

Case 33

History of Present Illness

A 39-year-old completely healthy woman presented to the emergency room. Four days before she defecated and suffered an “explosion” of pain in her head and behind her eyes. She had throbbing pain and nausea. She was first seen at an outside hospital and diagnosed with probable migraine. A head CT was negative and she did not have a lumbar puncture. She was discharged and the pain gradually decreased over the next 2 days and she was able to return to work. Then 4 days later she again experienced another explosion in her head. She had mild photophobia. She has a history of previous migraine. She does not recall any sympathomimetic use.

<i>Past medical and ocular history</i> Moderate obesity Two pregnancies delivered by cesarean section	<i>Past surgical history</i> None
<i>Medications</i> Occasional codeine for headaches	<i>Family history</i> Cerebral aneurysm in a great aunt
<i>Social history</i> Married with two children; no smoking, alcohol use	<i>Review of systems</i> No prodromal illness

Examination

Acuity with correction

Right eye: 20/20

Left eye: 20/20

Pupils

Equal and no RAPD

Intraocular pressure

Right eye: 14 mmHg

Left eye: 14 mmHg

External exam

Unremarkable

Eye alignment

Normal

Slit lamp examination

Normal

Visual field

Normal

Fundus examination

Normal

Neurologic examination

Normal

Blood pressure 116/75

Discussion

Neurologic Perspective—Dr. Digre

The sudden onset of the worst headache of one's life is sometimes called a "Thunderclap Headache"—and it usually makes every provider sit up and pay attention—since this is the typical headache of an ominous headache like a sub-arachnoid hemorrhage. Indeed 70% of subarachnoid hemorrhages from an aneurysm will present this way. The key feature of these headaches are the pain develops in less than 1 min and it is very severe—usually resulting in going to an emergency room. There is often photophobia and phonophobia as well as nausea and vomiting.

There are both primary and secondary thunderclap headaches. The definition of a primary thunderclap headache by the ICHD 3 beta is that NO other cause is found (see Table 33.1). This primary headache can be caused by cough (Case 29) or sexual intercourse (sometimes called orgasmic headache). However, before making the diagnosis, secondary causes must be evaluated. There are many serious causes of a thunderclap headache besides sub-arachnoid hemorrhage. See Table 33.2 for a list of primary and secondary causes of thunderclap headache. Looking for a secondary cause for thunderclap is essential and headaches must be thoroughly evaluated with imaging of the brain (usually a CT) and vessel imaging—CTA or MRA. In addition, a lumbar puncture must be done to look for sub-arachnoid hemorrhage. Most of the time, many of the causes will be seen on CT or MR scan.

In this case, the CT scan was initially normal, and the severe headache recurred 4 days later. This pattern of the *recurrent thunderclap headache* repetitively recurring

Table 33.1 Diagnostic criteria for Primary thunderclap headache (by ICHD3 beta)

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- (A) Severe head pain fulfilling criteria B and C
 - (B) Abrupt onset, reaching maximum intensity in <1 min
 - (C) Lasting for more than 5 min
 - (D) Not better accounted for by another ICHD-3 diagnosis
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Headache Classification Committee of the International Headache Society. The International Classification of Headache Disorders: 3rd edition (beta version). *Cephalalgia*. 2013;33:629–808

Table 33.2 Causes of thunderclap headache

Primary thunderclap headache:

- Benign Exertional headache
- Cough headache
- Exertional headache
- Orgasmic headache

Secondary thunderclap headache:

Vascular causes:

- Subarachnoid hemorrhage from an aneurysm
- other non-aneurysmal subarachnoid hemorrhage causes:

- Vertebral dissection
- Cavernous angioma
- Vasculitis
- Amyloid angiopathy
- Reversible vasoconstriction syndrome

Cerebrovenous sinus thrombosis

Intracerebral hemorrhage

Arterial dissection

Posterior reversible encephalopathy syndrome (PRES)

Reversible cerebral vasoconstriction syndrome (RCVS)

Pregnancy (usually post-partum)—and pregnancy complications

Migraine

Medications associated with RCVS:

- Illicit drugs (like cocaine, marijuana, lysergic acid diethylamide LSD, amphetamines, ecstasy)
- Sympathomimetic drugs (epinephrine, pseudoephedrine, diet pills)
- Triptans (e.g. Sumatriptan,
- Ergotamines
- Bromocriptine
- Serotonergic drugs (e.g. sertraline, fluoxetine)
- Immunosuppressant (cyclophosphamide, Tacrolimus, interferon alpha)
- Blood products: (intravenous immunoglobulin IVIG, blood transfusion)
- Others: Nicotine patches, oral contraceptives, ginseng, licorice, indomethacin

Swimming and bathing

Altitude

Tumors

- Pituitary apoplexy

- Colloid cyst of the third ventricle

Intracranial hypotension

Acute sinusitis—barotrauma

is typical of reversible cerebral vasoconstriction syndrome (RCVS). RCVS occurs usually in middle aged women, although all ages and sex occurs. These headaches may be triggered by simple every day activities such as bathing, swimming, or coughing. Frequently, the CT scan is initially normal. Most of these cases are misdiagnosed as migraine as in our case. Vessel imaging early on can be negative, and looking for risk factors in the history for the diagnosis is a good idea. The vessel imaging can look a lot like vasculitis, but a vasculitis workup is usually negative and the CSF in RCVS is usually near normal. Even more vexing is that vessel imaging can be initially normal and repeated vessel imaging should be performed, if there are repeated bouts or one of the risk factors. Making the correct diagnosis is often difficult. First, ruling out a sub-arachnoid hemorrhage with a CT scan and also LP is often done. In RCVS sometimes there can be small hemorrhages, but there is no aneurysm on angiography. Treatment of RCVS is directed usually to the use of calcium channel blockers such as verapamil or nimodipine treatment. Steroids may worsen the condition but have been used on occasion. Occasionally blood pressure may be elevated and may require treatment. While the outcome is usually excellent, complications can occur including hemorrhage, seizures, and stroke-like symptoms if not stroke. We really do not understand the cause of these reversible constrictions—and some have suggested abnormal vascular receptor sensitivity.

Ophthalmic Perspective—Dr. Lee

These patients have the “worst headache of their life” and the pain is very sudden onset. For the most part these patients will not present to the ophthalmologist and one of our ilk may never see a patient with RCVS. However, I do have some thoughts for the differential of the patient with sudden severe eye pain and headache. Besides an aneurysm, pituitary apoplexy can cause abrupt and severe headache and also cause ophthalmic findings. Usually this occurs in the setting of a previously present (but often not known about) pituitary adenoma. A bleed into the tumor or an infarction in the tumor leads to sudden expansion. The pituitary gland sits below the chiasm and between the two cavernous sinuses. If the tumor expands superiorly, then the patient can develop vision loss in one or both eyes. If it expands laterally, then it may cause a unilateral or bilateral third, fourth, and/or sixth nerve palsy. Since the pain is sudden onset, the patient should get a scan no matter what and imaging will typically show a bleed into a large sellar mass. The biggest thing is to scan patients with sudden and horrible headache.

Non-ophthalmic/Non-neurologic Perspective

Thunderclap headache is a type of eye/head pain that all primary care physicians should know about. While primary headache (benign, primary thunderclap headache) is the most common, these headaches require an extensive evaluation of imaging, lumbar puncture, and vessel imaging. Look out for RCVS since this one can be caused by many medications often used in general internal medicine and primary care.

Follow-up

The CT scan was normal; Lumbar puncture: protein 38, glucose 61, 0 WBC, 60 RBC, normal opening pressure. She had an MR scan which was normal. She was admitted and a re-read of the CT showed a very small subarachnoid hemorrhage on the left parietal region. She underwent an angiogram which showed diffuse segmental narrowing of her arteries in the MCA and PCA distribution (Fig. 33.1). There was no evidence of an aneurysm. Initially, she was thought to have a vasculitis, but all laboratory studies were negative. A trial of prednisone was initiated, and her headache subsided once again. She was diagnosed with RCVS or benign reversible angiopathy (see Table 33.3). She was placed on verapamil with improvement of her headache. She continued verapamil and baby aspirin without recurrence of her thunderclap headache. *Final Diagnosis: thunderclap headache due to Reversible Vasoconstriction Syndrome.*

Fig. 33.1 Sagittal CTA source image shows arteriolar “beading” (arrow) consistent with RCVS. With thanks to Jennifer Majersik and Adam DeHavenon for this case

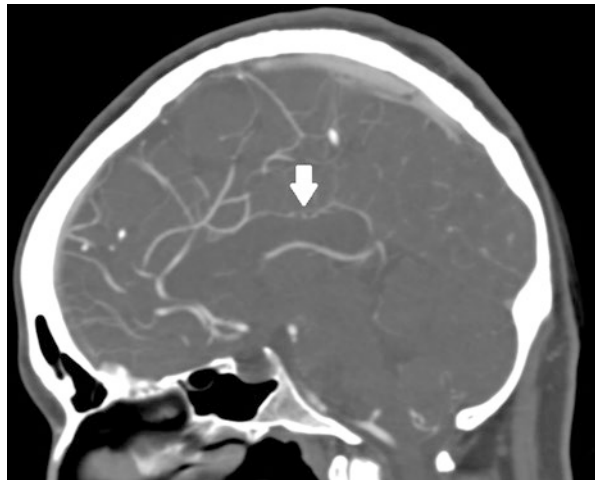


Table 33.3 Diagnostic criteria for the diagnosis of reversible vasoconstriction syndrome (RCVS)

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- (A) Any new headache fulfilling criterion C
- (B) Reversible cerebral vasoconstriction syndrome (RCVS) has been diagnosed
- (C) Evidence of causation demonstrated by at least one of the following:
1. Headache, with or without focal deficits and/or seizures, has led to angiography (with “strings and beads” appearance) and diagnosis of RCVS
 2. Headache has either or both of the following characteristics:
 - (a) Recurrent during 1 month, and with thunderclap onset
 - (b) Triggered by sexual activity, exertion, Valsalva maneuvers, emotion, bathing and/or showering
 3. No new significant headache occurs >1 month after onset
- (D) Not better accounted for by another ICHD-3 diagnosis, and aneurysmal subarachnoid hemorrhage has been excluded by appropriate investigations
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Headache Classification Committee of the International Headache Society. The International Classification of Headache Disorders: 3rd edition (beta version). *Cephalalgia*. 2013;33:629–808

For Further Study

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