Acute Severe Headaches in the Emergency Room

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Acute Severe Headaches in the Emergency Room

- Subarachnoid or intracerebral haemorrhage
- Epi- or subdural haematoma
- Retroclival haematoma
- Cerebral infarcts
- Reversible cerebral vasospasm
- Cervicocranial artery dissection
- Cerebral venous sinus thrombosis
- Intracranial hypotension (postural, post lumbar puncture)
- Intracranial hypertension: idiopathic, mass, shunt failure
- Pituitary apoplexy
- Aqueduct stenosis
- Colloid cyst 3rd ventricle

- Temporal arteritis
- Meningitis, encephalitis, brain abscess
- Sinusitis or dental pain
- Cardiocerebrovascular disease
- Acute glaucoma
- Medication induced (NO, N2O, MAO)
- Metabolic (CO, O2, hypoglycaemia)
- Hypertensive encephalopathy
- Phaeochromocytoma
- Febrile headache
- Primary headaches
  - Migraine
  - Cluster headache
  - Tension type headache
  - Primary benign thunderclap headache
  - Primary cough headache
  - Induced by exertion or sexual activity

In der Beschränkung zeigt sich erst der Meister
Acute Severe Headaches in the Emergency Room

- Subarachnoid or intracerebral haemorrhage
- Epi- or subdural haematoma
- Retroclival haematoma
- Cerebral infarcts
- Reversible cerebral vasoconstriction syndrome
- Cervicocranial artery dissection
- Cerebral venous sinus thrombosis
- Intracranial hypotension (spontaneous, post lumbar punction)
- Intracranial hypertension: idiopathic, mass, shunt failure
- Pituitary apoplexy
- Aquaduct stenosis
- Colloid cyst 3rd ventricle

- Temporal arteritis
- Meningitis, encephalitis, brain abscess
- Sinusitis or dental pain
- Cardiac cephalgia
- Acute glaucoma
- Medication induced (NO, N20, MAO)
- Metabolic (CO, O2, hypoglycaemia)
- Hypertensive encephalopathy
- Phaeochromocytoma
- Febrile headache
- **Primary headaches (> 2/3)**
  - Migraine
  - Cluster headache
  - Tension type headache
  - Primary benign thunderclap headache
  - Primary cough headache
  - Induced by exertion or sexual activity
Acute Severe (Thunderclap) Headache

Brain CT → SAH (11-25%) → CT-A → No Aneurysm

No SAH CT > 6h

LP > 12h

Blood break down products

SAH → CT-A

No SAH CT < 6h

No blood break down products

No SAH

Other Causes

MRI

Repeat DSA?

Aneurysm

Blood Not Perimesencephalic

DSA

No Aneurysm

Aneurysm

Perimesencephalic

Aneurysm

Other Causes

Repeat DSA?
A 48-year-old woman with spontaneous acute severe headache & vomiting

- Different than her usual migraines for which she uses sumatriptan
- Since one week: daily sumatriptan because of severe headaches
- Normal physical examination
- Normal CT scan & CSF ⇔
- Discharged with R/ Analgesics
- Waxing and waning headaches for 2 weeks
- Readmission: confusion & behavioural changes

Diagnosis?
Tests?
A 48-year-old woman with spontaneous acute severe headache & vomiting

- Normal brain MRI & MRA ⇒ other tests?
- TCD: blood flow velocities MCA↑ & ACA↑
- Diagnosis: ?
  - Reversible Cerebral Vasoconstriction Syndrome
- MRA & Angiography ⇒ Strings & Beads
A 48-year-old woman with spontaneous acute severe headache & vomiting

- Normal brain MRI & MRA
- TCD: blood flow velocities MCA↑ & ACA↑
- Diagnosis:
  - Reversible Cerebral Vasocostricition Syndrome
- MRA & Angiography ⇒ Strings & Beads
- R/ Verapamil 120 mg twice daily
- Clinical improvement within a day
- TCD after 4 days: normal blood flow velocities
- Strongly advised not to resume any triptans?
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ⇔ Clinical Features

- Most frequent cause non-SAH thunderclap headache
- Thunderclap headache usually lasting 1 - 3 hours
  - Bilateral, often with occipital onset
  - Migraine-like associated autonomic features
- Focal deficits and/or seizures (43%)
- Hypertensive surge (33%)
- Multiple thunderclap headaches (1 - 4 weeks)
- Lingering baseline headache persisting in-between attacks (66%)
- History of migraine (40%)
  - “Worst ever migraine attack” ⇔ triptans ⇔ aggravation
Reversible Cerebral Vasoconstriction Syndrome (RCVS) => Clinical Features

- Female preponderance (69% – 90%)
- Triggers inducing sympathetic activity (80%)
  - Vasoactive drugs
  - Valsalva manoeuvres (coughing, sneezing, bending, defaecation, urination, sexual activities)
  - Pregnancy & post-partum
  - Bathing/showering
  - Sudden emotion
  - Physical exertion
  - Cervical artery dissection/surgery
  - Acute head conditions
  - Catecholamine secreting tumours
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ⇒ Imaging Features

- First post-ictal week: small brain-convexity (subarachnoid) haemorrhages (33%)
  - DD: cerebral venous thrombosis or amyloid angiopathy
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- Second post-ictal week: watershed infarcts (39%)
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ➔ Imaging Features

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  - DD: cerebral venous thrombosis or amyloid angiopathy
- Second post-ictal week: watershed infarcts (39%)
- Posterior Reversible Encephalopathy Syndrome (PRES) (39%)

Bilateral posterior white matter hyperintensities ➔ vasogenic oedema
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ⇒ Imaging Features

• First post-ictal week: small brain-convexity (subarachnoid) haemorrhages (33%)
  – DD: cerebral venous thrombosis or amyloid angiopathy
• Second post-ictal week: watershed infarcts (39%)
• Posterior Reversible Encephalopathy Syndrome (PRES) (39%)
  – Usually disappears < few days, but sometimes fatal
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ⇒ Imaging Features

- Cervical carotid or vertebral artery dissection (12%)
Migraine
Cervical artery dissection
Reversible cerebral vasoconstriction syndrome (RCVS)

- Comorbid trias
- Strong female preponderance
- RCVS $\Rightarrow$ migraine-like attacks
- Shared genetic predisposition
- Common endotheliopathy?
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ⇔ Diagnostic Imaging
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ➔ Diagnostic Imaging

- TCD: increased blood flow velocities
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ⇒ Diagnostic Imaging

• TCD: increased blood flow velocities
• MRA & Angiography ⇒ diffuse bilateral segmental vasoconstriction (string & beads)
  – Outlasting clinical features by several weeks
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ⇒ Diagnostic Imaging

- TCD: increased blood flow velocities
- MRA & Angiography ⇒ diffuse bilateral segmental vasoconstriction (string & beads)
  - Outlasting clinical features by several weeks
  - MRA & Angiography may be normal in first week (20 - 40%)
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ⇒ Diagnostic Imaging

- **TCD:** increased blood flow velocities
- **MRA & Angiography** ⇒ diffuse bilateral segmental vasoconstriction (string & beads)
  - Outlasting clinical features by several weeks
  - MRA & Angiography may be normal in first week (20 - 40%)
  - Catheter angiography may trigger transient neurological deficits (9%)
  - **DD:** primary angiitis of the central nervous system (PANCS)
    - Step-wise gradual clinical presentation; only rarely thunderclap
    - No female preponderance and no specific trigger factors
    - Abnormal CSF (50% inflammatory response)
    - Mainly ischaemic lesions, rarely haemorrhagic lesions, no PRES
Reversible Cerebral Vasoconstriction Syndrome (RCVS) ➞ Management

• Management
  – Rest & avoid triggers
  – R/ Nimodipine?

• Prognosis:
  – Spontaneous resolution < 3 months (> 90%)
  – Delayed worsening (5 – 10%)
  – Fatal (1.4%)

• Longterm prognosis
  – Recurrence is rare (5%)
A-29 year-old man with transient paresis followed by headache & vomiting

- While playing football (no trauma): dizzy (≈ fainting)
- Blurred vision: spot for his left eye which first slowly expanded (10 min) and then slowly disappeared (5 min)
- History at Emergency Room ⇒ acute slack right arm for 3 min
- History at Neurology Clinic ⇒ slowly progressive heaviness and weakness right arm for 3 min
- Right side of his mouth didn’t move well
- Observation by a physiotherapist:
  - Patient looked pale and sweaty, drooping mouth and dysarthria without aphasia for 3 minutes
A-29 year-old man with transient paresis followed by headache & vomiting

- After disappearance in 10 - 15 min of all visual and motor symptoms:
  - Left-sided throbbing headache, increasing with activity
  - Nausea, vomiting (1x) and photophobia
- Uneventful prior history & normal physical examination
- Diagnosis:
- Next day: subacute right hemiparesis and hemianopia
- CT Brain & CTA:
  - Dissection & occlusion left internal carotid a.
  - Occlusion middle cerebral a.
- R/ Thrombolysis IV/IA
Cervical Artery Dissection

- Subacute or Thunderclap Headache
  - Ipsilateral to dissection
  - Neck/Occipital Pain $\rightarrow$ Vertebral a.
  - Temporal/Frontal pain $\rightarrow$ Carotid a.
- Migraine-like headache & aura
- Horner & cranial nerve palsy
- Retinal & cerebral ischaemia
- Pulsatile Tinnitus
- Young adults
- Ultrasound, CTA, MRA, MRI neck
A 20-year-old woman with severe unilateral headache

- Left frontal severe throbbing headache since 2 days
- Aggravation by physical activity
- Photophobia, nausea and vomiting (1x)
- Transient moderate improvement with NSAIDs
- Contraceptive pills for polycystic ovary
- Iron-supplement for anaemia
- Family history: migraine
- Normal physical and neurological examination
- Diagnosis?
A 20-year-old woman with severe unilateral headache

- CT brain: normal
- No effect of triptan
- Diagnostic tests?
- MRI:
  - Central filling defect
- MR Venography:
  - Flow defect left sigmoid sinus
  - Thrombosis left sigmoid sinus
- Improved with anticoagulant treatment
Cerebral venous (sinus) thrombosis

- Severe persistent headache
  - Subacute progressive, migraine-like, or thunderclap(-like)
  - Exacerbations by transient increase intracranial pressure (Valsalva manoeuvres such as coughing, sneezing, etc)
  - May be worse in the recumbent position or upon awakening
  - Headache may be an isolated feature!

- Focal neurological deficits, seizures and altered consciousness (in majority of cases, but not in all)

- Physical examination:
  - Raised intracranial pressure (papilloedema, VI nerve palsy)
  - Focal neurological deficits
  - May be normal!
Cerebral venous (sinus) thrombosis

• Risk factors:
  – Hypercoagulability state
  – Cranial trauma or infection

• CSF:
  – Raised pressure (and headache relief after tap)
  – May be normal
Cerebral venous (sinus) thrombosis

- **Risk factors:**
  - Hypercoagulability state
  - Cranial trauma or infection

- **CSF:**
  - Raised pressure with headache relief after tap
  - May be normal

- **CT & MRI:**
  - Cortical: SAH, haemorrhages, infarcts, oedema
  - Flow deficits
  - May be normal

**Images:**
- CT right temporal venous haemorrhages and perifocal oedema
- MRI right sigmoid sinus thrombosis and adjacent haemorrhage
- MRIs of cortical subarchnoid haemorrhages in cerebral venous thrombosis
Cerebral venous (sinus) thrombosis

- **Risk factors:**
  - Hypercoagulability state
  - Cranial trauma or infection

- **CSF:**
  - Raised pressure with headache relief after tap
  - May be normal

- **CT/MRI:**
  - Cortical: SAH, haemorrhages, infarcts, oedema
  - Flow deficits
  - May be normal

- **CT-V & MR-V:** venous sinus flow deficit

**MRI T1 (without contrast):** hyperintense signal superior sagittal and straight sinus

**MR-V loss of flow signal secondary to thrombus in central portion left transverse sinus**
Cerebral venous (sinus) thrombosis

MRA of absent flow right sigmoid and transverse sinus
Cerebral venous (sinus) thrombosis

- **Risk factors:**
  - Hypercoagulability state
  - Cranial trauma or infection
- **CSF:**
  - Raised pressure with headache relief after tap
  - May be normal
- **CT & MRI:**
  - Cortical: SAH, haemorrhages, infarcts, oedema
  - Flow deficits
  - May be normal
- **CT-V & MR-V:** venous sinus flow deficit
- **Anticoagulant treatment & hemicraniectomy if needed**
Only 30 min ⇒ what did you miss?

- Colloid cyst presenting as typical cluster headache responding to specific acute and prophylactic cluster headache therapy
- First attack of cluster headache presenting as thunderclap headache with stroke-like event
- Acute glaucoma presenting as cluster headache
- Pituitary apoplexy presenting as migraine or cluster headaches
- Many other causes of acute severe headache initially misdiagnosed in the emergency room