VESTIBULAR ISSUES IN THE ELDERLY

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A Practical Guide to Dizziness and Disequilibrium
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DIZZINESS IN THE ELDERLY

• 30% over 65 with dizziness
• 50% over 85 with dizziness
• 9% of all persons over 65 visit PCP for dizziness at least once per year
• PCPs unable to identify cause in 40-80%
• PCPs identify untreatable causes of dizziness (e.g., polyneuropathy)
• Inappropriate use of anti-vertiginous drugs in 10% of patients
  - (10% were given AVDs; not that 90% had appropriate use)
Maarsingh et al., British Journal of General Practice, 2012

PREDICTORS OF CHRONIC DIZZINESS

• Dizziness starting greater than 6-months ago
• Dizziness provoked by standing still
• Trouble walking
• Polypharmacy
• Absence of diabetes mellitus
• Presence of anxiety and/or depression
• Impaired functional mobility
Maarsingh et al., Frontiers in Medicine, 1:50, 2014. PMID 25593923

“...a simultaneous diagnosis and prognosis-oriented approach for older dizzy patients.”
ISSUES IN THE ELDERLY ASSOCIATED WITH DIZZINESS

- CNS changes
- Normal pressure hydrocephalus (NPH)
- Pharmacokinetics / Polypharmacy
- Sarcopenia
- Peripheral vestibular disorders
- Non-peripheral vestibular conditions

CENTRAL NERVOUS SYSTEM CHANGES

- Atrophy
- Small vessel disease

BRAIN ATROPHY

- About 5% reduction in volume per year after 40 years old
- Neuronal death
- Reduction in neuronal size
  - Dendritic retraction and shrinkage
- GCA Scale from 0-3 (none to severe)
- Common but not “normal” with age
BRAIN ATROPHY

- Associated with changes in function
  - Dementia, cognitive decline, dizziness and imbalance
- Common but not “normal”

SMALL VESSEL DISEASE

- Fazekas Scale
  - 0: none or few non-specific foci of punctate signal abnormality
  - 1: scattered foci of signal abnormality
  - 2: scattered and partially confluent areas of signal abnormality
  - 3: large confluent areas of signal abnormality

- White matter hyperintensities
  - Cognitive decline
  - Dizziness and imbalance
  - Hearing loss

Not “normal” for age

- White matter lesions and vascular vertigo: clinical correlation and findings on axial magnetic resonance imaging

Cognitive Impact of Cerebral Small Vessel Disease Changes in Patients with Hyperinsulinism

White Matter Lesions and Vascular Vertigo: Clinical Correlation and Findings on Axial Magnetic Resonance Imaging

Mild White Matter Hyperintensities and Low Frequency Hearing Loss in Older Adults
SMALL VESSEL DISEASE

- Associated with memory loss and several forms of dementia
- Associated with geriatric syndromes (Saji et al., 2015. PMID:26671153)
- F3 significantly more common in those with unexplained dizziness

NORMAL PRESSURE HYDROCEPHALUS

- Mild cognitive impairment
  - Memory loss, forgetfulness, decreased attention
  - May resemble early stage dementias
- Urinary symptoms
  - Incontinence; frequency or urgency
- Abnormal gait / imbalance
  - Ataxic, shuffling, feet stuck to floor

NORMAL PRESSURE HYDROCEPHALUS

- Ataxic gait
  - Wide-based
  - Penguin-like
  - Foot-catch
- Memory loss
- Urinary incontinence

Signs and Symptoms

- Ataxic gait
  - Wide-based
  - Penguin-like
  - Foot-catch
- Memory loss
- Urinary incontinence
NORMAL PRESSURE HYDROCEPHALUS

Treatment
• Lumbar drain trial
• Leave in for several days
• Check gait and cognitive function
• Can convert to a shunt

PHARMACOKINETICS

• Changes in pharmacokinetics with age
• Increased bioavailability and plasma concentration
  - Even if on a medication for years
• Interaction among increasing number of medications
• Increasingly influenced by other factors
  - Alcohol, frailty

HEPATIC METABOLISM

• Reduction in liver mass
• Reduction in hepatic blood flow
• Decreased first pass metabolism in numerous pathways
  - Hydroxylation, dealkylation, sulfide oxidation, hydrolysis, nitro-reduction
• Exacerbated by additional factors affecting hepatic function
  - Alcohol, polypharmacy (overlapping pathways), frailty
PHARMACOKINETICS: YOUNG VS OLD

<table>
<thead>
<tr>
<th>Medication</th>
<th>Young</th>
<th>Old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fentanyl</td>
<td>250 min</td>
<td>925 min</td>
</tr>
<tr>
<td>Diazepam</td>
<td>24 hrs</td>
<td>72 hrs</td>
</tr>
<tr>
<td>Midazolam</td>
<td>2.8 hrs</td>
<td>4.3 hrs</td>
</tr>
</tbody>
</table>

Propranolol: 10mg dose in elderly is equivalent to a 40mg dose in a young adult.


BEER’S CLASSIFICATION

- 2015 American Geriatrics Society (AGS) Beers Criteria for Potentially Inappropriate Medication Use in Older Adults


BEER’S CLASSIFICATION AND DIZZINESS

- Antihistamines
- Antiparkinsonian
- Antispasmodics
- Antithrombotics
- Cardiovascular
- Antidepressants
- Antipsychotics
- Benzodiazepines
- Endocrine
- Gastrointestinal
- Pain medications
- Genitourinary
BEER’S CLASSIFICATION

- Syncope/Orthostasis
  - AChEIs
  - Alpha-1 blockers
  - Tertiary TCAs
  - Chlorpromazine
  - Thioridazine
  - Olanzapine

- Falls
  - Anticonvulsants
  - Antipsychotics
  - Benzodiazepines
  - TCAs
  - SSRIs
  - Opiods
  - Hypnotics

POLYPHARMACY

- 21% increase risk of falls in those taking >5 medications
- 30% of patients >60 taking 5 or more medications

SARCOPENIA

- Loss of muscle mass (sarcopenia)
  - 1.2% per year after age 50
  - 40% over 80 are sarcopenic
- Risk Factors
  - Age
  - Sedentary lifestyle
  - Lack of exercise
- Some causality between mass and strength (e.g., dynapenia)
  - Strength also has a component of impaired neural activation of muscle
SARCOPENIA: SARC-F SCREENING TOOL

<table>
<thead>
<tr>
<th>Component</th>
<th>Question</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength</td>
<td>How much difficulty do you have in lifting and carrying 10 pounds?</td>
<td>Score</td>
</tr>
<tr>
<td>Ambulation</td>
<td>How much difficulty do you have walking across a room?</td>
<td>Score</td>
</tr>
<tr>
<td>Rise from a chair</td>
<td>How much difficulty do you have transferring from a chair to bed?</td>
<td>Score</td>
</tr>
<tr>
<td>Climb stairs</td>
<td>How much difficulty do you have climbing a flight of ten stairs?</td>
<td>Score</td>
</tr>
<tr>
<td>Falls</td>
<td>How many times have you fallen in the last year?</td>
<td>Score</td>
</tr>
</tbody>
</table>

Score: 0-2 Normal, 3-4 Pre-sarcopenia, 5-9 Sarcopenia, 10-16 Severe sarcopenia

> 4 is increased risk.

SARCOPENIA

- Fall Incidence
  - Pre-sarcopenia: 15.4%
  - Sarcopenia: 40.7%
  - Severe sarcopenia: 72%


GAIT SPEED AND MORTALITY

PERIPHERAL VESTIBULAR DISORDERS

- BPPV
  - Very common in the elderly
  - There may be limitations in performing the Epley or Dix Hallpike maneuver
- Meniere’s Disease
  - Reactivation of prior disease
  - Decline in overall vestibular function

NON-PERIPHERAL VESTIBULAR DISORDERS

- Anxiety and depression
  - Common in the elderly
  - Complicated by medication side-effects
- Migraine
  - 21% prevalence over 60 years
  - 12% prevalence over 70 years

SUMMARY

- Senescence is a normal process with pathological consequences
- Some causes of geriatric dizziness are preventable
  - Diet, exercise, lifestyle
- Some causes of geriatric dizziness are addressable
  - Physiotherapy, medication review
- Some causes of geriatric dizziness are identifiable
  - Polyneuropathy, vascular disease