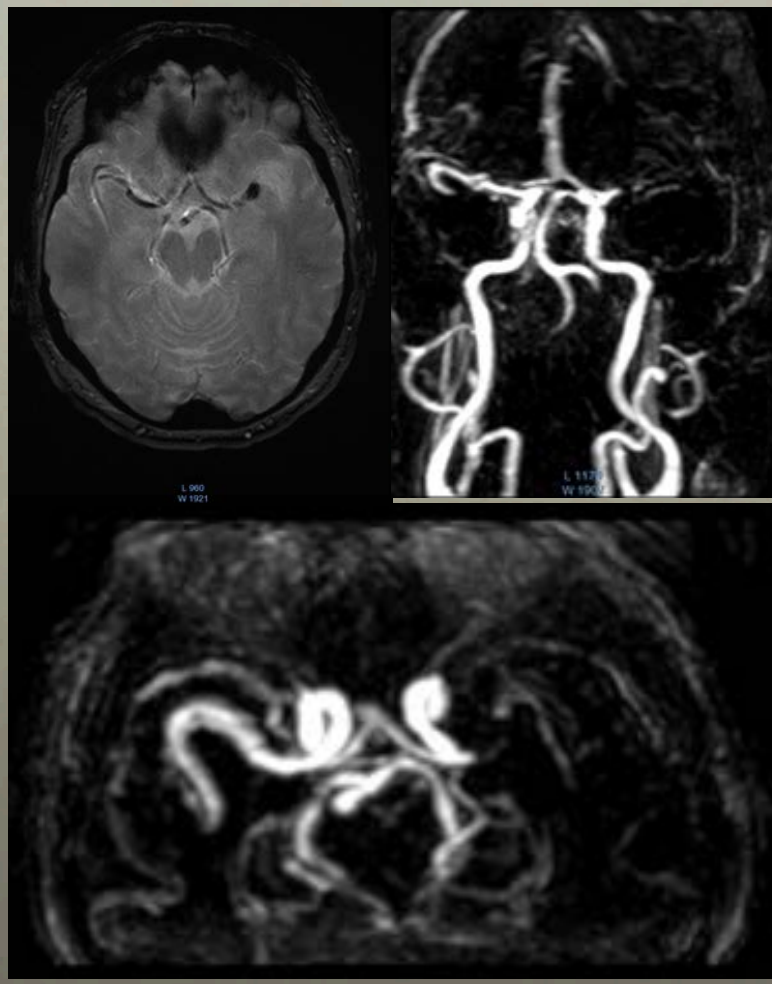






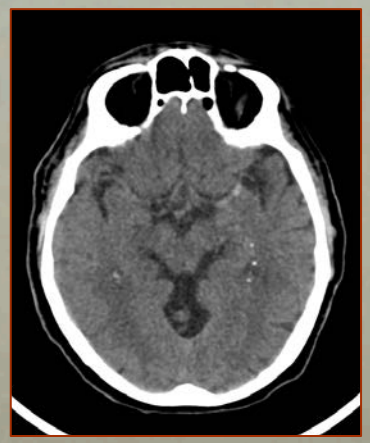


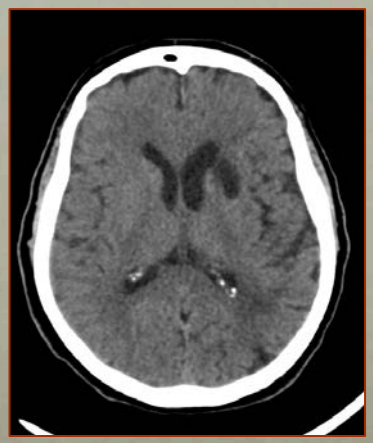


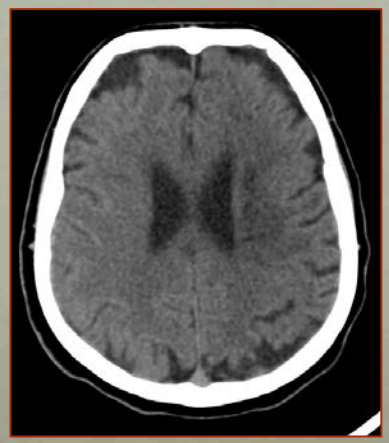


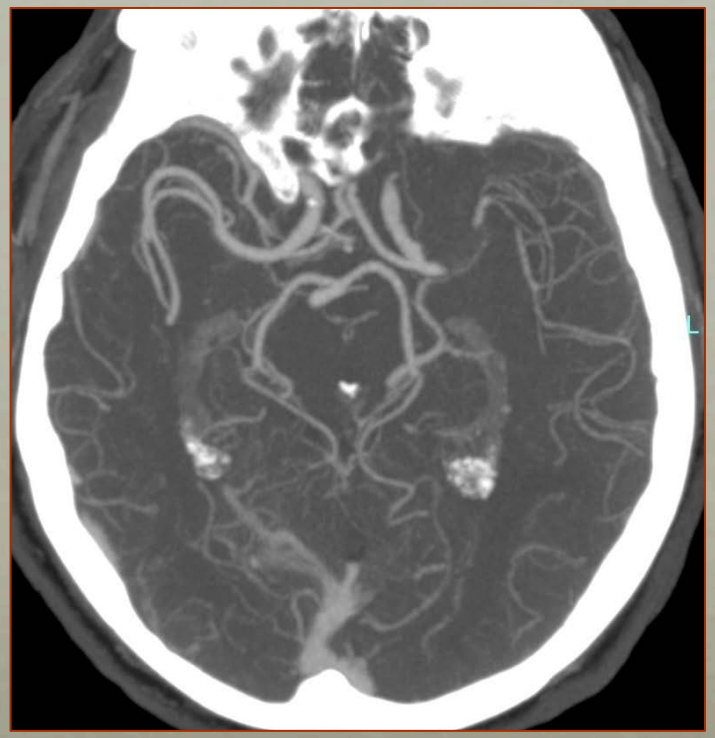
Courtesy case of Dr Gallego and Dr. López HGU of Alicante (Spain)

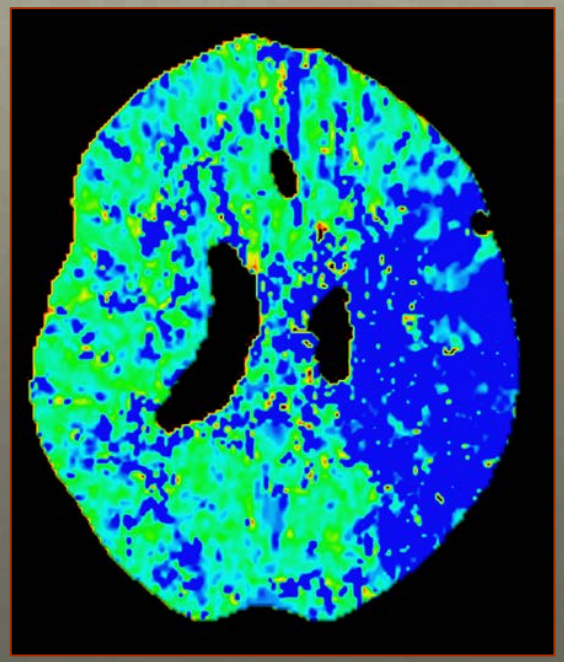
CT/CT-ANGIO/CT-PERF (PRE-TREATMENT)

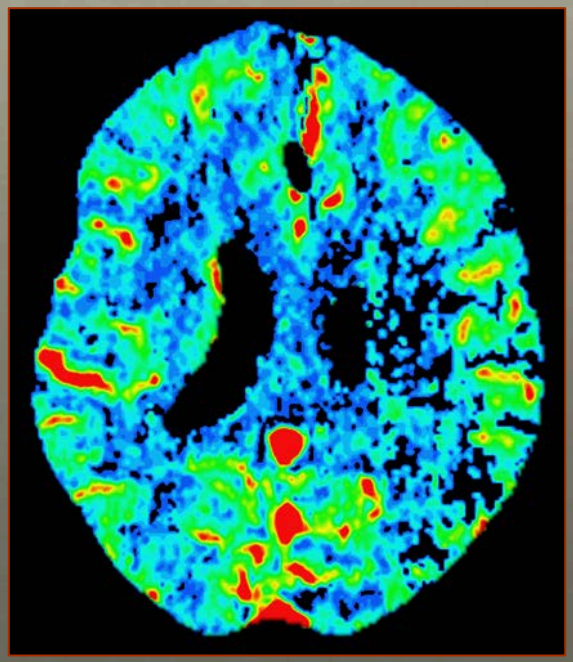


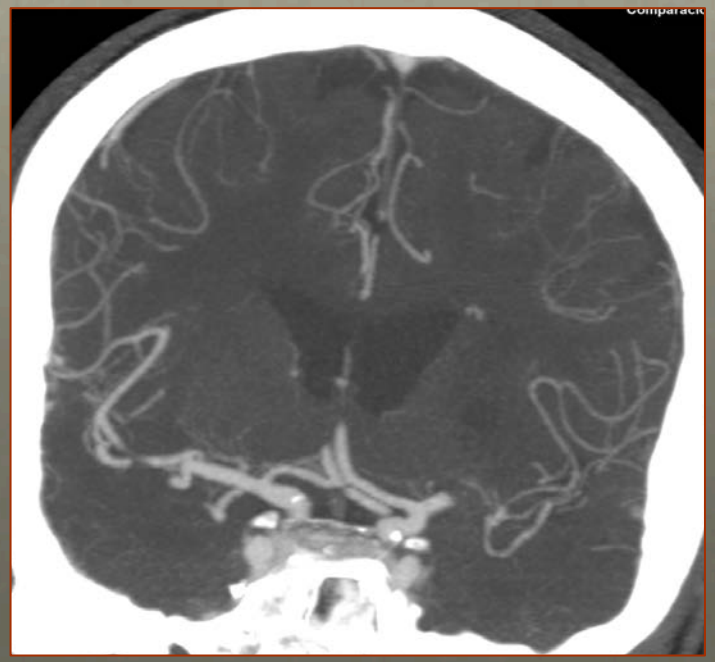


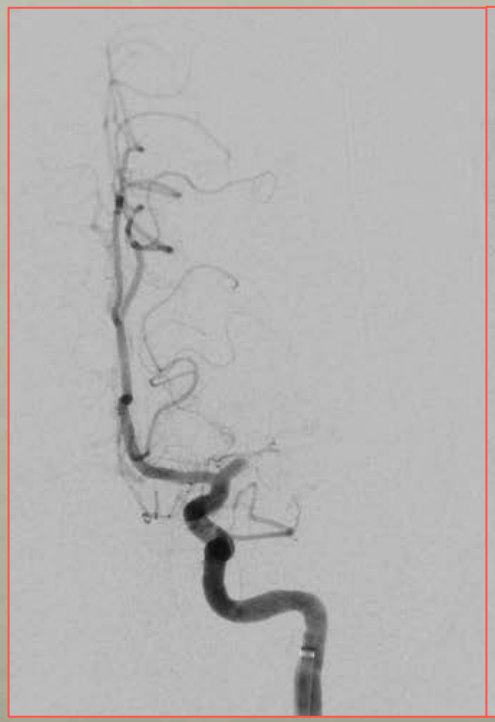
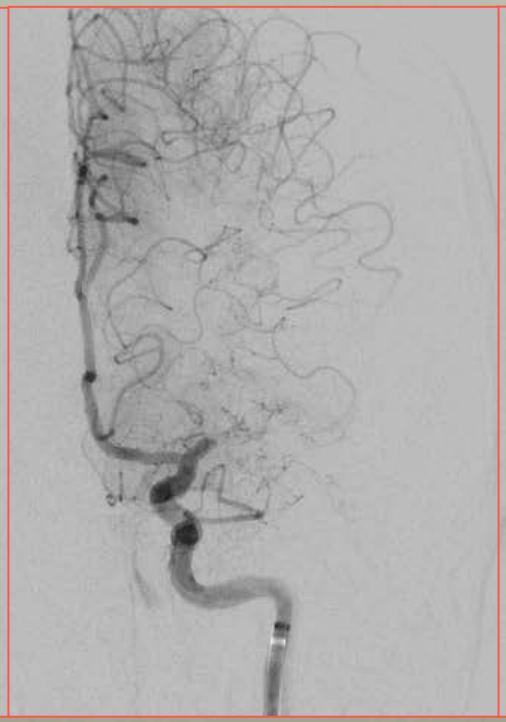
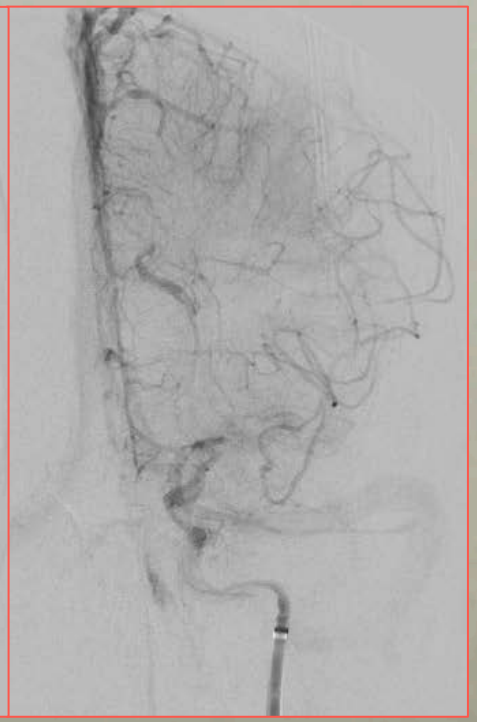




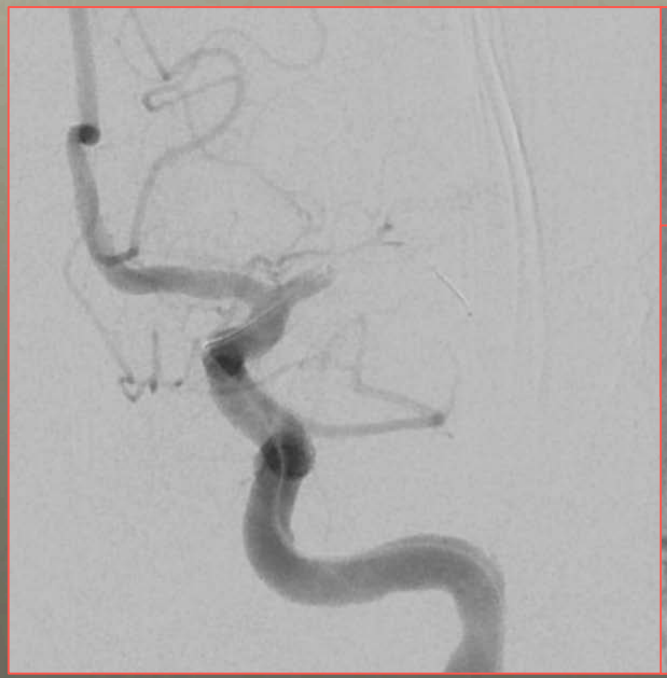
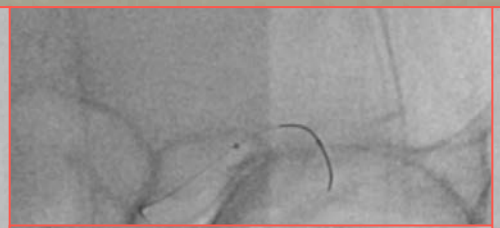
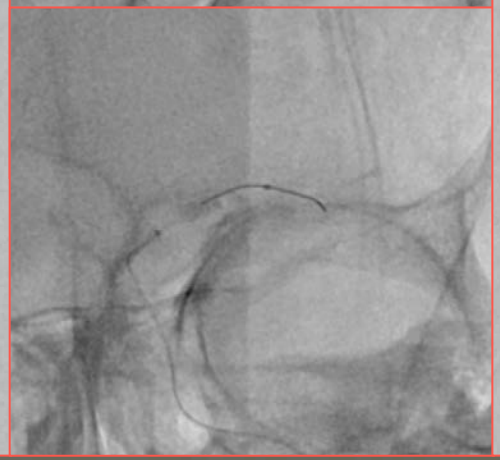
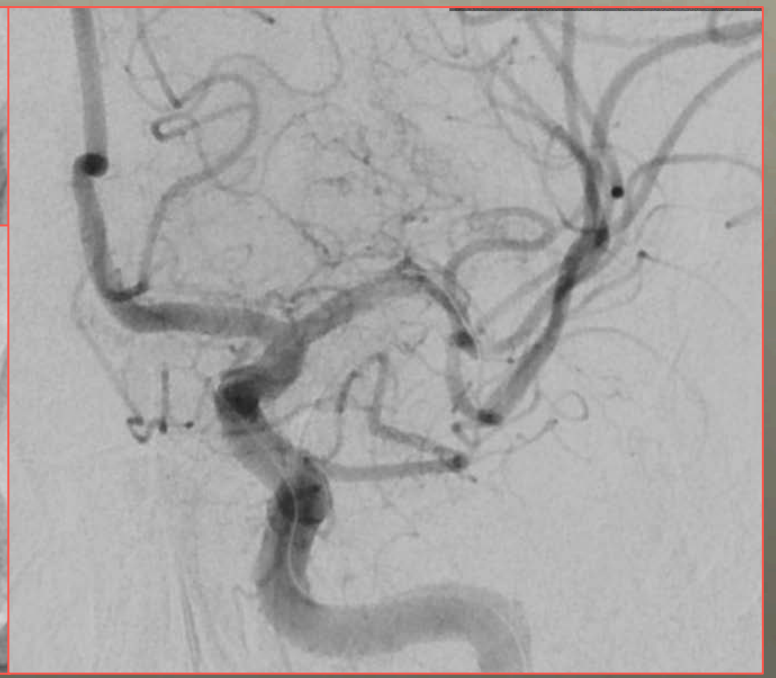


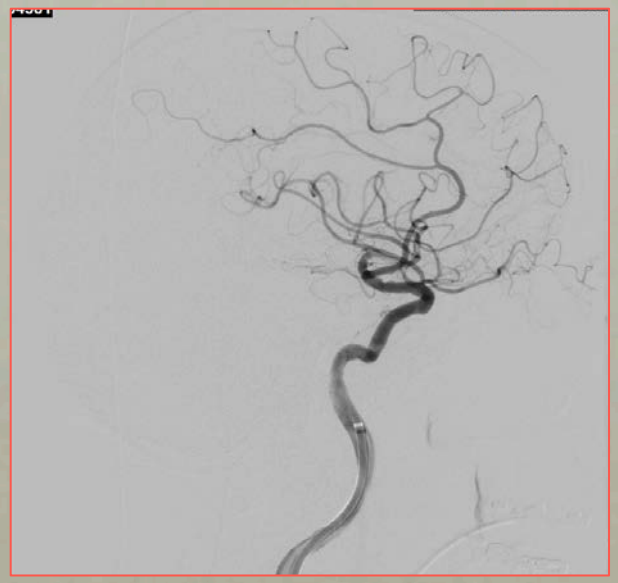


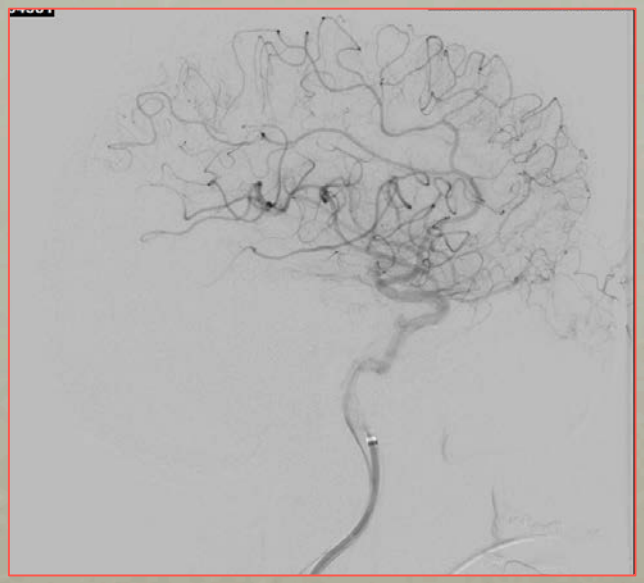


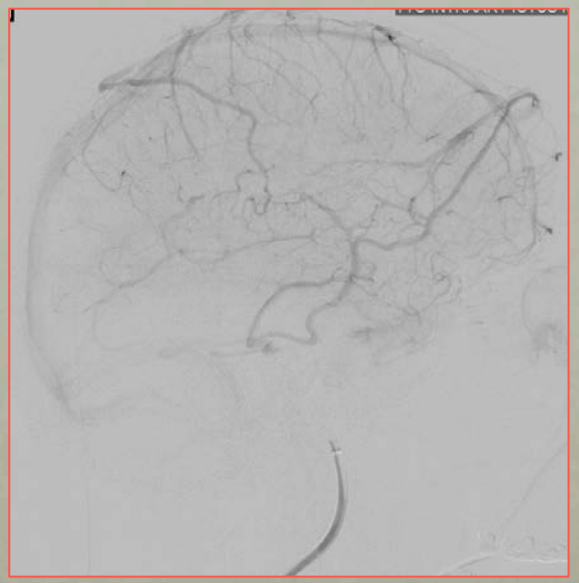




Neuron 0.088
Asahi 0.014
ATP (x2): ELUTAX 3

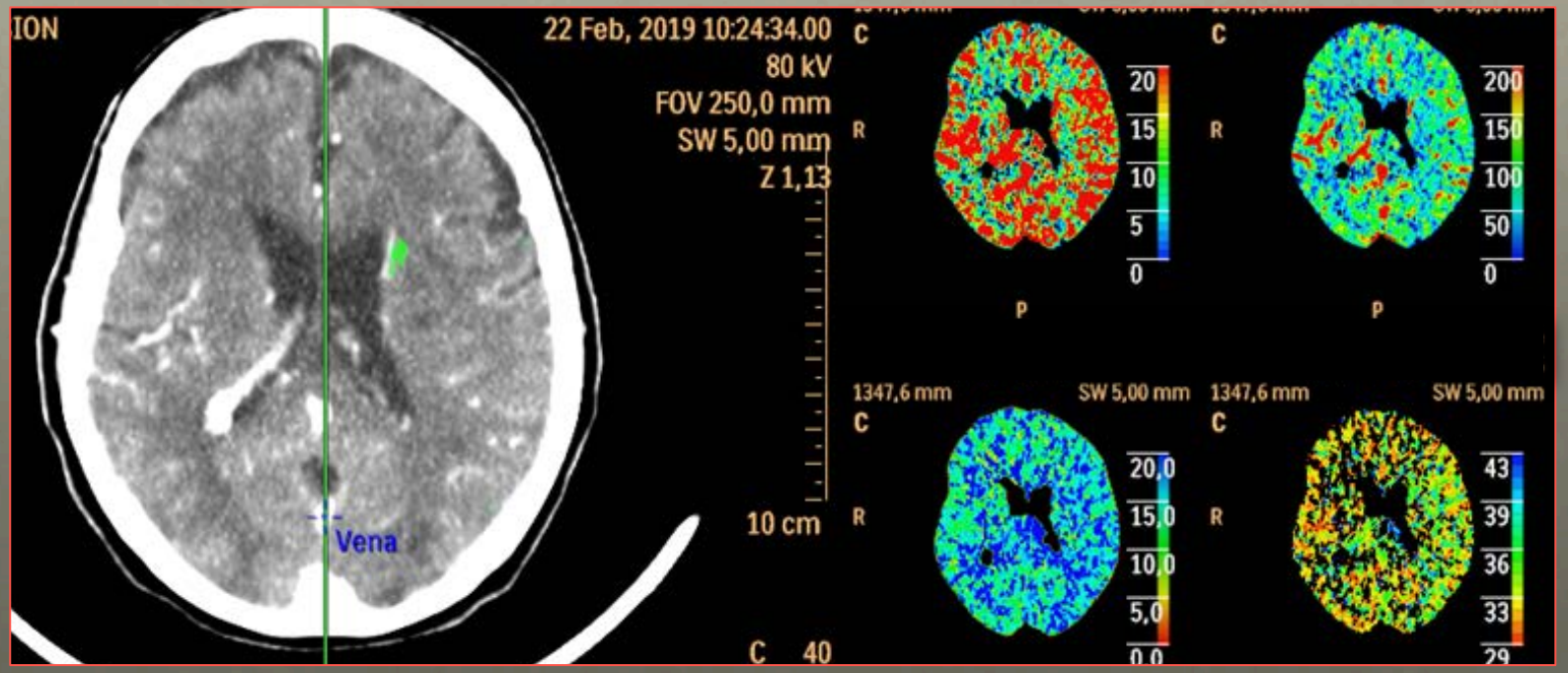







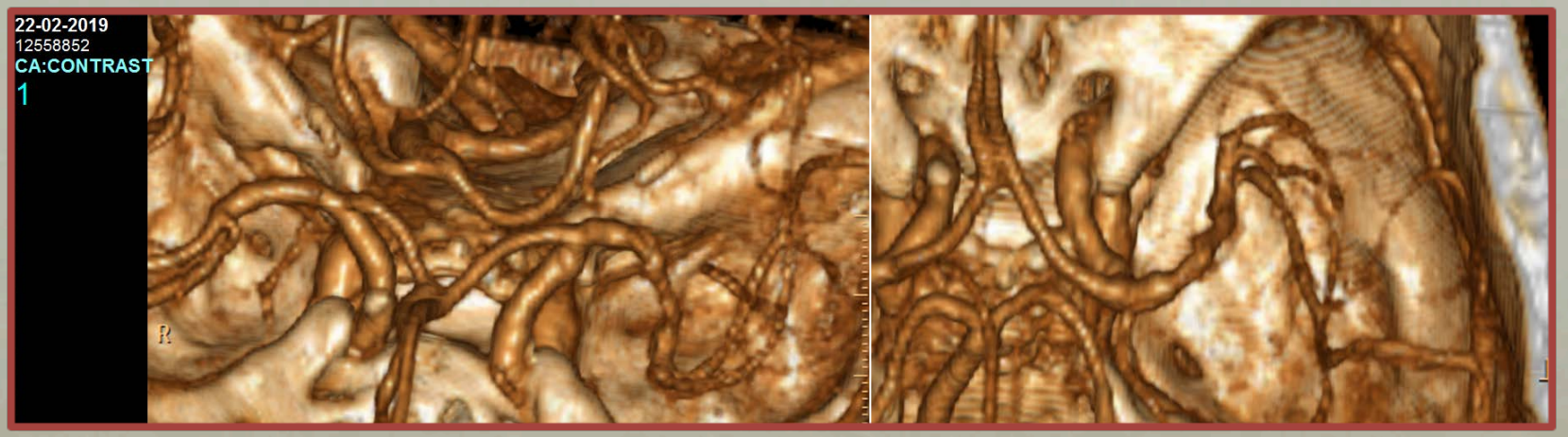




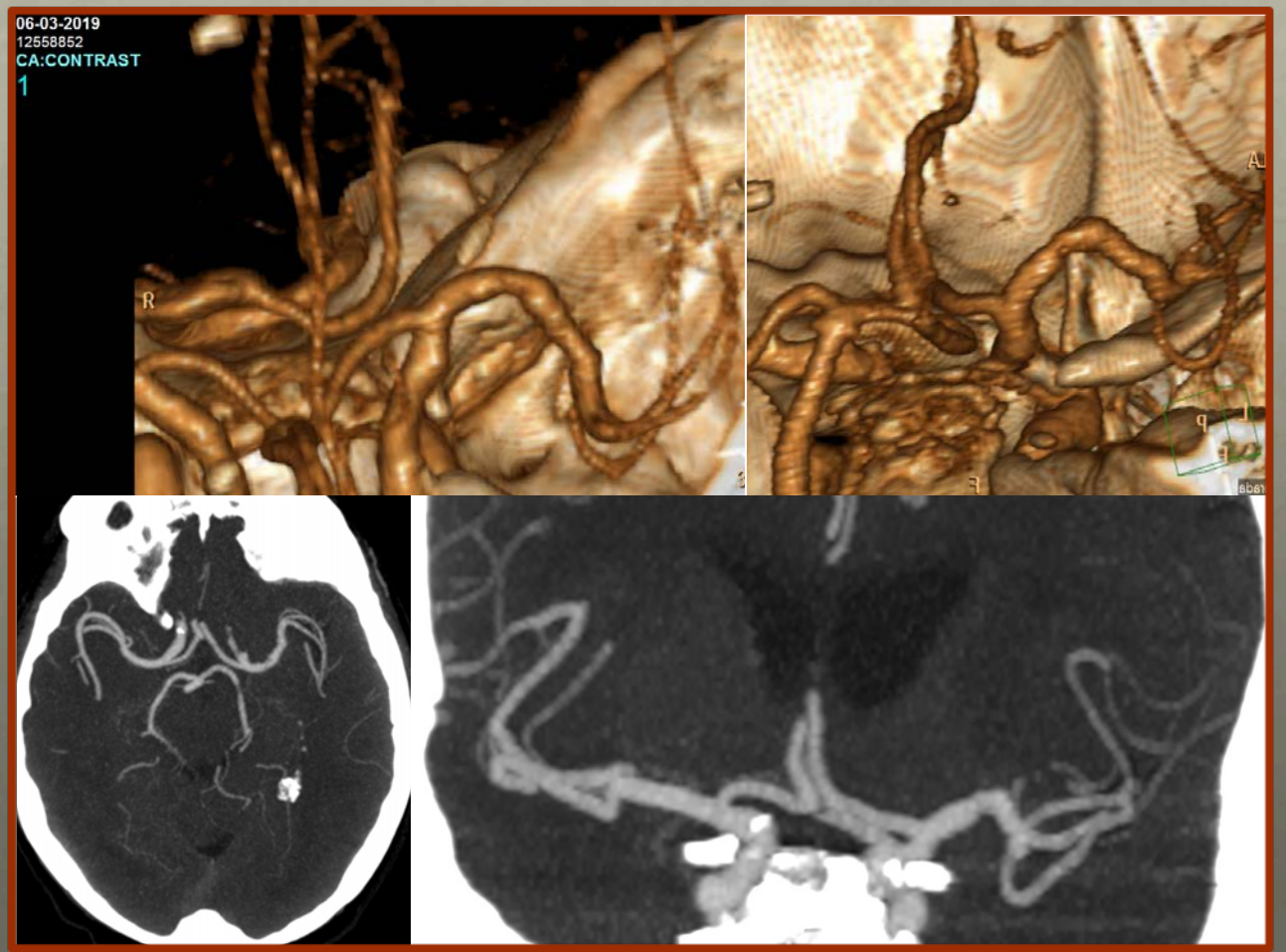
CT Perfusion
24 hs post
NIHSS=6

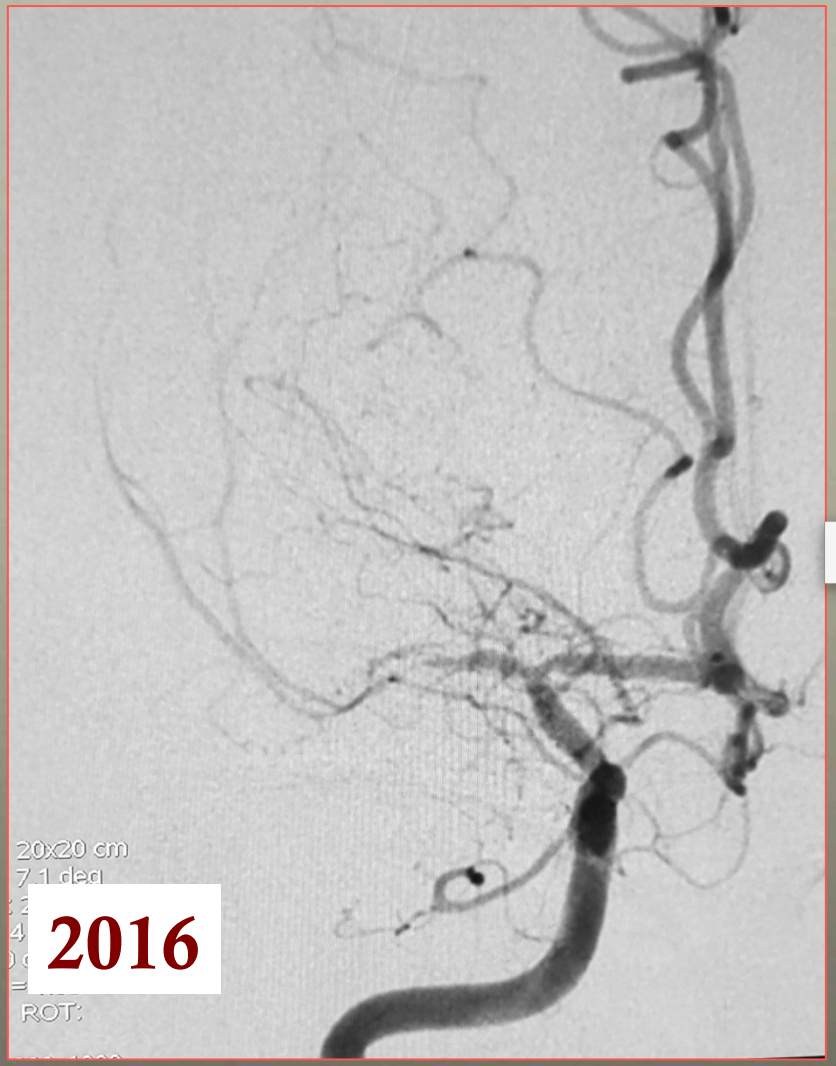


Ct-angio
24hs FU

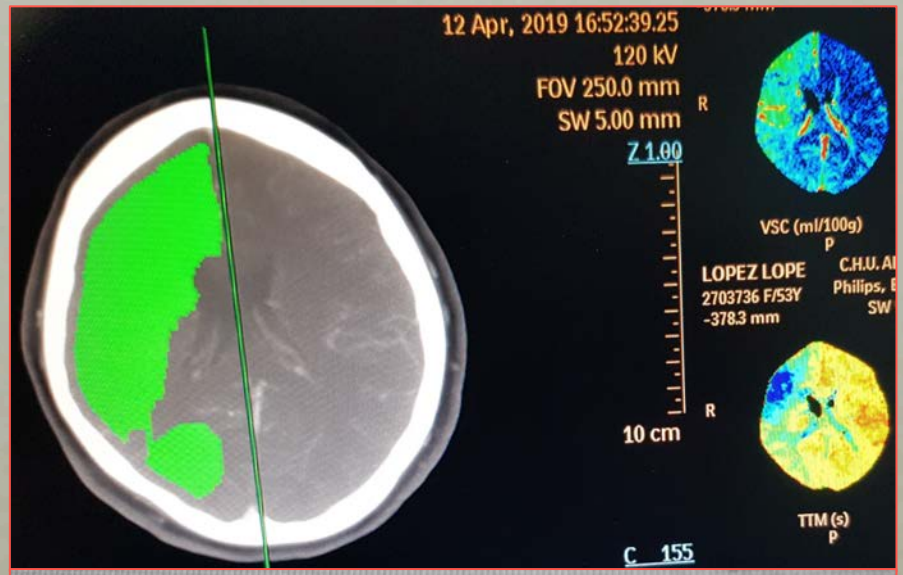


Ct-angio
13d FU

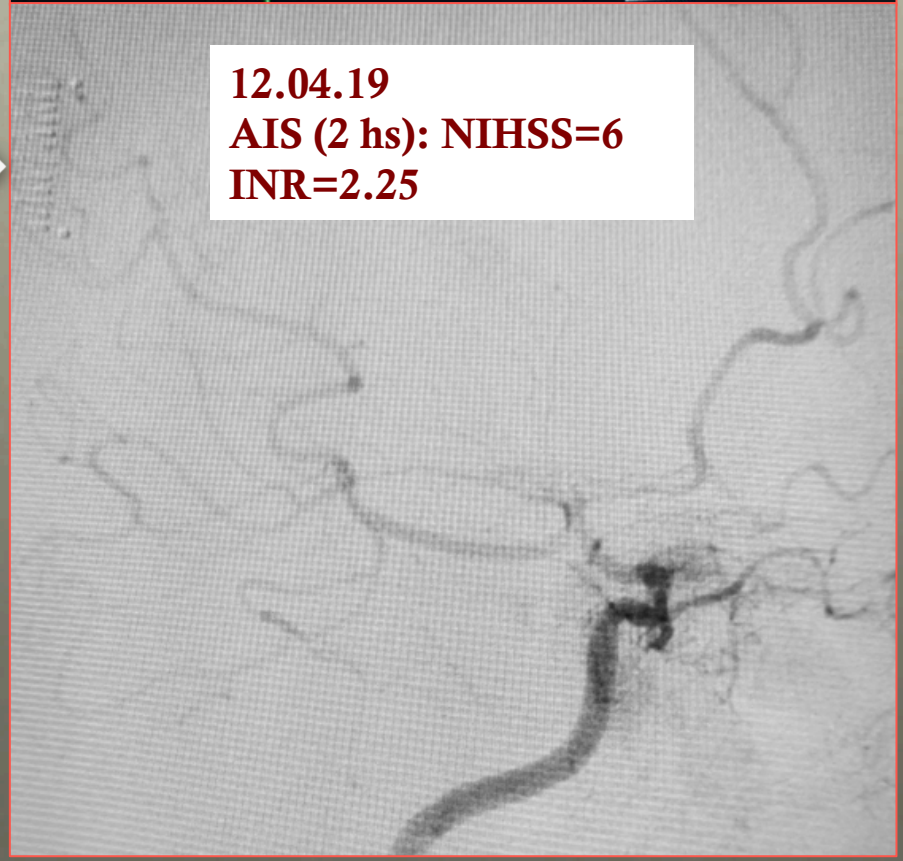




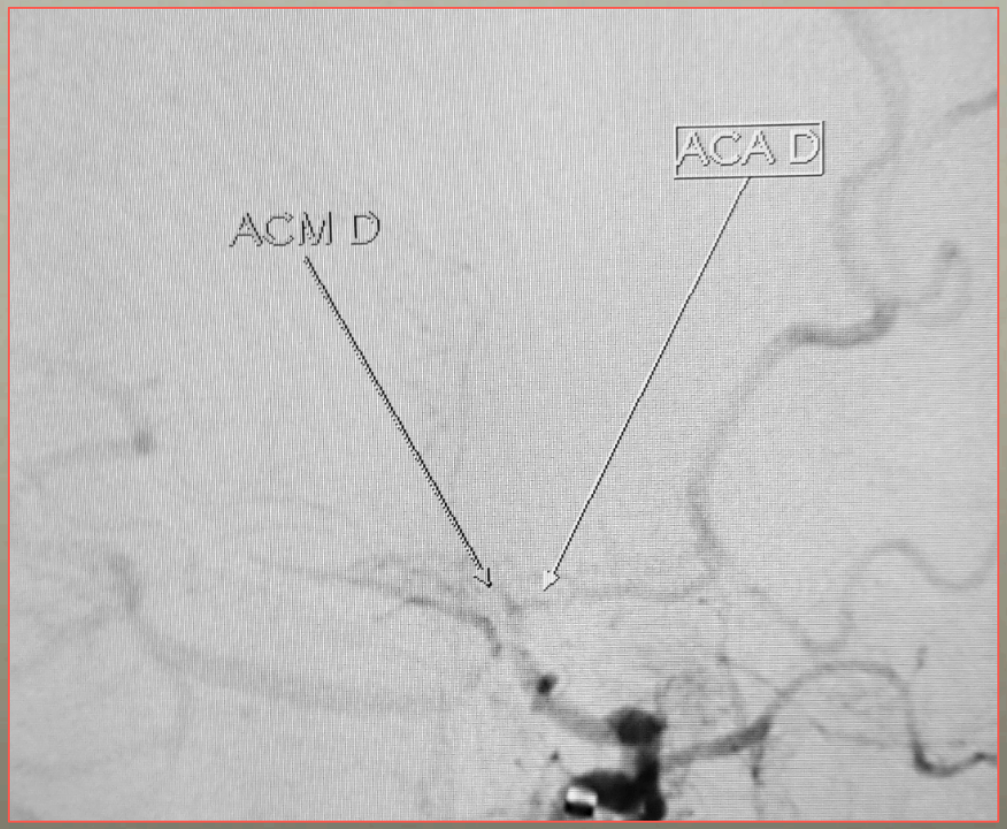
2016

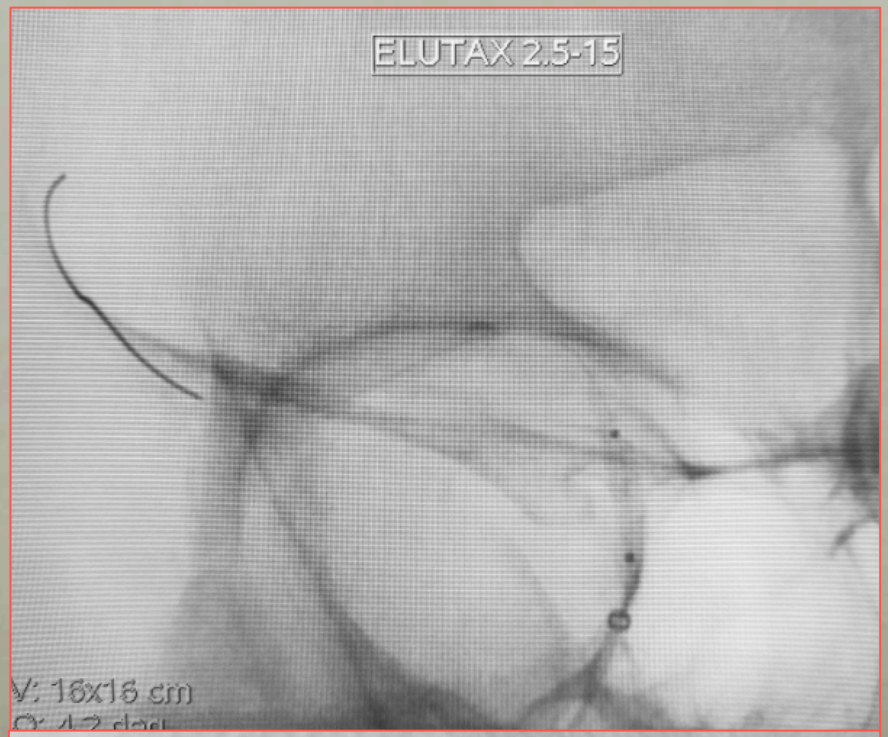


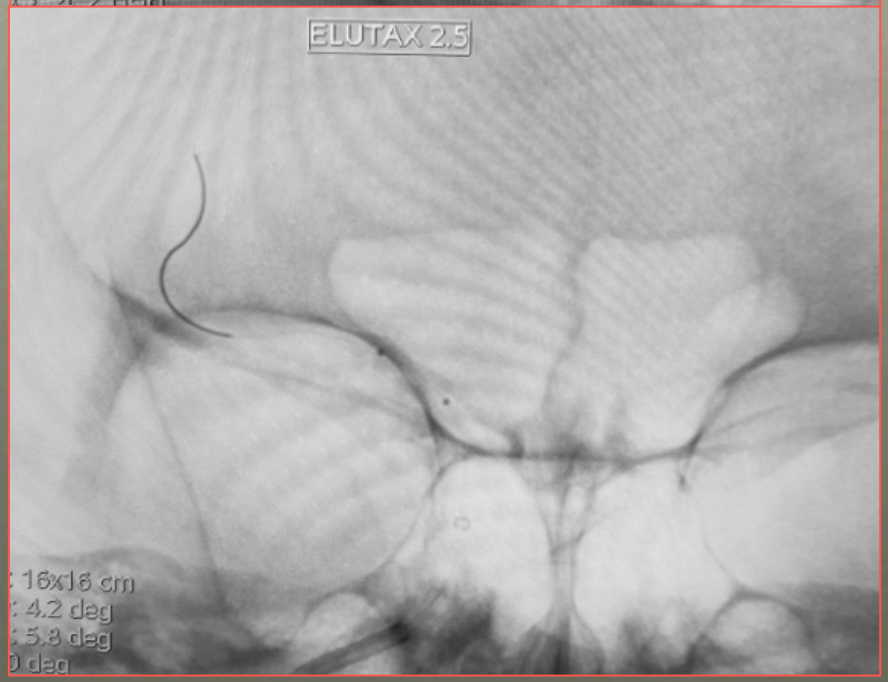
12.04.19
AIS (2 hs): NIHSS=6
INR=2.25

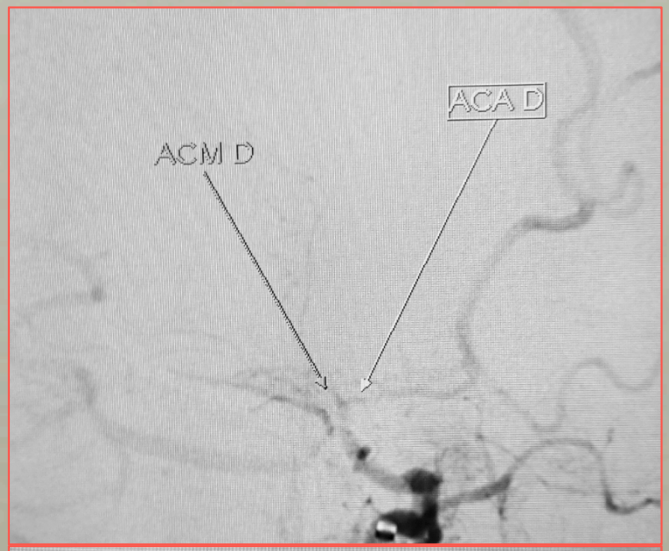


Courtesy case of Dr Hernández and Dr. Molina. HGU of Albacete (Spain)


ACM D
ACA D


ELUTAX 2.5-15
V: 16x16 cm


ELUTAX 2.5
16x16 cm
4.2 deg
5.8 deg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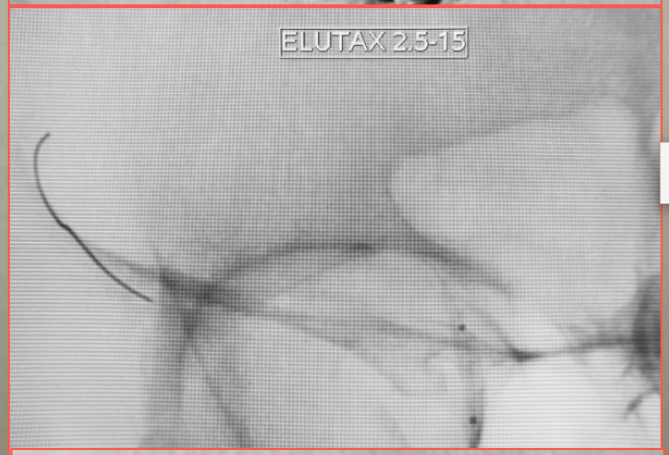
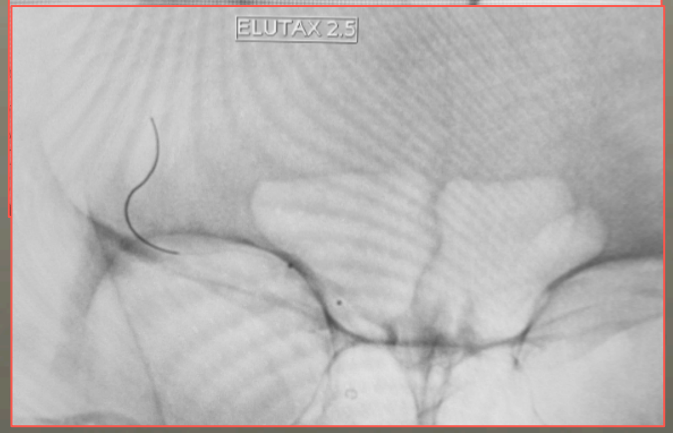
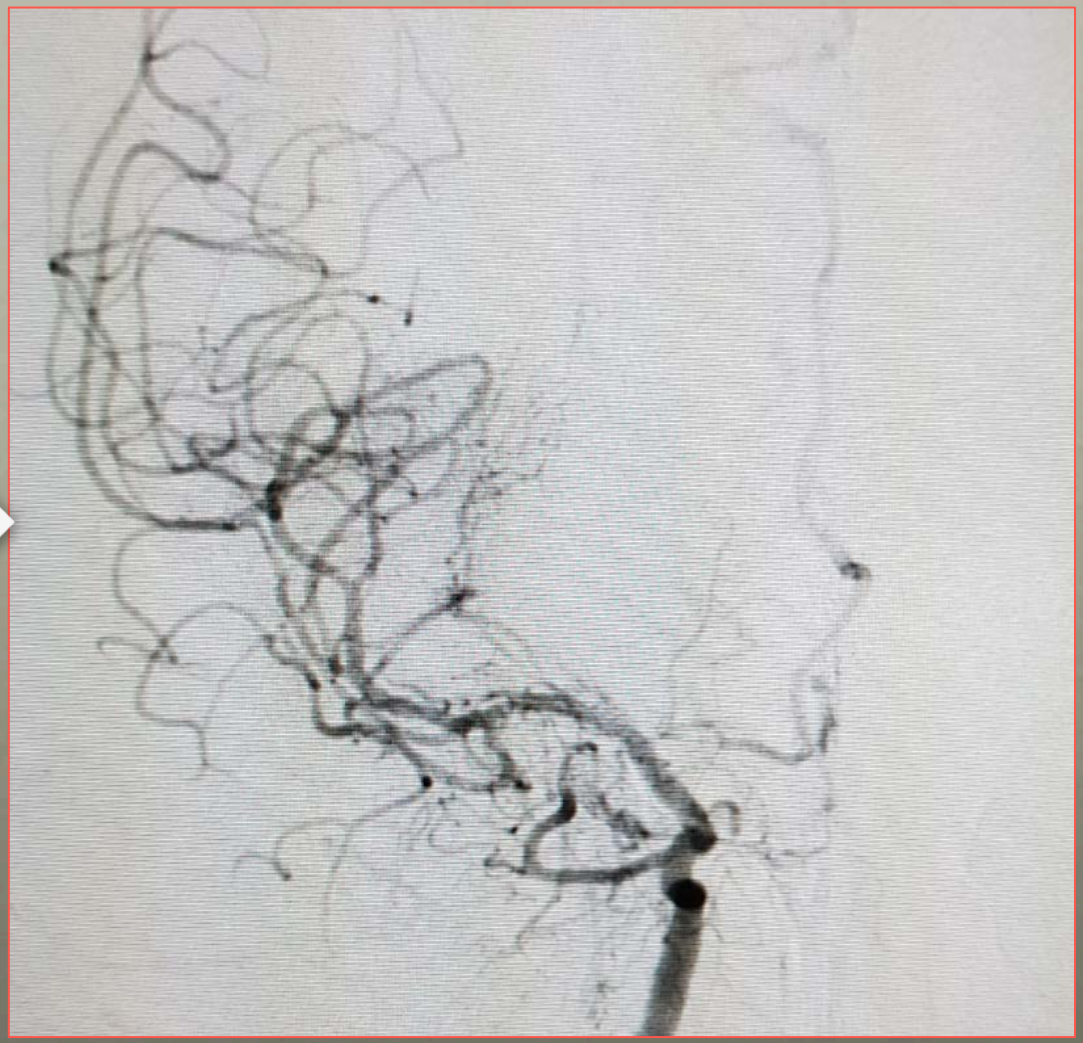
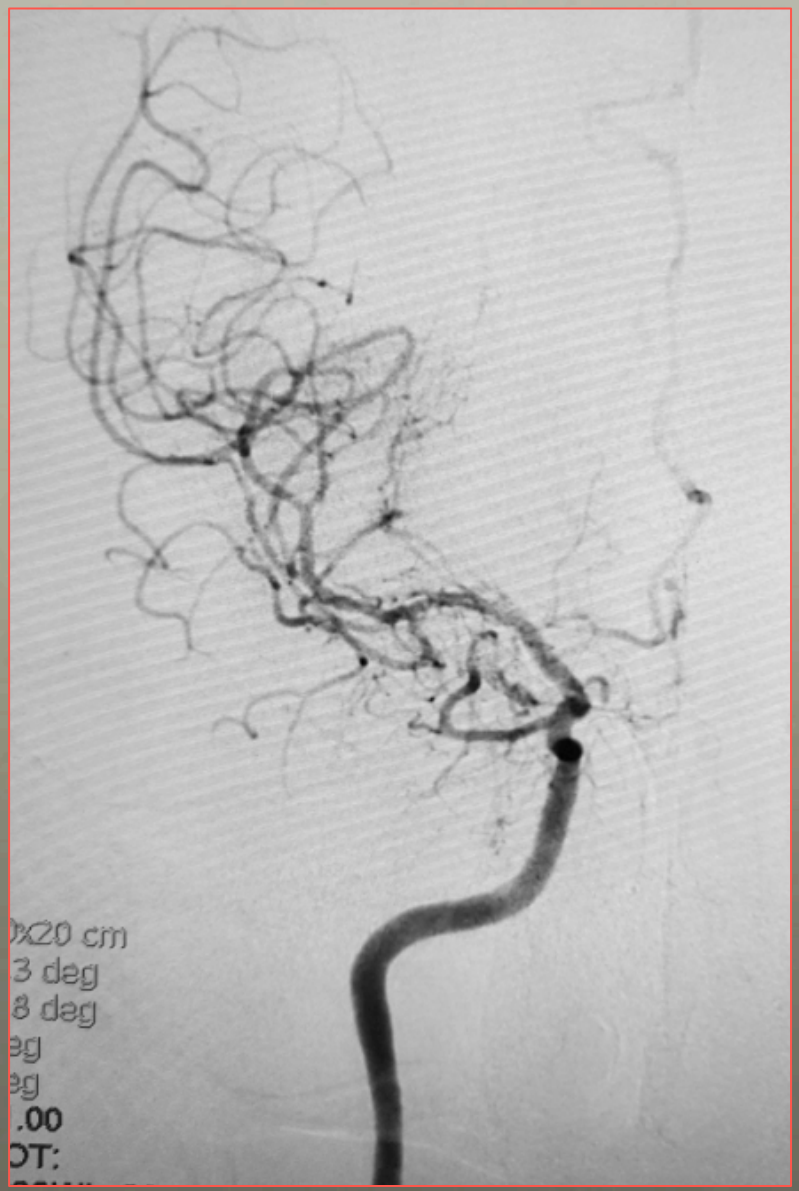
ACA D

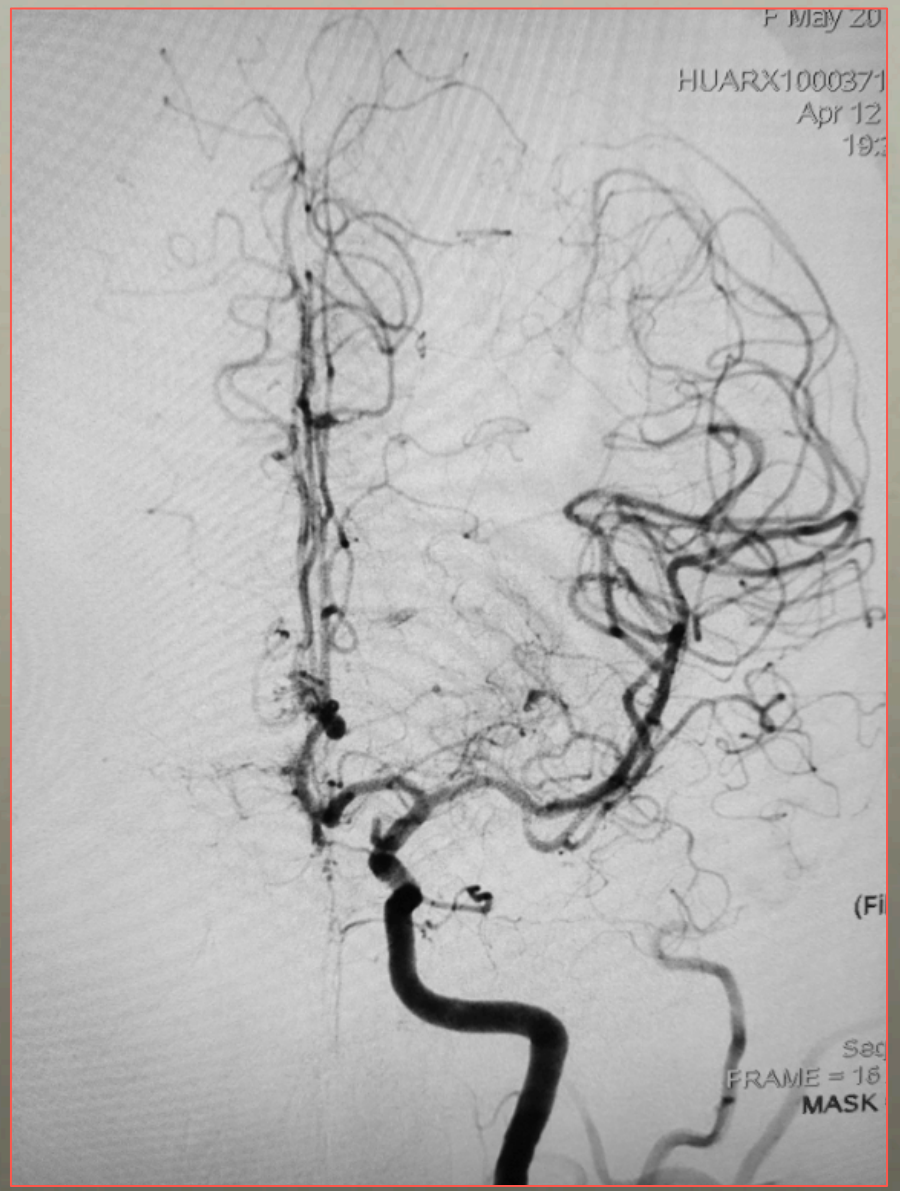

ELUTAX 2.5-15

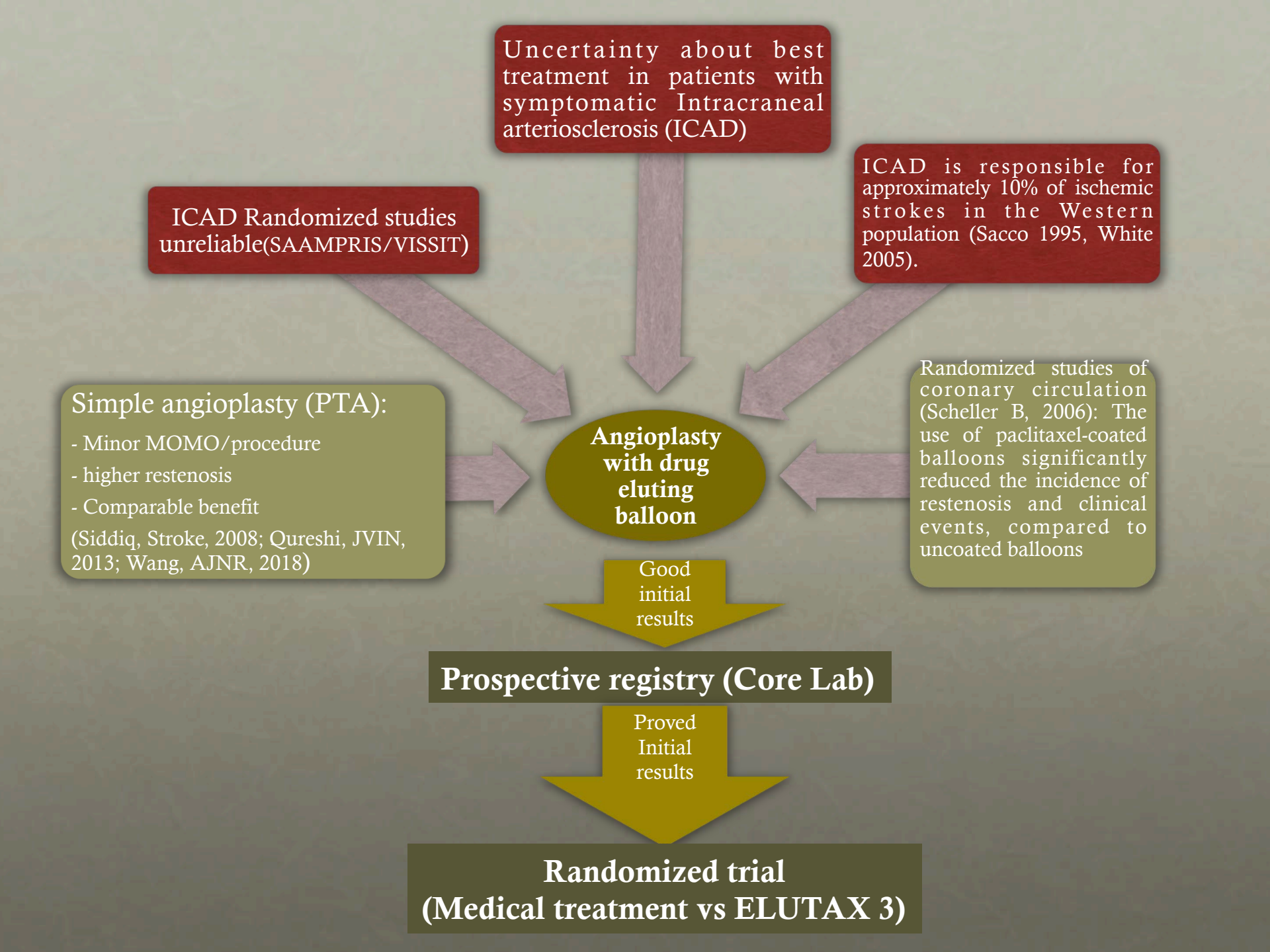

ELUTAX 2.5



FINAL CONTROL
NIHSS 48 HS: 0






Uncertainty about best treatment in patients with symptomatic Intracraneal arteriosclerosis (ICAD)
ICAD Randomized studies unreliable(SAAMPRIS/VISSIT)
ICAD is responsible for approximately 10% of ischemic strokes in the Western population (Sacco 1995, White 2005).
Simple angioplasty (PTA):
- Minor MOMO/procedure
- higher restenosis
- Comparable benefit
(Siddiq, Stroke, 2008; Qureshi, JVIN, 2013; Wang, AJNR, 2018)
Angioplasty with drug eluting balloon
Randomized studies of coronary circulation (Scheller B, 2006): The use of paclitaxel-coated balloons significantly reduced the incidence of restenosis and clinical events, compared to uncoated balloons
Good initial results
Prospective registry (Core Lab)
Proved Initial results
Randomized trial (Medical treatment vs ELUTAX 3)

DESIGN OF THE STUDY

Main objective of the study

To analyze the incidence of major complications (recurrence of stroke, cerebral hemorrhage, death), and the rate of restenosis associated with the use of paclitaxel-coated balloon treatment (Elutax 3) in patients with symptomatic high grade intracranial arteriosclerosis (ICAD).

Requirements

- To be able to collect data regarding the use of Elutax 3 in patients with ICAD including complication rate and follow-up.
- Centers included in the study must have extensive experience in the treatment of acute stroke (at least 50 cases per year)
- Treatment of the three described cases (AIS unstable) with stenosis ≥ 70% quantified by the WASID method, typical signs of arterial dissection such as intramural hematoma, double lumen, intimal flap and pseudoaneurysmal dilatation would result in exclusion of the patient (Shin J, 2018) ". In cases where the luminal evaluation does not allow differentiation, a high-field contrast MRI that demonstrates enhancement of the plaque is recommended. (Wang E, 2019).
- Images and radiological variables should be evaluated by a central imaging laboratory (*core lab*). The evidence of a stenosis ≥ 50% post-procedure by conventional arteriography will be considered a significant restenosis.
- Clinical-Radiological follow-up of patients includes record of clinical events at 30 days, 3 months and 1 year after treatment. At least one non-invasive radiological scan (TCD, angioTAC, MRI) should be performed during the follow-up period.), and in case of suspicion of significant restenosis (≥ 50%), confirmed by conventional angiography. If new events are recorded, it should be assessed by a vascular neurologist who properly documents the event.

INCLUSION CRITERIA

1. Age ≥ 50 years.
2. Signed informed consent either by the patient or his/her direct relative.
3. Previous mRS ≤ 2.
4. Maintain record of previous vascular risk factors (race, hypertension, diabetes, hypercholesterolemia, smoking, previous stroke), as well as their previous medication and doses.
5. NIHSS scale score before treatment, 24 hours and upon discharge.
6. mRS scale score before treatment, at 3 months and a year.
7. Stenosis ≥70% Quantified by the WASID method.
8. Location of intracranial circulation stenosis (distal to the carotid cavernous segment in circulation anteriorly or distal to V4 in posterior circulation).
9. Indication whilst performing mechanical thrombectomy and/or after failure of medical therapy with double antiplatelet or anticoagulation plus statins at high doses.
10. Exclusion of significant ipsilateral stenosis (≥ 50%) In ipsilateral internal or vertebral carotid artery.
11. Exclusion of major cardioembólicas sources according to the study “Stop Stroke Study Trial of Org 10172 in Acute Stroke Treatment”.
12. Reasonable exclusion by non-invasive vascular imaging tests and/or arteriography of other causes of intracranial stenosis such as dissection, vasculitis, Moyamoya, reversible cerebral vasoconstriction, dysplasia, or subarachnoid hemorrhage.
13. Performance of the angioplasty by slowly inflating the balloon over the stenosis for 30 seconds.
14. Maintain record of the number of angioplasty, stents and antiplatelet/anticoagulant medication used during the procedure.

CLINICAL AND TECHNICAL VARIABLES

Clinical Variables:

- Major event rate: death, new stroke, new TIA, cerebral hemorrhage in the periprocedural period (30 days) and follow-up to 1 year. The new ischemic events occurring in the same vascular territory of the treated stenosis are considered clinical relapses..
- Good clinical Prognosis (mRS ≤ 2) during follow-up.
- Significant restenosis ($\geq 50\%$) During follow-up. Need for endovascular re-intervention during follow-up.

Technical Variables:

- Use of submaximal angioplasty technique. It will be considered technical success to obtain a residual stenosis less than 50% after the treatment.
- Need for other angioplasty balloons. In the case that Elutax 3 is incapable of navigating towards the lesion.
- Need for definitive stenting. In case of plaque dissection after angioplasty with Elutax 3 or residual stenosis greater than 50%, evaluate definitive stent placement (indicate type and measurements).
- Severe dissection or perforation associated with the use of Elutax 3.

CONCLUSIONS (I)

- *Symptomatic intracraneal atherosclertoic disease (ICAD) is considered the primary cause of stroke. It accounts for 10% of ischemic stroke in Western societies*
- *ICAD is characterized by having a high rate of recurrence*
- *Uncertainty regarding the optimal treatment for patients with ICAD, especially unstable patients despite the best medical therapy available*
- *Unreliable randomized trials*

CONCLUSIONS (II)

- *The use of angioplasty with or without stent should be modified but not discarded*
- ***The use of paclitaxel coated balloons could potentially decrease the incidence of symptomatic restenosis in patients with ischemic stroke without compulsory stenting and double anti-platelet treatment. This solution is especially interesting during the treatment of stroke patients with urgent mechanical thrombectomy.***

SYMTAS2019 III INTERNATIONAL SYMPOSIIUM

MECHANICAL THROMBECTOMY IN ACUTE STROKE THERAPY

THANK YOU VERY MUCH FOR YOUR ATENTION

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