American Heart Association | American Stroke Association

Together to End Stroke™

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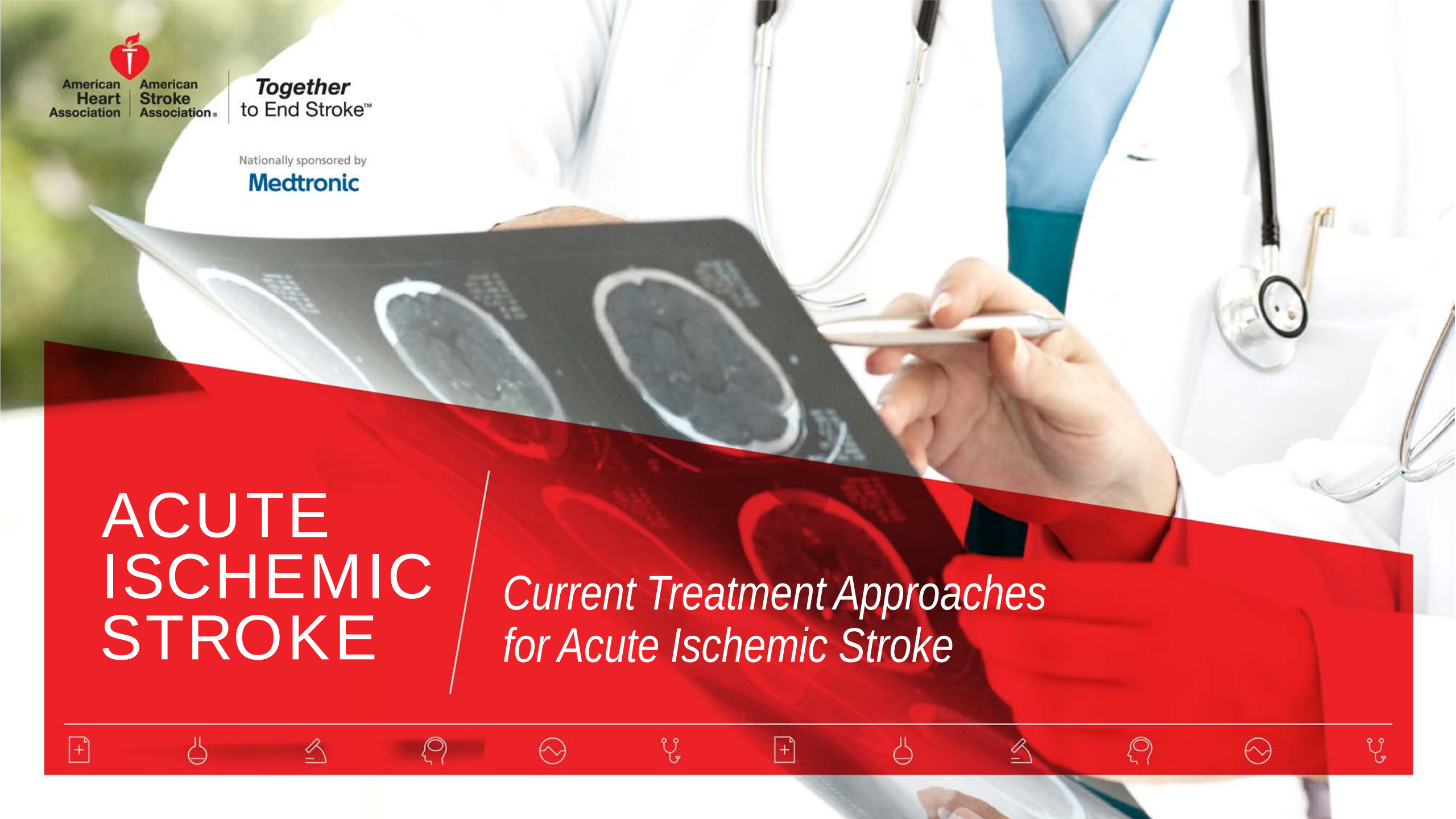

ACUTE ISCHEMIC STROKE

Current Treatment Approaches for Acute Ischemic Stroke

EARLY MANAGEMENT OF ACUTE ISCHEMIC STROKE

1

Rapid identification of a stroke

2

Immediate EMS transport to nearest stroke center

3

Standard of Care:
Alteplase (IV r-tPA) within 4.5 hours of stroke onset

1.9 times as likely to have a favorable outcome

4

Mechanical thrombectomy for patients with large vessel occlusion within 6 hours of stroke onset

- *70% improvement with patients**
- *Improved early neurological recovery*
- *Improved functional outcome at 3 months*
- *No significant safety concerns*

**2015 AHA/ASA Focused Update of the 2013 Guidelines for the Early Management of Patients with Acute Ischemic Stroke Regarding Endovascular Treatment. Powers WJ, Derdeyn CP, Biller J, et al. Stroke 2015;46):3020-3035.*

CLASS I AHA/ASA RECOMMENDATIONS FOR ALTEPLASE AND ENDOVASCULAR THERAPY*

- *Emergency non enhanced CT imaging of the brain is recommended before any specific treatment for acute stroke.*
- *Eligible patients should receive Alteplase intravenous r-tPA even if endovascular treatments are being considered.*
- *Noninvasive intracranial vascular imaging should be obtained as quickly as possible after IV r-tPA.*
- *Patients should receive endovascular therapy with a stent retriever if they meet all the criteria.*
- *To ensure benefit, reperfusion to TICI grade 2b/3 should be achieved as early as possible and within 6 hours of stroke onset.*

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DECISION-MAKING CRITERIA FOR ADMINISTERING ALTEPLASE (IV r-tPA)

If eligible, all acute ischemic stroke patients should receive Alteplase (IV r-tPA).

- *Inclusion Criteria*
  - *Diagnosis of ischemic stroke causing measurable neurological deficit*
  - *Treatment within 4.5 hours (IV r-tPA between 3 & 4.5 hours is not FDA-approved)*

- *Exclusion Criteria*
  - *Current intracranial hemorrhage*
  - *Subarachnoid hemorrhage*
  - *Active internal bleeding*
  - *Recent (within 3 months) intracranial or intraspinal surgery or serious head trauma, presence of intracranial conditions that may increase the risk of bleeding (e.g., some neoplasms, arteriovenous malformations, or aneurysms)*
  - *Bleeding diathesis*
  - *Current severe uncontrolled hypertension*

DECISION-MAKING CRITERIA FOR ADMINISTERING ALTEPLASE (IV r-tPA) CONTINUED

- *Additional exclusion criteria Between 3 and 4.5 hours:*
  - *Age >80 years*
  - *Severe stroke (NIHSS > 25)*
  - *History of diabetes and prior stroke*
  - *Taking an oral anticoagulant regardless of INR*

Alteplase (IV r-tPA) within 4.5 hours of stroke onset remains the standard of care for most ischemic stroke patients.

DECISION-MAKING CRITERIA FOR ENDOVASCULAR THERAPY

After the patient is administered Alteplase (IV r-tPA), and the cause is deemed to be occlusion of a large cerebral artery in the anterior circulation, considered endovascular therapy, best accomplished with a stent retriever.

- *Criteria for Endovascular Therapy:*
  - *Within 6 hours of stroke onset*
  - *Pre-stroke modified Rankin Score (mRs0-1)*
  - *Acute ischemic stroke receiving Alteplase (IV r-tPA) within 4.5 hours of onset according to guidelines from professional medical societies (prior administration of r-tPA is not required)*
  - *Causative occlusion of the internal carotid artery or proximal Middle Cerebral Artery (M1)*
  - *Age 18 years or older*
  - *National Institutes of Health Stroke Scale (NIHSS) score of ≥6*
    Alberta Stroke Program Early Computed Tomography Score (ASPECTS) of ≥6
  - *Treatment can be initiated (groin puncture) within 6 hours of symptom onset.*

BENEFITS OF ALTEPLASE (IV r-tPA)

OUTCOME	IV R-TPA AT 0-3 HOURS*	NO IV R-TPA
OVERALL OUTCOME	43%	32%
ABLE TO PERFORM ACTIVITIES OF DAILY LIVING	53%	32%
NO OR MINIMAL DEFICIT 1 YEAR AFTER STROKE	39%	26% at 3 months

Patients who are treated with Alteplase (IV r-tPA) at 0-3 hours are discharged home earlier, are more often discharged home rather than to a nursing home and report a better quality of life.

	IV R-TPA AT 3-4.5 HOURS	
NONE TO MINIMAL DISABILITY AT 90 DAYS	52.4%	45.2%

** Spokoynyl, CederequistL, Clay B, Meyer BC. COAST (Coordinating Options for Acute Stroke Therapy): An Advance Directive for Stroke. The Journal of Clinical Ethics 2015;26(3):206-211. Available at: http://www.clinicalethics.com/single_article/TQVMyqNshBA.html.*

BENEFITS OF ENDOVASCULAR TREATMENT

*TICI grade 2b/3 recanalization was achieved in 59%–88% of endovascularly treated subjects in 5 recent stent retriever trials**

OUTCOME	NO ENDOVASCULAR TREATMENT	ENDOVASCULAR TREATMENT
IN 4 RECENT TRIALS, THE AVERAGE OF PATIENTS REACHING A MODIFIED RANKIN SCALE OF 0-2 IN 90 DAYS*	28%	47% (a 20% improvement)

** 2015 AHA/ASA Focused Update of the 2013 Guidelines for the Early Management of Patients with Acute Ischemic Stroke Regarding Endovascular Treatment. Powers WJ, DerdeynCP, Biller J, et al. Stroke 2015;46:3026.*

RISKS OF ALTEPLASE (IV r-tPA) AND ENDOVASCULAR THERAPY

- *Risks Of Alteplase (IV r-tPA)*
  - ***Bleeding**: 2.8% (vs. 0.2% without r-tPA) intracerebral bleeding in patients treated in the 3-4.5 hour window (ECASS III Study)*
  - ***Mortality:** No increase from placebo groups*

- *Risks of Endovascular Treatment with Stent Retriever at 0-6 Hours:*
  - *The major risk is intracranial hemorrhage due to: vessel perforation (ripping the blood vessel) or stent retriever device perforating a vessel while attempting to remove the blood clot from the artery.*
  - *Systemic bleeding*
  - *Bleeding at the site of catheter introduction*
  - *Catheter infection*
  - *Death*

*Among recent studies, endovascular treatment did not increase risk above IV r-tPA.**

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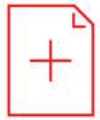
RESOURCES FOR YOU AND YOUR PATIENTS



Professional Resources:

2015 Focused Update to the 2013 AIS Guidelines

AIS Guidelines Quick Sheet

Stroke Simulation Event Toolkit

AIS Treatment Webinar

and Healthcare Professional Guide

Patient Resources:

In-Hospital Patient Education Deck

At-Risk of Experiencing AIS Education Deck

Patient Brochures

and more!

StrokeAssociation.org/AISToolkit

INFORMATION FOR PATIENTS AND FAMILIES

INFORMATION FOR PATIENTS AND FAMILIES

The following information can help support conversations with patients and their families about acute ischemic stroke treatment.

- *Current treatment recommendations for eligible patients with acute ischemic stroke have proved highly beneficial with acceptable risk.*
- *Early Alteplase IV r-tPA followed by mechanical stent thrombectomy is the new standard of care for patients who qualify.*
- *Alternate interventions are also beneficial for patients who do not qualify.*
- *Rapid intervention is critical to successful treatment.*
- *Interventions without general anesthesia are associated with a better outcome.*
- *Systems of care are being organized to facilitate the delivery of this care.*

For additional information, please refer to the AHA/ASA 2015 AIS Guideline Update and 2013 Early Management of Ischemic Stroke.

CASE STUDY 1

Courtesy of:
Brian L. Hoh, MD,
University of Florida

CASE 1: ACUTE LEFT M1 OCCLUSION TREATED WITH MECHANICAL THROMBECTOMY WITH NO IV TPA

- *The patient is a 65 year old woman who had a laparoscopic cholecystectomy 3 days prior.*
- *She was last seen normal at 10pm before sleep.*
- *She awoke at 2am and was discovered by her husband to have aphasia and right hemiplegia.*
- *She was brought by EMS to the ED at 3:15 am.*
- *She was not eligible for Alteplase IV tPA because of her wakeup stroke and recent surgery.*
- *Her NIHSS was 19.*

CASE 1 CONTINUED

- *The CTA shows an occlusion of the left MCA stem.*

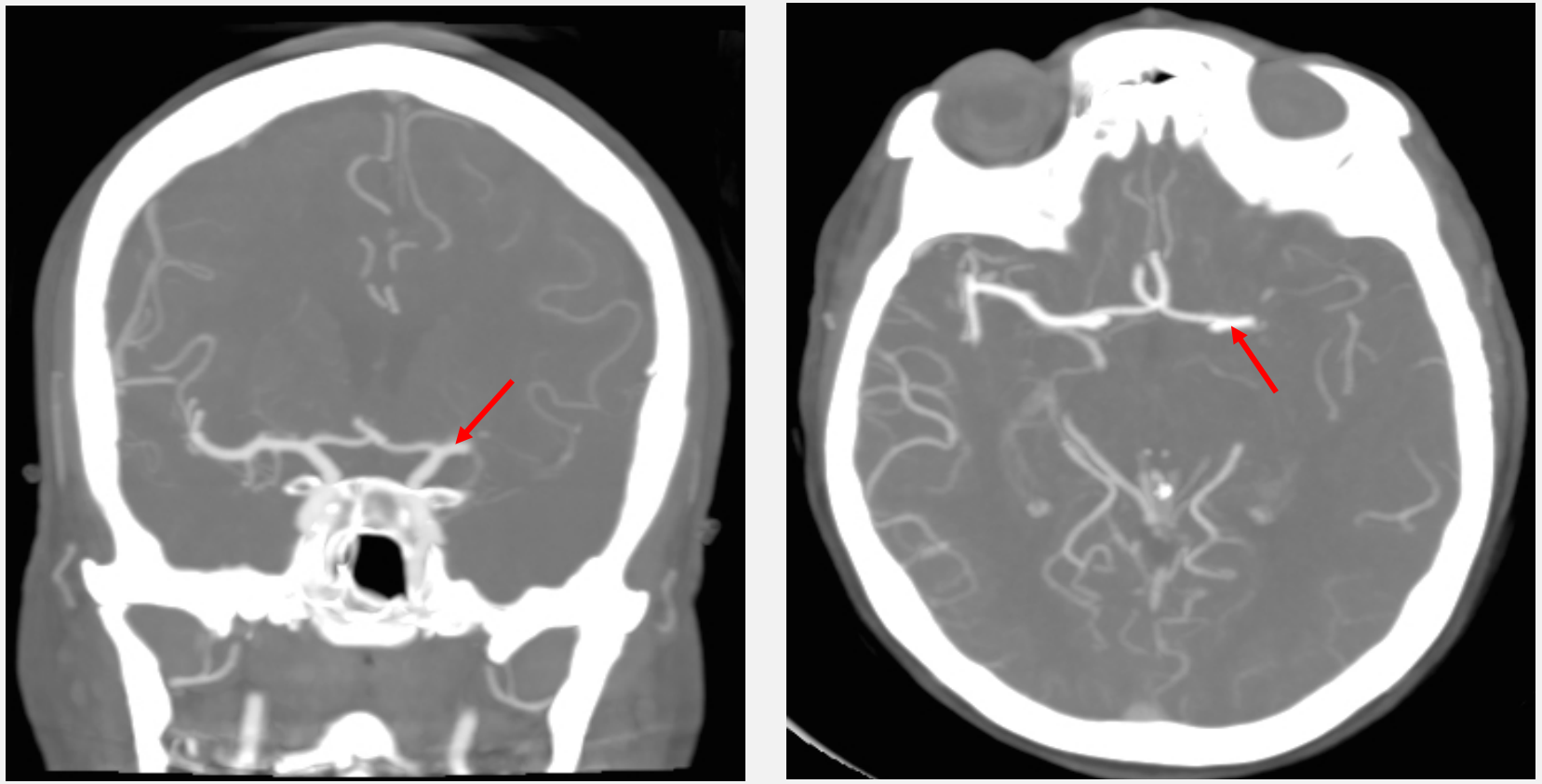


Fig. 1

CASE 1 CONTINUED

- *CT perfusion study shows hypoperfusion of the left MCA territory.*

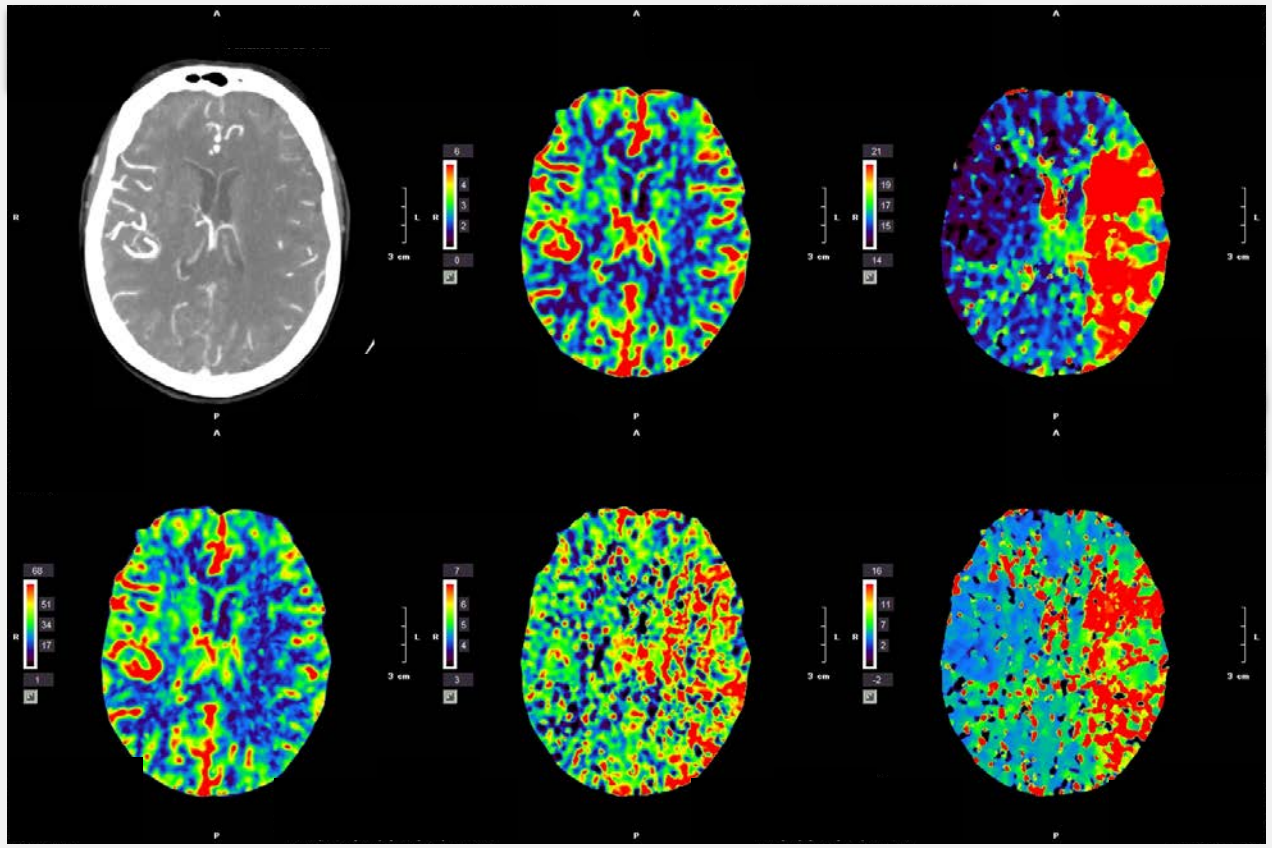


Fig. 2

CASE 1 CONTINUED

- *The angiogram confirmed occlusion of the left MCA.*
- *She was taken emergently to the neuroendovascular suite.*

Fig. 3

CASE 1 CONTINUED

- *Mechanical thrombectomy with stent retriever and suction aspiration was performed with successful TICI (Thrombolysis in Cerebral Infarction) 3 revascularization.*

Fig. 4

CASE 1 CONTINUED

- *The diffusion-weighted MRI scans show no infarction.*
- *She had a full recovery and was discharged home 3 days later.*

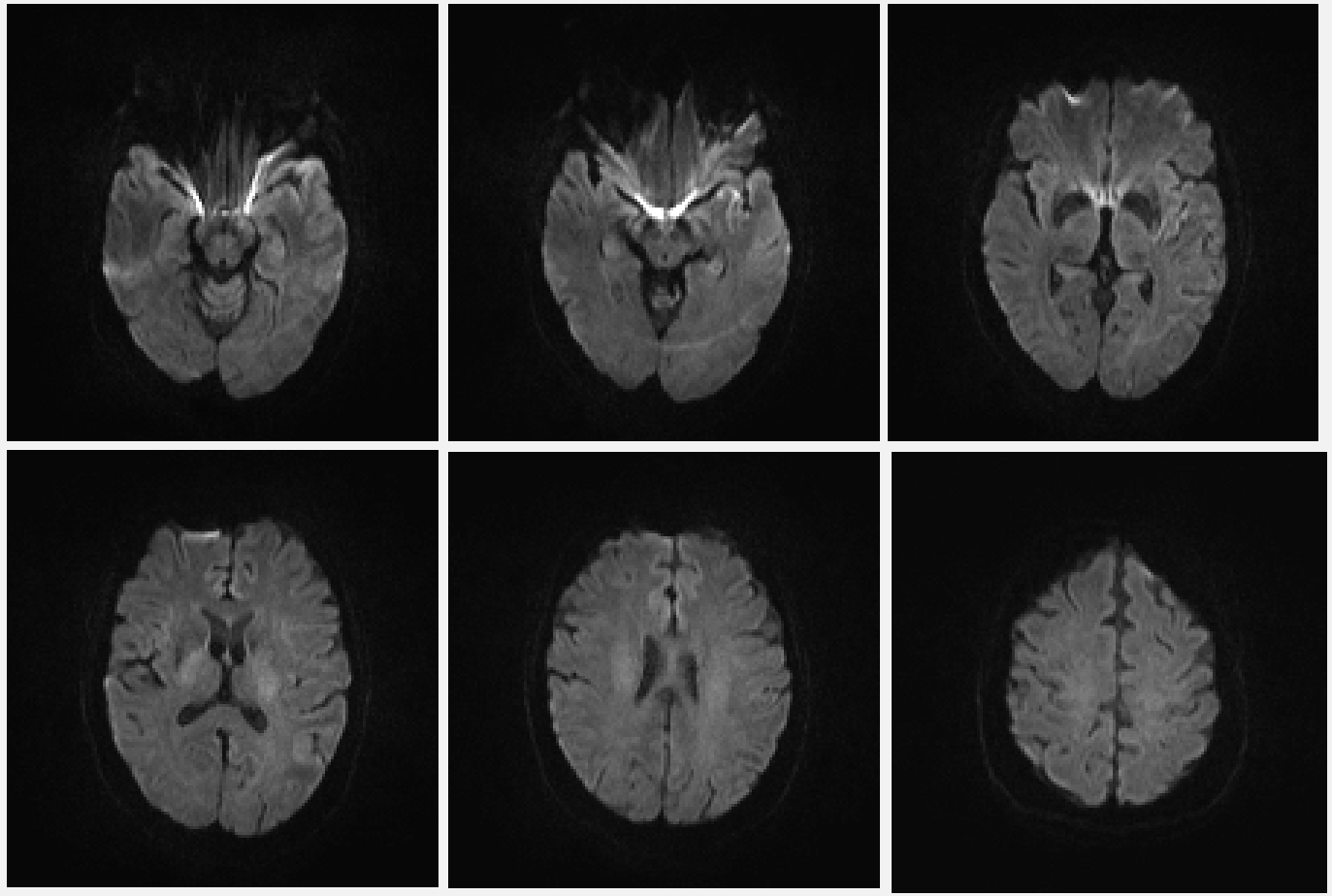


Fig. 5

CASE STUDY 2

Courtesy of:
Donald Frei, MD,
Michelle Whaley, MSN, CNS,
Swedish Medical Center

CASE 2: LEFT INTERNAL CAROTID OCCLUSION

- *This patient is a 66-year-old man, living in a rural community without hospital-based emergency services, who experienced sudden onset aphasia and dysarthria that was witnessed by his daughter. Local EMS arrived on the scene within 15 minutes, recognized the signs of stroke, and requested flight transport to a comprehensive stroke center (CSC). Initial NIHSS was assessed by the flight team as 3, but the patient deteriorated to a NIHSS of 22. The patient arrived to the CSC on a Saturday, 1 hour and 37 minutes from symptom onset. On examination, he had global aphasia, right homonymous hemianopsia, left gaze preference, and right-sided hemiplegia. The patient was rapidly transported to CT for advanced imaging. After a non-contrast CT, head was deemed normal. He was treated with intravenous alteplase IV r-tPA with a door-to-needle time of 17 minutes.*

CASE 2 CONTINUED

- *The CT perfusion images showed a large region of hypoperfusion of the left MCA territory without corresponding hypodensity on CT images, consistent with a large region of mismatch.*

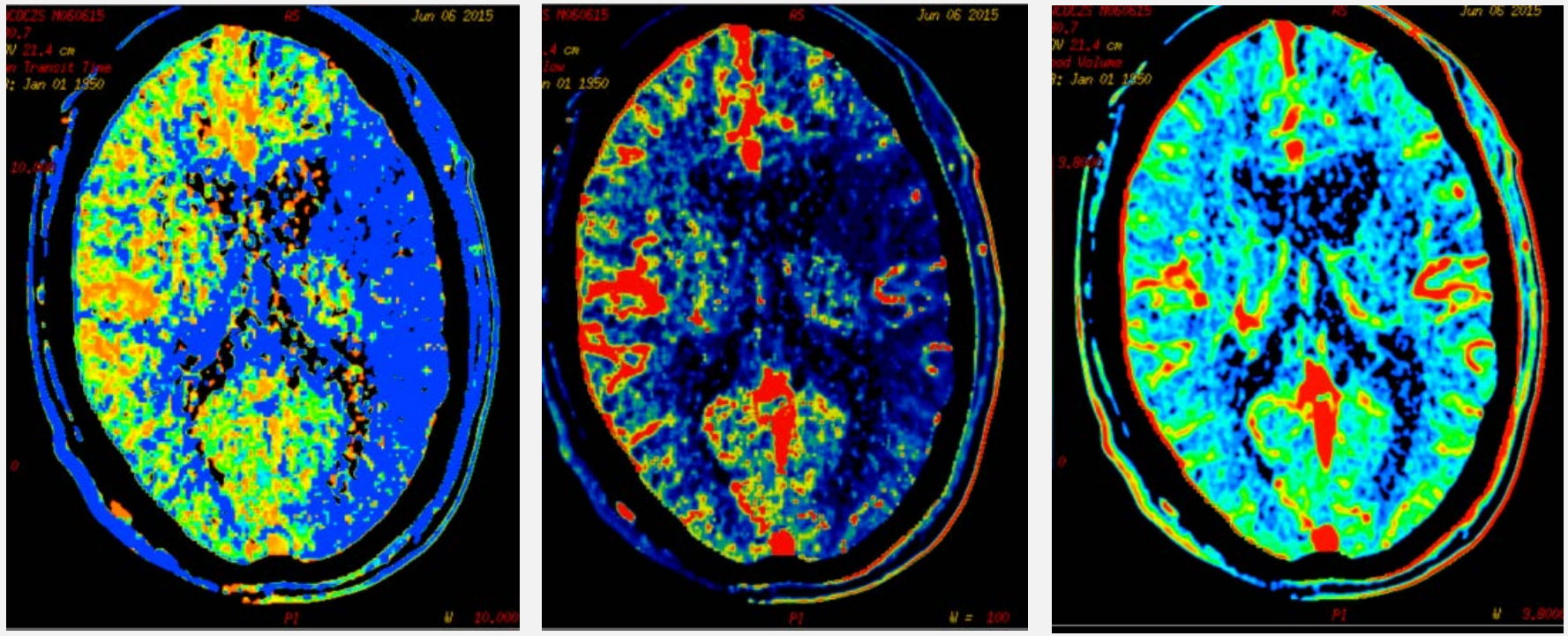


Fig. 1 - CT Perfusion with large mismatch

CASE 2 CONTINUED

- *Catheter angiography demonstrated complete occlusion of the left internal carotid artery (ICA; Figures 2A, B).*
- *Compete recanalization of the left internal carotid artery occlusion was achieved with a combination of local aspiration and stent retriever thrombectomy techniques.*

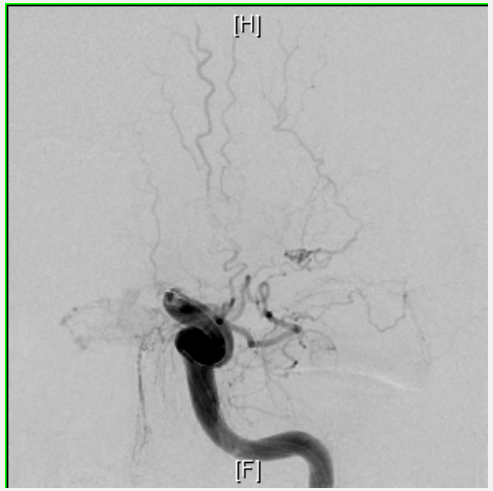


Fig. 2A

(A-P view, pre-thrombectomy procedure)

Fig. 2B

(lateral view, pre-thrombectomy procedure)

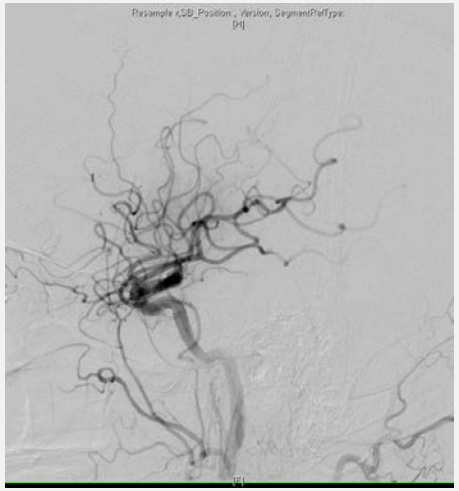


Fig. 2C

(lateral view, post-thrombectomy procedure)

CASE 2 CONTINUED

- *A large thrombus was aspirated from the ICA.*

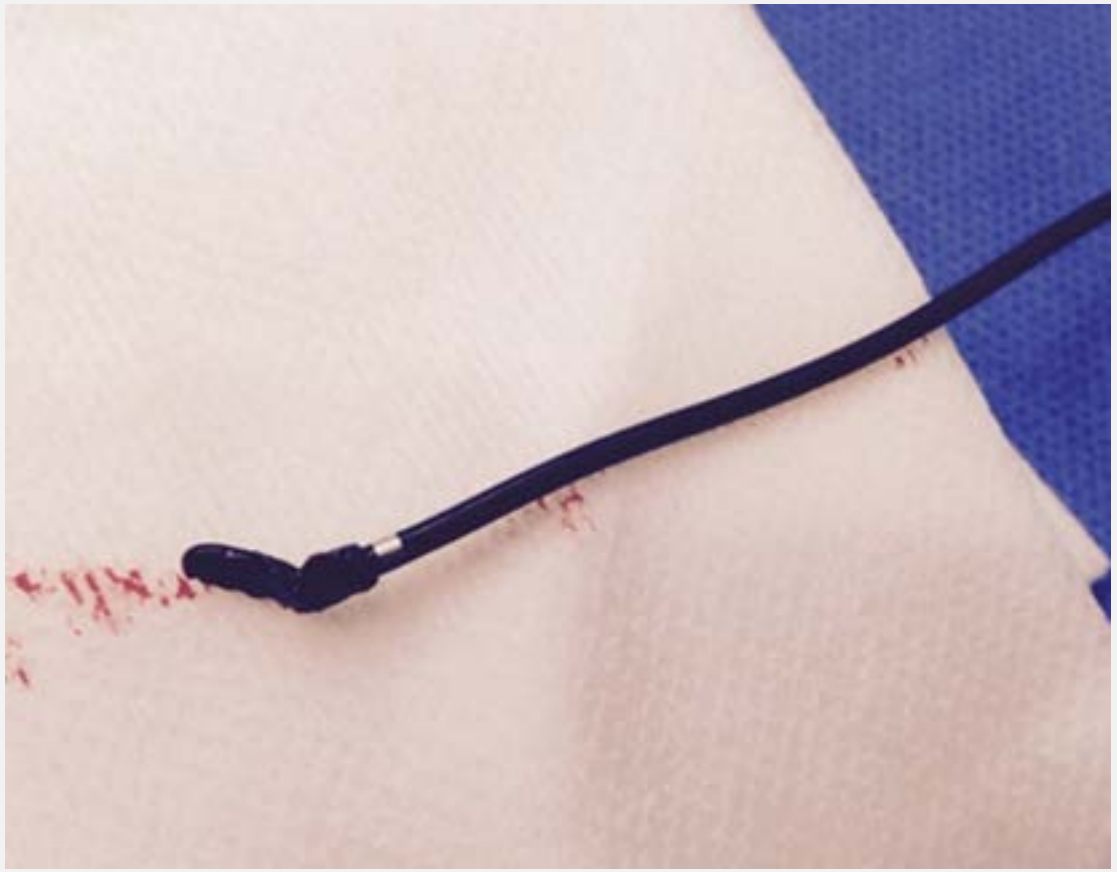


Fig. 3

CASE 2 CONTINUED

- *NIHSS upon arrival to NICU was 9. The patient experienced a dramatic improvement in symptoms with only mild aphasia and right facial weakness 24 hours post treatment. NIHSS 24 hours post treatment was 2. On hospital day 3, the patient was diagnosed with new onset atrial fibrillation. He was discharged home on hospital day 4 on warfarin and plans for outpatient speech therapy. At 90 days, the patient was nearly back to normal with a modified Rankin score of 1.*

CASE 2 CONTINUED

- *DC'd home on hospital day 4 on warfarin.*
- *90 day mRS 1.*
- *Follow-up MRI shows evidence of multiple infarcts in the left hemisphere consistent with embolic infarcts.*

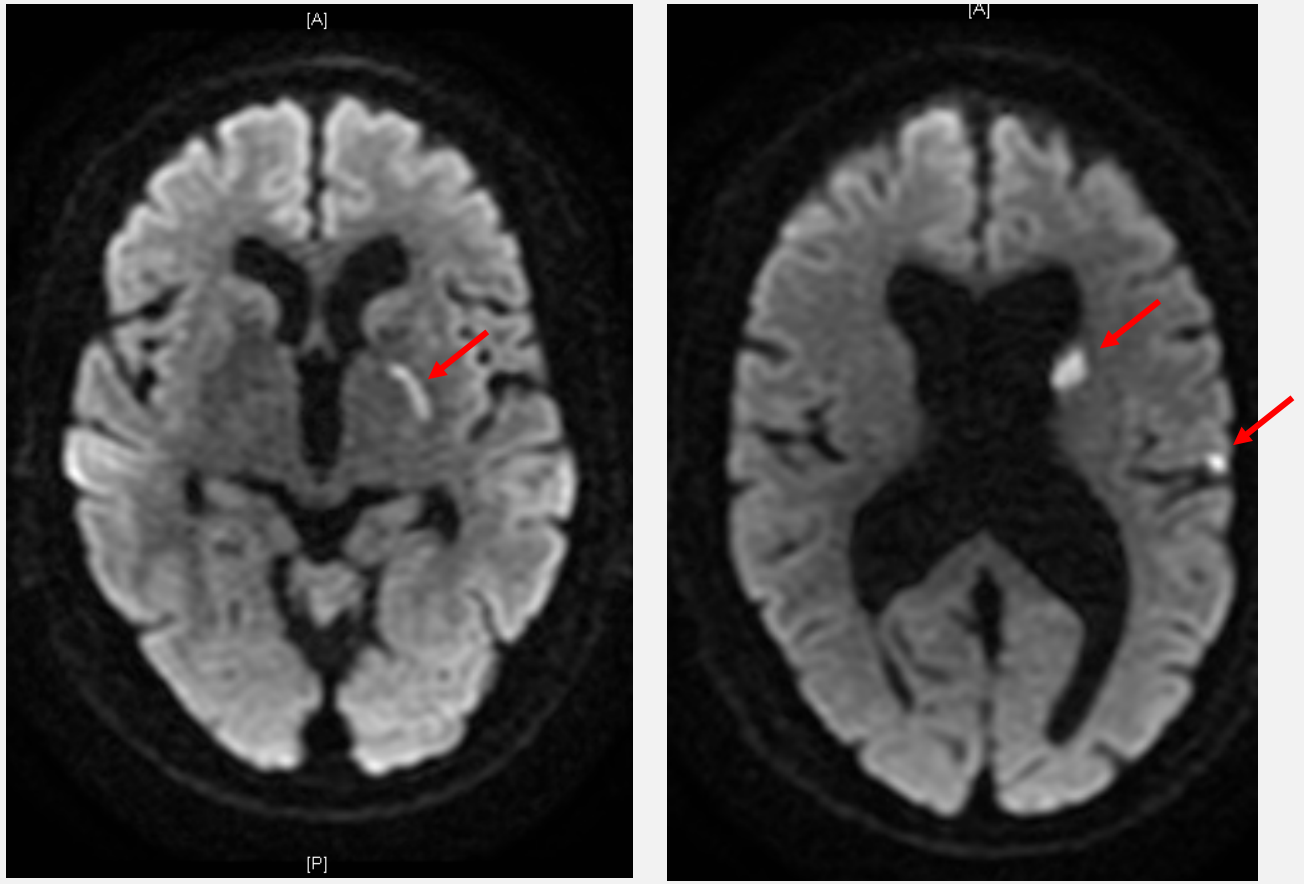


Fig. 4

CASE 2
TIMELINE

Actual Times of Treatment (Military Time)

- *Symptom onset – 11:15*
- *Local EMS calls flight – 11:37*
- *Flight arrives at 12:15 – Departs scene at 12:32*
- *Arrives to CSC at 12:47*
- *IV Alteplase started 13:04*
- *Arrives to INR (International Normalised Ratio) suite at 13:08*
- *Procedure time out 13:10*
- *Groin stick at 13:39*
- *TICI (Thrombolysis in Cerebral Infarction) 3 Recanalization at 14:40*

Time Intervals

- *Door to neurologist – 0 minutes*
- *Door to CT first slice – 10 minutes*
- *Door to needle – 17 minutes*
- *Door to groin puncture – 52 minutes*
- *Door to recanalization – 113 minutes*
- *Symptom onset to recanalization – 205 minutes*


For more information on
Acute Ischemic Stroke treatment, go to
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