Master School Cases International Headache Society

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But first, a Case!!

- Not a picture of the real patient!!

Case 1

- 46 year old male. History of migraine (none for 5 years). History of hypertension, erectile dysfunction, renal stone
- + Family history migraine (sister)
- Medications: testosterone gel, escitalopram, atorvastatin, lisinopril, hydrochlorothiazide, sumatriptan (in past)

1 day PTA

- Fight with his wife, mowed the lawn
- Sudden onset severe headache, vomited, fell to floor
- Fast squad (ambulance) brought him to the Emergency Department
- Agitated. Complained of back pain, R>L and severe headache.
- Vital signs: no fever. No hypertension. Pulse normal

Day - 1

- Urinalysis positive for blood
- Immediate head Cat Scan negative
- Lumbar puncture: 0 white cells, 0 red cells. Protein 38, glucose 93
- White blood cell count 11.2, hematocrit 42.6 erythrocyte sedimentation rate 6
- Impression: atypical migraine, recently passed kidney stone

Day -1

- Treatment: intravenous ketorolac, morphine, lorazepam, fentanyl.
- Result: minimal pain relief, agitated patient, angry family.
- Treatment: intravenous metoclopramide, dihydroergotamine.
- Result: significant but incomplete pain relief

Day -1

- Plan: home with 6 hydrocodone/acetaminophen
- Went home late that evening
- Headache recurred, all 6 pills consumed, worsening headache
- Returned to emergency room early am

Day 1

- Seen in emergency room: agitated, in pain
- Given 14 mg intravenous morphine, 1.5-2 mg lorazepam
- Result: deep stupor
- Plan: call Neurology (during rounds, 8 am)

Admission

- Seen by neurology resident
- Imp: deep stupor, non-focal exam
- 10 am: seen by Attending
- History, tests reviewed, family interviewed
- Plan: admit for observation
- And…..??

Day 1

- Admitted. MRI/MRA ordered.
- 10am-3:35 pm lightening up
- 3:45 unresponsive, seizing
- Coma, 5mm pupils, reactive
- Oculocephalics absent
- Corneals absent
- + Brudzinski BP 200/110 P50

Catastrophe

- What has happened?
- What should I do??
- And…what did I do?

Course

- Emergency MRI/MRA
- Required intubation in the MR suite
- Large right corpus striatum hemorrhage with mass effect, extension into the ventricular system
- Neurosurgery consult
- Thoughts??
- Why did this happen??

No….

- It wasn’t an arterio-venous malformation, nor an aneurysm
- CT angiogram negative that day
- Conventional angiogram negative except for right-sided vasospasm (day 2)
- In intensive care unit, deep coma
- Very angry family
- Thoughts??

Course

- Angry family
- Wanted bloody urine further evaluated
- Next test??
- Any other tests??
- Consultations?

CT scan abdomen

- Left adrenal mass
- Endocrine consult
- Meds reviewed
- 24 hour urine studies ordered

- Very smart, went to Harvard, probably fluent in Latin

Results

- 24 hour urine
- VMA 14.9 mg (nl < 7.9 mg)
- Metanephrines 703 nmol (nl 45-260, <400 in HTN), normetanephrine 2323 nmol (nl 120-450, < 900 in HTN)
- So the diagnosis is ???

Let's be certain!!

- Laparoscopic left adrenalectomy
- Pathology: adrenal cortical adenoma
- After review final dx: pseudopheochromocytoma
- We did everything right, and still everything went wrong.

Hypertension and headache

- Essential hypertension is usually NOT associated with headache.
- Paroxysmal elevations of blood pressure (as with pheochromocytoma and the tyramine reaction with monoamine oxidase inhibitors) usually is associated with headache
- Sustained elevations of blood pressure as in accelerated and malignant hypertension is associated with headache (systolic ≥ 180 mmHg, diastolic ≥ 120)

Another case

- 42 year old female, history of migraine, develops a sudden (thunderclap) headache, unlike prior headaches (more severe).
- It recurs with Valsalva (laughing, straining) and after the third time she goes to the emergency room
- Blood pressure is 192/114. Pulse 96. Afebrile
- Faces appear distorted to her, and she appears to have patchy visual field deficits)

Studies

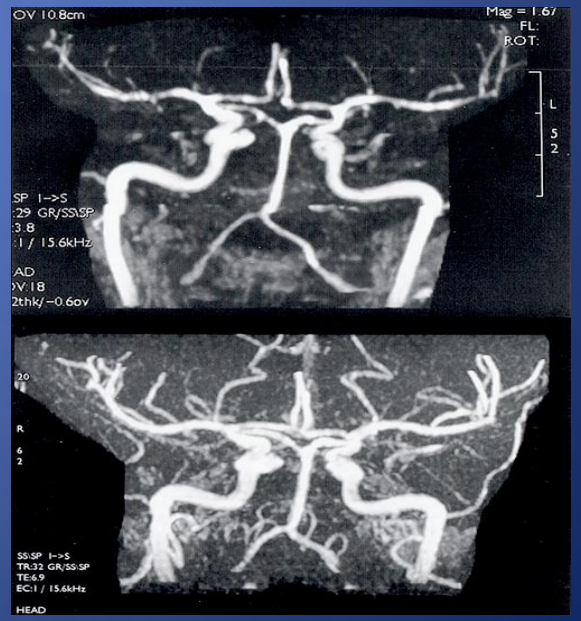
- CT scan of brain appears normal.
- MRI of brain is not. Posterior reversible encephalopathy syndrome (PRES)

Further evaluation

- MRA and CTA show multiple areas of segmental blood vessel narrowing intracranially.
- Cerebrospinal fluid unremarkable.
- Further history reveals she smokes marijuana.
- Diagnosis?

She has…

- RCVS (reversible cerebral vasoconstrictive syndrome)
- Calcium channel blocker started (nicardipine)
- Advised to abstain from marijuana
- Full recovery



Thunderclap headache

- ICHD-II 4.6 Primary thunderclap headache
- Description: High-intensity headache of abrupt onset mimicking that of ruptured cerebral aneurysm
- Diagnostic criteria: A. Severe head pain fulfilling B and C
- B. Both of the following:

Primary thunderclap HA ICHD-II

- 1. sudden onset, reaching maximal intensity in < 1 minute
- 2. Lasting from 1 hour to 10 days
- C. Does not recur regularly over subsequent weeks/months
- D. Not attributed to another disorder
- HA may recur within the first week
- Normal cerebrospinal fluid and normal imaging required (not associated with cerebral vasoconstriction).

Primary Thunderclap HA

- More: “evidence that thunderclap HA exists as a primary condition is poor”.
- Secondary thunderclap HA: consider intracerebral hemorrhage, venous sinus thrombosis, unruptured (ruptured) vascular malformation/aneurysm, arterial dissection, CNS angiitis, *RCVS*, pituitary apoplexy, crash migraine….

..more secondary thunderclap HA

- …and cardiac cephalgia (one case), intracranial hypotension, obstructive hydrocephalus, retroclival hematoma, sphenoid sinusitis, hypertensive encephalopathy, pheochromocytoma, giant cell arteritis
- Yes, coronary artery disease can present with HA instead of chest pain
- RCVS in very important to understand.

Reversible Cerebral Vasoconstrictive Syndromes (RCVS)

- Reversible multifocal narrowing of cerebral arteries (MRA/CTA/angiography sensitive but not specific)
- Sudden (thunderclap) headache (often repetitive)
- May have associated neurologic deficits (may have strokes)
- Pathophysiology unknown
- Differential diagnosis includes that of thunderclap headache, atherosclerosis, vasculitis

Calabrese LH, Dodick DW, Todd JS, Singhal AB. Narrative Review: Reversible Cerebral Vasoconstrictive Syndromes. Ann Intern Med 2007;146: 33-44

RCVS

- Vasculitis and SAH may be misdiagnoses
- CSF normal or near-normal (protein <80mg%, wbc <10/µL, glucose normal)
- Usually self-limited
- Other names Call or Call-Fleming syndrome, benign angiopathy of the CNS, postpartum angiopathy, drug-induced angiopathy, migrainous vasospasm/crash migraine
- CTA, MRA, CSF/LP, angiography

The Headache of RCVS

- “Hyperacute”/severe, occipital or diffuse, throbbing, with nausea/vomiting, photosensitivity.
- Can recur spontaneously or provoked by Valsalva
- May have neurologic deficits due to vasospasm, seizures
- Stroke, brain edema, even death

RCVS treatment

- Uncertain
- Support/observation
- Nimodipine or verapamil?
- Steroids—no! (see update!!)
- Generally self-limited < 3 months

RCVS update

- August Archives of Neurology Calabrese et al and accompanying editorial
- Massachusetts General Hospital and Cleveland Clinic
- Retrospective analysis of 139 RCVS cases
- 85% presented with thunderclap headache, usually repetitive
- 81% women
- Age range 13-69yo

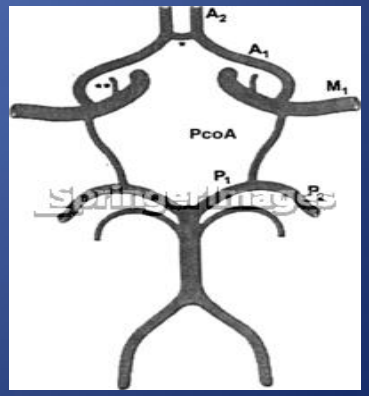
- Singhal AB, Hajj-Ali RA, Topcuoglu M et al. Reversible Cerebral Vasoconstrictive Syndromes. Arch Neurol 2011;68(8): 1005-1012.

RCVS update

- 40% with prior migraine, 42% with vasoconstrictive drug exposure (including amphetamines, Selective serotonin reuptake inhibitors(SSRIs)/SNRIs, triptans, marijuana, cocaine, ecstacy), 9% with recent pregnancy
- Initial brain imaging (CT/MRI) normal in 55% but 81% eventually became abnormal (infarcts 39%, convexity SAH 34%, lobar hemorrhage 20%, brain edema 38%)
- 90% with good clinical outcome, 9% severe deficits, 2% died

RCVS update

- Seizures in 17%
- Focal deficits aphasia, hemiparesis, ataxia, visual deficits (often fragments of Balint syndrome)
- 10% with PRES (known to be at risk for PRES if there is narrowing of the M1 and P2 arterial segments)



Balint Syndrome

- Inability to project gaze voluntarily into the peripheral field despite full EOMs (psychic paralysis of gaze)
- Inability to touch an object under visual guidance
- Visual inattention to the periphery of the visual field. Failure to direct voluntary oculomotor function.
- Usually bilateral watershed lesions parieto-occipital
- from Adams and Victor's Principles of Neurology

Differences between 1° angiitis of the CNS and RCVS

- Clinically very different
- Primary angiitis of the central nervous system is subacute/chronic often with dull headache. Cerebrospinal fluid more abnormal.
- RCVS acute/hyperacute, often with *repetitive thunderclap headache*, normal or minimally abnormal cerebrospinal fluid

(Possible) Diagnostic test

- Linn J et al. Cephalalgia 2011; 31(10):1074-1081
- Digital subtraction angiography series of 9 consecutive patients with suspected RCVS given intra-arterial nimodipine due to clinical worsening.
- 5/9 had RCVS, all their angiograms normalized after the nimodipine
- Others had primary angiitis of the central nervous system(PACNS), Moya-Moya, or atherosclerotic disease
- Given in the arterial distribution(s) needed 0.5-2mg/hr up to 2 hours. Responders then got up to 2 mg /hr iv.

RCVS update

- Still no proven therapy
- Steroids appear to worsen
- Calcium channel drugs unproven but may help

CASE 3

- 74 years-old male. History of craniocerebral trauma in 2002.
- 3 months later: memory loss, irritability, worsening gait and urinary incontinence.
- He was diagnosed with post-traumatic hydrocephalus and was admitted to undergo to ventriculo-peritoneal shunt.

CASE 3

- Diseases:
  - Diabetes mellitus
  - Hypertension
  - Chronic renal failure on haemodialysis since 2009.

- Medications:
  - Propranolol
  - Folic acid
  - Aspirin.
  - Furosemide
  - Renagel

1st day after admission

- During a haemodialyses session:

  epistaxis, headache (bilateral, throbbing) , nausea and vomiting.

- Vital signs:
  - BP 200 x 110 mmHg,
  - FC 78 bpm,
  - T 36 °C

1st day after admission

- No history of headache before haemodialysis.
- Normal neurological examination.
- Normal laboratory tests and ECG.
- Vital signs before:
  - ΔSBP 150 – 140 mmHg
  - Δ DBP 90 – 80 mmHg
  - ΔT 35,3 – 36,1 °C

Questions

1. What is the general diagnosis?
   Hypertensive crises.

2. What is the diagnosis of the headache?
   Headache attributed to hypertensive crisis without hypertensive encephalopathy.

Treatment

1. Acute administration
   - Captopril
   - Nifedipine

Next day

- Nausea, vomiting, headache (bilateral, throbbing and severe) and appetite loss.
- There were no changes in general or neurological examination.
- Vital signs:
  - BP 140 x 80 mmHg
  - FC 70 bpm
  - T 36°C

Headache after almost every haemodialysis session!

Questions

1. What is the diagnosis of the headache?

   Dialysis Headache.

2. What are the main differential diagnosis?

   Hypertensive crises.

   Dialysis disequilibrium syndrome.

   Caffeine withdrawal.

   Metabolic disturbances (e.g.: hypoglycemia)

   Medication-induced headache.

Questions

3. What should be done?

   Interrupt the dialysis if severe headache.

   Change dialysis parameters.

   Analgesics (may not work).

   ACE-inhibitor (one case – fosinopril).

Dialysis Headache

IHS classification
10.5 Dialysis
Diagnostic criteria:
A. Onset during haemodialysis and termination within 24 h after dialysis
B. Has occurred during at least half of haemodialyses and at least three times
C. Can be prevented by changing dialysis parameters

ICHD –II, 2004

Modifications proposed
10.5 Dialysis
Diagnostic criteria:
A. Onset after the beginning of the haemodialysis programme
B. Can be prevented by changing dialysis parameters
10.5.1 Dialysis headache during haemodialysis sessions
A. Onset during haemodialysis sessions and termination within 24 h after dialysis
B. Has occurred during at least half of haemodialyses and at least three times
10.5.2 Dialysis headache mainly between haemodialysis sessions
A. Has occurred during at least half of the intervals between haemodialyses and at least three times

Antoniazzi AL et al, 2003

CASE 4

- 65 years-old male. History of new onset headache (6 months ago).
- Left frontal pain, severe, throbbing; no nausea, vomiting, photophobia or phonophobia.
- Triggered by walking (up hills), mowing his lawn.
- Not evoked by Valsalva maneuver, coughing, sneezing, defecation or sexual intercourse.

CASE 4

- Pain relief after 5 minutes of rest.
- Antecedents: hypercholesterolaemia, hypertension and smoking (2 packs/day for 40 years).
- Medications: sinvastatin, captopril.
- No relevant findings on general examination. Normal neurological examination

Questions

1. What is the pattern of this headache?

   Exertional headache.

2. What should be done?
   - › Laboratory tests
   - › CT
   - › MRI (angiography - arterial and venous phase)
   - › Cardiological assessment?

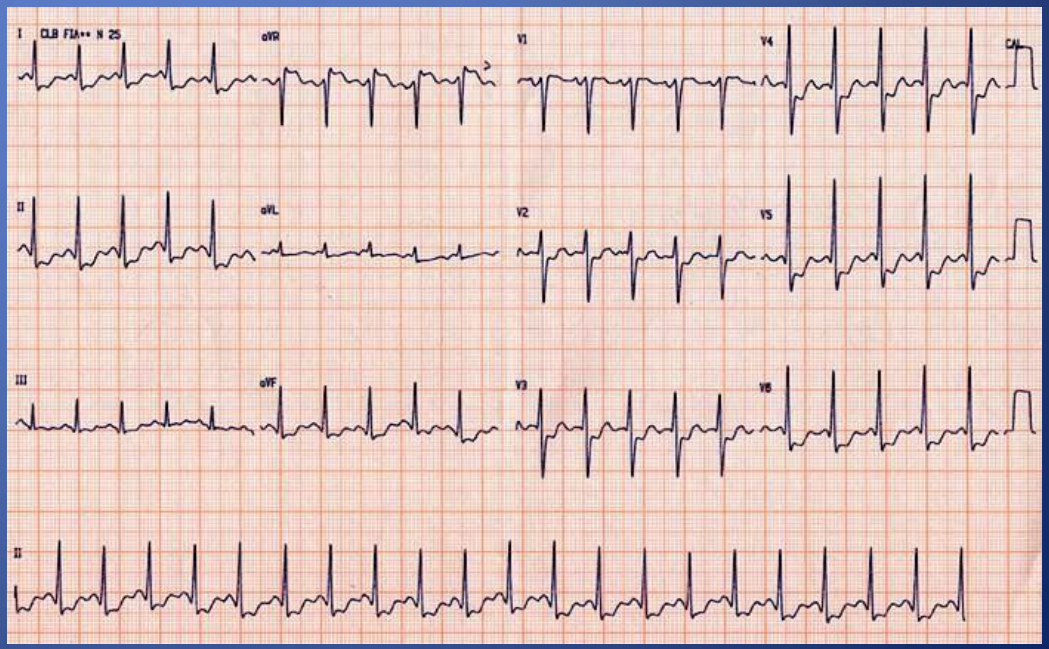
Cardiological assessment

- ECG – without significant changes.

- On stress testing:

  › headache

  › ST depression



Cardiological assessment

- Both headache and ECG abnormalities disappeared after one sublingual tablet of propatilnitrato (sustrate™).
- Coronary angiography - two-vessel coronary oclusive disease.
- Procedure – angioplasty
- 15 months later - no more headache.

Questions

1. What is the final diagnosis?

   Cardiac cephalgia.

2. When should we suspect this condition?
   - › older patients
   - › short duration
   - ›cardiovascular risk factors
   - › the onset of headache during exercise
   - › rapid resolution on resting

Cardiac Cephalgia

10.6 Cardiac cephalalgia

Diagnostic criteria:

A. Headache, which may be severe, aggravated by exertion and accompanied by nausea and fulfilling criteria C and D
B. Acute myocardial ischaemia has occurred
C. Headache develops concomitantly with acute myocardial ischaemia
D. Headache resolves and does not recur after effective medical therapy for myocardial ischaemia or coronary revascularisation

ICHD –II, 2004