The Complexity of Headache Management

Headache Management
Bernard Abrams, MD

From the seemingly endless number of headache entities, the International Classification of Headache Disorders (ICH D-2), updated in the year 2004, offers a new understanding of headache disorders. It is the key to the diagnosis and treatment of headaches. It divides headaches into primary and secondary with four primary headache categories and 8 secondary headache categories. A primary headache disorder is **not** due to another condition whereas a secondary headache disorder is due to another identifiable condition such as a brain tumor.

The primary headache disorders are:

- Migraine
- Tension type headache
- Cluster and other trigeminal autonomic cephalgias
- Other primary headaches

The secondary headache disorders are:

- Head and neck trauma
- Cranial or cervical vascular disorders
- None vascular intracranial disorders
- Substance abuse or withdrawal disorders
- Infection
- Disorders of homeostasis
- Disorders of the cranium, neck, eyes, nose, sinuses, teeth, mouth, or other facial or cranial structures
- Psychiatric

Since the vast majority of headaches in pain practice are primary headaches, the majority of this monograph is devoted to them.

Evaluation of headaches:
The distinction between primary and secondary headaches is the key. There are two goals for any headache evaluation:

1. The recognition of primary headache syndromes for which treatment is available.
2. The recognition of secondary syndromes which may constitute a threat to life or function.

The headache evaluation consists of a detailed history, pertinent information from the physical examination and pertinent diagnostic laboratory studies including imaging when indicated. Of these, the most important factor to consider is the patient history.

The secondary disorders will be dealt with briefly below. At the present time, we will consider “red flags” which offer concern about the possibility of a secondary headache disorder.

“Red flags” for secondary headaches

Sudden onset of a headache - “the first, worst headache”: Here the concern is that the patient

reports that a severe headache is of sudden onset, especially if it is the first occurrence of that type of headache. One must consider the possibility of a subarachnoid hemorrhage, bleeding into a mass lesion or from an arteriovenous malformation or a mass lesion especially in the posterior fossa. Investigation under the circumstances is mandatory and Neuroimaging, usually CT scan, is indicated. A lumbar puncture following imaging may be indicated to rule out an infectious process or bleeding not detected by the primary imaging technique. It should be obvious that any chronic primary headache such as migraine must have an initial event and this often produces confusion in the ER. The age, physical condition of the patient, past medical history and family history play a strong role in deciding what to do although imaging is often done. A child or young adult with a strong family history of migraine history of migraine should cause less concern that a previously headache-free individual who is 50 years old.

A worsening headache pattern causes concern for a mass lesion, subdural hematoma (especially after trauma) or medication overuse and/or rebound. The setting of the headache and the physical state and past medical history of the patient will often be a clue as the possible nature of this type of headache. Neuroimaging, a careful history of medication intake and possibly a drug screen are indicated. In this instance, MRI is usually superior to CT scanning.

Headache associated with systemic illness is a further cause for concern. The manifestations are protean and include (but are by no means limited to) fever, rash, joint pain or swelling, weight loss or gain, and change in bowel or bladder habits. Diagnostic considerations include meningitis, encephalitis, Lyme disease, systemic infection, collagen vascular disorder, or opportunistic infection in an immunological compromised host. The latter includes patients with cancer, patients on chemotherapy, HIV/AIDS complex or diabetes. Investigations required may include Neuroimaging, collagen-vascular evaluation, lumbar puncture, immune status workup or infectious disease workup.

Headache associated with focal neurological signs leads to consideration of a mass lesion, vascular lesion, arteriovenous malformation or collagen vascular disorder. This becomes more significant if it is not an obvious aura for migraine or if it persists following the cessation of the headache. Neuroimaging and other investigations are indicated.

Headache associated with personality or cognitive changes raises questions of chronic brain lesions such as tumor, especially frontal, subdural hematoma, chronic meningitis or other chronic general medical problem and requires neuroimaging and further tests dictated by the patient's general medical condition.

Abnormal optic fundi findings such as papilledema lead to consideration of a mass lesion, pseudo tumor cerebri (benign intracranial hypertension), hypertensive crisis, encephalitis or meningitis. A workup is indicated including Neuroimaging and lumbar puncture (almost always done after Neuroimaging) as well as appropriate laboratory tests.

Primary headache disorders:

Migraine headaches:
Migraine is a highly prevalent disorder, estimated to affect 28 million sufferers in the United States.[1] The overall prevalence is 12.6%, 18.2% in women and 6.5% in men. The severity of the disorder is such that 89% report severe to extremely severe headaches[1].Migraine typically occurs in several family members. The risk of migraine is 50% more likely in relatives of migraineurs than in controls, but the role of inheritance is complicated.[1] The prominent familial co-occurrence implies that genetic factors play a role in the genesis of migraine.[2] The International Headache Society (IHS) criteria for **migraine without aura**[3] include at least 5 previous attacks, duration of 4-72 hours for an individual attack in an adult (one hour in children) and a frequency of not more than 15 days per month. It also requires two criteria from the headache group:

1. Unilateral

2. Throbbing
3. Pain moderate to severe
4. Aggravation by oral causes avoidance of physical activity

It also requires one from the associated symptoms group:

1. Nausea
2. Vomiting
3. Sensitivity to both light and sound.

From these criteria, it can easily be seen that migraine is a recurring headache which is characteristically throbbing, often one-sided and almost always at least moderate to severe in intensity and interfering with physical activity. It is also usually associated with nausea and/or vomiting and light and sound sensitivity.

The IHS criteria for **migraine with aura** include at least 2 previous attacks and at least one from group A:

- Fully reversible visual symptoms including positive or negative visual features
- Full reversible sensory symptoms including positive or negative features
- Fully reversible dysphasic speech disturbance

And two from group B:

- Homonymous visual and/or unilateral sensory symptoms
- At least one of aura symptoms develops over more than 5 minutes or different aura symptoms occur in succession over more than 5 minutes
- Each symptom lasts more than 5 minutes and less than 60 minutes
- The headache begins during or follows the aura within 60 minutes

The adjusted odds ratios of migraine symptoms for diagnosis indicates that the 3 most reliable are nausea, disability, and photophobia followed remotely by pain on one side, phonophobia, pain exacerbated by activity, moderate to severe pain, throbbing pain and aura symptoms.[4]

Pathophysiology of migraine
The pathophysiology of migraine is incompletely known but brainstem activation[5] certainly occurs followed by vascular changes and liberation of vascular substances such as substance P, Calcitonin Gene Related Peptide (CGRP) and neurokinin A with inflammation of meningeal blood vessels and sensory sensitization[6] [7].

Migraine is a phasic disorder, with a prodrome, an aura (incidence perhaps 20%), a headache phase and a post headache phase, each with distinctive characteristics. Premonitory symptoms may be excitatory such as irritability, elation, physical hyperactivity, yawning, food craving, photophobia/phonophobia and increased bowel and/or bladder activity or inhibitory with mental/physical slowing, poor concentration, word finding difficulty weakness/fatigue, or chills, anorexia, constipation and abdominal bloating.

Sixty per cent (60%) of people with migraine experienced premonitory phenomena and 25% feel elated, irritable, depressed, hungry, thirsty or drowsy.

In patients with aura, the visual aura with a scotoma is far the most prevalent. However, aphasic difficulties and sensory difficulties may be present.

Following the headache, there is often a resolution or post headache phase. In one paper, 47/50 patient's remained symptomatic after the headache had ended up including 72% with mood changes, 54% with muscular weakness, 52% with physical tiredness and 32% with a reduced appetite.[8]

Migraine, along with its complicated pathophysiology and probable genetic background, has numerous comorbidities including stroke, epilepsy, lupus, Raynaud's, multiple sclerosis, essential tremor, hypertension, PFO and mitral prolapse, bipolar disorder, major depression, generalized anxiety disorder, panic disorder and simple and social phobia. Psychiatric comorbidity is often present in migraine and tension type headache with depression present in 25-80%, improving with affective headache treatment, and generalized anxiety is present in 70%. An abnormal Minnesota Multiphasic Personality Index (MMPI) is present in 60% and is a predictor of the intractability of headaches.[9] [10] There are also a substantial number of sleep disorders in headache especially obstructive sleep apnea. These comorbidities play a role in the choice of treatment.

Treatment of Migraine:
While treatment of migraine usually entails medication, there are several nonpharmacological steps that may be helpful in the treatment of the patient:

1. Simple reassurance that there is no underlying life-threatening pathology.
2. Removal of known triggers of migraine:
Sleep deprivation, hypoglycemia, altered sleep pattern, tyramine-containing foods, stress, consideration of the
role of oral contraceptives and postmenopausal hormone treatments.
3. Behavioral interventions, including relaxation training, biofeedback and stress management or cognitive-behavioral
therapy.

Pharmacological treatment:

Successful treatment relies on matching the appropriate level of treatment to the severity and disability of the migraine. This entails knowledge of 2 approaches to pharmacological treatment, the first is traditional *step care* and the second a newer *stratified care. Step care* begins with treating each headache episode with a low-end treatment such as simple analgesics. If the headache does not respond to this treatment the next migraine attack may be treated with the next *step* in therapy, such as combination analgesics. This pattern continues until effective treatment is identified. The problem with this approach is the time that the patient suffers until a proper level of effective treatment is reached.

Stratified care is based on the assessment of illness severity by scales such as the MIDAS score. Patients with more migraine-induced disability may be prescribed Triptans or even preventative treatments earlier in the course of treatment.[11]

The Migraine Disability Assessment Questionnaire (MIDAS) asks the following questions:

1. On how many days in the last 3 months that you miss work or school because of your headaches?
2. On how many days in the last 3 months was your productivity reduced by half or more due to headache?
3. On how many days in the last 3 months did you not do your household work because of headaches?
4. On how many days in the last 3 months was your productivity doing your household were reduced by half or more due to headache?
5. On how many days in the last 3 months did you miss family, social work leisure activities because of headache?

6. On how many days in the last 3 months did you have a headache? (add on a day for each additional day for the same headache)
7. On a scale of 1-10, on average how painful were these headaches?

Grade I: Minimal or infrequent disability 0-5
Grade II: Mild or infrequent disability 6-10
Grade III: Moderate disability 11-20
Grade IV: Severe disability 21+

Acute or abortive treatment of migraine
This may consist of simple and/or combination analgesics, NSAIDs, antiemetics or narcotics. Excessive use of these medications should be avoided to avoid analgesic rebound headaches. Ibuprofen and acetaminophen as well as acetaminophen/aspirin/caffeine-containing compounds relieve between 40 and 60% of patients at 2 hours. With more severe headaches, or headaches aren't responsive to simple analgesics or combination medications, Triptans are often prescribed. While the mechanism of migraine is not completely understood, it is known that certain vasoactive neuropeptides such as CGRP, substance P and neurokinin A are released from terminals of the trigeminal nerve on and the vasculature that surrounds the brain. These substances are inflammatory and results in dilatation of the blood vessels and protein extravasation. This type of inflammation is known as sterile inflammation and the inflammatory process appears to be an integral part of the pain syndrome associated with migraine. The trigger for this process is unknown but it is known that there are 2 serotonin receptors that exist on the nerve terminal and the blood vessels that have been identified as playing a critical role in the action of all Triptans. These are the 5-HT 1B receptor (blood vessels) and the 5 HT 1-D receptor (trigeminal nerve terminals) and Triptan binding here prevents the release of neuropeptides.[12]

There are various Triptan formulations including mode of administration-parenteral, oral, nasal spray and orally disintegrating tablets. In view of the frequent association of nausea and vomiting with an attack, the route of administration may be important in selecting a medication. Another consideration is the onset of action and the duration of action with 2 preparations being unique in the duration of action-naratriptan and frovatriptan. This is significant because of the median recurrence rate of headache at 24 hours which is between 17 and 40%. These 2 drugs, in contrast to other drugs such as sumatriptan, zolmitriptan, rizatriptan, almotriptan and eletriptan had a slower onset of action but longer duration of action. The choice of a Triptan is largely based on patient response but if there is a rebound effect then consideration should be given to longer onset, longer duration of action drugs. Tolerability of Triptans is individual but the risks and contraindications are essentially the same for all preparations. Recently, a combination of sumatriptan and naproxen has appeared on the market. This is based on the continuing allodynia due to inflammation that persists in many migraine patients. It should be noted that metaclopramide, an antiemetic and prokinetic has anti-migraine properties which are not fully understood. Prochlorperazine, promethazine, and metaclopramide, when used alone, were superior to placebo as rescue therapy for acute migraine attacks. Droperidol and prochlorperazine were superior or equal in efficacy to all other treatments, although they also have more side effects (especially akathisia). Metoclopramide was equivalent to prochlorperazine.[13]

Side effects of Triptans include tingling, paresthesias, warmth, dizziness, flushing, chest discomfort and sensations of pressure. ***Contraindications*** include ischemic heart disease, coronary vasospasm, hemiplegic or basilar migraine, uncontrolled hypertension, pregnancy, concomitant use of MAO inhibitors (or use within 2 weeks) is used within 24 hours of an ergot or another 5-HT agonist.[14] Recently clinical trials of CGRP antagonists have been conducted but not come to clinical fruition.

Migraine status is unremitting migraine for more than 72 hours and the options for treatment include IV DHE/metaclopramide, Magnesium sulfate, and Valproate. A steroid taper, prochlorperazine suppositories or narcotics may be considered.

Preventative or prophylactic migraine therapy
When it becomes necessary to use preventative or prophylactic migraine therapy, FDA approved drugs include the beta blockers propanolol and timolol and the anticonvulsants Valproate and topiramate. Valproate should be used with extreme caution in any women of childbearing age because of the unacceptable rate of fetal abnormalities associated with this drug. Methysergide is also approved but rarely used in migraine (although it is sometimes used in Cluster headaches) because of unacceptable side effects including retroperitoneal fibrosis. Tricyclic antidepressants such as amitriptyline have been used for many years without FDA approval. In recent years, botulinum toxin type A has been proven to be effective in chronic migraine, administered in the forehead and scalp. For intractable migraine, occipital nerve stimulation has been advocated. There is an FDA warning against the concomitant use of Triptans and SSRIs/SSNRIs because of the possibility of occurrence of the serotonin syndrome.

Comorbidities offer therapeutic opportunities. In patients with migraine who have hypertension, one could consider a beta blocker or angiotensin receptor blocker. In migraine with angina, calcium channel blockers may be efficacious and in migraine with stress and anxiety, a beta blocker might be considered. In migraine and depression a Triyclic antidepressant or a SNRI such as venlaxafine or duloxetine might be considered but the use of Triptans in that setting may be problematic because of the possibility of a serotonin syndrome. Contrariwise, the use of a Tricyclic in a patient with migraine and epilepsy, beta blocker in a patient with depression, a Tricyclic or Valproate in migraine and obesity, topiramate in migraine and the underweight patient or use of a beta blocker in migraine and hypotension may be contraindicated.

Menstrual migraine responds to Triptans but probably less well than non-menstrual migraine. Short-term prophylaxis with NSAIDs, or DHE, magnesium, estrogen gel and Triptans and have all been tried. In patients on oral contraceptives, manipulation of particular compound in conjunction with a gynecologist may produce increased headache control. A recent article indicates there is accumulating evidence that hormonal preventives may offer such protection. Although there is an increased risk of stroke with high-dose oral contraceptives (OCs) (those containing 50-150 μg of estrogen), there is evidence to suggest that this does not apply to ultralow-dose OCs – those containing <25 μg ethinyl estradiol – when used in appropriate populations (ie, normotensive non-smokers). Migraine with aura increases stroke risk, and that risk is directly correlated to the frequency of aura which can be diminished by combined hormonal contraceptives (CHCs).[15]

Case History:
A 30-year-old woman presented with a history of episodic disabling headaches. Her headaches began at menarche at age 11. In her teens, she had to go home early from school approximately once a month because of severe headaches associated with nausea (prior to taking any medications), sometimes progressing to vomiting and light and sound sensitivity; these headaches often occurred at the beginning of her period. Her headaches worsened during college, often precipitated by missed meals, stress, and sleep deprivation. Her headaches improved during her pregnancy but returned to their baseline frequency of twice monthly about 6 months after delivery of her child. She has never experienced an aura. She typically feels irritable for 1 to 2 hours before headache onset. Her headaches occur in the morning or afternoon. They evolve over 30 to 60 minutes, reaching maximal intensity within 2 hours. They are unilateral but will switch sides from episode to episode and are throbbing, synchronous with her pulse. Her headaches are often accompanied by a heightened sensitivity to bright lights, loud sounds, or strong odors. They are exacerbated by physical exertion. She finds lying down in a dark, quiet room and sleeping to be helpful in alleviating attacks. She tends to lie down on the side of the headache or press a pillow into that side of her head. She is otherwise healthy with a history of “sick headaches” in her mother, maternal grandmother and one of her two sisters. She was carsick as a child and, even today, cannot ride in the back seat of a car nor read in one. General physical and neurologic examinations are normal.

Comment: This is a typical case of migraine without aura (previously called *common migraine* in contrast to migraine with aura, previously called *classic migraine*.) She fulfills the criteria for frequency, headache characteristics and associated symptoms. In addition, there is a strong family history, childhood antecedents of migraine (carsickness) and inability to ride in the back of a car (sensitivity to motion and surround due to sensory conflict), precipitating factors such as missed meals, stress, and sleep deprivation. She tends to compress the affected side of the headache. If removal of triggers does not stop her headaches or bring them to an acceptable level, then prophylactic medications may be helpful. With the exception of Valproate, which is contraindicated in women of childbearing age, all other prophylactic medications could be considered and the "best fit" chosen on the basis of weight, blood pressure, physical activity and tolerability. The severity would militate in favor of a Triptan with the addition of an NSAID and/or metaclopramide. Imaging studies need not be carried out unless there is a family history of aneurysm.

Tension-type headaches (TTH):
Tension-type headache is the most common primary headache, and perhaps because of this, it has been called by several different names over the years. Prior terminology has included tension headache, psychogenic headache, muscle contraction headache, depressive headache, anxiety headache, stress headache, ordinary headache, essential headache, idiopathic headache, conversion headache, psychomyogenic headache, and somatoform disorder headache.[16]

The IHS criteria for the diagnosis of infrequent tension-type headaches are:

1. At least 10 episodes occurring less than one day per month on average (fewer than 12/year)
2. Headaches less than 30 minutes to 7 day
3. At least 2 of the following characteristics:

Bilateral location, pressing/tightening (non-pulsating) quality, mild or moderate intensity and not aggravated by routine physical activity.

4. Both of the following:
No nausea or vomiting (there may be anorexia) and no more than one of photophobia/phonophobia
5. Not attributable to another disorder.

Pathogenesis of tension-type headaches:
Contrary to prior hypotheses, increased muscle contraction does not seem to play a role in tension-type headaches. Neither resting muscle tension nor muscle tension headache is a greater than tension-type headaches than in migraines. Pericranial muscles are harder and more tender in tension-type headache patients than in controls. These changes could represent local pathology but given that a nitric oxide (NO) synthetase inhibitor significantly reduces headache pain intensity and muscle hardness in chronic tension-type headaches, a central mechanism is probable for some of these features as NO synthetase inhibitors reduce central sensitization.

Clinical manifestations:
Tension-type has no associated prodrome or aura it is not accompanied by the headache symptoms that characterize migraine. The patient tension headache is dull in bilateral compared with the throbbing, unilateral pain of migraine. In general, the patient is mild to moderate and is much less disabling migraine. The pain intensity does tend to increase with increasing frequency of attacks. Some episodic tension-type headache sufferers have tender nodules in the pericranial or cervical musculature that can be detected by manual palpation. Palpation of these nodules, sometimes called "trigger points preventative or prophylactic migraine therapy" leads to localized pain and also referred pain to the head and scalp.[17]

Nonpharmacological treatment of TTH:
Numerous nonpharmacological treatments have been advocated for TTH but Botox, physical therapy, and manipulation did not reach statistical significance. 3 osteopathic treatments coupled with relaxation there be was superior to relaxation alone. Relaxation was superior to acupuncture and physiotherapy.

Pharmacological treatment of TTH:
There are no FDA approved treatments for either the acute or prophylactic treatments of tension-type headaches. For acute treatment, aspirin, acetaminophen, or combinations with and without caffeine or customarily used. NSAIDs, Isomethepthene and butalbital have been used although the latter may lead to dependency.

For prophylaxis for more than 2 headaches a week, amitriptyline has been advocated and is better than SSRIs. Tizanidine has given unclear results as have baclofen or skeletal muscle relaxants. Migraine prophylactics are sometimes used especially in mixed headache types.

Case History:
A 42 year old, otherwise healthy man had a 5 year history of intermittent headaches which occurred in band-like fashion with moderate intensity about once a month, occasionally more under stress. He had no nausea, vomiting, sound or light sensitivity. There was no increase in headache intensity with effort. Simple analgesics reduced the pain to tolerable levels within 2 hours. Examination was entirely normal.

Comment:
This is a typical tension-type headache. No imaging is required. The main caution is avoidance of analgesics more than 2-3 times per week to avoid transition into analgesic rebound headaches.

Trigeminal autonomic cephalgias (TACs):

The TACs[18] include:

- Cluster headache
- Paroxysmal hemicrania
- SUNCT syndrome
- Hemicrania continua

It includes a group of indomethacin responsive headaches:

- Hemicrania continua
- Paroxysmal hemicrania
- Ice pick headache
- Sexual headache: explosive type, dull type, postural type
- Benign cough headache

Cluster Headache:
The IHS criteria for cluster includes that it is episodic it occurs in periods from 7 days to one-year with at least one month remission and that it is chronic it lasts more than a year without remission. It must have severe unilateral, orbital, supraorbital, or temporal a lasting 15 minutes to 3 hours every second day to 8 times per hour. It is associated with lacrimation, nasal congestion, rhinorrhea, forehead/facial swelling, miosis, ptosis, eyelid edema, conjunctiva with injection, restlessness.

Pathophysiology of cluster headache:
In cluster headache there is a trigeminal distribution of pain, autonomic involvement and periodicity.

There is evidence of neuropeptide release (CGRP & VIP) to influence the cerebral circulation. There are neuroendocrine changes including low testosterone during attacks and low response to TSH. There is PET scan activation in the posterior hypothalamic grey at the base of the third ventricle. The hypothalamic grey is likely to be the site of dysfunction which activates the trigeminal autonomic pathways.[19]

Clinical manifestations:
Cluster headache is relatively uncommon and more prevalent in men than women (8:1). It predominantly afflicts men in their 20s and 30s and there is a genetic predisposition. The actual pain associated with cluster headache is generally described as a severe, constant pain although some individuals will have throbbing or pulsating a very the pain is often described as burning or stabbing and is usually unilateral, located behind the eye, temple or upper jaw. There is often a dull background pain in the same area between the attacks. Each attack generally begins abruptly. The pain will usually peak within 15 minutes can last anywhere from 30 minutes to 3 hours, untreated although some attacks may have sustained pain for up to 8 hours. The attacks can end abruptly or may fade away.

The pain of cluster attacks is thought to be one of the most exquisite pain sensations, worse than the pain associated with childbirth or renal colic. As opposed to patients with migraine who tend to seek a quiet dark place during an attack, cluster patients will be agitated and restless and tends to pace rather than lie quietly.[20] The most striking thing about cluster headaches and the derivation of his pain is the periodicity of attacks. Individual episodes of head pain occur in clusters during the attack period. The typical patient will have him one or 2 cluster periods in a Year lasting from 1-3 months. There are longer periods of remission between attacks. There is a seasonal propensity to attacks with spring and fall being the major times of occurrence. There is also a daily periodicity with the most common times the early morning (occurring with the first period of REM sleep), mid-afternoon and evening.[21]

The autonomic features of cluster are as characteristic as the quality of the pain and periodicity of the attacks. Conjunctival injection and lacrimation are the most common, occurring in more than 80% of cluster patients. Nasal congestion and rhinorrhea are also fairly common. There may be swelling of the face, forehead or eyelid as well. A partial Horner's syndrome occurs in up to two thirds of patients. Facial flushing and sweating can occasionally occur. Some combination of autonomic symptoms is present in more than 97% of cluster headache patients. The autonomic symptoms are often unilateral, on the side of the pain. They resolve as the pain subsides except for the Horner's syndrome which may persist after long periods of attacks.

Treatment of Cluster Headache, general principles:
The management of CH includes: (1) patient education about the nature of the disorder; (2) advice on lifestyle changes (e.g., avoiding alcohol during an active cluster period); (3) prompt treatment of the acute attack; and (4) prophylactic treatment. Most patients can be managed with medical therapy. Rarely, surgical treatment is indicated. Recently, neurostimulation has emerged as a therapeutic option for select patients.

Abortive treatment of cluster headache:
Sumatriptan injection or oxygen inhalation is the first-line therapy for acute CH attacks, with the majority of patients responding to either treatment. 100% oxygen inhaled in 7-12 L per minute is 60% effective. Sumatriptan 6 mg subcutaneously is 75% effective. DHE 1 mg IV may be effective but cannot be used within 24 hours of a Triptan. Finally intranasal lidocaine and 46% concentration is effective about one third of the time.

Prophylactic treatments of cluster headache:
Short-term prophylaxis may be obtained with verapamil, the treatment of choice with 120- 240 mg as a starting dose. A steroid taper is often used. Methysergide 2mg to 4mg t.i.d, ergotamine 1 mg b.i.d. or DHE 0.5-1 mg q8 to 12h. Long-term prophylaxis may be obtained with verapamil, lithium

150-300 mg t.i.d., Methysergide 2mg to 4mg t.i.d, valproic acid 500-2000 mg daily with others using topiramate, gabapentin or melatonin.

Occipital nerve stimulation has been used for cluster headaches.[22] [23]The attacks improved with stimulation and returned with stimulator malfunction. These studies were done in drug resistant cluster headache and the stimulator was implanted on the side of the cluster. Complications, affecting 4 of the patients, included: excessive pain at incision site (n = 1), electrode migration (n = 3), electrode fracture (n = 1), and shock-like sensation because of kinking of wires (n = 1). [24]

Other neurosurgical treatments include percutaneous frequency retrogasserian rhizotomy, Gamma knife radiosurgery to ablate the trigeminal nerve root, and percutaneous retrogasserian glycerol rhizolysis.

Neurosurgical implantation of electrodes and stimulation of the posterior hypothalamus in intractable cluster headache, including those unresponsive to unresponsive to sphenopalatine blocks, has been reported to be generally well tolerated, but the risk of intracerebral hemorrhage, and even death, should be kept in mind when considering this treatment option .[25] [26] [27]

Case history:
A 42-year-old man developed severe unilateral headaches described as “an ice pick” pain through the left eye. These headaches came on initially in May, lasted 2 weeks, and stopped. The headaches resumed again in October and now would come in on daily, only starting 90 minutes after he went to sleep. The patient was awakened with severe restlessness and excruciating pain. He noticed that his left eye was drooping, that his left nostril felt plugged and that his left eye was injected and teared. His father had had similar headaches. He was otherwise in good health and on no medication.

Examination was normal except for coarsening of the facial features (leonine facies) and prominence of the pores of the nose (peau de orange), and a mild Horner's syndrome.

Comment: This history is almost classic for cluster headache. There is onset of the headache during the first REM sleep and characteristic restlessness. The facial features are also consistent with cluster headache. While the patient may appear to have a ptosis, it is actually a pseudoptosis associated with Horner's syndrome. While Horner's syndrome usually occurs only during an attack, with repeated attacks it may become permanent. The spring and fall distribution of the headache is also typical.

Other TACs

Paroxysmal hemicrania:
Paroxysmal hemicrania is characterized by multiple brief intense daily focal headache pain attacks, always affecting the same side. Most severe pain is experienced in the auriculo-temporal area, forehead and above or behind the ear. The pain is described as excruciating, throbbing, or pulsating. Tenderness may persist in the affected area between attacks, creating confusion with hemicrania continua. This headache usually becomes manifest in adults. The frequency of attack ranges from 2-30 attacks per day with individual attacks lasting between 2 and 25 minutes. Nocturnal attacks are associated with the REM phase of sleep. There is an episodic form lasting 7 days to one year with pain-free periods of one month or more and a chronic tie which lasts more than one year without remission. The treatment is indomethacin, 300 mg or less daily, to which nearly all are responsive. It shares the autonomic phenomenon associated with cluster headache.

SUNCT syndrome:
The SUNCT syndrome, short lasting, unilateral, neuralgiform headaches with conjunctival injection and tearing are rare, severe headaches with functional neuroimaging reporting specific activation of

the hypothalamus in association with attacks. Medical treatment options include lamotrigine, topiramate, and gabapentin. There are brief attacks of moderate to severe pain lasting 5 seconds to 4 minutes with associated conjunctival injection, lacrimation, rhinorrhea, nasal congestion ptosis or eyelid edema. In this syndrome there must be both conjunctival injection and lacrimation present. There is a variant syndrome, SUNA, in which there is either conjunctival injection, lacrimation but not both. There may be triggers from cutaneous stimuli such as touching the face, chewing, talking or cold wind on the face. Triggers are more prevalent in SUNCT than SUNA. There is both a episodic and chronic form. In addition to the pharmacological treatment as described above, greater occipital nerve injection dry, trigeminal microvascular decompression, occipital nerve stimulation and hypothalamic region/midbrain tegmentum deep brain stimulation may be tried. It should also be noted that there is secondary or symptomatic SUNCT or SUNA syndrome in which case treatment directed at the primary cause.

Hemicrania continua:
Hemicrania continua is one of the primary chronic daily headache disorders and is a continue was unilateral headache of moderate intensity with exacerbations of severe pain. It is associated with migrainous and cranial autonomic features. It is one of a group of indomethacin responsive headache syndromes (see below). Most headaches are chronic rather than the remitting form. there is a small female preponderance. The headaches are almost always unilateral some bilateral case one. Associated with this are:

1. cranial autonomic symptoms such as seen in cluster headache
2. “jabs and jolts” and some migrainous features.

Indomethacin responsive headaches:
These have been alluded to above, but for the sake of completeness, a table is appended below:

Trigeminal autonomic cephalalgias

- Episodic paroxysmal hemicrania
- Chronic paroxysmal hemicrania

Other primary headaches

- Primary stabbing headache
- Primary cough headache
- Primary exertional headache
- Primary headache associated with sexual activity
- Preorgasmic headache
- Orgasmic headache
- Hemicrania continua

Chronic daily headache (CDH):

Classifications:

Primary Headaches

- Chronic migraine (previously called transformed migraine)
- Probable chronic migraine
- Chronic tension-type headache
- Associated with pericranial tenderness
- Not associated with pericranial tendon

- Probably chronic tension-type headache
- Chronic cluster headache
- Chronic paroxysmal hemicrania
- Hemicrania continua
- New persistent daily headache

Secondary Chronic Headaches

- Chronic posttraumatic headache
- Attributed to moderate or severe head injury
- Attributed to mild head injury
- Chronic headache attributed to whiplash injury
- Chronic headache attributed to other head/neck injury
- Chronic post craniotomy
- Temporomandibular joint syndrome
- Sinus disease
- Arteriovenous malformation
- Arteritis (including giant cell arteritis)
- Subdural hematoma
- Vascular dissection
- Neoplasm
- Infections
- Intracranial hypertension
- Intracranial hypotension

Chronic daily headache is somewhat of a controversial term in that his biological basis and validity is still debated. He will be seen from the table below that it includes both primary headache types and secondary headaches as well as mixed headache disorders. Also, all diagnoses may be confounded by medication overuse. Precise criteria for this diagnosis have not been formally accepted, but chronic headache is often defined as headache occurring more frequently than 15 days per month for more than 6 months and lasting for more than 4 hours per day. There are several primary headache syndrome was as well as secondary headache disorders that fulfill the definition of chronic daily headache.

Risk factors for chronic daily headache include: High headache frequency, female gender, obesity (BMI greater than 30), snoring, stressful life events, higher caffeine consumption, acute medication overuse, depression, head trauma, history of migraine and less than a high school education.

Of the primary chronic daily headache patients, migraine or transformed migraine account for 78%, chronic tension-type headache 15% and other headaches 7 %.(new persistent daily headache or hemicrania continua).[28]

No medications are approved by the FDA for CDH but does commonly used medications and procedures include Tricyclic antidepressants, beta blockers, verapamil, valproate, topiramate Gabapentin, Zonisamide, SSRIs, Venlafaxine, NSAIDs, muscle relaxants, occipital nerve blocks and Botox™.

Primary chronic daily headaches (PCDH):
Primary chronic daily headaches are defined as headaches occurring more than 15 days per month, not related to structural or systemic disease and with or without medication overuse. The incidence is 4-5% of the general population over 3 continents, North America, Europe, and Asia.[29] [30]

Medication over use and rebound:
Medication overuse is a significant concern among physicians providing care for headache patient. Approximately 80% of patients with chronic daily headache overuse medications or might experience rebound. Medication overuse or rebound is a common concern in patients with migraine, tension type as well as other headache conditions. Of the primary headache types, migraine accounts for 65% of medication overuse rebound tension-type headache 27% and others, largely cluster, account for 8%. Women are 3.5 times is likely as mentioned to have overuse of medication. Specific pathophysiology of rebound headaches is not understood and the doses that are associated with its occurrence are not known. However general considerations on medication associated with medication overuse rebound headache include analgesics, simple or compound, Triptans, ergotamines and opiates. The dosage and time to rebound is unknown but it is felt that use of simple analgesics more than 5 days a week, Triptans or combination analgesics more than 3 times a week or opioids/ergotamine more than twice a week are conducive to the development of the medication overuse and rebound syndrome.[31] [32] [33]

Hemicrania continua:
The headache is present for more than one month, it is strictly unilateral and the pain has all 3 of the following characteristics: It is continuous but fluctuating, it is of moderate severity at least some of the time and there is a lack of a precipitating mechanism. There must be one of the following: Absolute response to indomethacin, autonomic symptoms or signs with severe pain exacerbation.[34]

Pediatric Headaches:
Pediatric headaches share some adult characteristics in that migraine and tension-type headaches are the most common intensities. The International Classification of Headache Disorders, second edition, does not address some of the subtleties of pediatric headache diagnoses. Migraine headaches, however, aren't exception and there are foot notes which contain specific mention of the pediatric features and there is a section on the childhood periodic syndromes. The ICHD-II criteria for adults catcher only 62% of pediatric and adolescent migraine. Adding osmophobia increased sensitivity of differentiation between migraine and tension-type headaches. The criteria of recognize episodic disorders related to migraines including recurrent abdominal symptoms (episodic and chronic), abdominal migraine and cyclical vomiting. Comorbid conditions in childhood headache are being increasingly recognized including abuse, blood pressure, the left she is psychological and psychiatric conditions.[35]

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