

Migraine Associated Vertigo (Vestibular Migraine)

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Case (patient DA)

- 43 y.o. F, episodes of dizziness for 5 years
- Attacks begin with headache, nausea, dizziness, and severe ear pain.
- About 3/month, lasting 2-3 days.
- Severe motion intolerance

Case Study (patient DA)

- Tinnitus in both ears
- Denies hearing loss
- Physical exam normal
- Audiogram, 3 caloric tests, MRI of brain normal

MAV Migraine Associated Vertigo

Headaches are common

- 90% lifetime prevalence
- 25% annually report recurrent episodes of severe headache
- 3-4% daily or near-daily headache
- Medications are used by 9% of US adults each week to treat headaches



Northwestern University

Migraine

- Most common headache, about 10-14% of entire population (Stewart, 1992)
- 20-30% of women of childbearing age have migraine
- Most self diagnosed “sinus” headaches are migraines (Eross et al, 2007)

Eross, E. et al (2007). "The Sinus, Allergy and Migraine Study (SAMS)." *Headache* 47(2): 213-221.

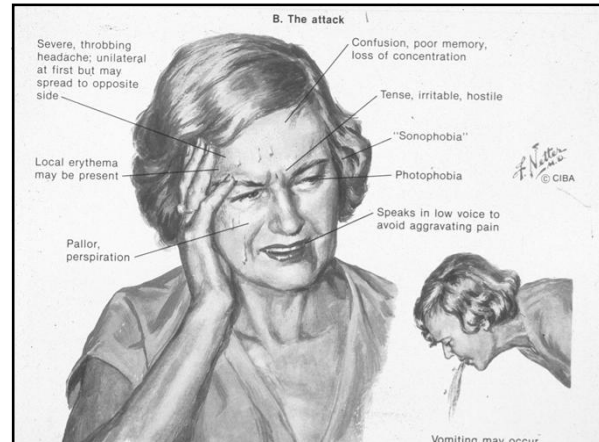
EPIDEMIOLOGY

Epidemiological Observations of Migraine Prevalence in Industrialized Countries³

Study (Authors)	Sample Source	Number of Respondents	Age of Respondents	Time period	Prevalence		
					% Males	% Females	% All
Breslau et al. USA	HMO	1,007	21-30	Lifetime	7	16	13
D'Alessandro et al. Italy	General Population	1,144	>7	Lifetime	3	13	13
				One year	9	18	16
Edmeads et al. Canada	General Population	2,737	>15	Lifetime	9	23	16
Henry et al. France	General Population	833	>15	Few years	6	18	12
Linek et al. USA	General Population	10,169	12-29	One-month	3	7	NR*
				One-year	6	20	13
Mendelberg et al. Switzerland	Results from screening scores	457	27-28	One-year	6	20	13
Rasmussen et al. Denmark	General Population	740	25-64	Lifetime	8	25	16
Stewart et al. USA	General Population	20,468	12-80	One-year	6	15	10
				One-year	6	18	NR*

*NR=not reported

References: 3. Rasmussen, B.K. et al.: Epidemiology of migraine, in *Towards Migraine 2000*, ed. Rose, F.C., Elsevier Science B.V., 1996, pp.1-11.



Migraine (IHS) criteria:

recurrent headaches separated by symptom-free intervals and accompanied by any three of the following:

- abdominal pain
- complete relief after sleep
- nausea or vomiting
- aura (visual, sensory, motor)
- hemicrania
- throbbing, pulsatile quality

Vestibular Migraine (Neuhauser) strict criteria:

- Migraine meeting IHS criteria (this is hard part)
- Episodic vestibular symptoms
- At least one of following during 2 attacks
 - Migraine headache
 - Photophobia
 - Phonophobia
 - Visual or other aura
- Exclusion of other causes

Neuhauser, H., M. Leopold, et al. (2001). "The interrelations of migraine, vertigo, and migrainous vertigo." *Neurology* 56(4):436-441.

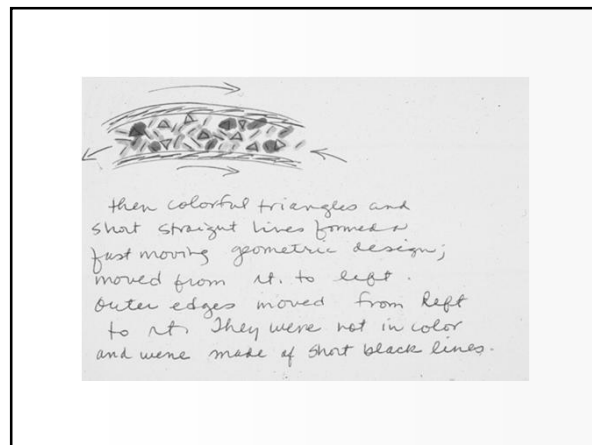
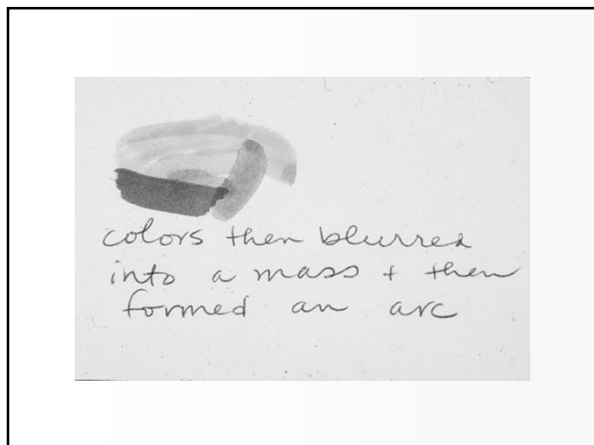
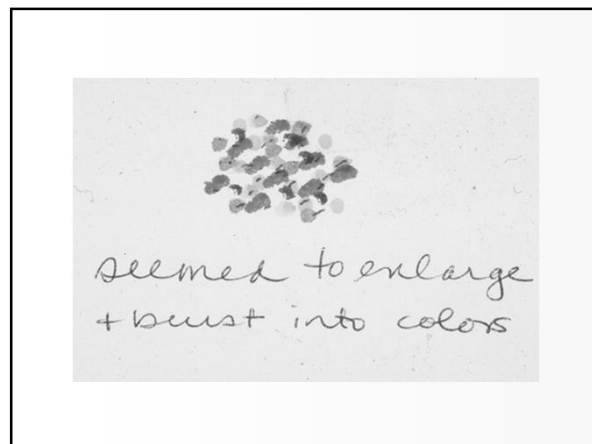
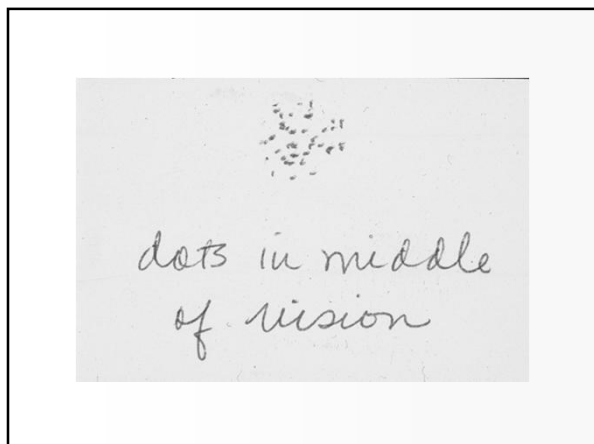
Our Take -

- IHS criteria for VM are too cumbersome – We prefer simpler criteria:
 - Headaches or sensory amplification (photo or phonophobia)
 - Dizziness
 - Exclusion of alternative causes

Chicago Dizziness and Hearing

Migraine Variants

- Common migraine (just headache – 90%)
- Classic migraine (with aura – 10%)



Migraine Art

Ina Rubloff (migraine patient of Dr. Hains)

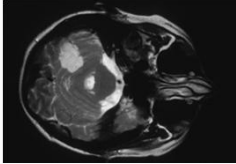
Migraine Variants

- Acephalgic migraine: Aura without headache (a tough call).
- Usual story is transformation of headache with aura into aura alone.
- About 1% of migraine population*

*Kayan/Hood, 1984; Selby/Lance, 1960
Kuritzky, et al, 1981

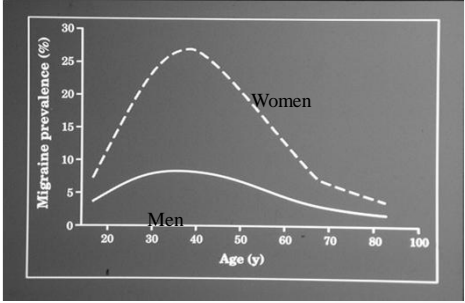
Migraine Variants

- **Complicated migraine** is accompanied by a neurological deficit.
 - About 1% of migraine patients
 - About 25% of patients with migraine have “small vessel disease” on MRI.
 - Prevention is important here



(Evans and Olesen, 2003; De Benedittis and Lorenzetti, 1995).

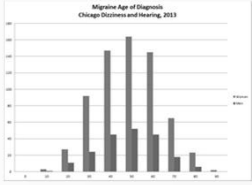
Prevalence of Migraine



(Stewart et al, 1994, did not align on menopause)

Second migraine peak at Menopause


- 57% of patients in a Menopause clinic, 29% of women during 3 months prior to visit.
- 44% “premenopausal” (Wang, 2003)
- Vestibular migraine patients age peaks around menopause.



MacGregor, E. A. (2009). "Migraine headache in perimenopausal and menopausal women." *Curr Pain Headache Rep* 13(5): 399-403.
 MacGregor, E. A. and D. Barnes (1999). "Migraine in a specialist menopause clinic." *Clinacteric* 2(3): 218-223.
 Wang, S. L. et al. (2003). "Migraine prevalence during menopausal transition." *Headache* 43(5): 470-478.

Migraine in Women

- 3:1 ratio of women:men.
- Peak age is 30-45.
- 10:1 increase in frequency of migraine around time of menses.
- Attributed to fluctuations in estrogen level. Can treat by eliminating fluctuations (BC pills – “seasonale”).
- 75% stop while pregnant
- Often flares for a few years near menopause



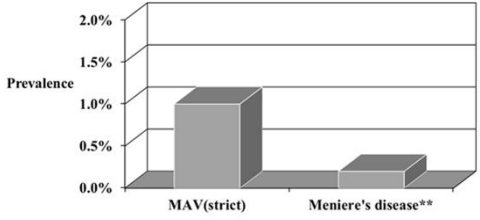
MacGregor, E. A. (2009). "Migraine headache in perimenopausal and menopausal women." *Curr Pain Headache Rep* 13(5): 399-403.

Migraine & Vertigo: Prevalence

- Migraine:
 - 10% of U.S. pop†
 - 20-30% of women childbearing age
- Vertigo: 35% of migraine population.*
- Migraine + vertigo (loose criteria):
 - ~ 3.5% of U.S. pop.
 - ~ 10% of women of childbearing age
- Strict criteria
 - 0.89% of German population (Neuhauser, 2006)

† Lipton and Stewart 1993; Stewart et al, 1994
 *Kayam/Hood, 1984; Selby/Lance, 1960; Kuritzky, et al, 1981
 Neuhauser, H. K., A. Radtke, et al. (2006). "Migrainous vertigo: prevalence and impact on quality of life." *Neurology* 67(6): 1028-1033.

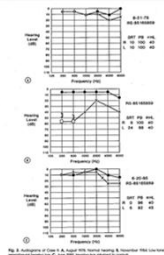
There is more migrainous vertigo than there is Meniere’s disease !



Neuhauser, H. K., A. Radtke, et al. (2006). **Waserman et al., 1984 (2/1000 prevalence of Menieres)

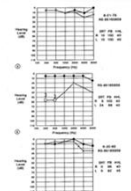
Hearing in MAV can look like Menieres

- Fluctuating low-tone SN hearing loss is common
- Both ears can fluctuate together
- 50% of Menieres have migraine too.



Harker, L. A. and C. Rassekh (1988). "Migraine equivalent as a cause of episodic vertigo." *Laryngoscope* 98(2): 160-164.
Radtke, A., T. Lempert, et al. (2002). "Migraine and Meniere's disease: is there a link?" *Neurology* 59(11): 1700-1704.

Dr. Hain's opinion is that migraine prophylaxis generally should be used prior to any invasive treatment for Meniere's



Exception: Migraine does NOT cause drop attacks.



Timing of headaches and dizziness in Vestibular Migraine


Headache (HA) and dizziness don't have to occur at same time in MAV.

- Cutrer/Baloh (1992)
 - 5% (5/91): vertigo time-locked to HA
 - 25%: vertigo always independent of HA
- Johnson (1998): 91% (81/89) vertigo independent of HA

Cutrer, F. M. and R. W. Baloh (1992). "Migraine-associated dizziness." *Headache* 32(6): 300-304.
Johnson, G. D. (1998). "Medical management of migraine-related dizziness and vertigo." *Laryngoscope* 108(1 Pt 2): 1-28.

Even intermittent headache is not necessary to diagnose migraine

Migraine without headache



- Acephalgic migraine: Aura without headache, or sensory exaggerations alone.
- Usual story is transformation of headache with aura into aura alone.
- About 1% of migraine population*

*Kayan/Hood, 1984; Selby/Lance, 1960, Kuritzky, et al, 1981

VM symptoms may last for days (or even months)

- Cutrer and Baloh, 1992 : Bimodal distribution
- 31% min-2 hrs
- 49% longer than 24 hours
- Chronic migraine – about 0.2%.

Cutrer, F. M. and R. W. Baloh (1992). "Migraine-associated dizziness." *Headache* 32(6): 300-304.

Migraine is often accompanied by strong motion sensitivity

10% normals have "motion sensitivity"

Percent of migraine patients with motion sickness		
Group	Authors	
49%	Children	Bille (1962)
45%	Children (60)	Barabas et al (1983)
50.7%	Unselected	Kayan and Hood (1984)

Migraines are "hard-wired"

- Sensitive brains, with thicker sensory cortex (Aurora, 2007)
- Structural changes in brain (Palm-Meinders, 2012)
- Strong genetic association (about 50%)

Aurora, S. K. and F. Wilkinson (2007). "The brain is hyperexcitable in migraine." *Cephalalgia* 27(12): 1442-1453.

Palm-Meinders, L. H., et al. (2012). "Structural brain changes in migraine." *Jama* 308(18): 1889-1897.

Montagna, P. (2008). "Migraine: a genetic disease?" *Neuro Sci* 29 Suppl 1: S47-51.

Diagnosis of MAV is Based on Clinical judgment – Committee diagnosis

- Headaches and dizziness
- Lack of alternative explanation (normal otological exam, neurological exam, CT)
- High index of suspicion in women of childbearing age. Perimenstrual pattern.
- Family history in 50%
- Response to prophylactic medication or a triptan

Genetics – is migraine one disorder ?

- Ducros, A. (2013). "[Genetics of migraine]." *Rev Neurol (Paris)* 169(5): 360-371.
- Since 2010, three large genome-wide association studies (GWAS) have identified six genetic variants associated with migraine. *Each variant has only a modest contribution to the overall genetic risk of migraine, suggesting a marked genetic heterogeneity.*

Chicago Dizziness and Hearing

Differential Diagnosis

- Independent headache/dizziness
 - HA responds to treatment, dizziness persists – might have BPPV...
- Structural lesion (very rare)
 - No response to treatment
- Sleep apnea (AM headache)
- Psychogenic headache and dizziness
- Anti-phospholipid antibody syndrome
 - Refractory headaches
 - May need anticoagulation because of stroke risk

I usually treat first – but if severe headaches do not respond ...

- MRI or CT scan of brain/sinuses, possibly neck also. Makes most sense for non-triptan responders.
- Sed-Rate (for temporal arteritis)
- Sleep study (especially for AM headaches)

Migraine Treatments

- Life style change (diet, sleep, BC pills)
- Analgesics and antiemetics
- Abortive agents (triptan family)
- Prophylactic agents
- Alternative agents (e.g. Butterbur, magnesium supplements)
- Last resorts (MAO inhibitors)

Most useful non-drug treatments

- Migraine diet (these patients LOVE diets)
- Magnesium supplements (500 mg/day)
- Withdraw birth control pills if possible
- Regular sleep patterns
- Withdraw vasodilators if possible (e.g. nitrates, some calcium channel blockers)

Dietary Factors in Migraine

- Monosodium glutamate (MSG)
- Cheese, especially blue cheese
- Alcohol (red wine)
- Chocolate (even dark)
- Caffeine



Analgesics and anti-emetics

- Acetaminophen, ASA
- NSAIDS
- Metoclopramide (Reglan)
- Phenergan



Prophylaxis is most important

- Unpredictable vertigo spells may be dangerous
- Migraineous vertigo rarely responds to vestibular suppressant medications
- Migraine rarely responds to physical therapy.



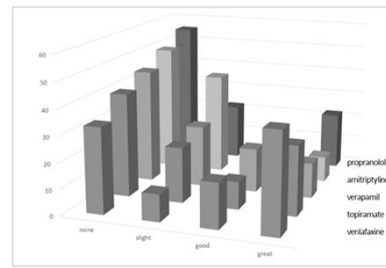
Prophylaxis of Migraine - 2015

80% of those who get headache relief also get vertigo relief
(Bikhazi et al, 1997)

- Antidepressants
- Anticonvulsants
- L-channel Calcium channel blockers
- Beta blockers
- Botox

Bikhazi, P, C. Jackson, et al. (1997). "Efficacy of antimigrainous therapy in the treatment of migraine-associated dizziness." *Am J Otol* 18(3): 350-4.

Effectiveness of Treatments in Headache with Dizziness

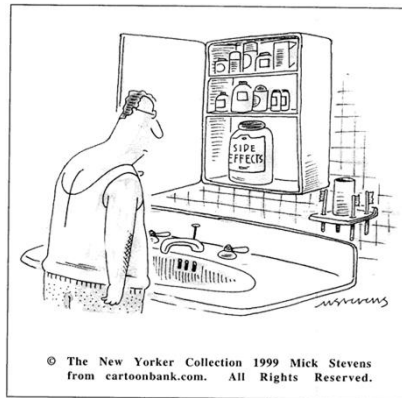


Unpublished Data, Chicago Dizziness and Hearing

Pregnancy Categories

(Almost all are Pregnancy C or D)

- A: Proven safe
- B. Probably safe
- C. Use caution
- D. Dangerous
- X. Don't use



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Venlafaxine (Effexor XL)

- Very effective – 50 to 80% (Bulut, 2004)
- Start with 37.5 XL, 1/3 capsule. Increase to full 37.5, 1/3 more every week
- Side effects are minor:
 - A little activation – like a cup of coffee
 - Minor sexual side effects
 - No effect on weight
 - Pregnancy category C
- Warn patient about “cold turkey” for larger doses



Bulut, S., et al. (2004). "Venlafaxine versus amitriptyline in the prophylactic treatment of migraine: randomized, double-blind, crossover study." *Clin. Neuro. Neurosurg.* 107(1): 44-48.

Tricyclic antidepressants

75% effective

- Very cheap and very effective
- Amitriptyline, Nortriptyline
- Side effects are **major**:
 - Fatigue, weight gain, hair loss
 - Antihistamine AND anticholinergic (vest. Suppressant)
 - Not a good drug for older people
 - Pregnancy category D
- Start with 10 mg, increase weekly to 25-50




SSRI antidepressants ?? effective ??

- Fluoxetine, Celexa, Paroxetine
- SSRI's don't work for migraine associated vertigo but can certainly use for depression. Some SSRI's cause tinnitus. All SSRI's cause nausea, at least on startup.

L-channel Calcium Channel Blockers

- Verapamil 120-240 SR.
- 1 mg/pound initial dose
- Takes 2 weeks to work
- No sedation – great drug for this reason
- Hypotension rarely a problem
- Constipation main side effect – increase dose if not constipated after 2 weeks.
- Cheap (\$19/month). Pregnancy category C, interacts with statins (prolongs tc)




Solomon, G. D., et al. (1983). "Verapamil prophylaxis of migraine. A double-blind, placebo-controlled study." *Jama* **250**(18): 2501-2502.

Other calcium channel blockers

- flunarizine (Sibelium) 5-10 mg.
- Not FDA approved, but VERY well studied -- 532 papers in Pubmed.
- Has a 30 day half-life and also common side effects (dopamine blocker, weight gain, cardiac).
- Most other calcium channel blockers just don't work or make headache worse due to vasodilation.

Beta Blockers

- Any beta blocker works – so pick an inexpensive one in a good pregnancy category. \$20/month
- Propranolol 60 LA (category C)
- Metoprolol 50 XL (category C)
- Bisoprolol (Bystolic) Low side effect
- Side effects
 - Fatigue, Slow pulse, Hypotension, sexual
- 1 month to work



Silberstein, S. D., et al. (2012). "Evidence-based guideline update: Pharmacologic treatment for episodic migraine prevention in adults." *78*(17): 1337-1345.

Anticonvulsants (Don't affect BP, cognitive issues)

- Gabapentin (Neurontin) – category C
- Sodium Valproate (Depakote) – category D
- Topiramate (Topamax) – category D
 - 10% cleft palate
 - “dopamax” – can't talk or think
- Levetiracetam (Keppra)
- Lamictal

Silberstein, S. D., et al. (2012). "Evidence-based guideline update: Pharmacologic treatment for episodic migraine prevention in adults." *78*(17): 1337-1345.

Gabapentin (Neurontin)

- Dose: 100 tid to 800 tid
- Extremely safe
- Not very effective – adjunctive agent
- Also suppresses vertigo and nystagmus
- Also useful for pain in general (arthritis)
- Pregnancy category C

Silberstein, S. D., et al. (2012). "Evidence-based guideline update: Pharmacologic treatment for episodic migraine prevention in adults." *78*(17): 1337-1345.

Anticonvulsants: Topiramate (Topamax)

- Dose: 25 mg to 150 mg, Start with 25, increase weekly
- 50% response
- Associated with weight loss !
- Moderate doses – speech disturbance
- Tingling in hands and feet too
- Pregnancy category D

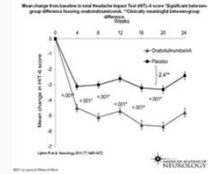


Silberstein, S. D., et al. (2012). "Evidence-based guideline update: Pharmacologic treatment for episodic migraine prevention in adults." *Neurology* 78(17): 1337-1345.

Botox for Migraine

“you mean my insurance will pay for this ?”

- Strong evidence for a small effect in many (roughly 10%). Large ‘n’.
- Trials funded by Botox manufacturer, Allergan
- Difficult to understand how paralyzing scalp works.
- Very expensive ! About \$1000 JUST drug



ACE inhibitors not effective for migraine

- Lisinopril (29-34% response)
- Candesartan (32-48% response)

Tronvik E, et al. *Prophylactic treatment of migraine with an angiotensin II receptor blocker. A randomized controlled trial.* *JAMA* January 1, 2003;289:65-9

Shrader et al, *Prophylactic treatment of migraine ... 2001 (BMJ)*

Abortive medications

- Triptans (sumatriptan, etc.).
- Useful for diagnosis
- Some are expensive
 - Generic – sumatriptan
 - Powerful – Relpax/Maxalt
 - Long acting – frovatriptan (36 hour)



Alternative Medications

- Magnesium 500 mg/day (two “cal-mag”)
- Petadolex 50 mg TID – author has had no good responders to this.

Holland, S., S. D. Silberstein, et al. (2012). "Evidence-based guideline update: NSAIDs and other complementary treatments for episodic migraine prevention in adults: Report of the Quality Standards Subcommittee of the American Academy of Neurology and the American Headache Society." *Neurology* 78(17): 1346-1353.

Medications of last resort

- MAO inhibitors (e.g. tranylcypromamine – Parnate; phenelzine -- Nardil)
- Narcotics

These medications have substantial potential for toxicity and are generally administered by headache neurologists or pain clinics.

Returning to our case

- Patient tried verapamil for 1 month. No response.
- Patient then tried on propranolol 60 LA. Headaches and dizziness greatly reduced.
- Plan was to continue on propranolol, with attempts to D/C every 2 years till post menopause.

Summary

- Migraine associated vertigo is very common
- Diagnosis is via clinical judgment, combined with judicious tests to exclude dangerous alternatives.
- Drug treatment is generally very successful but may require several months of trial/error

More reading

- Silberstein, S. D., S. Holland, et al. (2012). "Evidence-based guideline update: Pharmacologic treatment for episodic migraine prevention in adults: Report of the Quality Standards Subcommittee of the American Academy of Neurology and the American Headache Society." *Neurology* **78**(17): 1337-1345.
- Obermann, M. and M. Strupp (2014). "Current treatment options in vestibular migraine." *Front Neurol* **5**: 257.