Migraine

Migraine is a type of headache that is often localized in a certain area of the head and is sometimes accompanied by a pronounced sensitivity to light and sound. Another common migraine symptoms include nausea and vomiting. Migraines are usually gradual in onset, progressively more painful and then undergo a gradual resolution. When migraines are mild to moderate, they are usually described as being dull, deep and steady. When severe, migraines are throbbing or pulsating.

Some migraines are worsened by head motion, sneezing, straining or physical exertion. Since many patients also become sensitive to light and sound, some migraine sufferers will lie down in a darkened and quiet room to relieve symptoms.

More common in women than in men, migraine is a chronic condition, and migraine headaches may occur infrequently or as often as several times a week. Although migraines can begin at any time, the most common time is in the early morning. While migraines can begin during sleep, this is uncommon and must be evaluated to rule out other conditions.

The onset of migraine usually occurs between the ages of 5 and 35. It is treatable but not curable, and it is not considered a life-threatening condition, though rarely a severe migraine may cause a stroke. However, if the headaches are severe and frequent, migraine can have a debilitating impact on a person's life.

Signs and Symptoms

Migraines typically present with self-limited, recurrent severe headache associated with autonomic symptoms. About 15–30% of people with migraines experience migraines with an aura and those who have migraines with aura also frequently have migraines without aura. The severity of the pain, duration of the headache, and frequency of attacks is variable. A migraine lasting longer than 72 hours is termed status migrainosus. There are four possible phases to a migraine, although not all the phases are necessarily experienced:

1The prodrome, which occurs hours or days before the headache

2The aura, which immediately precedes the headache

3The pain phase, also known as headache phase

4The postdrome, the effects experienced following the end of a migraine attack

Prodrome phase

Prodromal or premonitory symptoms occur in about 60% of those with migraines, with an onset that can range from two hours to two days before the start of pain or the aura. These symptoms may include a wide variety of phenomena, including altered mood, irritability, depression or euphoria, fatigue, craving for certain food(s), stiff muscles (especially in the neck), constipation or diarrhea, and sensitivity to smells or noise. This may occur in those with either migraine with aura or migraine without aura.

Aura phase

An aura is a transient focal neurological phenomenon that occurs before or during the headache. Auras appear gradually over a number of minutes and generally last less than 60 minutes. Symptoms can be visual, sensory or motor in nature and many people experience more than one. Visual effects occur most frequently; they occur in up to 99% of cases and in more than 50% of cases are not accompanied by sensory or motor effects. Vision disturbances often consist of ascintillating scotoma (an area of partial alteration in the field of vision which flickers and may interfere with a person's ability to read or drive). These typically start near the center of vision and then spread out to the sides with zigzagging lines which have been described as looking like fortifications or walls of a castle. Usually the lines are in black and white but some people also see colored lines. Some people lose part of their field of vision known as hemianopsia while others experience blurring.

Sensory aurae are the second most common type; they occur in 30–40% of people with auras. Often a feeling of pins-and-needles begins on one side in the hand and arm and spreads to the nose–mouth area on the same side. Numbness usually occurs after the tingling has passed with a loss of position sense. Other symptoms of the aura phase can include speech or language disturbances, world spinning, and less commonly motor problems. Motor symptoms indicate that this is a hemiplegic migraine, and weakness often lasts longer than one hour unlike other auras. Auditory hallucinations or delusions have also been described.

Pain phase

Classically the headache is unilateral, throbbing, and moderate to severe in intensity. It usually comes on gradually and is aggravated by physical activity. In more than 40% of cases, however, the pain may be bilateral and neck pain is commonly associated with it. Bilateral pain is particularly common in those who have migraines without an aura. Less commonly pain may

occur primarily in the back or top of the head. The pain usually lasts 4 to 72 hours in adults, however in young children frequently lasts less than 1 hour. The frequency of attacks is variable, from a few in a lifetime to several a week, with the average being about one a month.

The pain is frequently accompanied by nausea, vomiting, sensitivity to light, sensitivity to sound, sensitivity to smells, fatigue and irritability. In a basilar migraine, a migraine with neurological symptoms related to the brain stem or with neurological symptoms on both sides of the body, common effects include a sense of the world spinning, light-headedness, and confusion. Nausea occurs in almost 90% of people, and vomiting occurs in about one-third. Many thus seek a dark and quiet room. Other symptoms may include blurred vision, nasal stuffiness, diarrhea, frequent urination, pallor, or sweating. Swelling or tenderness of the scalp may occur as can neck stiffness. Associated symptoms are less common in the elderly.

Rarely, an aura occurs without a subsequent headache. This is known as an acephalgic migraine or silent migraine; however, it is difficult to assess the frequency of such cases because people who do not experience symptoms severe enough to seek treatment may not realize that anything unusual is happening to them and pass it off without reporting any problems.

Postdrome

The effects of migraine may persist for some days after the main headache has ended; this is called the migraine postdrome. Many report a sore feeling in the area where the migraine was, and some report impaired thinking for a few days after the headache has passed. The patient may feel tired or "hung over" and have head pain, cognitive difficulties, gastrointestinal symptoms, mood changes, and weakness. According to one summary, "Some people feel unusually refreshed or euphoric after an attack, whereas others note depression and malaise." For some individuals this can vary each time.

Causes

The underlying causes of migraines are unknown. However, they are believed to be related to a mix of environmental and genetic factors. They run in families in about two-thirds of cases and rarely occur due to a single gene defect. While migraines were once believed to be more common in those of high intelligence, this does not appear to be true. A number of psychological conditions are associated, including depression, anxiety, and bipolar disorder, as are many biological events or triggers.

Genetics

Studies of twins indicate a 34% to 51% genetic influence of likelihood to develop migraine headaches. This genetic relationship is stronger for migraines with aura than for migraines

without aura. A number of specific variants of genes increase the risk by a small to moderate amount.

Single gene disorders that result in migraines are rare. One of these is known as familial hemiplegic migraine, a type of migraine with aura, which is inherited in an autosomal dominant fashion. Four genes have been shown to be involved in familial hemiplegic migraine. Three of these genes are involved in ion transport. The fourth is anaxonal protein associated with the exocytosis complex. Another genetic disorder associated with migraine is CADASIL syndrome or cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy.

Triggers

A trigger may be encountered up to 24 hours prior to the onset of symptoms.

Physiological aspects

Common triggers quoted are stress, hunger, and fatigue (these equally contribute to tension headaches). Psychological stress has been reported as a factor by 50 to 80% of people.Migraines have also been associated with post-traumatic stress disorder and abuse. Migraines are more likely to occur around menstruation. Other hormonal influences, such as menarche, oral contraceptive use, pregnancy, perimenopause, and menopause, also play a role. These hormonal influences seem to play a greater role in migraine without aura.[34] Migraines typically do not occur during the second and third trimesters or following menopause.

Dietary aspects

Between 12 to 60 % of people report foods as triggers. Evidence for dietary triggers; however, mostly relies on self-reports and is not rigorous enough to prove or disprove any particular triggers. A clear explanation for why food might trigger migraines is also lacking.

Regarding specific agents there does not appear to be evidence for an effect of tyramine on migraine, and while monosodium glutamate (MSG) is frequently reported as a dietary trigger, evidence does not consistently support this.

Environmental aspects

A review on potential triggers in the indoor and outdoor environment concluded the overall evidence was of poor quality, but nevertheless suggested people with migraines take some preventive measures related to indoor air quality and lighting.

Pathophysiology

Migraines are believed to be a neurovascular disorder with evidence supporting its mechanisms starting within the brain and then spreading to the blood vessels. Some researchers believe neuronal mechanisms play a greater role, while others believe blood vessels play the key role. Others believe both are likely important. High levels of the neurotransmitter serotonin, also known as 5-hydroxytryptamine, are believed to be involved.

Aura

Cortical spreading depression, or spreading depression according to Leão, is bursts of neuronal activity followed by a period of inactivity, which is seen in those with migraines with an aura. There are a number of explanations for its occurrence including activation of NMDA receptors leading to calcium entering the cell. After the burst of activity the blood flow to the cerebral cortex in the area affected is decreased for two to six hours. It is believed that when depolarization travels down the underside of the brain, nerves that sense pain in the head and neck are triggered.

Pain

The exact mechanism of the head pain which occurs during a migraine is unknown. Some evidence supports a primary role for central nervous system structures (such as thebrainstem and diencephalon) while other data support the role of peripheral activation (such as via the sensory nerves that surround blood vessels of the head and neck). The potential candidate vessels include dural arteries, pial arteries and extracranial arteries such as those of the scalp. The role of vasodilatation of the extracranial arteries, in particular, is believed to be significant.

Diagnosis

The diagnosis of a migraine is based on signs and symptoms. Neuroimaging tests are not necessary to diagnose migraine, but may be used to find other causes of headaches in those whose examination and history do not confirm a migraine diagnosis. It is believed that a substantial number of people with the condition remain undiagnosed.

The diagnosis of migraine without aura, according to the International Headache Society, can be made according to the following criteria, the "5, 4, 3, 2, 1 criteria":

•Five or more attacks—for migraine with aura, two attacks are sufficient for diagnosis.

•Four hours to three days in duration

•Two or more of the following:

•Unilateral (affecting half the head);

•Pulsating;

•"Moderate or severe pain intensity";

•"Aggravation by or causing avoidance of routine physical activity"

•One or more of the following:

•Nausea and/or vomiting;

•Sensitivity to both light (photophobia) and sound (phonophobia)

If someone experiences two of the following: photophobia, nausea, or inability to work or study for a day, the diagnosis is more likely. In those with four out of five of the following: pulsating headache, duration of 4–72 hours, pain on one side of the head, nausea, or symptoms that interfere with the person's life, the probability that this is a migraine is 92%. In those with fewer than three of these symptoms the probability is 17%.

Classification

Migraines were first comprehensively classified in 1988. The International Headache Society most recently updated their classification of headaches in 2004. According to this classification migraines are primary headaches along with tension-type headaches and cluster headaches, among others.

Migraines are divided into seven subclasses (some of which include further subdivisions):

•Migraine without aura, or "common migraine", involves migraine headaches that are not accompanied by an aura.

•Migraine with aura, or "classic migraine", usually involves migraine headaches accompanied by an aura. Less commonly, an aura can occur without a headache, or with a nonmigraine headache. Two other varieties are familial hemiplegic migraine and sporadic hemiplegic migraine, in which a person has migraines with aura and with accompanying motor weakness. If a close relative has had the same condition, it is called "familial", otherwise it is called "sporadic". Another variety is basilar-type migraine, where a headache and aura are accompanied by difficulty speaking, world spinning, ringing in ears, or a number of other brainstem-related symptoms, but not motor weakness. This type was initially believed to be due to spasms of the basilar artery, the artery that supplies the brainstem.

•Childhood periodic syndromes that are commonly precursors of migraine include cyclical vomiting (occasional intense periods of vomiting), abdominal migraine (abdominal pain, usually

accompanied by nausea), and benign paroxysmal vertigo of childhood (occasional attacks of vertigo).

•Retinal migraine involves migraine headaches accompanied by visual disturbances or even temporary blindness in one eye.

•Complications of migraine describe migraine headaches and/or auras that are unusually long or unusually frequent, or associated with a seizure or brain lesion.

•Probable migraine describes conditions that have some characteristics of migraines, but where there is not enough evidence to diagnose it as a migraine with certainty (in the presence of concurrent medication overuse).

•Chronic migraine is a complication of migraines, and is a headache that fulfills diagnostic criteria for migraine headache and occurs for a greater time interval. Specifically, greater or equal to 15 days/month for longer than 3 months.

Abdominal migraine

The diagnosis of abdominal migraines is controversial. Some evidence indicates that recurrent episodes of abdominal pain in the absence of a headache may be a type of migraine or are at least a precursor to migraines. These episodes of pain may or may not follow a migraine-like prodrome and typically last minutes to hours. They often occur in those with either a personal or family history of typical migraines. Other syndromes that are believed to be precursors include cyclical vomiting syndrome and benign paroxysmal vertigo of childhood.

Differential diagnosis

Other conditions that can cause similar symptoms to a migraine headache include temporal arteritis, cluster headaches, acute glaucoma, meningitis and subarachnoid hemorrhage. Temporal arteritis typically occurs in people over 50 years old and presents with tenderness over the temple, cluster headaches presents with one-sided nose stuffiness, tears and severe pain around the orbits, acute glaucoma is associated with vision problems, meningitis with fevers, and subaracchnoid hemorrhage with a very fast onset. Tension headaches typically occur on both sides, are not pounding, and are less disabling.

Those with stable headaches which meet criteria for migraines should not receive neuroimaging to look for other intracranial disease. This requires that other concerning findings such as papilledema (swelling of the optic disc) are not present. People with migraines are not at an increased risk of having another cause for severe headaches.

Prevention

Preventive treatments of migraines include medications, nutritional supplements, lifestyle alterations, and surgery. Prevention is recommended in those who have headaches more than two days a week, cannot tolerate the medications used to treat acute attacks, or those with severe attacks that are not easily controlled.

The goal is to reduce the frequency, painfulness, and/or duration of migraines, and to increase the effectiveness of abortive therapy. Another reason for prevention is to avoid medication overuse headache. This is a common problem and can result in chronic daily headache.

Medication

Preventive migraine medications are considered effective if they reduce the frequency or severity of the migraine attacks by at least 50%. Guidelines are fairly consistent in rating topiramate, divalproex/sodium valproate, propranolol, and metoprolol as having the highest level of evidence for first-line use. Recommendations regarding effectiveness varied however for gabapentin. Timolol is also effective for migraine prevention and in reducing migraine attack frequency and severity, while frovatriptan is effective for prevention of menstrual migraine.

Amitriptyline and venlafaxine are probably also effective. Angiotensin inhibition by either an angiotensin-converting enzyme inhibitor or angiotensin II receptor antagonist may reduce attacks. Botox has been found to be useful in those with chronic migraines but not those with episodic ones.

Alternative therapies

While acupuncture may be effective, "true" acupuncture is not more efficient than sham acupuncture, a practice where needles are placed randomly. Both have a possibility of being more effective than routine care, with fewer adverse effects than preventative medications. Chiropractic manipulation, physiotherapy, massage and relaxation might be as effective as propranolol or topiramate in the prevention of migraine headaches; however, the research had some problems with methodology. The evidence to support spinal manipulation is poor and insufficient to support its use.

Tentative evidence supports the use of stress reduction techniques such as cognitive behavioral therapy, biofeedback, and relaxation techniques. Of the alternative medicines, butterbur has the best evidence for its use.

Devices and Surgery

Medical devices, such as biofeedback and neurostimulators, have some advantages in migraine prevention, mainly when common anti-migraine medications are contraindicated or in case of medication overuse. Biofeedback helps people be conscious of some physiological parameters

so as to control them and try to relax and may be efficient for migraine treatment. Neurostimulation uses implantable neurostimulators similar to pacemakers for the treatment of intractable chronic migraines with encouraging results for severe cases. A transcutaneous electrical nerve stimulation device is approved in the United States for the prevention of migraines. Migraine surgery, which involves decompression of certain nerves around the head and neck, may be an option in certain people who do not improve with medications.

There are three main aspects of treatment: trigger avoidance, acute symptomatic control, and pharmacological prevention. Medications are more effective if used earlier in an attack. The frequent use of medications may result in medication overuse headache, in which the headaches become more severe and more frequent. This may occur with triptans, ergotamines, and analgesics, especially narcotic analgesics. Due to these concerns simple analgesics are recommended to be used less than three days per week at most.

Analgesics

Recommended initial treatment for those with mild to moderate symptoms are simple analgesics such as non-steroidal anti-inflammatory drugs (NSAIDs) or the combination of paracetamol, aspirin, and caffeine. Several NSAIDs, including diclofenac and ibuprofen have evidence to support their use. Aspirin can relieve moderate to severe migraine pain, with an effectiveness similar to sumatriptan. Ketorolac is available in an intravenous formulation.

Paracetamol (also known as acetaminophen), either alone or in combination with metoclopramide, is another effective treatment with a low risk of adverse effects. Metoclopramide is also effective by itself. In pregnancy, paracetamol and metoclopramide are deemed safe as are NSAIDs until the third trimester.

Triptans

Triptans such as sumatriptan are effective for both pain and nausea in up to 75% of people. They are the initially recommended treatments for those with moderate to severe pain or those with milder symptoms who do not respond to simple analgesics. The different forms available include oral, injectable, nasal spray, and oral dissolving tablets. In general, all the triptans appear equally effective, with similar side effects. However, individuals may respond better to specific ones. Most side effects are mild, such as flushing; however, rare cases of myocardial ischemia have occurred. They are thus not recommended for people with cardiovascular disease, who have had a stroke, or have migraines that are accompanied by neurological problems. In addition, triptans should be prescribed with caution for those with risk factors for vascular disease. While historically not recommended in those with basilar migraines there is no specific evidence of harm from their use in this population to support this caution. They are

not addictive, but may cause medication overuse headaches if used more than 10 days per month.

Ergotamines

Ergotamine and dihydroergotamine are older medications still prescribed for migraines, the latter in nasal spray and injectable forms. They appear equally effective to the triptans, are less expensive, and experience adverse effects that typically are benign. In the most debilitating cases, such as those with status migrainosus, they appear to be the most effective treatment option.

Other

Intravenous metoclopramide or intranasal lidocaine are other potential options. Metoclopramide is the recommended treatment for those who present to the emergency department. A single dose of intravenous dexamethasone, when added to standard treatment of a migraine attack, is associated with a 26% decrease in headache recurrence in the following 72 hours. Spinal manipulation for treating an ongoing migraine headache is not supported by evidence. It is recommended that opioids and barbiturates not be used due to questionable efficacy and the risk of rebound headache.

Epidemiology

Worldwide, migraines affects nearly 15% or approximately one billion people. It is more common in women at 19% than men at 11%. In the United States, about 6% of men and 18% of women get a migraine in a given year, with a lifetime risk of about 18% and 43% respectively. In Europe, migraines affect 12–28% of people at some point in their lives with about 6–15% of adult men and 14–35% of adult women getting at least one yearly. Rates of migraines are slightly lower in Asia and Africa than in Western countries. Chronic migraines occur in approximately 1.4 to 2.2% of the population.

These figures vary substantially with age: migraines most commonly start between 15 and 24 years of age and occur most frequently in those 35 to 45 years of age. In children, about 1.7% of 7 year olds and 3.9% of those between 7 and 15 years have migraines, with the condition being slightly more common in boys before puberty. During adolescence migraines becomes more common among women and this persists for the rest of the lifespan, being two times more common among elderly females than males. In women, migraines without aura is more common than migraines with aura, however, in men the two types occur with similar frequency.

During perimenopause symptoms often get worse before decreasing in severity. While symptoms resolve in about two thirds of the elderly, in between 3 and 10% they persist.

Prognosis

Long term prognosis in people with migraines is variable. Most people with migraines have periods of lost productivity due to their disease; however typically the condition is fairly benign and is not associated with an increased risk of death. There are four main patterns to the disease: symptoms can resolve completely, symptoms can continue but become gradually less with time, symptoms may continue at the same frequency and severity, or attacks may become worse and more frequent.

Migraines with aura appear to be a risk factor for ischemic stroke doubling the risk. Being a young adult, being female, using hormonal contraception, and smoking further increases this risk. There also appears to be an association with cervical artery dissection. Migraines without aura do not appear to be a factor. The relationship with heart problems is inconclusive with a single study supporting an association. Overall, however, migraines do not appear to increase the risk of death from stroke or heart disease. Preventative therapy of migraines in those with migraines with auras may prevent associated strokes.

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