Diagnosis and Classification of Secondary Headaches
Part 1 – Posttraumatic and Vascular

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ICHD II- Chaps 5&6
Posttraumatic and Vascular Headaches

- Post-traumatic headaches
  - Classification
  - Mechanisms
- Vascular Headaches
  - Types and Classification
  - Differential diagnosis
  - Migraine stroke

5. Headache attributed to head and/or neck trauma

5.1 Acute post-traumatic headache
5.2 Chronic post-traumatic headache
5.3 Acute headache attributed to whiplash injury
5.4 Chronic headache attributed to whiplash injury
5.5 Headache attributed to traumatic intracranial haematoma
5.6 Headache attributed to other head and/or neck trauma
5.7 Post-craniotomy headache

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Glasgow Coma Scale x/15

<table>
<thead>
<tr>
<th>Glasgow Coma Scale</th>
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<tr>
<td>1</td>
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<tbody>
<tr>
<td>Eyes</td>
<td>Does not open eyes</td>
<td>Open eyes in response to pain</td>
<td>Open eyes in response to voice</td>
<td>Open eyes spontaneously</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Verbal</td>
<td>Makes no sounds</td>
<td>Incomprehensible sounds</td>
<td>Utters inappropriate words</td>
<td>Confused, disoriented</td>
<td>Verbal communication normally</td>
<td>N/A</td>
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<tr>
<td>Motor</td>
<td>Makes no movements</td>
<td>Extension to side</td>
<td>Abnormal tone to speech</td>
<td>Frenzied/Withdrawal to pain</td>
<td>Localizes partial palsies</td>
<td>Other commands</td>
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- Severe ≤8
- Mod 9-12
- Mild ≥13

5.1.1 Acute post-traumatic headache attributed to moderate or severe head injury

A. Headache, no typical characteristics known, fulfilling criteria C and D
B. Head trauma with at least one of the following:
   1. loss of consciousness for >30 min
   2. Glasgow Coma Scale (GCS) ≤13
   3. post-traumatic amnesia for >48 h
   4. imaging demonstration of a traumatic brain lesion
C. Headache develops within 7 days after head trauma or after regaining consciousness following head trauma
D. One or other of the following:
   1. headache resolves within 3 mo after head trauma
   2. headache persists but 3 mo have not yet passed

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5.2.2 Chronic post-traumatic headache attributed to mild head injury

A. Headache, no typical characteristics known, fulfilling criteria C and D
B. Head trauma with all the following
   1. Either no loss of consciousness, or loc less than 30 min
   2. GCS ≥ 13
   3. Sx or signs diagnostic of concussion
C. Headache develops within 7 days after head trauma
D. Headache persists for > 3 months after head trauma
5.3 Acute headache attributed to whiplash injury

A. Headache, no typical characteristics known, fulfilling criteria C and D
B. History of whiplash (sudden and significant acceleration/deceleration movement of the neck) associated at the time with neck pain
C. Headache develops within 7 d after whiplash injury
D. One or other of the following:
   1. headache resolves within 3 mo after whiplash injury
   2. headache persists but 3 mo have not yet passed since whiplash injury

5.4 Chronic headache attributed to whiplash injury

As 5.3 except:

D. Headache persists for >3 mo after whiplash injury

Subdural, Epidural and Intracranial traumatic hemorrhages – 5.5

- Epidural – usually due to skull fx with tear of the middle meningeal artery
  - more common in children
  - focal deficits
  - brief lucid interval and deterioration.

Subdural, Epidural and Intracranial traumatic hemorrhages – 5.5

- Subdural – usually due to non penetrating head injury, possibly mild
  - usually in elderly
  - no lucid interval
  - Acutely, focal deficits, some headache
  - HA more common in chronic form w/ mental changes

6. Headache attributed to cranial or cervical vascular disorder

6.1 Headache attributed to ischaemic stroke or transient ischaemic attack
6.2 Headache attributed to non-traumatic intracranial haemorrhage
6.3 Headache attributed to unruptured vascular malformation
6.4 Headache attributed to arteritis
6.5 Carotid or vertebral artery pain
6.6 Headache attributed to cerebral venous thrombosis
6.7 Headache attributed to other intracranial vascular disorder

Vascular causes of headache

6.1 Headache attributed to ischaemic stroke or transient ischaemic attack
  6.1.1 Headache attributed to ischaemic stroke (cerebral infarction)
  6.1.2 Headache attributed to transient ischaemic attack (TIA)
6.2 Headache attributed to non-traumatic intracranial haemorrhage
  6.2.1 Headache attributed to intracerebral haemorrhage
  6.2.2 Headache attributed to subarachnoid haemorrhage (SAH)
6.3 Headache attributed to unruptured vascular malformation
  6.3.1 Headache attributed to saccular aneurysm
  6.3.2 Headache attributed to arteriovenous malformation (AVM)
  6.3.3 Headache attributed to dural arteriovenous fistula
  6.3.4 Headache attributed to cavernous angioma
  6.3.5 Headache attributed to encephalocoele or leptomeningeal angiomatosis (Sturge Weber syndrome)
6.4 Headache attributed to arteritis
  6.4.1 Headache attributed to giant cell arteritis (GCA)
  6.4.2 Headache attributed to primary CNS angiitis
  6.4.3 Headache attributed to secondary CNS angiitis
Vascular causes of headache

6.5 Carotid or vertebral artery pain
6.5.1 Headache or facial or neck pain attributed to arterial dissection
6.5.2 Post-endarterectomy headache
6.5.3 Carotid angioplasty headache
6.5.4 Headache attributed to intracranial endovascular procedures
6.5.5 Angiography headache
6.6 Headache attributed to cerebral venous thrombosis (CVT)
6.7 Headache attributed to other intracranial vascular disorder
6.7.1 CADASIL (Cerebral Autosomal Dominant Arteriopathy with Subcortical Infarcts and Leukoencephalopathy)
6.7.2 MELAS (Mitochondrial Encephalopathy, Lactic Acidosis and Stroke-like episodes)
6.7.3 Headache attributed to benign angiopathy of the central nervous system – Reversible cerebral vasoconstriction syndrome (RCVS)
6.7.4 Headache attributed to pituitary apoplexy

Stroke and HA

Portenoy (1984) - 165 pts with acute CVA were asked about HA
133 could answer meaningfully; 29% c/o HA
lacunes - 17% TIAs - 36%
Half were unilat, ipsi to CVA 50% of the time (!)
Stroke, 1984, 15:1009-1012.

HA ➔ Stroke
Migraine is a risk factor for stroke esp in some groups
Migraine can cause stroke – migrainous infarction

Stroke, TIA, and white matter lesions in migraine

Kruit MC, et al. Migraine as a risk factor for subclinical brain lesions. J Am Med Assoc. 2004; 291: 427–434 - Showed in a population-based (ages 30-60) MRI study that migraineurs with aura (MA) have a 12-fold increased risk of cerebellar infarcts, and that female migraineurs had more supratentorial deep white matter lesions than non-migraineurs.

Other authors have found that migraine sufferers are 4x more likely to have WMH, particularly in:
- centrum semiovale and subcortical < age 40
- deep wm > age 40
- Women migraineurs are more susceptible

Why do migraineurs (especially those with aura) get white matter lesions?

- Migraine leads to abnormal platelet aggregation?
- The observed oligemia leads to hypoperfusion ➔ damage?
- CSD induces hypermetabolism which ➔ damage?
- Genetic predisposition to hyperexcitable cortex may also predispose to wm damage?
- But –
  - Wm lesions are in cerebellum – rare aura source (or it is??)
  - No proof that these are actually ischemic lesions
  - Very few lesions are symptomatic

Does stroke occur due to migraine / migraine aura?

ICHD II

1.5.3 – persistent aura without infarction
- Definition: aura>than 1 week
- rare, may last months or years
- Acetazolamide and valproate have helped

1.5.4 Migrainous infarction
- Definition:
  - aura > 60 min
  - neuroimaging demonstrates ischemic infarction
Does stroke occur due to migraine / aura?


- The averaged risk of stroke for all Migraineurs was 2.16 times that of people without Migraine.
- Migraine with aura had 2.27 x risk
- Migraine without aura 1.83 x risk
- Adding oral contraceptives resulted in increasing the risk of stroke by ~ 8X

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6.2.2 Headache attributed to subarachnoid haemorrhage

A. Severe headache of sudden onset fulfilling criteria C and D
B. Neuroimaging (CT or MRI T2 or flair) or CSF evidence of non-traumatic subarachnoid haemorrhage with or without other clinical signs
C. Headache develops simultaneously with haemorrhage
D. Headache resolves within 1 mo

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6.3 Headache attributed to unruptured vascular malformation

6.3.1 Headache attributed to saccular aneurysm

A. Any new acute headache including thunderclap headache and/or painful III nerve palsy fulfilling criteria C and D
B. Neuroimaging evidence of saccular aneurysm
C. Evidence exists of causation by the saccular aneurysm
D. Headache resolves in 72 hours
E. Subarachnoid haemorrhage, intracerebral hemorrhage and other causes of headache rule out by appropriate investigations

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6.4 Arteritis Headaches

6.4.1 Headache attributed to giant cell arteritis (GCA)
6.4.2 Headache attributed to primary CNS angiitis
6.4.3 Headache attributed to secondary CNS angiitis
6.4 Arteritis Headaches

6.4.1 HA attributed to giant cell arteritis (GCA)

Features:
- Tender TA + elevated ESR/CRP or + bx
- HA develops with other signs of GCA
- Response to steroids in 3 d

6.4.2 Headache attributed to primary CNS angiitis

A. Any new persisting headache fulfilling criteria D and E
B. Encephalic signs of any type (e.g., stroke, seizures, disorders of cognition or consciousness)
C. CNS angiitis proven by cerebral or meningeal biopsy or suspected on angiographic signs in the absence of systemic arteritis
D. Headache develops in close temporal relation to encephalic signs
E. Headache improves within 1 month of steroid and/or immunosuppressive treatment

6.4.3 Headache attributed to secondary CNS angiitis

Same except C – evidence of systemic arteritis

6.4.4 Headache attributed to secondary CNS angiitis

Same except C – evidence of systemic arteritis

6.5 Carotid or vertebral pain

6.5.1 Arterial dissection

6.5.2 Post-endarterectomy headache

6.5.3 Carotid angioplasty headache

6.5.4 HA attributed to intracranial endovascular procedures

6.5.5 Angiography headache

6.6 Cerebral venous thrombosis

Etiology/Risk factors
- Estrogen, hypercoagulable state
- Factor V Leiden, Pro C, S defici

Presentation
- Headache, az, CVA, papilledema
- CT, MRI insensitive – MRV diagnostic

Treatment
- Heparin, Hydration (even if small hemorrhages)
- Consider Mannitol, steroids
- Consider thrombolysis

6.7.1 CADASIL

Cerebral Autosomal Dominant Arteriopathy with Subcortical Infarcts and Leukoencephalopathy

A. Attacks of migraine with aura, with or without other neurological signs
B. Typical white matter changes on MRI T2WI
C. Diagnostic confirmation from skin biopsy evidence or genetic testing (Notch 3 mutations)

Migraine w Aura present in 1/3; and in those cases may precede MRI changes by up to 15 years
6.7.2 MELAS
Mitochondrial Encephalopathy, Lactic Acidosis and Stroke-like episodes
A. Attacks of migraine with or w/o aura
B. Stroke-like episodes and seizures
C. Genetic abnormality such as 3243 point mitochondrial DNA mutation in the tRNA leu gene (or other)

There are other mitochondrial disorders that contain migraine, usually with aura

6.7.3 RCVS – Reversible Cerebral Vasoconstriction Syndrome
- RCVS - recurring acute headaches and reversible vasoconstriction of cerebral arteries, leading to neurological
- AKA Call–Fleming syndrome, benign angiopathy of the central nervous system, thunderclap headache with reversible vasospasm, postpartum angiopathy

RCVS probably includes many cases of drug-induced cerebral arteritis.
The etiology of RCVS is not clear but it can occur coincidently with certain medication or drug use or in pregnancy. It
Differentiated from primary angiitis of the CNS by its normal CSF.