

Headache (General)

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PATHOPHYSIOLOGY

- headaches *may be activated by anxiety*, but emotional stress is not necessary for symptom to appear.
- **genetic factors** may augment this system (some people are susceptible to more frequent or more severe head pain).

Pain-sensitive cranial structures:

- sensitive to **mechanical stimulation**: scalp & aponeurosis, large dural arteries, large arteries at base of brain, proximal segments of large pial arteries, dural venous sinuses, dura mater at skull base & falx cerebri.
- insensitive to pain - ventricular ependyma, choroid plexus, pial veins, much of brain parenchyma, most of dura, meningeal surfaces.
- most of brain is insensitive to **electrical stimulation**, but particular *midbrain site* (near midbrain dorsal raphe) is locus for headache generation.

Sensory stimuli from head are conveyed to brain:

- structures above tentorium in anterior and middle fossae - by **CN5**.
- posterior fossa and infratentorial structures - by **CN9 & 10, first three cervical nerves**.

Headache can occur:

- 1) distention, traction, dilation of **arteries** (intracranial or extracranial).
- 2) traction, displacement of large intracranial **veins** or their dural envelope.
- 3) compression, traction, inflammation of **nerves** (cranial and spinal).
- 4) spasm, inflammation, trauma to **muscles** (cranial and cervical).
- 5) **meningeal** irritation.
- 6) perturbation of **intracerebral serotonergic projections**.

Previously, head pain was thought to originate from either *contracted scalp & neck muscles* or *vascular dilatation*; neither of these mechanisms achieved scientific support; **central mechanisms** of head pain are of current interest!

INTERNATIONAL HEADACHE SOCIETY (IHS) CLASSIFICATION

PRIMARY HEADACHE DISORDERS - *headache itself is illness* and no other etiology is found; normal examination during asymptomatic intervals!

1. Migraine

- 1) migraine with aura (classic migraine)
- 2) migraine without aura (common migraine)
- 3) ophthalmoplegic migraine

- 4) retinal migraine
- 5) childhood periodic syndromes that may be precursors to or associated with migraine
- 6) migrainous disorder not fulfilling above criteria

2. Tension-type headache

- 1) episodic tension-type headache
- 2) chronic tension-type headache

3. Cluster headache, chronic paroxysmal hemicrania

- 1) cluster headache
- 2) chronic paroxysmal hemicrania

4. Medication-overuse headache

5. Miscellaneous headaches unassociated with structural lesion

- 1) idiopathic stabbing (fleeting ice-pick) headache
- 2) external compression headache
- 3) cold stimulus headache
- 4) benign cough headache
- 5) benign exertional headache
- 6) headache associated with sexual activity

6. Head trauma

- 1) acute posttraumatic headache
- 2) chronic posttraumatic headache

SECONDARY HEADACHE DISORDERS - *headache is symptom* of identifiable abnormality (structural or metabolic):

7. Cranial vascular disorders

- 1) **carotidynia** (subtype of migraine?)
- 2) **acute ischemic cerebrovascular disorder** (< 30% patients with middle cerebral artery vascular accidents have any head pain; headache is result of involvement of larger vessels; involvement of smaller, deeper vessels produces no painful stimuli).
- 3) **intracranial hematoma** (intracerebral, epidural, and subdural)
- 4) **subarachnoid hemorrhage**
- 5) **unruptured vascular malformation** (AVM, aneurysm)
- 6) **temporal arteritis** (in elderly patients, palpation of superficial temporal arteries is essential!!!)
- 7) carotid or vertebral **artery dissection**
- 8) **venous thrombosis**
- 9) **acute arterial hypertension** (pheochromocytoma, malignant hypertension)
N.B. arterial hypertension per se is uncommon cause of headache (diastolic pressures ≥ 130 mmHg are requisite for hypertension to cause headache)

8. Nonvascular intracranial disorders

- 1) intracranial pressure \uparrow (e.g. obstructive hydrocephalus, idiopathic intracranial hypertension, space-occupying intracranial lesions)
- 2) intracranial pressure \downarrow (e.g. post-lumbar puncture)
- 3) intracranial infection (acute meningitis, meningoencephalitis, brain abscess)
- 4) noninfectious inflammatory diseases (sarcoidosis, Tolosa-Hunt syndrome)
- 5) intrathecal injections
- 6) intracranial neoplasm

9. Substances or their withdrawal

- 1) substance use or exposure:
 - a) acute (e.g. nitrites, CO)
 - b) chronic
- 2) substance withdrawal:
 - a) acute use
 - b) chronic use (e.g. caffeine)

10. Noncephalic infections

Fever is extremely common cause of headache (potential for meningitis exists in all patients with febrile head pain!)

- 1) viral infection
- 2) bacterial infection

11. Metabolic disorders

- 1) hypoxia, altitude sickness, sleep apnea
- 2) hypercapnia (e.g. early morning headaches in chronic pulmonary failure with hypercapnia)
- 3) hypoglycemia
- 4) dialysis
- 5) systemic lupus erythematosus
- 6) Hashimoto thyroiditis

12. Disorders of facial / cranial structures

- 1) cranial bone
- 2) eyes, e.g. glaucoma (astigmatism, refractory errors, eye strain, squint are rarely responsible for headaches)
- 3) ears
- 4) nose and sinuses (e.g. sinusitis)
- 5) teeth, jaws, and related structures
- 6) temporomandibular joint disease
- 7) neck

13. Cranial neuralgias, nerve trunk pain, and deafferentation pain

- 1) persistent (in contrast to ticlike) pain of cranial nerve origin
- 2) trigeminal neuralgia
- 3) glossopharyngeal neuralgia
- 4) nervus intermedius neuralgia
- 5) superior laryngeal neuralgia
- 6) occipital neuralgia

14. Psychiatric conditions (depression, anxiety disorders, somatization and conversion disorders).

EPIDEMIOLOGY

- 40% persons experience severe headaches annually.

Only 1 in 250,000 patients with chief complaint of headache have *secondary headache*.
Almost all patients have one of three*: **migraine**, **tension-type**, or **cluster** headache.

*all three are diagnosed clinically based on International Headache Society criteria

CLINICAL FEATURES

- most headaches are dull, aching, deeply located.
- superimposed jabbing, brief, sharp pain, often occurring multifocally (*ice pick-like pain*), is signature of benign disorder.
- throbbing quality and tight muscles about head, neck, and shoulder girdle are common nonspecific accompaniments (tightening in scalp and neck musculature is reaction to pain).
- pain **INTENSITY** seldom has diagnostic value; patients with *most severe headache of their lives* usually have *migraine* (alternatives - *meningitis, subarachnoid hemorrhage, cluster headache*).
N.B. headache produced by *brain tumor* is not severe!
More severe headache, more likely it is to be associated with *nausea, photophobia* and *hyperacusis*.
- **response to PLACEBO medication** has no diagnostic value (simply identifies “placebo responders” - group that includes $\approx 30\%$ of population).
- headache **LOCATION** may occasionally be informative:
 - *extracranial structure* correspondence with pain site is fairly precise.
 - *posterior fossa lesions* cause occipitonal pain; *supratentorial lesions* - frontotemporal pain.
 - *MULTIFOCALITY* is strong indicator of benignity.
 - *intracranial masses* may cause pain by displacement of pain-sensitive blood vessels that are *distant from their location*; mass may cause bilateral headache if CSF flow is obstructed.
- **EXACERBATING phenomena** with high probability that headache syndrome is benign: provocation by red wine, sustained exertion, pungent odors, hunger, lack of sleep, weather change, menses.
- patient whose *headache pattern and neurologic status has been normal over period of years* is extremely unlikely to have life-threatening cause for headache!
- *hypertension, tachycardia* commonly accompany any severe headache.

DIAGNOSIS

Normal physical & neurologic examination + history* consistent with one of patterns of benign headache → no further diagnostic testing.

*invaluable technique is to ask patient to describe pattern of headaches *when they began* (often many years ago) rather than to focus on current, usually confusing, headache presentation.

- testing is reserved for patients who do not respond as expected to treatment.
- if benign diagnosis cannot be made (new-onset headache with nausea, vomiting, or abnormal signs) → **MRI**;
 - CT poorly visualizes posterior fossa tumors (far more likely than forebrain tumors to cause headache), Arnold-Chiari malformation.
- **ESR** for those > 50 yrs.
- **ophthalmoscopy** – for papilledema.
- **EEG** has no utility in diagnosis of headache.

TREATMENT

PERIPHERAL NERVE BLOCKS

Injection Sites (majority bilateral):

- greater occipital nerve (GON)
- supraorbital nerve (SON)
- supratrochlear nerve (STN)
- auriculotemporal nerve (ATN)

Solutions: BUPIVACAINE + LIDOCAINE + DEXAMETHASONE.

Average duration of relief - 2 weeks

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