CHAPTER

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An Approach to Headache

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Headache is a common symptom worldwide, it is important for physicians to evaluate patients with headache to determine whether the condition is benign or it is a serious neurological or systematic illness.

CLASSIFICATION OF HEADACHE[1,2,3]

International Headache Society classifies headache as primary or secondary.

Primary headache are recurrent headaches where there is no cause identifiable on examination or investigation and where diagnosis is made by recognizing a pattern eg. Migraine, tension type headache, cluster headache Table 1.

Secondary headaches are those headache where there is a definite underlying cause identifiable on examination or in investigations Table 2. Ninety percent of headache in practice are primary headache, and less than 10% are secondary headaches.

Table 1: Primary headache disorders characteristics

Cause	Clinical features	Diagnostic approach
Migraine	Frequently unilateral, pulsating/throbbing type lasting for 4-72 hours, occasionally with aura, phonophobia, photophobia, worse with activity, preference to lie in the dark, resolution with sleep	Clinical evaluation
Tension –type headache	Frequent or continuous, mild, bilateral, band-like holocranial, occipital or frontal pain the that spreads to entire head, worse at the end of the day.	Clinical evaluation
Cluster headache	Unilateral orbitotemporal attacks at the same time of day, deep, severe lasting 30-180 min, often with facial flushing, lacrimation, Horner's syndrome, restlessness, cannot sit still in a place	Clinical evaluation

Primary stabbing / coughing / exertional / sex-related headache

Table 2: Disorders causing secondary headache

Cause	Examples
Extracranial disorders	Glaucoma Sinusitis Dental disorders Temporomandibular joint dysfunction Carotid or vertebral artery dissection
Intracranial disorders	Infections (meningitis, encephalitis, abscess, Subdural empyema) Noninfectious meningitis (carcinomatous, chemical) Brain space occupying lesion Cerebrospinal fluid leak with low-pressure headache Hemorrhage (Intracranial, subdural, subarachnoid) Idiopathic intracranial hypertension Obstructive hydrocephalus Vascular disorders (e.g. vascular malformations, vasculitis, venous sinus thrombosis) Chiari Type 1 malformation
Systemic disorders	Viral infections Fever Acute severe hypertension Giant cell arteritis Hypercapnia
Drugs and toxins	Analgesics overuse Nitrates Caffeine withdrawal Hormones (estrogen) Carbon monoxide Proton pump inhibitors

Box 1: The Pain Sensitive Cranial Structures are[4]

Skin, subcutaneous tissue, muscles, extra cranial arteries, and peritoneum of the skull

Delicate structures of the eye, ear, nasal cavities, and para nasal sinuses

The optic, oculomotor, trigeminal, glossopharyngeal, vagus, and first three cervical nerves

Middle meningeal and superficial temporal arteries

Intracranial venous sinuses and their large tributaries

Part of the dura at the base of the brain and the arteries within the dura, particularly the proximal parts of the anterior and middle cerebral arteries and the intracranial segment of the internal carotid artery.

The diagnosis of headache depends on **three** elements[5]

History
Physical Examination
Investigations

The gold standard in diagnosing headache is by history and clinical examination.

A Suggested framework for the targeted headache history[6].

AGE OF ONSET

- Childhood and adolescent-secondary to sinusitis, pharyngitis, otitis and primary headache like migraine is common
- Adult- tension type headache, medication overuse
- Elderly-glaucoma, hypertension, stroke, brain tumor or brain metastasis

DURATION AND FREQUENCY OF PAIN

- Vascular headache and trigeminal neuralgia – episodic pattern
- Cluster headache – seasonal and it range in minutes
- Migraine in hours
- Headaches of organic origin (eg. ocular disease sinusitis, brain tumor) are continuous with acute exacerbate caused by exercise, change in position and valsalva maneuver.

ONSET TO PEAK TIME

- Rapid onset -to -peak (seconds to minutes) – suspicion of organic disease
- Tension headache evolve over period of hours to days and then remain constant
- Cluster headache rapid onset to peak time.
- Migraine evolve over several hours

LOCATION

- Vascular headache – unilateral, side may change from attack to attack
- Cluster headache – localized to ocular and retro ocular region
- Migraine tends to involve entire hemi cranium
- Tension type headache typically bilateral, but can be unilateral, often involving frontal, temporal and occipital region – band like or cap like tightness.
- Trigeminal neuralgia involves one division of trigeminal nerve.
- Pain that is occipital or unilateral but becomes holocranial during valsalva maneuver suggests intra cranial abnormalities and probable increased intracranial pressure.

CHARACTER AND SEVERICY OF PAIN

- Vascular headache – throbbing and pulsatile in nature, with intense pain.
- Cluster headache – deeper boring and burning quality.
- Trigeminal neuralgia – paroxysmal jab like or shock like pain.
- Tension type of headache – persistent dull aching pain, band like, occasional exacerbations.
- Head ache associated with lumbar puncture will worsen when patient assumes the recumbent position.

PREMONITORY SYMPTOMT AND AURAE

- In migraine premonitory symptoms precedes 2-48 hours.
- Tumors involving the occipital lobe may produce symptoms similar to migranous aura.

ASSOCIATED SYMPTOMS

- In migraine associated symptoms are photophobia, phonophobia, nausea, vomiting, aversion to strong odors and focal neurological changes.
- Cluster headache associated with complete or partial horner syndrome, including lacrimation, heavy rhinorrhea and blanching of the face on affected side.
- Tinnitus or hearing loss in trigeminal neuralgia patients indicates an underlying brainstem tumor.

PRECIPITATING FACTORS

- Migraine headache triggered by change in diet or sleep habits, tyramine containing foods, monosodium glutamate, nitrates, alcohol, hormones and oral contraceptives, fatique, stress, menstruation, strong odors, and bright sunlight.
- Tension type headache triggered by underlying environmental or physiological stress, depression, fatigue and occasionally, abnormalities of the cervical spine.
- Cluster headache triggered by alcohol, high attitude and occasionally, vasodilating substances.

ENVIRONMENTAL FACTORS

- Stress and pressure in the workplace, industrial fumes, carbon monoxide, high attitude implicated as precipitations factors of headache.

FAMILY HISTORY

Migraine is familial disease.

Box 2: Criteria for Low Risk Headaches
Age younger than 30 years
Features typical of primary headaches
History of similar headache
No abnormal neurological findings
No concerning change in usual headache pattern
No high risk comorbid conditions (e.g., human immunodeficiency virus infection)
No new concerning historical or physical examination findings

Box 3: Serious Headaches	
Primary brain tumor	Meningitis
Metastatic brain tumor	Temporal arteritis
Brain abscess	Stroke
Subdural hematoma	Glaucoma
Intra cerebral hemorrhage	Hydrocephalus
Subarachnoid hemorrhage	

Table 3: Red flag signs and symptoms in the evaluation of acute headache[7]

Danger Sign or Symptom	Possible Diagnosis	Tests
First or worst headache of the patient's life	CNS infection, intracranial hemorrhage	Neuroimaging
Focal neurologic signs (not typical aura)	Intracranial mass lesion, arteriovenous malformation, collagen vascular disease	Blood tests, neuroimaging
Headache triggered by cough or exertion, or while engaged in sexual intercourse	subarachnoid hemorrhage, intracranial mass lesion	Lumbar puncture, neuroimaging
Headache with change in personality, mental status, level of consciousness	CNS infection, intracerebral bleed, mass lesion	Blood tests, lumbar puncture, neuroimaging
Neck stiffness or meningismus	Meningitis	Lumbar puncture
New onset of severe headache in pregnancy or postpartum	Cortical vein/cranial sinus thrombosis, carotid artery dissection, pituitary apoplexy	Neuroimaging
Older than 50 years	Temporal arteritis, intracranial mass lesion,	Erythrocyte sedimentation rate, neuroimaging
Papilledema	Meningitis, encephalitis, intracranial mass lesion, pseudotumor cerebri	Lumbar puncture, neuroimaging
Rapid onset with strenuous exercise	Intracranial bleed, carotid artery dissection,	Neuroimaging
Sudden onset (maximal intensity occurs within seconds to minutes, thunderclap headache)	Subarachnoid hemorrhage, bleeding into a mass or arteriovenous malformation, mass lesion (especially in posterior cranial fossa)	Lumbar puncture, neuroimaging
Systemic illness with headache (fever, rash)	Meningitis, encephalitis, arteritis, collagen vascular disease	Blood tests, lumbar puncture, neuroimaging, skin biopsy
Tenderness over temporal artery	Temporal arteritis, polymyalgia rheumatica	Erythrocyte sedimentation rate, temporal artery biopsy
Worsening pattern	History of medication overuse, subdural hematoma, intracranial mass lesion,	Neuroimaging
New headache type in a patient with Cancer	Metastasis	Lumbar puncture, neuroimaging
Human immunodeficiency virus infection	Opportunistic infection, tumor	Lumbar puncture, neuroimaging

Table 4: American College of Radiology recommendations for neuroimaging in patients with headache

Clinical Features	Recommended Imaging Modality
Headache in immunocompromised	MRI of the head with and without contrast media
Headache in patients older than 60 years with suspected temporal arteritis	MRI of the head with and without contrast media
Headache with suspected meningitis	CT or MRI of the head without contrast media
Severe headache in pregnancy	CT or MRI of the head without contrast media
Severe unilateral headache caused by possible dissection of the carotid or arterial arteries	MRI of the head with and without contrast media, MRA of the head and neck, or CTA of the head and neck
Sudden onset or severe headache; worst headache of the patient's life	CT of the head without contrast media; CTA of the head with contrast media, MRA of the head with or without contrast media, or MRI of the head without contrast media

CT = computed tomography; CTA = computed tomographic angiography; MRA = magnetic resonance angiography; MRI = magnetic resonance imaging.

PREGNANCY AND MENSTRUATION

- Migraine commonly occurs with onset of menses.
- Pregnancy ameliorates symptoms of migraine after first trimester.
- Menopause ameliorates symptoms of migraine but may prolong symptoms of headache after hormone replacement therapy.
- Smoking and oral contraceptives increases the headache in migraine
- Some tension type headache patients may experience in associated with menses.

MEDICAL / SURGICAL HISTORY

- Headache can be a symptom of systemic illness of hypertension, anemia, thyroid disease,depression etc
- Drugs like nitrates, analgesic overuse, disease of eye, ear, nose, throat and cervical spine diseases.
- History of head injury, cranial surgery, recent lumbar puncture may reveal important clues

PHYSICAL EXAMINATION[12]

Should take less than 5 minutes

The mandatory elements are:

1. Ultra Quick Mental Status Examination
   - Orientation
   - Attention and calculation
   - Memory
   - Speech
2. Cranial nerve examination
3. Examination of motor, sensory system, reflexes, gait, cerebellar function and pronator drift
4. Looking for signs of meningitis
   - Neck stiffness, kernig and brudzinski sign
5. Examination of ear, nose and throat
   - Ear and nasal discharge, nasal polyps, pharyngitis, tonsillitis, sinus and mastoid tenderness
6. Examination of eye
   - Diminished visual acuity suggestive of refractive error, glaucoma, optic neuritis or temporal arteritis.
   - Ophthalmoplegia or visual field defects sign of venous sinus thrombosis, tumor or aneurysm.
   - Afferent pupillary defects can be due to intracranial masses or optic neuritis.
   - Ipsilateral ptosis and miosis (Horners syndrome) with acute headache-Carotid artery dissection.
7. Fundoscopic examination –absent retinal artery pulsations or papilledema- sign of elevated intracranial pressure.
8. Examination of mouth and dental portions for caries tooth, root abscess, ulcers and improper denture fittings.
9. Examination of cervical spine- passive movement and spine tenderness.
10. Looking for any tenderness over TM joint.
11. Examination of scalp and superfical temporal artery tenderness –patient older than 60 years.
12. Vitals to be checked- Temperature in case of infection
13. BP measurement.

Table 3 gives an idea about the dangerous types of headaches.

INVESTIGATIONS

Neuroimaging[7] (Table 4)

Neuroimaging is indicated for all patients who present with signs or symptoms of dangerous headache, because they are at increased risk of intracranial pathology

LUMBAR PUNCTURE[12]

Lumbar puncture is indicated to exclude infectious cause of acute headache, particularly in patients with fever or meningeal signs.

Table 5: Abortive Therapy for Migraine-Specific Treatment[3,8]

Drugs	Dose and Route
Ergot Alkaloids	
Cafergot (ergotomine tartrate 1mg caffeine 100 mg)	One or two tablets taken at the onset of head ache or warning symptoms followed by one tablet every 30 minutes, if necessary 6 tablets /attack and no more than 10 days per month.
Dihydroergotamine mesylate	0.5- 1mg intravenously (or) 1-2 mg subcutaneously or intramuscularly
5 HT Receptor Agonist	
Sumitriptan	4-6 mg subcutaneously, may repeat once after 2 hours
Zolmitriptan	Orally 5 mg/day be repeated after 5 hours
	Nasal spray 5mg in one nostril, one may be repeated once after 2 hours
	Maximum dose in both formulation is 10mg in 24 hours
Rizatriptan	5-10 mg orally at onset may repeat every 2 hours twice Maximum dose 30 mg/24 hours
Nartriptan	1-2.5 mg orally at onset may repeat once after 4 hours Maximum dose 5 mg/24 hours.
Other agents	
Dopamine antagonist Prochlorperazine	5-10 mg orally 5-10 mg intravenously or intramuscularly 25 mg rectal suppository
Metoclopramide	10-20 mg intravenously

Cerebrospinal fluid tests should routinely include gram stain, white blood cell count with differential count, red blood cell count, glucose, protein and bacterial culture. In appropriate patients consider CSF fluid for VDRL (syphilis), cryptococcal antigen (HIV-positive patients) and acid fast bacillus stain and culture (Tuberculous meningitis). Polymerase chain reaction tests for specific infectious pathogens (eg, herpes simplex 2) should also be considered in patients with evidence of central nervous system infection but no identifiable pathogen.

Other investigations

Refractive error testing

Tonometry for glaucoma

CT paranasal sinus- in case of sinusitis, polyps

ESR-temporal arteritis, endocarditis

Urine analysis-malignant hypertension, preeclampsia

MANAGEMENT OF HEADACHE

Depending on the headache type, one would be prescribed medicines to terminate the headache episode (abortive treatment) or to prevent the occurrence of headache (prophylactic treatment).

TREATMENT OF MIGRAINE[8] (TABLE 5)

There are three main aspects of treatment

- Avoidance of triggers
- Treatments of acute attack
- Migraine prophylaxis

Treatments of acute attack

- Rest in quiet darkened room until symptoms subside
- Simple analgesics like aspirin, acetaminophen, ibuprofen or naproxen are most commonly used and provide symptomatic relief.

PREVENTIVE THERAPY IN MIGRAINE (TABLE 6)

Preventive therapy may be necessary if migraine occurs more frequently than two to three times a month or significant disability in associated with attacks

Treatment of Chronic Tension-Type Headache[3]

- Relaxation techniques
- Abortive treatment - simple analgesic (aspirin, NSAIDs, acetaminophen)
- Effective prophylactic drug amitriptyline dosage of 50-150 mg per day. Lower dosage may be tried initially.
- Other drugs are tricyclic antidepressants (TCAs), gabapentin, mirtazapine and topiramate.

Treatment of Cluster Headache[3]

- Inhalation of 100% oxygen (12-15 L/min)
- Sumatriptan -subcutaneous 6 mg or intranasal 20mg/spray
- Zolmitriptan- 5 to 10mg nasal spray
- Dihyroergotamine 0.5-1mg intramuscularly or intravenously

Transitional prophylaxis (short-term use of drugs to vide over the crisis)

- Ergotamine tartrate -Rectal suppositories 0.5-1mg at night or twice daily, by mouth 2mg daily, or by subcutaneous injection 0.25 mg three times daily for 5 days per week (or)

Table 6: Preventive Drugs for Headache		
Drug	**Dosage**	**Selected Side Effects**
Beta-blocker Propranolol	40-120 mg bid	Tiredness, postural hypotension
Tricyclics: Amitriptyline	10-75 mg at night	Drowsiness, urinary retention
Tricyclics: Nortriptyline	25-75 mg at night	Drowsiness, urinary retention
Anticonvulsants: Topiramate	25-200 mg/day	Paraesthesia, cognitive symptoms, glaucoma, weight loss
Antriconvulsants: Valproate	400-600 mg bid	Tremors, weight gain, drowsiness
Anticonvulsants: Gabapentin	900-3,600 mg/day	Dizziness, sedation
Serotonergic drugs: Methysergide	1-4 mg/day	Drowsiness, leg cramps, hair loss, retroperitoneal fibrosis
Serotonergic drugs: Flunarizine	5-15 mg/day	Drowsiness, parkinsonism, depression

Table 7: Characteristics of headache suffers who may be suited for nonpharmacologic therapies
Poor tolerance of drug treatment
Medical contraindications for drug treatment
Inadequate response to drug treatment
Preference for nonpharmacologic intervention
Pregnancy or nursing
History of frequent or excessive use of analgesics or other acute medications

- Dihydroergotamine 9.25mg intravenously several days or 0.5 mg intramuscularly twice daily (or)
- Prednisone 50mg daily for 5 days followed by gradual withdrawal

Maintenance prophylaxis (agents throughout the entire expected duration of cluster headache)

- Verapamil 80 mg three times a day to a maximum dose of 720 mg per day; monitor with ECG if total daily dose is more than 480 mg/ day)
- Lithium (300 mg three times daily; monitor with lithium levels)
- Topiramate (100 -400 mg/day)
- Sodium valproate 750-1500mg daily

Neurostimulation strategies have been employed in patients who fail on above prophylactic therapies.

Nonpharmacologic Therapies[9-11]

Nonpharmacologic therapies play an important role in the prevention and treatment of migraine and tension type headache, especially given the number of identified triggers of headache. Nonpharmacologic therapies for headache disorders may be well suited for several types of patients, as outlined in Table 7.

RELAXATION TRAINING

Relaxation training helps to reduce internal tension, allowing a person to control headaches triggered by stress. Relaxation training includes two different types of methods: (1) physical and (2) mental.

Physical methods

Physical relaxation methods involve actual body movement or action.

In the progressive muscle relaxation method, releasing tension involves purposefully tensing and then relaxing groups of muscles in a definite sequence.

Another method called deep breathing is done by breathing from the bottom of the lungs up, which is characterized by the rise and fall of the stomach, not the chest.

Mental methods

Relaxation therapy can involve mental techniques to decrease body tension.

The focused imagery method involves concentration on relaxed body parts, followed by focus on tense muscles and imagining that the tense areas are being worked on or relaxed.

The deepening imagery method involves focus on the whole body, instead of its individual parts ie a person imagines the body's tension as a meter of high to low, and works to reduce tension mentally.

Meditation in a relaxing environment is also suggested to prevent headaches

BIOFEEDBACK

Biofeedback is often used to evaluate the effectiveness of relaxation training, because it feeds back information to the chronic headache sufferer about the "body's (biological) current state". Common bio feedbacks used are electromyography (EMG), electroencephalograph (EEG), thermograph, etc. Biofeedback methods have been proven to work. They allow headache sufferers to identify problems and then seek to reduce them.

BEHAVIORAL THERAPY AND PSYCHOLOGICAL THERAPY

Psychological and behavioral therapies identify stressful situations and teach chronic headache patients to react differently, change their behavior, or adjust attitudes to reduce tension that leads to headaches. Patients are advised to simply avoid stressors when plausible or share their burdens with others. In this way, studies have found that patients with multimodal treatment in a group setting fare better than patients who follow multimodal treatment alone.

ACUPUNTURE

Another nonmedicinal treatment, acupuncture may make the body release chemicals that block pain, such as endorphins. It also may stimulate the brain to give off other chemicals and hormones that send signals between different types of cells, including those of the immune system. Trials show that acupuncture can cause relevant improvements for people with chronic headaches.

CHANGES IN DIET

Many of the chemicals in certain foods can cause chronic headaches, including caffeine, monosodium glutamate (MSG), nitrites, nitrates, tyramine, and alcohols. Some of the foods and beverages that chronic headache sufferers are advised to avoid include caffeinated beverages, chocolate, processed meats, cheese and fermented dairy products, fresh yeast-risen baked goods, nuts, and alcohol as well as certain fruits and vegetables.

To sum up, headache management involves multimodality treatment especially in chronic patients. Every individual patient is a challenge in himself/ herself. The most important component is careful patient listening and reaching a correct diagnosis. Investigations are at best ancillary and should not be the primary focus in reaching a diagnosis

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