

## Assessment of Vertigo

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### Abstract

Vertigo is defined as a subjective sense of imbalance and includes unsteadiness as well as a sensation of rotation. Vertiginous symptoms may arise from defects in the labyrinth, the visual system, or the central nervous system, although in most patients presenting with balance problems, the lesion lies within the labyrinth or its central connections. The most important step in the diagnosis is an unhurried and detailed history, bearing in mind that many patients will have difficulty in describing their symptoms. A detailed neurological examination is usually unnecessary but one must examine the ears, cranial nerves, cerebellum, and balance function, and look for the presence of nystagmus. The common error of carrying out investigations in place of a detailed history is to be avoided. In many cases, investigations are not required at all, although it is the author's practice to do a routine pure tone audiogram with basic assessment of speech discrimination. There is no indication for routine caloric testing, imaging or blood analysis, each of which should be carried out only when there are specific indications. In the routine clinical care of patients, it is only in exceptional situations that specialised vestibular testing is required, although these are often necessary in research projects.

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### Introduction

Vertigo has been said to be the greatest "heartsink" symptom in medicine. That certainly is a possibility but every specialty has its similar conditions, and vertigo is no worse than low back ache or nocturnal cramps. However, the main reason for this problem is not the symptom but the doctor. It has been said that labyrinthine vertigo can change, in seconds, a healthy and active individual into a helpless invalid, and a rational physician into a babbling idiot.

There is no agreed definition of the term vertigo but the one preferred by the author is "a subjective sense of imbalance" and in general, this can be considered synonymous with dizziness. This is a comprehensive definition and does not exclude any lesion within the vestibular system, which comprises the peripheral labyrinths, the vestibular nerves and the vestibular nuclei.

It really is quite remarkable that so few humans feel imbalanced. We stand on 2 relatively small feet and have a very unstable centre of gravity about 3 feet above the

ground, certainly not the way one would design a robot. We manage to maintain our upright posture by the combination of 3 systems, visual, proprioceptive and labyrinthine, which are subconsciously coordinated by the central nervous system.

An upset to any one of these 3 systems, or to the coordinating central nervous system, can cause balance problems. However, in most cases of visual or proprioceptive impairment, e.g., cataracts or progressive arthritis, the patient is usually aware of the reason for any imbalance and rarely seeks medical help for that symptom. Hence in most patients presenting with a complaint of vertigo, the problem lies either in the vestibular system or the central connections, although one may have to exclude certain cardiovascular conditions.

There are, of course, quite a few general neurological conditions, such as parkinsonism, where imbalance can be an early feature and it is important to bear these in mind. However, it is only rarely that the initial diagnosis of these general illnesses is made at a vertigo clinic.

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## History

The most important diagnostic tool for vertigo is old-fashioned detailed clinical history. So far there are still no tests that render the history redundant.

Doctors like to emphasise the satisfaction from patient contact and that opportunity presents itself in patients with vertigo, but sadly, as a group, doctors seem reluctant to avail themselves of this opportunity. Most doctors tend to deny themselves, and more especially their patients, the satisfaction of a well-taken history! Those who run vertigo clinics in tertiary centres find that most patients seem pleasantly surprised when a detailed history is extracted from them. Too often, it is a new experience for them. The word “extracted” is used advisedly. A vertigo history is rarely easy, and time and effort are needed with most patients, even those who are very bright and articulate. Trying to deal with vertigo without making time for a detailed history is rather like running a fracture clinic without access to X-rays. It is a good general principle to delay a consultation until one has the time necessary to take a full history.

One of the problems confronting the patient in giving a detailed history is finding words to express their symptoms. Spinning dizziness may be straightforward enough to describe, but there are many variations of vertigo, including a sense of unsteadiness, which the patient may find difficult to describe. A few patients have even acknowledged that they were reluctant to describe the sensations they had been experiencing, as they believed that the doctor would think them at best foolish or at worst insane.

Most who run vertigo clinics will report that very often the patient seems to change the history as time goes by. This is true, not because of any incompetence or malevolence on the part of the patient but rather, when being asked for the first time, the patient may not know the correct answer and, rather than say so to an impatient doctor, gives an incorrect reply, only to have to change it later in the light of further consideration. It is the author’s policy, when the clinical course is not running according to expectations, to repeat the full history, starting again from the very beginning and setting aside all previous thoughts on the patient. This is time-consuming but more satisfying and more effective than unnecessary investigations, which may fail to advance the management of the patient. This point is laboured because most patients with vertigo require very few investigations and one should resist the temptation of trying to cover ignorance by ordering more tests.

The history should start at the beginning. This requires patience and considerable guiding of the patient. Patients tend to start at some very significant point in the history, such as the dizzy attack at their daughter’s wedding. Get them off that and get back to the beginning. One must start

at the point when the patient was last perfectly well. The next thing then is to decide whether the dizziness is rotatory or not. Most patients who have clear rotatory vertigo will have no difficulty in saying so but not everyone will be able, easily, to say that it wasn’t rotatory. This is not because they are stupid, unhelpful or psychologically difficult. It may simply be because they lack the words to describe their experience. Keep in mind the possibility that the nature of the dizziness may change as the course progresses and what had started off as rotatory may change to be a mixture or even purely imbalance.

Having established that the vertigo is either rotatory or purely unsteadiness, the next step is to decide whether it is constant or intermittent. Surprisingly, this can prove to be difficult. The best way to establish this is to specify a period of time, for example the past 2 weeks, and ask detailed questions about it. If it is intermittent, one must then ascertain the duration of the episodes.

One must establish the severity of the dizziness. How much does it interfere with everyday life? This will require specific questions such as how they get to the bathroom during a severe attack and how long they are unable to go out unaccompanied. If it is episodic, are they perfectly well between attacks?

At the end of the history, most patients can be subdivided into 1 of 6 groups:<sup>1</sup> rotatory or non-rotatory, episodic or non-episodic and if episodic, very short duration, less than 1 minute, or longer duration, most often expressed in hours. There is a pathological correlate for most of these groups (Table 1).<sup>2</sup> It is then usually possible to consider the types of vertigo that fall within each group (Tables 2 to 7) and to continue with a differential or even a definitive diagnosis. Generally speaking, if one does not have a tentative diagnosis at the end of the history, one is very unlikely to have one at the end of examination and investigations.

## Examination

Following the history, one must examine the patient. Unlike the history, this is usually quite a short procedure.

Table 1. Pathology of Vertigo

Sensation of rotation		
<i>Episodic</i>	Seconds	Stimulation or depression of the labyrinth
	Hours	Metabolic or biochemical failure of the labyrinth
<i>Prolonged</i>	Weeks	Destructive lesion of the labyrinth
Sensation of unsteadiness		
<i>Episodic</i>	Seconds	Physiological overload of the vestibular system
	Hours	Temporary impairment of the vestibular system
	to days	
<i>Prolonged</i>	Weeks to months	Vestibular inadequacy

Table 2. Main Causes of Short-lived Rotatory Vertigo (duration: less than 1 minute, usually about 20 seconds)

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Benign positional vertigo
Labyrinthine fistula
Caloric effect
Vertebrobasilar insufficiency

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Table 3. Main Causes of Longer Episodic Rotatory Vertigo (duration: ¼-24 hours, usually a few hours)

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Meniere’s disease
Delayed endolymphatic hydrops
Syphilitic labyrinthitis
Decompensation of a previously compensated vestibular lesion “Vestibular-Meniere’s disease”

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Table 4. Main Causes of Prolonged Rotatory Vertigo (duration: up to 3 weeks)

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Vestibular neuritis		
Trauma	Accidental	Head injury
	Planned	Ear surgery
		Labyrinthectomy
		Vestibular nerve section
Labyrinthitis	Bacterial or viral	
Vascular lesions of the labyrinth		
Metastatic deposits in Cerebello-Pontine angle		

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Table 5. Main Causes of Short-lived Unsteadiness (duration: less than 1 minute, usually a few seconds)

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Rapid head movements – especially post-concussion	
Abnormal input	Visual (including heights)
	Cervical
Minor inadequacies	Visual
	Vestibular
	Proprioceptive

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A full neurological examination is usually not required. The essential points of the examination are the ears, cranial nerves III to XII, the performance of balance tests, the presence or absence of nystagmus, which can, of course, be checked when testing cranial nerves III, IV and VI, and positional tests. The history may take up to 20 or 30 minutes but the examination is usually completed in about 5 minutes or less. In most vertigo clinics, there is little need to do a routine measurement of the blood pressure, for 2 reasons. First, it usually has already been done by the GP before referral and secondly, blood pressure, per se, is an extremely rare cause of balance problems. Indeed, the treatment of hypertension causes more imbalance than the hypertension itself.

**Investigations**

The history and examination findings should be the main indicators of any necessary investigations. There are clinics,

Table 6. Main Causes of Longer Episodic Unsteadiness (duration: from hours to days)

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Drugs
· Self-inflicted
· Iatrogenic
Motion sickness
Perilymph fistula
Active chronic suppurative otitis media
Decompensation of previously compensated lesion
Hyperventilation
Psychogenic

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Table 7. Main Causes of Prolonged Unsteadiness (duration: weeks to months, even years)

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Ageing
Drugs
· Metabolic effect (reversible) e.g., anticonvulsants
· Destructive effect (irreversible) e.g., ototoxic antibiotics
CNS lesions
· Parkinsonism
· Multiple sclerosis
· Vascular disease
· Tumours
Floating patient
Active chronic suppurative otitis media

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usually private with a vested interest, where a batch of tests is carried out on every new vertigo patient, sometimes even before they are seen by the doctor, regardless of the likely diagnosis. This is usually defended on the grounds of being comprehensive, but really is quite inefficient in that numerous tests, often expensive and time-consuming for the patient, are done unnecessarily.

It is the author’s belief that investigations should be carried out only for 1 of 3 purposes; first, to help with the diagnosis or prognosis, secondly, to exclude other important conditions and thirdly, as part of a research programme.

*Audiometry*

For routine clinical management, many patients with vertigo do not need any investigations whatsoever. However, it is the duty of the otologist to look a little further than the immediate problem and for that reason, the author routinely arranges for an audiogram, testing for air conduction, bone conduction and speech discrimination. This provides a baseline for the hearing, which may later become relevant in dizzy patients, and occasionally one exposes an unexpected hearing loss the patient had not noticed, but which may be significant.

In the author’s opinion, few other audiological tests need to be carried out. In the past, before magnetic resonance imaging (MRI) had been brought to its present level, other special hearing tests could help to raise the suspicion of an eighth nerve tumour. Now there is only one way to make

this important exclusion and that is MRI. In the view of most, this makes almost all the other audiological tests redundant in the management of vertigo. These redundant tests include brainstem evoked response audiometry and auditory reflexes, as well as a batch of even older tests already made redundant by these more modern ones. Of course, this does not necessarily apply when considered in the light of building up a database as part of a research programme.

Generally speaking, once a definitive diagnosis has been made and the hearing confirmed to be normal, other investigations are unnecessary so long as the patient's clinical course continues along the lines expected in the light of this diagnosis. Apart from any research interests, investigations are now dictated by what has gone before.

#### *Blood Tests*

There is no indication for any routine blood tests on patients with vertigo. There are those who make a plea for a routine full blood picture and measurement of electrolytes. In the author's experience this is a waste of time and money. Routine tests for thyroid function or diabetes, in the absence of clinical indications, are also not a good use of medical resources.

When the clinical diagnosis is Meniere's disease, one ought also to exclude syphilis, as this condition can present with the ear symptoms typical of Meniere's disease. The problem is that the spirochaete can enter the bony capsule of the labyrinth and remain there untouched by routine antibiotic therapy because of the relative avascularity of this bone. However, there is no indication for exclusion of syphilis in every dizzy patient.

#### *Imaging*

A unilateral or asymmetrical sensorineural hearing loss, in the absence of a clearcut explanation for this, such as previous documentation following exposure to gunfire, is an absolute indication for imaging to exclude a tumour of the eighth cranial nerve. If there are no contraindications, a Gd-MRI is the investigation of choice. Computed tomography (CT) scans can be used if MRI is contraindicated but these are not as efficient and cannot be relied upon to exclude a small tumour. Of course, if there is any suggestion of cholesteatoma, a CT scan is indicated.

#### *Vestibular Investigations*

There is a wide range of vestibular investigations available for research purposes but which have few routine clinical uses. Electronystagmography is the electrical recording of nystagmus, usually detected by use of the eye as a bipole. Electrodes, placed on the face on the lateral side of each orbit, detect movements of the eye, which are recorded. There are 2 main ways of stimulating the vestibular labyrinth,

the caloric test and the rotating chair.

In the caloric test, the lateral semicircular canal is stimulated or depressed by instilling air or water into the external ear canal at temperatures above or below that of the body. The most commonly used temperatures are 44 and 30 degrees centigrade, that is, 7 degrees above and below normal. The theory is that these can indicate how well each labyrinth is functioning in comparison with the other one, although there are no absolute figures for normality.

Rotating chairs stimulate the semicircular canals by rotating the patient at predetermined speeds and recording the induced nystagmus. Unfortunately, rotating chairs stimulate both sides at the same time, although the rotating chair has the advantage that it can test each pair of canals separately in each of the 3 different planes.

These tests are rarely of value clinically and the one used most by the author, although very rarely, is the instillation of 2 ml of iced water into the ear canal. This is a strong stimulus that shows the presence or absence of any vestibular function. It is an unpleasant test for the patient and should be used only when maximal stimulation is genuinely needed.

#### *Pure Research Investigations*

Well-equipped vestibular research laboratories have other computerised systems such as the force plate, where the patient stands on a small platform and all changes in the position of the centre of gravity of the patient are recorded. This shows the amount of sway in various situations, such as when the patient's eyes are closed or when he or she is standing on one leg. Once again, it is difficult to justify the use of these for routine clinical work.

#### **Conclusions**

The author can almost hear criticism of this paper from a certain group of otologists who, in his view, over-investigate the dizzy patient. If this over-investigation were accompanied by extravagant use of time spent talking to the patient, they could be excused. Sadly, in the author's experience, the extensive investigators rarely spend sufficient time taking an adequate history.

#### REFERENCES

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#### FURTHER READING

Further details of the various diagnoses referred to in this article can be found in any comprehensive postgraduate textbook of otology and audiology.