Vestibular Migraine Diagnosis and Treatment Strategies
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Case Study- History
36 yo WF with unsteadiness and occasional vertigo lasting seconds to days
Motion sensitive since childhood
Severe throbbing headaches with photophobia, nausea and vomiting starting in late teenage years
Photophobia with dizziness

Case Study- Exam
Normal neuro-otologic examination
Normal posture
Normal gait

Case Study- Lab Tests
Normal audiogram
Normal VOG
Prolonged vertigo and nausea following caloric stimulation

Case Study- Key Points
History suspicious for vestibular migraine (VM)
Normal exam consistent with VM
Strong reaction or sensation of vertigo with caloric stimulation consistent with VM
Therapy included modification of environmental triggers, adequate sleep, diet modification and supplementation, prophylactic medication

Epidemiology
Lifetime Prevalence of migraine:
- 5.7-20% of males
- 17.6-29% of females
Among migraine patients:
27-33% report episodic vertigo
28-72% report non-specific dizziness
VM approximately 1% of general population (5-10 times MD)

Common Migraine-IHS Criteria
Headache lasting 4 to 72 hours
Unilateral, pulsating, severe, aggravated by activity
Nausea and/or vomiting
Photophobia and phonophobia
At least 5 attacks

Classic Migraine with Aura- IHS Criteria
Three of the following four aura characteristics:
- Reversible aura symptoms
- Symptom onset over four minutes
- Symptom duration less than 60 minutes
- Headaches follows in less than 60 minutes
At least two attacks

Vestibular migraine: Diagnostic criteria
Consensus document of the Barany Society and the International Headache Society


Vestibular Migraine
IHS diagnosis in the appendix
Replaces what we previously referred to as
Migraine associated vertigo/dizziness (MAV/MAD)
Migraine related vestibulopathy
Migrainous vertigo

ICHĐ- 3 beta
Vestibular migraine

A. At least 5 episodes with vestibular symptoms of moderate or severe intensity, lasting 5 min to 72 hours
B. Current or previous history of migraine with or without aura according to the International Classification of Headache Disorders (ICHD)
C. One or more migraine features with at least 50% of the vestibular episodes:
   – headache with at least two of the following characteristics: one sided location, pulsating quality, moderate or severe pain intensity, aggravation by routine physical activity
   – photophobia and phonophobia,
   – visual aura
D. Not better accounted for by another vestibular or ICHD diagnosis

Probable vestibular migraine

A. At least 5 episodes with vestibular symptoms of moderate or severe intensity, lasting 5 min to 72 hours
B. Only one of the criteria B and C for vestibular migraine is fulfilled (migraine history or migraine features during the episode)
C. Not better accounted for by another vestibular or ICHD diagnosis

Pathophysiology of Vestibular Migraine

• Extracellular transmitter release and spreading cortical depression (posterior insula, anterior insula, orbitofrontal cortex, posterior and anterior cingulate gyri)
• Exogenous and endogenous activation of the trigeminovascular system of the peripheral and central vestibular pathways
• Neurotransmitter release and peripheral and central neuronal stimulation
• Ca.2,1 channelopathy and calcitonin gene-related peptide (CGRP) release

Migraine-associated Dizziness: Patient Characteristics and Management Options
Reploeg MD, Goebel JA
81 patients with vertigo and IHS migraine criteria
Retrospective evaluation of symptoms and laboratory findings
Response to diet, medication or both

Study Patients
Patients: 81 with f/u > 4 weeks
- Mean 54.5 wks; range 4 – 456 wks

Hx, PE, and Dx exclusively by senior author
Diagnostic testing to r/o related diagnoses

Baseline Characteristics
Mean age 36.6 years
Age range 8 - 71 years
Female 75%
Male 25%
Common migraine 60%
Classic migraine 30%
Vertigo w/o headache 10%

Vestibular Symptoms
Vertigo
Imbalance
Motion intolerance-eyes, head or body
Lightheadedness
Problems focusing
Nausea
Symptoms may occur with migraine or in the absence of migraine
Other Symptoms
Aural fullness 10%
Hearing changes 6%
Visual Blurring 6%
Bilateral tinnitus 5%
Unilateral tinnitus 4%
Bilateral ear pain 2%
Unilateral ear pain 2%
Diplopia 1%
Hemianesthesia 1%

Clinical features of definite vestibular migraine in 33 patients
Clinical Features %
Vestibular symptoms (a)
Rotational vertigo 70
Other illusory self- or object motion 18
Positional vertigo 42
Head motion intolerance (b) 48

Duration of vestibular symptoms
Seconds to 5 minutes 18
5 to 60 minutes 33
1 hour to 1 day 21
>1 day 2

Migrainous symptoms during vertigo
Migrainous headache 94
Always 47
Sometimes 48
No headache 6
Photophobia 70
Phonophobia 64
Visual or other auras 36

(a) Several patients had more than one type of vestibular symptoms.
(b) None of the patients had only head motion intolerance.

Survey of Vestibular Migraine
30-50% of migraineurs c/o lightheadedness, imbalance or vertigo symptoms associated with their migraines
87% of 208 pts with BRV met ICHD-II criteria for migraine
   62% migraine with aura
   38% migraine without aura
In patients with migraine, age of onset of migraine headache preceded onset of vertigo by 14 years and aura preceded vertigo by 8 years

*Cha YH et al Cephalalgia 2009; 29*

Triggers for VM and Migraine Cephalgia
Barometric pressure weather changes
Hormonal fluctuations
Sleep variation
Stressors
Anxiety/Depression

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<tr>
<th>Diagnostic Tests</th>
<th>Abnormal %</th>
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<tr>
<td>ENG</td>
<td>21%</td>
<td>(37)</td>
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<tr>
<td>Audiometry</td>
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<td>(53)</td>
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<td>Head MRI</td>
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<td>(24)</td>
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<tr>
<td>ABR</td>
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<td>(7)</td>
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<tr>
<td>CDP</td>
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<td>(5)</td>
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<td>ECoG</td>
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<td>Rotary Chair</td>
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*Reploeg MD, Goebel JA*  

Vestibular Tests In Vestibular Migraine
Video oculography-20 pts with acute VM
   70% with pathological nystagmus during acute VM
   6 had spontaneous nystagmus
   5 had isolated positional nystagmus
   3 had spont and positional nystagmus

*Brevern M. Brain 2005*
Abnormal Motion Percept in VM
Perception dependent on central interactions between semicircular canal cues and otolith cues
3 paradigms used to stimulate the canals and otoliths independently and together in 24 subjects
Large reduction in perceptual motion thresholds in VM patients vs NL and migraineur subjects when tilted at mid frequency (0.1 hz) not high frequency (1.0 hz) and only with stim together of the canals and otoliths

Lewis R. et. al. Laryngoscope 2011

Oh No- Help Me!!
http://www.onlinepharmaciescanada.com
http://www.blogiseverything.com

Therapeutic Options for Vestibular Migraines
Vast majority of data is from case reports and retrospective analyses from headache guidelines for migraine with and without aura
Large retrospective studies of 100 or fewer patients compare vestibular migraine patients with or without prophylactic migraine therapy.
Patients on prophylactic treatment had a reduction in frequency, intensity and duration of vertiginous symptoms
No definitive data regarding triptan abortive therapy

Proposed Mechanisms for Migraine Prophylaxis
Currently, the major prophylactic medications for migraine work via one of the following mechanisms:
5-HT2 antagonism - Methysergide
Regulation of voltage-gated ion channels - Calcium channel blockers
Modulation of central neurotransmitters - Beta blockers, tricyclic antidepressants
Enhancing gamma-aminobutyric acid-ergic (GABAergic) inhibition - Valproic acid, gabapentin
Prevention of acetylcholine from presynaptic membrane – Botulinum toxin
Calcitonin gene-related peptide (CGRP) inhibitors – Erenumab, fremanezumab, galcanezumab

Supplements
Alteration of neuronal oxidative metabolism by riboflavin 200 mg BID
Reduction of neuronal hyperexcitability by magnesium replacement 200 mg BID

Dietary Changes
Food triggers
Sugar content
Timing of meals
Magnesium 200 mg BID
B-2 supplementation 200 mg BID
Butterbur root 10 mg QD

Food Triggers for VM and Migraines
Foods containing MSG
Artificial sweeteners
Nitrites
Nuts
Aged cheeses
ETOH
Excessive caffeine
Skipping meals

Diet for the migraine patient
Avoid
Ripened Cheeses (Cheddar, Emmentaler, Gruyere, Stilton, Brie, and Camembert) Cheeses that are permitted: (American, Cottage, Cream and Velveeta)
Licorice
Herring
Chocolate
Vinegar (except white vinegar)
Anything fermented, pickled or marinated
Sour cream, yogurt
Nuts, peanut butter, seeds (sunflower, sesame, pumpkin, etc.) Hot fresh breads raised coffeecakes and raised doughnuts.
(These are permitted, if they are allowed to cool. Toast is permitted)
Pods of broad beans (lima, navy, pinto, garbanzo and pea pods)
Any foods containing large amounts of monosodium glutamate (Chinese foods)
Onions
Canned figs
Citrus foods (no more than one serving per day: one orange, one grapefruit, one glass of orange juice)
Bananas (no more than one-half banana per day) Raisins
Papayas
Pizza
Excessive tea, coffee and cola beverages (no more than 2 cups total per day) Avocado
Fermented sausage (processed meats such as bologna, salami, pepperoni, summer sausage, hot dogs and ham)
Chicken livers
Avoid all alcoholic beverages, if possible. If you drink, no more than two normal size drinks.

Suggested drinks:
Haute Sauterne
Riesling Seagram’s VO Cutty Sark Vodka

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Lifestyle Changes
Regular sleep
Stress management
Exercise
BCP use
Treatment Trials in Vestibular Migraine

Vestibular migraine prophylaxis recommendations parallel migraine cephalgia

Two small randomized controlled treatment trials of triptans (Zolmitriptan and Rizatriptan) for vestibular migraine with methodological flaws are of limited utility

Multiple retrospective trials using prophylactic therapy for vestibular migraine

One randomized clinical trial (RCT) for VM prophylaxis

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Stepwise Treatment of MAD (VM)

Step 1: Institute a migraine diet
Step 2: Tricyclic antidepressant (nortriptyline)
  - Dose titration 10 – 50mg
Step 3: Beta-blockers (atenolol)
  - Dose titration 12.5 – 50mg
Step 4: Neurologic consultation/other medical regimens


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Response to Therapy Definitions

Resolution = No further episodes of dizziness
Well Controlled = Greater than 75% reduction in frequency of symptoms
Poor Control = Less than 75% reduction in frequency of symptoms
Worse = Unchanged or worse symptoms


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Response to Therapy

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<th>Treatment</th>
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<th>%W</th>
<th>%P</th>
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<td>Diet + TCA</td>
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<tr>
<td>Diet + other</td>
<td>37</td>
<td>16</td>
<td>41</td>
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Response to Therapy
Overall, 72% of patients experienced resolution of >75% reduction in Sx
In all except 4 patients, the headache and dizziness responded in kind to therapy
Only 5% no change in Sx after therapy
Only 4% and 5% not tolerate TCA and beta-blocker, respectively


Prophylactic Medications in Retrospective Analysis or Open Label Trials
Propranolol 40-160 mg, Metoprolol 100-200 mg
Venlafaxine 37.5-150 mg
Amitriptyline 10-100 mg
Nortriptyline 25-100 mg
Verapamil 120-240 mg SR
Topiramate 50-150 mg
Lamotrigine 75-100 mg
Flunarizine 5-10 mg
Valproic acid 600 mg

Beta Blockers- On Label
Propranolol LA 160-240 mg qD
Atenolol 25-50 qHS
Watch for low BP, bradycardia, low energy, depression

Venlafaxine versus Propranolol
52 patients with IHS criteria for VM
Prospective randomized trial to venlafaxine (150 mg max) versus propranolol (160 mg max)
Primary outcome measures-Dizziness Handicap Inventory (DHI) and Vertigo Severity Score (VSS)
Secondary outcome measures- Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI) scales
Both drugs significantly reduced DHI and VSS
Venlafaxine superior to propranolol for improvement in BAI and BDI
Nortriptyline- Off Label
25-100 mg qHS in graduated dose
May vary with menstrual cycle
Monitor for BP, palpitations
Dry mouth
Weight gain
Pregnancy

Verapamil- Off Label
120-240 mg sustained release qD
Monitor for low BP, orthostasis
Adjust other BP meds

Topiramate-On Label
50 mg BID in graduated dose up to 200 mg/day
Side effects include paresthesias (7%), nausea (4%), fatigue (4%), inattention (3%), insomnia (3%), anorexia (2%), and dizziness (2%)
Weight loss dose dependent

Other Medications
Acetazolamide (Diamox)
Gabapentin (Neurontin)
Steroids
Valproic acid (Depakote)
CGRP Antagonists
Three monoclonal antibodies that bind to the CGRP receptor were approved in the United States in 2018 (ie, erenumab, fremanezumab, galcanezumab).
The first CGRP inhibitor approved by the FDA for migraine prophylaxis was erenumab (Aimovig) in May 2018.
Two additional CGRP inhibitors, fremanezumab (Ajovy) and galcanezumab (Emgality), were approved in September 2018.

New Thoughts to Consider
Vestibular migraine versus Meniere’s disease?
Vestibular migraine and Meniere’s disease?
Vestibular migraine and Persistent Postural Perceptual Dizziness (PPPD)?

Conclusions
Treatment for vestibular migraine is a stepwise approach including diet/supplementation, lifestyle changes, prophylactic medications and physical activity/therapy

These are some of the most grateful patients you will ever treat

Suggested Reading
Ombergen AV, Rompaey VV, Heyning PV, Wuyts F. Vestibular Migraine in an Otolaryngology Clinic: Prevalence, Associated Symptoms, and
Prophylactic Medication Effectiveness. Otol Neurotol 36 (2014); 133-138.

THANK YOU!