Hands-on Course 3

Bedside examination of the vestibular and ocular motor system - Level 2

How to take the patient history

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Vertigo and dizziness are not unique disease entities. The two terms cover a number of multisensory and sensorimotor syndromes of various aetiologies and pathogeneses. After headache, vertigo and dizziness are among the most frequent presenting symptoms, not only in neurology. The life-time prevalence of rotatory and postural vertigo is around 30% [7]; the annual incidence is about 11% for imbalance [3], which rises with increasing age [4]; patients with dizziness have a 1.7-fold higher mortality [3].

Whether caused by physiological irritation (spinning vertigo when riding on a merry-go-round, motion sickness, height intolerance) or a pathological lesion (e.g., acute unilateral peripheral vestibulopathy or vestibular nuclei lesions), the resulting vertigo syndrome characteristically exhibits similar signs and symptoms despite the different pathomechanism: dizziness/vertigo, nystagmus, a tendency to fall and nausea or vomiting. These disorders of perception (vertigo/dizziness), gaze stabilisation (nystagmus), postural control (postural imbalance, falling tendency) and the vegetative system (nausea/vomiting) are related to the main functions of the vestibular system, and can be associated with different sites in the brain [2].

Vertigo and dizziness - in the pathological sense - are considered either an unpleasant disturbance of spatial orientation or the illusory perception of a movement of the body (spinning and wobbling) and/or of the
surroundings. Care is necessary when taking the neurological, neuro-otological and neuro-ophthalmological history of the patient, especially because the patient’s complaint of being “dizzy” or having vertigo or suffering from imbalance of gait is ambiguous [2]. The important criteria for differentiating the various dizziness/vertigo syndromes, also the basis for clinical classification [1], are as follows:

Criteria of the patient history for differentiating the various vestibular syndromes

Duration of vertigo

In terms of the duration, patients can have (1) attacks or (2) an acute onset of longer-lasting symptoms or (3) persisting symptoms (> 3 months).

1. Attacks of vertigo: If a patient has attacks of vertigo, it is important to define the minimal and maximal duration of the attacks:
   - seconds to minutes, e.g., BBPV, vestibular paroxysmia, paroxysmal brainstem attacks
   - many minutes to hours, e.g., Menière’s disease, vestibular migraine, episodic ataxia type 2 or transient ischaemic attack of the brainstem

2. Acute onset of symptoms lasting for many days to a few weeks, e.g., acute unilateral peripheral vestibulopathy or brainstem/cerebellar stroke

3. Persisting symptoms (> 3 months), e.g., bilateral vestibulopathy, functional dizziness or due to neurodegenerative diseases affecting the cerebellum or the basal ganglia
Type of vertigo

To determine the type of vertigo/dizziness it is necessary to provide the patient with comparisons, e.g.,

- spinning vertigo as when riding a merry-go-round (e.g., BPPV or acute unilateral peripheral vestibulopathy)
- dizziness or postural imbalance, as during boat trips (e.g., bilateral vestibulopathy)
- light-headedness or fullness of the head (e.g., functional dizziness or drug intoxication)

Trigger/exacerbation/improvement of symptoms

The patient must be explicitly asked about these features of the disorder:

for example, vertigo or dizziness

- also at rest (e.g., acute unilateral peripheral vestibulopathy, downbeat nystagmus syndrome, attacks of vestibular migraine or Menière’s disease)
- while walking (e.g., bilateral vestibulopathy)
- while turning the head to the side (e.g., bilateral vestibulopathy, rotational vertebral artery occlusion syndrome)
- when changing head position relative to gravity (e.g., BPPV)
- when coughing, pressing, or at loud sounds of a certain frequency - as the Tullio phenomenon - (e.g., superior canal dehiscence syndrome (SCDS))
- context-dependent intensity (worsening in certain social or environmental situations with improvement during sport activities or after light alcoholic drinks, e.g., functional dizziness).
**Accompanying symptoms**

Any further questions should aim to identify possible accompanying symptoms. Here too it is necessary to investigate each possible symptom individually.

- Accompanying symptoms can originate, on the one hand, from the inner ear, for example, hearing loss, tinnitus or a feeling of pressure in one of the ears as in Menière's disease.

- On the other hand, they can originate from the brainstem or cerebellum, for example double vision, perioral paraesthesia, disorders of swallowing or speaking, impaired sensation of the arms or legs, or ataxia.

- Finally, migraine-typical symptoms, such as headache, light and noise sensitivity or ongoing or a history of migraine, can occur, which suggest vestibular migraine.

The **accompanying symptoms** can be grouped individually by their respective causes (in alphabetical order) as follows:

**A) Combination of vestibular and audiological symptoms**

- Cerebellopontine angle tumour
- Cholesteatoma
- Cogan’s syndrome or other autoimmune diseases
- Ear/head trauma (labyrinthine contusion)
- Inner ear malformation
- Labyrinthine infarct (anterior inferior cerebellar artery, labyrinthine artery)
- Menière’s disease
- Neurolabyrinthitis
- Otosclerosis
- Pontomedullary brainstem infarct
- Pontomedullary MS plaque
- SCDS
- Vestibular paroxysmia
- Zoster oticus
B) Illusionary movements of the surroundings (oscillopsia) with head stationary
- Acquired fixation/pendular nystagmus
- Congenital/infantile nystagmus (depending on direction of gaze)
- Convergence-retraction nystagmus
- Downbeat nystagmus
- Myokymia of the superior oblique muscle (monocular oscillopsia)
- Ocular flutter
- Opsoclonus
- Paroxysmal ocular tilt reaction
- Peripheral vestibular spontaneous nystagmus
- Periodic alternating nystagmus
- Spasmus nutans (children)
- Upbeat nystagmus
- Vestibular paroxysmia
- Voluntary nystagmus

C) Only during head movements
- Bilateral vestibulopathy
- BPPV
- Central positional/positioning nystagmus
- Intoxication (e.g., anticonvulsants, alcohol-induced positional nystagmus)
- SCDS
- Peripheral or central ocular motor disorders
- Post-traumatic otolith vertigo
- Rotational vertebral artery occlusion syndrome (during head rotation)
- Vestibular paroxysmia (only in some patients)
- Vestibulocerebellar ataxia

D) Vertigo with additional brainstem/cerebellar symptoms
- Brainstem encephalitis
- Cerebellitis
- Craniocervical malformations (e.g., Arnold-Chiari malformation)
- Episodic ataxia type 2
- Haemorrhages (e.g., cavernoma)
- Head trauma
- Inflammation (e.g., MS plaque)
- Intoxication
- Lacunar or territorial infarcts
- Tumours of the cerebellopontine angle, brainstem or cerebellum
- Vestibular migraine

E) Vertigo with headache
- Brainstem/cerebellar ischaemia
- Head trauma (especially transverse temporal bone fracture)
- Infratentorial haemorrhage
- Infratentorial tumour
- Inner/middle ear infections
- Vertebrobasilar dissection
- Vestibular migraine
- Zoster oticus
New diagnostic criteria for vestibular disorders

The International Classification Committee of Vestibular Disorders of the Bárány Society has elaborated diagnostic criteria since 2009. They can all be downloaded from the Journal of Vestibular Research as open access articles: http://www.jvr-web.org/ICVD.html. It is important to note that the information from the patient history is essential for most of these diseases, which highlights how important it is to take a careful and systematic patient history. Below the currently published criteria are summarized.

Diagnostic criteria for benign paroxysmal positional vertigo

Canalolithiasis of the posterior canal (pc-BPPV)
A. Recurrent attacks of positional vertigo or positional dizziness, provoked by lying down or turning over in the supine position.
B. Duration of attacks < 1 min.
C. Positional nystagmus elicited after a latency of one or few seconds by the Dix-Hallpike maneuver or side-lying maneuver (Sémont diagnostic maneuver). The nystagmus is a combination of torsional nystagmus with the upper pole of the eyes beating toward the lower ear combined with vertical nystagmus beating upward (toward the forehead) typically lasting < 1 minute.
D. Not attributable to another disorder.

von Brevern et al. JVR (2015) [9]

Menière’s disease

- two or more attacks of vertigo, each lasting 20 min to 12 h
- audiometrically documented hearing loss in at least one examination < 2000 Hz (≥ 30 dB) and related to the attacks
- fluctuating tinnitus or aural fullness in the affected ear
- not better accounted for by another vestibular diagnosis

Vestibular paroxysmia
A) At least ten attacks of spinning or non-spinning vertigo
B) Duration less than 1 minute
C) Spontaneous occurrence
D) Stereotyped phenomenology in a particular patient
E) Response to a treatment with carbamazepine/oxcarbazepine
F) Not better accounted for by another diagnosis

Probable vestibular paroxysmia
A) At least five attacks of spinning or non-spinning vertigo
B) Duration less than 5 minutes
C) Spontaneous occurrence
D) Stereotyped phenomenology in a particular patient
E) Not better accounted for by another diagnosis.

Bilateral vestibulopathy: proposed new diagnostic criteria
A. Chronic vestibular syndrome with at least three of the following symptoms
   1. Postural imbalance
   2. Unsteadiness of gait
   3. Movement-induced blurred vision or oscillopsia during walking or quick head/body movements
   4. Worsening of postural imbalance or unsteadiness of gait in darkness and/or on uneven ground
B. No symptoms while sitting or lying down under static conditions
C. Bilaterally reduced or absent angular VOR function documented by bilaterally pathological horizontal angular VOR gain < 0.6, measured by the video-HIT/scleral-coil technique and/or reduced caloric response (sum of bithermal max. peak SPV on each side < 6°/sec) and/or reduced horizontal angular VOR gain < 0.1 upon sinusoidal stimulation on a rotatory chair (0.1 Hz, Vmax = 50°/sec).
D. Not better accounted for by another diagnosis

Strupp et al. JVR (under revision)
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 > 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

Lempert et al. JVR (2012)[5]
Reference List


COI
M. Strupp is Joint Chief Editor of the Journal of Neurology, Editor in Chief of Frontiers of Neuro-otology and Section Editor of F1000. He has received speaker’s honoraria from Abbott, Actelion, Auris Medical, Biogen, Eisai, GSK, Henning Pharma, Interacoustics, MSD, Otometrics, Pierre-Fabre, TEVA, UCB. He acts as a consultant for Abbott, Actelion, Heel, IntraBio and Sensorion.