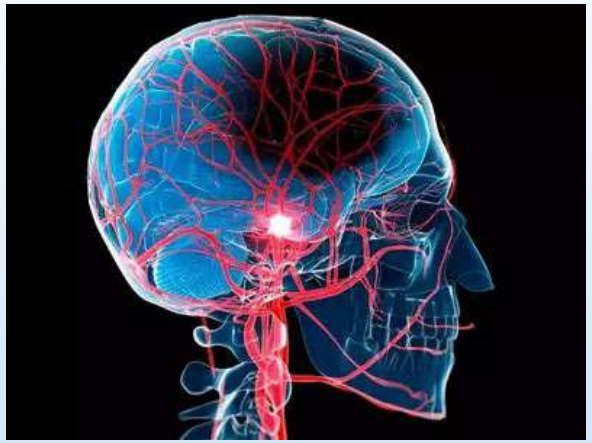


РЕСПУБЛИКАНСКИЙ СЕМИНАР

Реперфузионная терапия ишемического инсульта.

13 марта
г. Минск 2024 г.

Реперфузионная терапия ишемического инсульта: стратегия интервенционного этапа.

Заведующий лабораторией неотложной и интервенционной кардиологии
ГУ РНПЦ «Кардиология»
Бейманов Александр Эдуардович


МРЦ (Молодечено)
МРЦ (Островец)
Университетская клиника (Гродно)
МРЦ (Новополоцк)
Обл. Больница (Витебск)
МРЦ (Орша)
МРЦ (Борисов)
БСМП (Могилев)
МРЦ (Мозырь)
МРЦ (Солигорск)
МРЦ (Барановичи)
Госпиталь ИВОВ Гомель
МРЦ (Бобруйск)
БСМП, МНПЦ, 5 ГКБ, Обл. Больница (Минск)
Обл. больница, ЖД Больница (Брест)
МРЦ (Пинск)
Минск
Могилев
Витебск
Гомель
Брест
Гродно
Полоцк
Новополоцк
Орша
Борисов
Мозырь
Солигорск
Барановичи
Пинск
Молодечно
Островец

ОНМК

- Ишемический (88%)
  - Лакунарный (23%)
  - Не лакунарный (77%)
    - КАРДИО ЭМБОЛИ ЧЕСКИЙ (35%)
    - КРИПТО ГЕННЫЙ (45%)
      - ESUS (50%)
      - NON ESUS (50%)
    - БОЛЕЗНЬ БОЛЬШИХ СОСУДОВ (17%)
    - ДРУГОЕ (3%)
- Геморрагический (12%)
  - Субархноидальные (2%)
  - Внутримозговые (10%)

AB

AB

AHA/ASA GUIDELINE

2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack

ОНМК

Ишемический (88%)

Геморрагический (12%)

Лакунарный (23%)

СД, АГ

Не лакунарный (77%)

АВ

Субархноидальные (2%)

Внутримозговые (10%)

КАРДИОЭМБОЛИЧЕСКИЙ (35%) ФП

КРИПТОГЕННЫЙ (45%)

БОЛЕЗНЬ БОЛЬШИХ СОСУДОВ (17%) А

ДРУГОЕ (3%)

ESUS (50%)

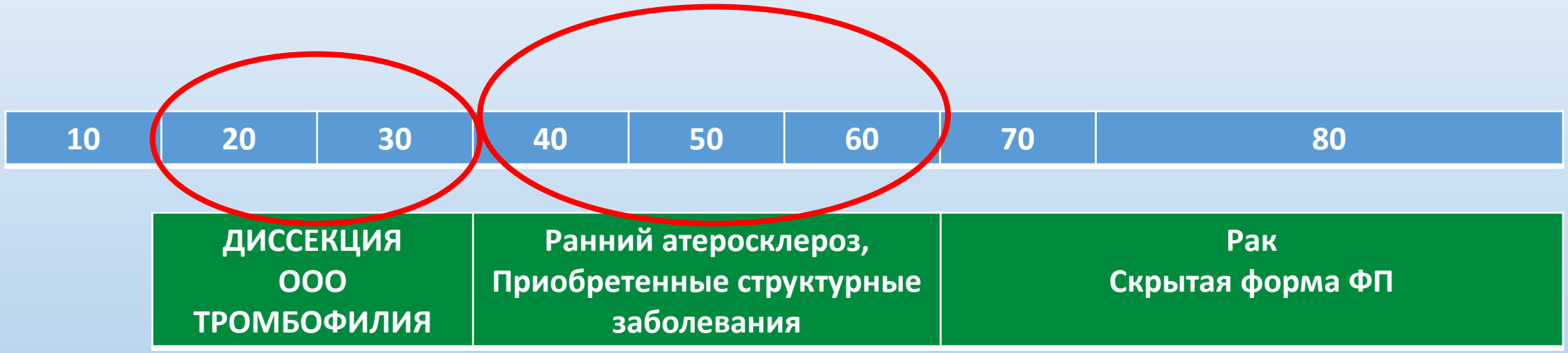
NON ESUS (50%)

АВ

AHA/ASA GUIDELINE

2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack

Этиология в зависимости от возраста.



Из лекции Кулеш А.А., Пермь, РФ

ESUS – инсульты.

- ESUS - это нелакунарный инфаркт головного мозга без установленного кардиогенного источника эмболии или стеноза брахиоцефальных или интракраниальных артерий на стороне поражения

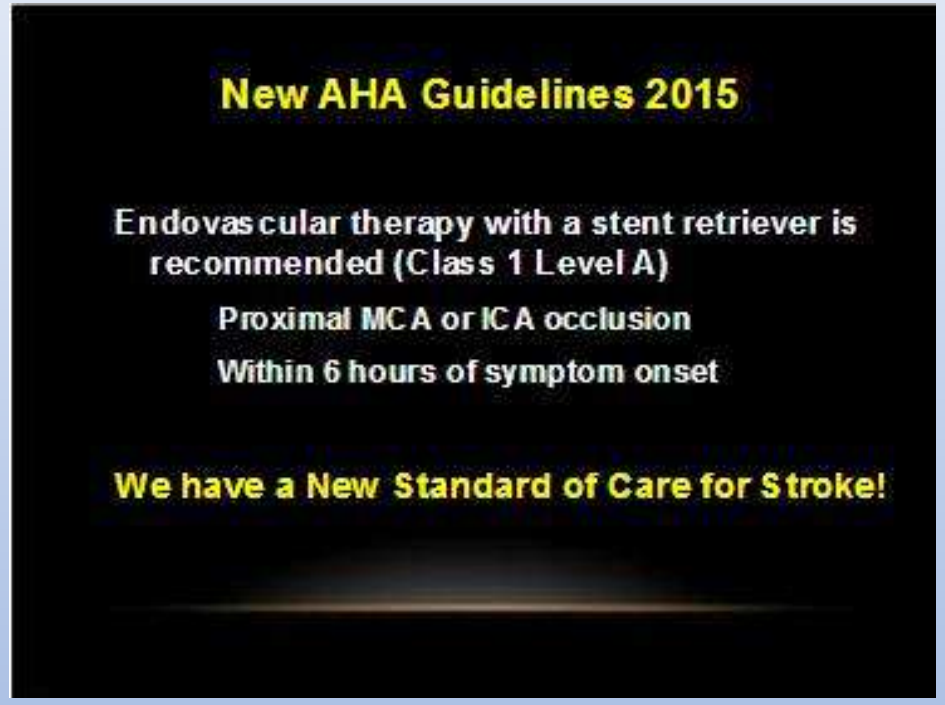
Наиболее частые причины :

- кардиоэмболия на фоне скрытых форм ФП или других источников;
- атеросклеротическое поражение аорты, экстра- и интракраниальных сосудов (атеросклеротический стеноз <50% просвета) и другие;
- васкулопатии, например, диссекция;
- парадоксальная эмболия (ООО) или дефекты предсердной или желудочковой перегородки, а также внесердечные артериовенозные аномалии легочных сосудов.
- канцер ассоциированные ОНМК.

Наиболее частые причины криптогенных инсультов. ESUS – инсультов.

- КАРДИОГЕННАЯ ЭМБОЛИЯ
- АТЕРОСКЛЕРОЗ
- КАНЦЕР АССОЦИИРОВАННЫЕ ОНМК
- АРТЕРИО-ВЕНОЗНЫЕ ШУНТЫ
- CAROTID WEB

Почему интервенция?



Почему интервенция?

- Расширение терапевтического окна в сравнении с тромболитической терапией.
- Тромболитическая терапия имеет противопоказания.
- МТ более эффективна в восстановлении дееспособности пациента.

Показания к интервенционному вмешательству.

- До 6 часов от начала заболевания.

1. Время от начала заболевания		0-6 часов
2. Возраст		Старше 18 лет
3. Дееспособность при поступлении		0-1 mRS
4. Зона повреждения		ВСА, М 1 сегмент
5. КТ диагностика		ASPECTS ≥6.
6. NIHSS		6 и более

Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018

Всем ли пациентам мы можем помочь?

As the number of patients eligible for endovascular treatment of acute ischaemic stroke increases, centres across Europe must consider whether there are enough interventionalists to fight the burden of stroke. According to Urs Fischer (University of Bern, Bern, Switzerland), while some countries, like Germany, might have an adequate number of interventionalists capable of providing thrombectomy procedures, the rest of Europe does not.

Speaking at the European Society for Minimally Invasive Neurological Therapy annual meeting (ESMINT; 8–10 September, Nice, France) Fischer compared the eligibility of patients for endovascular therapy based on the strict criteria adhered to in trials versus the more liberal criteria of clinical practice. One study from Switzerland (*Stroke*. 2016;47:1844–1849, originally published 14 June, 2016) he described showed that 12% of all stroke patients coming into hospital are eligible for IV tPA and 45% of patients are arriving in the time window of six hours. Regarding endovascular therapy Fischer said: "If you apply strict criteria for endovascular therapy, 10% of patients presenting within six hours are eligible for endovascular therapy and if you take the soft criteria you are reaching numbers of 18%. However, if you look only at the local population, which means people living in the suburb of Lausanne and Lausanne itself, then the numbers are slightly different—you have 40% within the six-hour time window eligible for IV t-PA and 8% for endovascular therapy with the strict criteria and 16% with the soft criteria. They have also been looking at this in Glasgow (*European Stroke Journal*. December 2016 vol. 1 no. 4 264–271), and their estimate is that roughly 15% of patients presenting within the first six hours might be eligible."

ACTION PLAN FOR STROKE IN EUROPE 2018–2030

TARGETS FOR 2030

Treating 90 % or more of all patients with stroke in Europe in a stroke unit as the first level of care.

Guaranteeing access to recanalisation therapies to 95% of eligible patients across Europe.

Decreasing median onset-to-needle times to <120 minutes for intravenous thrombolysis and onset-to-reperfusion times to <200 minutes for endovascular treatment.

Achieving IVT rates above 15%, and EVT rates above 5%, in all European countries

Decreasing first-month case-fatality rates to <25% for ICH, and increasing the rate of good functional outcomes to >50%.

Decreasing first-month case-fatality rates to <25% for SAH, and increasing the rate of good functional outcomes to >50%.

СНИЖЕНИЕ ОБЩЕГО ЧИСЛА ОНМК НА 10%

90% с ОНМК лечении в специализированных стационарах.

95% с ОНМК доступность реперфузионной терапии (при селекции пациентов).

Начало ОНМК –ТЛТ - менее 120 минут.

Начало ОНМК – МТ – менее 200 минут .

ТЛТ более 15% от общего числа ИИ.

МТ более 5% от общего числа ИИ.

Снижение летальности при ВМК и САК на 25%, увеличение числа дееспособных пациентов на 50% .

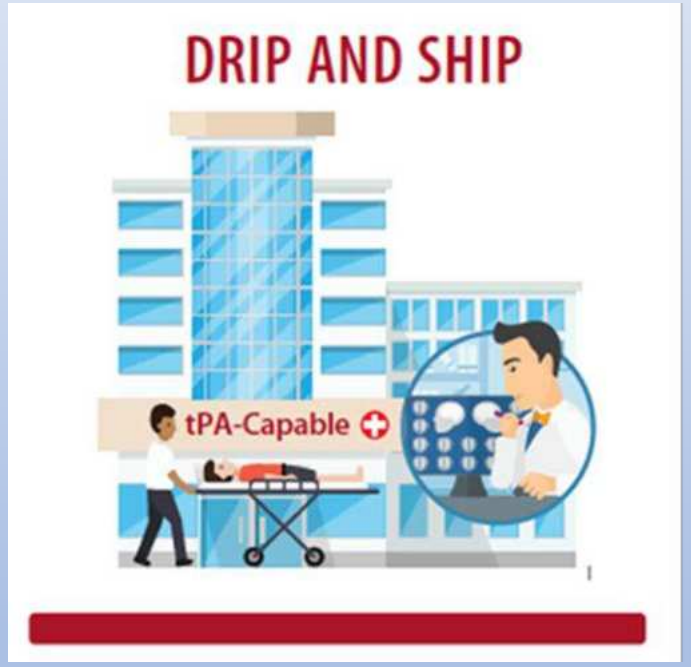
- MT performed at 629 centres
- 27.500 MT procedures in 2016

- *Barriers to EVT:* lack of specially trained personnel; lack of facilities; and costs.

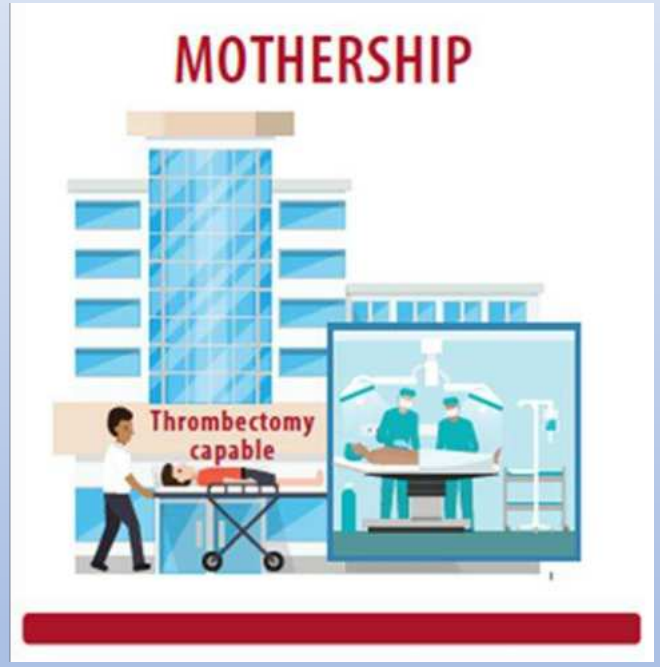
- Established **benchmark rates**: 18% for IVT and 5% for EVT (based on 3rd highest country rates)
  - If all countries achieved 5% rate, then additional 67.000 MTs
  - However: *'…there are no established and well-accepted benchmarks for determining what proportion of patients with AIS should receive IVT and EVT.'* (Page 13)
- Benchmark of 1 CSC per 1 million inhabitants → 286 more CSCs delivering EVT would be needed

Организация помощи.

Если транспортировка более 60 минут

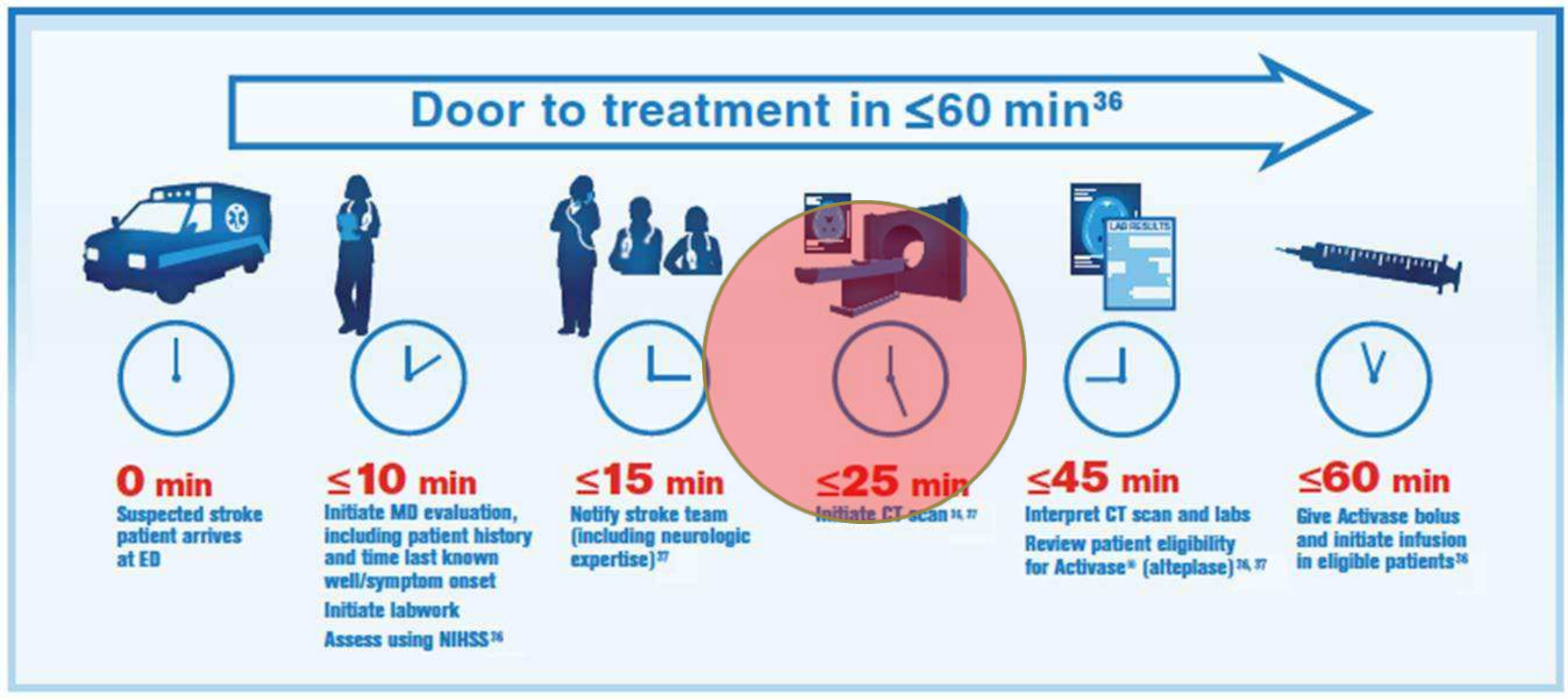


Центр, где может быть сделано КТ- исследование и начат тромболизис



Центр в котором могут быть проведены ТЛТ, МТ.

На каком этапе подключается рентгенохирург?



На каком этапе подключается рентгенохирург?

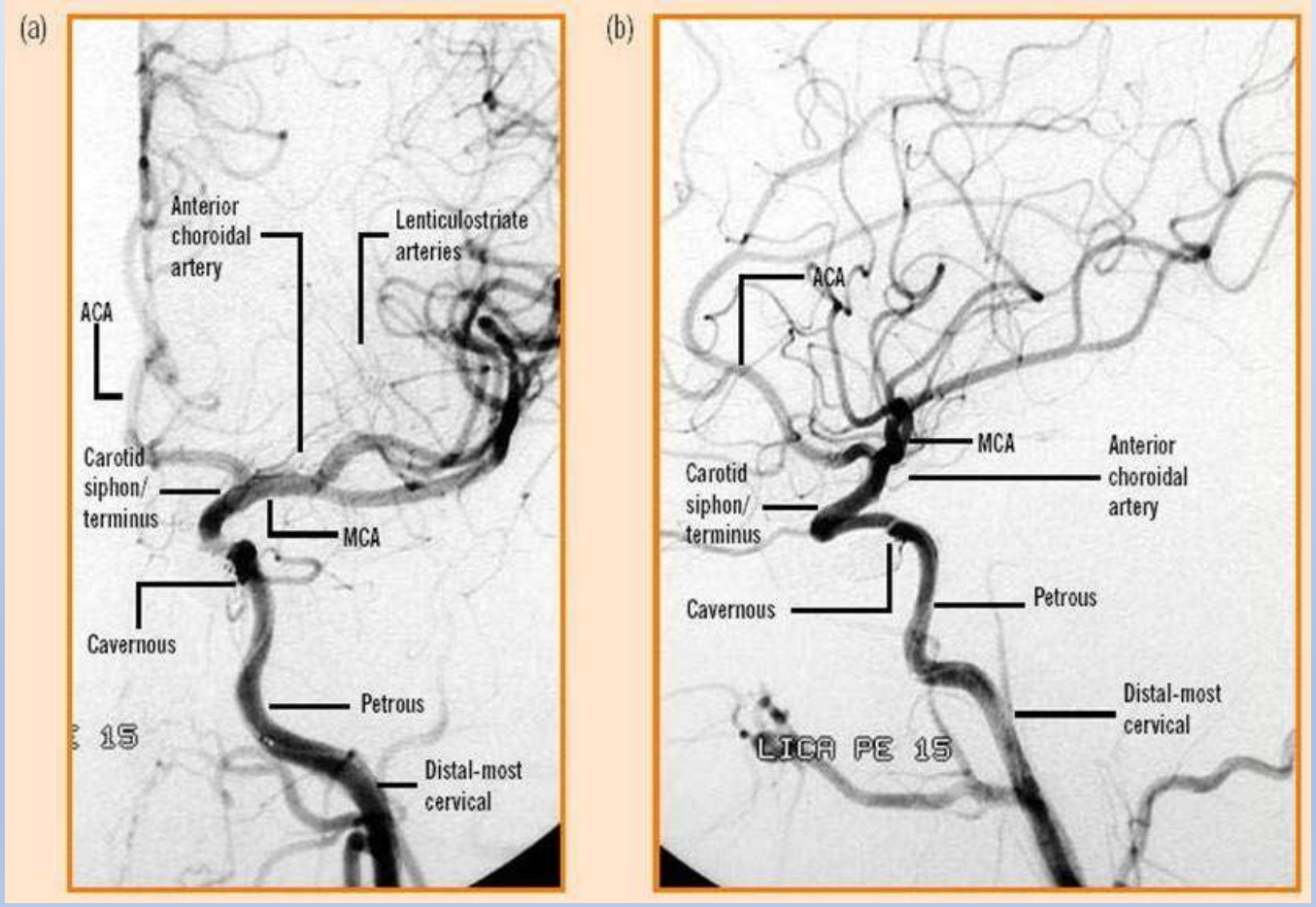
Показания к интервенционному вмешательству.

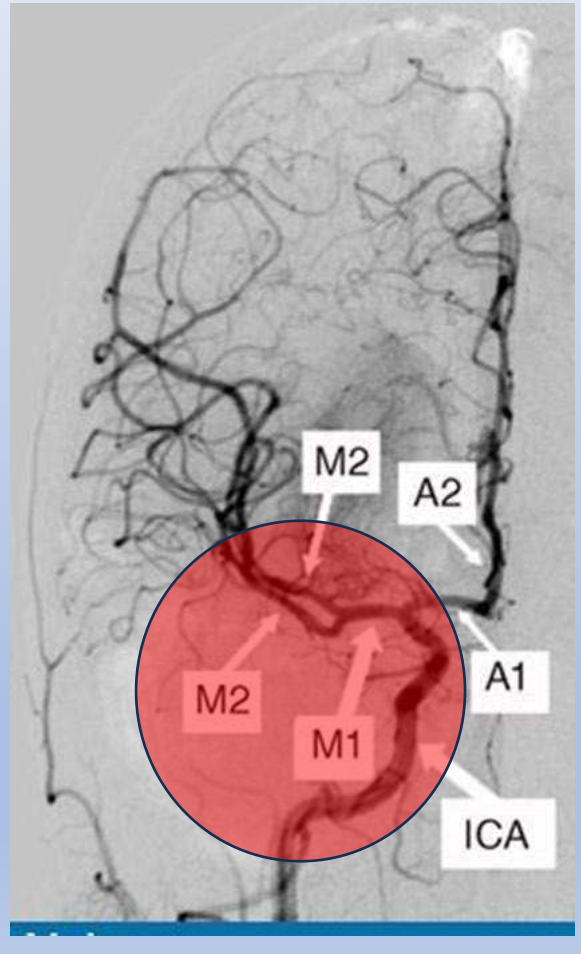
- До 6 часов от начала заболевания.

1. Время от начала заболевания		0-6 часов
2. Возраст		Старше 18 лет
3. Дееспособность при поступлении		0-1 mRS
4. Зона повреждения		ВСА, М 1 сегмент
5. КТ диагностика		ASPECTS ≥6.
6. NIHSS		6 и более

Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018

Р/анатомия передней циркуляции (зона интересов интервенционных вмешательств)



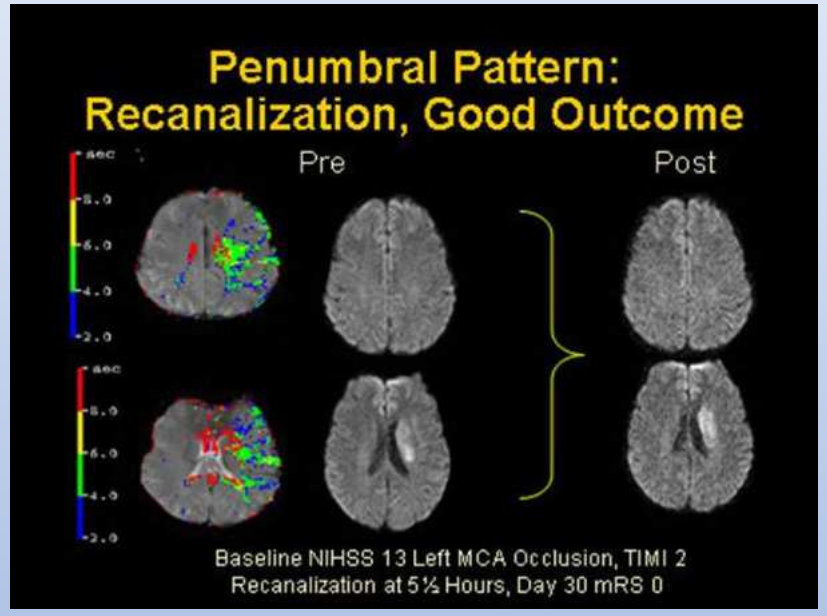


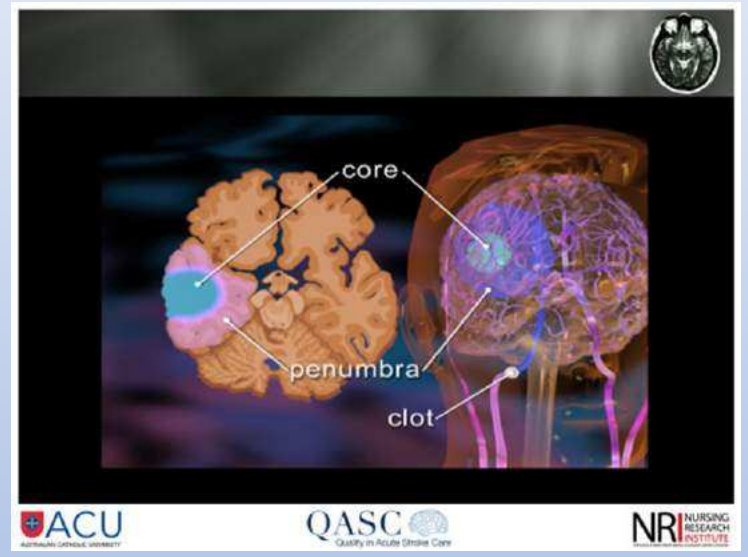
Механическая тромбэкстракция 6-16-24 часа.

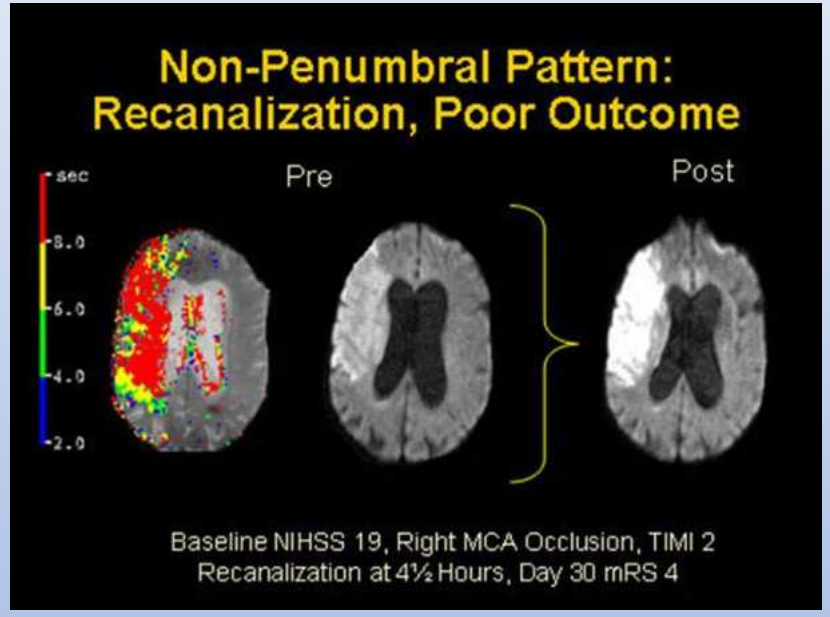
3.7. Mechanical Thrombectomy (Continued)	COR	LOE	New, Revised, or Unchanged
7. In selected patients with AIS within 6 to 16 hours of last known normal who have LVO in the anterior circulation and meet other DAWN or DEFUSE 3 eligibility criteria, mechanical thrombectomy is recommended.	**I**	**A**	New recommendation.
8. In selected patients with AIS within 6 to 24 hours of last known normal who have LVO in the anterior circulation and meet other DAWN eligibility criteria, mechanical thrombectomy is reasonable.	**IIa**	**B-R**	New recommendation.
The DAWN trial used clinical imaging mismatch (a combination of NIHSS score and imaging findings on CTP or DW-MRI) as eligibility criteria to select patients with large anterior circulation vessel occlusion for treatment with mechanical thrombectomy between 6 and 24 hours from last known normal. This trial demonstrated an overall benefit in function outcome at 90 days in the treatment group (mRS score 0–2, 49% versus 13%; adjusted difference, 33%; 95% CI, 21–44; posterior probability of superiority >0.999).[108] In DAWN, there were few strokes with witnessed onset (12%).The DEFUSE 3 trial used perfusion-core mismatch and maximum core size as imaging criteria to select patients with large anterior circulation occlusion 6 to 16 hours from last seen well for mechanical thrombectomy. This trial showed a benefit in functional outcome at 90 days in the treated group (mRS score 0–2, 44.6% versus 16.7%; RR, 2.67; 95% CI, 1.60–4.48; $P<0.0001$).[109] Benefit was independently demonstrated for the subgroup of patients who met DAWN eligibility criteria and for the subgroup who did not. DAWN and DEFUSE 3 are the only RCTs showing benefit of mechanical thrombectomy >6 hours from onset. Therefore, only the eligibility criteria from these trials should be used for patient selection. Although future RCTs may demonstrate that additional eligibility criteria can be used to select patients who benefit from mechanical thrombectomy, at this time, the DAWN and DEFUSE-3 eligibility should be strictly adhered to in clinical practice.			See Table XXIII in online Data Supplement 1.

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke

Важность проведения КТ перфузии.







Показания для интервенционного вмешательства (DEFUSE 3/DAWN).

- При поступлении 6-16 часов от начала заболевания.

NIHSS	6 и более
Объем зоны инфаркта	< 70 мл.
Отношение объема ишемии/объему инфаркта	1,8 и больше
Объем пенумбры (обратимой зоны ишемии или реверсивного кровотока)	Не менее 15 мл.

При поступлении 6-24 часов от начала заболевания.

		ВОЗРАСТ	NIHSS	ОБЪЕМ ЯДРА ИШЕМИИ
ГРУППА А		≥80 ЛЕТ	10 и выше	Меньше 21 мл.
ГРУППА В		<80 лет	10 и выше	Меньше 31 мл.
ГРУППА С		<80 лет	20 и выше	31-50 мл

Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018

Критерии включения до 16-24 часов.

Критерии для отбора пациентов для тромбоэкстракции

Критерии DAWN STUDY 6–24 часов

	ВОЗРАСТ	NIHSS	ОБЪЕМ ЗОНЫ ИНФАРКТА
ГРУППА А	80 лет и старше	10 и выше	Меньше 21 мл
ГРУППА В	Моложе 80 лет	10 и выше	Меньше 31 мл
ГРУППА С	Моложе 80 лет	10 и выше	Меньше 21 мл

Критерии DEFUSE 3 6–16 часов

ВОЗРАСТ	6 И БОЛЬШЕ
Объем зоны инфаркта	<70 мл
Отношение объем зоны ишемии/ объем зоны инфаркта	1,8 и больше
Абсолютный объем потенциально обратимой ишемии	15 мл и больше

Объем зоны инфаркта измерялся с использованием автоматических систем обработки изображений (RAPID, iSshema View)
Анализировались МРТ ДВИ или КТП изображения

ОЦЕНКА ПРОВОДИЛАСЬ НА ОСНОВАНИИ ДАННЫХ КТ-ПЕРФУЗИИ.

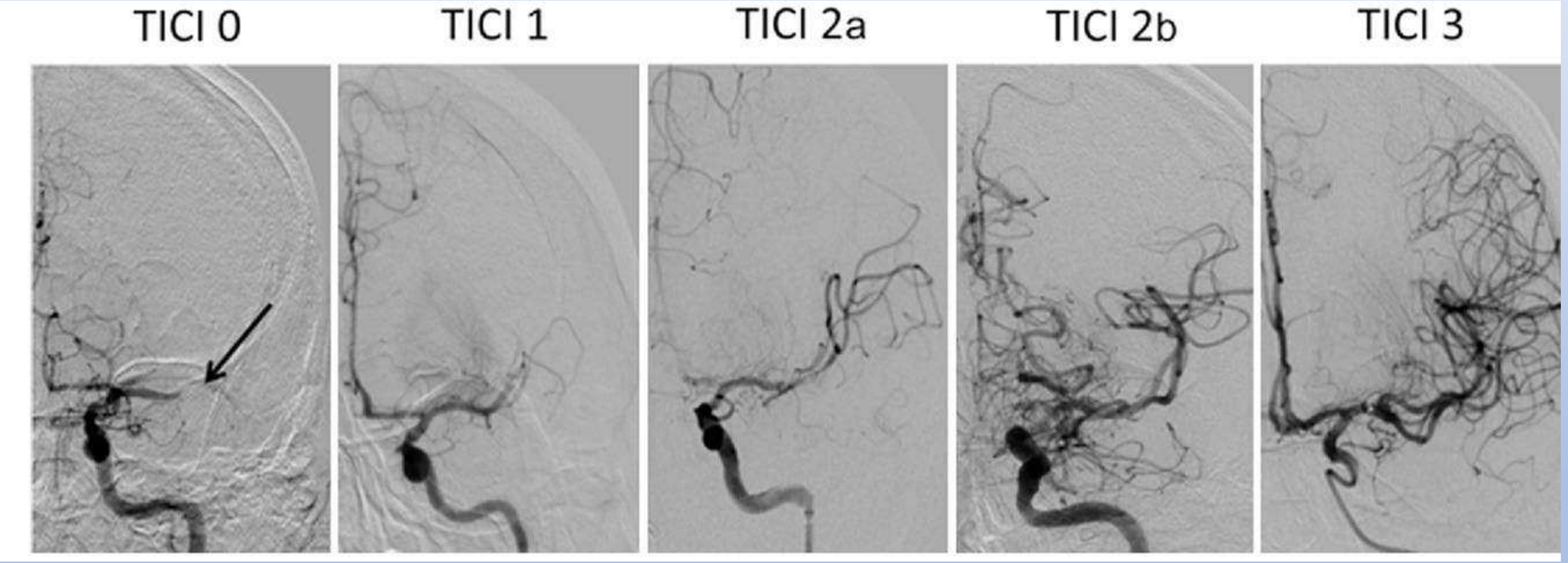
Цель механической реваскуляризации.

Снижение уровня инвалидизации.

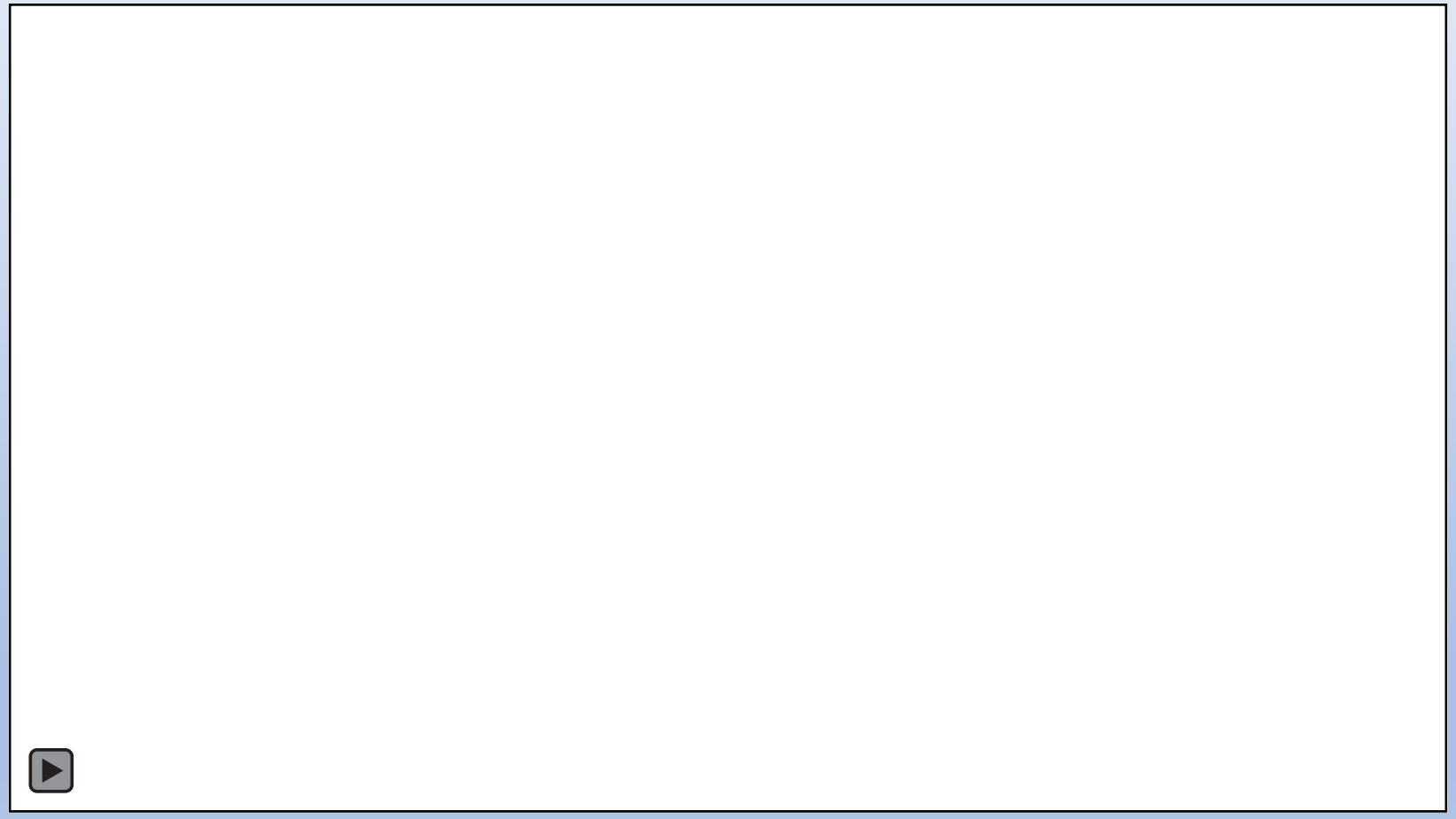
Достижение восстановления кровотока до уровня
TICI 2b/3 в 70-90%.

Восстановление уровня дееспособности в 30-60% случаев до уровня
0-1-2-3 по модифицированной шкале Рэнкин.

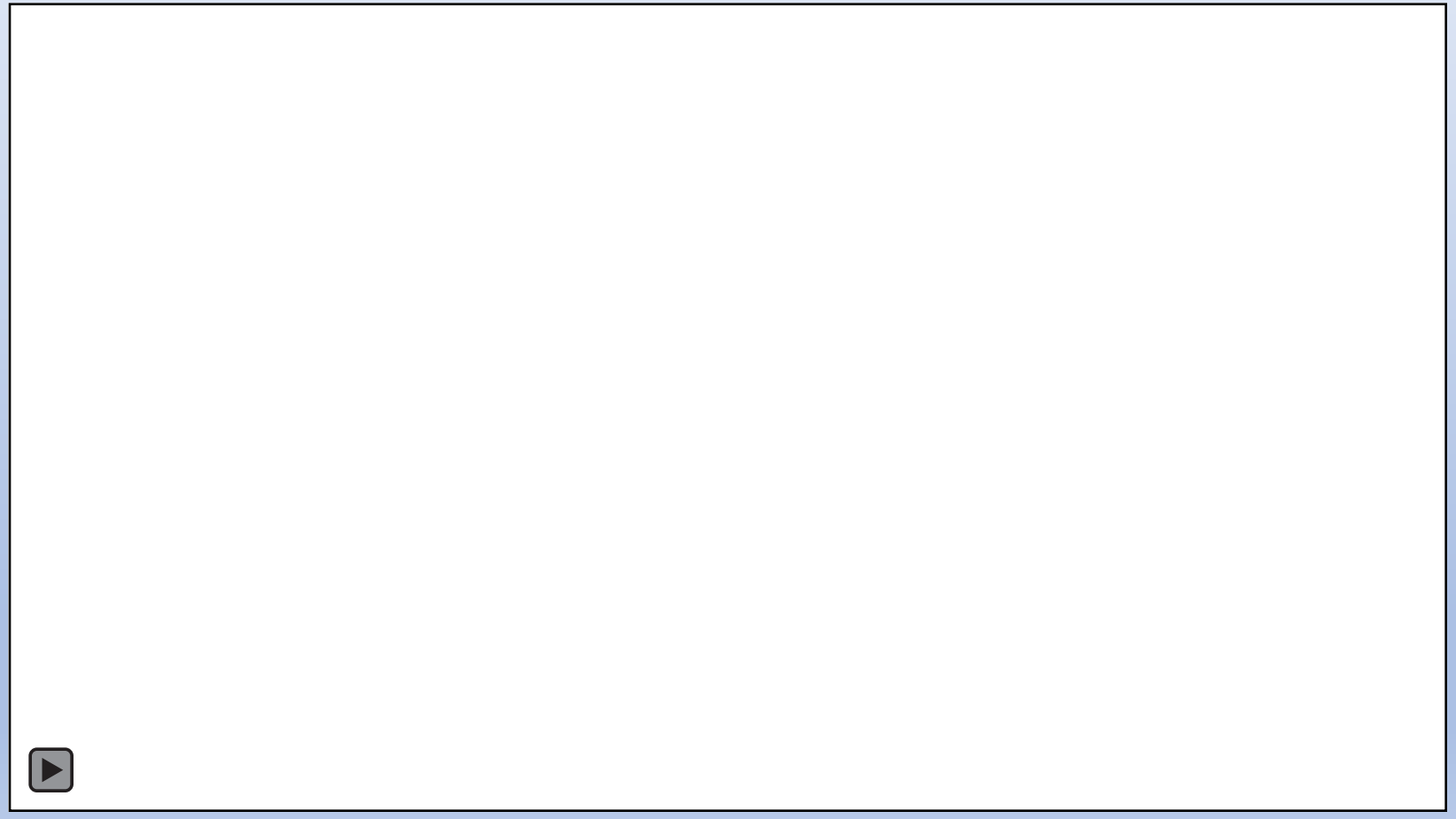
Оценка церебрального кровотока по шкале TICI.



Использование аспирационного катетера.



Использование аспирационного катетера и стент-ретривера.



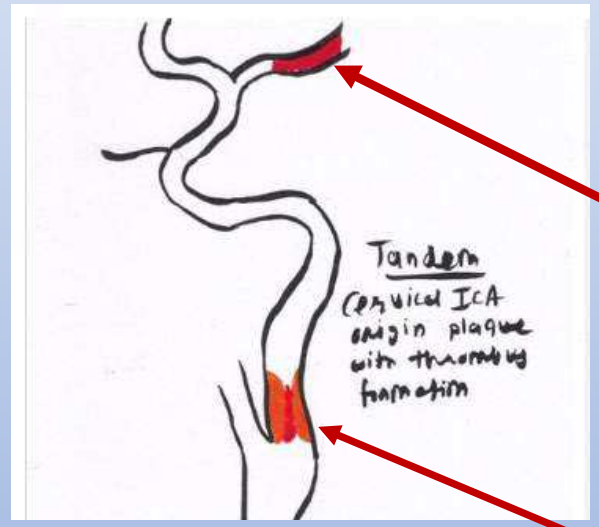
Варианты поражения. (1)

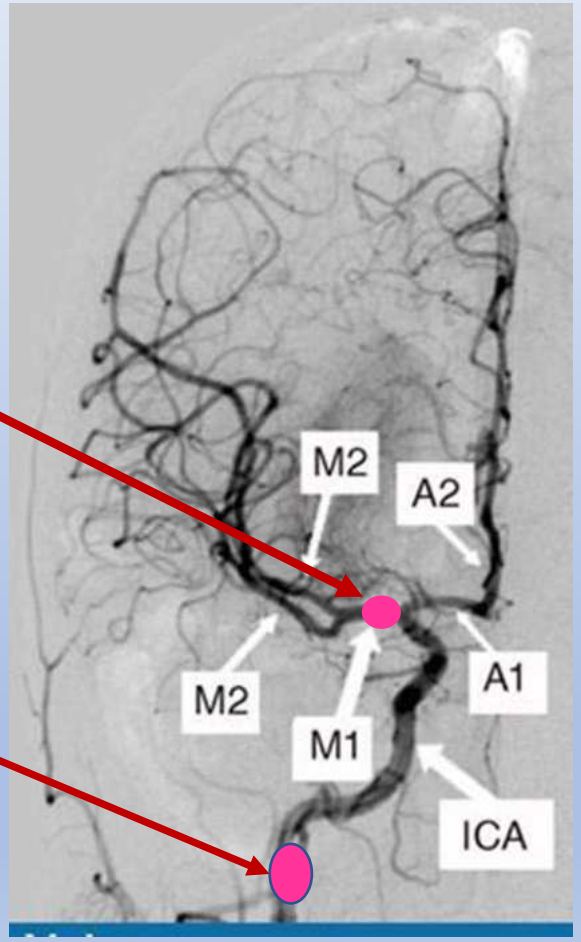
ТАНДЕМНОЕ

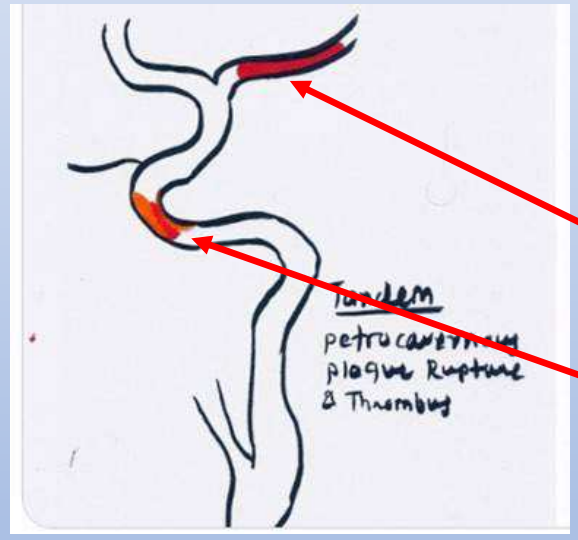
ПОРАЖЕНИЕ ВСА

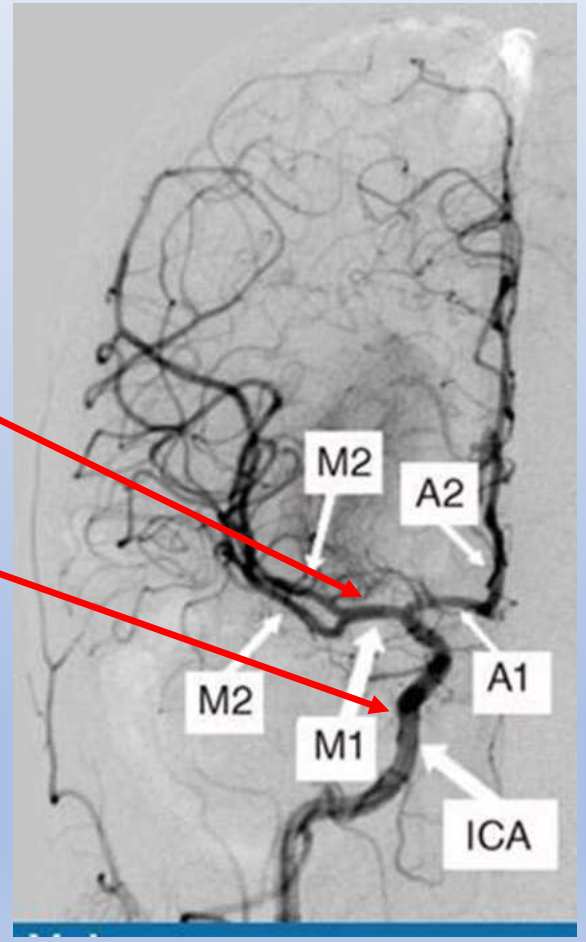
Т-ОБРАЗНОЕ ПОРАЖЕНИЕ

Варианты поражения – тандемное поражение.

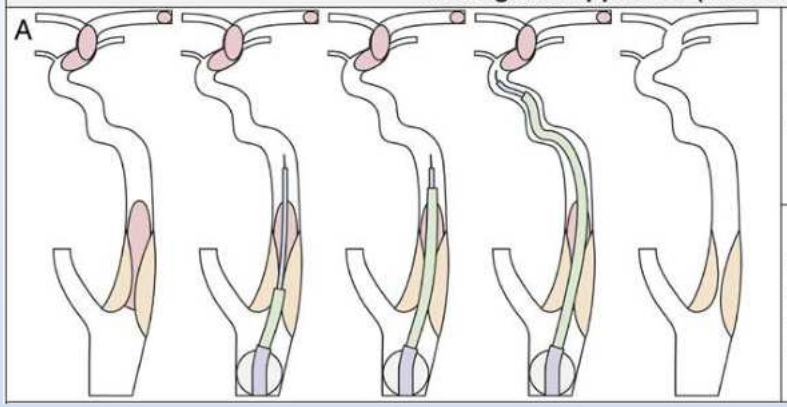








Retrograde approach (direct MT)



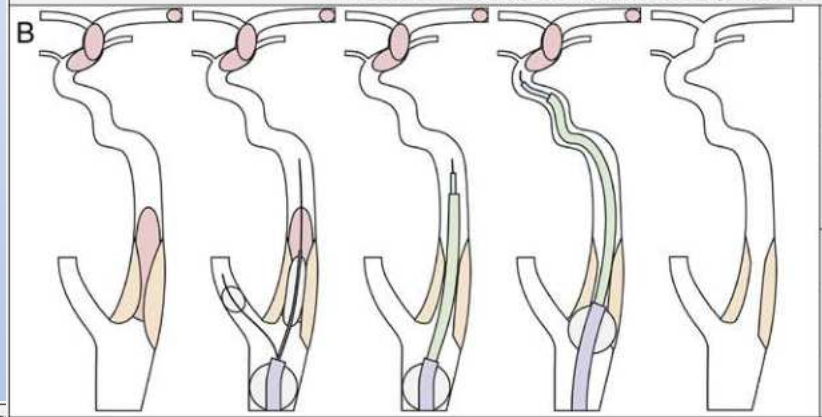
Advantages

- Immediate intracranial therapy
- Does not require strong antiplatelet therapy
- Ability to perform staged cervical revascularization

Disadvantages

- Difficulty in crossing the cervical lesion
- Insufficient control of proximal blood flow
- Mostly blind manipulation procedure
- Possibility of reocclusion of the cervical lesion

PTA first-antegrade approach (PTA followed by MT)



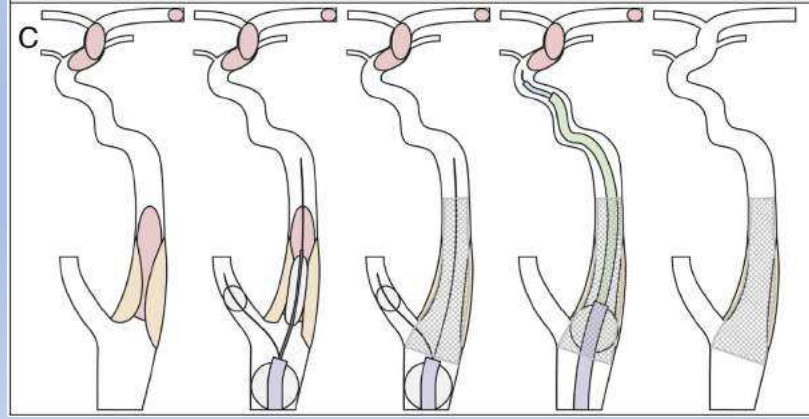
Advantages

- Facilitates crossing the cervical lesion
- Does not require strong antiplatelet therapy
- Better control of proximal blood flow
- Ability to perform staged cervical revascularization

Disadvantages

- Delay in starting intracranial therapy (compared to Direct MT)
- Possibility of reocclusion of the cervical lesion

CAS first-antegrade approach (CAS followed by MT)



Advantages

- Easy approach for the intracranial lesion (reducing blind manipulation)
- Better control of proximal blood flow

Disadvantages

- Delay in starting intracranial therapy (compared to direct MT and PTA first)
- Immediate need for strong antiplatelet therapy to prevent stent thrombosis
- High concern of hyperperfusion syndrome

This patient presented with severe right hemiplegia and aphasia (NIHSS score = 20).

Figures ▾ Tables

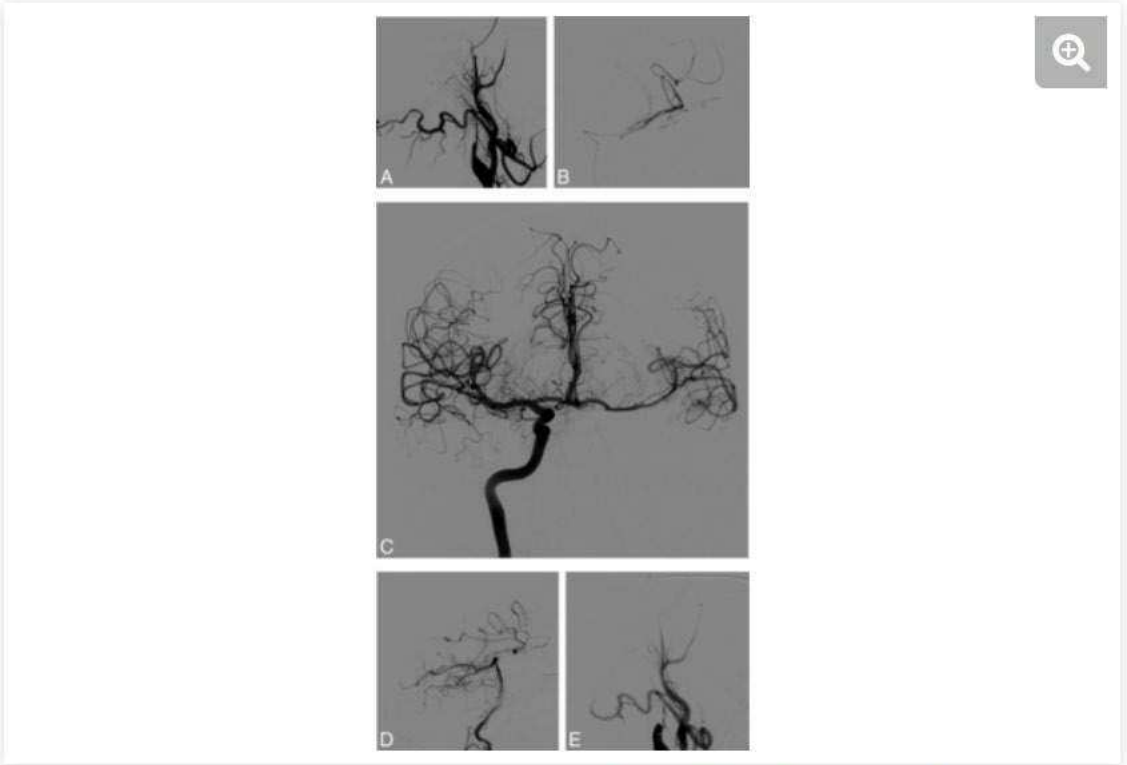
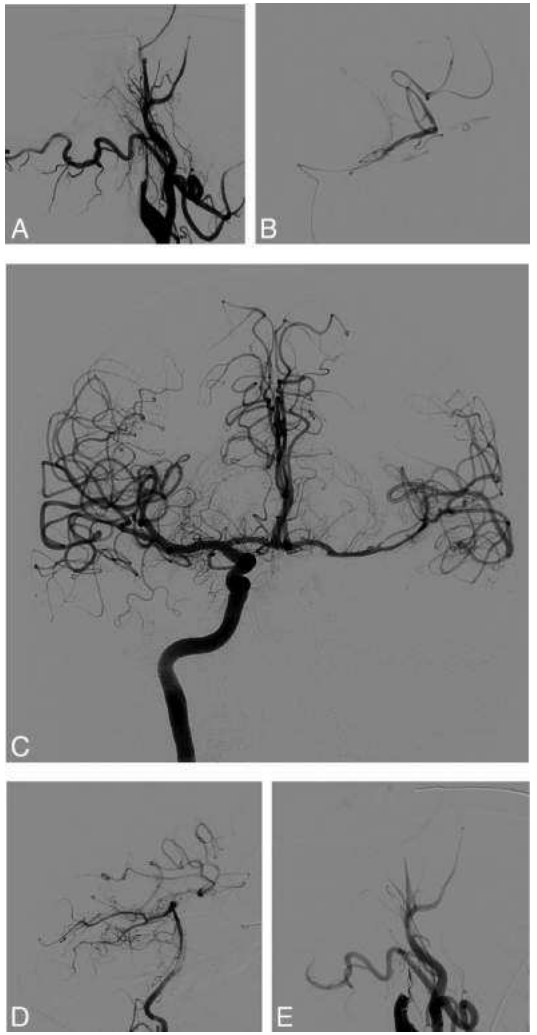


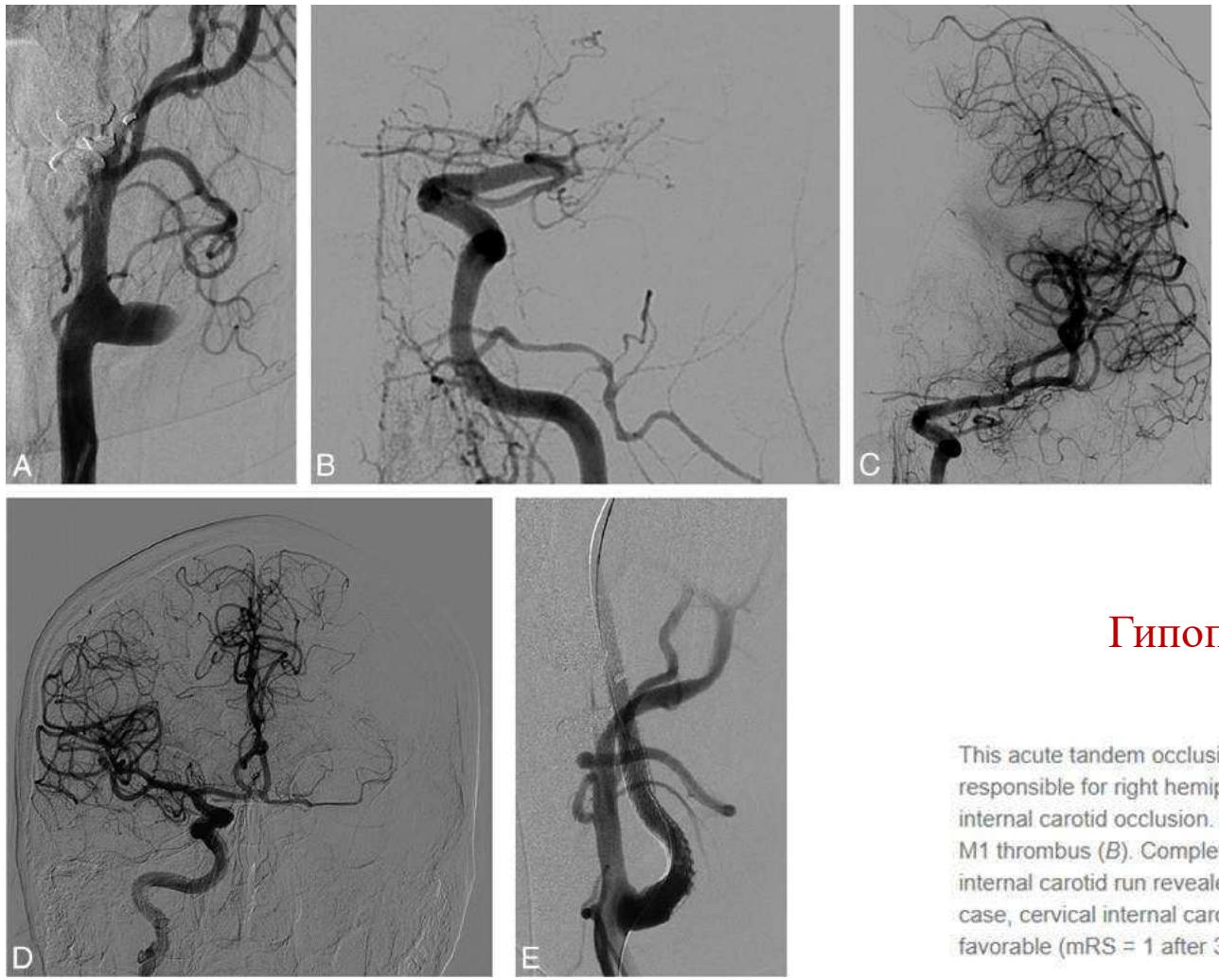
Fig 1. Download figure | Open in new tab | Download powerpoint

This patient presented with severe right hemiplegia and aphasia (NIHSS score = 20). Initial MR imaging revealed a DWI-ASPECTS = 6 after 4.5 hours since symptom onset, associated with left tandem ICA and middle cerebral artery occlusions. The initial angiogram (*A*) demonstrates left internal carotid occlusion related to cervical dissection. We then carefully navigated the microcatheter through the dissected ICA to the intracranial occlusion (*B*). Thrombectomy performed after contralateral femoral puncture and right ICA run shows a functional circle of Willis and no residual left M1 occlusion (*C*). The posterior communicating artery is also permeable as seen on the left vertebral artery run (*D*). Consequently, we decided not to treat the cervical ICA dissection, and the artery was left in its initial condition (*E*).



G. Marnat et al. AJNR Am J Neuroradiol 2016;37:1281-1288

This acute tandem occlusion related to left cervical internal carotid dissection with a downstream intracranial M1 embolus was responsible for right hemiplegia and aphasia (NIHSS score = 22).

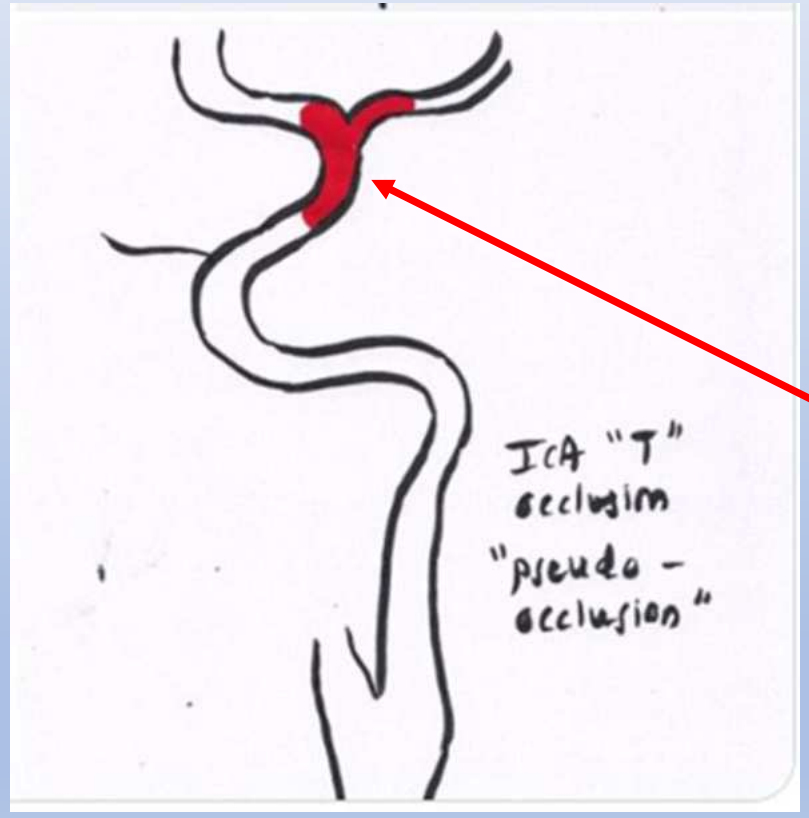


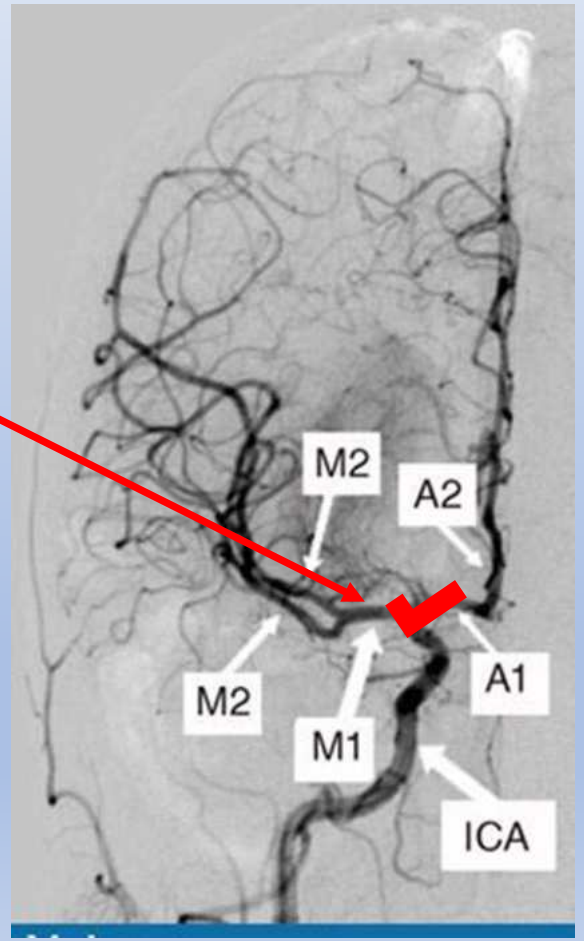
Гипоплазия передней соединительной артерии

This acute tandem occlusion related to left cervical internal carotid dissection with a downstream intracranial M1 embolus was responsible for right hemiplegia and aphasia (NIHSS score = 22). The first angiographic (*A*) run demonstrated postbulbar internal carotid occlusion. After we navigated through the dissected segment, an intracranial initial angiogram confirmed the M1 thrombus (*B*). Complete intracranial recanalization was performed with 1 stent retriever pass (*C*). Thus, a contralateral internal carotid run revealed insufficient filling of the left MCA territory through the anterior communicating artery (*D*). In this case, cervical internal carotid stent placement of the dissected occlusive segment was mandatory (*E*). Clinical evolution was favorable (mRS = 1 after 3 months).

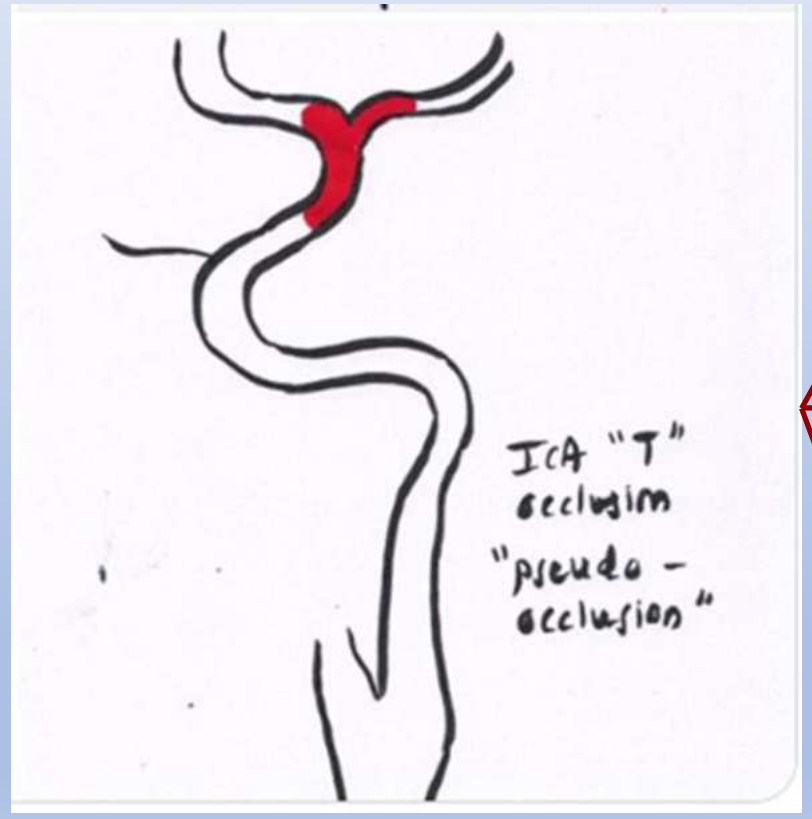
G. Marnat et al. AJNR Am J Neuroradiol 2016;37:1281-1288

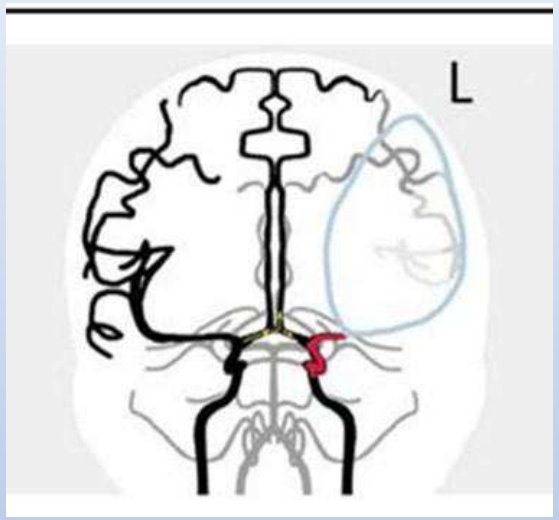
Варианты поражения – Т-поражение.

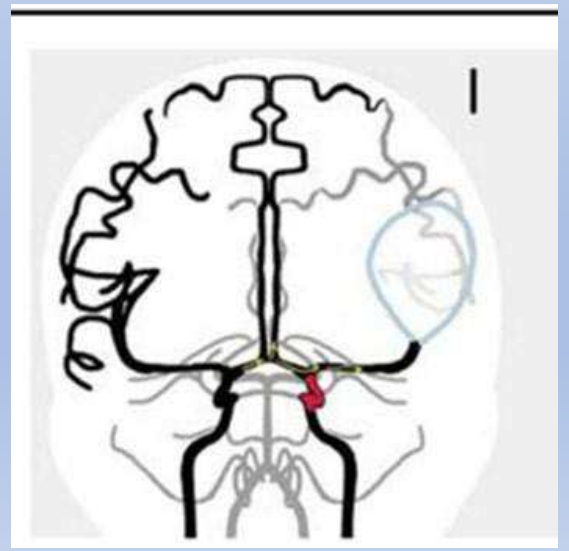


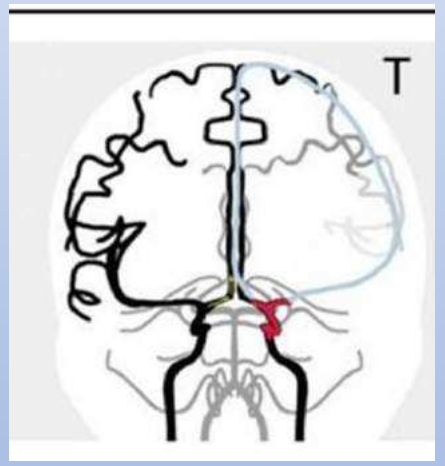


Варианты поражения – Т-поражение.

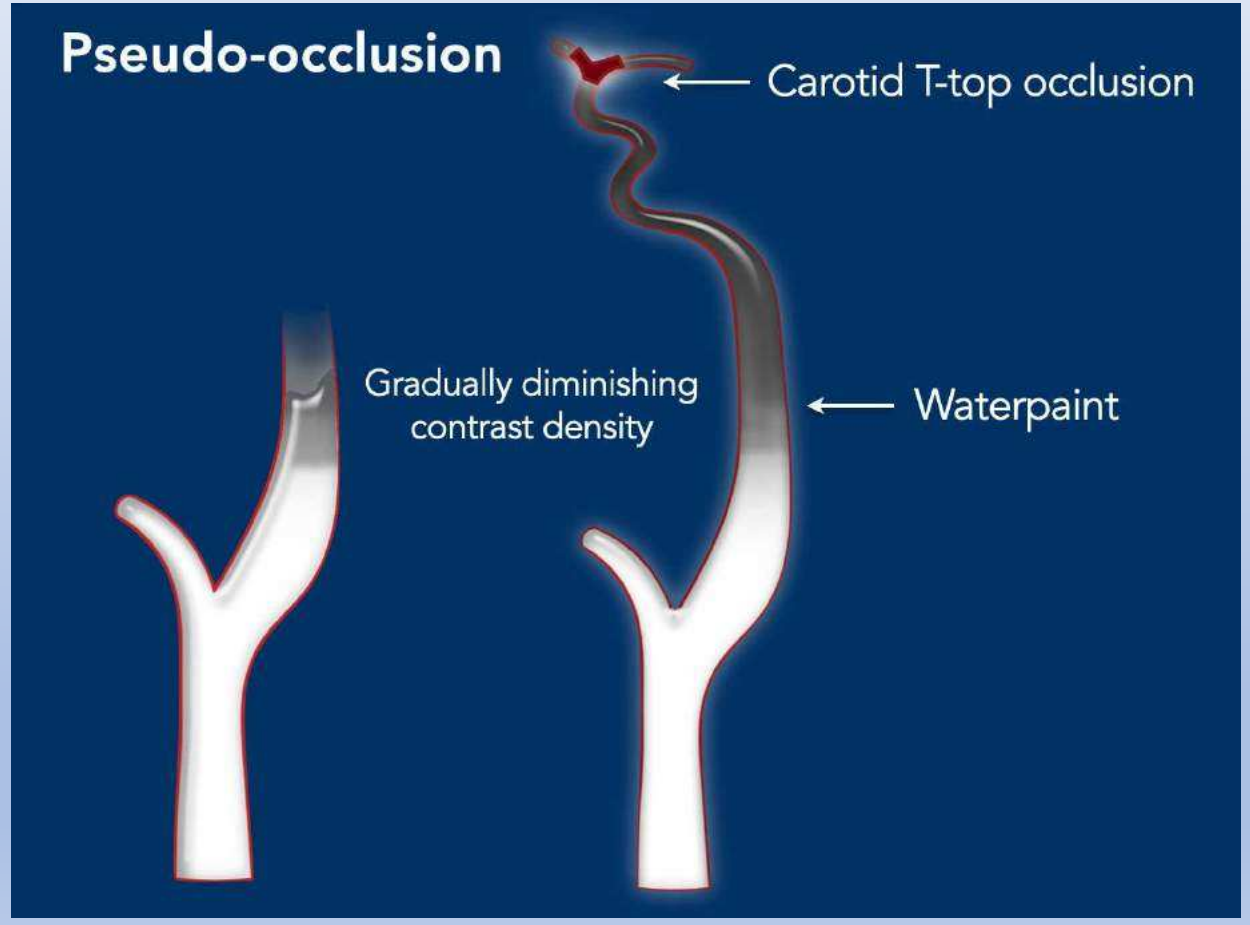


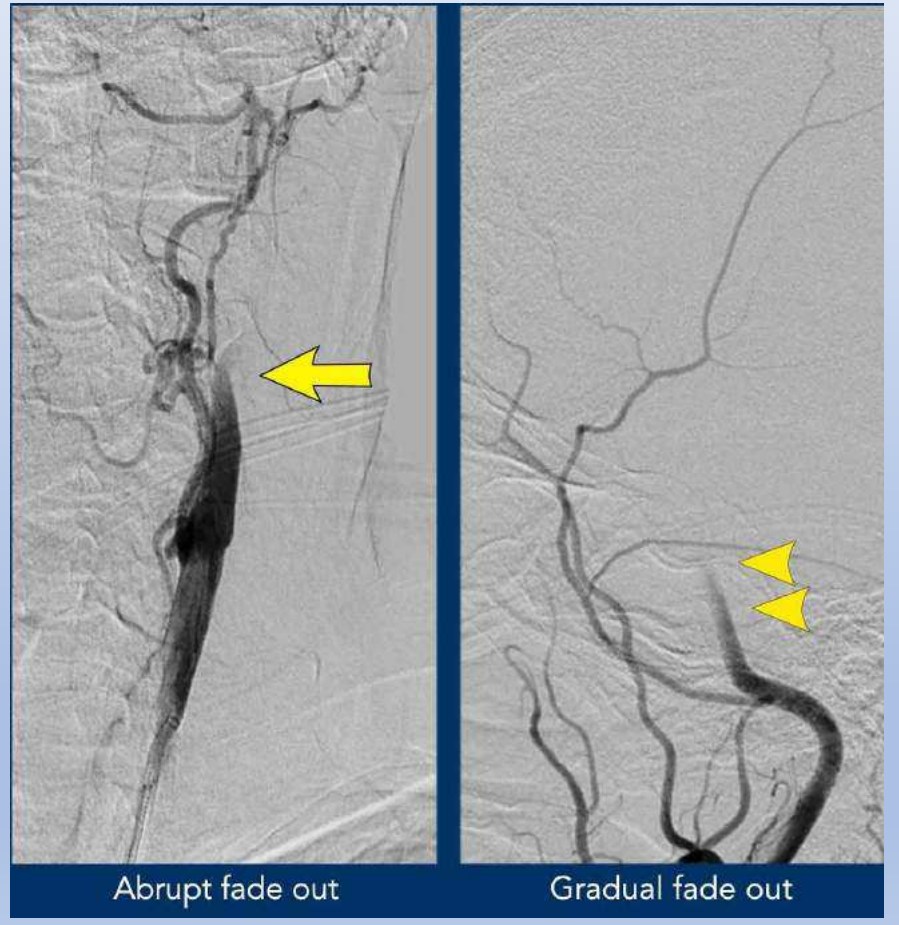




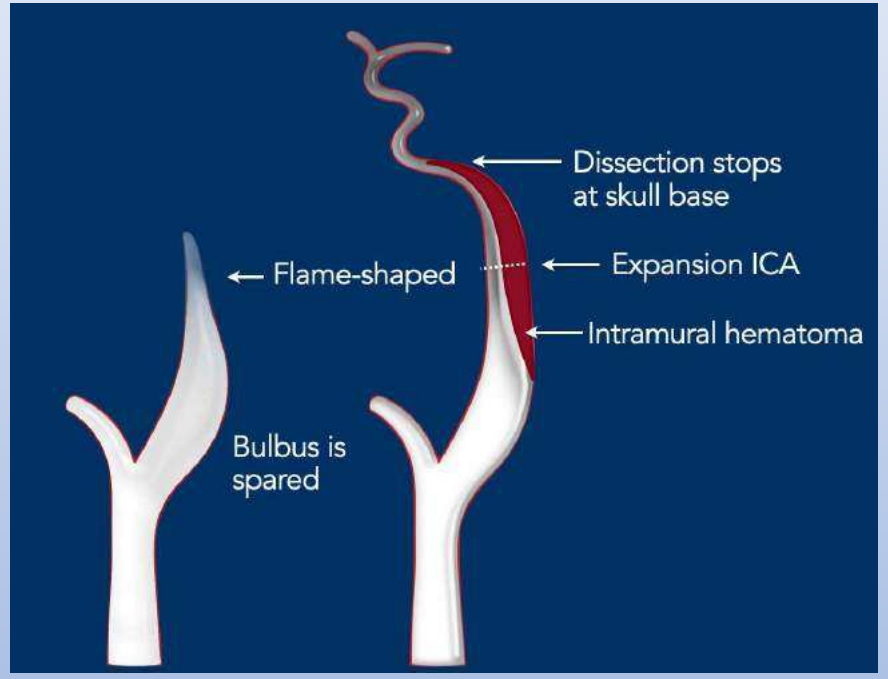


Псевдо-окклюзия ВСА при Т-поражении.

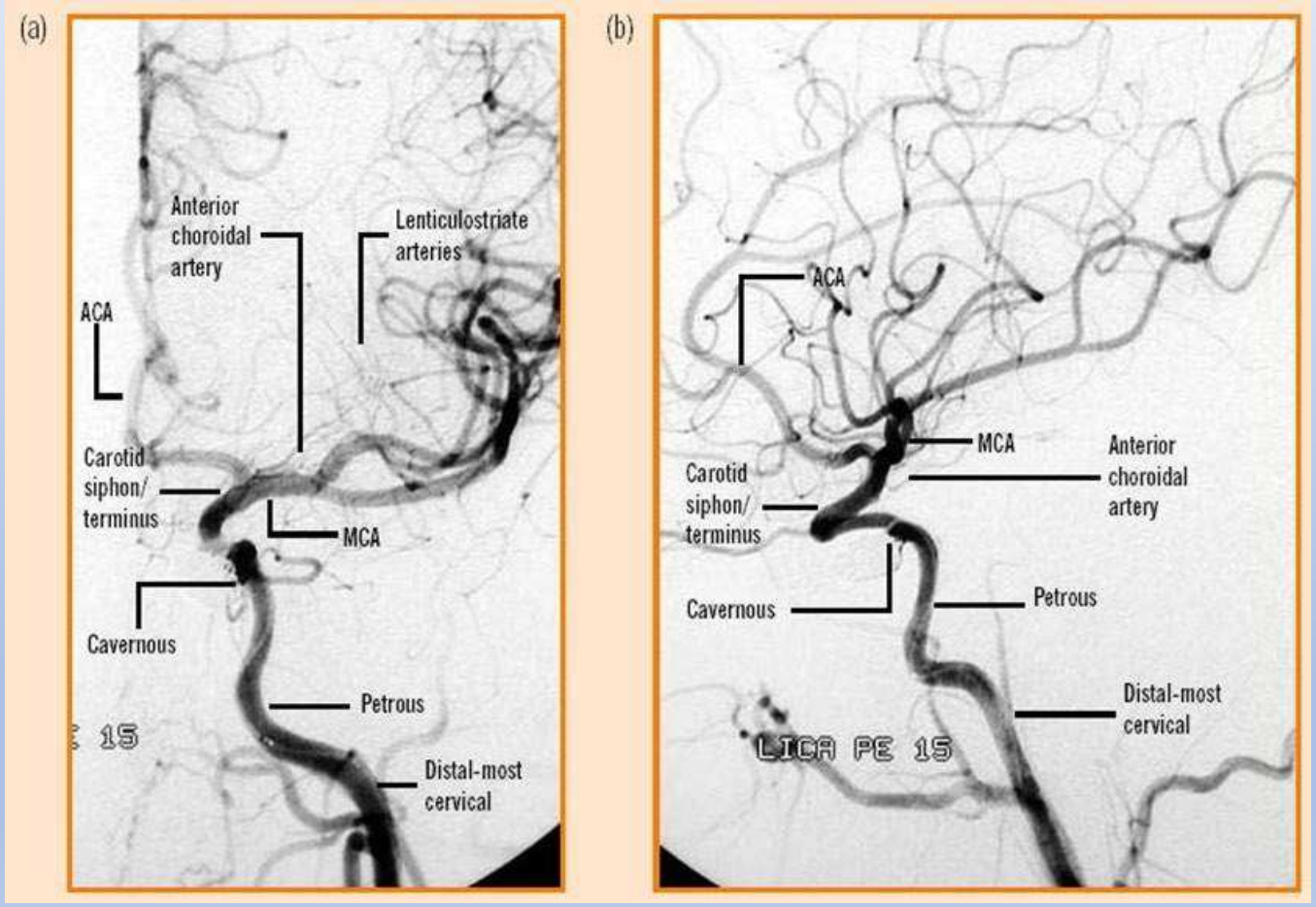


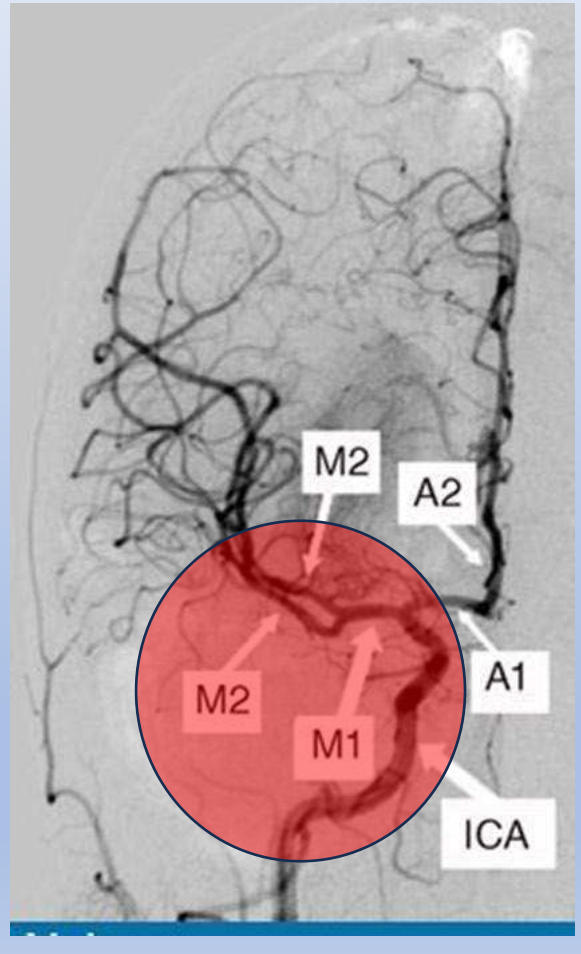


Диссекция ВСА с тромбозом СМА.



Р/анатомия передней циркуляции (зона интересов интервенционных вмешательств)





Наиболее часто встречающиеся варианты поражения внутренней сонной артерии.

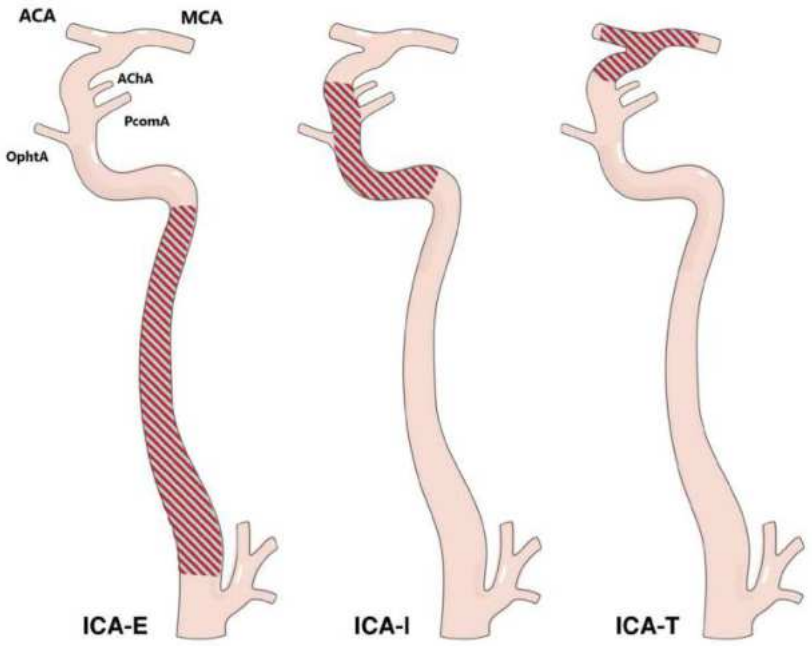


Figure 1 Occlusion patterns of the internal carotid artery. ACA, anterior cerebral artery; AChA, anterior choroidal artery; ICA-E, occlusion of the extracranial segment of the internal carotid artery; ICA-I, occlusion of the non-terminal internal segment of the internal carotid artery; ICA-T, occlusion of the terminal segment of the internal carotid artery (involving the proximal segments of the ACA and MCA); MCA, middle cerebral artery; OphtA, ophthalmic artery; PComA, posterior communicating artery.

OPEN ACCESS

Original research

Endovascular therapy in patients with internal carotid artery occlusion and patent circle of Willis

Christoph Riegler ,[1,2] Regina von Rennenberg,[1,2] Kerstin Bollweg,[1,2] Thanh N Nguyen ,[3,4] Justus F Kleine,[5] Steffen Tiedt ,[6] Heinrich J Audebert,[1,2] Eberhard Siebert,[5] Christian H Nolte [1,2,7,8]

► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/jnis-2023-020556).

For numbered affiliations see end of article.

Correspondence to
Dr Christoph Riegler, Department of Neurology, Charité – Universitätsmedizin Berlin, Berlin, Germany; christoph.riegler@charite.de

ES and CHN contributed equally.

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ABSTRACT

Background Occlusion of the internal carotid artery (ICA) may extend into the middle or anterior cerebral artery (ICA-T) or be confined to the intracranial (ICA-I) or extracranial segment (ICA-E). While there is excellent evidence for endovascular therapy (EVT) in ICA-T occlusions, studies on EVT in non-tandem ICA-I or ICA-E occlusions are scarce.

Objective To characterize EVT-treated patients with ICA-I- and ICA-E occlusion by comparing them with ICA-T occlusions.

Methods The German Stroke Registry (GSR), a national, multicenter, prospective registry was searched for EVT-treated patients with isolated ICA occlusion between June 2015 and December 2021. We stratified patients by ICA occlusion site: (a) ICA-T, (b) ICA-I, (c) ICA-E. Baseline factors, procedural variables, technical (modified Thrombolysis in Cerebral Infarction (mTICI)), and functional outcomes (modified Rankin scale score at 3 months) were analyzed.

Results Of 13 082 GSR patients, 2588 (19.8%) presented with an isolated ICA occlusion, thereof 1946 (75.2%) ICA-T, 366 (14.1%) ICA-I, and 276 (10.7%) ICA-E patients. The groups differed in age (77 vs 76

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Endovascular therapy (EVT) is highly effective in improving clinical outcomes of patients with acute occlusion of the terminal internal carotid artery (ICA-T occlusion). Patients with further proximal isolated ICA occlusion and patent collateral flow through the circle of Willis have been under-represented in all randomized clinical trials on EVT.

WHAT THIS STUDY ADDS

⇒ Patient characteristics and outcomes differ substantially between individuals with ICA-T occlusion and those with further proximal ICA occlusions and patent circle of Willis.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ These results warrant further studies on the efficacy and safety of EVT in patients with isolated ICA occlusion and patent circle of Willis.

Исходы лечения в зависимости от типа поражения.

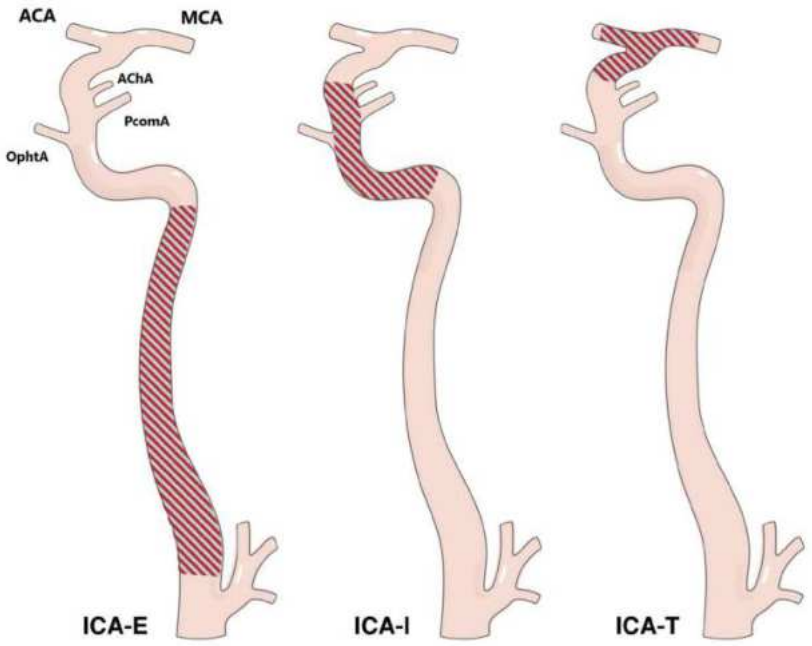


Figure 1 Occlusion patterns of the internal carotid artery. ACA, anterior cerebral artery; AChA, anterior choroidal artery; ICA-E, occlusion of the extracranial segment of the internal carotid artery; ICA-I, occlusion of the non-terminal internal segment of the internal carotid artery; ICA-T, occlusion of the terminal segment of the internal carotid artery (involving the proximal segments of the ACA and MCA); MCA, middle cerebral artery; OphtA, ophthalmic artery; PComA, posterior communicating artery.

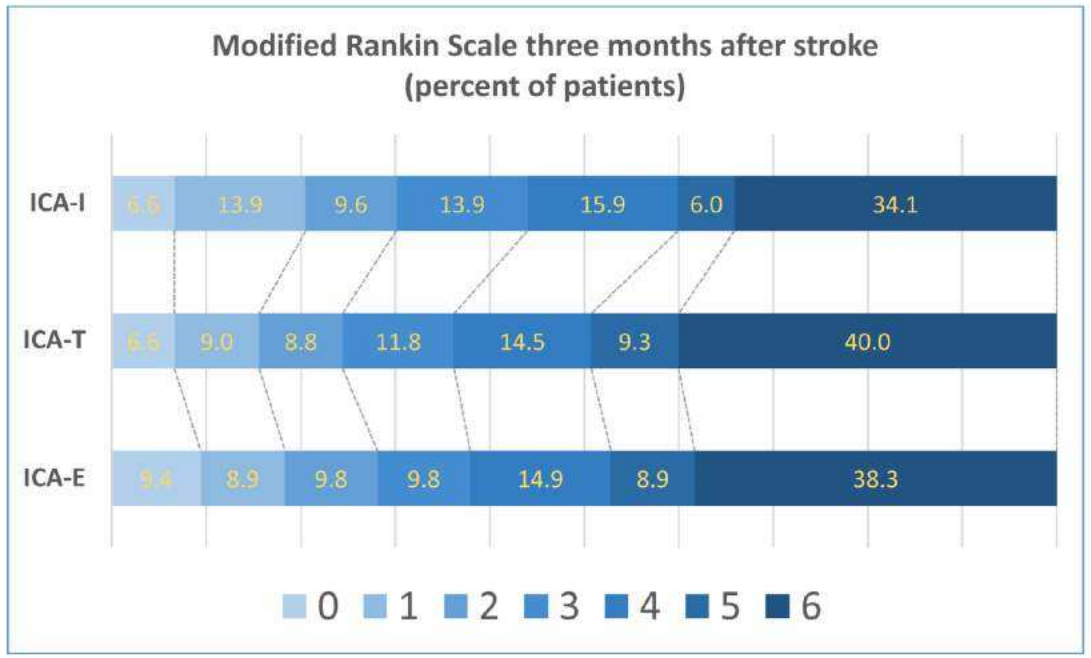


Figure 2 Distribution of clinical outcome 3 months after stroke stratified by internal carotid artery occlusion pattern. ICA-E, occlusion of the extracranial segment of the internal carotid artery; ICA-I, occlusion of the non-terminal internal segment of the internal carotid artery; ICA-T, occlusion of the terminal segment of the internal carotid artery (involving the proximal segments of the anterior cerebral artery and middle cerebral artery).

Стент-ретривер или Тромбаспирация?

UK SH UNIVERSITÄTSKLINIKUM Schleswig-Holstein

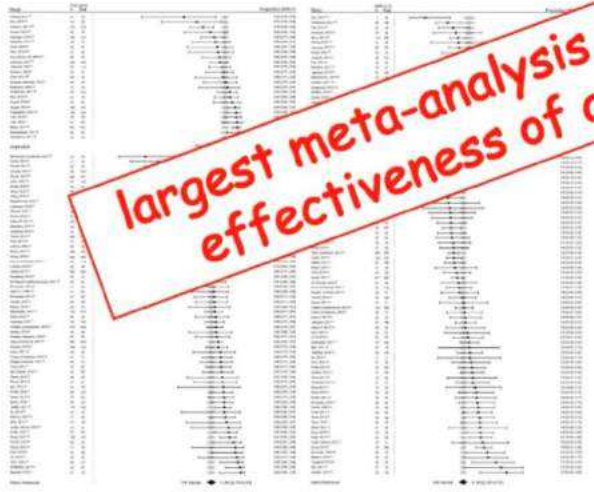
Direct Aspiration versus Stent Retriever Thrombectomy for Acute Stroke: A Systematic Review and Meta-Analysis in 9127 Patients

J Stroke Cerebrovasc Dis. 2019; 28: 1329-1337

Table 1. *Clinical characteristics and outcomes*

	Stent retriever (N = 6875)	Aspiration (N = 2252)	*P* value (95% CI)
Age, years	66.9 ± 4.8	69.0 ± 3.4	.0510 (−4.18 to .0089)
NHISS on admission- mean	17.41 ± 3.1	16.56 ± 2.3	.2253 (−.53 to 2.21)
IV tPA use, n (%)	2946/6083(48.4)	1220/2252(54.2)	.0933 (−17.46 to)
Location of LVO			
ICA	1522 (22.1)	602 (26.9)	
MCA	4610 (67.1)	1532 (68.5)	
Posterior circulation	661 (9.6)	121 (5.4)	

largest meta-analysis supports the same effectiveness of aspiration and SR



…ntly higher in the
…the primary stent retriever group
…%, P < .0001)
…gnificant difference in:

good clinical outcome mRS 0-2 (aspiration 52% versus stent 48%, P = .13)

- symptomatic intracerebral hemorrhage (aspiration 5.6% versus stent 7.2%, P = .07),
- mortality at 3 months (aspiration 15% versus stent 19%, P = .10)

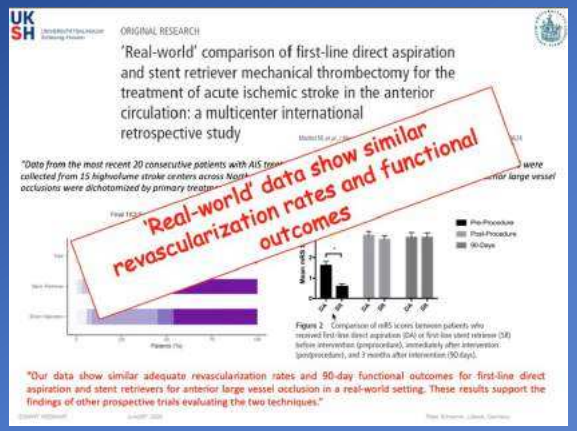
"Conclusion: Both aspiration-first (including the subsequent use of stent retriever) and primary stent retriever thrombectomy approaches are equally effective in achieving good clinical outcomes."

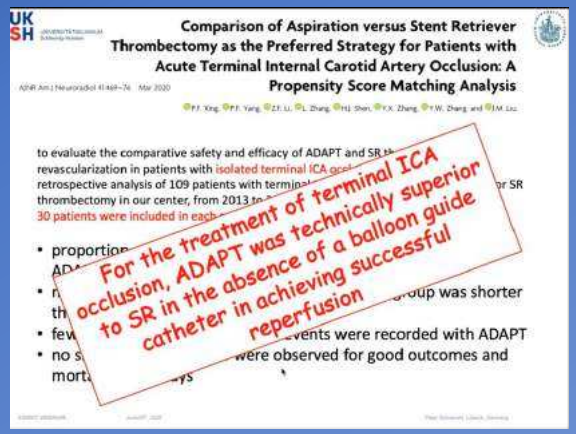
Аспирация/тромбэкстракция
на фоне тромболизиса или без?

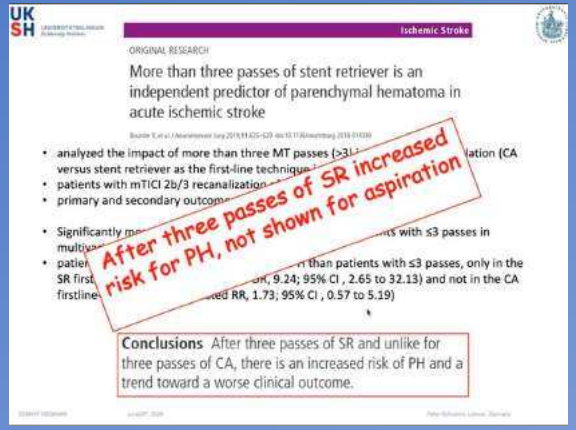
Общая или местная анестезия?

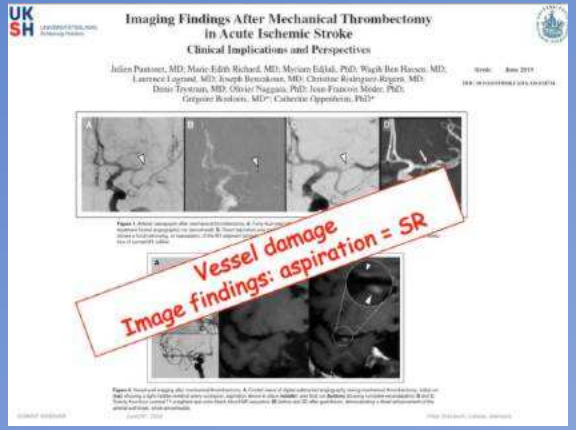
Тромбэкстракция или тромбаспирация ?

Важность извлечения тромба после первой попытки

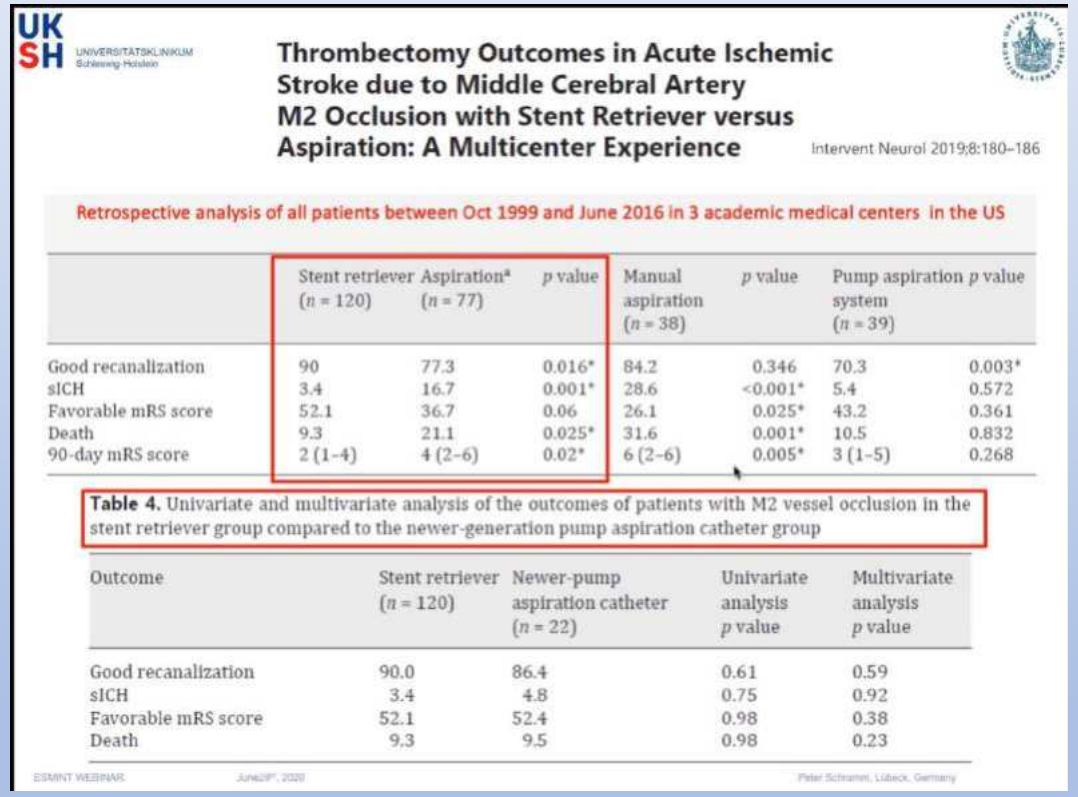








Эффективность ТА и СР в М2 сегменте.



Thrombectomy Outcomes in Acute Ischemic Stroke due to Middle Cerebral Artery M2 Occlusion with Stent Retriever versus Aspiration: A Multicenter Experience

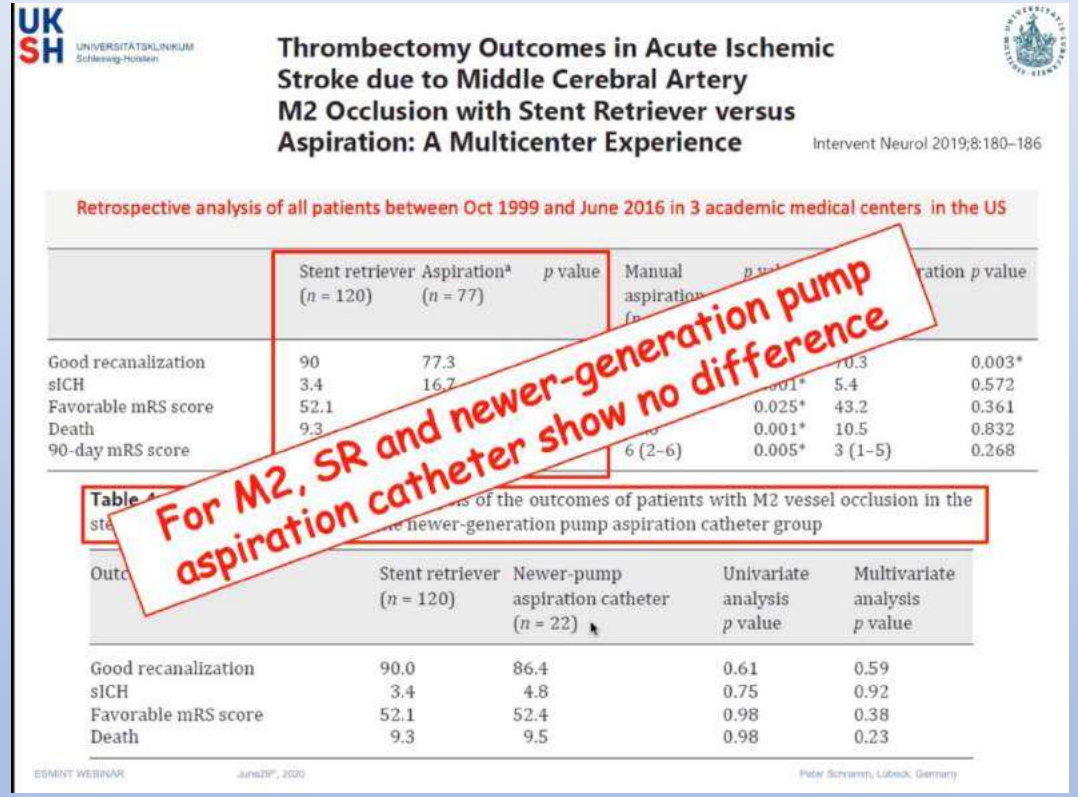
Intervent Neurol 2019;8:180–186

Retrospective analysis of all patients between Oct 1999 and June 2016 in 3 academic medical centers in the US

	Stent retriever (n = 120)	Aspiration[a] (n = 77)	p value	Manual aspiration (n = 38)	p value	Pump aspiration system (n = 39)	p value
Good recanalization	90	77.3	0.016*	84.2	0.346	70.3	0.003*
sICH	3.4	16.7	0.001*	28.6	<0.001*	5.4	0.572
Favorable mRS score	52.1	36.7	0.06	26.1	0.025*	43.2	0.361
Death	9.3	21.1	0.025*	31.6	0.001*	10.5	0.832
90-day mRS score	2 (1–4)	4 (2–6)	0.02*	6 (2–6)	0.005*	3 (1–5)	0.268

Table 4. Univariate and multivariate analysis of the outcomes of patients with M2 vessel occlusion in the stent retriever group compared to the newer-generation pump aspiration catheter group

Outcome	Stent retriever (n = 120)	Newer-pump aspiration catheter (n = 22)	Univariate analysis p value	Multivariate analysis p value
Good recanalization	90.0	86.4	0.61	0.59
sICH	3.4	4.8	0.75	0.92
Favorable mRS score	52.1	52.4	0.98	0.38
Death	9.3	9.5	0.98	0.23



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For M2, SR and newer-generation pump aspiration catheter show no difference

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Как начинали кардиологические центры.

PERIPHERAL

Stable Clinical Outcomes When a Stroke Thrombectomy Program Is Started in an Experienced Cardiology Cath Lab

Jakub Sulženko, MD, PhD,[a] Boris Kožnar, MD, PhD,[a] Tomáš Peisker, MD, PhD,[b] Peter Vaško, MD, PhD,[b] Jana Vavrová, MD,[b] Ivana Štětkářová, MD, CSc,[b] Petr Widimský, MD, DrSc[a]

ABSTRACT

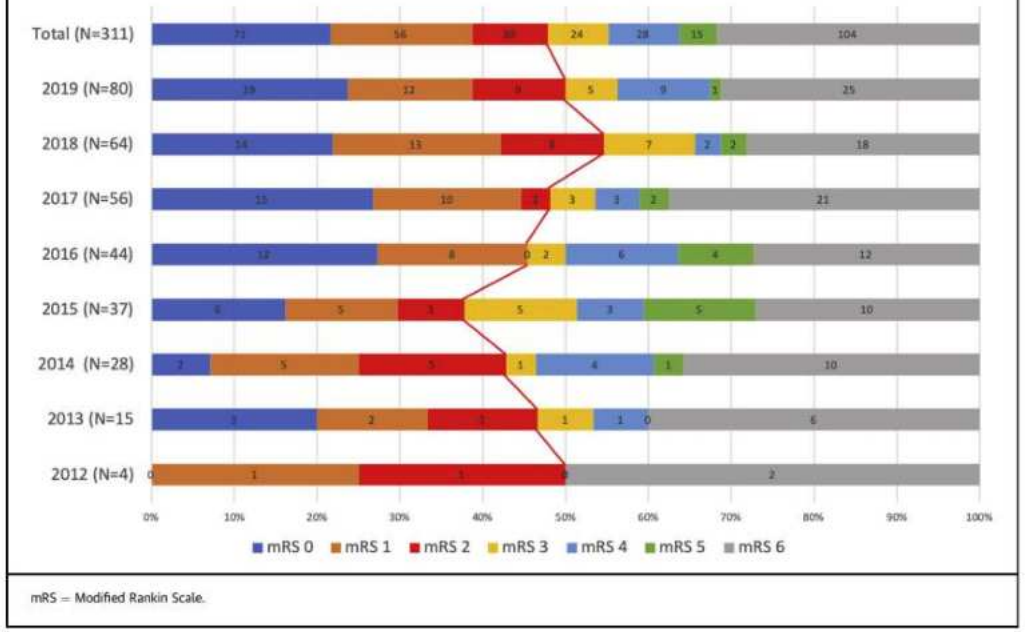
OBJECTIVES This study analyzed the learning curve effect when a new stroke thrombectomy program was initiated in a cardiac cath lab in close cooperation with neurologists and radiologists.

BACKGROUND Mechanical thrombectomy has proven to be the best treatment option for ischemic stroke patients, but this method is not widely available.

METHODS An endovascular treatment program for acute ischemic strokes was established in the cardiac cath lab of a tertiary university hospital in 2012. The decision to perform catheter-based thrombectomy was made by a neurologist and was based on acute stroke clinical symptoms and computed tomography angiographic findings. Patients with a large vessel occlusion of either anterior or posterior circulation were enrolled. The primary endpoint was the functional neurological outcome (Modified Rankin Scale [mRS] score) of the patient at 3 months. A total of 333 patients were enrolled between October 2012 and December 2019.

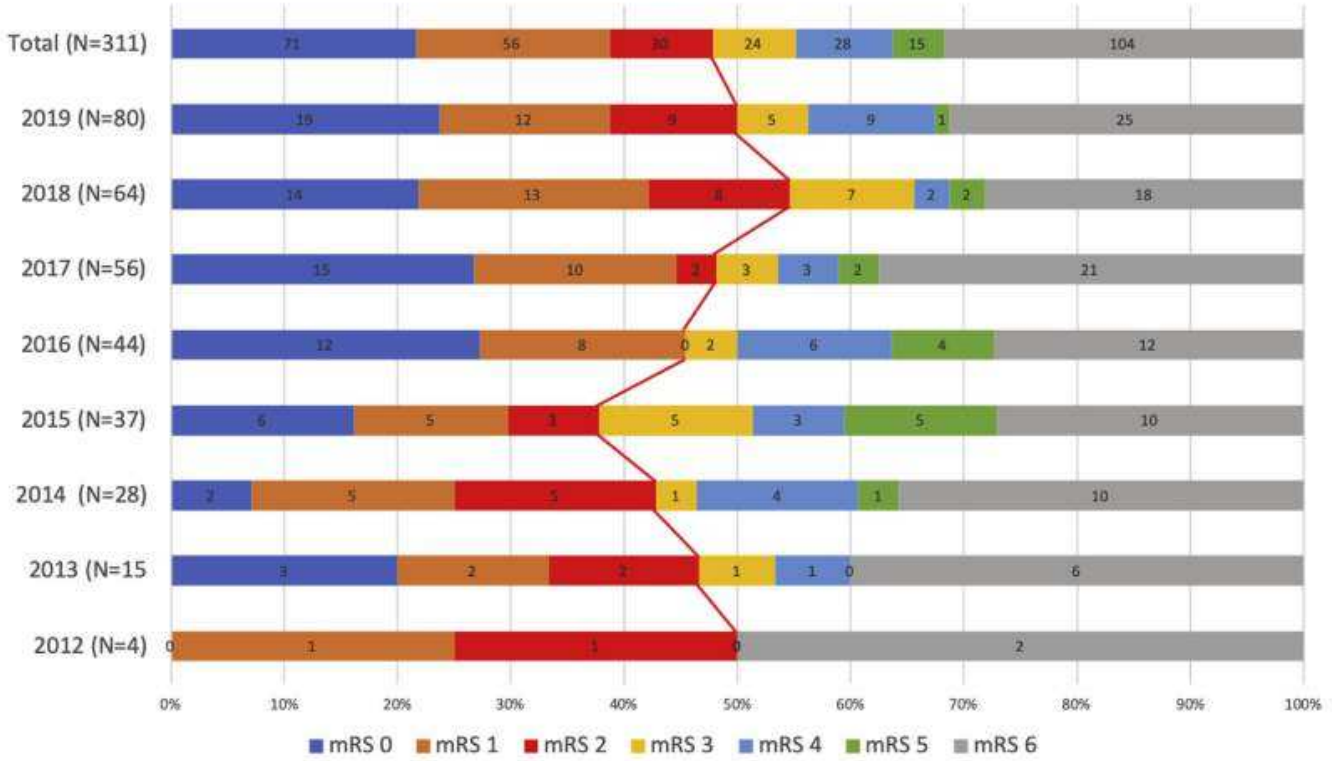
RESULTS The clinical (mRS) outcomes did not vary significantly across years 2012 to 2019 (mRS 0 to 2 was achieved in 47.9% of patients). Symptomatic intracerebral hemorrhage occurred in 19 patients (5.7%). Embolization in a new vascular territory occurred in 6 patients (1.8%).

FIGURE 2 mRS Scores at 90 Days Post-Procedure



mRS = Modified Rankin Scale.

FIGURE 2 mRS Scores at 90 Days Post-Procedure



mRS = Modified Rankin Scale.

Рига: Университетская клиника П.Страдиня.

2y Outcome

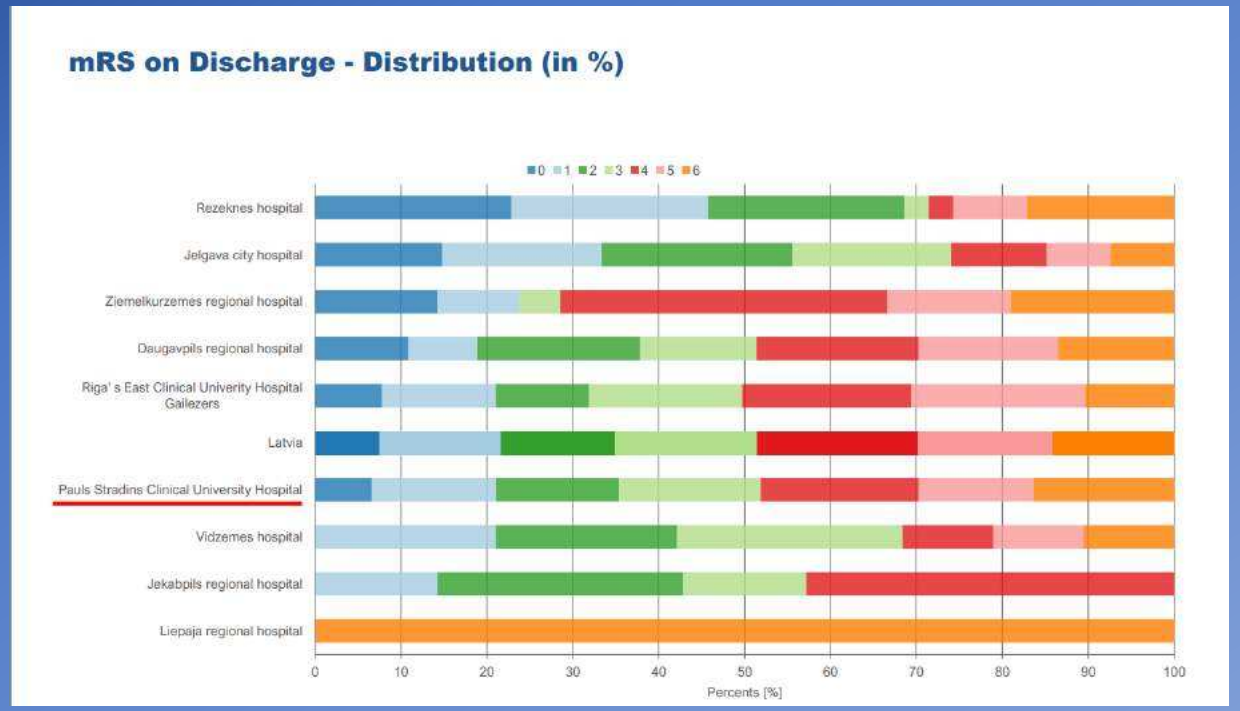
Two-Year Outcome after Endovascular Treatment for Acute Ischemic Stroke

	3 months		2 years		p Value	
mRS 0-2	40%	32.6% EV 19.1% TL	37%	37.1% EV 24.0% TL	p=0.32	p>0.05
Mortality	15%	21% EV 22% TL	35%	30.4 % EV 38.6 % TL	p<0.001	p<0.46
Study	Latvia	MR CLEAN	Latvia	MR CLEAN	Latvia	MR CLEAN

391/500 pt Long-term results showing improvement in functional recovery at 3 months and still maintained at 2 years

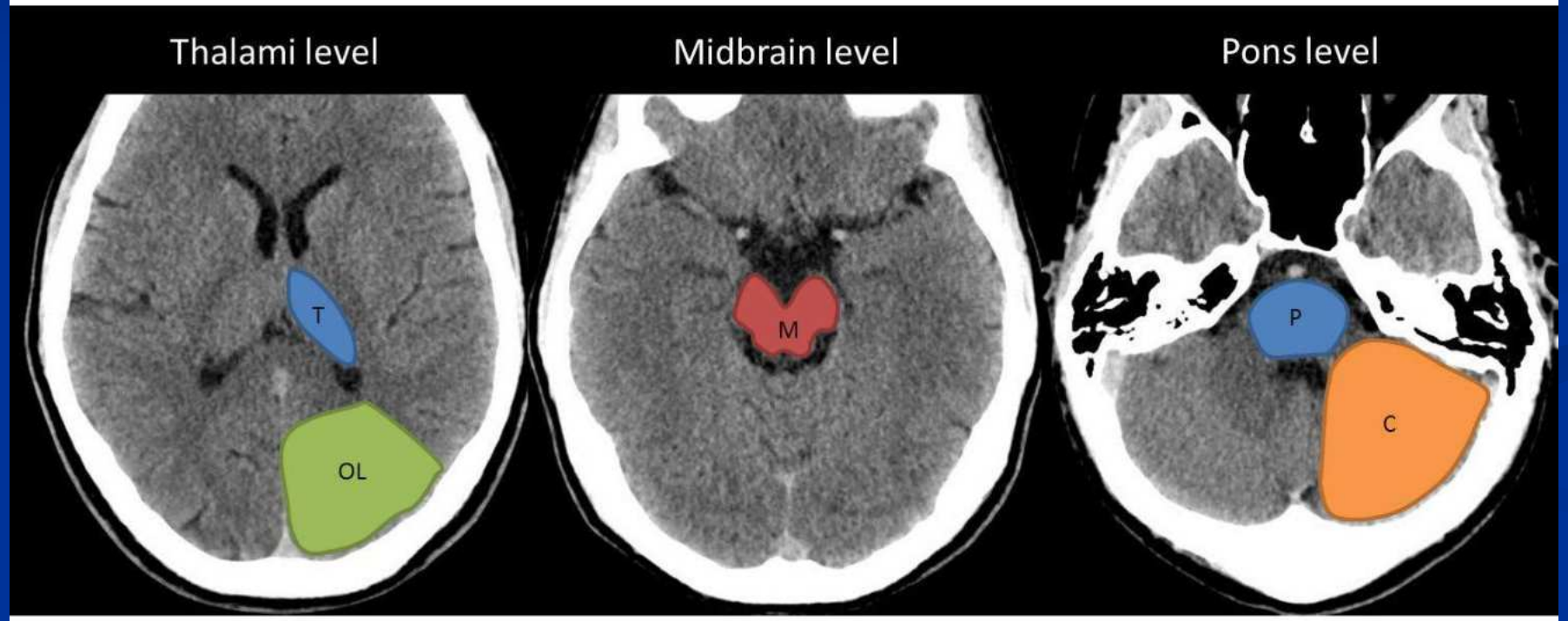
Mechanical thrombectomy can be applied in all patients, but only favourable early outcome patients may achieve good long term clinical independence after successful reperfusion therapy

Patients with severe neurological deficit at 3 months have higher mortality rate in the long term even with successful therapy, therefore patient selection criteria



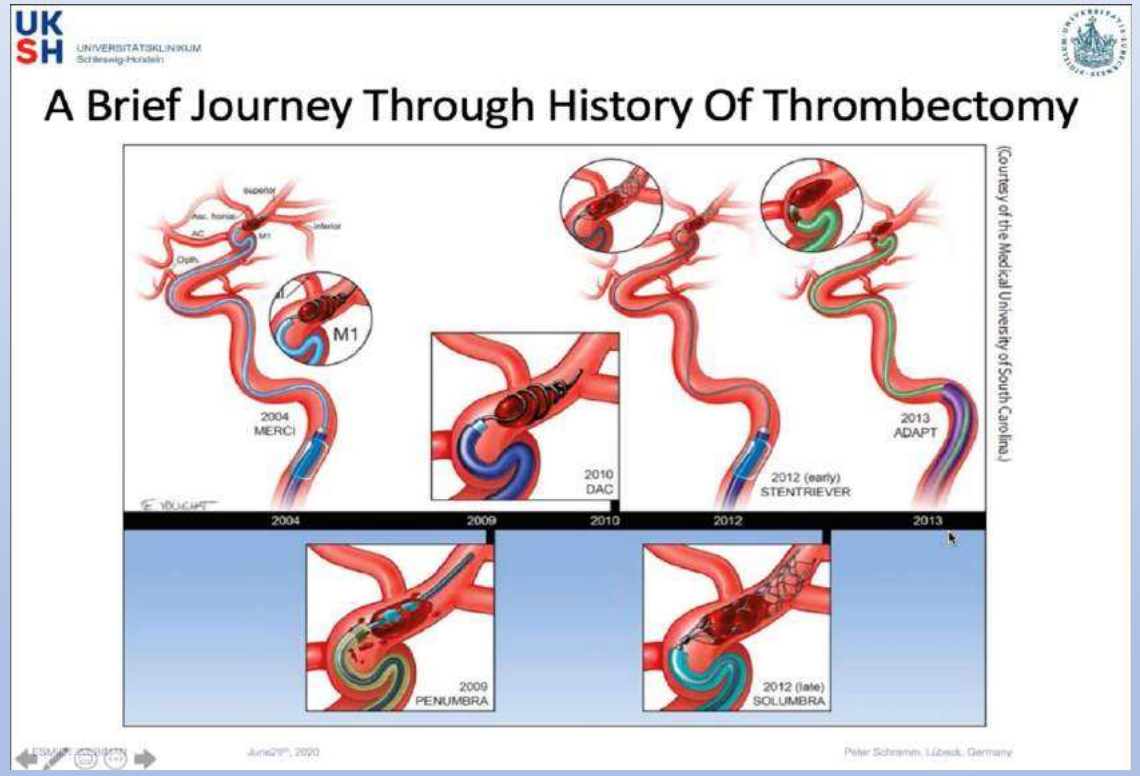
Шкала pc-ASPECT.

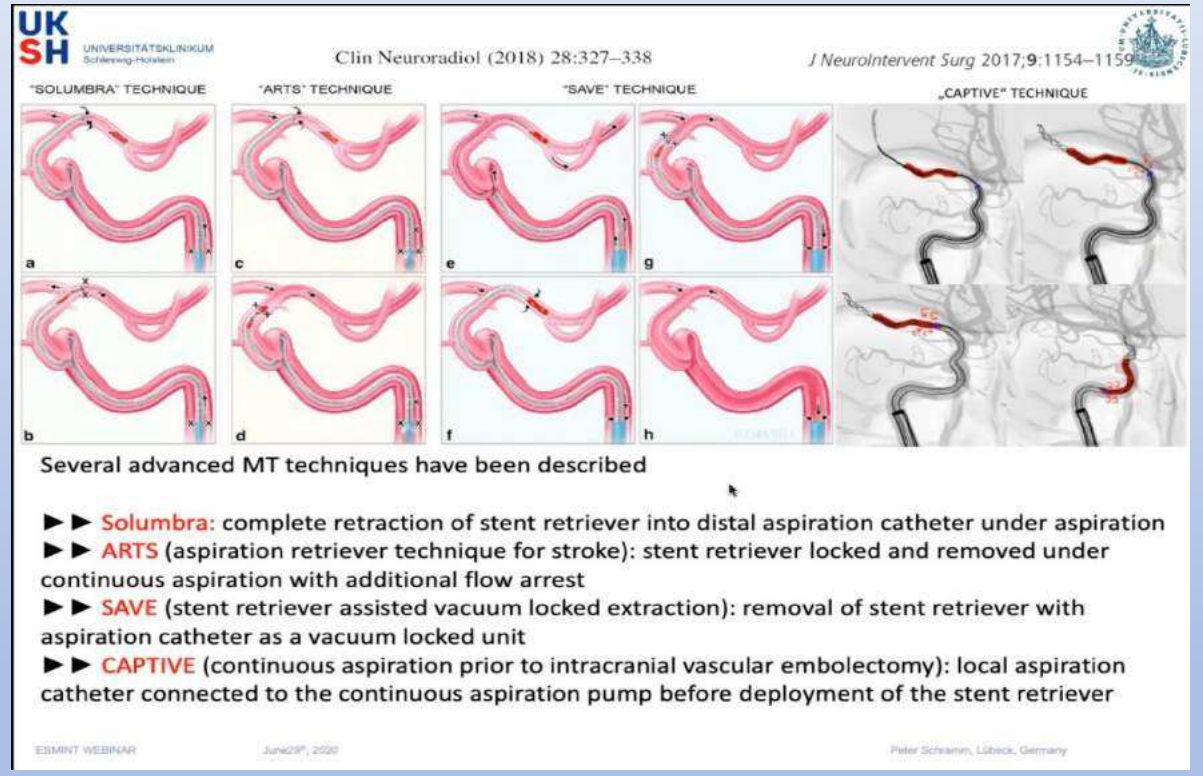
Posterior circulation Acute stroke prognosis early CT score (pc-ASPECTS)



T: thalamus; OL: occipital lobe; M: any part of the midbrain; P: any part of the pons;
C: cerebellar hemisphere.

Современные интервенционные техники.





Контроль АД.

Which target blood pressure is optimal during and after interventional procedures in acute stroke?

Thomas Kahan, MD, PhD, FESC, FAHA

Professor of Medicine, Karolinska Institutet, Department of Clinical Sciences, Danderyd Hospital, Division of Cardiovascular Medicine, Stockholm, Sweden

Head, Cardiovascular Risk Assessment Unit, and European Society of Hypertension Center of Excellence Department of Cardiology, Danderyd University Hospital Corp, Stockholm, Sweden

October 14, 2020

ESC Council Stroke

T Kahan 2020

Thomas Kahan
Sweden

Контроль АД.

Hypertension in acute stroke

ESC Council Stroke

- Hypertension is a major risk factor for haemorrhagic and ischaemic stroke
- Blood pressure is often elevated at presentation with acute stroke but often declines without intervention
- In **acute haemorrhagic stroke** increased blood pressure is associated with haematoma expansion, increased mortality, worse prognosis of neurological recovery, and dependency
- In **acute ischaemic stroke** blood pressure is elevated in 4 out of 5 patients, and often decreases within 1-2h
- Blood pressure management during the acute phase of **haemorrhagic stroke** remains uncertain, and the benefit in **ischaemic stroke** is even less clear
- Blood pressure management during **stroke reperfusion** is not well studied and mostly unknown

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Elevated BP and *planned thrombolysis* in acute ischemic stroke

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2. Patients who have elevated BP and are otherwise eligible for treatment with IV alteplase should have their BP carefully lowered so that their SBP is <185 mm Hg and their diastolic BP is <110 mm Hg before IV fibrinolytic therapy is initiated.	I	B-NR

Class of recommendation I–III; level of evidence A–C; NR nonrandomized

- Pivotal studies required SBP <185 mm Hg and DBP <110 mm Hg before treatment and <180/105 mm Hg for the first 24 h after treatment.
- Some observational studies suggest that the risk of hemorrhage after administration of alteplase is greater in with higher BP and in with more BP variability.
- The exact BP at which the risk of hemorrhage after thrombolysis increases is unknown.

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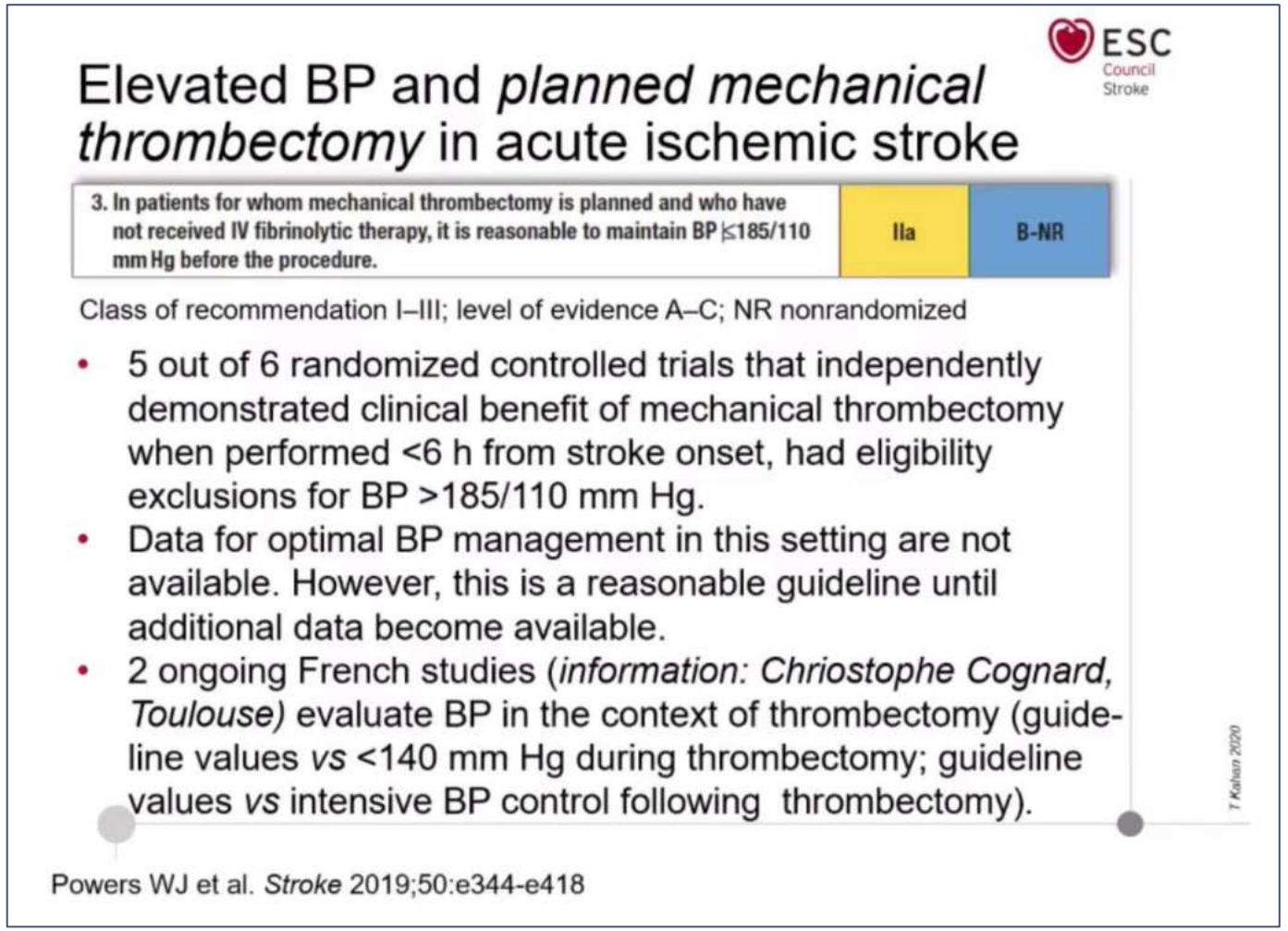
Powers WJ et al. *Stroke* 2019;50:e344-e418

Контроль АД.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Elevated BP and *planned mechanical thrombectomy* in acute ischemic stroke
3. In patients for whom mechanical thrombectomy is planned and who have not received IV fibrinolytic therapy, it is reasonable to maintain BP ≤185/110 mm Hg before the procedure.
IIa
B-NR
Class of recommendation I–III; level of evidence A–C; NR nonrandomized
• 5 out of 6 randomized controlled trials that independently demonstrated clinical benefit of mechanical thrombectomy when performed <6 h from stroke onset, had eligibility exclusions for BP >185/110 mm Hg.
• Data for optimal BP management in this setting are not available. However, this is a reasonable guideline until additional data become available.
• 2 ongoing French studies (*information: Chriostophe Cognard, Toulouse)* evaluate BP in the context of thrombectomy (guideline values *vs* <140 mm Hg during thrombectomy; guideline values *vs* intensive BP control following thrombectomy).
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Powers WJ et al. *Stroke* 2019;50:e344-e418

BP control *following mechanical thrombectomy* in acute ischemic stroke

1. In patients who undergo mechanical thrombectomy, it is reasonable to maintain the BP at ≤180/105 mmHg during and for 24 hours after the procedure.	IIa	B-NR
2. In patients who undergo mechanical thrombectomy with successful reperfusion, it might be reasonable to maintain BP at a level <180/105 mm Hg.	IIb	B-NR

Class of recommendation I–III; level of evidence A–C; NR nonrandomized

- There are very limited data to guide BP management during and after mechanical thrombectomy.
- The vast majority of patients enrolled in <6 h interventional therapy received alteplase, and the trial protocols stipulated BP ≤180/105 during and for 24 h after the procedure.
- However, two trial protocols provided additional recommendations to target lower BP.

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Powers WJ et al. *Stroke* 2019;50:e344-e418

More intensive BP control of benefit *following mechanical thrombectomy*?

The ESCAPE protocol states that SBP ≥150 mm Hg is probably useful in promoting and keeping collateral flow adequate while the artery remains occluded; and that controlling BP once reperfusion has been achieved and aiming for a normal BP for that individual is sensible.

The DAWN protocol recommends maintaining SBP <140 mm Hg in the first 24 h in subjects who are reperfused after mechanical thrombectomy.

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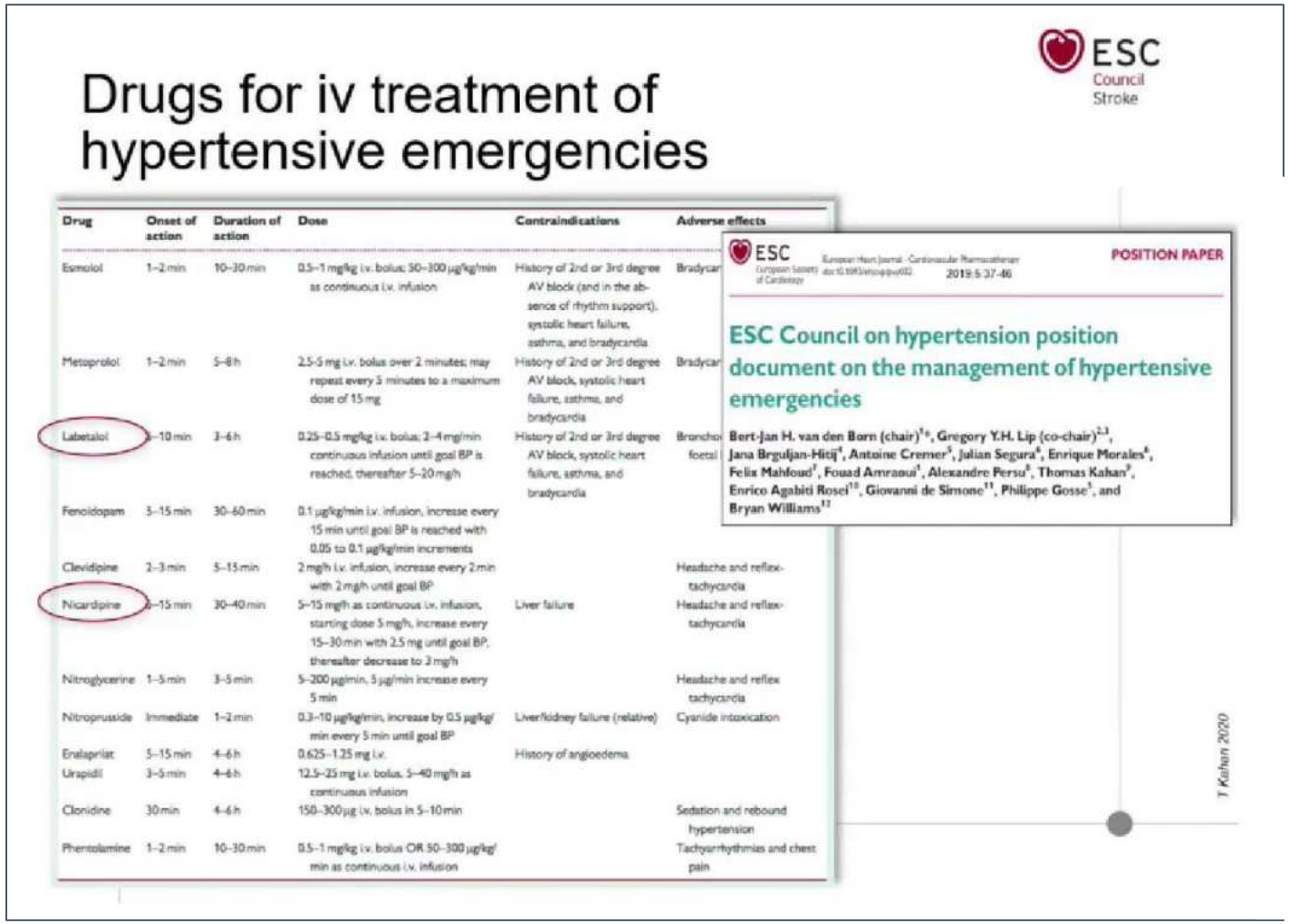
Goyal et al. *N Engl J Med* 2015;372:1019–30. Nogueira et al. *N Engl J Med* 2018;378:11–21

Экстренная фармакотерапия при артериальной гипертензии.

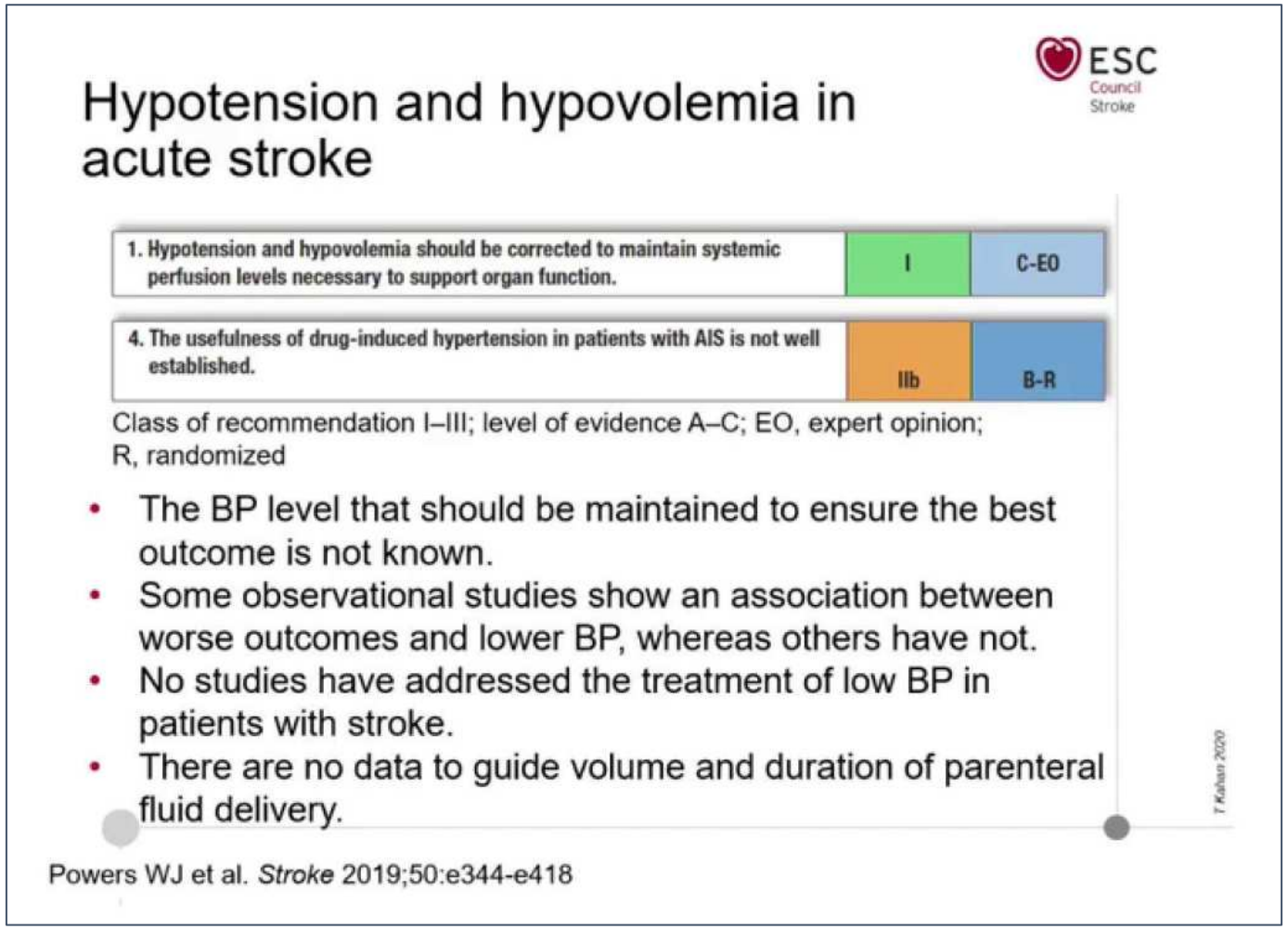


Drug	Onset of action	Duration of action	Dose	Contraindications	Adverse effects
Esmolol	1–2 min	10–30 min	0.5–1 mg/kg i.v. bolus; 50–300 μg/kg/min as continuous i.v. infusion	History of 2nd or 3rd degree AV block (and in the absence of rhythm support), systolic heart failure, asthma, and bradycardia	Bradycar
Metoprolol	1–2 min	5–8 h	2.5–5 mg i.v. bolus over 2 minutes; may repeat every 5 minutes to a maximum dose of 15 mg	History of 2nd or 3rd degree AV block, systolic heart failure, asthma, and bradycardia	Bradycar
Labetalol	5–10 min	3–6 h	0.25–0.5 mg/kg i.v. bolus; 2–4 mg/min continuous infusion until goal BP is reached, thereafter 5–20 mg/h	History of 2nd or 3rd degree AV block, systolic heart failure, asthma, and bradycardia	Bronchoc foetal
Fenoldopam	5–15 min	30–60 min	0.1 μg/kg/min i.v. infusion, increase every 15 min until goal BP is reached with 0.05 to 0.1 μg/kg/min increments		
Clevidipine	2–3 min	5–15 min	2 mg/h i.v. infusion, increase every 2 min with 2 mg/h until goal BP		Headache and reflex-tachycardia
Nicardipine	5–15 min	30–40 min	5–15 mg/h as continuous i.v. infusion, starting dose 5 mg/h, increase every 15–30 min with 2.5 mg until goal BP, thereafter decrease to 3 mg/h	Liver failure	Headache and reflex-tachycardia
Nitroglycerine	1–5 min	3–5 min	5–200 μg/min, 5 μg/min increase every 5 min		Headache and reflex tachycardia
Nitroprusside	Immediate	1–2 min	0.3–10 μg/kg/min, increase by 0.5 μg/kg/min every 5 min until goal BP	Liver/kidney failure (relative)	Cyanide intoxication
Enalaprilat	5–15 min	4–6 h	0.625–1.25 mg i.v.	History of angioedema	
Urapidil	3–5 min	4–6 h	12.5–25 mg i.v. bolus, 5–40 mg/h as continuous infusion		
Clonidine	30 min	4–6 h	150–300 μg i.v. bolus in 5–10 min		Sedation and rebound hypertension
Phentolamine	1–2 min	10–30 min	0.5–1 mg/kg i.v. bolus OR 50–300 μg/kg/min as continuous i.v. infusion		Tachyarrhythmias and chest pain

Table 4 Intravenous drugs for the treatment of hypertensive emergencies

Drug	Onset of action	Duration of action	Dose	Contraindications	Adverse effects
Esmolol	1–2 min	10–30 min	0.5–1 mg/kg i.v. bolus; 50–300 μg/kg/min as continuous i.v. infusion	History of 2nd or 3rd degree AV block (and in the absence of rhythm support), systolic heart failure, asthma, and bradycardia	Bradycardia
Metoprolol	1–2 min	5–8 h	2.5–5 mg i.v. bolus over 2 minutes; may repeat every 5 minutes to a maximum dose of 15 mg	History of 2nd or 3rd degree AV block, systolic heart failure, asthma, and bradycardia	Bradycardia
Labetalol	5–10 min	3–6 h	0.25–0.5 mg/kg i.v. bolus; 2–4 mg/min continuous infusion until goal BP is reached, thereafter 5–20 mg/h	History of 2nd or 3rd degree AV block, systolic heart failure, asthma, and bradycardia	Bronchoconstriction and foetal bradycardia
Fenoldopam	5–15 min	30–60 min	0.1 μg/kg/min i.v. infusion, increase every 15 min until goal BP is reached with 0.05 to 0.1 μg/kg/min increments		
Clevidipine	2–3 min	5–15 min	2 mg/h i.v. infusion, increase every 2 min with 2 mg/h until goal BP		Headache and reflex-tachycardia
Nicardipine	5–15 min	30–40 min	5–15 mg/h as continuous i.v. infusion, starting dose 5 mg/h, increase every 15–30 min with 2.5 mg until goal BP, thereafter decrease to 3 mg/h	Liver failure	Headache and reflex-tachycardia
Nitroglycerine	1–5 min	3–5 min	5–200 μg/min, 5 μg/min increase every 5 min		Headache and reflex tachycardia
Nitroprusside	Immediate	1–2 min	0.3–10 μg/kg/min, increase by 0.5 μg/kg/min every 5 min until goal BP	Liver/kidney failure (relative)	Cyanide intoxication
Enalaprilat	5–15 min	4–6 h	0.625–1.25 mg i.v.	History of angioedema	
Urapidil	3–5 min	4–6 h	12.5–25 mg i.v. bolus, 5–40 mg/h as continuous infusion		
Clonidine	30 min	4–6 h	150–300 μg i.v. bolus in 5–10 min		Sedation and rebound hypertension
Phentolamine	1–2 min	10–30 min	0.5–1 mg/kg i.v. bolus OR 50–300 μg/kg/min as continuous i.v. infusion		Tachyarrhythmias and chest pain

Гипотензия и гиповолемия при инсульте.



Management of hypertension in patients with acute ischaemic stroke

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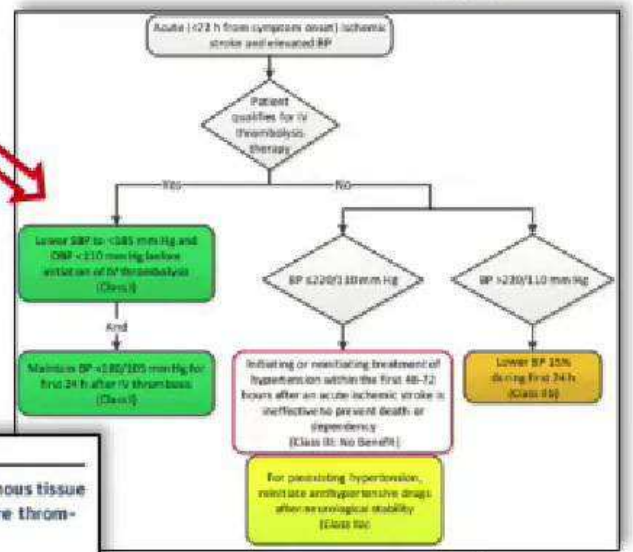

COR	LOE	RECOMMENDATIONS
I	B-NR	1. Adults with acute ischemic stroke and elevated BP who are eligible for treatment with intravenous tissue plasminogen activator should have their BP slowly lowered to less than 185/110 mm Hg before thrombolytic therapy is initiated (S9.4.2-1,S9.4.2-2).
I	B-NR	2. In adults with an acute ischemic stroke, BP should be less than 185/110 mm Hg before administration of intravenous tissue plasminogen activator and should be maintained below 180/105 mm Hg for at least the first 24 hours after initiating drug therapy (S9.4.2-3).
IIa	B-NR	3. Starting or restarting antihypertensive therapy during hospitalization in patients with BP greater than 140/90 mm Hg who are neurologically stable is safe and reasonable to improve long-term BP control, unless contraindicated (S9.4.2-4,S9.4.2-5).
IIb	C-EO	4. In patients with BP of 220/120 mm Hg or higher who did not receive intravenous alteplase or endovascular treatment and have no comorbid conditions requiring acute antihypertensive treatment, the benefit of initiating or reinitiating treatment of hypertension within the first 48 to 72 hours is uncertain. It might be reasonable to lower BP by 15% during the first 24 hours after onset of stroke.
III: No Benefit	A	5. In patients with BP less than 220/120 mm Hg who did not receive intravenous thrombolysis or endovascular treatment and do not have a comorbid condition requiring acute antihypertensive treatment, initiating or reinitiating treatment of hypertension within the first 48 to 72 hours after an acute ischemic stroke is not effective to prevent death or dependency (S9.4.2-4–S9.4.2-9).

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Whelton PK et al. J *Am Coll Cardiol* 2018;71:e127-248

Antihypertensive strategies in patients following an acute stroke

Recommendations	Class	Level
In patients with acute intracerebral haemorrhage: • Immediate BP lowering is not recommended for patients with SBP <220 mmHg. • In patients with SBP ≥220 mmHg, careful acute BP lowering with i.v. therapy to <180 mmHg should be considered.	III IIa	A B
In acute ischaemic stroke, routine BP lowering with antihypertensive therapy is not recommended, with the exceptions: • In patients with acute ischaemic stroke who are eligible for i.v. thrombolysis, BP should be carefully lowered and maintained at <180/105 mmHg for at least the first 24 h after thrombolysis. • In patients with markedly elevated BP who do not receive fibrinolysis, drug therapy may be considered, based on clinical judgement, to reduce BP by 15% during the first 24 h after the stroke onset.	III IIa IIb	A B C
In hypertensive patients with an acute cerebrovascular event, antihypertensive treatment is recommended: • Immediately for TIA. • After several days in ischaemic stroke.	I I	A A
In all hypertensive patients with ischaemic stroke or TIA, an SBP target range of 120–130 mmHg should be considered.	IIa	B
The recommended antihypertensive drug treatment strategy for stroke prevention is a RAS blocker plus a CCB or a thiazide-like diuretic.	I	A

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Williams B et al. *Eur Heart J* 2018;39:3021-3104; *J Hypertens* 2018;36:1953-2041

Summary, optimal BP in acute stroke reperfusion

- Optimal BP management during stroke reperfusion is not well studied and mostly unknown, in particular in the context of mechanical thrombectomy.
- For *thrombolysis*, <185/105-110 mm Hg before is recommended/ should be considered; and <180/105 mm Hg for the first 24 h after treatment should be considered.
- For mechanical *thrombectomy*, similar target BP values should be considered, but evidence is even more circumstantial.
- Lower (140-150 mm Hg) target BP for 24 h following intervention have been suggested and appears safe.
- Labetalol, nicardipine and clevidipine are primarily recommended drugs for hypertensive emergencies in the context of acute stroke reperfusion.
- The treatment of low BP in acute stroke has not been addressed.

Контроль АД в первые 24 часа при ИИ

Stroke

FOCUSED UPDATES: BLOOD PRESSURE

Blood Pressure Management for Ischemic Stroke in the First 24 Hours

Philip M. Bath, DSc, FMedSci; Lili Song, MD, PhD; Gisele S. Silva, MD, PhD; Eva Mistry, MBBS, MSCI; Nils Petersen, MD, MSc; Georgios Tsivgoulis, MD, PhD; Mikael Mazighi, MD, PhD; Oh Young Bang, MD, PhD; Else Charlotte Sandset, MD, PhD

ABSTRACT: High blood pressure (BP) is common after ischemic stroke and associated with a poor functional outcome and increased mortality. The conundrum then arises on whether to lower BP to improve outcome or whether this will worsen cerebral perfusion due to aberrant cerebral autoregulation. A number of large trials of BP lowering have failed to change outcome whether treatment was started prehospital in the community or hospital. Hence, nuances on how to manage high BP are likely, including whether different interventions are needed for different causes, the type and timing of the drug, how quickly BP is lowered, and the collateral effects of the drug, including on cerebral perfusion and platelets. Specific scenarios are also important, including when to lower BP before, during, and after intravenous thrombolysis and endovascular therapy/thrombectomy, when it may be necessary to raise BP, and when antihypertensive drugs taken before stroke should be restarted. This narrative review addresses these and other questions. Although further large trials are ongoing, it is increasingly likely that there is no simple answer. Different subgroups of patients may need to have their BP lowered (eg, before or after thrombolysis), left alone, or elevated.

Key Words: antihypertensive agents ■ blood platelets ■ blood pressure ■ brain ischemia ■ humans


СПАСИБО ЗА ВНИМАНИЕ !