

Sorting out neurologic and
vestibular concerns: medications,
labs and imaging studies

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I have no declarations
(Alas.....)

Objectives

- . Differentiate between vertigo and dizziness.
- . Discuss the different causes of the vertigo and dizziness in patients.
- . Discuss the different medications, labs and imaging studies available for diagnosing vertigo and dizziness.

- 30% of people > 65 experience dizziness in some form
- up to 50% of people > 85
- subjective - depends on self reporting
- caused by a wide range of conditions, both benign and serious



The components of balance

- Proprioception
 - Vision
 - Vestibular



Accurate diagnosis of dizziness or unsteadiness in the elderly is often made more difficult because of multiple comorbidities.

Demographics

- Race
 - no preference
- Sex
 - variable
- Age
 - CNS causes of vertigo typically affect older population groups because of the associated risk factors
 - Younger population groups, think MS or migraine
 - Older adults, think cerebellar tumors (bimodal). CPA tumors typically affect people in the fifth to eighth decades of life.

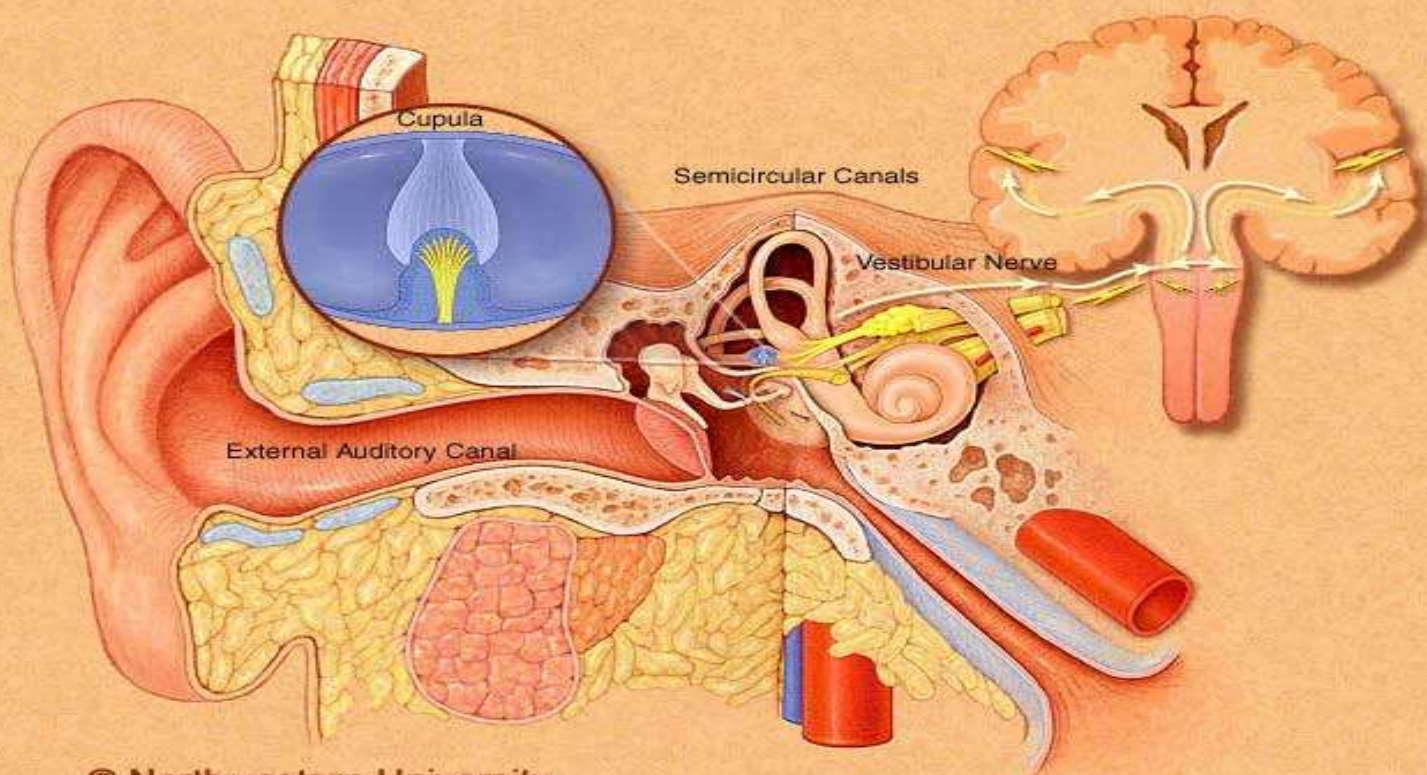
Dizziness in the elderly

- . 69% pre-syncope
- . 44% have more than 1 subtype
 - . 57% cardiovascular disease
 - . 14% peripheral vestibular disease
 - . 10% psychiatric illness
 - . 23% adverse drug effect

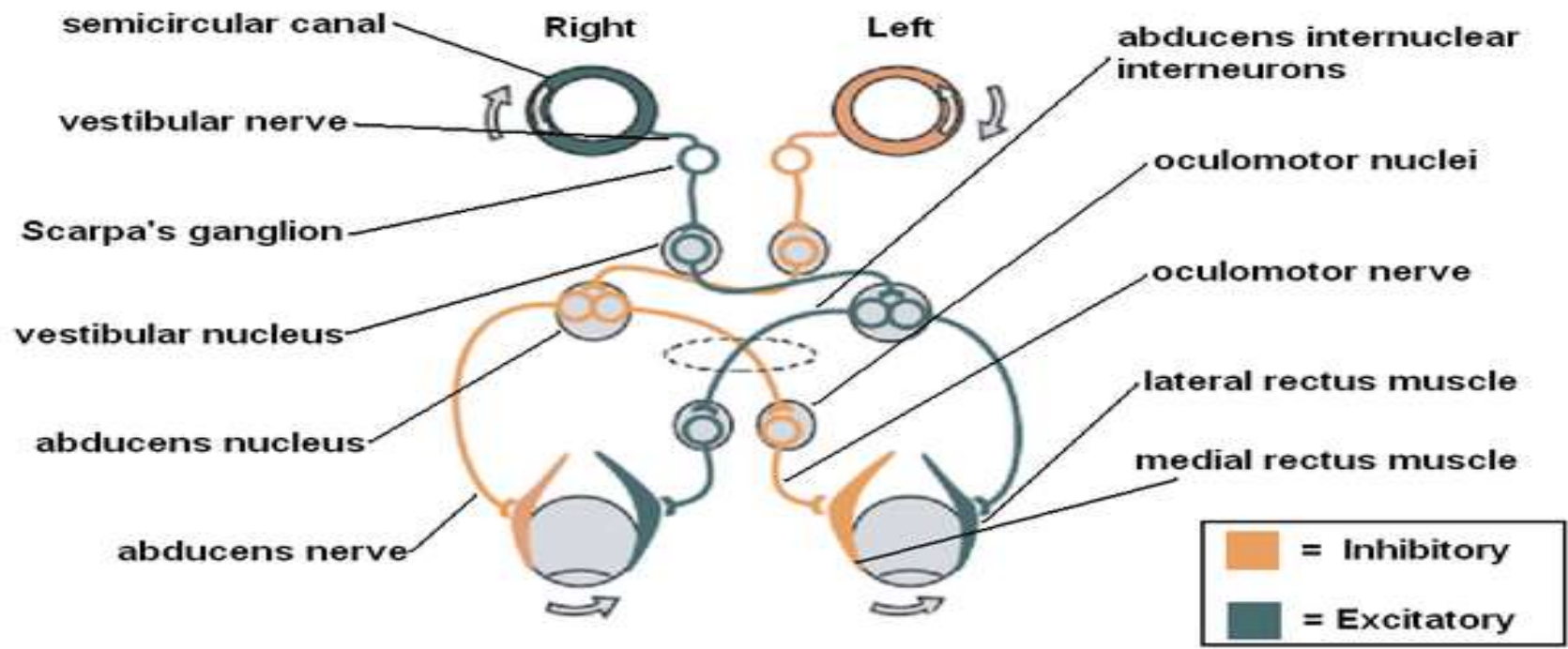
- cardiovascular disease is the most common major cause of dizziness in elderly patients in primary care
- adverse drug effect is a contributory cause of dizziness in 25% of patients

Medications: We worry about the medications they're on being the source of the problem.



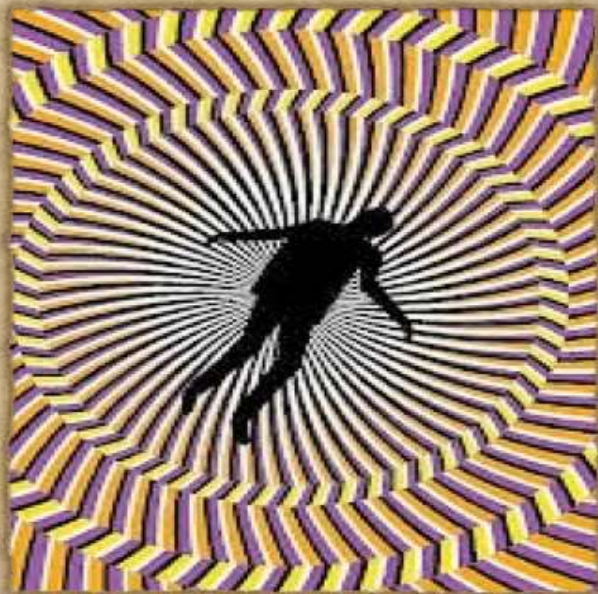


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Peripheral vs. Central

- What do we think in neurology clinic when someone presents with dizziness?
- In the over-65 crowd - cardio, cardio, cardio, cardio, vestibular, cardio, neuro.
- What are we afraid of missing?
 - Posterior stroke syndrome, tumor, NPH.



1. How can we promptly and dependably differentiate peripheral from central causes of vertigo?
2. How do we identify posterior circulation ischemia?

Dizziness and Vertigo

- Dizziness is vague and nonspecific
- Abnormal sensation in relation to space and position
- Vertigo is a specific type of dizziness, characterized by a sense of movement - this can refer to self or to the environment

Central causes of vertigo

- vertebrobasilar insufficiency
- acoustic neuroma
- multiple sclerosis
- infection
- intoxication

- Peripheral vertigo
 - sudden onset
 - paroxysmal
 - associated hearing loss or tinnitus
 - nystagmus suppressed with visual fixation
 - they fear falling (and often do!) but are not ataxic or uncoordinated

- Central vertigo
 - gradual onset
 - constant
 - no associated hearing loss/tinnitus
 - nystagmus not suppressed with fixation
 - postural instability - frequent falls while walking
 - clumsy

Place emphasis on the patient's age and
vascular risk factors:

diabetes

prior strokes

cardiac disease

hypertension



- Get a good history
Ask patient to describe symptoms without
using the word, “dizzy.”
Anxiety?

1. Symptoms that last only seconds are likely peripheral.
2. Recurrent symptoms lasting more than seconds is suggestive of ischemic disease.
3. Vertical or multidirectional nystagmus should increase suspicion of a central cause of vertigo.

The time course of vertigo is important.

- Vestibular neuritis - episodic vertigo lasting days, with nausea and no other ear or CNS symptoms.
- BPPV - episodic; associated with head or body position changes.
- Meniere's - lasts for hours; associated with hearing loss and/or tinnitus.
- Sudden onset - differential includes complex migraine, brain or vascular disease (consider risk factors).

Central Lesion with
Direction-Changing
Nystagmus

Labs - low yield in diagnosis

- CBC
- CMP
- Vit B12, folate
- TSH
- ESR
- CRP

Physical Exam Pearls

- vestibulospinal reflex
 - Romberg
 - tandem gait
 - dysdiadokinesis testing
 - FTN, HTS, FNF
 - orthostatic BP
 - Fukuda stepping
 - Dix-Hallpike



There is currently no validated clinical decision rule for imaging patients with suspected central vertigo.

CT to rule out hemorrhage and edema

MRI brain

MRI may reveal other causes such as MS or space occupying lesion
MRA brain to rule out vascular etiology

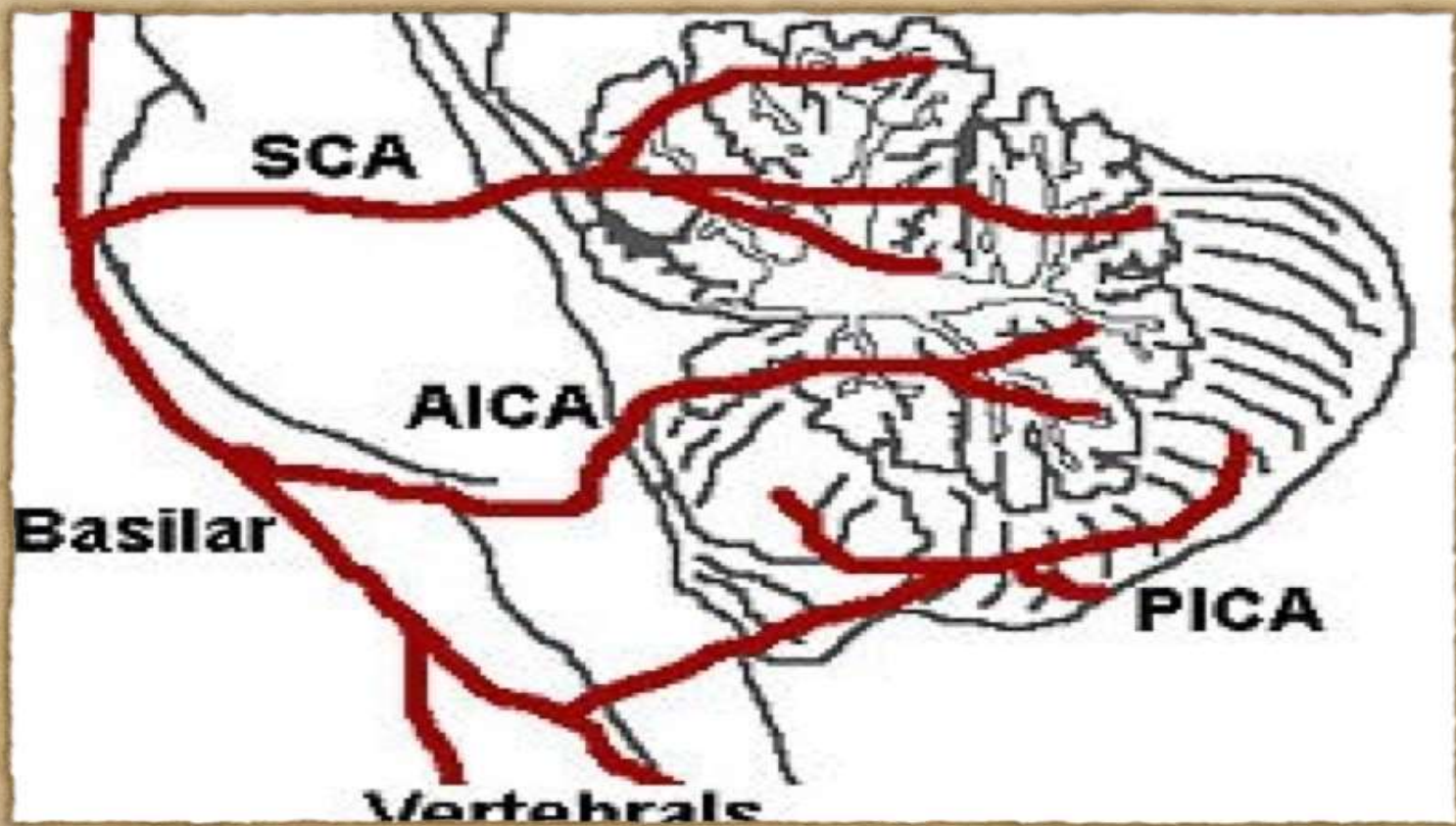
neurologic consultation

neurologic consultation



posterior circulation stroke
syndromes
7-20% mortality
permanent debilitating deficits





Central vertigo secondary to brain stem or cerebellar ischemia

- usually lasts 20 minutes to 24 hours
- diplopia (bulbar muscle weakness)
- nausea
- dysarthria
- dysphagia
- focal weakness
- unable to ambulate (gait ataxia)
- changes in temperature or sensation



Common causes of posterior circulation large artery ischemia

- . atherosclerosis
- . embolism
- . dissection

~ 1/3 posterior circulation strokes are caused by occlusive disease of the ECVA, ICVA, basilar and PCA arteries

Posterior stroke syndromes

- . lateral medullary syndrome (Wallenberg)
- . medial medullary syndrome
- . hemimedullary syndrome
- . cerebellar infarct
- . pseudotumor cerebellar infarct
- . dolichoectasia - dilated, tortuous, stretched blood vessels
- . basilar artery ischemia
- . rostral brainstem ischemia (affects alertness, behavior, memory)

Also consider

- . autoimmune (Cogan syndrome)
- . Chiari malformation, hydrocephalus
- . MS, Parkinson's
- . Vitamin deficiency, especially B12
- . CNS or posterior neoplasms
- . migraines

Posterior stroke symptoms

- 47% dizziness
- 41% unilateral limb weakness
- 31% dysarthria
- 28% headaches
- 27% nausea and/or vomiting

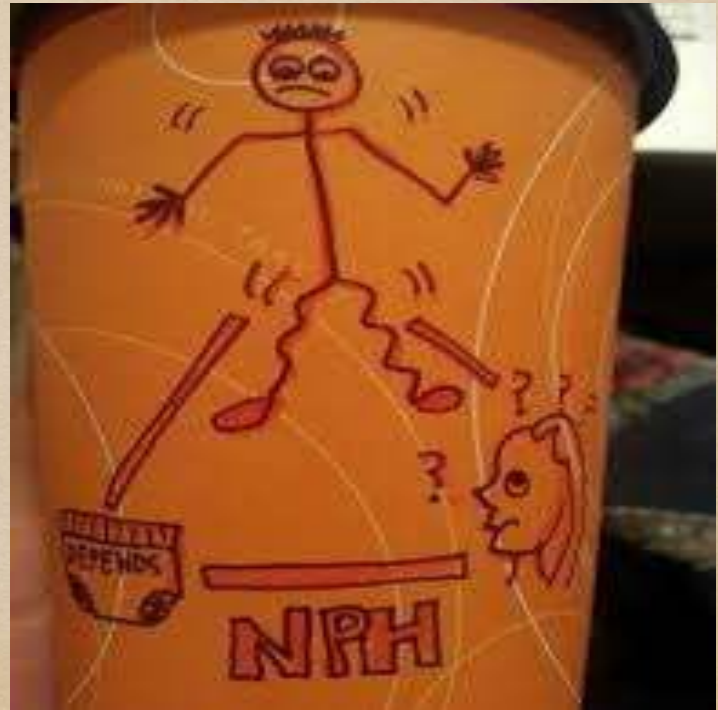
Posterior stroke signs

- 38% unilateral limb weakness
- 31% gait ataxia
- 30% unilateral limb ataxia
- 28% dysarthria
- 24% nystagmus

- Dysphagia, nausea or vomiting, dizziness and Horner syndrome correlate with the proximal vascular territory
- Unilateral limb weakness, CN V11 deficits correlate with the middle territory
- Limb sensory deficit and visual field loss correlate with the distal territory

Normal Pressure Hydrocephalus

- progressive gait difficulty
- memory loss
- urinary incontinence



Medial medullary syndrome

- contralateral hemiparesis - flaccid at onset
- later, spasticity and increased tone
- sensory symptoms - commonly in the contralateral trunk and LE - less often in arm and hand
 - paresthesias
 - dysesthesias
- often no objective signs of sensory loss in any modality but may have proprioceptive dysfunction in contralateral foot

Hemimedullary syndrome

- . both medial and lateral symptoms
- . same as Wallenberg with contralateral hemiparesis (may concurrent or later)

Cerebellar infarct

- . PICA - edema, mass effect
- . severe vertigo, prominent nystagmus
- . ipsilateral gait ataxia; veers to side of lesion
- . may see ataxia without vertigo or dysarthria
- . vomiting
- . truncal lateropulsion
- . after 1st 24 hours, often develop h/a, vomiting, decreased LOC, progress from drowsiness to stupor
- . bilateral + Babinski is an early sign

Basilar infarct

- short course, important territory
- transient or persistent weakness
- lateralized motor weakness
- almost always abnormal findings on the contralateral side
- ataxia/incoordination almost always worse in LEs
- fasciculations, twitching, tremors, jerking, shuddering in contralateral side may be mistaken for seizures
- bulbar symptoms: facial weakness, dysphonia, dysphagia, dysarthria, decreased jaw movements (aspiration risk)

Posterior cerebral artery ischemia (embolic - heart, aorta, ECVA)

- visual loss - hemianopia, quadrantanopia; may have macular sparing
- somatosensory symptoms - paresthesias, numbness of face, limbs, trunk - sensation reduced touch, pinprick, position
- rarely hemiplegic or hemiparetic
- left vs right symptoms

Vertebral artery dissection

- physical trauma - blunt injury (MVC), aggressive cervical manipulation, rotational sports
- 1-4% spontaneous dissections have connective tissue disease
- less common than carotid artery dissection
 - < 2% die
 - 10-25% hemorrhagic strokes in young and middle aged adults
- symptoms usually vestibulocerebellar, head and neck pain
- ASA, heparin, warfarin

Migraine associated vertigo

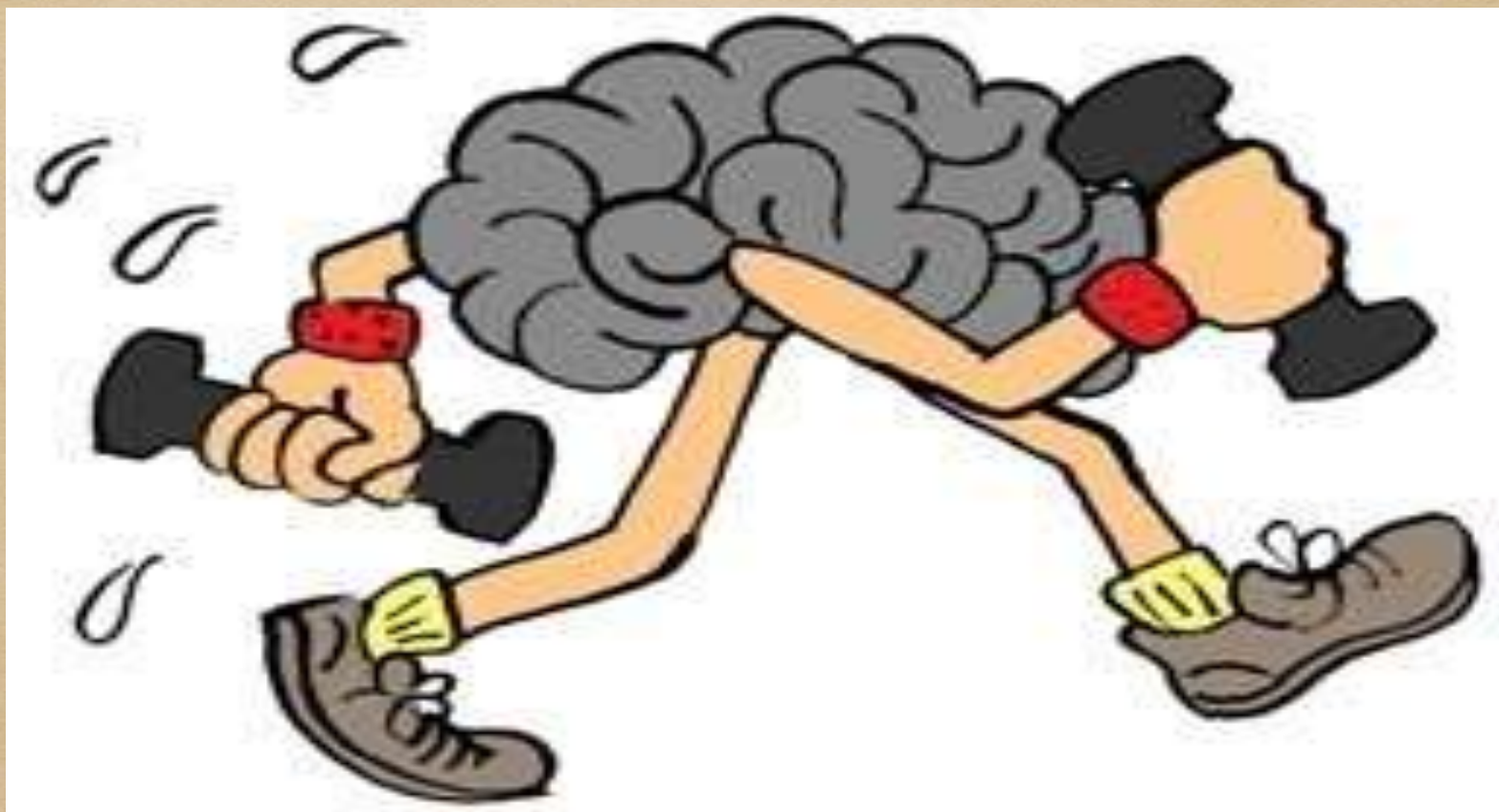
- difficult diagnosis - multidisciplinary - diagnosis of exclusion
- ~ 35% of migraine patients have some sort of vestibular syndrome at some time or another
- may occur prior to, during, after or independent of headache
- may also have independent BPPV
- dizziness, motion intolerance, spontaneous vertigo with n/v, photophobia, phonophobia, decreased eye focus, tinnitus, ataxia, cervicalgia, muscle spasm, confusion, AMS, anxiety/panic

Migraine associated vertigo should be treated according to IHS guidelines



Medical management

- secondary stroke prevention
 - BP control
 - statin
 - glucose control
 - antiplatelet
 - exercise



Antiplatelet

- ASA for primary stroke prevention
- ASA + clopidogrel for recurrent stroke
 - dipyridamole, ticlopidine
- If cardiogenic or concomitant/subsequent a fib, more choices
 - warfarin
 - dabigatran
 - rivaroxaban

When is it OK to stop antiplatelet?

- generally, not necessary for routine procedures
- emergently, can give FFP, Vit K for warfarin - new agents can be reversed with PCC (prothrombin complex concentrate - \$\$\$)
- 1/2 life of fX inhibitors is relatively short
- 1/2 life of dabigatran is longer, but still averages 14-17 hrs (28 hrs in severe renal disease)

Management of symptoms

- Antihistamines

- meclizine dimenhydrinate

- Anticholinergics

- scopolamine

- Benzodiazepines

- diazepam

- Phenothiazines

- promethazine,
prochlorperazine

- Monoaminergics

- ephedrine

None of these are particularly desirable in the elderly

Answer

- Cerebellar stroke. If not caught early and treated can lead to herniation and death.

Knowledge Assessment

- . 1. Adverse drug effect is a contributory cause of dizziness in what percentage of patients?
 - . a. 10%
 - . b. 25%
 - . c. 50%

- . 2. Migraine associated with vertigo should be treated according to International Headache Society guidelines.
 - . a. True
 - . b. False

- . 3. The largest demographic factor associated with vertigo is
 - . a. Race
 - . b. Sex
 - . c. Age