TIAs and posterior circulation problems

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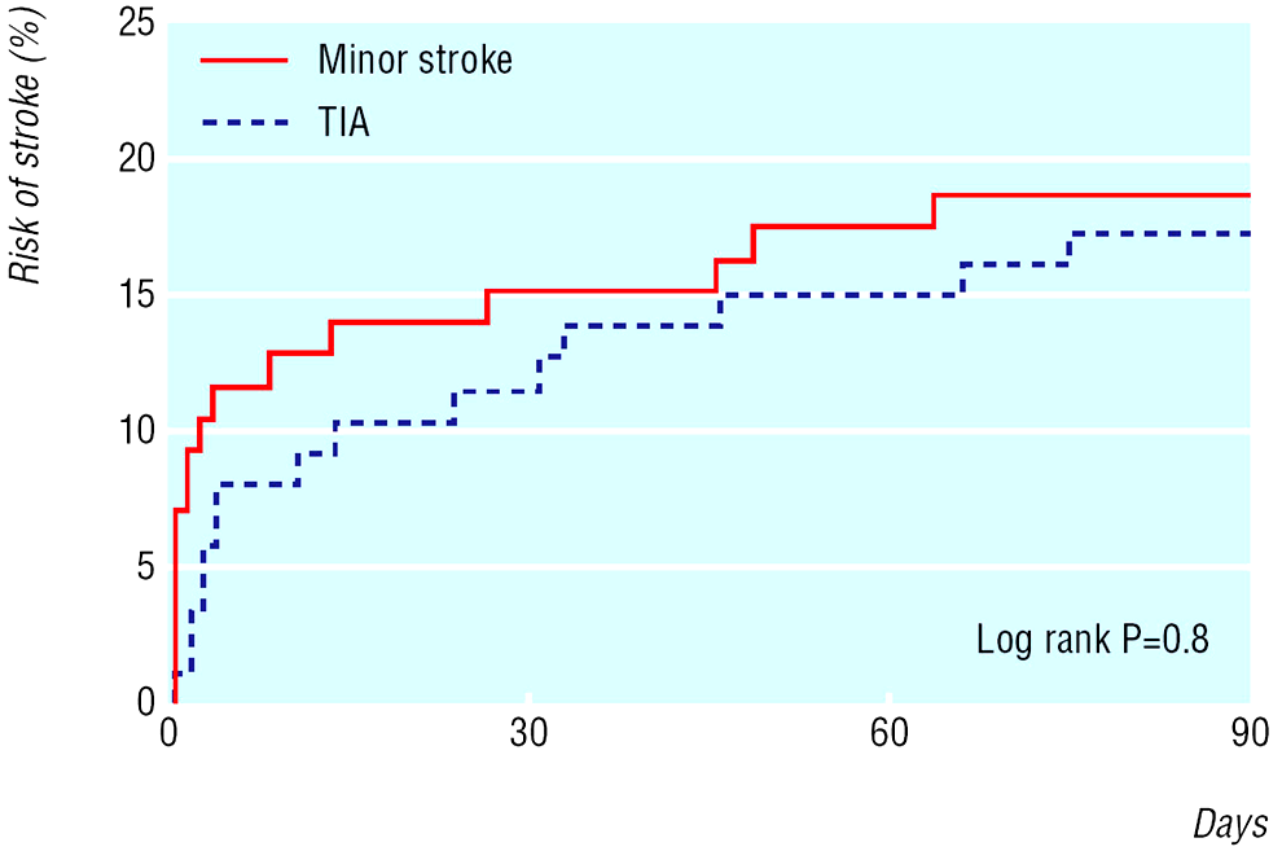
How many strokes and TIAs are out there?

- depends on the definition!
- ~60,000 strokes in Australia annually
- TIA/minor stroke ~40% ischaemic brain episodes
- 30-40% patients with ischaemic stroke have an earlier TIA/minor stroke
- Difficult to accurately count
  - Non-presentation
  - Mimics hard to differentiate retrospectively

Cumulative risk of stroke after a transient ischaemic attack (TIA) or minor stroke



A J Coull et al. BMJ 2004

TIA: a rubbish diagnostic label

- Terribly inaccurate acronym
- Thanks in advance
- Totally inexplicable attack
- TIA = TNA
- This is Art
- *Acute Cerebrovascular Syndrome*?

TIA: a brief history

- The classic definition (mid 1960s):

  "sudden, focal neurological deficit of presumed vascular origin lasting <24 hours"

- Time threshold completely arbitrary
- Assumed no symptoms = no brain injury
- RIND abandoned in 1970s
  - Recognition that prolonged symptoms associated with cerebral infarction
- Recent recognition that symptoms <24 hours associated with cerebral infarction

TIA: the inconsistencies

- Based on concept of no brain injury
  - entrenched ennui
  - TIA thought benign (at least it wasn't a stroke!)

- 1/3 'traditional TIAs' have infarction
  - Duration of symptoms doesn't discriminate
  - 1/3 of those with symptoms <1 hour have +ve DWI indicating ischaemic injury

TIA: the inconsistencies

- Stroke and TIA on a spectrum of brain ischaemia
  - TIA an opportunity to prevent disabling injury, including cognitive impairment
  - TIA a marker of high risk for vascular death
    - NOT BENIGN!

TIA: the new tissue-based definition

"*a transient episode of neurological dysfunction caused by focal brain, spinal cord or retinal ischaemia, without acute infarction*"

ASA recommendation (2009):

"TIA patients should undergo neuroimaging within 24 hours of symptom onset, preferably with magnetic resonance imaging, including diffusion sequences"

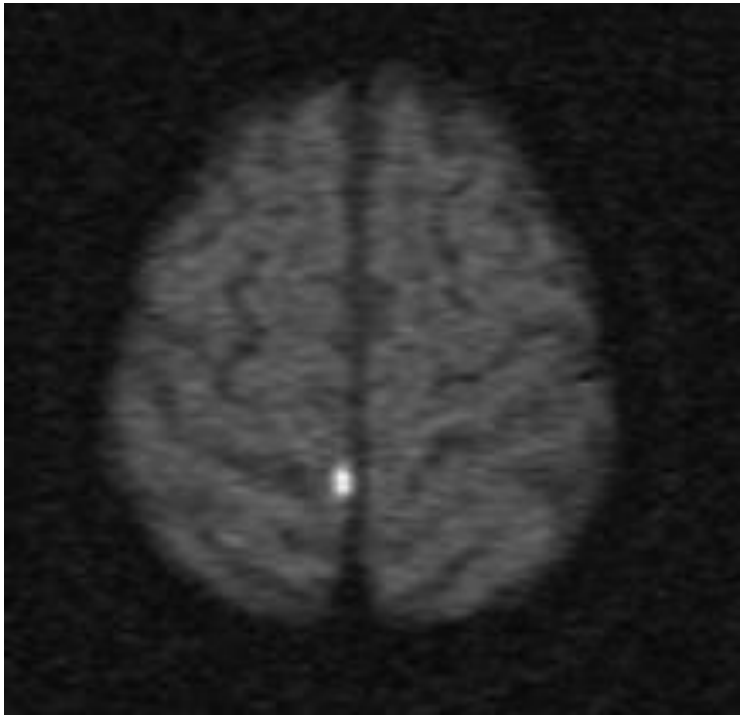
Stroke versus TIA

Stroke and TIA are the same condition:

- If patient has symptoms, it is a stroke
- TIA lasts minutes
  - if arrive to ED with symptoms, it is stroke
  - In NINDS study, if signs at 1hr; 97% signs at 24
- Distinction only retrospective
- Stroke symptoms are urgent
- New definition of stroke is imaging based

MRI confirmed TIA

77 year old woman; sudden onset sensory disturbance in Left foot; clumsy foot; signs resolved at assessment



What should you do?

Symptoms and signs fully resolved?

- If not, this is stroke!
- Acute therapy will be the initial focus

Yes?

- assessment & investigation is the same

Stroke or mimic?

Stroke likely:

- Sudden onset – exact time of onset
- Patient well at onset
- Focal neurology history and signs
  - Referable to Left or Right brain
  - Sub-typing possible (Oxfordshire types)
- Greater neurological deficit
- Abnormal vascular signs
  - BP, PVD, AF, valvular disease

Oxfordshire stroke subtypes

TACI - large anterior circulation stroke

- hemiparesis, HH, cortical signs

PACI – smaller anterior circulation stroke

- e.g. monoparesis; dysphasia alone

LACI – lacunar syndromes

- pure motor hemiparesis most common
- implications for underlying cause

POCI – posterior circulation territory

- Isolated HH, brainstem or cerebellar signs.

Stroke or mimic?

Stroke unlikely:

- Known history of cognitive impairment
- Confusion (beware isolated dysphasia)
- Unwell during last week
- No neurological signs
- Signs in other symptoms e.g. chest crackles
- Seizure at onset
- Loss of consciousness without focal signs
- Isolated vertigo

ROSIER scale –
Recognition of stroke in the ER

- Check BSL
  - If <3.5 mmol → treat and reassess once BSL normal
- Loss of consciousness/syncope = -1
- Seizure activity = -1
- New acute:
  - Asymmetric facial weakness = +1
  - Asymmetric arm weakness = +1
  - Asymmetric leg weakness = +1
  - Speech disturbance = +1
  - Visual field defect = +1

Stroke unlikely if total score ≤0

Basilar Occlusion

- Often preceding transient symptoms:
  - Diplopia
  - Bilateral visual disturbance
  - Vertigo PLUS hearing loss/other sympts
  - Transient LOC with quadriparesis
  - Dysarthria with quadriparesis/sensory loss

Basilar occlusion

- High index of suspicion with unconscious collapse and ↓GCS at presentation
- Quadriparesis, upgoing plantars
- Check the eyes
  - Likely loss of normal VOR
  - Pupillary changes
- Consider adding CT angiogram if NCCT excludes brainstem/large hemispheric ICH

The science of strokeology

- Time since event determines short term risk
- Pre-existing vascular risk (BP, IHD, AF, smoking)
- Co-existing brain disease e.g. dementia
- Sudden onset, mins to hours (not secs), recurrence
- Predictive symptoms:
  - weakness, dysphasia
- Negative predictors:
  - sensory symptoms, especially if multiply repeated
  - vertigo alone
- Careful systematic neuro exam
- Investigations: brain and vascular imaging, ECG
- The tunnel of truth

The world of mimics

- Syncope
- Peripheral vestibulopathy
- Migraine
- Anxiety and hysteria
- Delerium
- Hypoglycaemia
- Peripheral neuropathy e.g. radial
- Partial seizures
- Transient global amnesia

Vertigo – is it stroke

- Key is to take an excellent history
  - Detailed history of symptoms and time course
  - Have there been other episodes?
  - Ask specifically about other brainstem symptoms
  - Check with witness

Vertigo – is it stroke?

The physical exam:

- Full neurological exam - careful attention to the eyes
  - Is there a skew deviation (are the eyes level)
  - Do they move smoothly and together in all directions?
  - Is there vertical nystagmus?
  - Are the pupils equal and react normally?
  - Is there a ptosis?
  - Head impulse test

Caution needed here!

- Beware vomiting and can’t walk
- Beware sudden deafness with vertigo
- Beware the patient with large cerebellar infarct who looks a million dollars
- Collapse and unconsciousness
  - Think basilar occlusion
  - Take a history for preceding events
  - Look at the eye movements

EXPRESS and SOS-TIA

- Marked benefits from:
  - early clinical assessment
  - rapid investigations
    - CT brain, ECG for AF, Carotid imaging
    - Other
  - urgent initiation secondary prevention
    - Triple therapy: antiplatelet, antihypertensive, statin
    - Targetted treatment e.g. CEA, warfarin for AF
- Inpatient care better than outpatient?

Essential Investigations (1)

- History and examination
  - Exclude mimics
    - Check blood sugar!!!
  - Large artery or lacunar; anterior or posterior
  - OCSP classification – TACI, PACI, LACI, POCI
- Brain imaging – CT mandatory and urgent!
  - Exclude mimics; ICH or ischaemic
  - CT stroke in up to 20%
    - Old strokes – topography and number
    - Early ischaemic changes
    - More established change (non-dominant)

Essential investigations (2)

- Mechanism?
  - BSL – mimic, diabetes
  - Systemic disease – UEC, FBE, ESR
  - Fasting lipids and sugar
  - ECG - AF, ACS or other high risk cardiac source
  - Carotid duplex - high grade symptomatic stenosis
  - Rare specific causes e.g. dissection; venous sinus thrombosis; GCA; endocarditis
  - Assess risk factors – BP, smoking, lipids, diabetes

Key investigations

- All patients with stroke symptoms need
  - CT brain as soon as possible
  - BSL, UEC, FBE, ESR, CXR
  - ECG
  - Most will need carotid duplex ultrasound

Targeted role for stroke MRI

- Confirm stroke or non-stroke diagnosis
  - Brainstem events
  - Minor/transient event
  - ‘functional’ vs real deficit; stroke versus tumour
- Accurately define the topography of stroke
  - Small artery versus large artery
  - Influences further investigations
- Added value
  - Shows old/other changes in brain including micro-haemorrhages
  - Non-invasive view of brain arteries

ABCD2 – a prognostic score

- **A**ge ≥60 years = 1
- **B**P (systolic >140 and/or diastolic ≥90) = 1
- **C**linical features
  - unilat weakness =2; speech =1; other =0
- **D**uration
  - >60 mins =2; 10-59 =1; <10 =0
- **D**iabetes

2 day $ABCD^2$ risk:

1% if = 0-3

4.1% if = 4-5

8.1% if = 6-7

ABCD2 – the positives

- A new focus on TIA recognition, risk factors, stroke risk in ED and GP
- ? a diagnostic tool for the non-expert
- Predicts risk moderately in some populations
  - AUC 0.72 in systematic review
  - AUC only 0.62 in Australian setting

ABCD2 – the negatives

- Misclassifies 1/2 of those with high risk mechanisms
  - Ignores carotid stenosis and AF
- ‘Cook book’ approach to TIA
- Doesn’t differentiate mimic from TIA
- Ignores importance of expert detailed history and clinical examination
- Used to justify non-urgent expert assessment
  - Most recurrent stroke events < 2 days

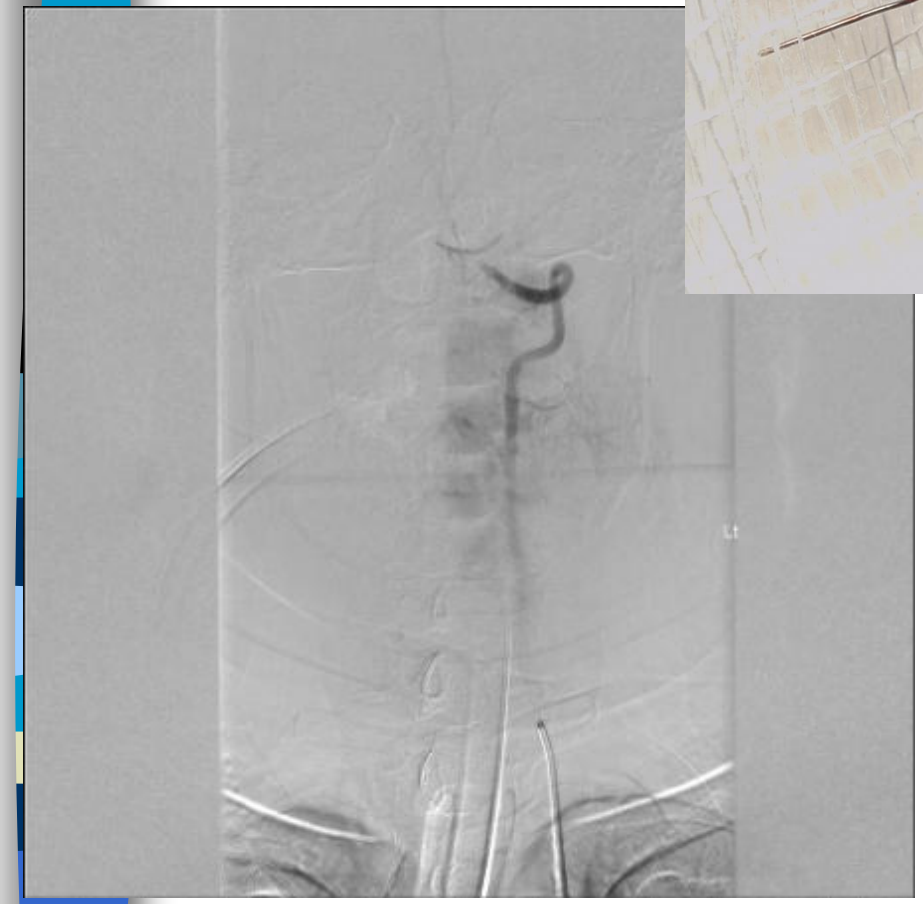
Stroke prevention strategies

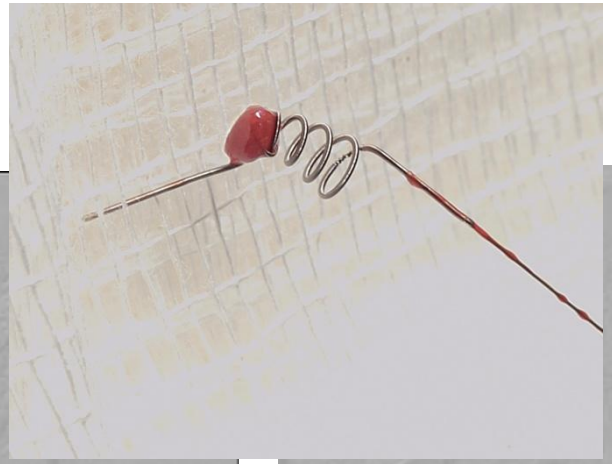
- Carotid endarterectomy for >70% stenosis
- Warfarin for AF and high risk cardiac sources
- Anti-platelet agent
- Risk factor management
- BP lowering
- Lipid lowering
- Education of patient and family

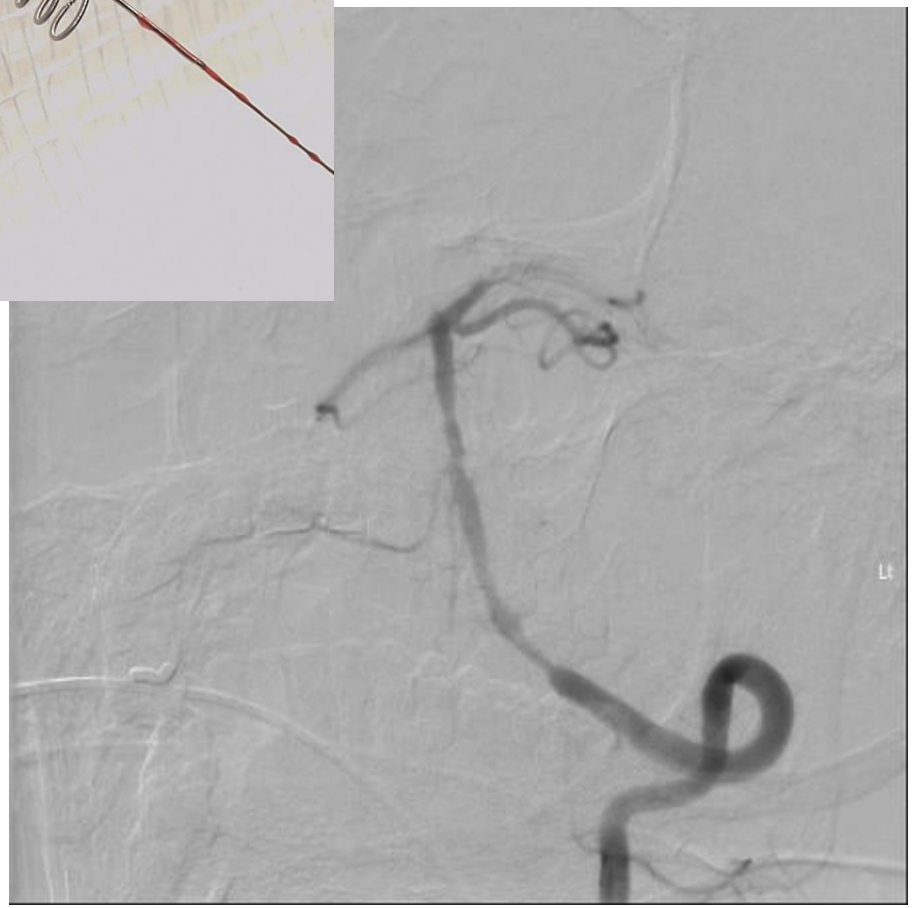
Basilar thrombosis

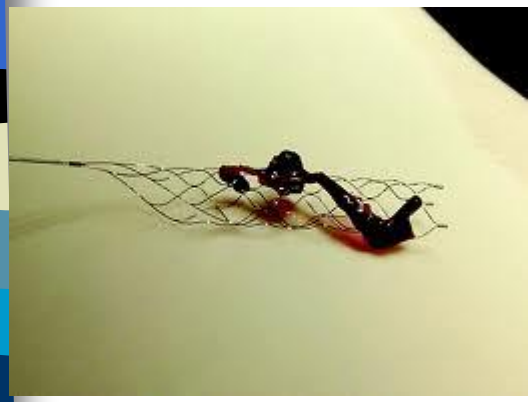
- IV alteplase if <4.5 hours and eligible
- If presenting late or severe syndrome and/or not responding to thrombolysis, consider urgent transfer for clot retrieval
- Outcomes influenced by age, severity of symptoms, time from onset
- BASICS registry – no benefit from treatment beyond 9 hours in severe

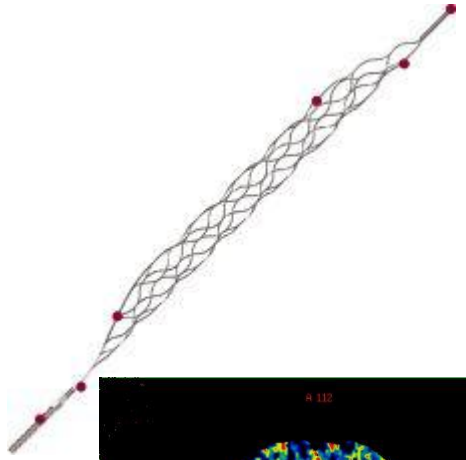
Clot retrieval

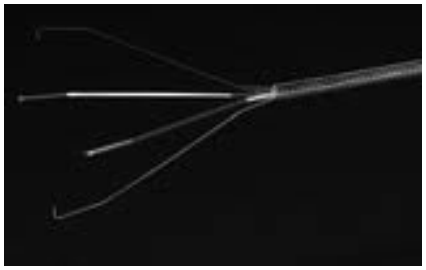


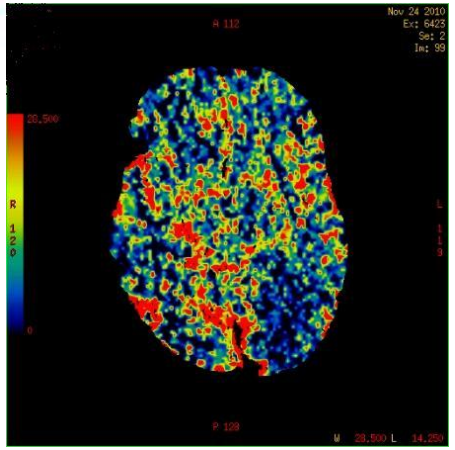








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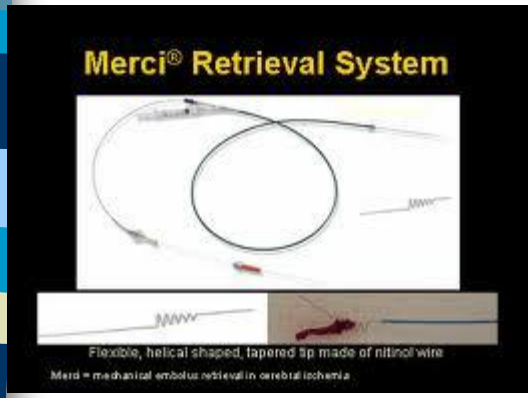
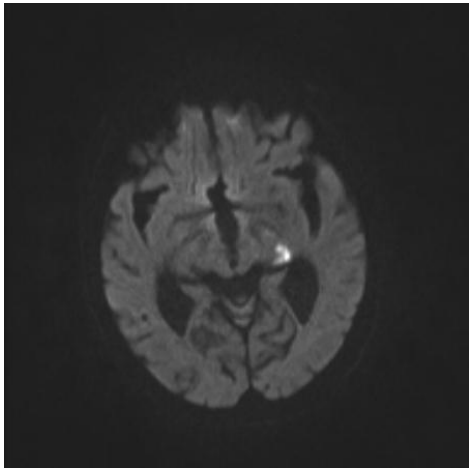
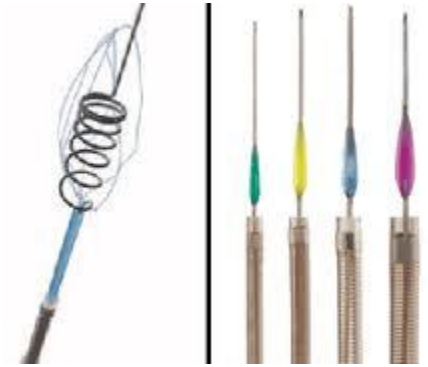
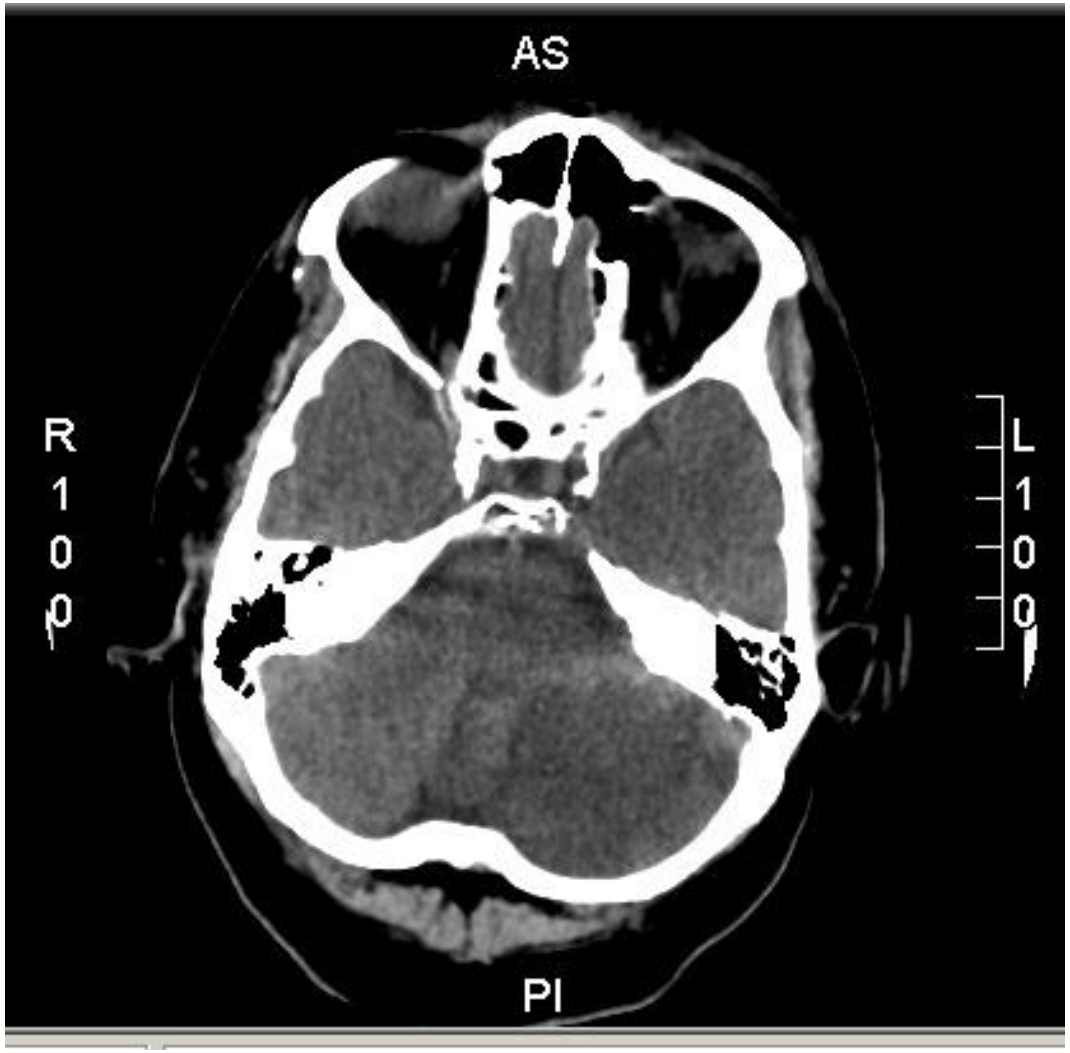

Merci® Retrieval System
Flexible, helical shaped, tapered tip made of nitinol wire
Merci = mechanical embolus retrieval in cerebral ischemia





Cerebellar stroke



Cerebellar stroke