

Picking up High-Risk Headaches in Emergency Department

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- Patients with headache constitute up to 4.5 percent of emergency department (ED) visits. The differentiation of the small number of patients with life-threatening headaches from the overwhelming majority with benign primary headaches (ie, migraine, tension, or cluster) is an important problem in the ED. Failure to recognize a serious headache can have potentially fatal consequences.
- Emergency departments (ED) are a resource well suited to the expeditious diagnostic workups of worrisome headaches and to effective treatment of severe primary headaches refractory to oral medications.

- A careful history and physical examination remain the most important part of the assessment of the headache patient; they enable the clinician to determine whether the patient is at significant risk for a dangerous cause of their symptoms and what additional workup is necessary.
- Emergency-medicine clinical researchers with an interest in headache focus on defining efficient approaches to diagnosis, optimizing acute treatment paradigms, improving throughput in the ED, and reducing the need for future ED care.

Differential Diagnosis - Emergent

- Subarachnoid or Intracerebral Hemorrhage
- CNS infection: Meningitis, Encephalitis, Brain abscess
- Carbon Monoxide Poisoning
- Temporal Arteritis
- Increased Intracranial Pressure: Mass, Idiopathic Intracranial Hypertension, Shunt Failure
- Cerebral Sinus Thrombosis
- Cervicocranial Artery Dissection
- Subdural Hematoma
- Acute Angle Closure Glaucoma

Differential Diagnosis - NonEmergent

- Tension
- Migraine
- Cluster
- Febrile headache
- Dental, TMJ
- Trigeminal Neuralgia
- Post-Lumbar Puncture headache

General Approach to Evaluation

- **History of Present Illness**
- Onset
 - Sudden versus gradual onset
 - Rest versus exertion (including cough, bowel movement, sexual activity)
- Location
 - Although this is not reliable for diagnosis, in a constellation of symptoms can point toward a specific type of headache.
- Aggravators/Alleviators
 - Worse with awakening/bending over (increased intracranial pressure)
 - Comes and goes with specific enclosed settings (carbon monoxide)
 - Others with similar headache in the household or place of work (carbon monoxide)

- **Associated symptoms**
 - Nausea, vomiting, photophobia (non-specific)
 - Altered mental status, confusion
 - Syncope
 - Seizure
 - Vision changes, eye pain (glaucoma)
 - Jaw claudication (temporal arteritis)
 - Numbness, weakness

- **Other History Points**

- Prior headaches

- Prior neuroimaging

- Immunosuppression, Hypertension, Diabetes Mellitus, Malignancy, Coagulopathy

- Pregnant, postpartum

- Medications including nitroglycerin, analgesics, MAOIs, anticoagulants, birth control

- Alcohol, cigarette, or cocaine use

- **Family history**
 - Relatives with subarachnoid hemorrhage
 - Migraine headaches

Physical exam

- General
 - Mental status, orientation
- Vital Signs
 - Hypertension
 - Bradycardia
 - Fever

Physical exam (cont.)

- HEENT
 - Palpate temporal artery
 - Palpate TMJ, mouth opening/closing
 - Kernig or Brudzinski signs (not sensitive)
 - Conjunctival injection, pupil reactivity, visual acuity, slit lamp exam, fundus examination for papilledema
- Neurologic
 - Cranial nerve examination – CN VI palsy (increased ICP)
 - Strength, Sensation, Reflexes
 - Finger to nose, Heel to shin, Rapid alternating movements, Pronator drift, Romberg
 - Gait – ataxia

Clinical Features of Dangerous Headaches

- **Subarachnoid or Intracerebral Hemorrhage**
- ***HA Quality***: “Thunderclap headache”: sudden, severe, reaches maximal intensity within minutes, onset with exertion
- ***Associated sx***: nausea, vomiting, nuchal rigidity, altered mental status, syncope, seizure
- ***Hx***: recent severe headache (sentinel bleed), family history of SAH, hypertension, smoking, cocaine use, connective tissue disease (SAH), amyloid angiopathy (intracerebral)
- ***Exam***: change in mental status, neurologic deficits commonly cranial nerves, motor

Clinical Features of Dangerous Headaches

- **CNS Infection**
- ***HA Quality:*** gradual, moderate to severe
- ***Associated sx:*** fever, meningismus, altered mental status, seizures, rash, photophobia, psychiatric sx (encephalitis), cognitive deficits (encephalitis)
- ***Hx:*** immunization status, recent outbreaks, local epidemics, sinusitis, otitis media, brain surgery, military barracks, dormitory immunocompromised (HIV, AIDS, immunosuppressants) → think cryptococcal meningitis, toxoplasmosis
- ***Exam:*** altered mental status, Kernig, Brudzinski, papilledema, skin exam, focal neurologic deficits

Clinical Features of Dangerous Headaches

- Carbon Monoxide Poisoning
- **HA Quality:** gradual, intensity does not correlate with COhb levels, dull or throbbing, frontotemporal or diffuse, no pattern rules out or in carbon monoxide₁₀
- **Associated sx:** dizziness, fatigue, weakness, nausea, vomiting, confusion, syncope, seizure, chest pain (rare), dyspnea (rare)
- **Hx:** headache in the winter months, household or work contacts with headache, evidence of self harm, ask about suicidal intent
- **Exam:** confused to comatose, ataxia (severe)

Clinical Features of Dangerous Headaches

- **Temporal Arteritis**
- ***HA Quality:*** gradual, severe, throbbing, unilateral frontotemporal
- ***Associated sx:*** jaw claudication, vision changes/loss of vision, polymyalgia rheumatic, scalp tenderness
- ***Hx:*** new onset or change in pattern of HA, HA with brushing hair, jaw pain after latency of tough chewing localized at the muscles
- ***Exam:*** temporal artery tenderness, absent temporal artery pulsation, change in visual acuity

Clinical Features of Dangerous Headaches

- **Temporal Arteritis Criteria (3 of 5)**
- >50y
- New-onset localized headache
- Temporal artery tenderness or decreased pulse
- ESR >50mm/H
- Abnormal arterial biopsy findings

Clinical Features of Dangerous Headaches

- Increased ICP: tumor/mass, idiopathic intracranial hypertension (IIH), shunt failure
- **HA Quality:** gradual, unilateral or bilateral
- “Classic”: severe, early morning or nocturnal
- Typical: moderate to severe, intermittent, nonspecific (aching, pressure, tightness, throbbing, shooting), progressive
- IIH: lateralized, throbbing
- **Associated sx:** nausea, vomiting, vision changes, neurologic deficits
- **Hx:** HIV/AIDS à CNS lymphoma; malignancy à brain metastasis; history of shunt
- IIH: young, female, obese
- **Exam:** papilledema, neurologic deficits, CN VI palsy, skull-based metastases syndromes

Clinical Features of Dangerous Headaches

- **Cerebral Venous Thrombosis**
- ***HA Quality:*** 1/3 acute, 1/3 sub-acute (<1mo), 1/3 chronic, diffuse
- ***Associated sx:*** nausea, vomiting, seizures
- ***Hx:***
- Hypercoagulable states: Oral contraceptive use, postpartum, post-operative, malignancy
- Coagulation disorders: Factor V Leiden, Antithrombin III deficiency, Protein C or S deficiency, plasminogen deficiency, hyperhomocysteinemia
- Polycythemia, sickle cell disease
- Vasculitis – Behcet’s, Wegener’s granulomatosis, sarcoidosis
- Septic CVT – local (i.e. mastoiditis, otitis media, sinusitis, tonsillitis) or generalized (i.e. septicemia, endocarditis)
- ***Exam:*** +/- papilledema, fluctuating neurologic deficits
- Cavernous sinus – ocular nerve palsies, ipsilateral ocular affection (chemosis, proptosis, papilledema)
- Lateral sinus – aphasia if left
- Deep cerebral venous system – coma, motor deficits, aphasia

Clinical Features of Dangerous Headaches

- **Cervicocranial Artery Dissection**
- ***HA Quality:*** sudden or gradual, severe, non-throbbing, occipital (vertebral), facial/frontotemporal pain (internal carotid)
- ***Associated sx:*** nausea, vomiting, neck pain, vertigo
- ***Hx:*** minor trauma within 6 hours of onset of head/neck pain
- ***Exam:***
- Internal Carotid
- Audible pulsatile tinnitus for the patient or bruit
- Partial Horner syndrome – ptosis, meiosis without anhidrosis
- Cranial nerve palsies, particularly lower (III – diplopia, V – facial numbness, VII – facial paresis, XII – tongue deviation)
- Vertebral
- Resemble lateral medullary syndrome
- Upper extremity weakness

Clinical Features of Dangerous Headaches

- **Subdural Hematoma**
- ***HA Quality:*** gradual, moderate to severe
- ***Associated sx:*** nausea, vomiting, altered mental status
- ***Hx:*** elderly, remote trauma, history of alcohol abuse, anticoagulation
- ***Exam:*** change in mental status, neurologic deficits

Clinical Features of Dangerous Headaches

- **Acute Angle Closure Glaucoma**
- ***HA Quality***: sudden, moderate to severe, centered about the eye
- ***Associated sx***: nausea, vomiting, blurred vision, foggy vision or halos
- ***Hx***: precipitated dilation, far sighted
- ***Exam***: mid-dilated, globe is hard, unreactive to light, reduced visual acuity, hyperemia more prominent adjacent to limbus, hazy cornea, tonometry >20mmHg

Neuroimaging Considerations

- An assessment of the dangerous diagnoses of headache would be incomplete without mention of the ACEP Clinical Policy statement from 2008₅. This policy provides valuable recommendations for the evaluation of headache. Importantly, the **level B** recommendation for **emergent neuroimaging** includes:
 - **New abnormal finding on neurologic examination** (altered mental status, altered cognitive function, focal deficit) (non-contrast head CT)
 - **New sudden-onset severe headache** (head CT)
 - **HIV-positive patients with new type of headache** (neuroimaging)

- There is a **level C** recommendation for urgent neuroimaging, meaning outpatient neuroimaging should be arranged by the emergency physician, in **patients older than 50 years of age with a new type of headache.**

- Although there are many sub-populations to be cognizant of when presented with the chief complaint of headache (*elderly, pregnant women/postpartum, coagulopathic patients, those with subacute/subtle trauma, cancer patients*), the immunosuppressed and particularly HIV-positive patients require special consideration. Given the high prevalence of HIV-positive patients with central nervous system complications, approximately 70%, the emergency physician should ***order a non-contrast head CT in HIV-positive patients presenting with:***
 - **New seizure**
 - **Depressed or altered orientation**
 - **Headache different in quality**
 - **Prolonged headache >3 days**
 - **Focal neurologic deficit**

- Thank you for your patience 😊

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