STROKE MIMICS

Chris Douglass
Stroke mimics. RCP guidelines

- A term used to describe other clinical conditions which can mimic a stroke and confound diagnosis.
  - brain tumours,
  - epilepsy
  - subdural haematosis.

- Neurologic abnormalities similar to a stroke can also be the result of imbalances of glucose, sodium and calcium.
Can be 30-50% of acute stroke evaluations.


25% Rønning et al. Tidssker NorLeageforan 2005;16:1655-7


31% Hand et al. Stroke 2006; 37 (3):769-75

38.6% Röther et al. 2014 Poster AHA International Stroke Conference
411 patients coded as stroke in SanDiego Stroke Centre

- 19 ICH
- 11 old CVA
- 10 seizures
- 6 mass lesion
- 18 other

- 6 SAH
- 11 hypotension
- 8 intoxication
- 7 hypoglycaemia

- 3 SDH
- 5 migraine

42% of these mimics had an acute disease caused by a severe neurological condition other than stroke
100 consecutive A&E patients
Me. Spring/summer 2016

- 52 were strokes (40 ischaemic, 6 bleeds, 6 TIAs)
- 48 were mimics
  - 9 Functional
  - 8 Seizures
  - 6 Migraines
  - 4 Infection with old CVA symptoms
  - 4 Tumour
  - 3 Labyrinthitis
  - 3 Bell’s palsy
  - 2 Vasculitis in known neurology patients
  - 2 Delirium
- 7 Others (Hypotension, Hemifacial spasm, Hypoglycaemia (ABCDEFG), Respiratory failure, Concussion, Anaemia Hb=2, Infective exacerbation of MS)
Figure 2  The 20 most common stroke mimics, identified in a systematic review and meta-analysis of case series.⁴⁰

Figure 2  The 20 most common stroke mimics, identified in a systematic review and meta-analysis of case series.\cite{Fernandes2013}
Male 48 yrs

- PC; Sudden onset tingling in right face and arm with dysarthria
- HPC; 2 episodes of right face pins and needles lasting 10 minutes in last 2 weeks.
- PMH; Left occipital lobe stroke “years ago”
- Lung cancer, completed courses of chemo and radiotherapy.
Male 57 yrs

- PC; sudden onset dense left sided weakness, arm 0/5, leg 2/5, left sided neglect, gaze preference to the right
- HPC; dragging left leg for 2 weeks, ½ stone weight loss last few months
- CXR
- CT
- Witnessed focal motor seizures with Todd’s paresis
Tumours

- 5% of tumours have a stroke like presentation
- Acute onset due to
  - Bleed into a lesion
  - Extrinsic compression of vascular structures
  - Obstructive hydrocephalus
  - Todd’s paresis
- Scan appearances of early mass effect more likely to indicate tumour as stroke oedema may take 24-48 hours to occur
Female 52

- Sudden onset aphasia, only able to say yes/no. NIHSS of 7.
- CT and CTA reported as normal so thrombolysed.
- Had a seizure after tPA infusion completed so rescanned and when second scan compared to the first in hindsight a left frontal lobe abnormality was seen on original CT.
- Had an MRI at the 24 hour point and this showed changes consistent with a high grade GBM, subsequently confirmed on biopsy.
Female 60yrs

- PC; found on floor with dense left sided weakness and slurred speech
- SH; alcohol abuse
- o/e; global weakness, unsafe swallow
- CT reported as brainstem infarction...
- Required PEG feeding, tracheostomy, prolonged stay on neuro-rehab unit
Central Pontine Myelinolysis

- Osmotic demyelination syndrome
- Can be in the pons or other areas of the brain
- Common in alcoholism, rapid correction of hyponatraemia or with use of cyclosporin in liver transplantation
- “whenever a patient who is gravely ill with alcoholism and malnutrition or a systemic medical disease develops confusion, quadriplegia, pseudobulbar palsy, and pseudo coma (‘locked-in syndrome’) over a period of several days, one is justified in making a diagnosis of central pontine myelinolysis”
Female 40

- PC; Sudden onset slurred speech, facial weakness, nystagmus.
- CT reported as left postero-frontal ischaemia
- MRI requested…
Balo’s concentric sclerosis
Vertigo

- Sudden onset vertigo can be central (stroke) or peripheral
- Dix Hallpike test

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<th>Central lesions</th>
<th>Peripheral lesions</th>
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<tr>
<td>Duration of nystagmus</td>
<td>Persistent</td>
<td>Less than 60 secs</td>
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<tr>
<td>Onset of nystagmus</td>
<td>Immediate</td>
<td>Delay of 0-40 secs</td>
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<td>Fatiguability of nystagmus</td>
<td>Non-fatiguuable</td>
<td>Fatiguuable</td>
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<tr>
<td>Character of nystagmus</td>
<td>Variable</td>
<td>Fixed; torsional upwards towards lower most ear</td>
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<tr>
<td>Severity of symptoms</td>
<td>Mild (but marked nystagmus)</td>
<td>Severe vertigo with nausea</td>
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Male 81

- PC; left sided weakness
- HPC; 2 weeks headache and left sided heaviness
- o/e; keen to keep his cap on
- scalp dressing oozing
Pneumocephalus
Male 37

- Knocked on neighbour’s door at midnight
- Naked, sweaty, confused.
- Right sided weakness
- 5 days frontal headache
- 2 days cough
- Lives alone, alcohol abuse, self-neglect
- Chest clear, normal heart sounds
Sepsis with multiple abscesses in the brain, liver and lung.

- Treated with Ceftriaxone and Metronidazole.
- Fungal and Toxoplasmosis serology awaited.
- Echo no obvious abnormality but will need a TOE.
- HIV -ve

- Seizures in this admission.

- Blood and CSF cultures -ve.
  - CSF WCC 32,
  - CSF glucose 3.2/ serum Glu 5.8,
  - CSF protein 1.33
- CRP 208
- Remains confused and agitated. Not keeping any clothes on.
- Echo x3 NAD (High BMI, agitated so poor views)
Old stroke with systemic illness

- Acute or subacute worsening of signs in same vascular territory as old stroke.
- Patients with previous stroke who become unwell with hyponatraemia, sepsis or severe fatigue (lying on floor all night) whose clinical signs worsen.
- Clues are old stroke on CT and in history with new symptoms consistent with old stroke.
- Patients improve when sepsis or other cause treated.
- Raised CRP, WCC or low sodium.
Old stroke with systemic illness

- Difficult when stroke and aspiration pneumonia overlap
- Sepsis may cause stroke (mycotic emboli, hypercoagulable state)
Dysphagia
Seizures after stroke study Arch Neurol;2000 57:1617-22

- 8.9% of patients have post stroke seizures
  - 8.6% of ischaemic strokes (40% in first 24 hours)
  - 10.6% of haemorrhagic strokes (57% in first 24 hrs)
- 3.4% in first 24 hours
- 2% at onset
- 2.5% have recurrent seizures
Todd’s (post-ictal) paresis

- 328 patients had prolonged video-EEG pre epilepsy surgery work up
- PP occurred in 44 patients (13.4%)
- PP was always unilateral and always contralateral to the seizure focus
- The mean duration of PP was 174 seconds (range 11 seconds to 22 minutes)
- Of all seizures followed by PP, the following features were noted:
  - Obvious ictal motor activity was seen in 78%
  - Very slight ictal motor activity was seen in 10 %
  - No ictal motor activity was seen in nearly 10 %
Todd’s (post-ictal) paresis

- Rolack et al. JNNP 1992;55:63-64
- Post-epileptic paralysis persisted from half an hour to 36 hours, with a mean of 15 hours.
- The nature, duration, and severity of PEP were unrelated to the duration or severity of the seizures, the presence or absence of underlying lesions, or any changes on the EEG.
- Weakness always persisted longer than other symptoms.
- Post-epileptic paralysis occurred sporadically.
Headaches

- 27% have a headache at onset of the stroke
- Primary headache disorders account for 10% of stroke mimics
- Migraines can be associated with conditions causing increased stroke risk
  - Anti-phospholipid syndrome
  - CADASIL & MELAS
  - Carotid dissection
Familial Hemiplegic Migraine

*International Headache Society diagnostic criteria for familial hemiplegic migraine*

1. At least two attacks fulfilling B and C
2. Aura consisting of fully reversible motor weakness and at least one of the following:
   A. Fully reversible visual symptoms including positive and/or negative features
   B. Fully reversible sensory symptoms including positive and/or negative features
   C. Fully reversible dysphasic speech disturbance
3. At least two of following:
   A. At least one aura symptom developing gradually over ≥5 min and/or different aura symptoms occur in succession over ≥5 min
   B. Each aura symptom lasts ≥5 min and <24 h
   C. Headache fulfilling criteria for migraine without aura begins during aura or within 60 min of onset of aura
- https://www.youtube.com/watch?v=dwHpBwAxDI6
- Serene Branson...
Somatisation/functional

- Usually young
  - Usually lack vascular risk factors (but beware “angina”)
- Often multiple unexplained symptoms or syndromes over many years or operations
- Often other diagnoses such as:
  - sero-negative SLE/sero-negative arthritis
  - fibromyalgia
  - cholecystectomy, appendicectomy and hysterectomy
- May or may not have any psychiatric history apparent
History usually
- vague, long list
- inconsistent within one telling
- inconsistent between tellings
- contains mutually inconsistent features

Presentation often delayed e.g. 3/7 after onset of severe hemiparesis
Variable signs from one examination to another.

- No objective features e.g. tone, reflexes, plantars
- Variable effort & power
- grunts/grimaces
- agonist/antagonist
- encourage up to normal (“one finger test”)
- collapsing quality to the weakness

Mutual inconsistencies

- e.g. numb hand/tie laces/make-up/jewellery/buttons
- high-heels

Non-sensical sensory “signs”

- turn over
- “no”
- vibration on sternum
- finger to nose
"Push down with your right heel"
No effect

"Lift your leg" (against resistance)
Right hip extends
Fig. 2. The Abductor sign. (A) While abducting the unaffected leg (2), the affected one (1) is able to involuntarily compensate the force applied by the examiner so that the midline position will remain unchanged. (B) While abducting the affected leg (1), the sound one (2) will be equally weak and easily overpowered in the hyper-adducted position by the examiner. Black arrow, voluntary movement; gray arrow, involuntary movement; gray bar, lack of involuntary movement; thin arrow, resistance applied by the examiner. See Ref. [29].

Fig. 3. The Abduction Finger sign. After keeping finger abduction with the sound hand (2) against resistance for a while (2 min in the original description, see Ref. [35]), involuntary synkinetic abduction finger movements are detectable in the paretic hand (1) marked with a white elastic. Black arrow, voluntary movement; gray arrow, involuntary movement; thin arrows, resistance applied by the examiner.
Drift without pronation

Hemisensory disturbance.

Charcot 1889

J Stone et al. J Neurol Neurosurg Psychiatry 2005;76:i2-i12
Ministry of Silly Walks
Thrombolysis of Stroke mimics

- 7/250 thrombolysed patients were mimics.
- Mostly seizures
- Global aphasia with no hemiparesis
  - 3/7 mimics (43%) cf 8/243 (3.3%) strokes
- Thrombolysed Strokes;
  - 1.2% angioedema, 5.3% symptomatic intracranial bleed, 12.3% asymptomatic intracranial bleed.
- Thrombolysed Mimics; 0%, 0%, 0%
Thrombolysis of Stroke mimics

- 10/151 (7%) patients thrombolysed in ED were stroke mimics
- 0% intracerebral bleeds
- mRS and age were lower in mimic group
Indirect cost burden of stroke mimics post iv thrombolysis; Goyal et al 2014

- 113 consecutive thrombolysed patients 2009-2011
- 23/113 had negative MRI at 24 hours
  - 10 conversion disorder - 4 migraine
  - 2 Todd’s paresis - 3 encephalopathy
  - 4 TIA
- Cost $185,822 – cost of MRI on admission = $110,543
- A median excessive cost of $5,427 per admission
Stroke mimic patients classified according to initial NIHSS. NIHSS indicates National Institutes of Health Stroke Scale.


- Seizures 17%
- Systemic infection 17%
- Brain tumour 15%
- Toxic/metabolic 13%
- Positional vertigo 6%
- Conversion Disorder
- Migraine
- Syncope
- Transient global amnesia
Decreased level of consciousness and normal eye movements increased the odds of a stroke mimic being present.

Abnormal visual fields, initial diastolic blood pressure greater than 90 mmHg, atrial fibrillation, and history of angina decreased the odds of mimic being present.
Stroke Chameleons

- Strokes that imitate other diseases
  - Gradual or stuttering onset
  - No clear arterial territory

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<th>Hemiballismus/myoclonus</th>
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<td>Persistent acute global amnesia</td>
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<td>Limb shaking TIA</td>
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<td>Cortical stroke (hand motor area)</td>
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<td>Confusion/delerium</td>
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Slides 45, 46 and 47
The TeleStroke Mimic (TM)-Score: A Prediction Rule for Identifying Stroke Mimics Evaluated in a Telestroke Network

Syed F. Ali, MD, Anand Viswanathan, MD, Aneesh B. Singhal, MD, Natalia S. Rost, MD, Pamela G. Forducey, PhD, Lawrence W. Davis, MD, Joseph Schindler, MD, William Likosky, MD, Sherene Schlegel, BSN, Nina Solenski, MD, Lee H. Schwamm, MD, and on Behalf of Partners Telestroke Network

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