Benign Paroxysmal Positional Vertigo of the Horizontal Canal

Benign paroxysmal positional vertigo (BPPV) of the horizontal canal is far less common than posterior canal BPPV. It may occur spontaneously, but also because of an Epley manoeuvre. When performing the diagnostic manoeuvre (supine roll test) for horizontal canal BPPV the nystagmus observed is purely horizontal and direction-changing (when changing the head position). Two types of horizontal canal BPPV have been described: geotropic and apogeotropic, depending on whether the canaliths are in the anterior segment or the posterior segment of the horizontal semicircular canal. If symptoms do not resolve spontaneously, a variety of canalith repositioning manoeuvres is available. However, these have not been as well established as in posterior canal BPPV.

Keywords
Horizontal semicircular canal; BPPV, Canalith repositioning manoeuvre

Introduction
Benign paroxysmal positional vertigo (BPPV) is the most common vestibular disorder, with the vast majority of BPPV cases being of the posterior canal variant (p-BPPV). The diagnosis and treatment of p-BPPV have been well established [1, 2]. However, the horizontal canal variant (h-BPPV) has received considerably less attention in the literature. Clinicians may therefore be unaware of its existence and the proper diagnostic and therapeutic manoeuvres [2].

H-BPPV was first described by McClure in 1985 [3]. He reported seven cases with a history suggestive of BPPV, who on positional testing showed a horizontal, geotropic (beating toward the ground) nystagmus instead of the rotatory upbeat nystagmus characteristic of p-BPPV. He speculated that this phenomenon resulted from the presence of otoconial debris in the posterior arm of the horizontal semicircular canal. Later there appeared to be another variant of h-BPPV with an apogeotropic nystagmus, resulting from the presence of either otoconial debris in the anterior (ampullary) part of the canal or debris adhering to the cupula (= cupulolithiasis) [4] (Figure 1).

Horizontal canal BPPV is far less common than posterior canal BPPV, it is estimated to be responsible for 5-14% of BPPV cases [5,6]. Symptoms in h-BPPV and p-BPPV are more or less the same, although some claim that in h-BPPV patients predominantly develop vertigo when rolling over in bed [7]. Usually, in h-BPPV symptoms resolve more quickly than in p-BPPV, because, due to the anatomical orientation of the horizontal canal, the otoconial debris tends to float back into the utricle quite easily [8]. Horizontal canal BPPV may occur spontaneously, but also following an Epley manoeuvre for treatment of p-BPPV [9, 10]. Because of the risk of ‘canal conversion’ it is important that clinicians who treat patients for p-BPPV are aware of the phenomenon h-BPPV. In the last years progress has been made concerning the recognition and treatment of h-BPPV [11-13]. The present study briefly reviews the data and provides a protocol for diagnosis and treatment of h-BPPV.
towards the lowermost ear. The apogeotropic variant is less common (25%), here we see on both sides a nystagmus beating towards the uppermost ear.

Identification of the affected side

For proper treatment one has to know the affected side. When h-BPPV follows a repositioning manoeuvre for p-BPPV, the affected ear is the same as in p-BPPV. In the geotropic variant this is the side with the stronger nystagmus, in the apogeotropic variant the side with the weaker nystagmus.

In situations where the side is unclear there are several methods to reveal the affected side, one of them being the ‘bow and lean test’ [14]. Then, one has to check for nystagmus when the patient bows the head for 90 degrees (“bowing nystagmus”) and leans the head backward over 45 degrees (“leaning nystagmus”). In the geotropic variant of h-BPPV the ‘bowing nystagmus’ is directed toward the affected side, whilst the ‘leaning nystagmus’ is toward the healthy side. In the apogeotropic variant of h-BPPV the ‘bowing nystagmus’ is toward the healthy side, whereas the ‘leaning nystagmus’ is toward the affected side (Table 1).

Treatment

As in p-BPPV the goal of treatment in h-BPPV is to move the otolithic debris into the utricle under the influence of gravity. It should be noted that the effectiveness of the various therapeutic manoeuvres for h-BPPV is less well established than in p-BPPV [2].

For patients with the geotropic variant there are basically three treatment options. A common feature of these treatments is that they should be executed towards the healthy side (‘from bad to good ear’). The most commonly used manoeuvre is a ‘barbecue roll manoeuvre’, such as the one described by Lempert & Tiel-Welck [7]. This manoeuvre (video 2) starts with the patient in a supine position and consists of three 90 degree head rotations toward the unaffected side. Each head position should be maintained for 30-60 seconds. After 270 degrees rotation the patient is brought back from the supine to the sitting position.

The Gufoni manoeuvre (video 3) is more easy to perform and (probably) as effective as the barbecue roll manoeuvre [15]. Here the patient is seated upright with both legs hanging from the side of the couch and is then rapidly tilted to the nonaffected side. After approximately two minutes, the head is quickly turned downwards (nose down) by 45 degrees. Finally, after two minutes the patient is returned to the sitting position [16].

The most simple treatment option is the forced prolonged positioning manoeuvre, introduced by Vannucchi et al. [17] The patient lies on the unaffected side for 12 hours. This allows slow movement of the otoconial debris from the posterior arm into the utricle. It may be performed as
a single treatment or in combination with one of the other manoeuvres.

The treatment of the apogeotropic variant of h-BPPV is more difficult. This has to do with the fact that one does not know the exact location of the otoconial debris. Also, one does not know whether canalolithiasis or cupulolithiasis is present. In case of canalolithiasis the goal of treatment is to move the otoconial debris from the anterior part of the horizontal canal to the posterior part (and thus changing an apogeotropic variant into a geotropic variant which is more easy to treat). This can be done by executing a modified Gufoni manoeuvre toward the affected side (video 4). The patient sits on the side of a couch, is moved quickly toward the affected side and after two minutes the head is turned 45 degrees upward (nose up in stead of nose down) [18]. After two minutes the patient returns to the sitting position. After 10-15 minutes the supine roll test is repeated to check for a change in nystagmus direction. If a geotropic nystagmus is present, treatment follows as described above.

If an apogeotropic nystagmus cannot be converted into a geotropic nystagmus, it is likely that cupulolithiasis is present. A head-shaking manoeuvre may detach the otolithic debris from the cupula, irrespective of the side to which it is attached [17, 19]. The head-shaking manoeuvre can be performed in the sitting position, with the head 30 degrees in anteflexion. The head is moved sideways in a sinusoidal way at a rate of approximately 3 cycles per second for 15 seconds (video 5).

If the otolitihc debris is attached to the utricular side of the cupula, detachment should result in immediate resolution of symptoms. If the debris is attached to the canal side of the cupula, detachment should result in either an apogeotropic nystagmus (when the loose debris is still in the anterior arm) or a geotropic nystagmus (when the debris is in the posterior arm).

It is important to perform a supine roll test after each manoeuvre to check for the presence of nystagmus and, if present, to check for the direction of the nystagmus.

**Conclusion**

BPPV affecting the horizontal canal is far less common than posterior canal BPPV. It may occur spontaneously, but also
as a consequence of an Epley manoeuvre. There are two variants of h-BPPV: geotropic and apogeotropic, depending on the location of the otoconial debris (in the anterior or posterior segment of the horizontal canal). If symptoms do not resolve spontaneously, a variety of manoeuvres is available to move the debris towards the utricle.

References


