What is a symptomatic patient???

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The symptomatic patient

- A stroke occurs every minute
- 3rd leading cause of death behind cardiovascular disease and cancer
- Leading cause of adult neurological disability
- Second leading cause of dementia
Epidemiology

- Longest length of hospital stay
- Leading cause of transfer to long-term care
- 90% attributable to atherosclerosis
- Approx. 25% directly related to carotid stenosis
Thrombo-embolism

- At least 1/3 of strokes are due to emboli from heart or ICA
- Small clot breaks off from a larger thrombus
- It becomes lodged in a distal smaller vessel, producing an infarct
Ischemic stroke patterns

1. Lacunar – small-vessel infarction
2. Territorial – arterial branch occlusion
3. Distal field – watershed infarction
Lacunar infarction

- One-third of all ischemic strokes
- Etiology: arterioslerotic occlusion of perforators in the basal ganglia, brainstem, and centrum semiovale
- Associated with HTN and diabetes
- Lesions < 1.5 cm³
- Morbidity/mortality lowest of stroke types
Lacunar infarction

Classical clinical syndromes

1. Pure motor
2. Pure sensory
3. Sensorimotor deficits in 2 of 3 body parts
4. Ataxic hemiparesis
5. Dysarthria clumsy-hand syndrome
6. Acute hemiballismus
Lacunar infarction

right paramedian pontine lacunar infarction => left pure motor hemiparesis
Territorial Infarction

- Two-thirds of all ischemic strokes
- Arterial branch or stem occlusions
- Etiology: embolic (cardiac or artery-to-artery) or local thrombosis
- Prognosis related to severity of presenting symptoms, size of lesion, and patient’s age & comorbidities
Territorial infarction

Clinical syndromes

1. Supratentorial –
   sudden motor/sensory deficit
   
   *Plus cortical symptoms such as aphasia, apraxia, neglect, homonymous visual deficits*

2. Infratentorial –
   sudden motor/sensory deficit
   
   *Plus additional brainstem or cerebellar disturbances*
Clinical syndromes

1. Embolus –
   sudden onset with maximal deficit at outset

2. Thombosis –
   maximal deficit occurs several hours after initial symptoms
Distal field infarction

- Uncommon cause of ischemic stroke

- Etiology: perfusion failure due to severe stenosis/occlusion of major cranial vessel or following prolonged systemic hypotension

area of subacute infarction in the border zone between the left MCA and ACA.
Distal field infarction

Clinical syndromes

1. Stereotypical TIA’s
2. Unusual patterns of paresis
   • Man-in-the-barrel syndrome
3. Complex cortical syndromes
   • Balint’s syndrome
   • Anton’s syndrome
4. Deficits similar to territorial infarction
Early stroke signs

- Hyperdense MCA
- Loss of the insular ribbon
- Focal swelling
- Mascing of nuclei
The Symptomatic Patient

TIA or completed stroke
Transient Ischemic Attacks or TIA

“A transient neurological deficit caused by temporary disturbance of blood supply and characterised by full recovery often within a number of hours and defined as within 24 hours”
vessel territories

3 main cortical vessels:
ACA, MCA, PCA
functional territories

- Central Sulcus
- Motor Cortex (Movement)
- Sensory Cortex (Pain, heat, and other sensations)
- Parietal Lobe (Comprehension of language)
- Temporal Lobe (Hearing)
- Occipital Lobe (Primary visual area)
- Wernicke's area (Speech comprehension)
- Cerebellum (Coordination)
- Brainstem (Swallowing, breathing, heartbeat, wakefulness center and other involuntary functions)
- Frontal Lobe (Judgement, foresight, and voluntary movement)
- Broca's Area (Speech)
- Temporal Lobe (Intellectual and emotional functions)
- Frontal Lobe (Smell)
TIA - Clin. Symptoms

- Contralateral weakness / numbness
  - Contralateral Leg Weakness
  - Contralateral Leg Sensory loss
  - +/- Contralateral Arm weakness
    or Sensory loss
- Contralateral hemianaesthesia
- Visual field disturbance
- Amnesia
TIA - Clin Sympt.

- Contralateral Hemianopia
- Deviation of eyes to side of lesion
- Aphasia (if dominant Hemisphere)
- Neglect of stroke side (if non-dominant)
- Pure Motor /Sensory Hemiparesis (Lacunar Syndrome)
- Vertigo, Nausea, Vomiting, Ataxia, Nystagmus (Vertebrobasilar Artery Territory) not usually in isolation
A small stroke there will result in a major deficit as the fibres are packed close together.
48 J M; acute monoparesis right hand
DD: Plexus, spinal lesion, ischemia, tumor ??
Cranial nerve signs suggest localisation to (an within) the brainstem.
Be wary of diagnosing a TIA with only the following presentation:

- Vertigo
- Dizziness
- Diplopia
- Faintness
- Unsteadiness
- Confusion
- Sudden unconsciousness
TIA - History

- Sudden onset
- No prodromal features
- Usually maximal at onset
- Maybe single or multiple
- Short lived
- Most are fully recovered by under one hour
TIA – A Reliable Diagnosis?

- No Test
- Depends entirely on History
  - Recollection by Patient
  - Witness account
  - Interpretation by Doctor

- **GP’s:** Neurologists found a different diagnosis in 30%
- **Neurologists:** Disagreed in diagnosis of TIA in 14%
TIA - Differential Diagnosis

- Metabolic
  - Hypo/Hyperglycaemia
  - Hypercalcaemia
  - Hyponatraemia
- Todd’s Paresis
- Partial(focal) Epileptic Seizures
- Migraine Aura (+/- headache)
- Transient Global Amnesia
TIA - Differential Diagnosis

- Drugs
- Bells Palsy
- Brain Tumour
- Hyperventilation / Anxiety or Panic attacks
- Conversion Disorder / Somatisation
- Acute demyelination (MS)
- Syncope / Drop Attacks
TIA - Differential Diagnosis

Amaurosis Fugax
or Transient Monocular Blindness

*Curtain or Veil descending*

- Retinal migraine
- Retinal vein thrombosis (central or branch)
- Retinal Haemorrhage
- Consider urgent Ophthalmic or Optician review
Causes of a TIA

- Athero-thrombo-embolism
  - In-situ cerebral atherosclerosis
  - Carotid Artery
  - Aorta
- Cardiac origin
  - Valvular Heart Disease
  - Atrial Fibrillation
- Transient Fall in Blood Pressure
- 5% from rarer forms of arterial disease
  - Vasculitis
  - Haematological disorders
  - Trauma
So, from the symptoms and signs you observe, you can tell:

- what side of the brain is affected
- whether the lesion is in the brainstem (a brainstem stroke)
- whether the cortex is involved (a cortical stroke)
- or if the lesion is in the deep white matter (a lacunar stroke)
- what blood vessel is involved
Treatment Strategies

- Need to search for underlying cause(s)
- Carotid Endarterectomy/Stent for high-grade symptomatic stenosis
- Anticoagulation for cardioembolic events
- Antiplatelet therapy for large and small vessel arteriosclerosis
Modifiable Risk factors

1. Hypertension
2. Smoking
3. Diabetes
4. Hyperlipidemia
5. Atrial fibrillation
6. Sickle cell disease
Hypertension

- Strongest link as a risk factor
- 42% risk reduction
- Benefit seen within 12 months
- Optimal SBP/DBP unknown
- Recommendation: <140/85
Smoking

- 50% increase in stroke risk
- rates normalize after only 2-4 years
- this is regardless of age/pack years
Diabetes

- Progression of risk by severity
- Stroke risk stratified by HgA1C
- Goal is normoglycemia
A Medical Emergency

- 5% will have a Stroke in next month
- 12% risk of major Stroke in First Year
  - 7% per annum thereafter
- 10% risk MI / Stroke / Death
- Highest in
  - Elderly
  - History of frequent TIA’s
  - Severe Carotid Stenosis
Cumulative risk of stroke after TIA

Risk of stroke (%) vs. Days

2002-2004
1981-1984

Lancet 2005; 366: 29-36
Rapid treatment of symptomatic patients

No. of Strokes prevented per 1000 CEAs at 3 years

time from last event to randomisation
<table>
<thead>
<tr>
<th>Clinical</th>
<th>Imaging</th>
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<tbody>
<tr>
<td>Males</td>
<td>Ulcerated stenoses</td>
</tr>
<tr>
<td>Hemispheric symptoms</td>
<td>Increasing stenosis</td>
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<tr>
<td>Symptoms for &gt;6 months</td>
<td>Contralateral occlusion</td>
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<tr>
<td>TIA &lt; 1 month</td>
<td>Intracranial disease</td>
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<tr>
<td>Increasing co-morbidity</td>
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<tr>
<td>Increasing age</td>
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TIA- Management

Lifestyle changes

Antiplatelet agents

- as soon as possible (<48hrs)

Blood Pressure

![Graph showing relative risk of stroke associated with usual diastolic and systolic blood pressure.](image)
Most trials can be characterized by two major criteria:
- presence and absence of neurological symptoms
- extent of carotid stenosis
Extracranial CAS

CEA for symptomatic CAS

- VACS, *JAMA*, 1991

- CEA reduces recurrent stroke and death in patients with symptomatic high-grade stenosis
NASCET – Symptomatic Stenosis

- **NASCET**: 
  - ≥70% stenosis 24m
  - 24m | medical | surgical
  - Any ipsilateral CVA | 26% | 9% p=0.001
  - 50-69% stenosis
  - 22.2% | 15.7% p=0.045
  - Ipsilateral CVA
  - Established 5% complication rate for surgery
  - Greatest result among men, pt with recent CVA, pt with hemispheric symptoms
6092 patients with > 35K patients years

<table>
<thead>
<tr>
<th>% stenosis</th>
<th>n</th>
<th>Stroke RR(%)</th>
<th>p</th>
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<tbody>
<tr>
<td>&lt; 30</td>
<td>1746</td>
<td>-2.2</td>
<td>0.05</td>
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<tr>
<td>30-49</td>
<td>1429</td>
<td>3.2</td>
<td>0.60</td>
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<tr>
<td>50-69</td>
<td>1549</td>
<td>4.6</td>
<td>0.04</td>
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<tr>
<td>&gt; 70 (no sub-totals)</td>
<td>1095</td>
<td>16.0</td>
<td>&lt;0.001</td>
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Sub-totals – trend towards benefit at 2 years, gone by 5 years
Amaurosis fugax only – no benefit
Absolute benefit increases with age

Lancet Jan 11, 2003
<table>
<thead>
<tr>
<th>Indication</th>
<th>0-29%</th>
<th>30-49%</th>
<th>50-69%</th>
<th>70-99%</th>
<th>&lt;60%</th>
<th>&gt;60%</th>
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<td>Indication</td>
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<td>Trial</td>
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<td>ECST NASCET</td>
<td>-</td>
<td>ACAS</td>
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**ECST**

**NASCET**
“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”
Ischemic stroke patterns

- Although specific clinical syndromes may suggest ischemic stroke patterns, there is considerable clinical overlap.

- As many as 25% of patients with lacunar syndromes confirmed radiologically are ultimately proved to have nonlacunar infarct mechanism.
Risk factors

Non-modifiable

1. Age (doubles each decade after age 55)
2. Gender (M > F)
3. Race (blacks & hispanics > whites)
4. Family history of TIA/stroke
Screening

• **Carotid Dopplers As an Emergency**
  - CT / MRI Brain
  - Echocardiogram
    - Transthoracic +/- Transoesophageal
  - 48 Hr Tape / T Test
• **Other**
  - MRI/A
  - Lab Test (Cholesterol, Glucose)
  - BP