How to manage complications of carotid stenting-case based lecture

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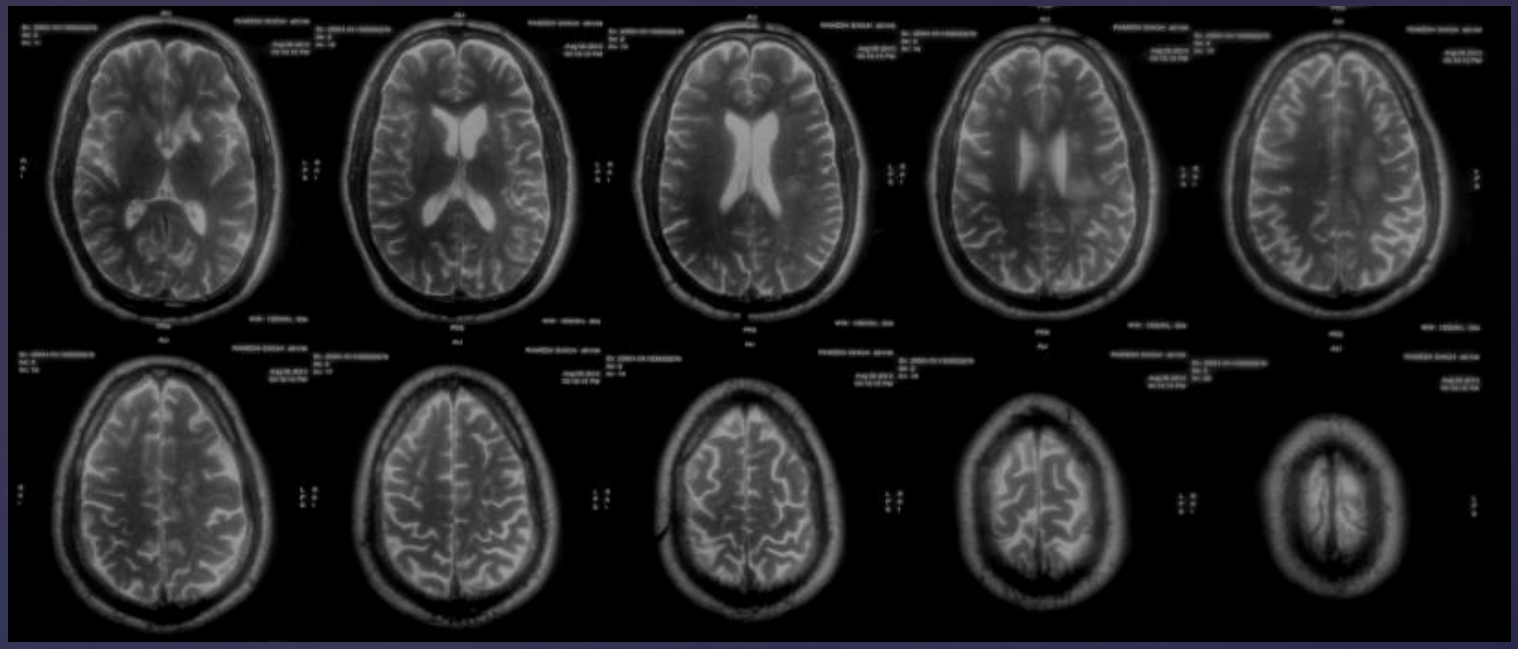
Disclosures

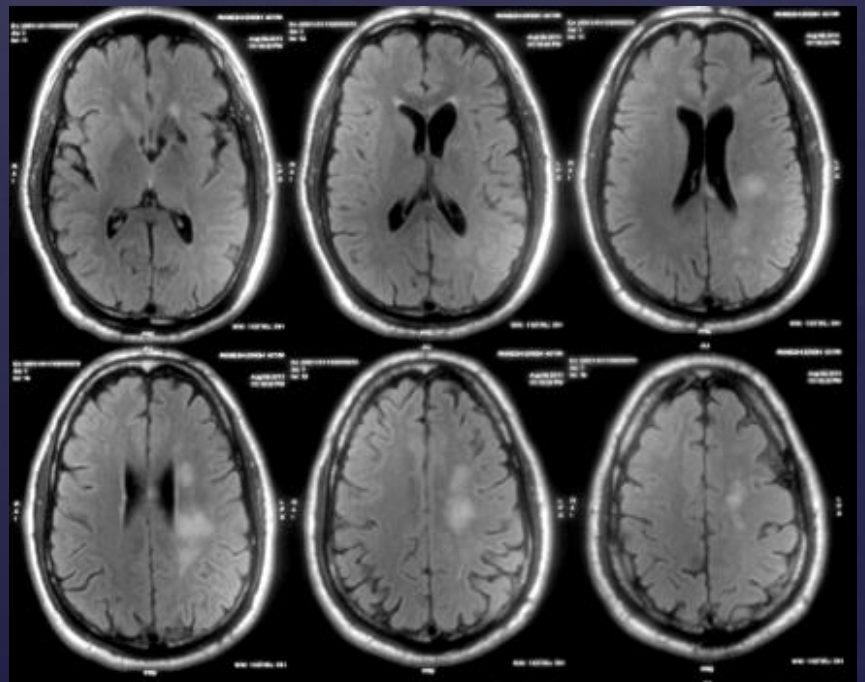
- No disclosures to make
- No financial or conflict of interests

Case 1

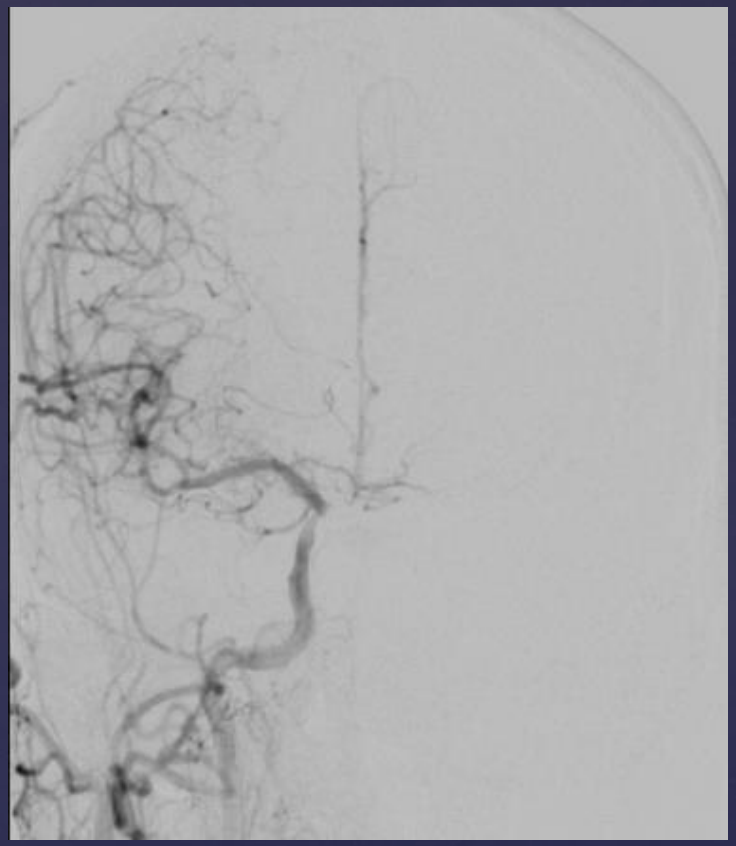
CASE DESCRIPTION:

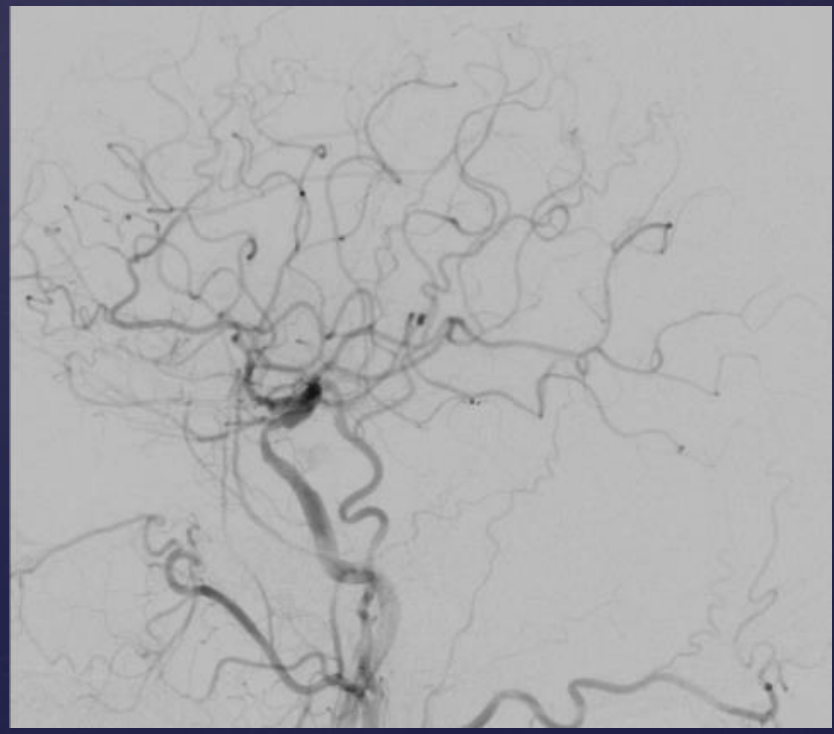
- A 49- year-old hypertensive man was referred to our hospital for assessment 3 months after experiencing a left hemispheric ischemic stroke with aphasia.
- Risk factors: HT,DM,CAD, Smoking
- MRI and MRA-
- Planned for stenting
- DSA-25/Nov/13

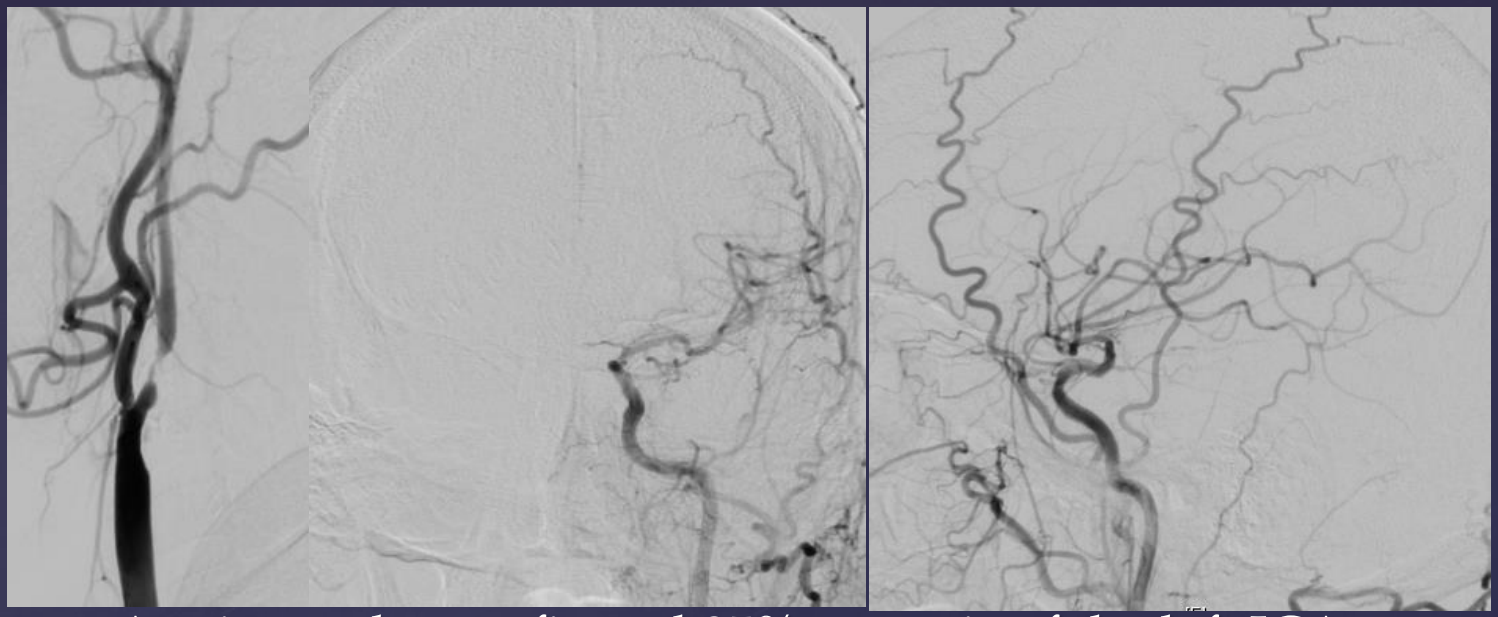




RCCA



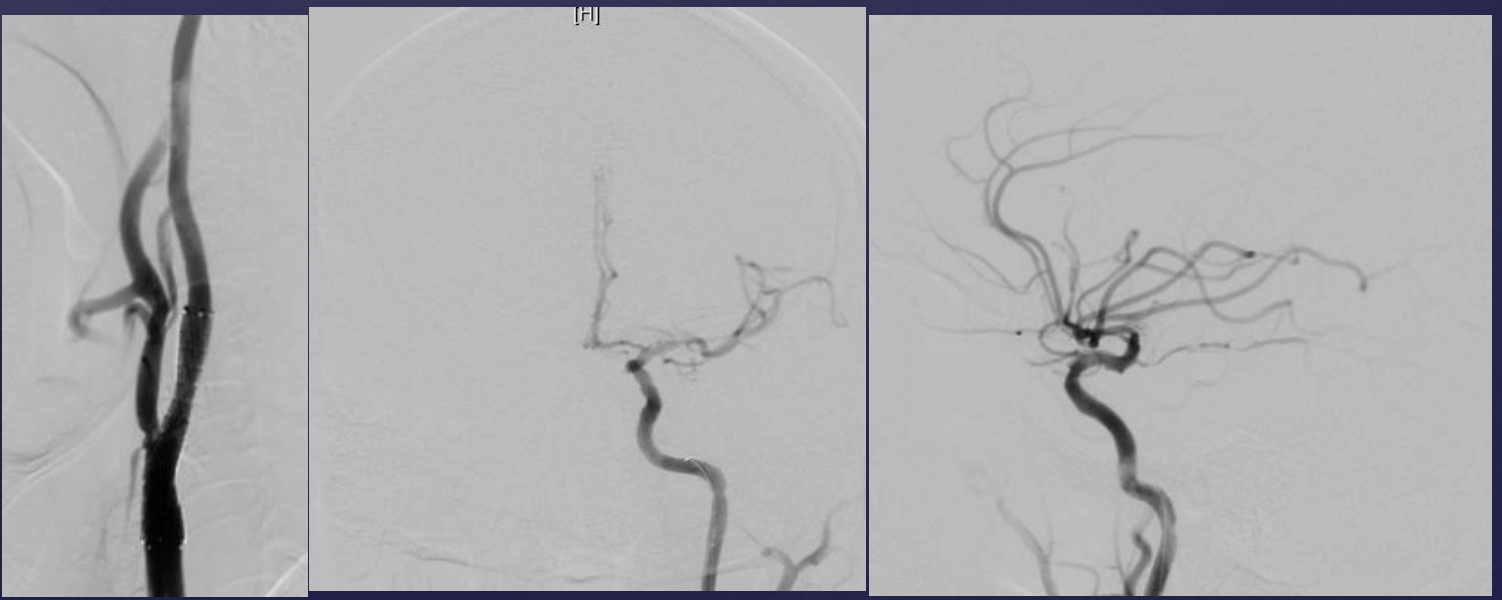




Pre-stent-LCCA

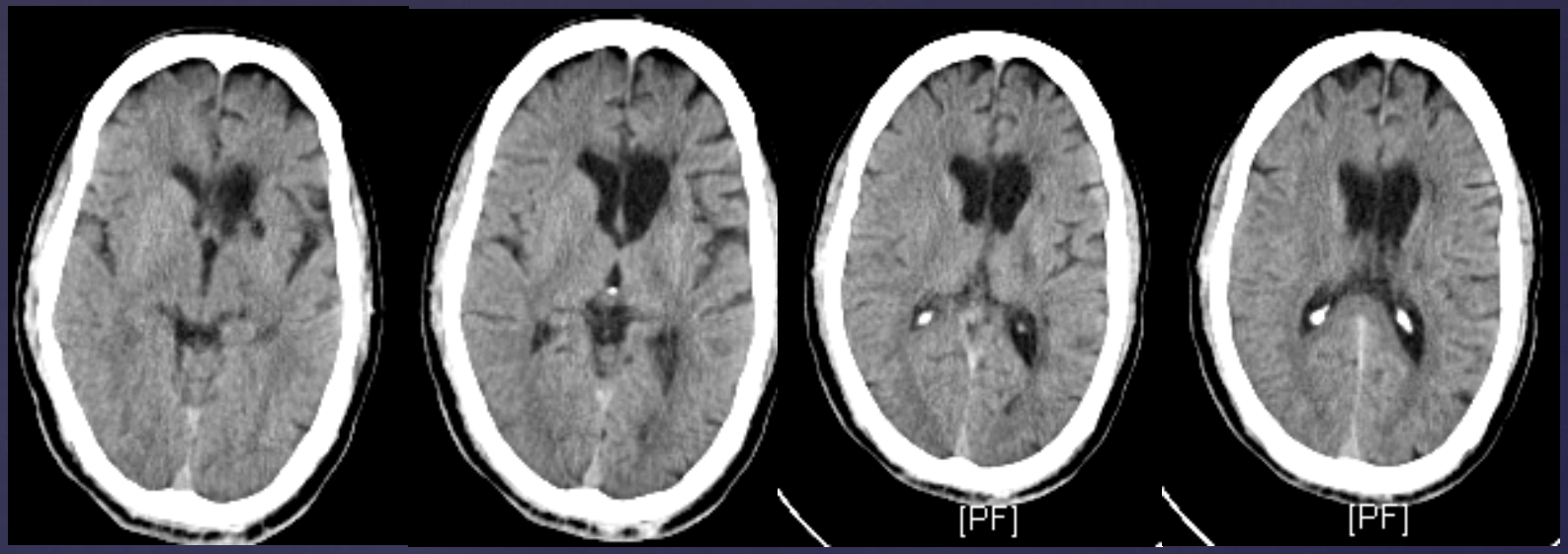
- Angiography confirmed 95% stenosis of the left ICA.

Left carotid percutaneous transluminal stenting was performed without any initial complications

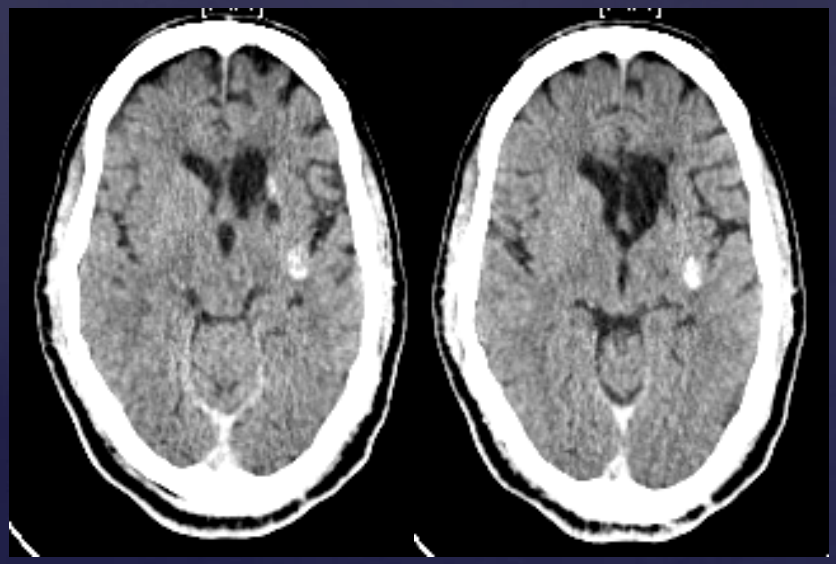


Post-stent-LCCA

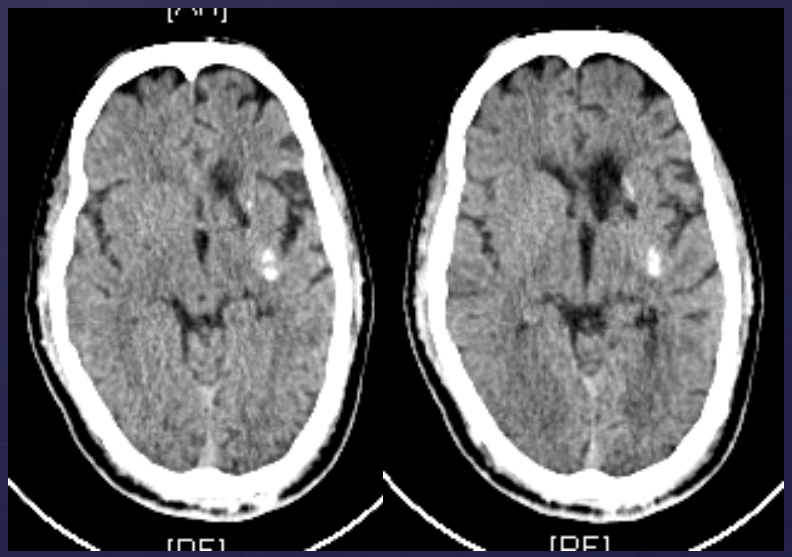
Pre Stenting NCCT Head



Immediate Post Stenting

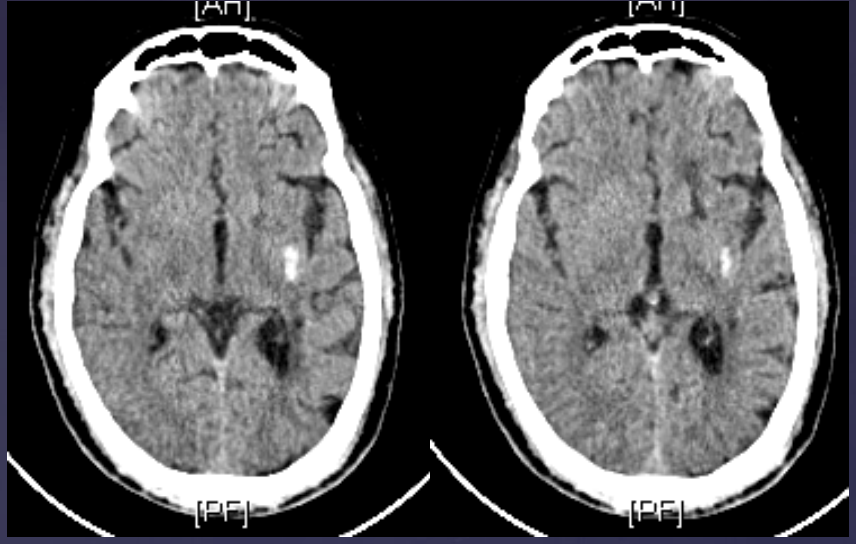


6 hours after Stenting



- Aspirin 75mg OD on 25/11/13
- Tab clopidogrel 75mg OD

- On 28th Nov-(Day 4) patient developed headache, vomiting and alteration of sensorium
- E2V1M4
- CT of the brain revealed extensive intracerebral hemorrhage (ICH), Received platelet concentrate and FFP
- Blood pressure was elevated at the time of the deterioration.



Day 2 after Stenting

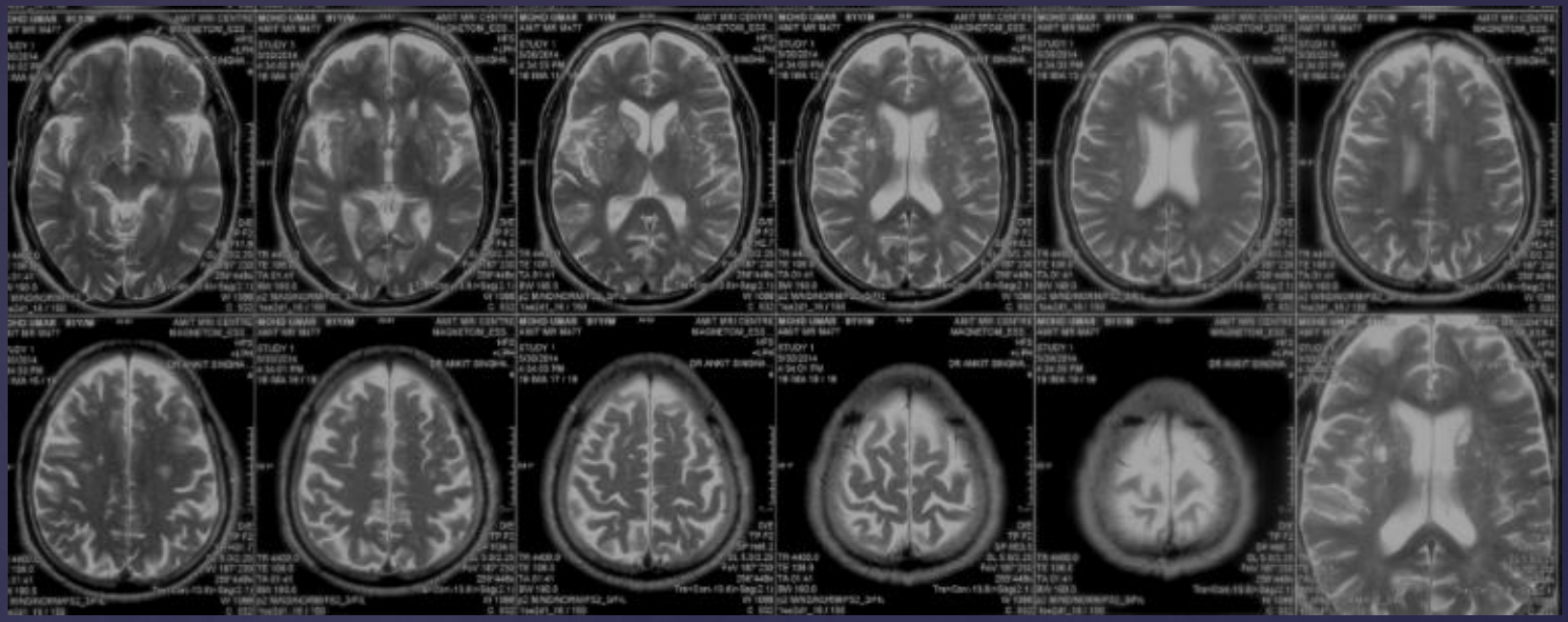
4 Days after Stenting

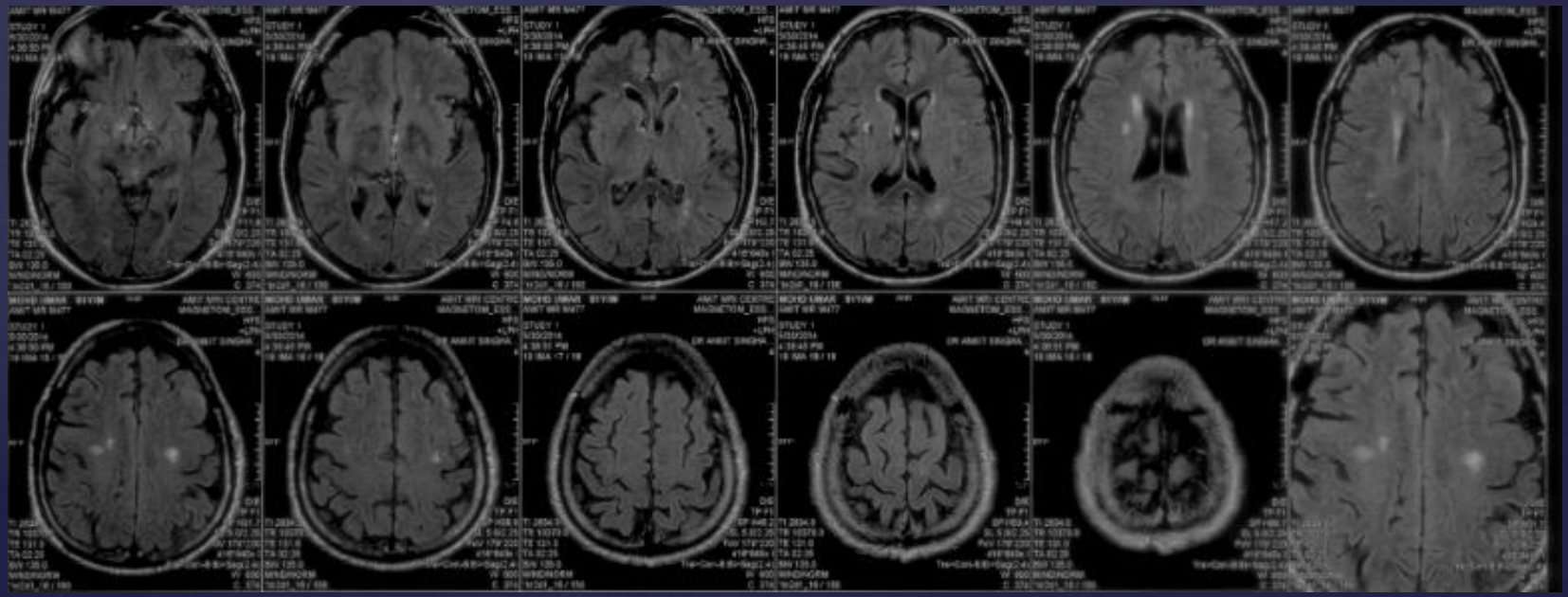



- Neurosurgery consult-EVD inserted
- 9pm-E1VTM2
- Pupil-right-3mm,reacting to light, left 5mm non reacting
- He subsequently died.

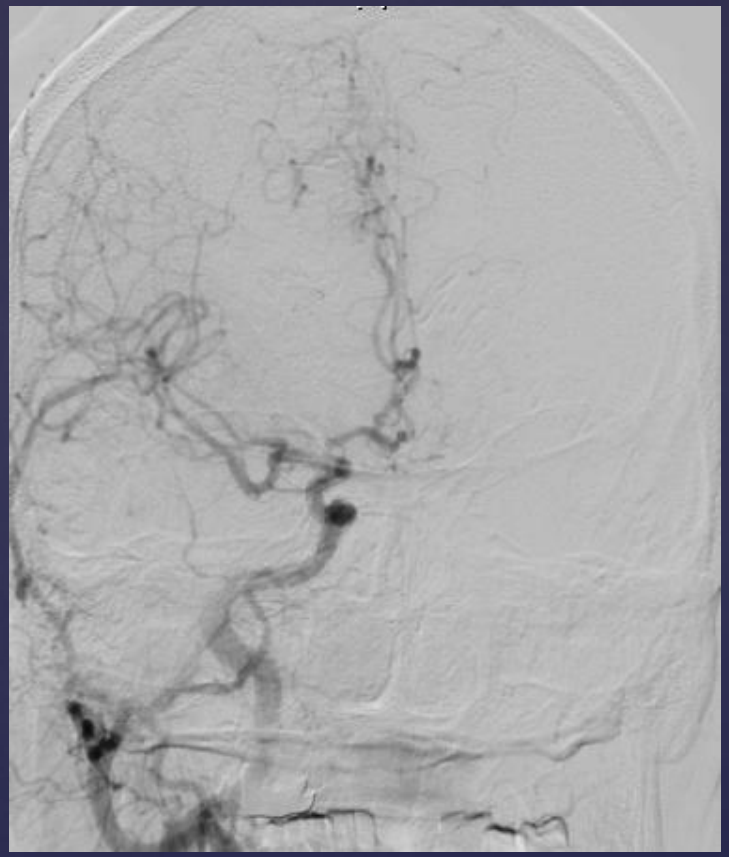
Case 2

- 81-year-old man had recurrent right hemiparesis for 20 days.
- Risk factors: Hypertension/DM

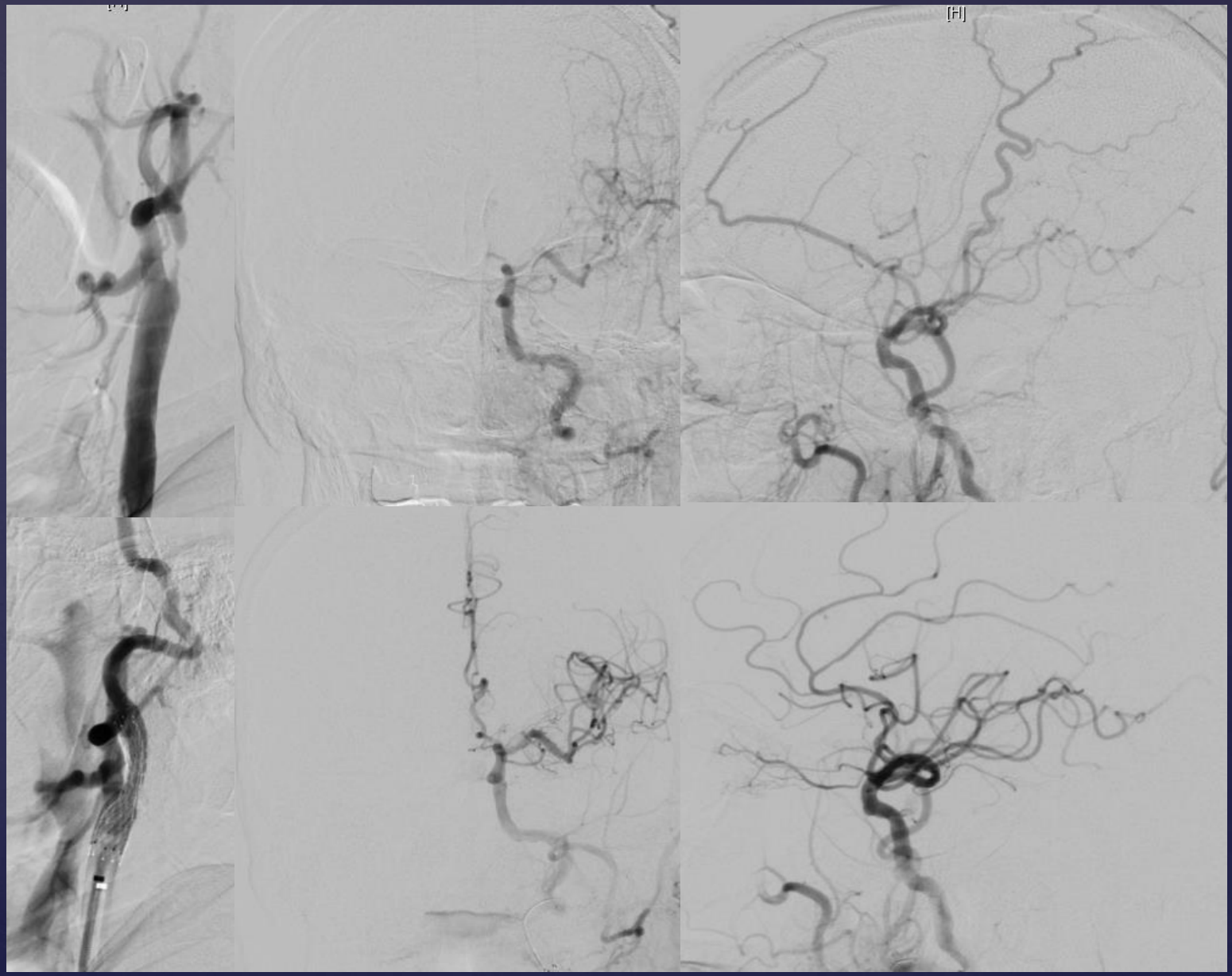




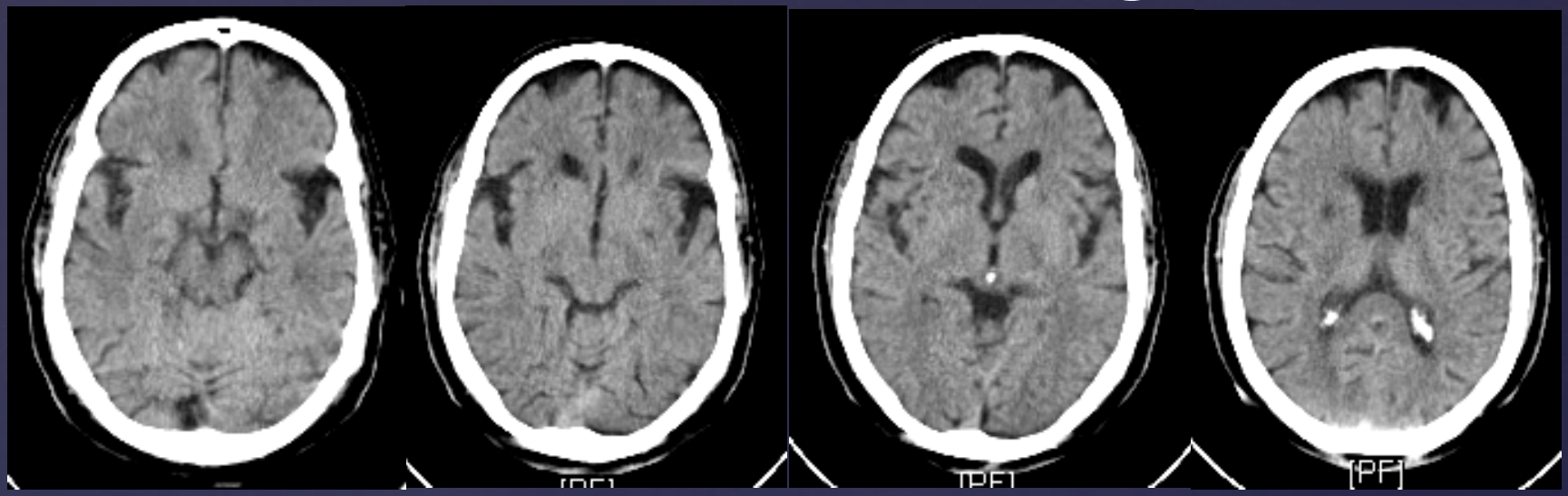
RCCA



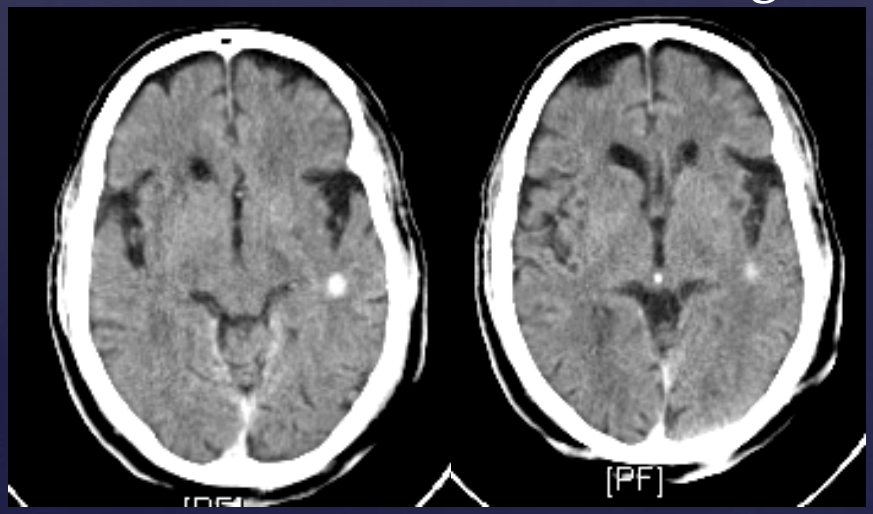
LCCA



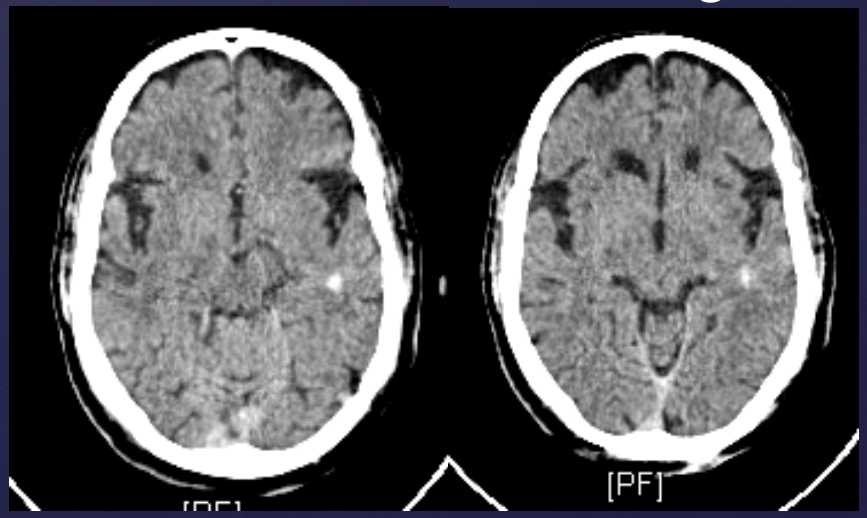
Pre Stenting



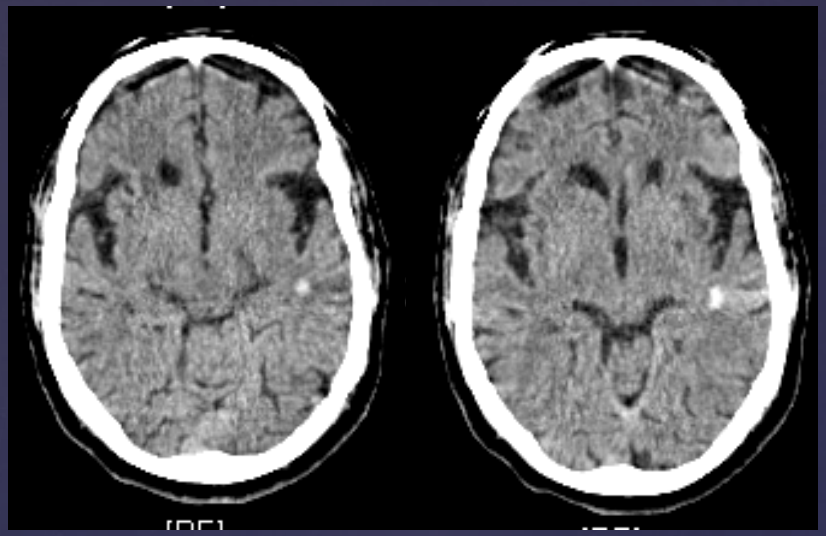
Immediate Post Stenting



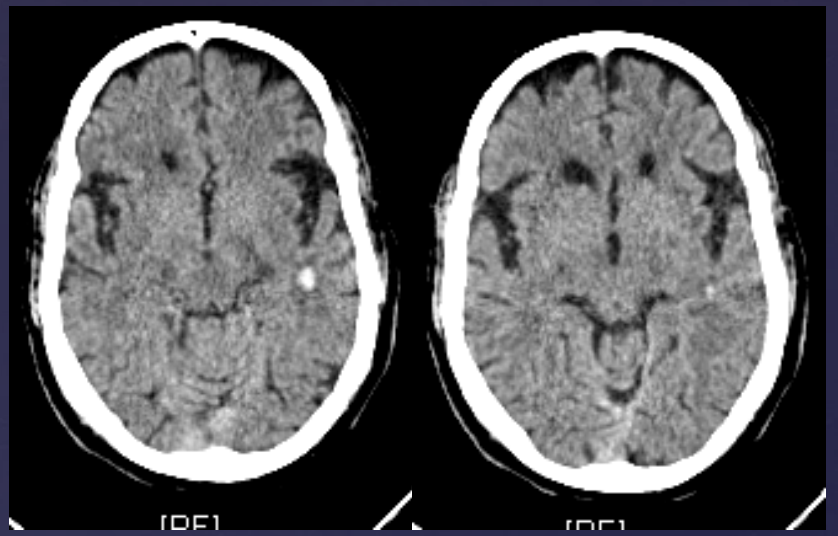
4 hours after stenting



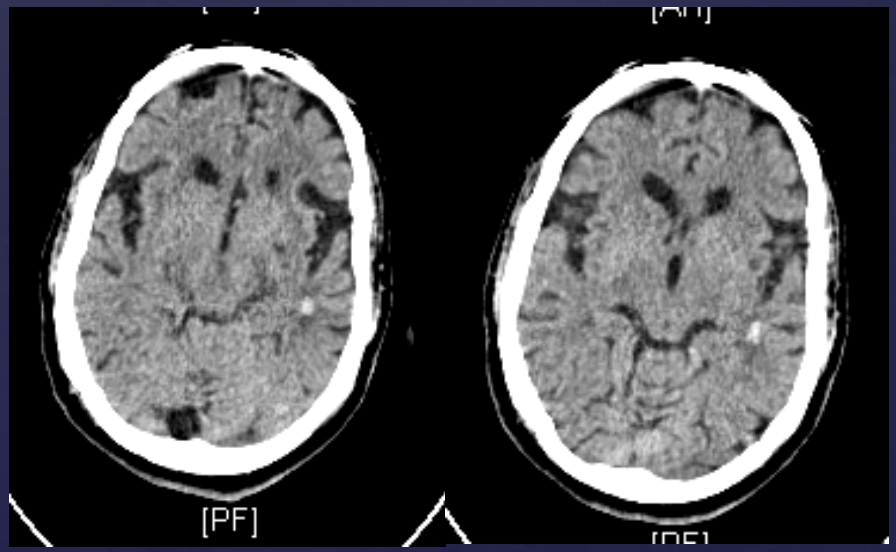
Day 2 after Stenting



3 Days after Stenting



5 Days after Stenting



Discussion

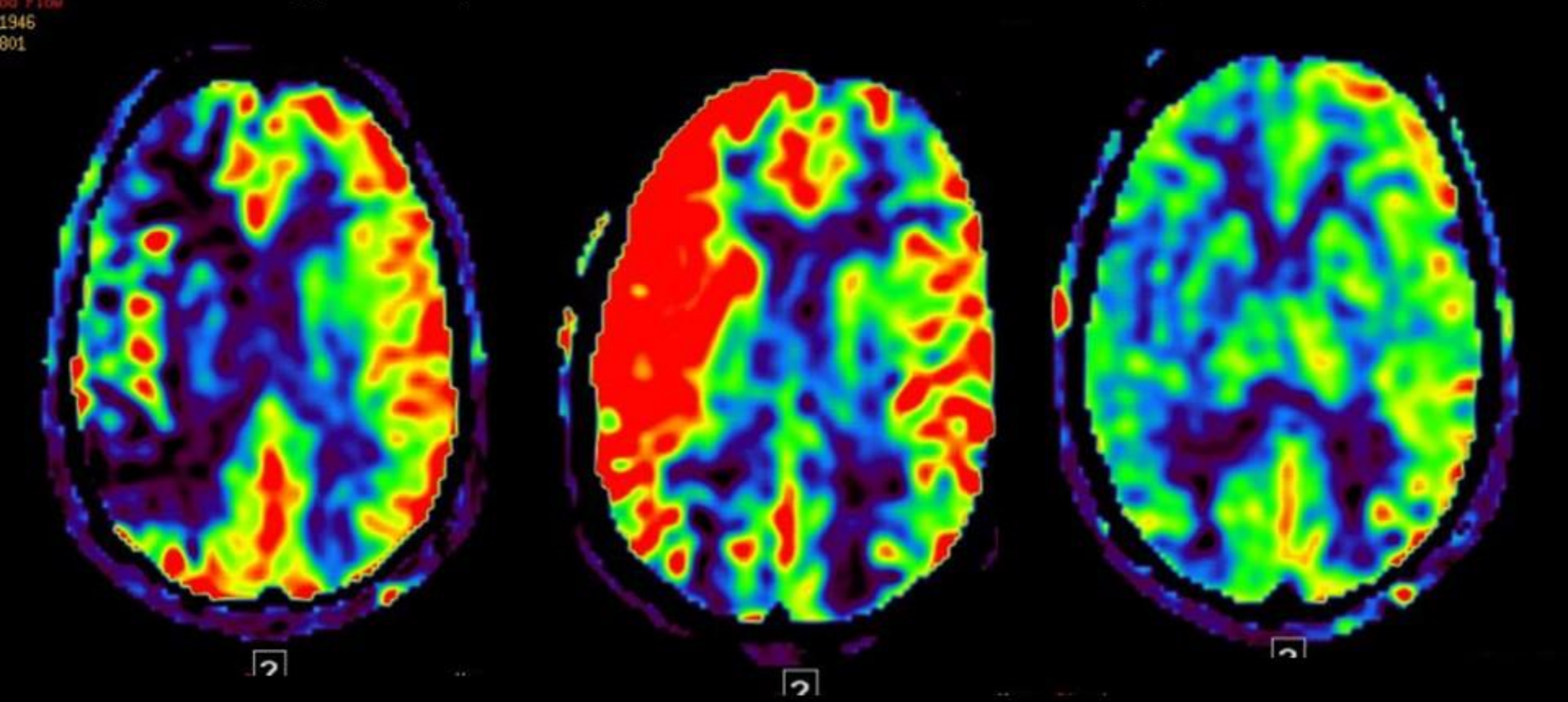
- Definition: Major increased ipsilateral cerebral blood flow following revascularization by CEA/CAS.
- Hyperperfusion syndrome-unilateral headache, seizures, focal symptoms due to ICH or focal oedema.
- Incidence: CEA (.0.6-3.1%), CAS (0.6-6.8%)
- Symptoms/signs-between 3-8 days.

Mechanism

- Failure of normal cerebral auto regulation secondary to long-standing decreased cerebral perfusion pressure.
- Failure results in maximal dilatation of cerebral arterioles over a long period, with subsequent loss of their ability to constrict when the normal pressure is restored.
- Excessive blood flow directed into non-auto regulated vascular bed, may result in disruption of the small vessels with consequent hemorrhage into brain parenchyma
- SPECT: Acetazolamide challenge test for measuring quantitatively CBF and hemodynamic reserve as cerebro vascular reactivity (CVR). Decreased CVR & CBF
- PET-CBF decreased, CBV & OEF increased

56yr, M, Lt hemiparesis 4 months back

A. Before stenting – right sided hypoperfusion
B. Post stenting (2 days) – right sided hyperperfusion
C. Post stenting (1 month) – normalization, after conservative management



Predictors

- Preoperative decreased CVR (SPECT) predictor of postoperative cerebral hyperperfusion.
- High grade stenosis
- Poor cerebral collateral blood flow
- Contralateral carotid occlusion
- Isolated ipsilateral MCA
- Increased PSV on Color Doppler US

Conclusion

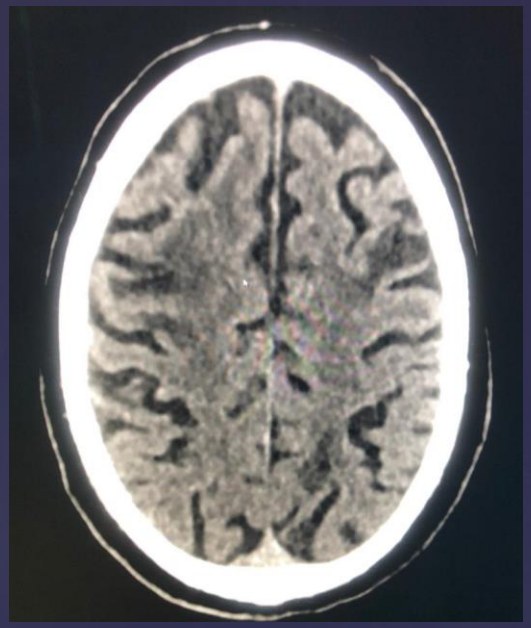
- Hyperperfusion syndrome is generally noted after CBF increase of 100% values as compared to preoperative values.
- However, there are case reports of ICH without evidence of hyperperfusion in the CBF study.

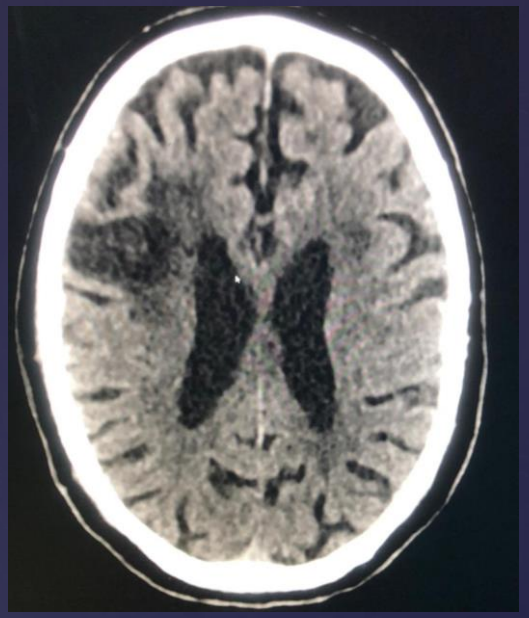
Case 3

- 74 yrs M
- Decreased right side limb movement
- H/o left sided weakness in the past
- Stenting done on 1/12/2014

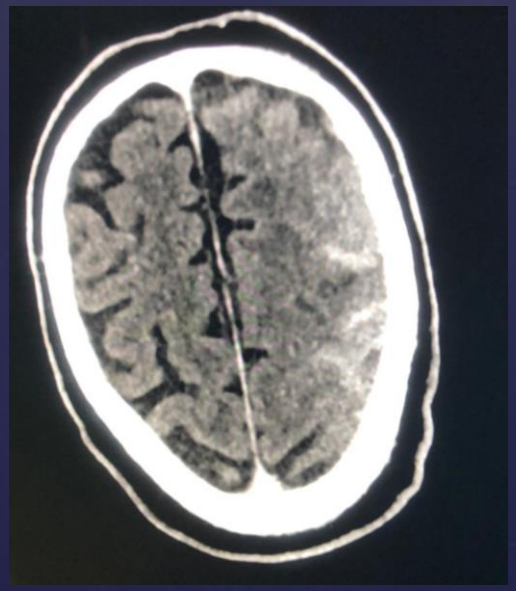
Case 3

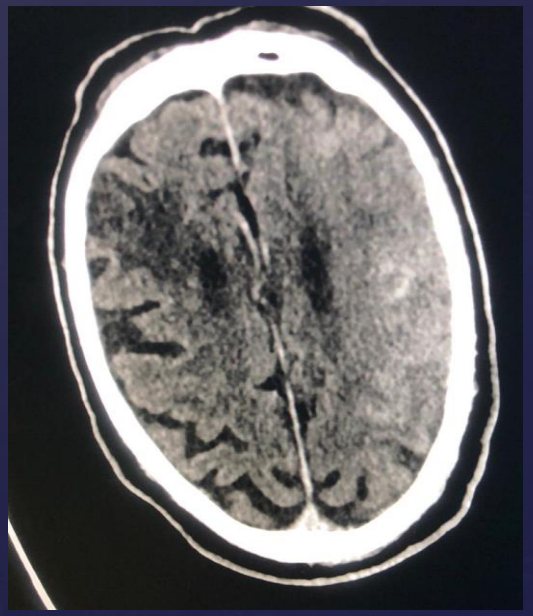
Presenting NCCT





Post stenting NCCT





Contrast Induced Encephalopathy-after CAS

- Symptoms-Seizures, asymptomatic, no persistent neurologic deficits

- Contrast enhancement-Contrast extravasation or hemorrhage or stroke?
- HU measurement greater than 70
- Would not be expected to resolve so quickly (20-24hrs)
- CIE is ascribed to breakdown of the BBB in response to large contrast load selectively injected into the ipsilateral carotid.
- series-reported in 204, 2006, AJNR
- CIE-was defined broadly as a new hyperintensity on noncontrast CT scan obtained immediately after therapeutic procedures.
- Significantly increased rate of hyperattenuation when balloons were used for remodeling (54% compared with 34.6% when they were not).
- Suggestion-Intermittent contrast trapping by the balloons was related to the physiological mechanism.
- CIE was statistically correlated with contrast load (relative to body weight), and elapsed time between the end of procedure and obtaining the CT scan (shorter times lead to increased likelihood of CIE).
- Treated with steroids, Repeat scan by 24 hours)
- Role of MR imaging: No evidence for infarction in the area of CIE.

Take Home Message

- Benign? Not really (Seizures, FND)
- Direct correlation with contrast injection-4.7ml/kg as the cutoff for the minimum amount of contrast in which CIE was found.
- CIE reported after other neuroendovascular procedures-embolization of cerebral AVMs, intracranial stent placement, intracranial aneurysms with balloon assisted coiling, intra-arterial thrombolysis in acute stroke (suggesting that the causal mechanism is unrelated to the primary etiology).
- Steroids?
- Anti-epileptics?
- Hydration
- Caveats-Why only few developed CIE and others not? Multifactorial process? Host factors? Co-morbidities?

45yrs old female with neck injury followed by recurrent stroke

Angiogram after stent placement shows non filling of LICA.

Angiogram shows filling of LICA after balloon angioplasty.


Thank You