

# Anatomical Reasons and Clinical Significance of Headache: From Basics to the latest

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**Mini Review**

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## Mini Review

Headache, the commonest neurological disorder, is one of the humanity's most common medical complaints; most people experience them at some point in their life. According to the World Health Organization (WHO) reports almost half of all adults worldwide will experience a headache in any given year. Among first 20 causes of disabilities migraine WHO declared headache as the most disabling medical condition experienced worldwide. The headache can affect anyone regardless of age, race, and gender. In the ancient time Charak (Circa 100 BC) described five types of '*shirashool*'; Sushurut reported eleven types of '*anyatovat*' including migraine and trigeminal neuralgia.

The headache is caused by more than 300 causes [1]. Most patients with headache requiring medical attention need CT/ MRI only a small proportion of headache pts need investigation [2]. Committee of International Headache Society 1988 (revised in 2004) [3], 14 main types of headaches are classified into [4-10]:

## The Primary Headaches

1. Migraine
2. Tension - type H
3. Cluster H & other trigeminal autonomic cephalalgias (TAC)
4. Other primary headache disorders

## Secondary Headaches

5. Attributed to head and / or neck trauma
6. Attributed to cranial and / or cervical vascular disorder
7. Attributed to non - vascular, non - infections intracranial disorder
8. Headache attributed to a substance or its withdrawal
9. Headache attributed to infection.
10. Attributed to disturbance of homeostasis.
11. Attributed to disorders of cranium, neck, eyes, ears, nose, sinuses, teeth, mouth, other facial or cranial structures.
12. Attributed to psychiatric disorder.
13. Cranial neuralgia.
14. Other headaches, cranial neuralgia, central or primary facial pain.

## Pain sensitive Intracranial Structures

1. Portions of dura mater near blood vessels
2. Dural arteries, large veins and venous sinuses
3. Arteries of circle of Willis (base of brain), first few cm. Medium-sized branches
4. Pial vessels
5. Cranial nerves II, III, VI, V, IX, X and Cervical 1-3 spinal nerves

## Extracranial Structures

6. Scalp and neck muscles
7. Skin, cutaneous nerves mucosa of nose, air sinuses, teeth (pulp) external carotid a & branches

## Pathogenesis of Headache

- Irritation of meningeal lining

### a) Inflammation

### b) Blood in subarachnoid hemorrhage

- Displacement, distention distortion or traction of blood vessels, large veins, sinuses
- Irritation, stretching, compression, distortion of sensory nerves, most often V, IX, X, C1-3, tumours, aneurysms
- Muscle contraction or spasm
- Raised or lowered intracranial pressure

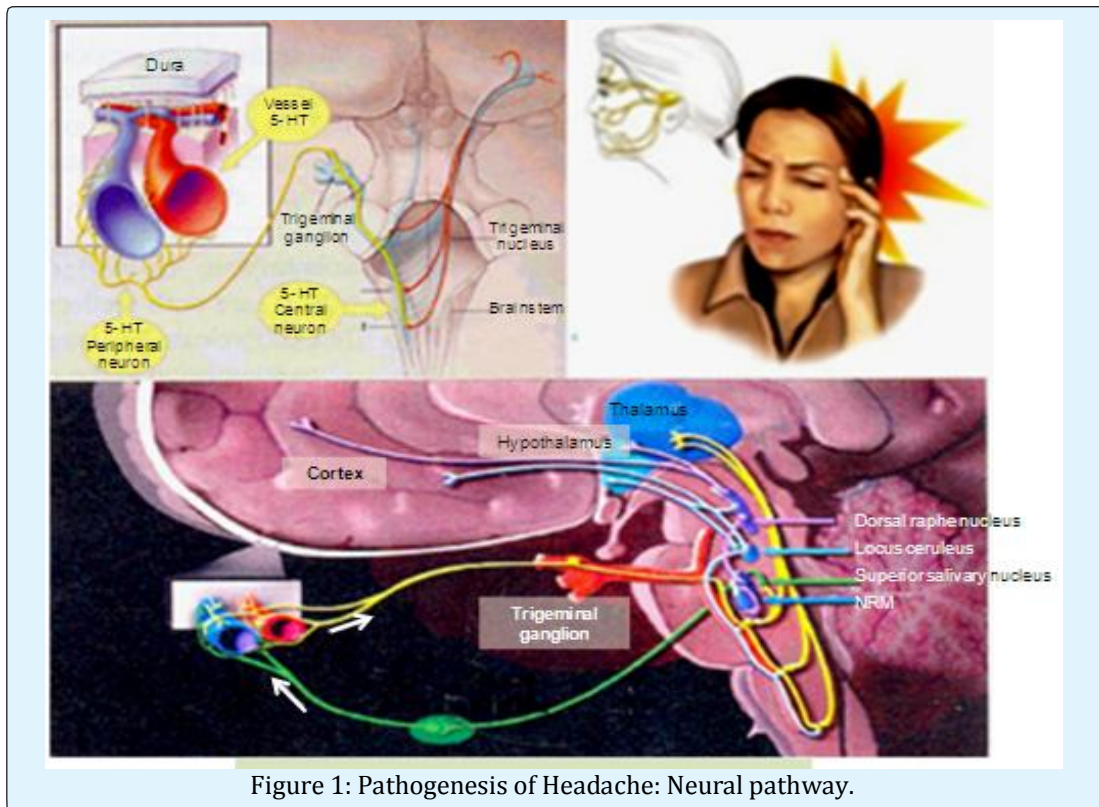


Figure 1: Pathogenesis of Headache: Neural pathway.

## Ice cream Headache

- Cold stimulus headache
- Extremely cold substance contacts roof of mouth and upper incisors (Boes et al. 2004)
- Most often midfrontal pain, peaks in 20-60 s.
- Complaint most often in migraineurs than gen. population (may feel on same side as migraine)
- Pathogenesis unclear. Reflex vasoconstriction?
- ↓Skin temp. forehead by 1°C

## Headache in Women

- Change in oestrogen: headache with menarche, menstruation, pregnancy and menopause

- 14% have migraine only during menstruation or in premenstrual syndrome
- Headache as complication of pregnancy
- SAH
- Pseudotumor cerebri
- Migraine may be ameliorated by pregnancy but tension type headache is not affected

## Useful Practical Points

- Migraine is the most common form of headache
- The initial attack may suggest more serious causes, particularly if associated with focal symptoms and signs
- Beware of diagnosing migraine beginning after the age of 50

- Consistently lateralised hemicrania with persisting symptoms, signs or a skull bruit require further investigation
- Migrainous neuralgia affects middle-aged men with attacks of severe periorbital pain often awakening the patient
- Treatment of migraine relies on rest, reassurance, metoclopramide (or other anti-emetics and simple analgesics)
- Ergot derivatives may help about one half of migraineurs. Beware of ergot habituation with the development of withdrawal headache
- Frequent migraine attacks require preventive treatment with regular medication, e.g. pizotifen, pro-pranolol, methysergide, Amitriptyline.
- Cough headache may occur with raised ICP, posterior fossa lesions and as a benign entity

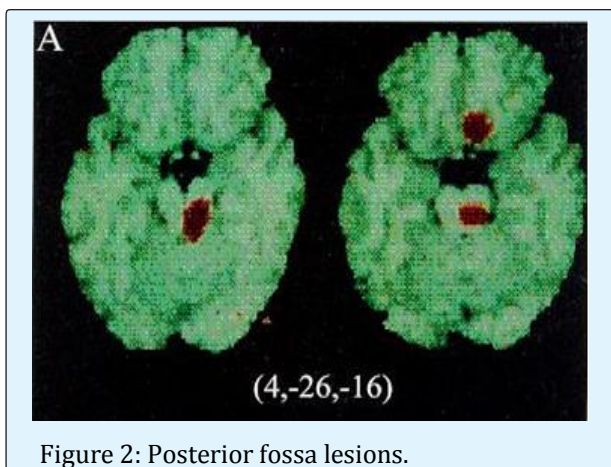


Figure 2: Posterior fossa lesions.

### Migraine in Children

- Common- 7 yr (3%), 14 yr (11%)
- Shorter duration
- Bilateral or unilateral
- Phonophobia or photophobia
- Syndromes of childhood migraine
- Vertigo
- alternating hemiplegia
- Nausea vomiting (every 30- 40 days)

### Central Modulation of Headache

- Rostral brainstem is crucial
- Discrete lesions of brainstem and locus ceruleus
- CBF through  $\alpha$  2 adrenoreceptor in occipital region by 25%
- Corresponding extracerebral vasodilatation, 5HT containing neurons in brainstem dorsal raphe nucleus.

### Headaches Unclassified

Certain distinctive forms of headache defy classification under the above scheme for it is unclear whether they involve: a *peripheral, nociceptive cause* or a *neurogenic cause*.

Cluster headache is characterized by episodes of severe orbital pain lasting 15 minutes to three hours [11-15], occurring one or more times a day in bouts lasting weeks or months, followed by pain-free intervals. Distinctive associated features are ipsilateral lacrimation, conjunctival injection and nasal obstruction [16-19]. The mechanism of cluster headache is unknown but may involve central dysmodulation of pain, triggered from the hypothalamus. In contrast, the mechanism may involve oedema of the cavernous portion of the internal carotid artery [20-24]. Resembling cluster headache is paroxysmal hemicrania which is characterized by attacks of sustained hemicranial pain lasting 15 minutes each, recurring six to 30 times a day for periods of three to six weeks.

Like cluster headache, paroxysmal hemicrania is associated with parasympathetic features on the ipsilateral side. Its cause is unknown but may involve a source in the cervical spine. Diagnostic is the response of this form of headache to. Indomethacin

### Diagnostic Considerations

When headache is episodic and recurrent and follows a well-established pattern, the patient likely has a primary headache disorder (i.e. headaches with no organic or structural etiology). Differentiating migraine from other primary headaches (e.g. muscle contraction tension headache, cluster headache) is important, as optimal treatment may differ.

Migraine may also may simulate or be simulated by secondary headache disorders or coexist with a secondary headache disorder [25-29]. Any of the following features suggest a secondary headache disorder and warrant further investigation:

- The first or worst headache of the patient's life, especially if rapid in onset
- A change in frequency, severity, or clinical features of the attack
- New progressive headache that persists for days
- Precipitation of headache with Valsalva maneuvers (i.e. coughing, sneezing, bearing down)

- The presence of associated neurologic signs or symptoms (e.g, diplopia, loss of sensation, weakness, ataxia)
- Onset of headaches after the age of 55 years
- Headache developing after head injury or major trauma
- Persistent, 1-sided throbbing headaches
- Headache accompanied by stiff neck or fever
- Atypical history or unusual character that does not fulfill the criteria for migraine
- Inadequate response to optimal therapy

### Crash Migraine

Severe headache of sudden onset is a concern despite its occurrence in primary headache disorders. Migraine headaches may have an abrupt onset; these are termed "crash" migraine headaches and are similar to a "thunderclap" headache [30-33]. Cluster headache also may be sudden and excruciating, but it lasts only 15-180 minutes and is recognized easily if the patient has had previous attacks.

### Exertional Headache

Exertional headaches are precipitated by strenuous activity (eg, running, coughing, sneezing, Valsalva maneuver) and build in intensity over minutes. They are particularly common in patients who have an inherited susceptibility to migraine. Coital headache is a type of exertional headache that can develop at the height of orgasm or it may build up through intercourse.

### Intracranial aneurysm

Despite the possibility of a benign cause, a ruptured intracranial aneurysm is the primary consideration if the headache is severe and of sudden onset and reaches maximum intensity in minutes. The classic presentation of an aneurysmal subarachnoid hemorrhage (SAH) is as follows:

- Severe headache with sudden, explosive onset
- Stiff neck
- Photophobia
- Nausea and vomiting
- Possibly, alteration of consciousness

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