

**ΒΑΡΥ ΙΣΧΑΙΜΙΚΟ ΑΓΓΕΙΑΚΟ
ΕΓΚΕΦΑΛΙΚΟ:ΠΟΤΕ ΚΑΙ ΠΩΣ ΠΡΕΠΕΙ
ΝΑ ΑΝΤΙΜΕΤΩΠΙΖΕΤΑΙ ΣΗΜΕΡΑ
ΠΑΡΕΜΒΑΤΙΚΑ**

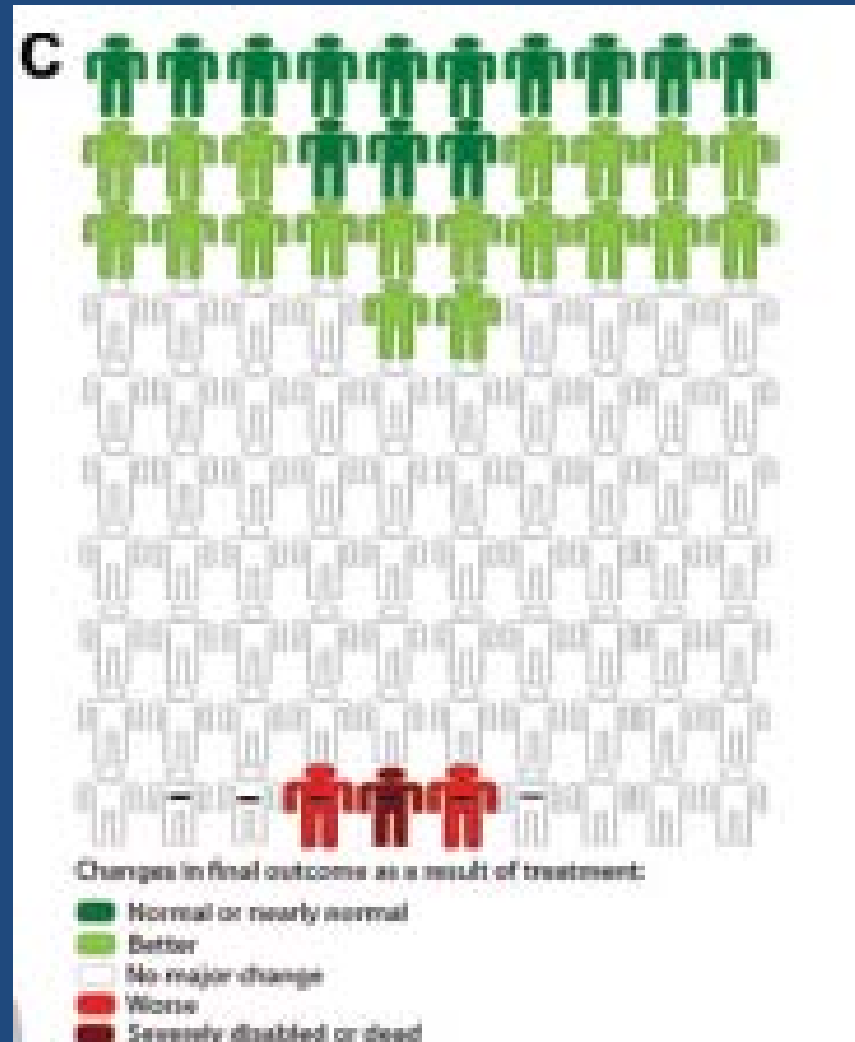
**ΧΡΗΣΤΟΣ ΓΚΟΓΚΑΣ
ΕΠΕΜΒΑΤΙΚΟΣ ΝΕΥΡΟΑΚΤΙΝΟΛΟΓΟΣ**

Ενδοφλέβια θρομβόλυση

“The development of thrombolytic stroke therapy was one of the signal triumphs of emergency medicine and neurology at the turn of the twentieth century”

Saver S, et al. Graphic reanalysis of the two NINDS-tPA trials confirms substantial treatment benefit. Stroke 2010;41:2381-2390

IV tPA 32 στους 100 ασθενείς με κλινικά σημαντική βελτίωση



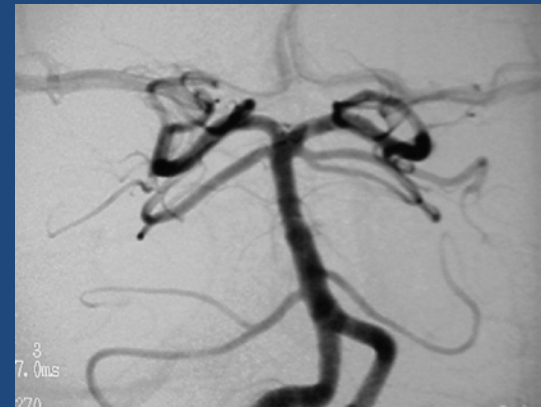
Απόφραξη μεγάλου αγγείου

- Το 40% των ενδοκρανιακών αποφράξεων αφορούν μεγάλου μεγέθους εγκεφαλικά αγγεία όπως οι έσω καρωτίδα, η βασική αρτηρία, και το εγγύς τμήμα της μέσης εγκεφαλικής αρτηρίας.
- Η απόφραξη ενός μεγάλου εγκεφαλικού αγγείου από θρόμβο δεν έχει καλή πρόγνωση με ποσοστά θνητότητας από 30-90%.

Πρόγνωση απόφραξης μεγάλου αγγείου

Ποσοστά θνητότητας:

- Carotid-T: 53%-73% Jansen, 1995
- MCA: 30-35% Chambers, 1987
- Basilar: 89-92% Bruckman H, 1986 & Brandt, 1996



Γυναίκα 62 ετών με αιφνίδια απώλεια συνείδησης

- Αιφνίδια πτώση στο έδαφος
- Μεταφορά στο νοσοκομείο σε 50 λεπτά από τους οικείους της
- National Institute of Health Stroke Scale NIHSS 22
- GCS 14

Hyperdense MCA



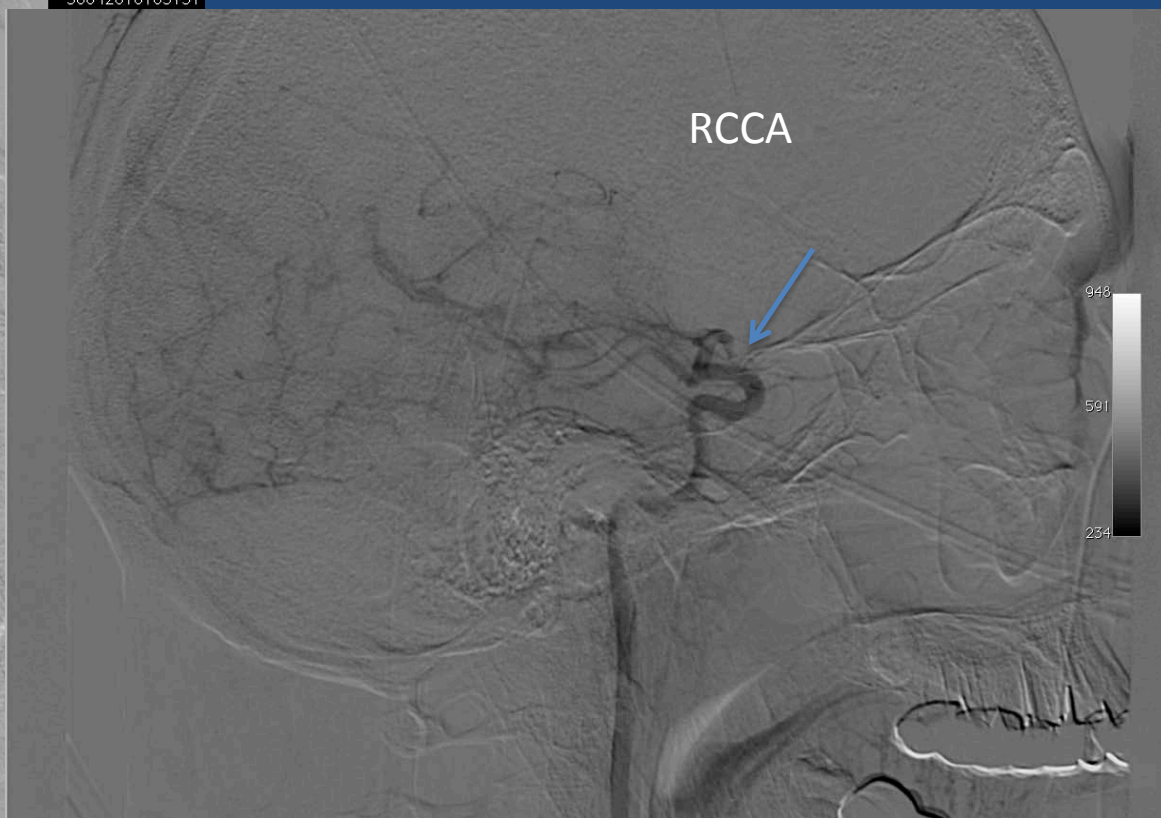
Θεραπεία

Θρομβολυτική αγωγή με Αλτεπλάση ενδοφλεβίως σε δόση 0,9mg/kg εντός 60 λεπτών

Έναρξη θεραπείας 1.5 ώρες από την εκδήλωση του επεισοδίου

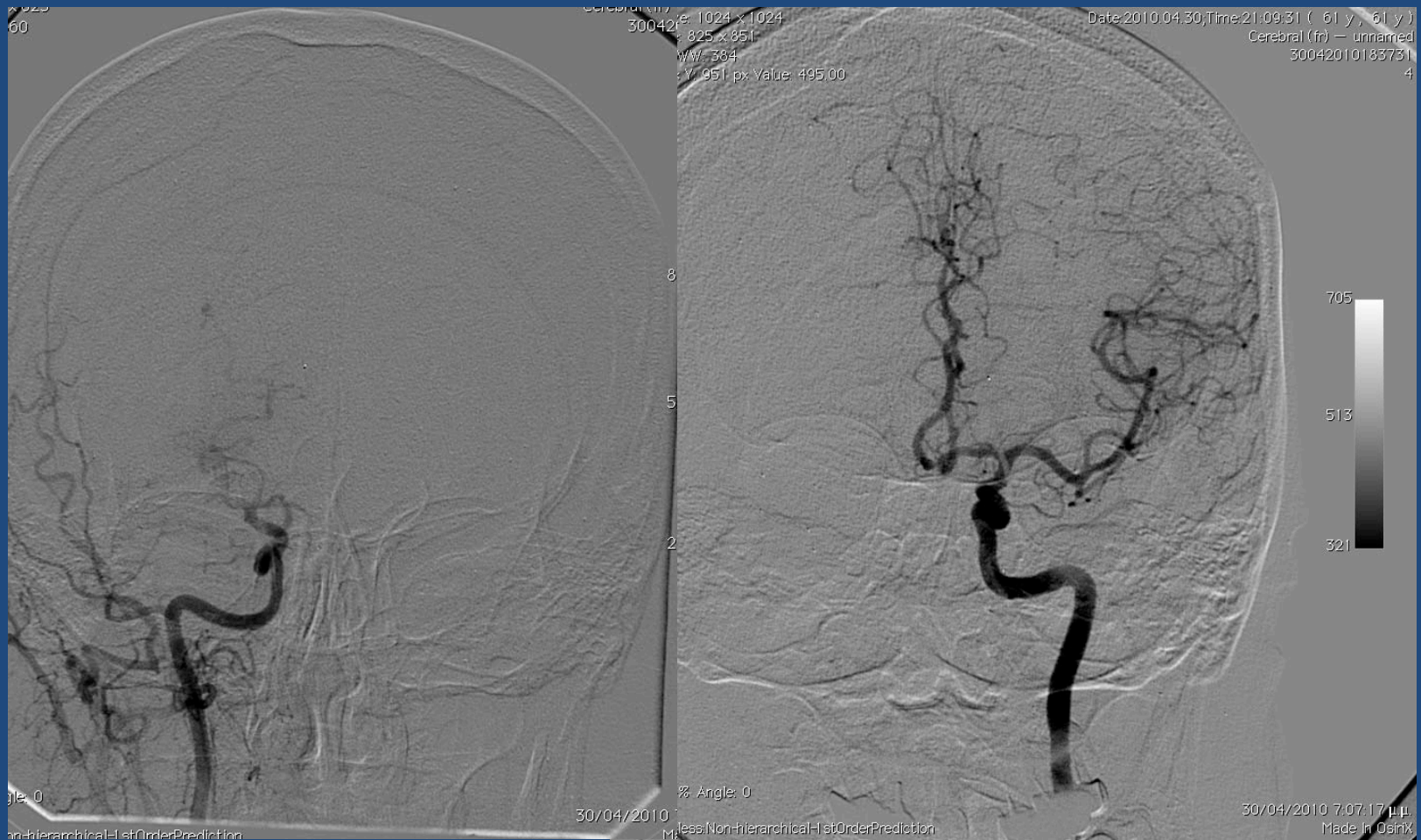
Χωρίς κλινική ανταπόκριση

DSA τραχήλου εγκεφάλου χωρίς γενική αναισθησία



RCCA

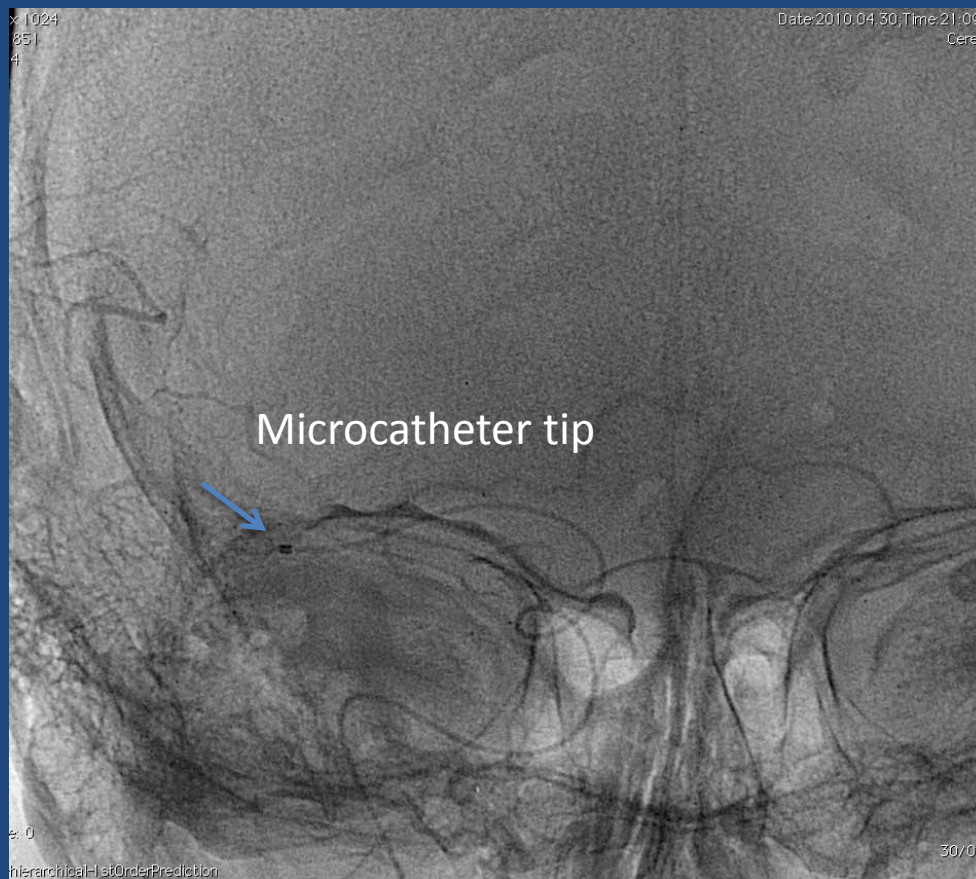
LICA



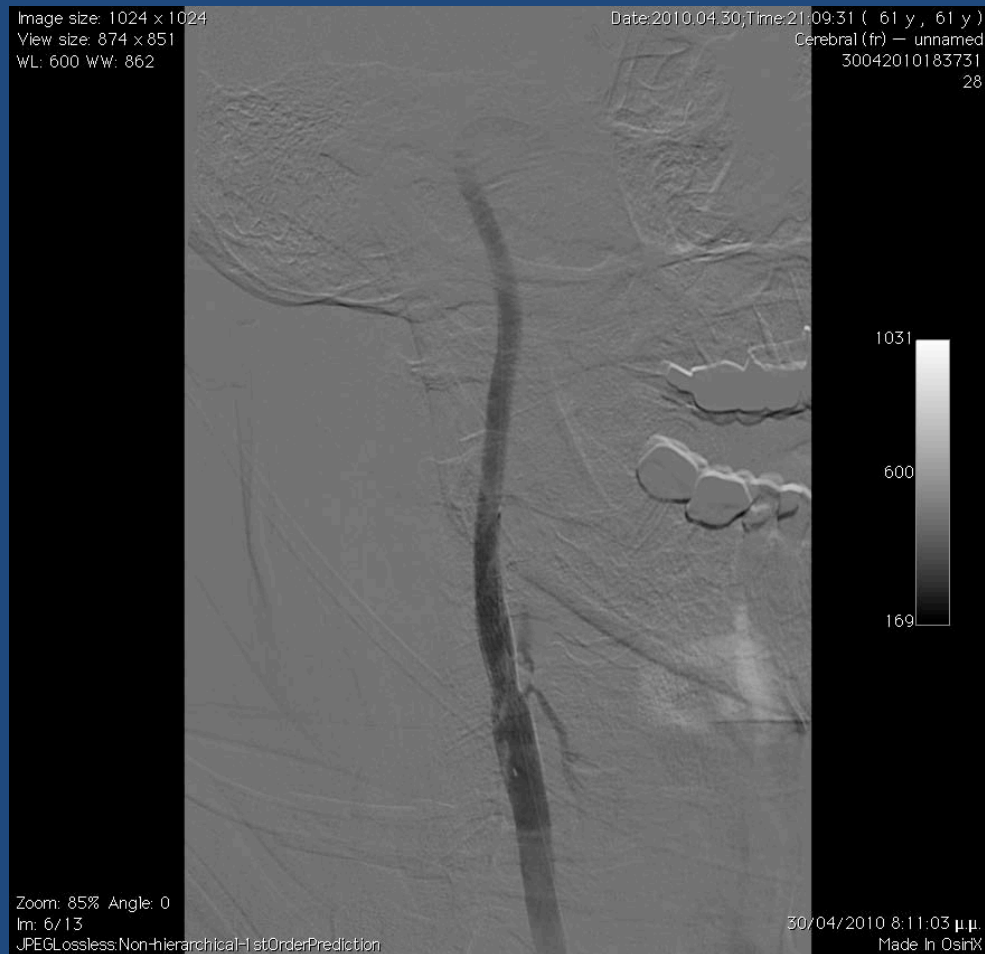
Angioplasty RICA



Θρομβεκτομή με σύστημα MERCI



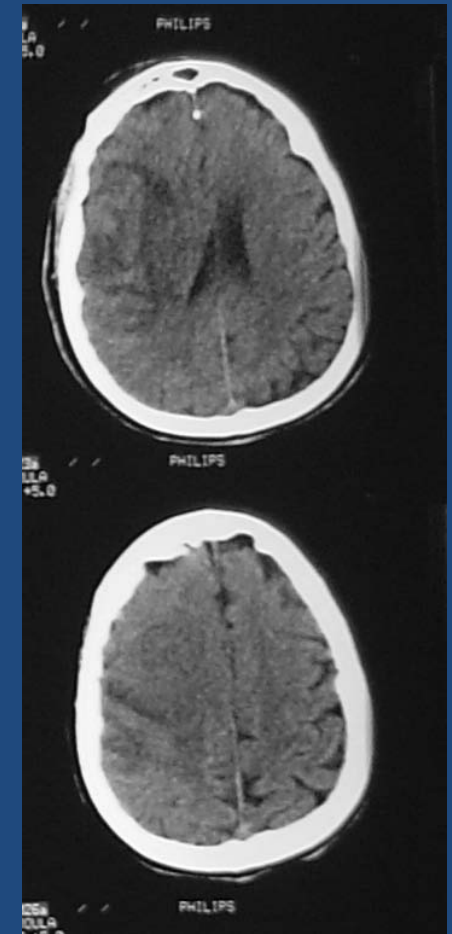
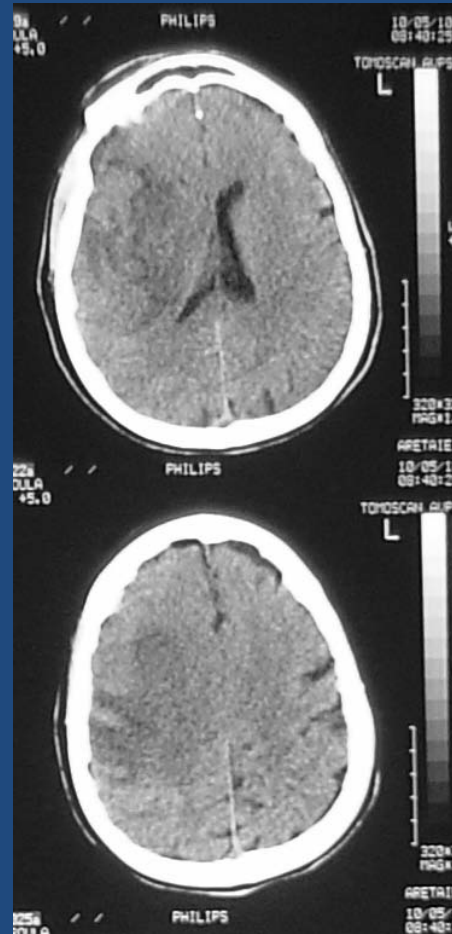
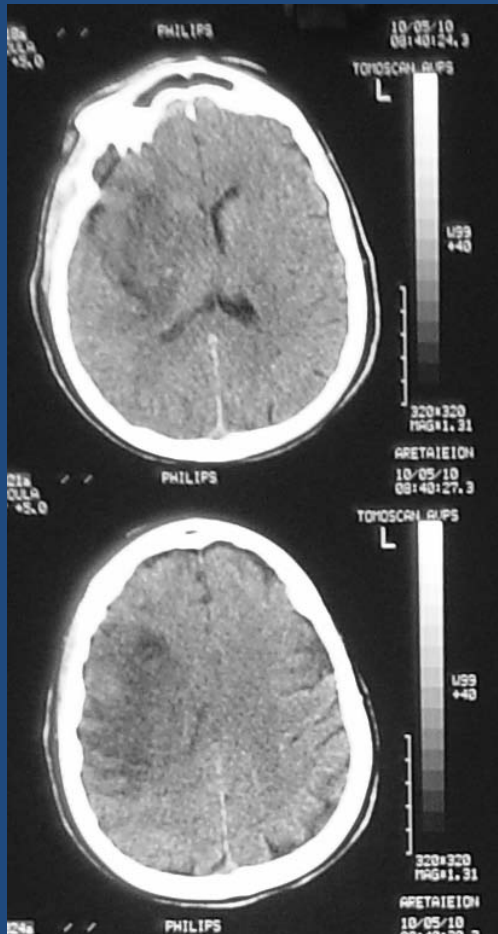
RICA stenting



Τελική DSA μετά θρομβεκτομή με σύστημα MERCI



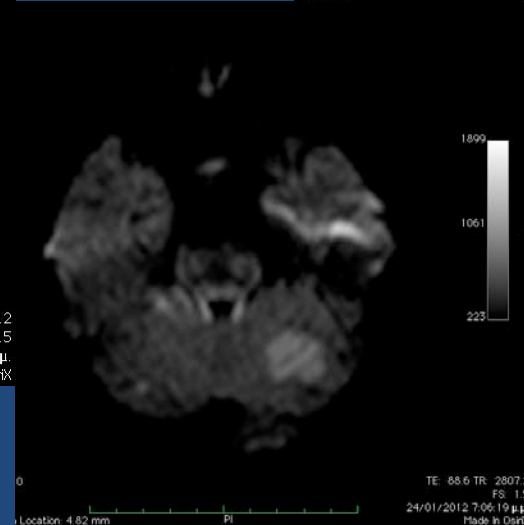
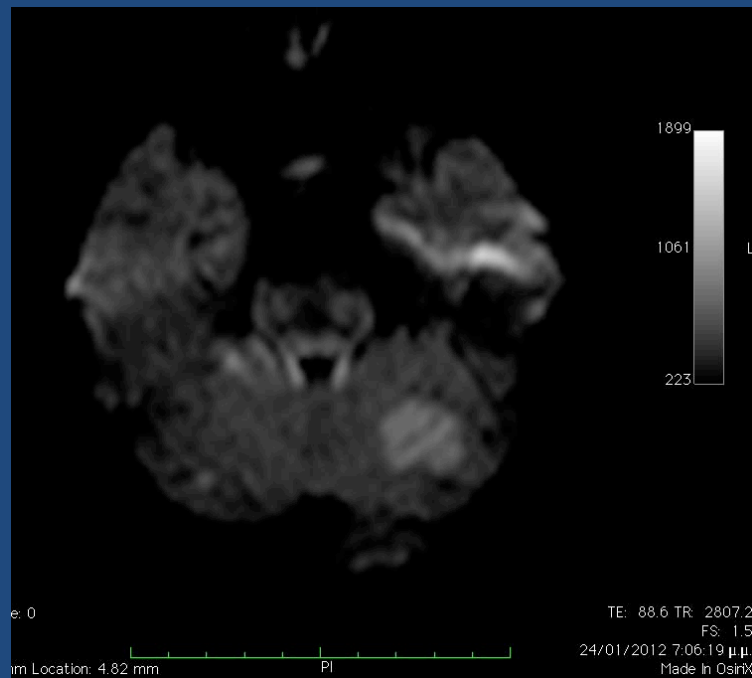
ΥΤ μετά 10 ημέρες



Κλινική ανταπόκριση

- Βελτίωση του NIHSS από 21 σε 17 αμέσως μετά την επέμβαση.
- mRS 4 στις 30 μέρες
- mRS 2 στις 90 μέρες

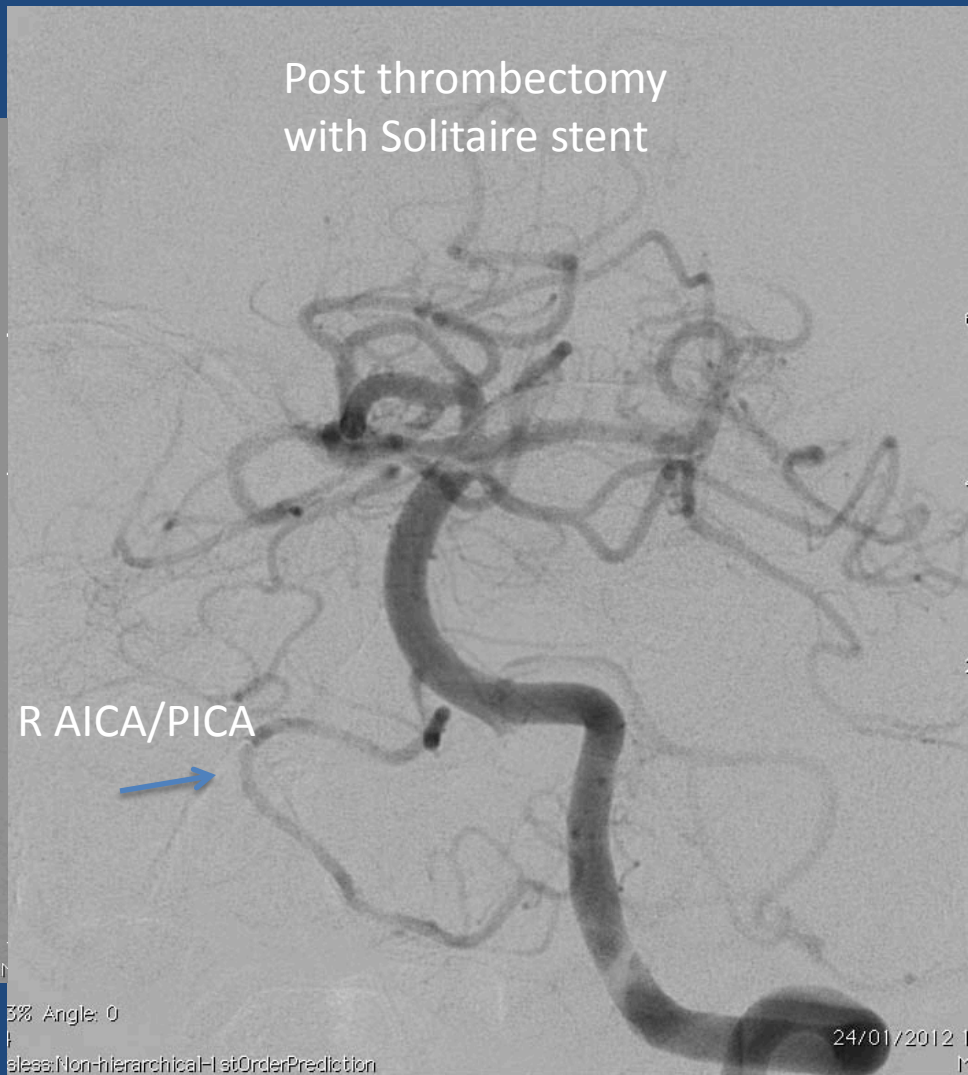
21 ετών αθλητής με εμέτους, ζάλη και αιφνίδια απώλεια ακοής δεξιά από 12ώρου. Πτώση επιπέδου συνείδησης



Υφολική απόφραξη βασικής αρτηρίας



24/01/2012



3% Angle: 0

less:Non-hierarchical-H stOrderPrediction

24/01/2012



1. Remove shaping manifold from distal tip of the catheter.

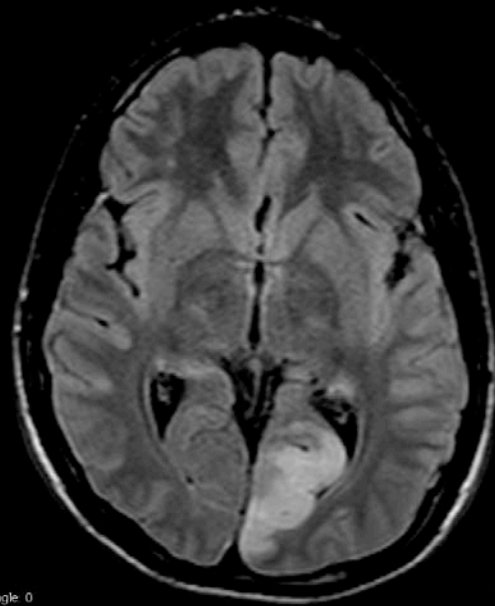
2. Carefully bend catheter tip and a desired shape. A slight over-bend shape may be required to account catheter relaxation.

3. Shape the catheter by holding the approximately 1 inch (2.5 cm) end from the steam source for about 20 NOT EXCEED 30 SECONDS.)

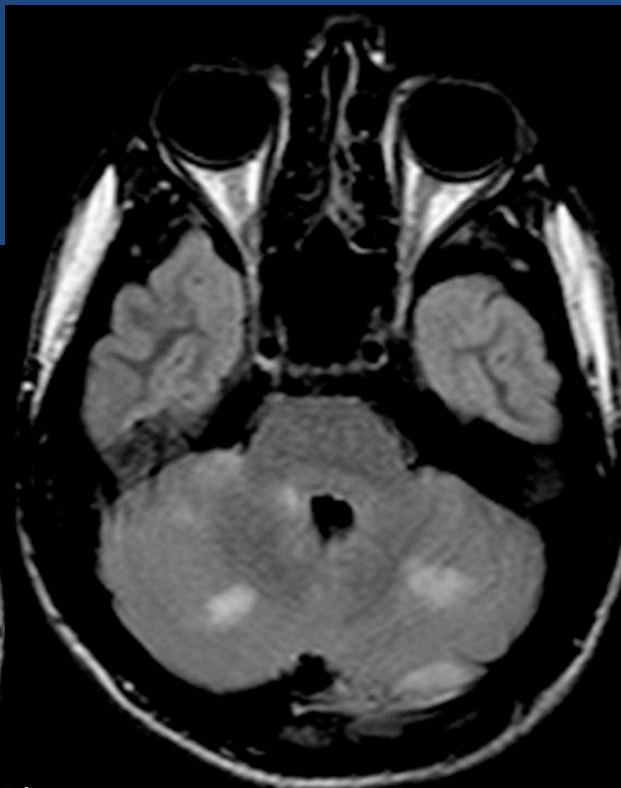
4. Allow catheter tip to cool to air or water prior to removing manifold.

5. Remove manifold from catheter and Multiple shaping is not recommended.

6. Inspect the tip for any damage that is resulted from steam affecting the catheter. Any damage is found, do not use the catheter.



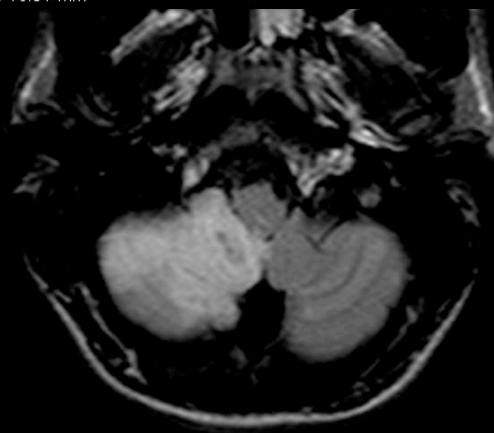
h: 334% Angle: 0
2/22 (1 → S)
mpressed
ness: 5.00 mm Location: 106.46 mm
P



e: 0
I

im Location: 76.57 mm
P

27/01/2012 9:1
Made

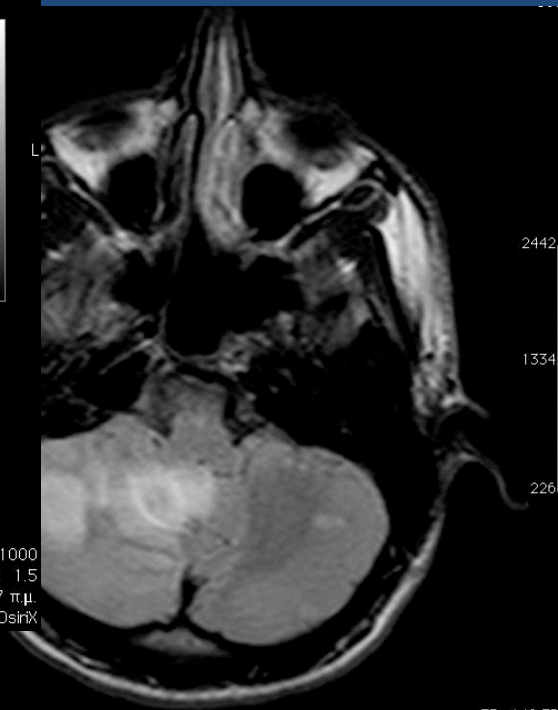


ngle: 0
(S)

0 mm Location: 52.66 mm
P

TE: 140 TR: 11000
FS: 1.5
27/01/2012 9:12:27 π.μ.
Made in Osirix

2187
1313
439



2442
1334
226

TE: 140 TR:

27/01/2012 9:12
Made

L
ion: 64.61 mm
P

2500
1523
478

TE: 140 TR: 11000
FS: 1.5
27/01/2012 9:12:27 π.μ.
Made in Osirix

Κλινική έκβαση στις 90 ημέρες

- Απώλεια ακοής δεξιά

**Ασθενής 36 ετών με οξεία
εμφάνιση αφασίας και δεξιά
ημιπληγία**

ΙΣΤΟΡΙΚΟ

- Ρευματικός πυρετός
- Αντικατάσταση μιτροειδούς βαλβίδος πριν τέσσερις μήνες

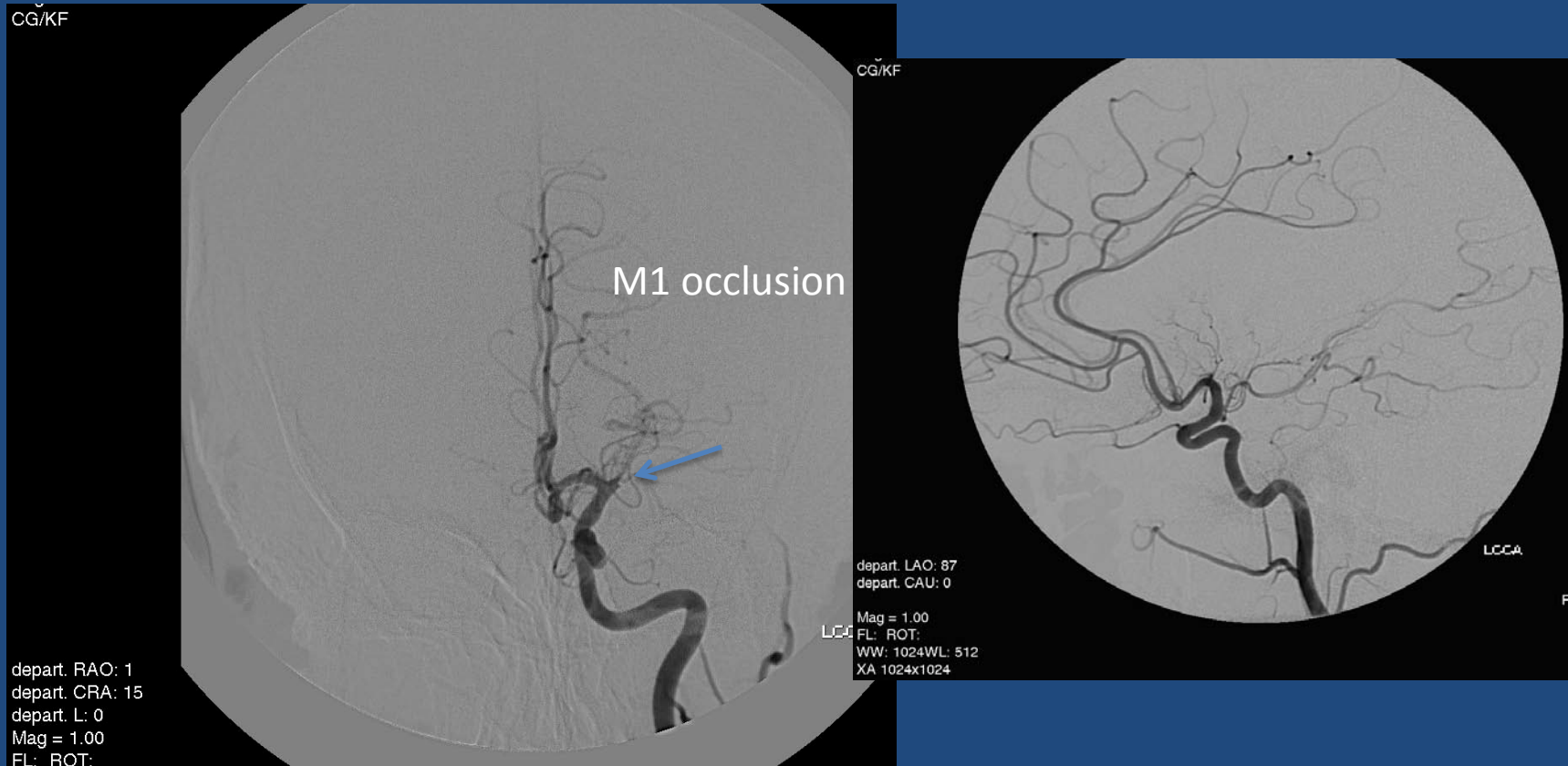
ΚΛΙΝΙΚΗ ΕΞΕΤΑΣΗ

- Αφασία κατανόησης και εκπομπής
- Δεξιά ημιπληγία
- NIH Stroke Scale 25

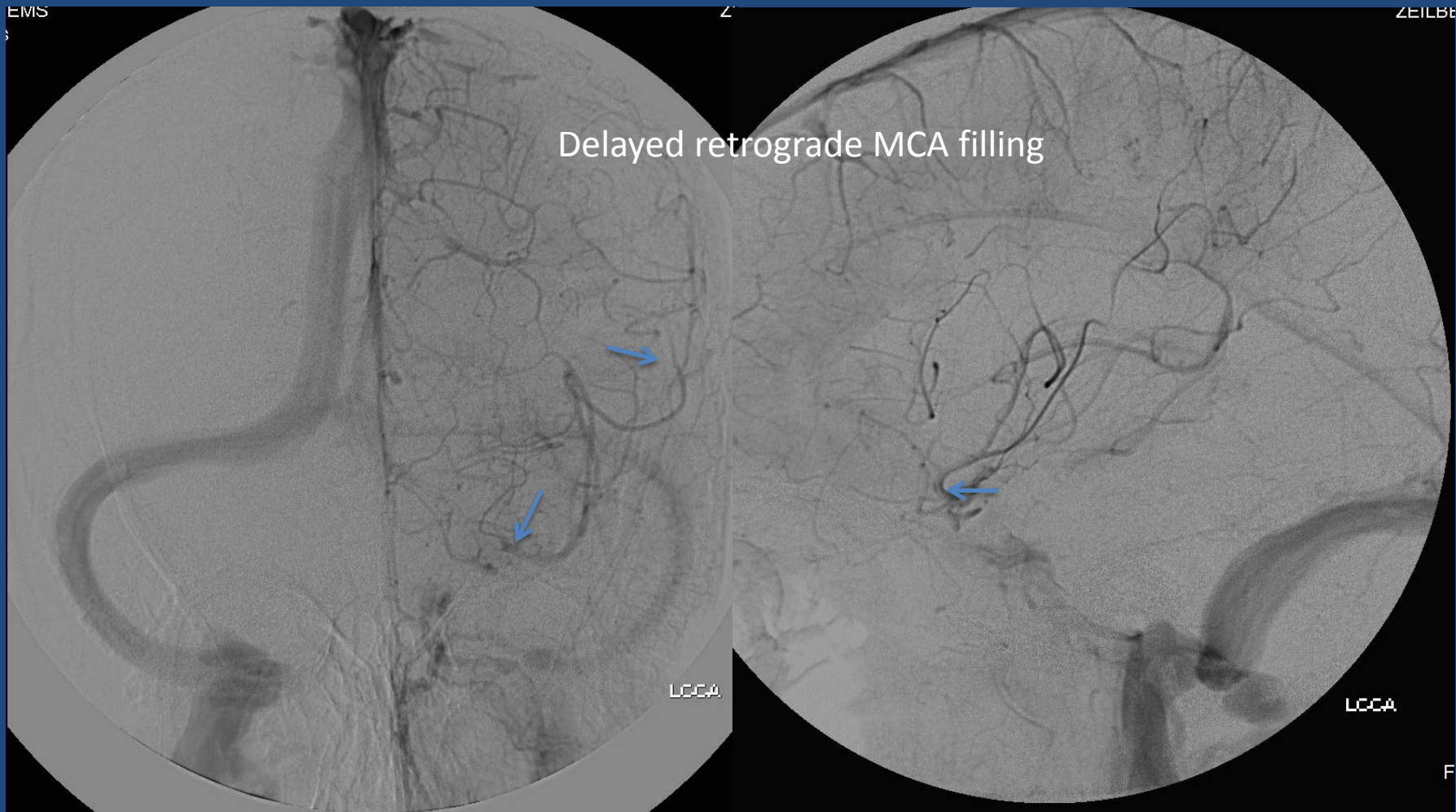
Υπεγκεφάλου 4 hrs μετά την έναρξη της συμπτωματολογίας



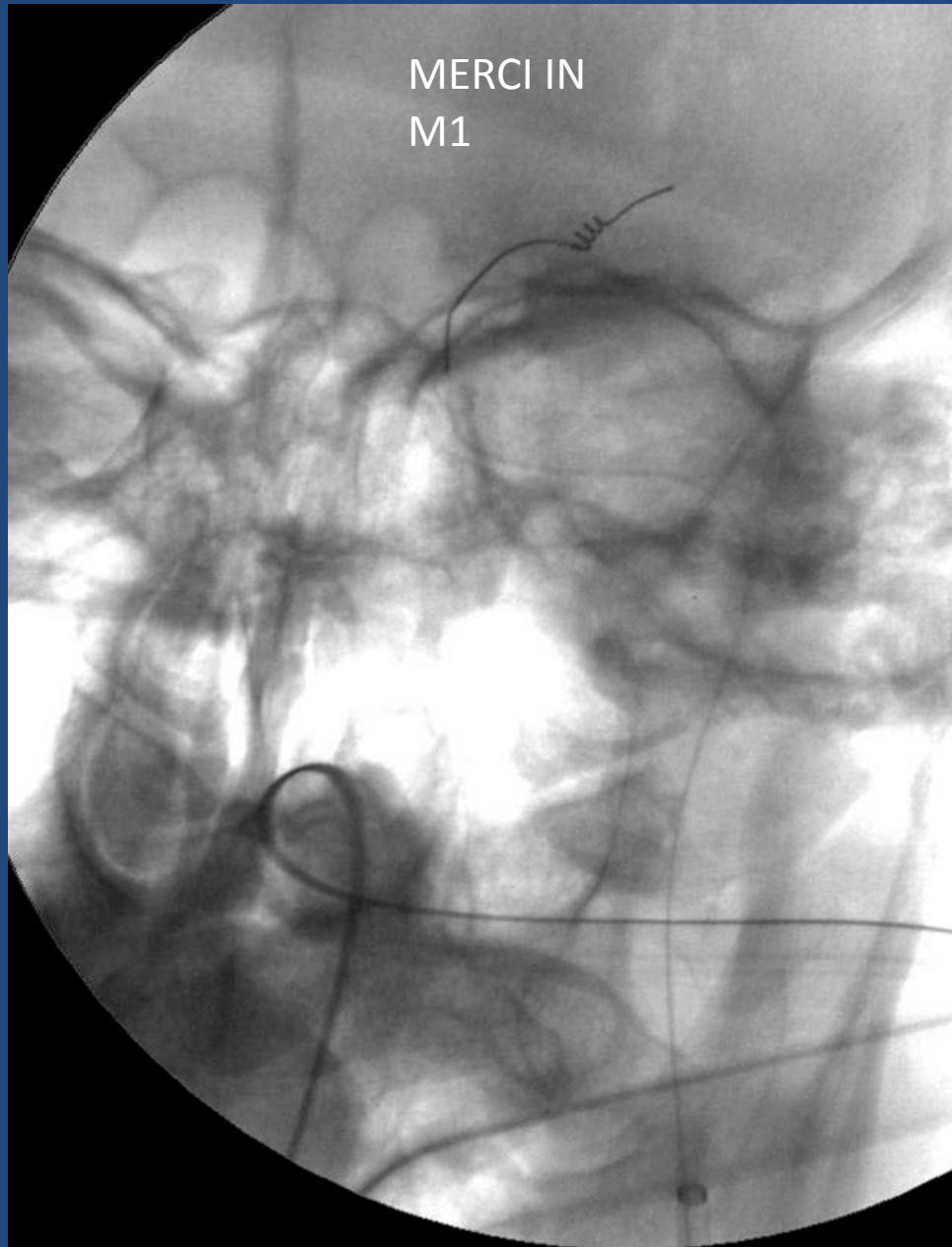
DSA αρτηριακή φάση



DSA φλεβική φάση



MERCI IN
M1



DSA μετά θρομβεκτομή και 4mg tPA- αρτηριακή φάση



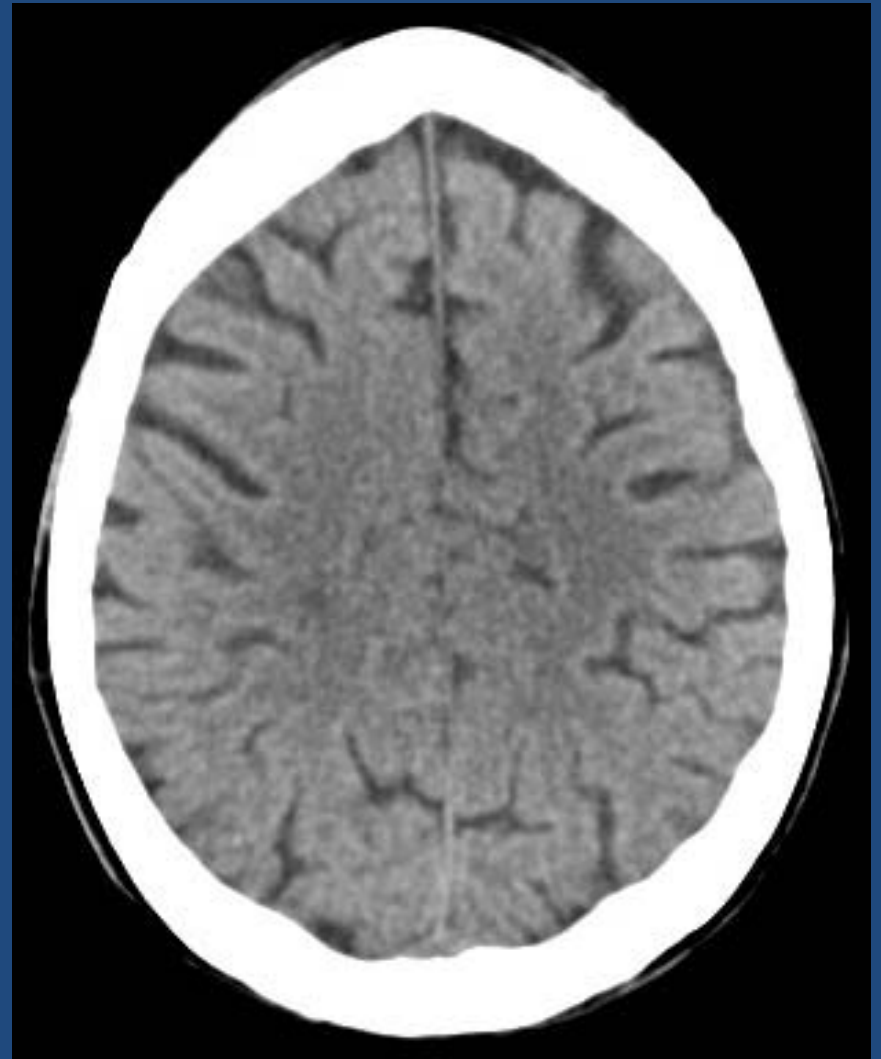
ΥΤ 24 ώρες μετά την επέμβαση NIHSS 0

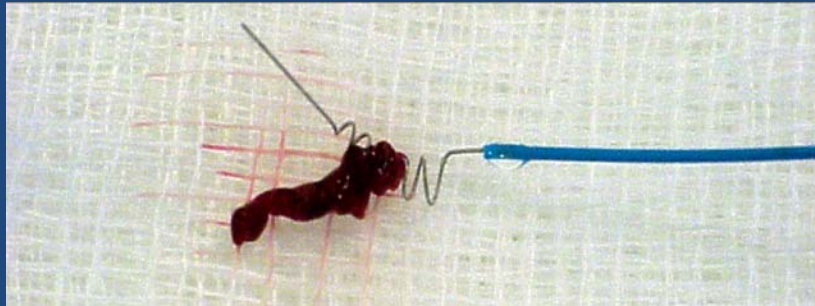


ΠΡΙΝ

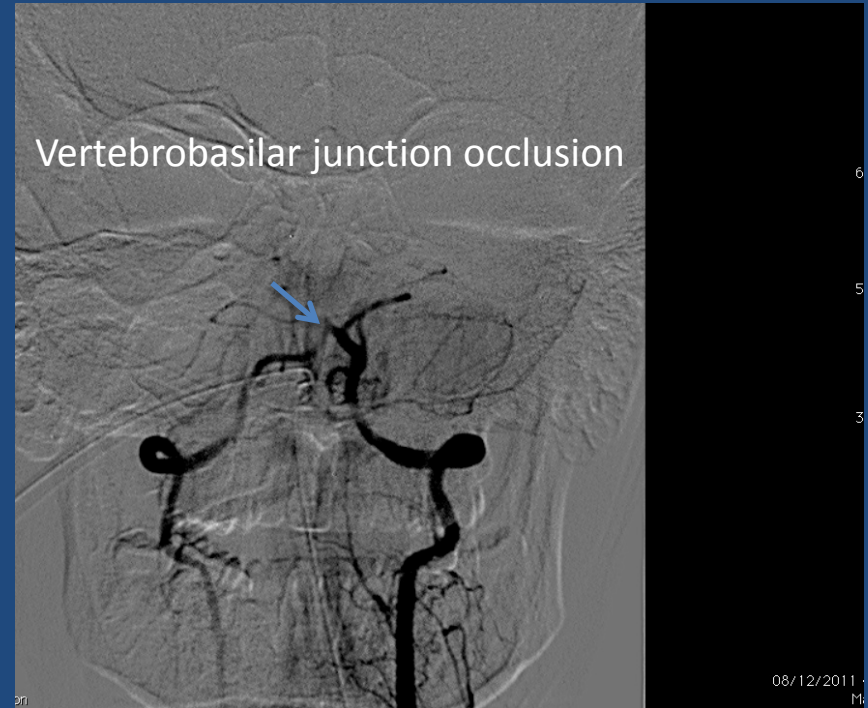


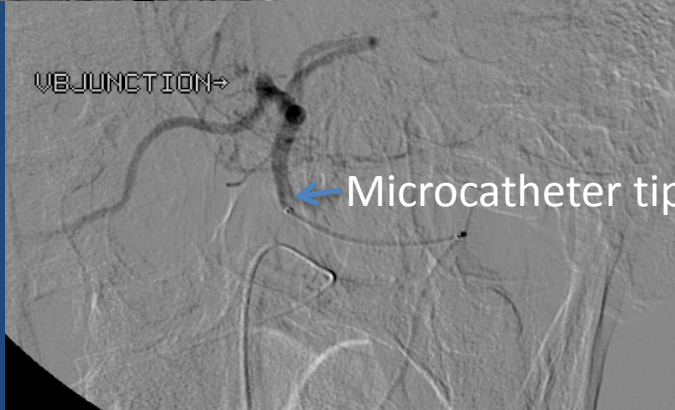
ΜΕΤΑ





28 ετών με απόφραξη βασικής αρτηρίας Locked in syndrome





H1stOrderPrediction

ww: 255
 Y: 1000 px Value: 200.00
 Ant Y: 0.00 mm Z: 0.00 mm



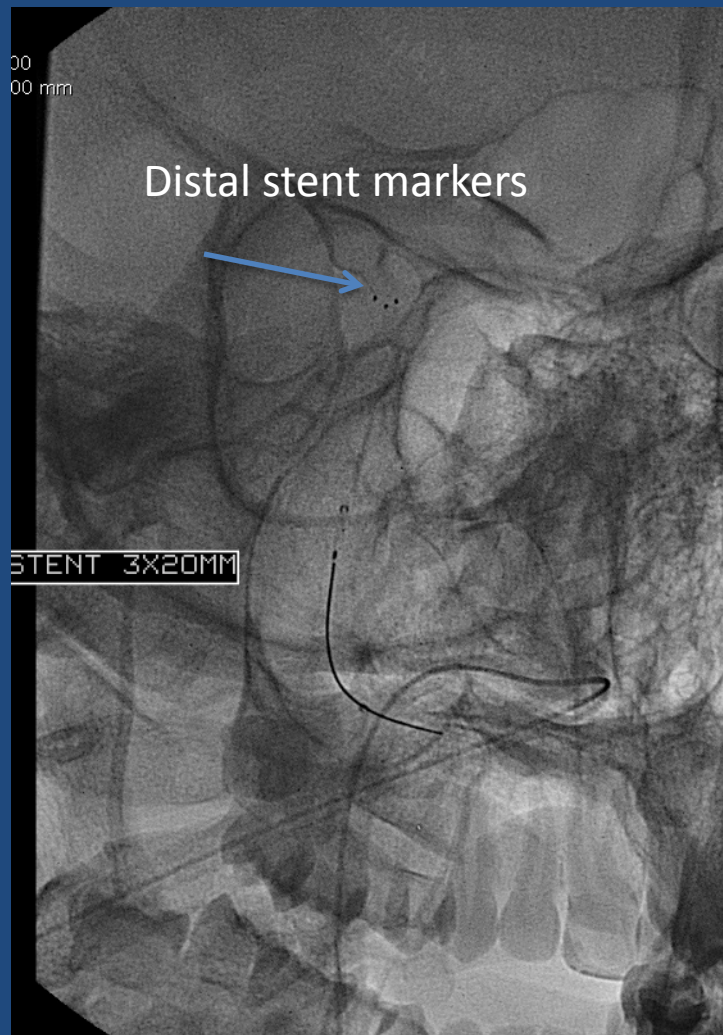
BA TIP

Micro at BA tip

Left PCA

Right PCA

GOGAS



08/12/2013
GOGAS CHRIS

255

128

0

08/12/2013 4:21
MASK, I
Made



Techniques for Endovascular Treatment of Acute Ischemic Stroke

From Intra-Arterial Fibrinolytics to Stent-Retrievers

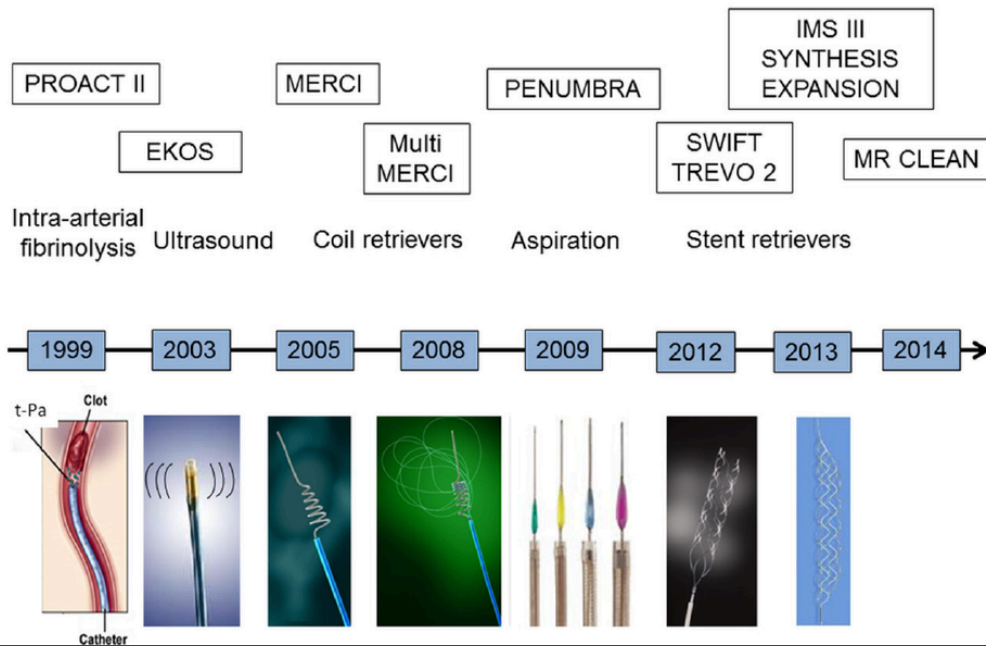


Figure 1. Evolution of endovascular techniques for acute ischemic stroke and clinical trials. IMS indicates Interventional Management of Stroke; MERCI, Mechanical Embolus Removal in Cerebral Ischemia; MR CLEAN, Multicenter Randomized Clinical Trial of Endovascular Treatment for Acute Ischemic Stroke in the Netherlands; PROACT, Prolyse in Acute Cerebral Thromboembolism; SWIFT, Solitaire With the Intention for Thrombectomy; and TREVO, Thrombectomy Revascularization of Large Vessel Occlusions in Acute Ischemic Stroke.

MR CLEAN Trial

AIM: To assess the effect of intra-arterial treatment on functional outcome after acute ischemic stroke caused by - **a proven** - intracranial arterial occlusion, against a background of best medical management (with or without IV tPa)

Berkhemer et al, NEJM, January 2015

MR CLEAN

- **Πρώτη** μελέτη που έδειξε καλύτερα κλινικά αποτελέσματα για την ενδοαυλική θεραπεία
- Υψηλότερα ποσοστά επαναιμάτωσης
- Μικρότερος όγκος ισχαιμικής βλάβης

MR CLEAN CONCLUSION

- The Mr Clean trial is the **first** trial to show that intra- arterial treatment within 6 hours from stroke onset in patients with acute ischemic stroke caused by an intracranial arterial anterior circulation occlusion is **safe and... clinical effective!**

Five Randomized Prospective Trials Supporting Stent Thrombectomy for Large Vessel Acute Stroke: Results

	MR CLEAN (Netherlands)	SWIFT PRIME (Global)	EXTEND IA (AUS, NZ)	REVASCAT (Spain)	ESCAPE (Global)
mRS 0-2 at 90 days IV tPA + Endovascular vs. IV tPA alone	32.6% vs 19.1%	60% vs 35%	71% vs 40%	43.7 vs 28.2%	53% vs 29%
% Recanalized TICI 2b-3	59%	88%	86%	66%	73%
Median Time from Stroke Onset to Revascularization	332 minutes	248 minutes (1 st deployment of stent)	248 minutes	355 minutes	241 minutes
Symptomatic ICH	7.8% vs 6.4% ns	0 vs 3% ns	0 vs 6% ns	1.9% vs 1.9%	3.6% vs 2.7% ns
Mortality at 90 days	21% vs. 22% ns	9% vs 12% ns	9% vs 20% ns	18.4% vs 15.5% ns	10% vs 19% ns

ESCAPE N Engl J Med 2015 372: 1019-1030
 EXTEND-IA Study N Engl J Med 2015 372: 1009-1018
 MR CLEAN N Engl J Med 2015 372: 11-20
 SWIFT PRIME Study N Engl J Med 2015 372:2285-2295
 REVASCAT N Engl J Med 2015 372: 2296-2306

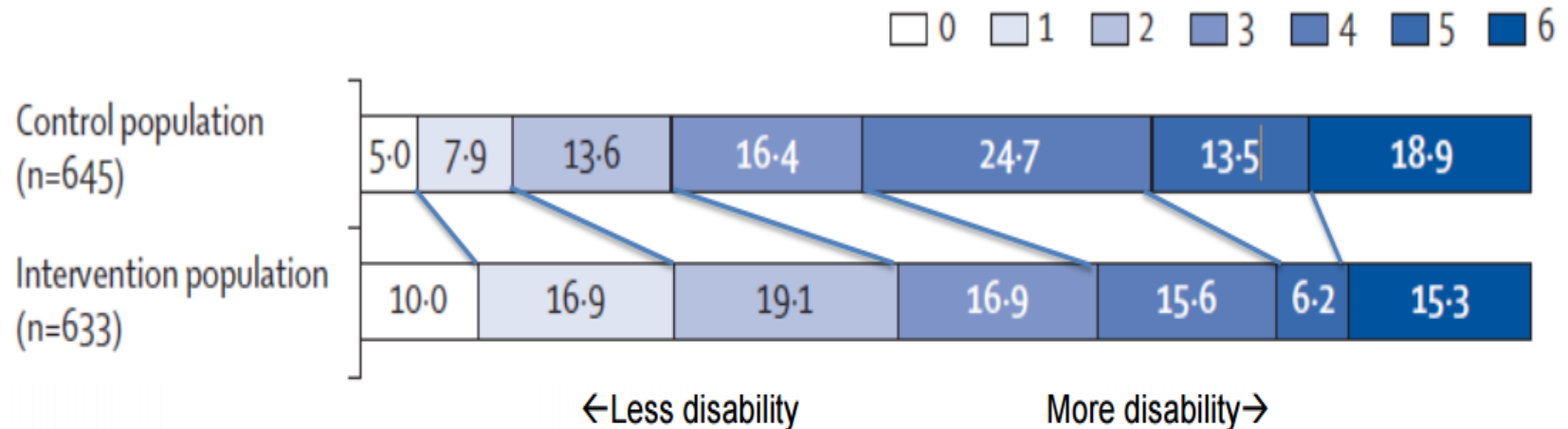
Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials

Mayank Goyal, Bijoy K Menon, Wim H van Zwam, Diederik W J Dippel, Peter J Mitchell, Andrew M Demchuk, Antoni Dávalos, Charles B L M Majoie, Aad van der Lugt, Maria A de Miquel, Geoffrey A Donnan, Yvo B W E M Roos, Alain Bonafe, Reza Jahan, Hans-Christoph Diener, Lucie A van den Berg, Elad I Levy, Olvert A Berkhemer, Vitor M Pereira, Jeremy Rempel, Mònica Millán, Stephen M Davis, Daniel Roy, John Thornton, Luis San Román, Marc Ribó, Debbie Beumer, Bruce Stouch, Scott Brown, Bruce C V Campbell, Robert J van Oostenbrugge, Jeffrey L Saver, Michael D Hill, Tudor G Jovin, for the HERMES collaborators

Lancet 2016

- 71% RECANALIZATION RATE WITH STENT CLOT RETRIEVERS
- 2.5 MORE LIKELY TO BE INDEPENDENT AT 90 DAYS IN THE EVT group
- 2.6 PTS NEED TO BE TREATED TO REDUCE DISABILITY BY 1 POINT

Benefit of Endovascular Treatment



- Pooled analysis of 1287 patients from 5 recent trials
- Functional independence (mRS 0-2) at 3 months, 46% vs 26%
- For every 100 patients treated with endovascular therapy
 - 38 patients will have less disabled outcome
 - Including 20 more functionally independent

NNTs for Cerebral and Cardiac Ischemia Binary Outcomes

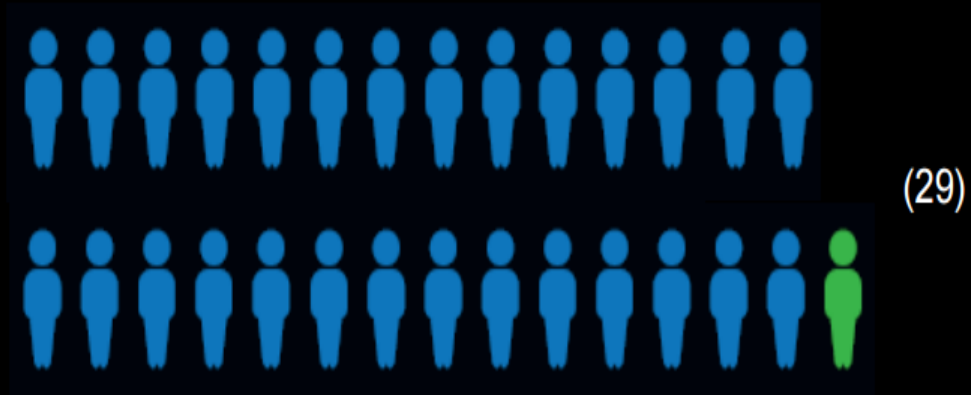
Thrombectomy
for AIS (vs Lysis)
Independence



IV Lytics
for AIS (vs ASA)
Nondisability

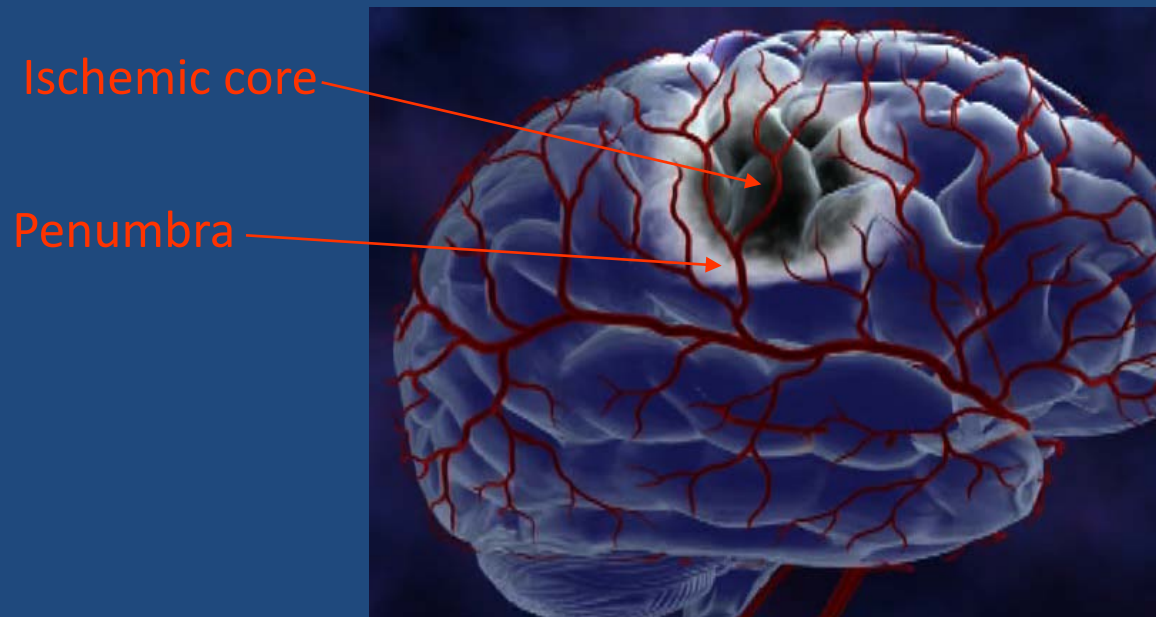


PCI
for STEMI (vs Lysis)
Mortality



The Penumbra

- Surrounding this ischemic core is an area of reduced blood flow called the ischemic penumbra¹
- The penumbra's cells receive suboptimal blood flow (<40%)²



TIME IS BRAIN

43% of pts mRS 0-1 if reperfused in 2hrs
23% if reperfused at 8 hrs

No interaction of reperfusion time and ICH or
mortality

Time to reperfusion

- Functional independence rate 64% at 3hrs
- 46% at 8hrs
- Benefit nonsignificant after 7.3 hrs

Time to Treatment with endovascular thrombectomy and outcomes from ischemic stroke: A Meta-analysis

Saver et al, JAMA 2016

Time to endovascular reperfusion and degree of disability in acute stroke

- Every 5 min delay in endovascular reperfusion, 1 of 100 pts has a worse disability outcome
- For every 15 minute acceleration 34 of 1000 pts had improved disability level

Sheth, SA et al, Annals of Neurology, 78(4) 584-593

ACUTE STROKE GUIDELINES 2015

- AHA
- EUROPEAN CONSENSUS (ESO+ESMINT+ESNR)

2015 American Heart Association/American Stroke Association Focused Update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment

Patients should receive **endovascular therapy with a stent retriever** if they meet all the following criteria

(Class I; Level of Evidence A).

1. Pre-stroke mRS score 0 to 1
2. Acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies
3. Causative occlusion of the ICA or proximal MCA
4. Age ≥ 18 years,
5. NIHSS score of ≥ 6 ,
6. ASPECTS of ≥ 6 , and
7. Treatment can be initiated (groin puncture) within 6 hours of symptom onset

GUIDELINES for ICA,MCA (M1,M2/M3) occlusions

- Mechanical Thrombectomy within 4.5 h in addition to IVT
- Mechanical Thrombectomy alone 4.5-6hrs
- Mechanical Thrombectomy first line treatment if IVT contraindicated

Basilar artery occlusion

- MT in addition to EVT but low level of evidence

Recommendations

- IVT should not delay Mechanical Thrombectomy(MT)
- MT should nor prevent IVT

DAWN TRIAL NEJM 2017

Diffusion weighted Imaging(DWI) or CT
Perfusion(CTP)Assessment with Clinical Mismatch in the
Triage of Wake –Up and Late Presenting Strokes
Undergoing Neurointervention

? Πρέπει να αντιμετωπίζονται παρεμβατικά ασθενείς με ΑΕΕ και άγνωστη ώρα έναρξης συμπτωματολογίας

DAWN TRIAL NEJM 2017

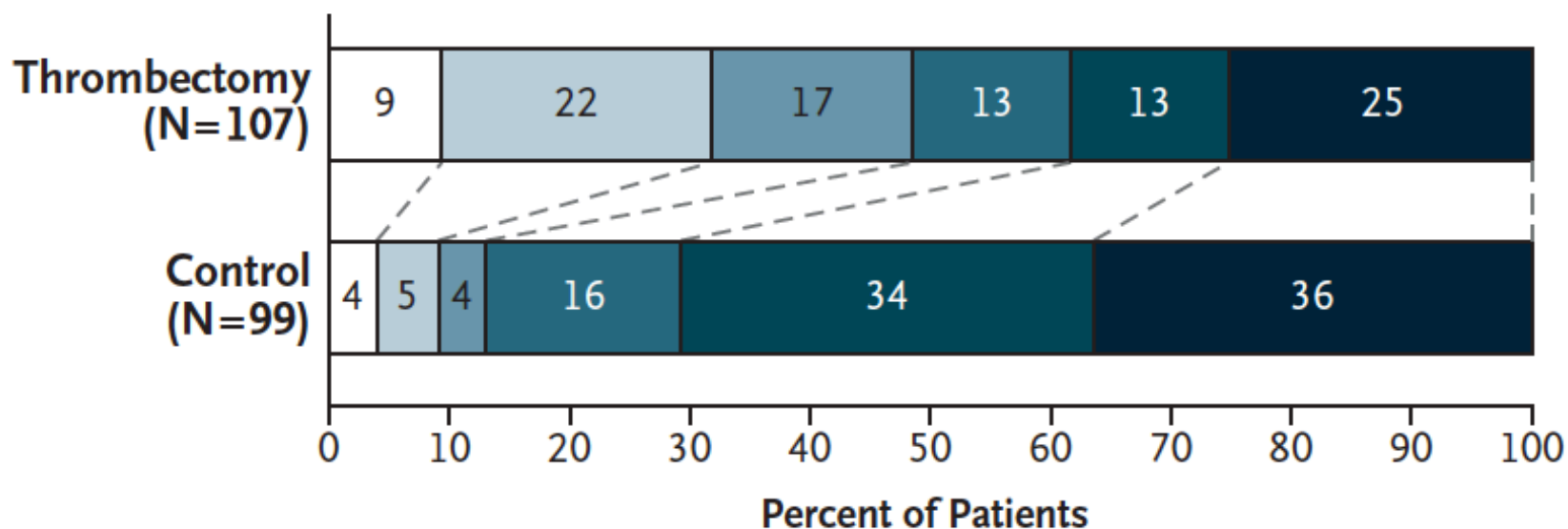
- Potentially salvagable tissue defined by a mismatch between clinical assessment and Imaging

DAWN TRIAL RESULTS

Score on the Modified Rankin Scale

□ 0 □ 1 □ 2 □ 3 □ 4 □ 5 or 6

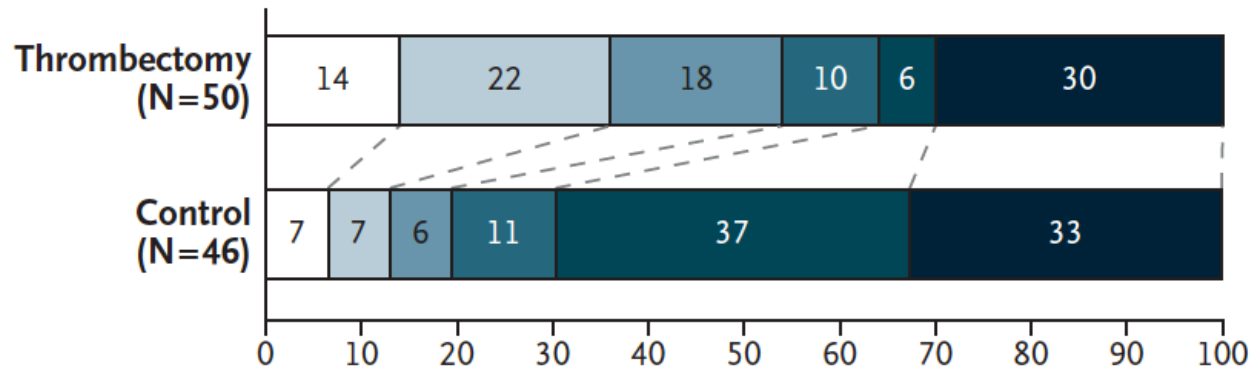
A Intention-to-Treat Population



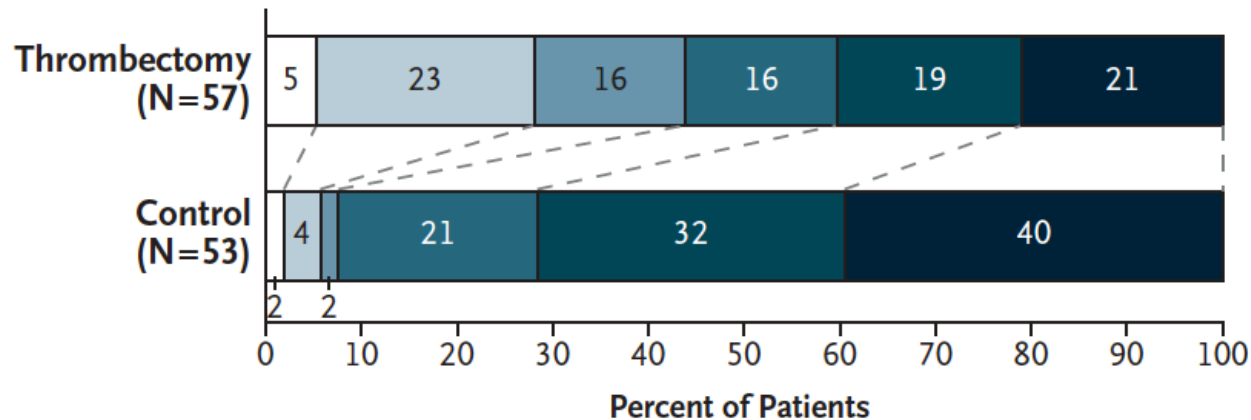
DAWN TRIAL RESULTS

B Subgroups According to Time of Stroke Onset

Last Known to Be Well 6 to 12 Hr before Randomization



Last Known to Be Well >12 to 24 Hr before Randomization



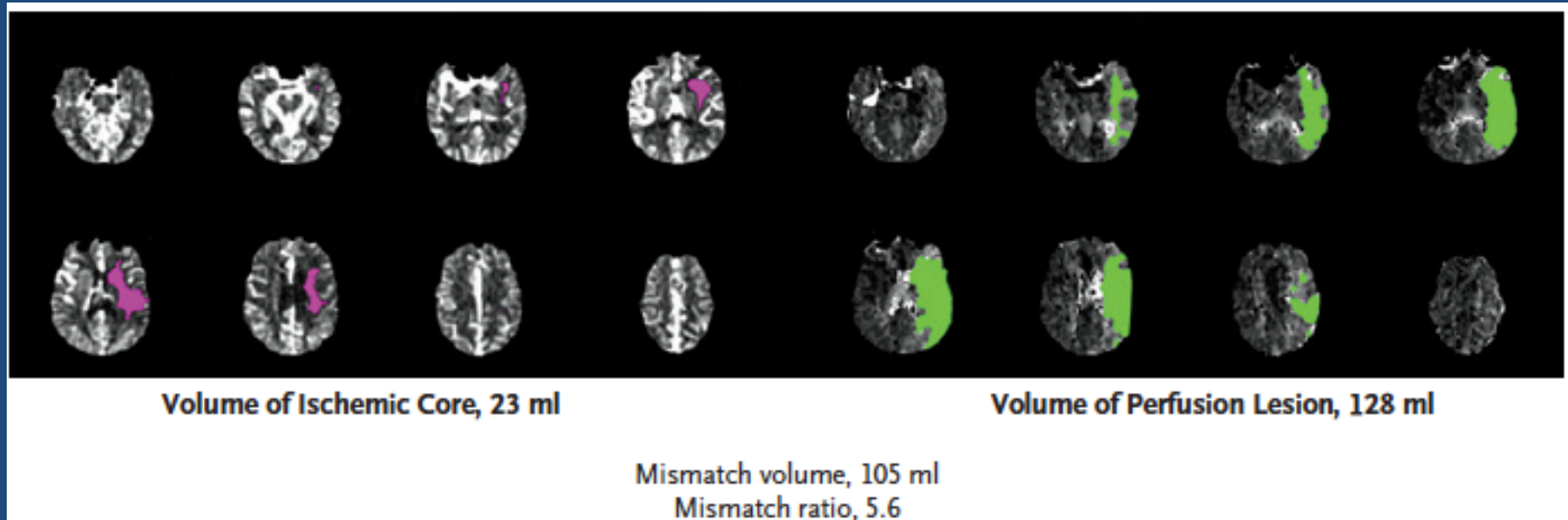
DAWN TRIAL RESULTS

- Για κάθε 2.8 ασθενείς που υποβάλλονται σε θρομβεκτομή 1 επιπλέον ασθενής καθίσταται λειτουργικά ανεξάρτητος στις 90 ημέρες μετά το ΑΕΕ.

DEFUSE 3 TRIAL NEJM 2018

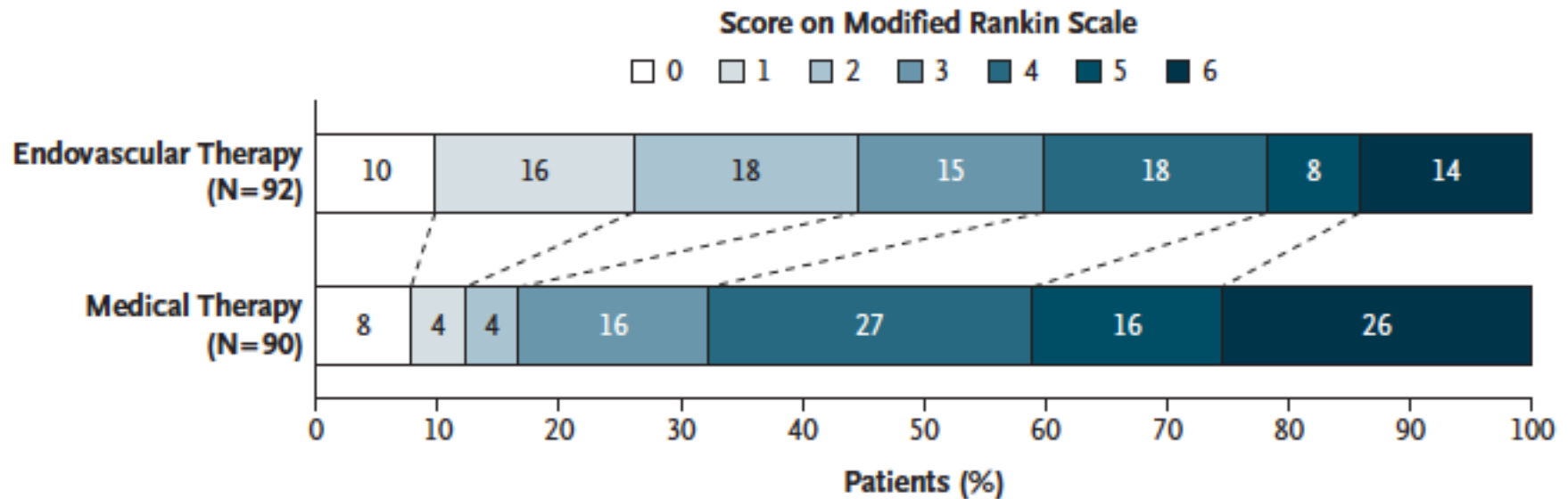
Thrombectomy for Stroke at 6 to 16
Hours
with Selection by Perfusion Imaging

DEFUSE 3 TRIAL PATIENT SELECTION



DEFUSE 3 TRIAL RESULTS

- ODDS RATIO FOR FAVORABLE mRS 2.77



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

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

2018 Guidelines

Patients should receive mechanical thrombectomy with a stent retriever if they meet all the following criteria: (1) prestroke mRS score of 0 to 1; (2) causative occlusion of the internal carotid artery or MCA segment 1 (M1); (3) age ≥ 18 years; (4) NIHSS score of ≥ 6 ; (5) ASPECTS of ≥ 6 ; and (6) treatment can be initiated (groin puncture) within 6 hours of symptom onset.

I

A

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

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.

Ila

B-R

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 MCA segment 2 (M2) or MCA segment 3 (M3) portion of the MCAs.

IIb

B-R

In selected patients with AIS within 6 to 24 hours of last known normal who have LVO in the anterior circulation, obtaining CTP, DW-MRI, or MRI perfusion is recommended to aid in patient selection for mechanical thrombectomy, but only when imaging and other eligibility criteria from RCTs showing benefit are being strictly applied in selecting patients for mechanical thrombectomy.

I

A

Additional imaging beyond CT and CTA or MRI and magnetic resonance angiography (MRA) such as perfusion studies for selecting patients for mechanical thrombectomy in <6 hours is not recommended.

III: No Benefit

B-R

ΣΥΜΠΕΡΑΣΜΑΤΑ

- Η ενδοαρτηριακή θεραπεία του οξέος ΑΕΕ υπερέχει της συντηρητικής θεραπείας σε σωστά επιλεγμένους ασθενείς με απόφραξη μεγάλου ενδοκράνιου αγγείου στις πρώτες 6 ώρες.
- Time is brain
- Physiology is brain – Ανάδειξη παρεγχύματος που ισχαιμεί αλλά δεν έχει ακόμα νεκρωθεί
- Σημαντικό όφελος και από 6-24 ώρες μετά την έναρξη των συμπτωμάτων σε σωστά επιλεγμένους ασθενείς.

OUTCOMES

	Recanaliz ation	Time to groin(min)	MRS 0- 2(independent pts)		Symptomatic ICH	
	TICI 2b/3		CTL	EVT	CTL	EVT
MR CLEAN	59%	260	19%	33%	6%	8%
ESCAPE	72%	241	29%	53%	3%	4%
REVASCAT	66%	269	28%	44%	2%	2%
EXTEND- IA	86%	210	40%	71%	6%	0%
SWIFT PRIME	88%	224	36%	60%	3%	0%
THRACE	NR	255	42%	54%	2%	2%
THERAPY	NR	226	30%	38%	11%	11%