

Vestibular Migraine

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Migraine Definitions



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Migraine

- Complex, neuro-biological disorder
- Recurrent episodes
- Often characterized by headache and various other neurological signs and symptoms
 - Headache \neq migraine, migraine \neq headache
- Neurological manifestations can be present between attacks



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Migraine Subtypes

- Migraine w/o aura – most common, 80%
- Migraine w/ aura – 20%
 - Aura- sensory manifestation of migraine
 - Ocular/retinal – visual symptoms (disturbance, temp blindness)
 - Paresthesias
 - Dysphasia/aphasia
 - Hemiplegic – stroke-like symptoms (unilateral weakness, facial droop, etc)
 - Basilar – brainstem-type symptoms (vertigo, ataxia, dysarthria, confusion, etc)
 - Acephalgic – aura w/o headache



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Migraine Classifiers

- Chronic
 - 15 headache days/month
 - 8 headaches/month with migraine features
 - Present for at least 3 months
 - With or without aura
- Catamenial (menstrual)
 - Estrogen-related
 - 60% of those w/ migraine note correlation with menses cycle
 - Occur immediately prior to or at start of menses



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Epidemiology



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Migraine Epidemiology- Worldwide

- 1 billion people have migraine worldwide
- 3rd most common disease in the world
- Leading cause of disability in people under 50
- Second highest cause of disability across all ages



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Migraine Epidemiology- Worldwide

- 5.6% of global disease burden (more than all other neuro dx combined)
- Prevalence 11% (similar in U.S.)
- More commonly diagnosed in Western countries (higher prevalence?)
- Some studies have shown higher rates associated with poverty



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Migraine Epidemiology

- More common in females = 2.5:1 preponderance
- More common in Caucasians
 - Caucasians
 - Females- 20%
 - Males- 9%
 - African Americans
 - Females- 16%
 - Males- 7%
 - Asian Americans
 - Females- 9%
 - Males- 4%



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Migraine Epidemiology

- Peak incidence
 - Migraine w/ aura
 - Boys: 5 years
 - Girls: 12-13 years
 - Migraine w/o aura
 - Boys: 10-11 years
 - Girls: 14-17 years



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Migraine Epidemiology

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Migraine Epidemiology- U.S. Burden

- 22,758,044 outpatient visits/year = \$3.2 billion
- 908,541 ER visits/year = \$700 million
- 51,116 inpatient hospitalizations/year = \$375 million

- Annual costs of \$4.3 billion in the United States

- Migraine fairly unique, as typically affects individuals in their most financially productive years



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Migraine Epidemiology- Burden

- Globally, 45.1 million yrs are lived with disability
- Family and social impact (research in U.S.)
 - Reduced work productivity and career potential
 - Individual and families less engaged socially
 - Children of those with migraine – poorer academics and less involved
 - 49% of those w/ migraine indicated they would be a better partner w/o migraine
 - 3.2% indicated they did not have children due to migraine



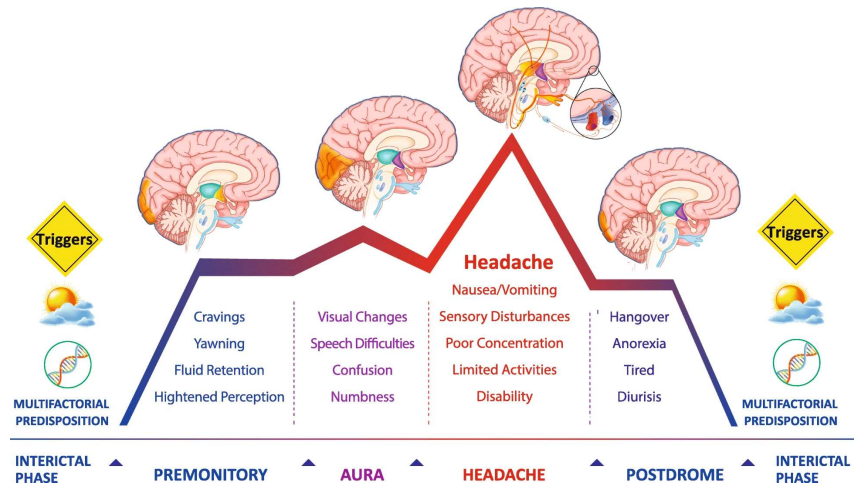
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Pathophysiology



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Migraine Course



Andreou, Anna & Edvinsson, Lars (2019). Mechanism of migraine as a chronic evolutive condition, The Journal of Headache and Pain



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Migraine Course- Prodrome

- Prodrome phase
 - 40 – 80% of people experience
 - Symptoms begin days to hours prior to attack
 - Homeostatic changes in brain – blood flow, neurotransmitters
 - Varying symptoms:
 - Depression, trouble concentrating, irritability
 - Food cravings, appetite changes = activation of hypothalamus
 - Sleep disturbances = locus coeruleus involvement
 - Nausea, photophobia = activation of visual cortex and rostral dorsal medulla
 - Neck pain = trigeminocervical complex involvement



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Migraine Course- Aura

- Aura
 - ~20% experience
 - Last 10 – 30 minutes
 - Theorized to be related to cortical changes during a migraine
 - May occur before or during attack (or in absence of headache)
 - Typical visual = fortification spectrum, scotoma, scintillations



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Migraine Course- Headache

- Headache phase
 - Diagnostic criteria
 - Moderate to severe
 - Unilateral
 - Throbbing/pulsatile
 - Aggravated by physical activity
 - Associated with nausea, vomiting, photophobia, phonophobia
 - Typically persist for 4 to 72 hrs *
- Caused by activation of trigeminovascular pathway
 - Synapse and project to thalamus and other regions that modulate sensory information



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Migraine Course- Postdromal

- Postdromal phase
 - Follows headache
 - May persist for days
 - Characterized by being tired, having issues concentrating, neck discomfort, etc.
 - Less studied and exact cause unknown – reset to homeostasis



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Migraine Course- Interictal

- Interictal phase
 - Period between episodes
 - Patients are relatively symptoms free
 - However, many individuals report general sensitivity to sensory information, dizziness, disequilibrium, and cognitive dysfunction
 - Functional MRIs have shown general altered brain function in those w/ migraine



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Comorbidities of Migraine



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Comorbidities

- Those with migraine, have a higher incidence of:
 - Stroke- vascular inflammation, vasospasm
 - Sub-clinical microvascular brain lesions- inflammation/wear-and-tear
 - Coronary artery disease- cause or result?
 - Hypertension- cause or result?
 - Epilepsy- coded on similar gene
 - Anxiety and depression- serotonin levels, chronic disease



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MAV Diagnosis



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IHS Diagnostic Criteria

- Current or previous dx of migraine with/without aura
- At least 5 episodes characterized by:
 - Moderate to severe vertigo lasting 5 min to 72 hrs
 - At least ½ of these 5 episodes accompanied by at least 1 of the following 3:
 - Migraine-type headache (unilateral, pulsatile, moderate to severe, worse w/ exertion)
 - Photophobia and/or phonophobia
 - Visual aura
- Not better explained by another diagnosis (Dx of exclusion)



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Barany Society- Probable VM

- At least 5 episodes characterized by:
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 - At least ½ of these 5 episodes accompanied by at least 1 of the following 3:
 - Migraine-type headache (unilateral, pulsatile, moderate to severe, worse w/ exertion)
 - Photophobia and/or phonophobia
 - Visual aura

OR

- Previous Dx of migraine
- Not better accounted for by another Dx



Bárány Society

The International Society for Neuro-otology



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Barany Society- Probable VM

- Very liberal definition (problematic in my opinion)
- Only need:
 - Remote Hx of migraine
 - Vertiginous episodes (no temporal relationship)
 - No other identified cause



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MV Diagnostic Footnotes

- According to IHS, vertigo can be characterized as:
 - Internal or external
 - Positional
 - Provoked by complex visual stimuli
 - Provoked by head movement
 - “Sensation of disturbed spatial orientation”
- For Sxs to be considered moderate to severe, they must interfere with or prohibit daily activities



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MV Diagnostic Footnotes

- According to IHS, length of episodes can vary
 - Seconds- 10% (definitions says 5 min???)
 - Minutes- 30%
 - Hours- 30%
 - Days- 30%
 - Some individuals have attacks lasting weeks, but core Sxs resolve w/in 72 hrs
- Different migraine-type Sxs may occur at different times with vertiginous attacks



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Migraine and Peripheral Dysfunction



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Current Literature Suggests

- Vestibulopathy in 44% of migraineurs
- Meniere's disease is 2x more common
- BPPV is 3x more prevalent
- Otolgic symptoms
 - Fluctuating hearing
 - Tinnitus
 - Often unilateral



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Migraine and Vestibulopathy

- Vestibular hypofunction- fluctuating, permanent, or progressive
- Unilateral or bilateral
- Should consider lesions of end organ and both vestibular nerve branches
 - Permanent end organ = cVEMP/oVEMP, calorics
 - Unilateral = calorics; bilateral = rotary chair
 - Superior nerve = calorics; oVEMP; tests of VOR
 - Inferior nerve = cVEMP



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Migraine and Meniere's Disease

- Diagnostic criteria for Meniere's
 - Based on Sxs, no specific test
 - Fluctuating SNHL (unilateral and often low frequency)
 - Tinnitus (unilateral)
 - Vertigo lasting 20 min to 24 hours
 - Can also have aural fullness (unilateral)
- Migraine
 - Fluctuating SNHL
 - Tinnitus
 - Vertigo



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Migraine and Meniere's Disease

- Differentiating
 - Meniere's disease = unilateral aural fullness (unless bilateral)
 - Migraine = less likely true aural fullness
 - Meniere's disease = unilateral permanent SNHL (unless bilateral)
 - Migraine = fluctuating HL, less likely permanent
 - Meniere's disease = less likely a hormonal link (menses cycle)
 - Migraine = can be hormonal link (age of onset, menses cycle, etc)
 - Meniere's disease = rare genetic link
 - Migraine = often maternal inheritance
- Barometric pressure change?



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Migraine and Meniere's Disease

- Pearls
 - Both can be caused by exogenous factors = diet, alcohol, etc
 - Meniere's disease can cause drop attacks = Crisis of Tumarkin
 - Meniere's disease = progressive reduction in function
 - Migraine is 54 times more common
 - Migraine = 11,350/100,000
 - Meniere's disease = 210/100,000
 - Unfortunately, both have been used as a waste basket Dx



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Migraine and BPPV

- Higher incidence of BPPV in those with migraine (3x)
- If BPPV in patient under 60 (excluding head trauma) = consider migraine
- If unexplained recurrent BPPV = consider migraine
- Migrainous positional vertigo (MPV) can mimic BPPV
 - MPV nystagmus is often persistent or longer than 1 minute
 - MPV nystagmus is often not canal specific
 - Canalith repositioning has 99.6% efficacy rate (my clinic)



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Migraine and Otologic Symptoms

- With all of that being said, can migraines cause permanent end-organ ear damage?
- Most of the migraine lectures and publications hypothesize the connection is vascular.
- Does our vascular neuro-anatomy support this conclusion?



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Migraine and Otologic Symptoms

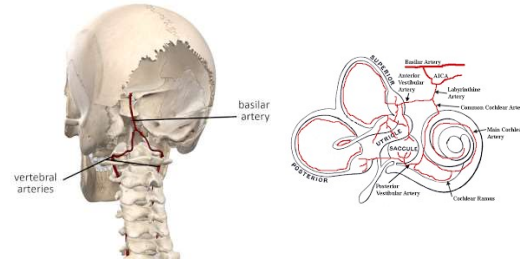
- Vestibular migraine pathophysiology
 - Brainstem generator proximal to the vestibular nucleus
 - Activation of a presumed vestibulotrigeminal pathway
 - Cortical change in blood flow
- The above should not cause end organ cochleovestibular end organ dysfunction (particularly unilateral)



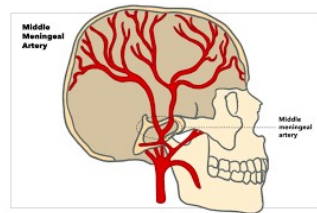
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Migraine and Otologic Symptoms

- Inner ear vascular supply = posterior circulation



- Migraines = cortical change in blood flow



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Migraine and Otologic Symptoms

- Other arguments against vascular connection
 - Do typical migraines cause vasospasm?
 - Are migraines related to vasoconstriction or dilation (or neither)?
- Where's the disconnect between our literature and the A&P?
- If the connection is not vascular, what/where is it?
 - Brainstem generator
 - Vestibulo-trigeminal pathway
 - Neurotransmitter (serotonin)
 - Predisposition, common cause



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Vestibular Migraine Management



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Management

- Medical intervention
 - MAV is not well managed with abortive medications
 - If meds deemed appropriate, should be prophylactic
 - Aimed at the underlying headache disorder
- Other treatments
 - OTC supplements
 - Avoiding triggers
 - Migraine diet



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Management

- OTC
 - Magnesium = 400 mg
 - Inhibits glutamate = excitatory neurotransmitter; reduces pain signals; helps blood flow
 - Riboflavin (B-2) = 400 mg
 - Helps energy production and metabolism = mitochondrial energy deficiencies might cause migraine
 - CoQ10 = 300 mg
 - Promotes energy metabolism and mitochondrial energy transport
- Triggers
 - Sleep hygiene
 - Scheduled eating



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Management

- Diet
 - Caffeine (help or hurt???)
 - Drinks with tannins
 - MSG
 - Artificial sweeteners
 - Cured meats and cheeses
 - Pickled foods



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Management

- Abortive
 - Rare attacks with reasonable response to therapies (MAV?)
- Preventative/Prophylactic
 - ≥ 4 days/mo
 - Unsatisfactory response to acute therapy
 - Contraindication to acute treatments and adverse effects
 - Use of abortive medications $\geq 2x/week$
 - Hemiplegic migraine
 - Migraine with prolonged aura



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Management- Abortive

- NSAIDS:
 - Aspirin
 - Ibuprofen
 - Naproxen sodium
 - Excedrin migraine (ASA, acetaminophen, caffeine)
- Triptans/Ergots
- Anti-emetics
- Combinations of above

- More than 10-15 doses/month can lead to medication overuse headaches



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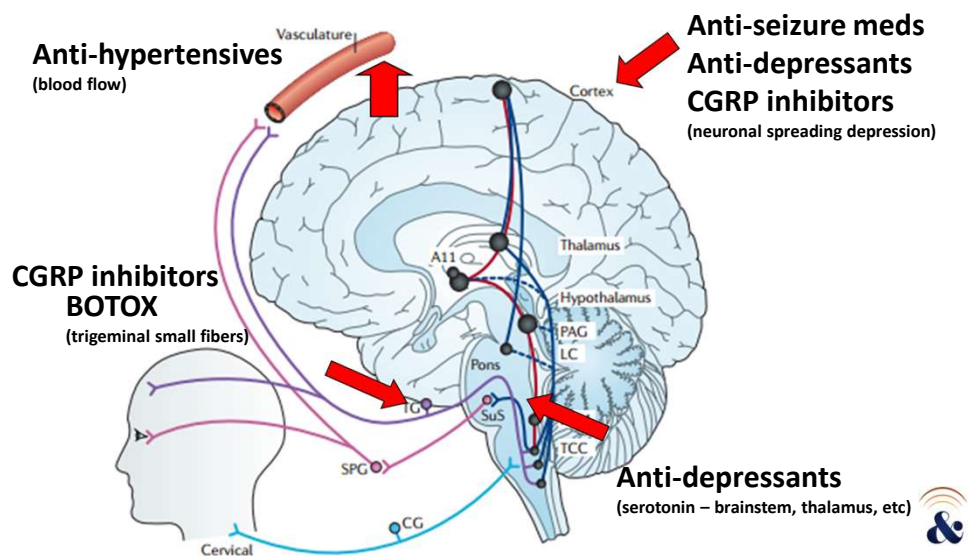
Management- Preventative

- Pharmaceutical intervention
 - Anti-hypertensives:
 - Beta-blockers, ACE-I, ARBs, Alpha-blocker, CCBs
 - Anti-depressants
 - SNRIs, SSRIs
 - Anti-epileptic medications
 - Calcitonin gene related peptide inhibitors (CGRP)
 - Botulinum toxin - Botox



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Migraine Treatment



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Management

- Is physical therapy (VRT) effective in managing vestibular migraine?
 - VRT more efficacious for stabilized conditions
 - If peripheral function is fluctuating or degrading, VRT less useful
 - Exercise has been shown to decrease migraine frequency
 - Mindfulness and relaxation can help



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Management

- When and if VRT should be considered
 - VRT's purpose is to encourage and speed up the natural central compensation process, desensitization, habituation, etc.
 - In conjunction with medical intervention, lifestyle changes, etc.
- VRT is less indicated (determined during formal vestibular eval)
 - Structural issues (SCDS, fistula, mass lesions, etc)
 - Central vestibular dysfunction
 - Compensated peripheral lesions



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Management

- VRT and migraine
 - If an individual with migraine also has an uncompensated lesion:
 - Migraine should be effectively managed
 - If peripheral function stabilized, VRT might be considered
 - Only addressing migraine without treating peripheral involvement will have poorer outcomes
 - VRT should be recommended based on specific deficits with specific modalities



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Pearls



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Pearls

- Dizziness and headache may or may not be temporally associated
- MAV mean age of onset:
 - Women- 38
 - Men- 42
- Migraine headache typically predate dizziness by 8 years
- Attacks can last 5 min to 72 hrs.
- Dizziness is typically characterized as “vestibular” in nature
- Vestibular stimulation can provoke migraine



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Pearls

- Very atypical for migraines to start past 5th decade
- New onset headaches in older patient is a red flag
- However, migraines can morph in their characteristics over time
- Do not use MAV as a wastebasket diagnosis
- Migraines are best managed by a neurologist



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Pearls

- Dizziness with migraine:
 - Common- dizziness with some or all headaches
 - Less common- known migraine headaches, but dizziness occurs in isolation
 - Least common- no history of headache, but have migraine-associated dizziness
- Might be challenging to diagnose headache-free migraines



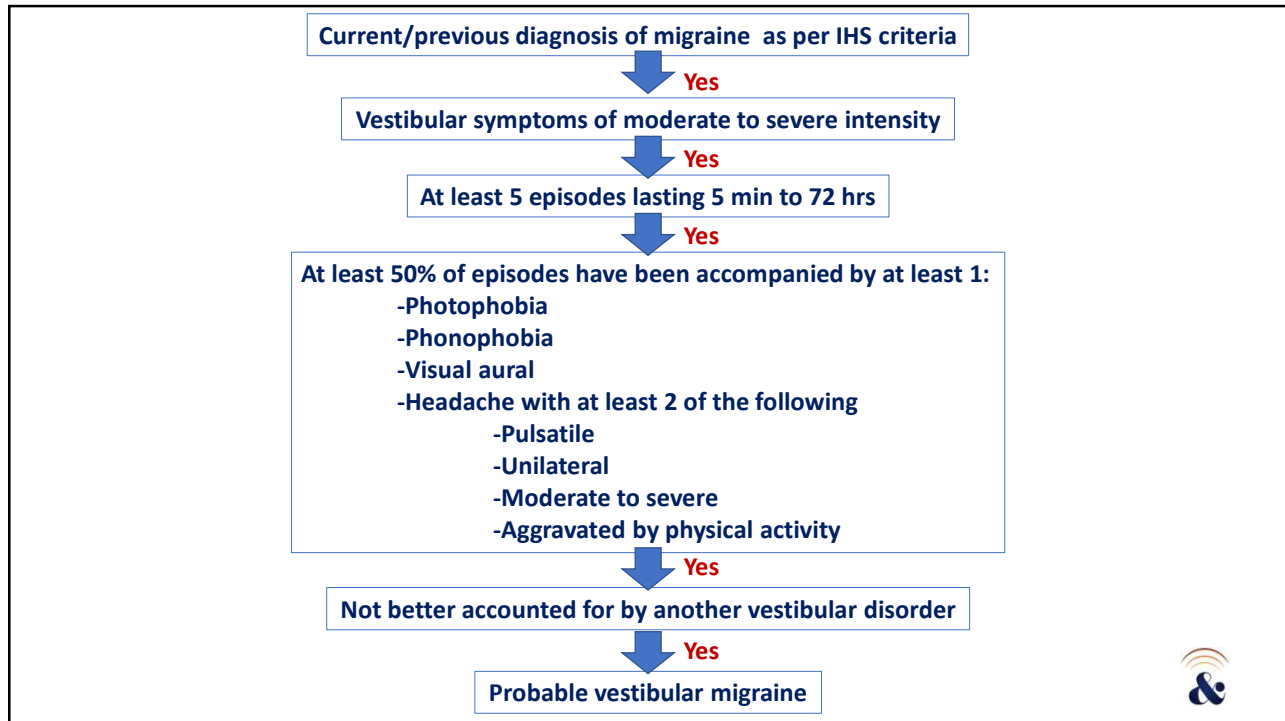
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Pearls- Physical Exam

- Between attacks and no peripheral involvement = unremarkable
- During attack
 - Peripheral-type nystagmus
 - Horizontal
 - Direction fixed
 - Visually suppressed
 - Dynamically enhanced
 - Central-type nystagmus
 - Horizontal or rotary
 - Direction changing
 - Not visually suppressed
 - Not enhanced dynamically
 - Migrainous Positional Vertigo (MPV)



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Questions???

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