Balance Disorders and Aging

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About the Authors
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The trend in demographics that
should lead to an overall concern for
the health care systems of North America
is the tremendous growth in the
population of people over the age of 65
years. Konrad et al. reported that there
would be almost 40 million adults over
the age of 65 by 2010 in the United
States alone.1 Balance disorders and
disorders that lead to instability become
more prevalent with age.2,3 The three
sensory modalities responsible for
normal balance and steadiness: vision,
vestibular, and proprioception, canecome compromised as a result of
normal age related changes as well as
age-related disease or pathology leading
to increased risk of falls and fall related
injury.1,2,4,5

The elderly fall more often and with
greater consequence as a result of balance
and instability issues, leading to huge
personal costs as well as sky-rocketing
health care costs.4 Over the age of 65, 1
in every 3 adults will suffer from a fall.6

and given the explosion in the number
people living today over 65 years of age,
falls are a major healthcare crisis.1 The US
National Institutes of Health (Senior
Health),7 reported 1.6 million emergency
room visits as a result of falls. The elderly
are less likely to fully recover from a fall,
and falls have been linked to increase the
risk of death especially for individuals
over 85.5,7

Authors have cautioned clinicians that
gait and balance concerns should not be
considered just a normal part of aging, as
a large proportion of balance complaints
occur in conjunction with some known
disease process or a composition of
different pathologies.2,4 However,
symmetric vestibular sensory hair cell
loss, declining visual acuity, and declining
muscular strength and mobility are some
examples of known age-related changes
to a human’s balance system.4 These
normal age-related declines in function
may cause worsening stability and
sensory integration during locomotion.3,6

Many musculoskeletal, cardiovascular,
and neurologic disorders are associated
with advancing age while also having
detrimental effects on gait and balance.2,6
Some common age related pathologies
that affect balance, postural stability and
gait include: arthritis, orthostatic
hypotension, vitamin B-12 deficiency,
diabetes mellitus, vestibular disorders
such as benign paroxysmal positional
vertigo (BPPV) and vertebrabasilar
insufficiency.1 Cardiovascular disease
such as atherosclerosis which is highly
associated with increased age has a
degenerative effect on vision structures,
inner ear structures, and the peripheral
musculature and nerve tissues which
encompass the balance system, and can
lead to hemorrhaging and stroke in the
brain.1 Orthostatic hypotension has been
cited as a major cause of falls in the
elderly.1,5 The patient typically reports
severe lightheadedness and presyncope
upon rising from lying or sitting down.8
Causes of hypotension include cardiovascular disease, poly-pharmacy,
and dose related issues for medications to control hypertension.  

Arthritis, vitamin B-12 deficiency, and diabetes mellitus can lead to poor peripheral sensory control of limbs leading to poor gait and postural instability. For arthritis, pain and inflammation of joints make quick movements needed to brace for falls more difficult and overall physical activity becomes difficult leading to physical muscular and skeletal attrition.

Joint pain has been cited as the most likely contributor to poor gait. vitamin B-12 deficiency is a syndrome that forms as a result of a lack of essential vitamin B12 absorption. The deficiency of vitamin B-12 can cause significant degeneration of the peripheral and spinal nerves, causing poor postural stability and worsening gait because of poor tactile and proprioceptive sensitivity in the joints and extremities.

Diabetes mellitus leads to sensory neuropathy for vision and peripheral sensory function in the extremities, leading to an increased risk for tripping over objects and loss of balance on moving, vibrating, or slippery surfaces.

Benign paroxysmal positional vertigo (BPPV) is a vestibular impairment that is common as people age, and has been identified as another major cause of falls in the elderly. The average age of onset for BPPV is between 51 and 57 years of age. BPPV is caused physiologically by misplaced otocochia in the semicircular canal (SCC), (commonly the posterior SCC) as a result of simple age related changes to the SCC, or head trauma. The symptoms are usually precipitated by a change in head movement, so often people who have not been treated avoid that head movement or only sleep on a certain side in bed. The misplaced otocochia cause stimulation of the sensory structure of the SCC causing transient vertigo when the patient looks up, bends over, or turns in bed. This momentary vertigo can cause the patient to lose stability and fall. The dizziness/vertigo from this usually only lasts 30 seconds to a minute.

Vision is an essential sensory modality for balance as this sense allows a person to avoid obstacles and properly move around in space. Physiologic deterioration to the eye and eye musculature, as well as vision disorders such as macular degeneration, cataracts, and glaucoma become more common with age, leading to poorer mobility, and identification of objects that could cause falls. Sturniak et al., recommends the correction of visual deficits as part of falls prevention for the elderly.

According to the American Academy of Audiology, an audiologist should be able to properly identify, assess, diagnose, manage, and help in the prevention of balance disorders for all patients. No other group will need these services more than those over 65 years. The steps needed to prepare for this increased demand for balance services by the over 65 population include: improved diagnostic skills training, better inter-professional collaboration, proper and timely referral, improved falls prevention, and evidence based treatment strategies. To increase proficiency in balance disorder and falls prevention diagnostics, university audiology programs will need to expand and improve balance disorders coursework and practicums to help future audiologists diagnose patients with balance complaints. As diagnostic protocols are developed for falls prevention clinics, audiologists will need to become active leaders in forming clinical test batteries. The next step is for Audiologists to become part of a team approach in diagnosing and treating balance disorders. Inter-professional communication and referral will need to be set-up between audiologists, ENT doctors, physiotherapists, neurologists, internal medicine physicians, and occupational therapists to provide the highest level of patient care in the falls clinic setting.

Proper referral to other professionals will only be possible if audiologists become cognizant of the multitude of pathologies that may be associated with balance and dizziness symptoms which lead to falls, as well as normal age related changes to vision, muscular strength and mobility, and vestibular function. An audiologist’s caseload, even in a private practice hearing aid clinic, includes people predominantly over 65 years of age. As such, private practice “hearing focused” audiologists should have some idea of when a diagnostic balance assessment is necessary, and when there is a risk of falling present, so proper referral to a falls clinic can be made. Prevention of future falls as a result of balance disorders should be a high priority to all audiologists. This means that any patient at risk for a fall based on balance disorder complaints, or patients who have reported a fall in the past should be referred to a falls prevention program and have a home safety assessment.

In some circumstances, audiologists may also be needed to conduct vestibular rehabilitation therapies (VRT) or be able to recommend exercises to do at home. Audiologists can be involved in coordinating home-based VRT, group VRT, and simple exercise programs which have been shown to be effective for the elderly. Canalith repositioning maneuvers are also within the scope of practice for audiologists for patients with BPPV.
CASE STUDY BILATERAL WEAKNESS

- 81-year-old female (A.D.).
- Referred by the Cochlear Implant (CI) Team as part of the assessment for CI.
- History of vertigo in the past where episodes would last from minutes to hours.
- Two years prior to assessment the patient had sudden episode of vertigo and a force which was “trying to get her down” which lasted for about one minute.
- She also experienced fleeting episodes where she felt like she was “moving inside her head,” even when stationary.
- Following this she had poor balance and would have to hold on to something when walking; was unable to walk in a straight line.
- This resolved after a few months and she was able to walk without holding on to things.
- Reports oscillopsia when trying to read a sign while walking or driving.
- Visual motion around her is bothersome and makes her feel off balance.
- She has difficulty walking in the dark in poor lighting.
- She was investigated for stroke which was negative.
- Severe flat sensorineural loss in the right ear and severe to profound loss in the left ear

CALORIC RESULTS

- No nystagmus response was noted for either cool or warm water irrigation.
- Results suggest bilateral peripheral disorder.

RECOMMENDATIONS

- Referral to falls prevention program.
- Vestibular rehabilitation therapy.

REFERENCES


Editor’s note: For those who are interested in becoming involved in a new CAA interest group on vestibular issues, please contact either Maxine Armstrong (Maxine.Armstrong@uhn.ca) or Janine Verge (Janine.Verge@cdha.nshhealth.ca).