



Basilar artery thromb aspiration. Feasibility and results

Ivo Petrov, MD, PhD, FESC, FACC



DISCLOSURE STATEMENT OF FINANCIAL INTEREST

I, Ivo Petrov, DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as
a real or apparent conflict of interest in the context of the subject of this presentation.



Basilar artery thrombosis may present in three general constellations:

- Rapid onset of advanced motor and bulbar symptoms with a decreased level of consciousness.
- Insidious or stuttering symptoms over a few days as a combination of the above that end with disabling motor and bulbar symptoms, a decreased level of consciousness (coma), or both.
- Prodromal symptoms that may include headache, neck pain, loss of vision, binocular diplopia, dysarthria, dizziness, hemiparesis, paresthesias, ataxia, and tonic-clonic type movements.

Ausman et al. Surg Neurol Int. 2018; 9: 106.

petrovivo@hotmail.com



Acute stroke caused by basilar artery occlusion accounts for 27% of the strokes in the posterior circulation and is associated with worse prognosis and mortality than those associated with anterior circulation stroke. The natural evolution is devastating with mortality reaching 80%.

The 7 big positive trials for endovascular intervention did not enroll patients with basilar artery occlusion.

There are only compassionate cases and small series for thrombectomy in BAO published to date

The benefits of mechanical thrombectomy for patients with acute basilar artery occlusion remain uncertain.

Ausman et al. Surg Neurol Int. 2018; 9: 106.

Dong-hun, J Am Heart Assoc. 2018;7:e009419.

petrovivo@hotmail.com



Interventional treatment

- Early BASICS prospective observational trial showed similar results between BMT and catheter based IA treatment for BAO
- Early studies all showed a high recurrence of stenosis and up to a 25% procedure complication rate or other complications. The results in randomized and non-randomized trials were no better than medical management if not worse.



- Recent multicenter (3 centers) retrospective observational study which included 212 consecutive patients with acute BAO who were treated by either stent-retriever or contact aspiration thrombectomy as the first-line approach.
- Thrombectomy was associated with high rate of successful reperfusion (91.5%) and a high rate of favorable outcomes (44.8%) in these patients.
- Thrombectomy and thromaspiration were safe for treating acute basilar artery occlusion, with low rates of mortality (13%), symptomatic hemorrhage (1.9%), and procedure-related complications (4.2%)

• J Am Heart Assoc. 2018;7:e009419. DOI: 10.1161/JAHA.118.009419



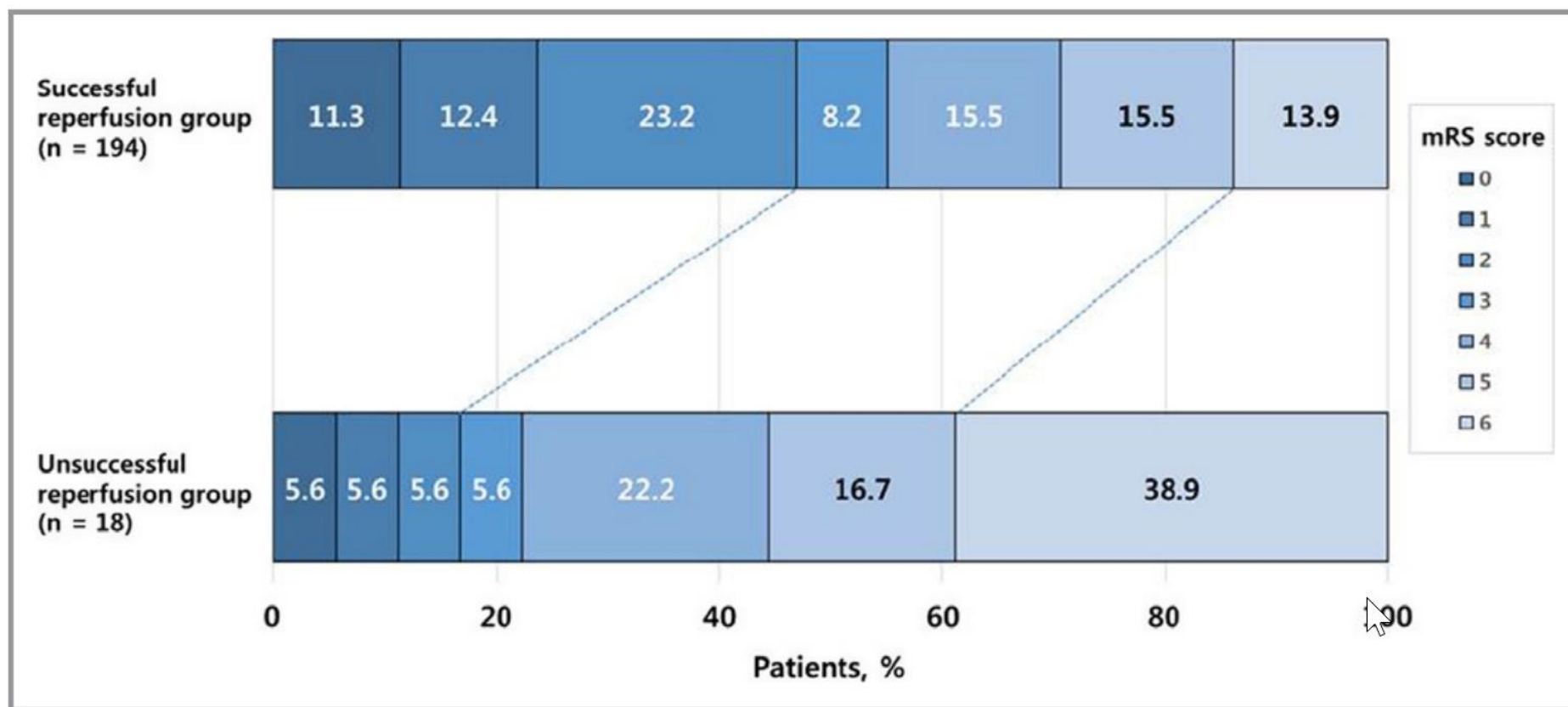
Endovascular Thrombectomy for Acute Basilar Artery Occlusion: A Multicenter Retrospective Observational Study

Dong-Hun Kang, MD;* Cheolkyu Jung, MD;* Woong Yoon, MD, PhD; Seul Kee Kim, MD, PhD; Byung Hyun Baek, MD; Joon-Tae Kim, MD, PhD; Man Seok Park, MD, PhD; Yong Won Kim, MD; Yang Ha Hwang, MD, PhD; Yong-Sun Kim, MD, PhD; Beom Joon Kim, MD; Moon-Ku Han, MD; Hee-Joon Bae, MD

Table 2. Associations Between 90-Day Modified Rankin Scale Scores and Treatment Outcomes After Thrombectomy in 212 Patients With Acute BAO

Outcomes	All Patients*	Unadjusted cOR (95% CI) [†]	P Value [†]
Successful reperfusion	194 (91.5%)	3.597 (1.496–8.645)	0.004
Complete reperfusion	134 (63.2%)	2.408 (1.458–3.978)	0.001
Hemorrhagic infarction	39 (18.4%)	0.468 (0.252–0.868)	0.016
Parenchymal hematoma	9 (4.2%)	0.097 (0.025–0.377)	0.001
Subarachnoid hemorrhage	7 (3.3%)	0.434 (0.114–1.652)	0.221





Parameter	Distribution
CT imaging at baseline	15 (83.3%)
MRI imaging at baseline	9 (50%)
Occlusion site	
MCA	10 (55.6%)
ICA (2 high-grade stenosis and 1 T-occlusion)	3 (16.7%)
Basilar artery	2 (11.1%)
Vertebral artery	1 (5.6%)
Anterior cerebral artery	1 (5.6%)
Pericallosal artery	1 (5.6%)
Onset-to-needle time (min) – mean ± SD	187 ± 112
Groin puncture-to-recanalization time (min) - mean ± SD	68,6 ± 14.3
Onset-to-TICI 2b/3 recanalization time (min) - mean ± SD	255 ± 113
Intravenous thrombolysis	7 (38.9%)
Penumbra system (PS) mechanical thromboaspiration (A-method)	4 (22.2%)
PS, balloon PTA and low-dose supraselective intra-arterial thrombolysis (B-method)	4 (22.2%)
Wire manipulation, balloon PTA and low-dose supraselective intra-arterial thrombolysis (C-method)	5 (27.8%)
Supraselective intra-arterial thrombolysis (D-method)	5 (27.8%)
ICA stenting	2 (11.1%)
TICI 2b-3 flow	4+9 (72.3%)

Reocclusions after EVT and Device related complications	0 (0%)
Symptomatic ICH	2 (11.1%)
Asymptomatic ICH	1 (5.6%)
Minor systemic bleeding	3 (16.7%)
NIHSS final - mean ± SD	8.7 ± 7.2
mRS 0-2 at 90 days	9 (50%)
Mortality at 3 months	1 (5.6%)

Patient presentation

History:

- 67 years old male, presenting in ER with: comatose state, tetraplegia and deviation of the eyes and head towards left, vomiting.
- Some stuttering neurological symptoms were present during the last several days but the acute deterioration occurred three hours earlier
- discharged from another hospital at the same day, treated 3 days for a mild ischemic stroke (LMCA involved)

Comorbidities:

- Arterial hypertension
- History of several episodes of paroxysmal atrial fibrillation, CHA2DSVASC2=5

(denied taking anticoagulant for thromboembolic prevention)

- History of ICH, residual mRs=1
- History of permanent pacemaker implanted



Initial evaluation

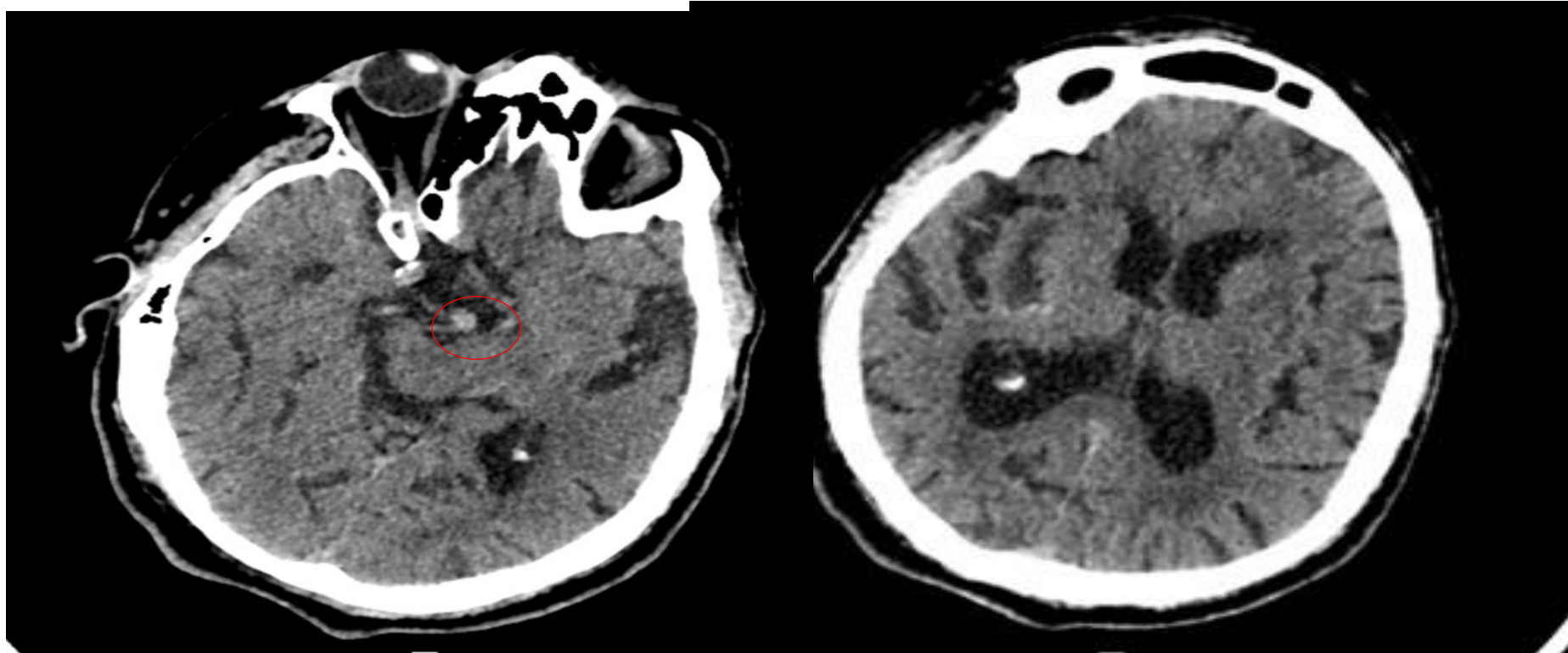
Glasgow-Liege Coma scale (GLCS) score = 11,

NIHSS = 24,

Modified Rankin scale (mRS) = 5.



NCCT- old posthemorrhage lesion
no new infarct,
Note! hyperdense sign for basilar artery
Suggesting Basilar artery thrombotic occlusion



Our strategy

- After discussion within multidisciplinary team - neurologist, interventionalist and anesthesiologist, a decision to perform an immediate cerebral pan-angiography and interventional intra-arterial treatment was taken, because of clinical evidence of the acute basilar artery occlusion (BAO) within the optimal time window.
- According to our interventional stroke protocol, we performed cerebral angiography and intraarterial catheter based treatment.
- Based on Stroke Thrombolysis Guidelines Version 2.0 (March 2015): “Patients with a basilar artery occlusion can be considered **up to 24 hours, and occasionally longer** if stuttering symptom onset.”

Ivo Petrov et al. A case of successful interventional treatment in acute BAO Cor & Vasa 58(2016) 287-291





f) Basilar artery occlusion

Despite high mortality and morbidity rates associated with basilar artery occlusion³⁰, evidence from RCT's is lacking. A recent meta-analysis of 45 studies (n=2056) of reperfusion of acute basilar occlusion showed numbers needed to treat (NNT) of 3 and 2.5 to decrease death or dependency and death alone, respectively.³¹

Single-centre studies with samples inferior to 100 patients have shown good functional outcomes following thrombectomy of the basilar artery ranging from 30%^{32, 33} to 48%.³⁴⁻³⁶ Experience at the Karolinska Hospital showed a 57% rate of good functional outcome (95% CI 37% to 75%), and of 73% (95% CI 50% to 89%) when there were no signs of acute infarction prior to treatment, with about 21% mortality.³⁷

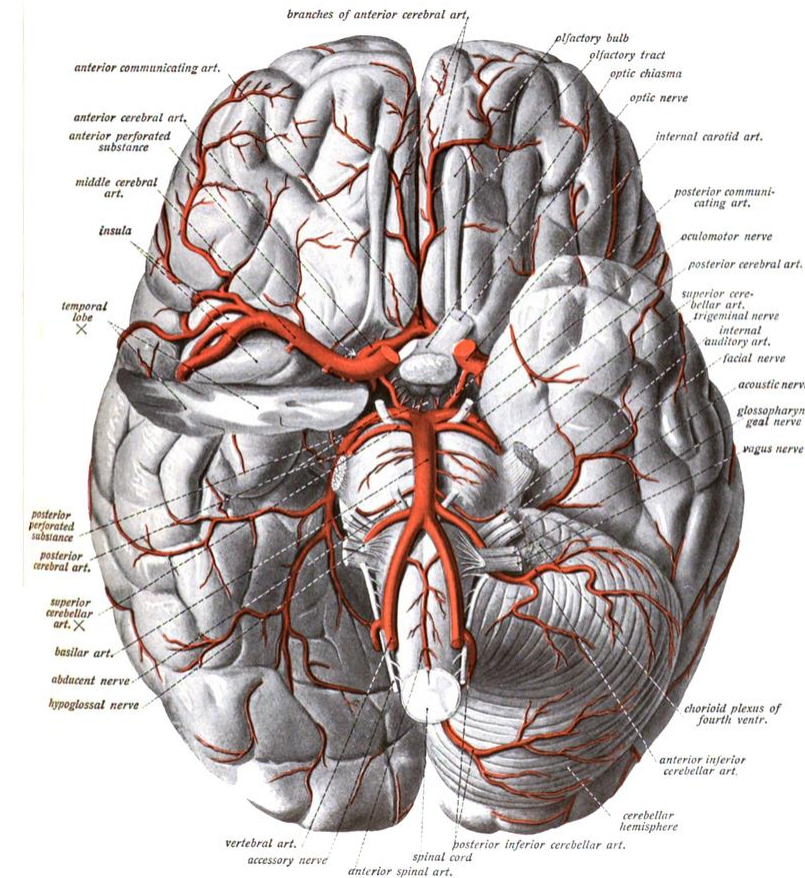
Recanalisation rates over 75% were reported with new generation devices^{33, 38} as well as with older generation devices in the MERCI and multi-MERCI trials but with lower benefit.³⁹

A previous prospective registry, the Basilar Artery International Cooperation Study (BASICS) could not demonstrate superiority of endovascular therapy against IVT, however, it employed mostly older-generation devices.⁴⁰ The same investigators are now undertaking the BASICS treatment trial, comparing thrombectomy <6 hours in addition to IVT with IVT alone.



Intracranial angiography:

- A total occlusion (acute thrombosis) of the basilar artery in the middle and distal segment
- Posterior cerebral arteries were not visible.



Interventional procedure protocol:

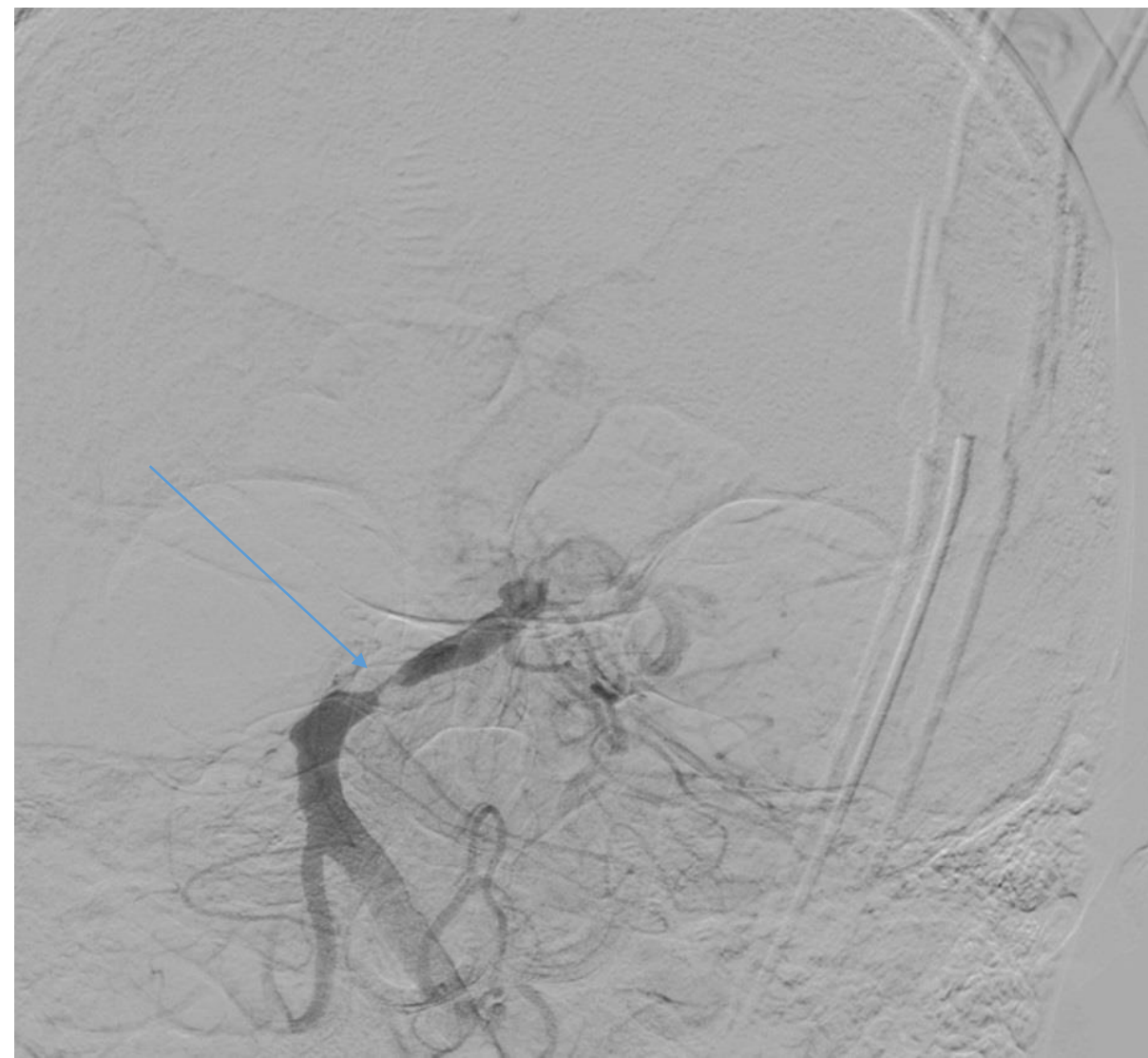
- 6F right femoral approach
- Positioning of guiding catheter (Simmons 2 6Fr, J&J) in the middle left vertebral artery
- Recanalization of BAO with a “014 Runthrough wire supported by a low profile OTW Sprinter 1.25/15 mm balloon



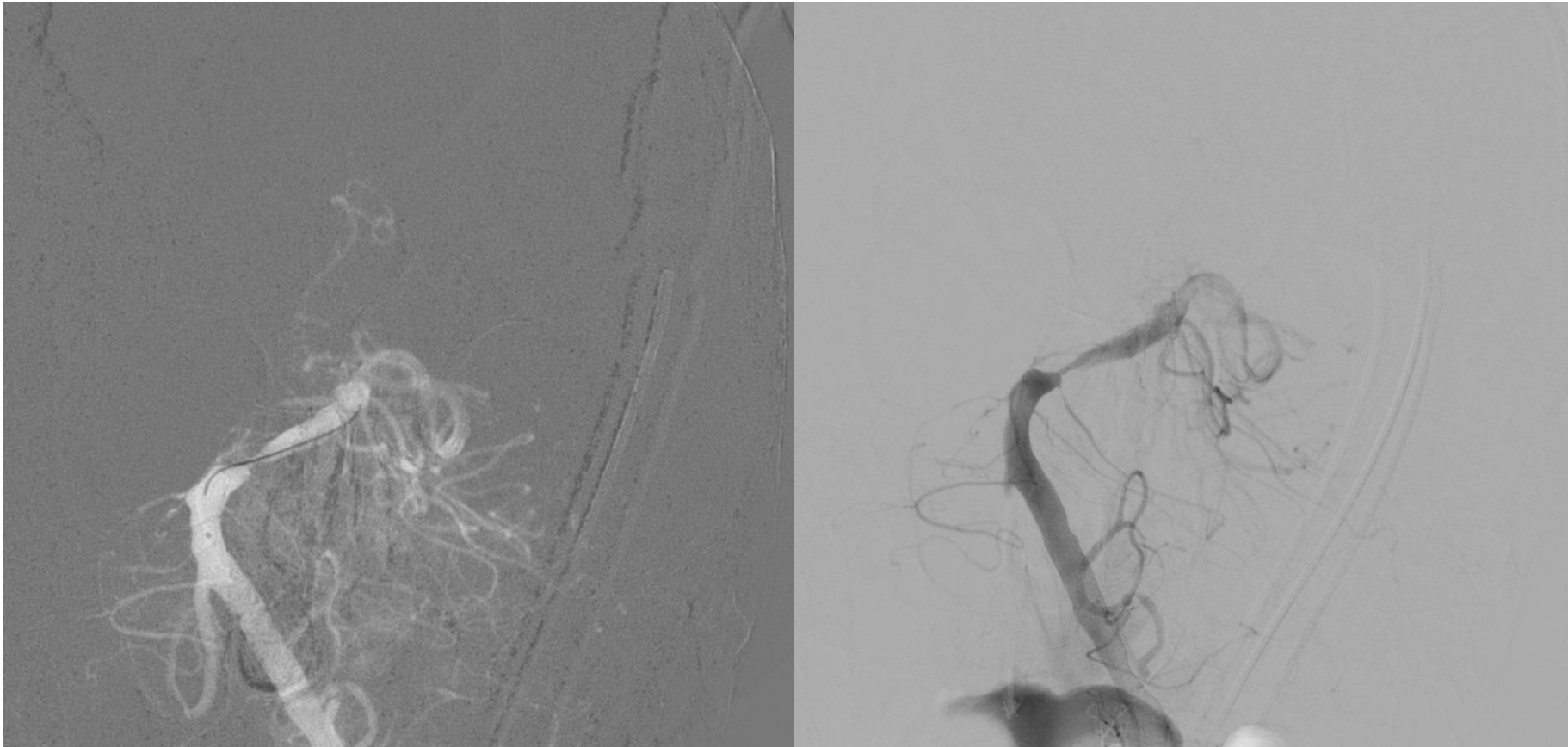
Penumbra 5 MAX aspiration

Immediate partial flow restoration after Penumbra thrombaspiration

Atherosclerotic aspect of the underlying residual lesion



Three Sprinter NC balloon inflations with incremental sizes, from 1.25 to 3.5 mm



Ivo Petrov, Marko Klissurski,; Iveta Tasheva; et al. A case of successful interventional
petrovivo@hotmail.com treatment in acute basilar artery occlusion, Cor & Vasa 58(2016) 287-291



The final angiographic result:
residual 25-30% stenosis,
Restored TIC1-3 flow



Symptom onset to
recanalization time- 167min
Groin to recanalization- 21 min
min.
Difference= 146min
(mainly spent to convince chief
of Anaesthesiology there is a
chance to save patient's life)



Clinical results

- Stabilization of general and neurological condition. The patient was extubated 12 hours after procedure
- On the first postprocedure day, the patient:
 - regained consciousness
 - being adequate and able to speak
 - with no new deficit in the right limbs, except for mild arm ataxia



- Clinical presentation on admission:

- Glasgow-Liege Coma scale (GLCS) score = 11,
Institutes of Health Stroke scale (NIHSS) = 24,
Modified Rankin scale (mRS) = 5.



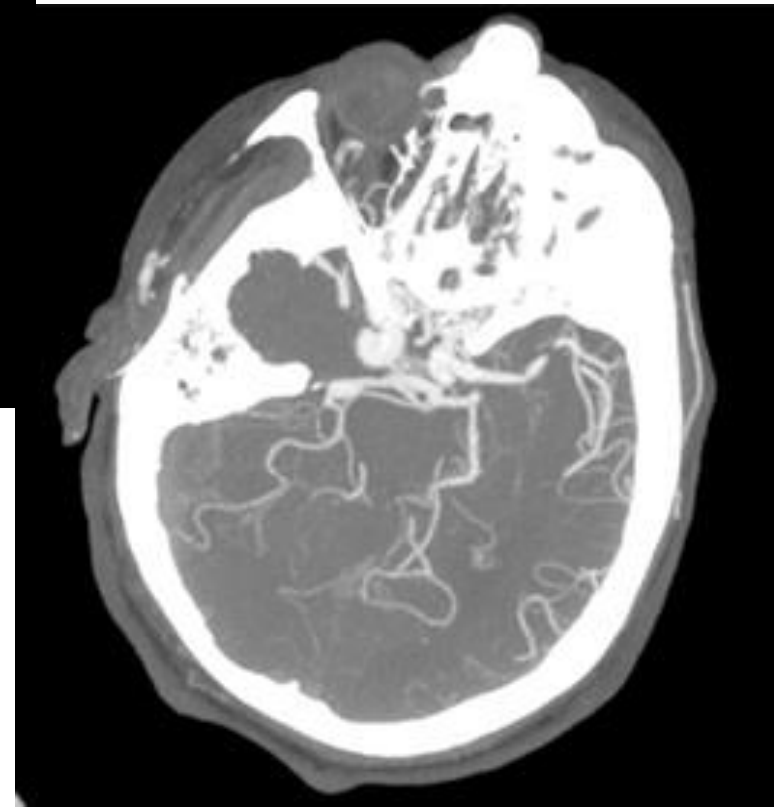
- On the next day after interventional treatment:

- Glasgow-Liege Coma scale (GLCS) score = 20,
Institutes of Health Stroke scale (NIHSS) = 7,
Modified Rankin scale (mRS) = 2.



Control CT angiography

- no new signs of ischemic stroke, no intracerebral haemorrhage, as well as other complications
- complete basilar artery recanalization in the distal part, a moderate residual stenosis in the middle segment, and aplasia of the left posterior communication artery



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Case report– Special issue: Acute Ischemic Stroke

A case of successful interventional treatment in acute basilar artery occlusion



Ivo Petrov^{*}, Marko Klissurski, Sevim Halibryam,
Galina Georgieva-Kozarova, Vesela Stoyanova

City Clinic Cardiology Center University Hospital, 127 Okolovrasten pat Street, 1407 Sofia, Bulgaria¹

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ABSTRACT

We describe a case of successful recanalization and favorable clinical outcome of a patient with acute basilar artery occlusion (BAO) and interventional treatment (IT). A 67-year-old patient presented in a comatose state, with quadriplegia, and decerebrate posturing. His initial Glasgow-Liege Coma Scale (GLCS) score was 11, Institutes of Health Stroke scale (NIHSS) 24, and modified Rankin scale (mRS) 5. Non-contrast CT was performed before IT. Due to suspicion of BAO, an immediate cerebral angiography was performed. It demonstrated BAO in the middle and distal segment. Intra-arterial catheter based treatment was performed including balloon angioplasty and thrombolysis with 20 mg Actilyse (within 4 h of symptoms onset). An optimal angiographic result was achieved. After the procedure the patient was treated in ICU with another 10 mg Actilyse infused over the next 3 h. Because of improvement in neurological condition, the patient was extubated 12 h later. On the first day, he regained consciousness, being able to speak, without new neurologic deficit. Control CT did not demonstrate new signs of ischemic stroke. CT angiography showed complete basilar artery recanalization in the distal part and a moderate residual stenosis in the middle segment. On the 7th day the patient was discharged with NIHSS 7, GLCS 20, and mRS 3. We believe that the success in our case was a result of the prompt clinical diagnosis, fast access to the cathlab and early mechanical–pharmacological recanalization.

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Tips and tricks for successful basilar intervention

- Baseline MRA/CTA is mandatory: to observe the exact location of the thrombotic occlusion, to evaluate proximal vascular anatomy (tortuosity, size and dominance of the vertebral arteries, distal anatomy: collateral filling and possible distal landing zone for the wire)
- Use soft tip guiding sheaths and guiding catheters in order to avoid spasm
- For access to the basilar artery go through the dominant vertebral artery
- In type III aortic arch and Bovine arch radial approach is the access of choice in order to avoid too much manipulations (risk of embolization)



What the guidelines say ?

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke:(AHA/ASA)

1 Although the benefits are uncertain, the use of mechanical thrombectomy with stent retrievers may be reasonable for carefully selected patients with AIS in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have causative occlusion of the anterior cerebral arteries, vertebral arteries, basilar artery, or posterior cerebral arteries.	IIb	C-EO	Recommendation reworded for clarity from 2015 Endovascular. Class unchanged. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.
			See Table LXXXIII in online Data Supplement 1 for original wording.

2 The use of mechanical thrombectomy devices other than stent retrievers as first-line devices for mechanical thrombectomy may be reasonable in some circumstances, but stent retrievers remain the first choice.	IIb	B-R	Recommendation revised from 2015 Endovascular.
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The ASTER trial (Contact Aspiration vs Stent Retriever for Successful Revascularization) compared the contact aspiration technique and the standard stent retriever technique as first-line EVT for successful revascularization within 6 hours among patients with acute anterior circulation ischemic stroke and LVO. The proportion of patients with successful revascularization at the end of all interventions was 85.4% (n=164) in the contact aspiration group versus 83.1% (n=157) in the stent retriever group (OR, 1.20; 95% CI, 0.68–2.10; P=0.53; difference, 2.4%; 95% CI, –5.4 to 9.7%). The secondary clinical end point of mRS score of 0 to 2 at 90 days was achieved by 82 of 181 (45.3%) in the contact aspiration group versus 91 of 182 (50.0%) in the stent retriever group (OR, 0.83; 95% CI, 0.54–1.26; P=0.38). The primary end point in ASTER was technical (successful revascularization after all interventions), and the trial was not powered to detect a smaller yet potentially clinically important difference between groups. Given its superiority design to detect a 15% difference in the primary end point, this trial was not designed to establish noninferiority.¹⁷



What the guidelines say?/ European Stroke Organisation (ESO)/

Recommendations: In adults with anterior circulation LVO-related acute ischaemic stroke presenting within 6 hours after symptom onset, we recommend mechanical thrombectomy (MT) plus best medical management (BMM), including intravenous thrombolysis (IVT) whenever indicated, over BMM alone to improve functional outcome. Quality of evidence: High ++++ Strength of recommendation: Strong

Expert opinion: There is a consensus among the panel (11/11 votes) that in analogy to anterior circulation large vessel occlusion (LVO) and with regard to the grim natural course of basilar artery occlusions, the therapeutic approach with IVT plus MT should strongly be considered

European Stroke Journal 2019, Vol. 4(1) 6–12 ! European Stroke Organisation 2019



Conclusions

- Basilar artery occlusion is devastating condition related to high mortality rate
- Immediate recanalization strategy has to be undertaken regardless the time window
- Both thrombaspiration and thrombectomy are feasible and safe
- Despite lack of RCT evidence the clinical guidelines encourage EVT in BAO



Albena resort. Bulgaria

