

CASE STUDY 1 & 2

*Courtesy of:
Mitchell S.V. Elkind, MD, Columbia University
and Shadi Yaghi, MD, Brown University*





CASE 1

CASE 1

- *A 20 year old man with no past medical history presented to a primary stroke center with sudden left sided weakness and imbalance followed by decreased level of consciousness. Head CT showed no hemorrhage, no acute ischemic changes, and a hyper-dense basilar artery. CT angiography showed a mid-basilar occlusion.*



CASE 1 CONTINUED

- Head CT showed no hemorrhage, no acute ischemic changes, and a hyper-dense basilar artery (Figure 1, arrow). CT angiography showed a mid-basilar occlusion (Figure 2, arrow).



Fig. 1



Fig. 2

CASE 1 CONTINUED

- He received Alteplase intravenous tPA and was transferred to a comprehensive stroke center where angiography confirmed mid-basilar occlusion (Figure 3, arrow). He underwent mechanical thrombectomy (Figure 4) with recanalization of the basilar artery.
- His neurological exam improved and he was discharged to home after 2 days. At his 3 month follow up, he was back to normal and returned to college.



Fig. 3



Fig. 4





CASE 2

CASE 2

- *A 62 year old woman with a history of hypertension and hyperlipidemia presented to a primary stroke center with sudden onset of weakness of the right side. On examination, she had a global aphasia, left gaze preference, right homonymous hemianopsia (field cut), right facial droop, dysarthria, and right hemiplegia (NIH Stroke Scale = 22). Head CT showed only equivocal hypodensity in the left middle cerebral artery territory (Figure 1 on next slide). CT angiography showed a left middle cerebral artery occlusion (Figure 2 on next slide, arrow). She was given Alteplase intravenous tPA at 2 hours from symptom onset and transferred to a comprehensive stroke center, where digital subtraction angiography confirmed left middle cerebral artery occlusion (Figures 3 and 4 on slide 9, arrows). She underwent mechanical thrombectomy with recanalization of the MCA (Figure 5 on slide 9). The next day, she had only a very mild expressive aphasia and right facial droop (NIHSS = 2). Three months later she had no neurological deficits (NIHSS=0).*



CASE 2 CONTINUED



Fig. 1



Fig. 2



CASE 2 CONTINUED



Fig. 3

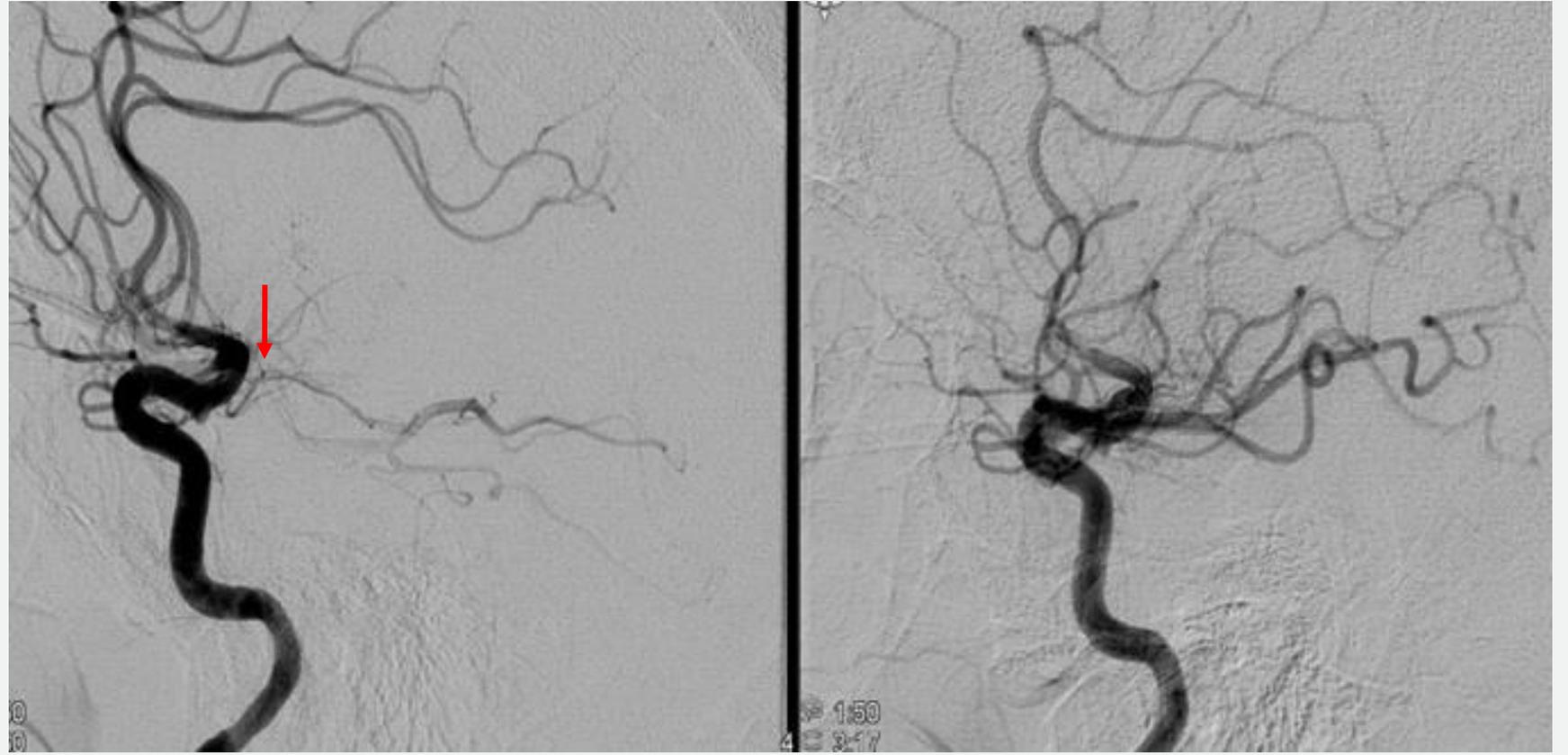


Fig. 4

Fig. 5

CASE STUDY 3 & 4

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





CASE 3

CASE 3: 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 3 CONTINUED

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

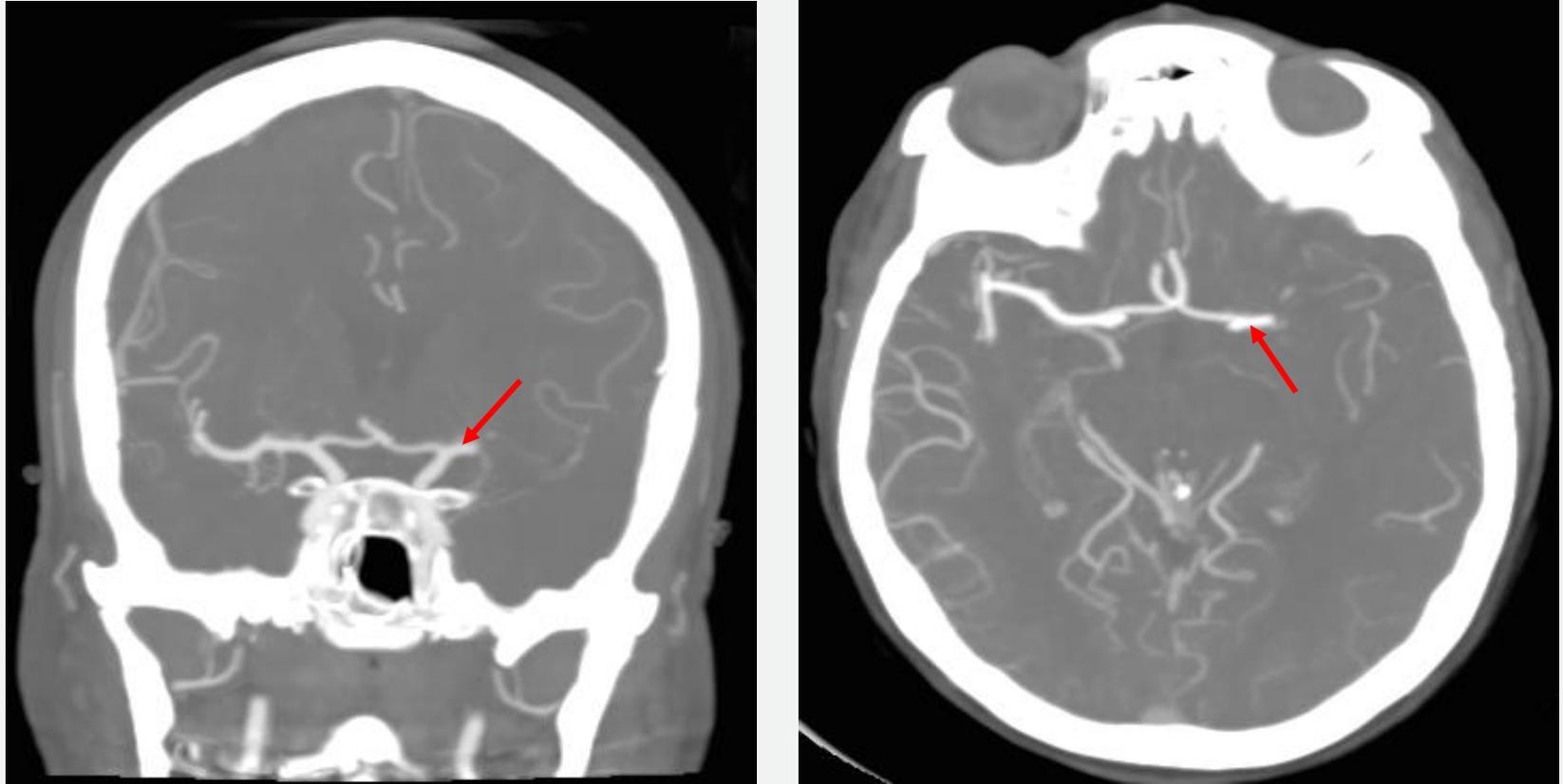


Fig. 1



CASE 3 CONTINUED

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

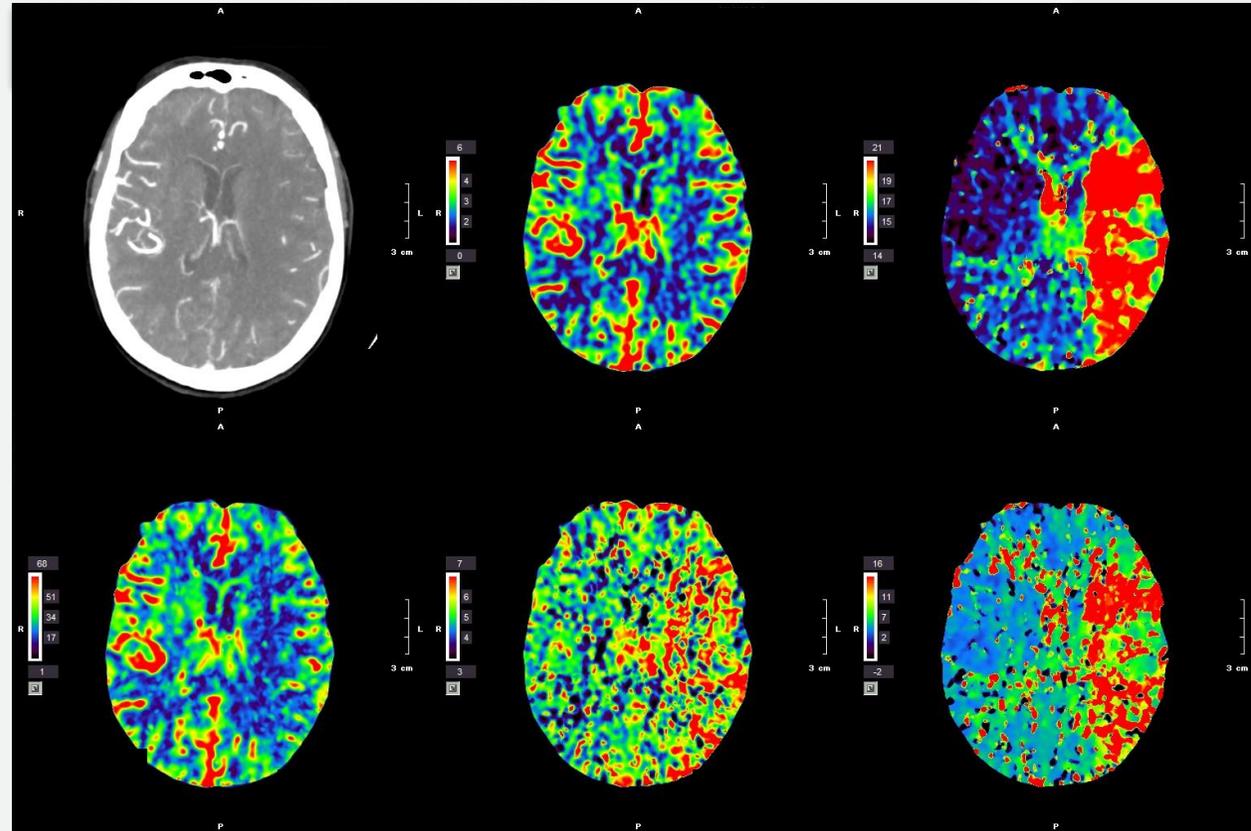


Fig. 2



CASE 3 CONTINUED

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

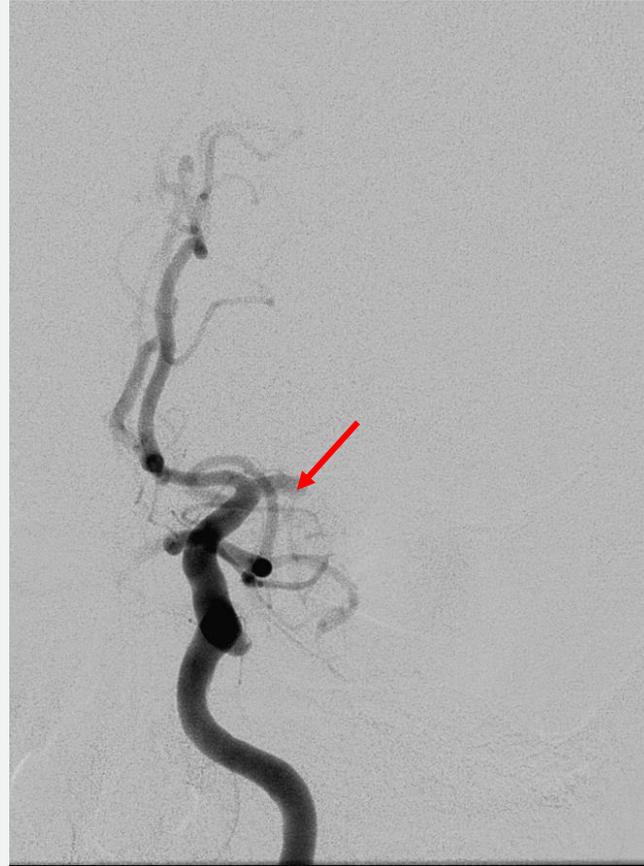


Fig. 3



CASE 3 CONTINUED

- *Mechanical thrombectomy with stent retriever and suction aspiration was performed with successful TIC1 (Thrombolysis in Cerebral Infarction) 3 revascularization.*



Fig. 4

CASE 3 CONTINUED

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

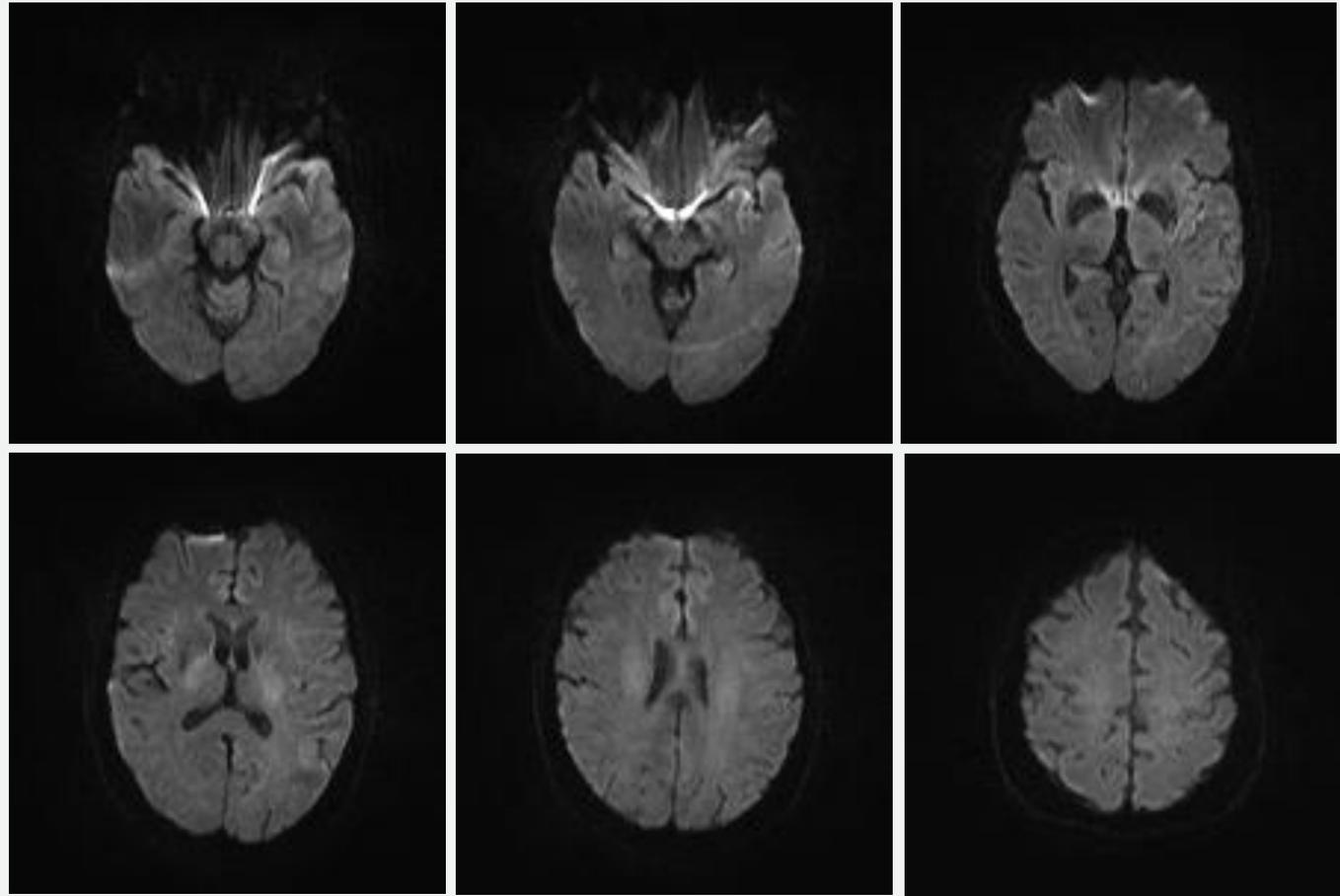


Fig. 5





CASE 4

CASE 4: ACUTE RIGHT M1 OCCLUSION TREATED WITH MECHANICAL THROMBECTOMY AFTER “DRIP & SHIP” IV TPA

- *The patient is a 38 year old man who developed sudden left hemiparesis.*
- *He was taken to his local hospital ED.*
- *After a telephone consultation with a stroke neurologist, he was given Alteplase IV tPA. Needle time was 1 hour 30 min after symptom onset.*
- *He was then transferred to a comprehensive stroke center (“drip and ship”).*
- *On arrival to our ED, his NIHSS was 11.*



CASE 4 CONTINUED

- *CTA showed right MCA occlusion.*

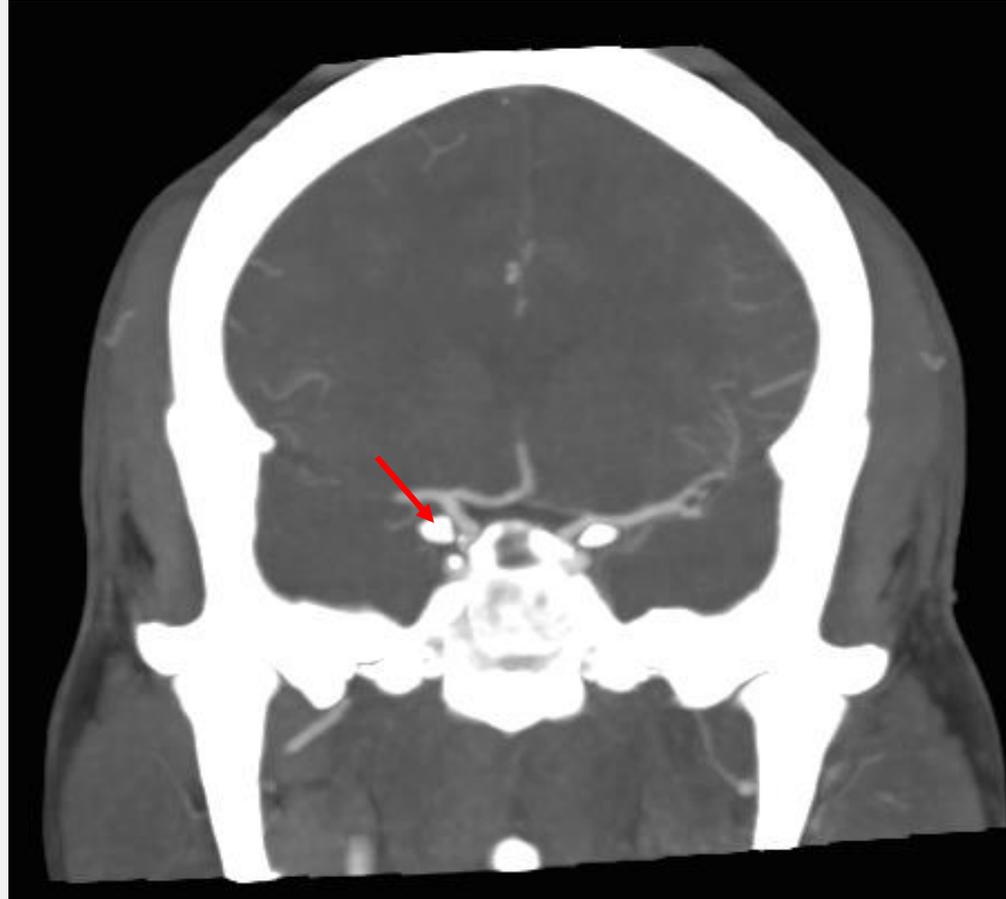
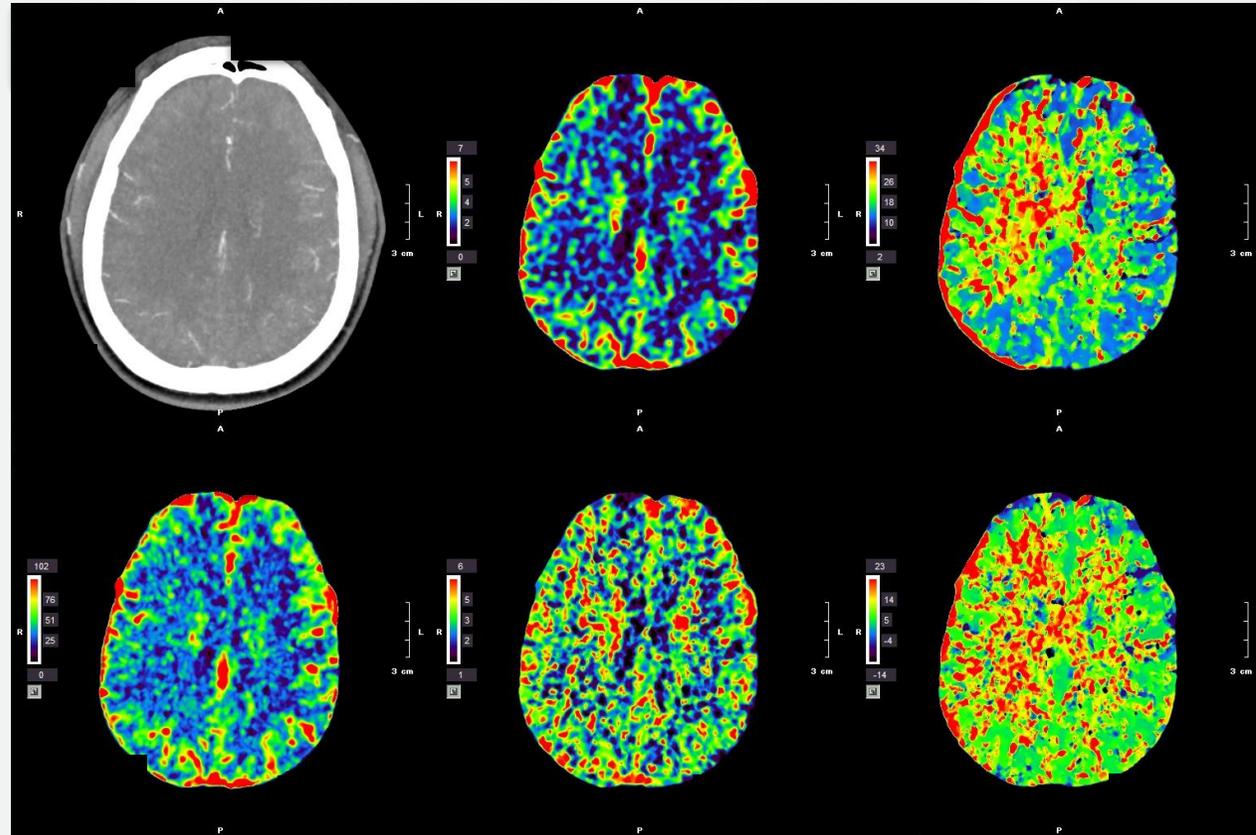


Fig. 1



CASE 4 CONTINUED

- *CT perfusion images show hypoperfusion to the right hemisphere.*



CASE 4 CONTINUED

- *Angiography confirmed right MCA occlusion.*
- *He was taken emergently to the neuroendovascular suite.*



Fig. 3



CASE 4 CONTINUED

- *Mechanical thrombectomy with stent retriever and suction aspiration was performed.*
- *There was excellent recanalization of the MCA (image on the right).*



Fig. 4

CASE 4 CONTINUED

- *He had a full recovery and was discharged home 5 days later.*

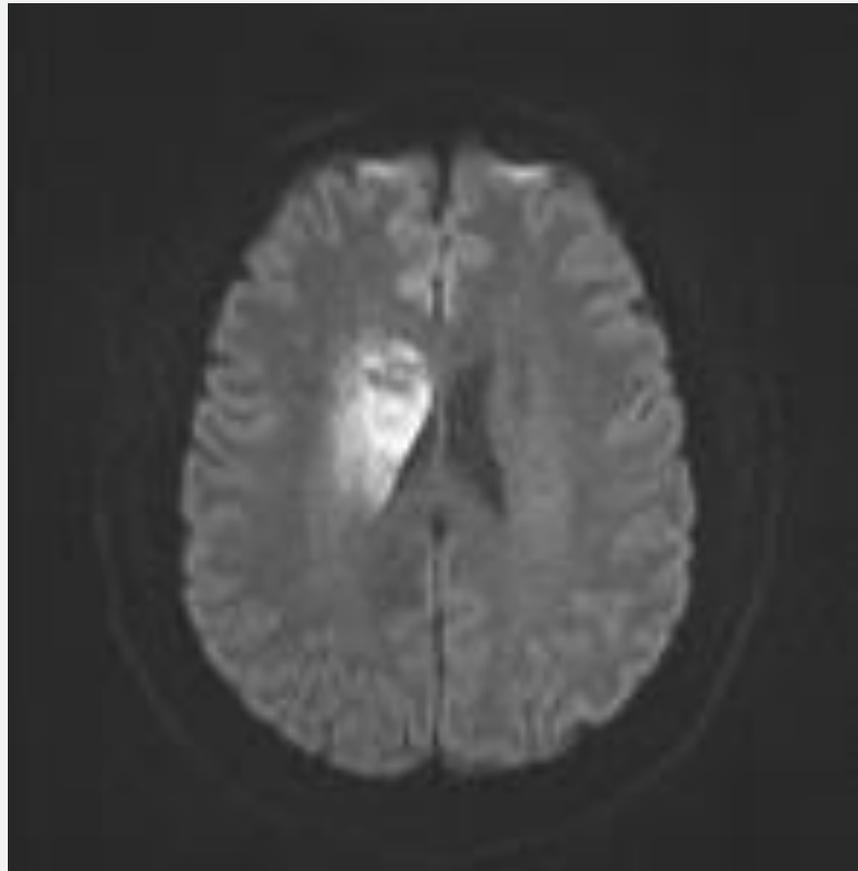


Fig. 5



CASE STUDY 5

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



CASE 5: 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 5 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.

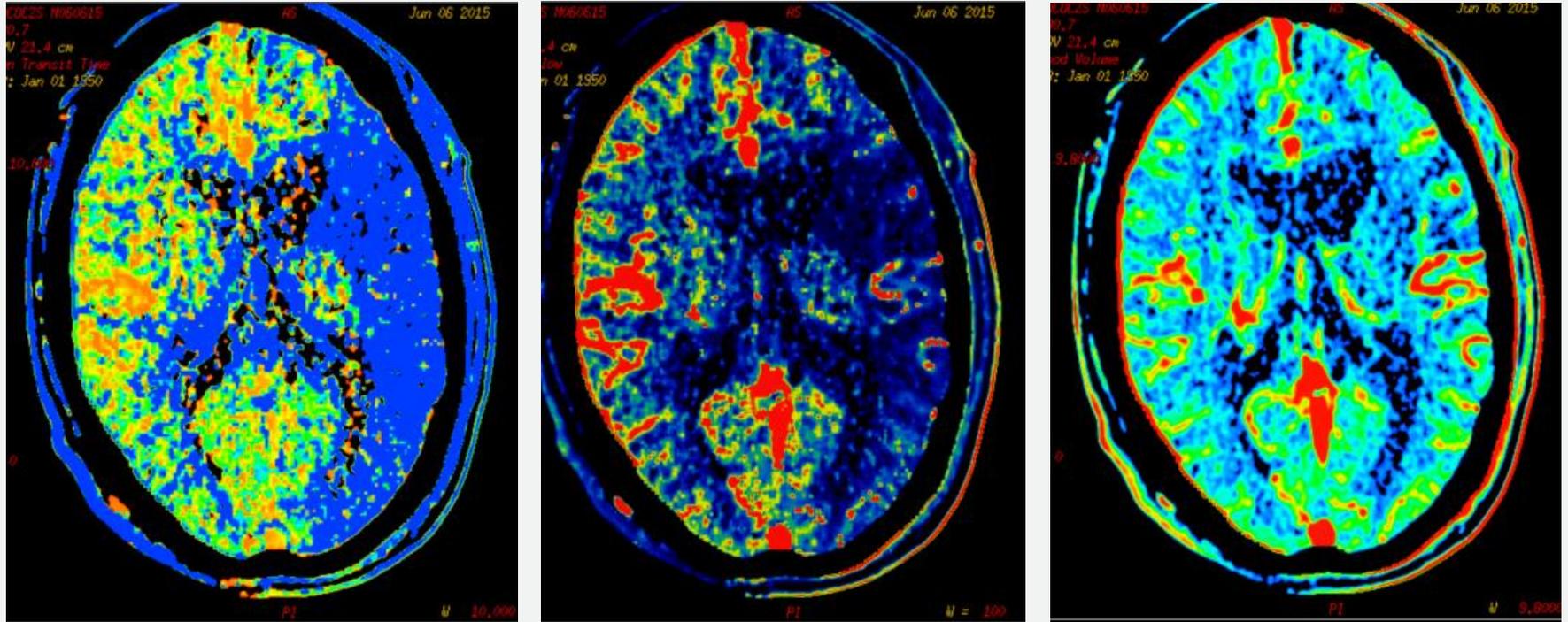


Fig. 1 - CT Perfusion with large mismatch

CASE 5 CONTINUED

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

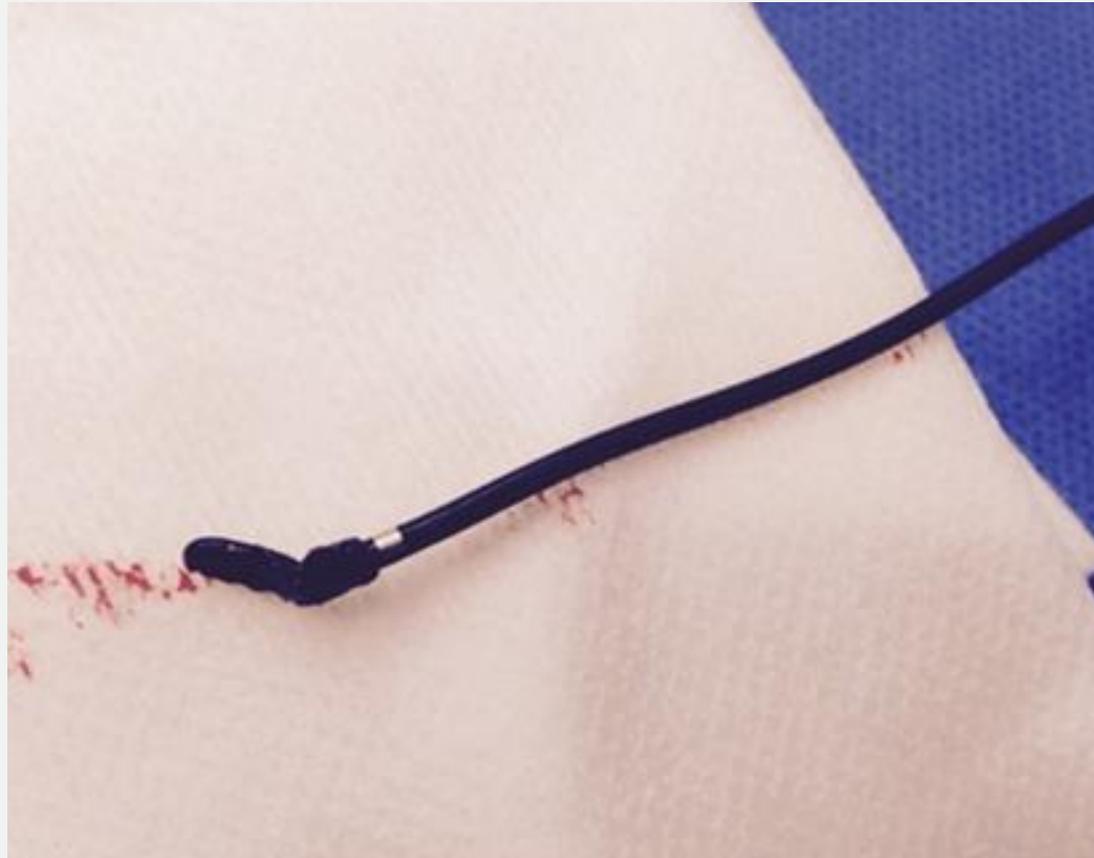


Fig. 3



CASE 5 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 5 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.

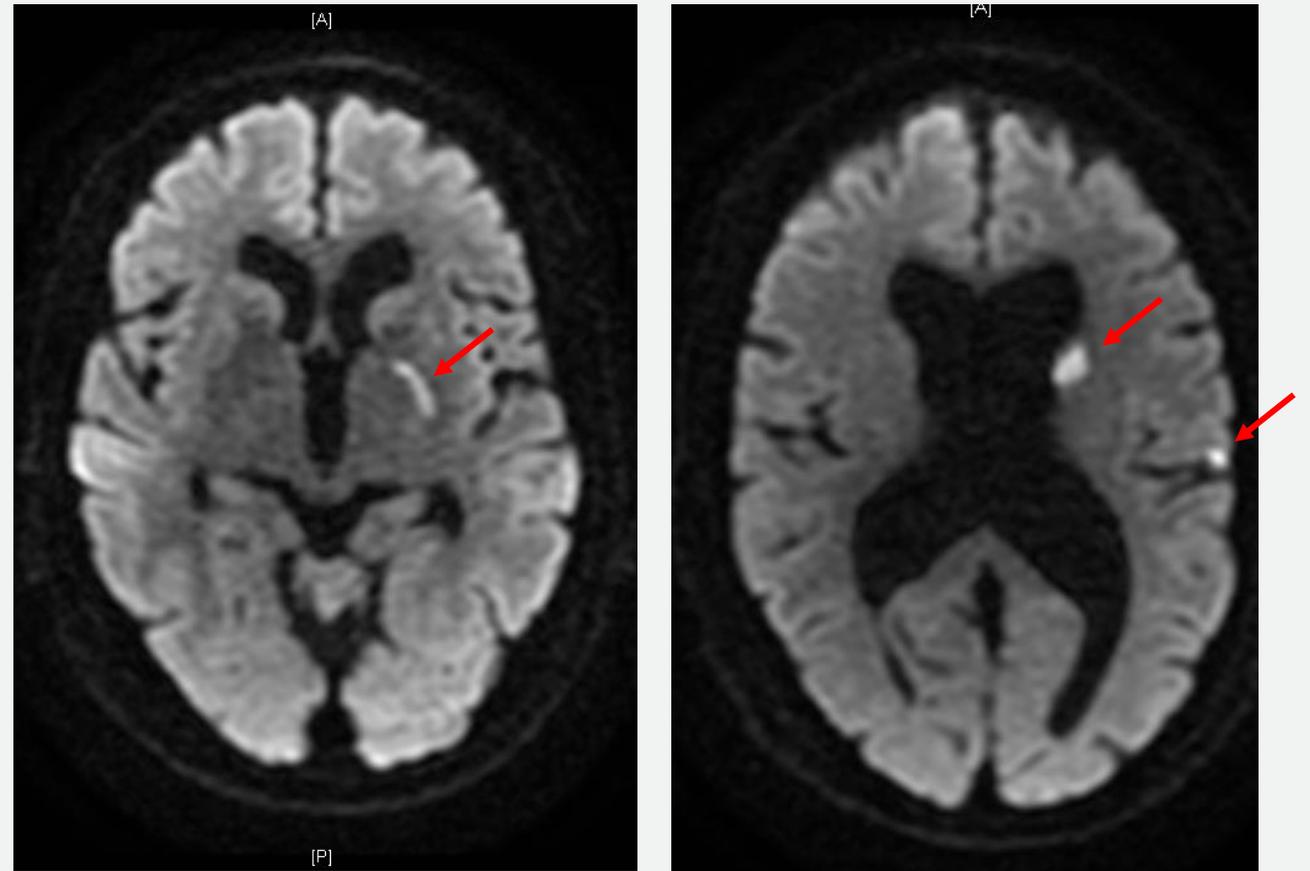


Fig. 4

CASE 5

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





**Together
to End Stroke™**

Nationally sponsored by
Medtronic

LVO CASE STUDIES

Columbia University Medical Center





CASE 6

CASE 6

- *62 year old man with atrial fibrillation on warfarin presented with sudden-onset left-sided weakness. His international normalized ratio (INR) was 1.4.*
- *Pre-notified by EMS, Cincinnati Pre-hospital Screening Scale (CPSS) positive, brought directly to comprehensive stroke center (CSC).*
- *NIHSS 22 for right MCA syndrome.*
- *Non-contrast head CT with no early infarct changes, no hemorrhage (figure 1).*
- *Alberta Stroke Program Early CT score (ASPECT) 10.*
- *CTA with right M1 cut-off (figure 2).*
- *He received Alteplase IV r-tPA with a door-to-needle time of 45 minutes, 90 minutes after symptom onset.*



CASE 6 CONTINUED



Fig. 1



Fig. 2



CASE 6 CONTINUED

- Patient taken for endovascular therapy where angiography confirmed right M1 cut-off (figure 3A). He underwent thrombectomy with a combination use of a stent-retriever and intra-arterial Alteplase IV r-tPA, with Thrombolysis in Cerebral Infarction (TICI III) recanalization (figure 3B).
- Follow-up imaging showed minimal infarct burden (figure 4).
- The patient had an excellent clinical outcome. He left the hospital with an NIHSS of 0, completely functionally independent.

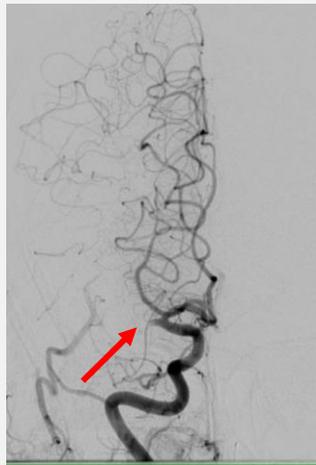


Fig. 3A



Fig. 3B

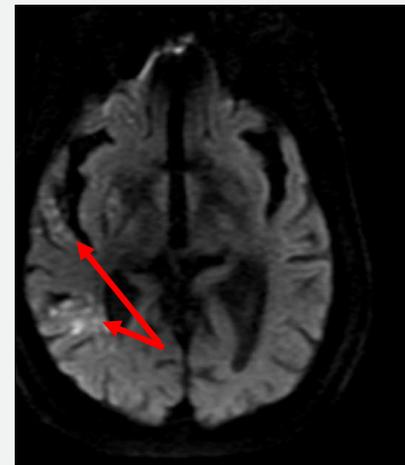
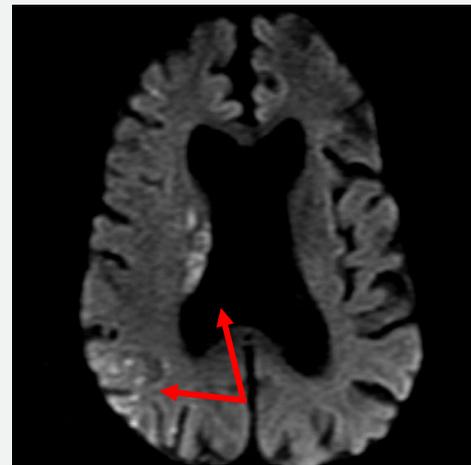


Fig. 4





CASE 7

CASE 7

- *56 year old man with hypertension presented to a primary stroke center (PSC) with acute-onset right-sided weakness and inability to talk.*
- *NIHSS 23 on presentation, consistent with large left MCA syndrome.*
- *Non-contrast head CT showed a dense L MCA (figure 1A) without early infarct changes, ASPECTS 10 (figure 1B).*
- *He received Alteplase IV r-tPA with a door-to-needle time of 27 minutes, 54 minutes from symptom onset.*



CASE 7 CONTINUED

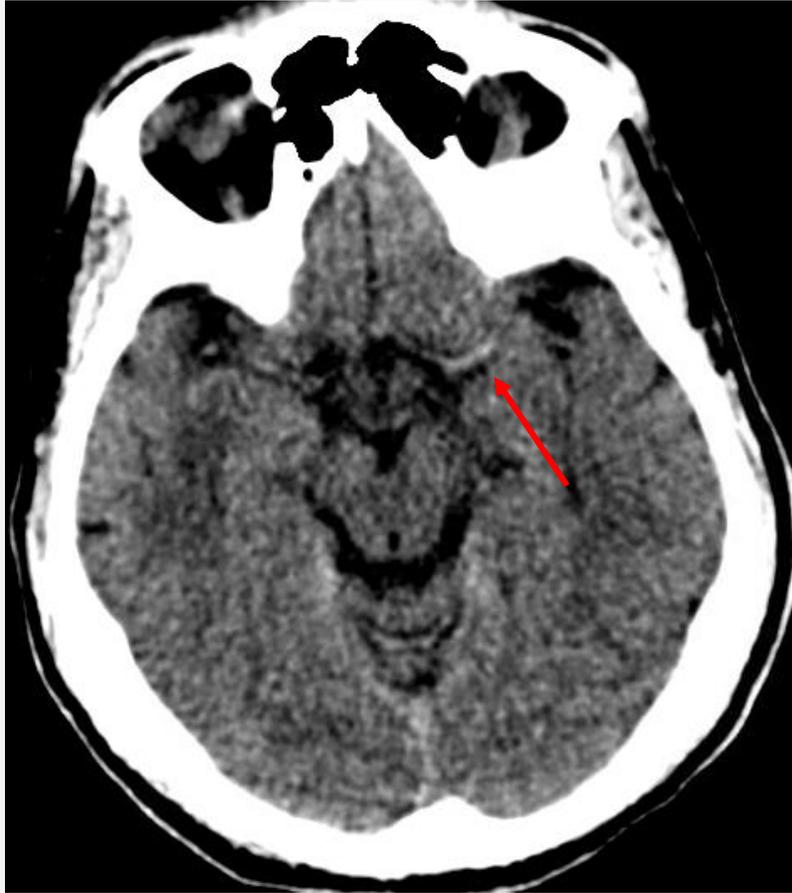


Fig. 1A

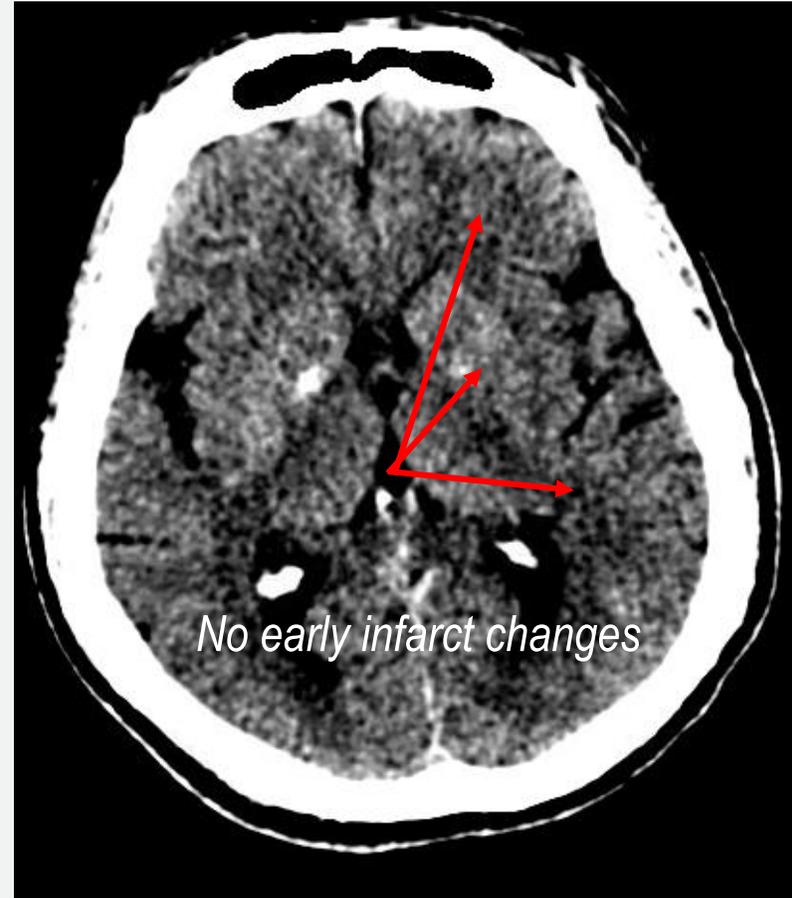


Fig. 1B



CASE 7 CONTINUED

- Transfer activated to comprehensive stroke center (CSC) given suspicion for large vessel syndrome.
- CTA head obtained at PSC while waiting for transfer showed a proximal L M2 cut-off (figure 2).

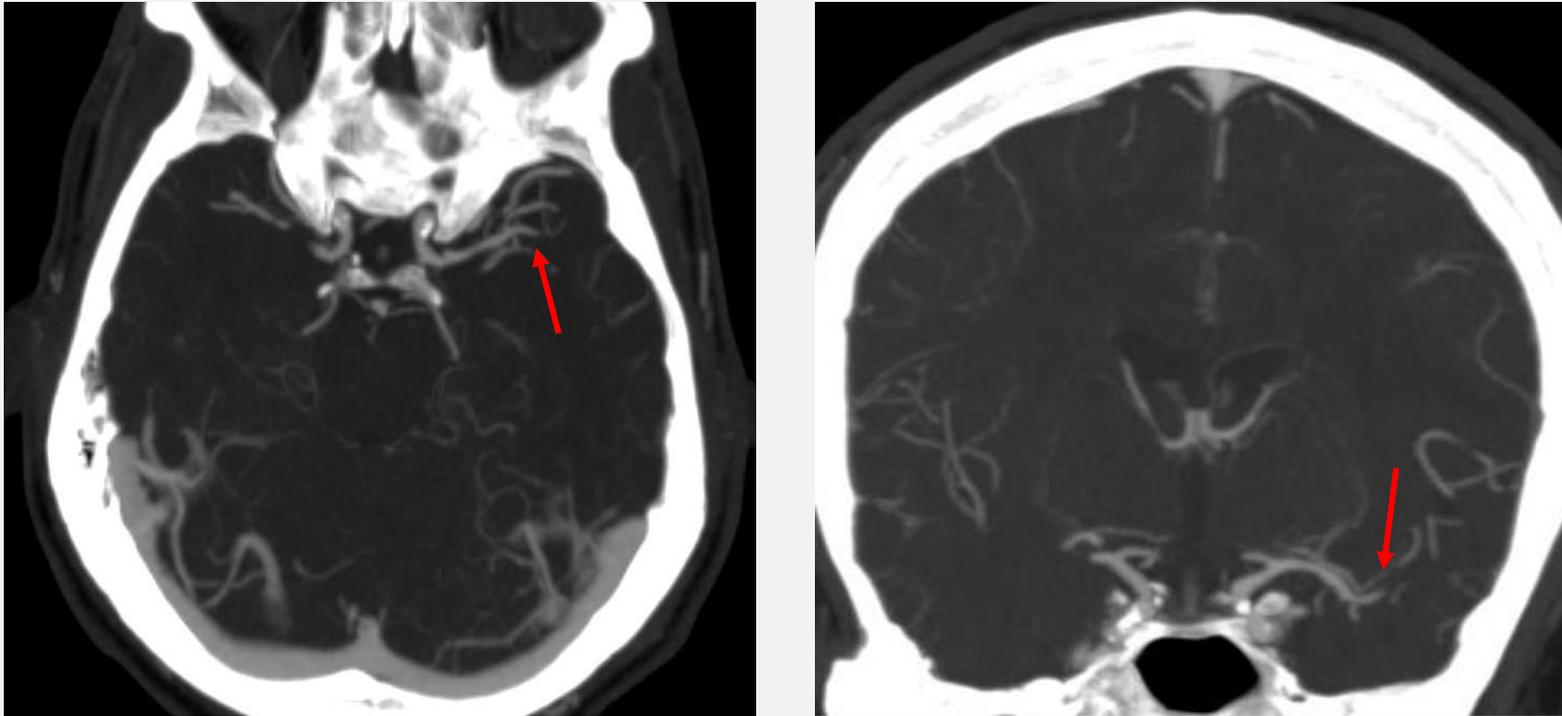


Fig. 2



CASE 7 CONTINUED

- Patient taken directly to angio suite on arrival at CSC.
- Proximal left internal carotid artery stenosis (figure 3A) and left M2 cut-off visualized (figure 3B).
- Thrombectomy achieved TICl Ib re-canalization of left MCA (figure 4).



Fig. 3A



Fig. 3B



Fig. 4



CASE 7 CONTINUED

- *NIHSS 0 24h after tPA.*
- *Minimal infarct on MRI (figure 5).*
- *Uncomplicated carotid endarterectomy hospital day #3.*
- *Discharged home on hospital day #5 without significant neurologic deficit (NIHSS 0).*

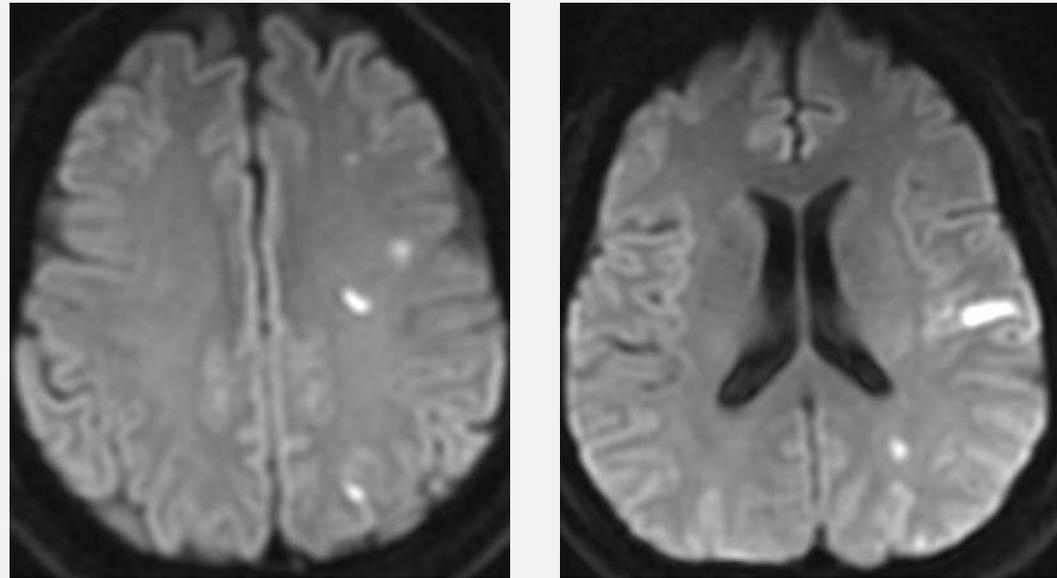


Fig. 5





CASE 8

CASE 8

- 85 year old woman with atrial fibrillation off anticoagulation presented with sudden-onset left-sided weakness and confusion.
- Pre-notified by EMS, NIHSS 19 on ED arrival.
- Non-contrast head CT showed ASPECTS 9 with early ischemic changes in basal ganglia (figure 1).
- CTA showed R M1 cut-off (figure 2).
- CTA source images showed ASPECTS 7 (figure 3).



CASE 8 CONTINUED

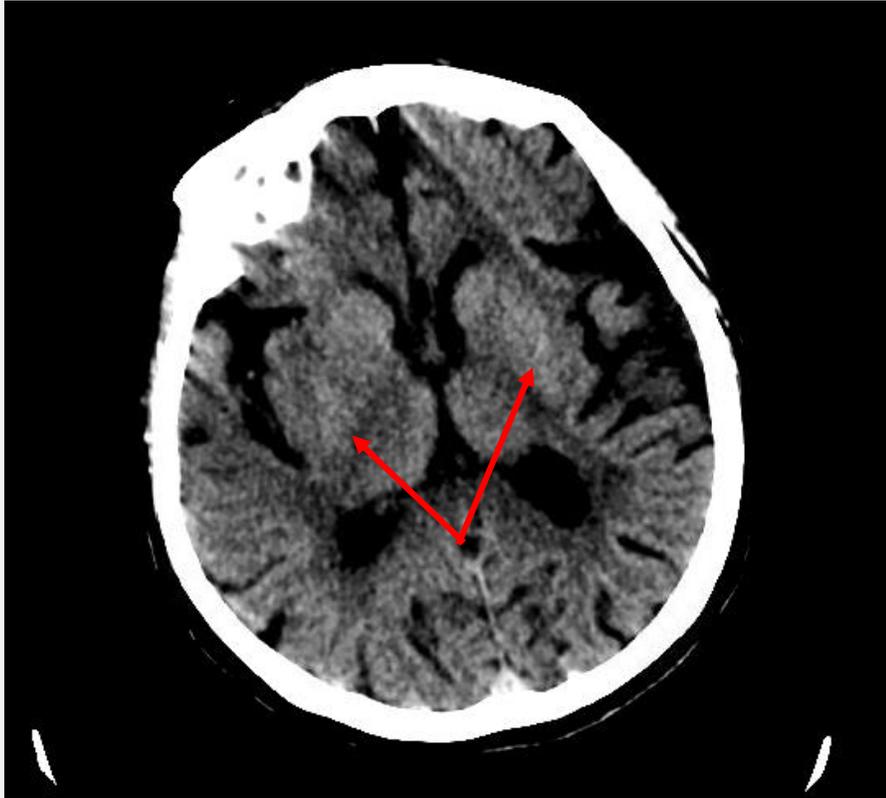


Fig. 1

*ASPECTS 9 for loss of differentiation
of right putamen compared with left*

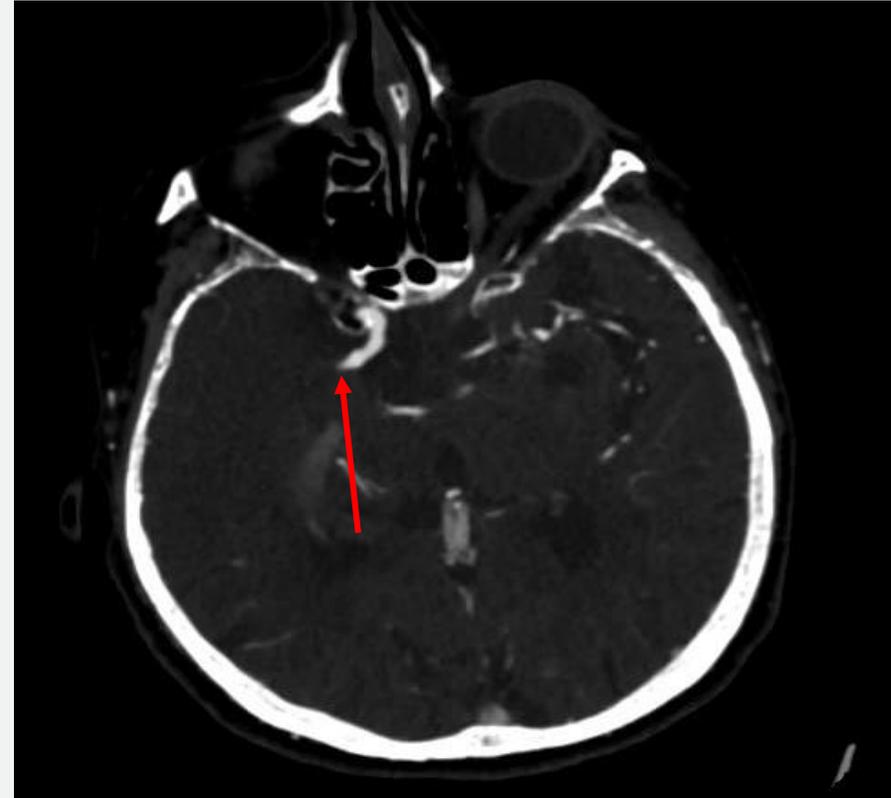


Fig. 2



CASE 8 CONTINUED



Fig. 3

On CTA source images early infarct changes are seen in the insula, basal ganglia and inferior division R MCA



CASE 8 CONTINUED

- Alteplase IV r-tPA given with a door-to-needle time of 23 minutes, 66 minutes after symptom onset.
- Patient taken for angio where right M1 cut-off was confirmed (figure 4).
- Thrombectomy achieved TICl III re-canalization (figure 5).
- Patient discharged to a subacute nursing facility for rehab with NIHSS 2.

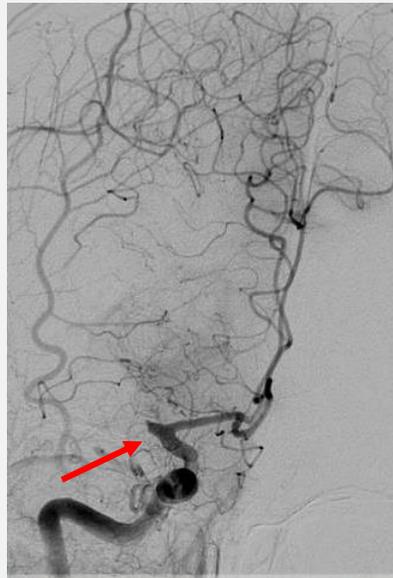


Fig. 4

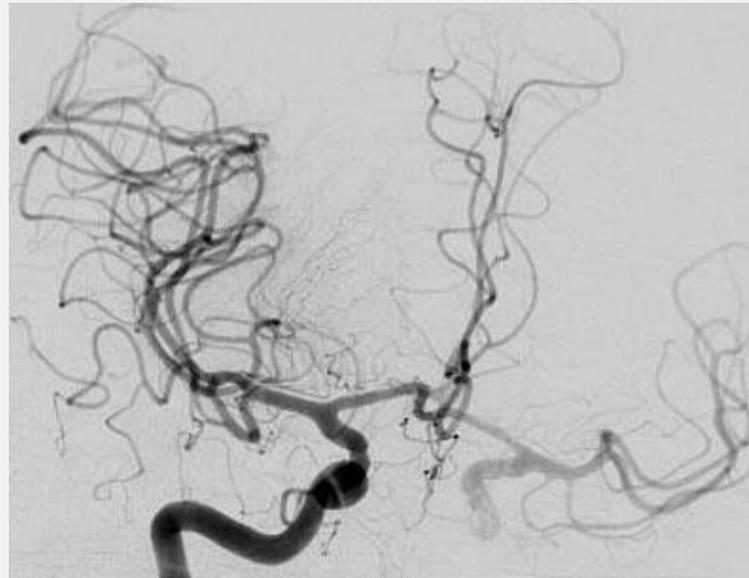


Fig. 5

For more information on
Acute Ischemic Stroke treatment, go to
[StrokeAssociation.org/AISToolkit](https://www.strokeassociation.org/AISToolkit)



American
Heart
Association

American
Stroke
Association®

Together
to End Stroke™

Nationally sponsored by
Medtronic