Sacadas corretivas com ganho normal do RVO no schwannoma vestibular

Caso Clínico

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Resumo

O Video Head Impulse Test (vHIT) é usado para avaliar a função vestibular. Esta ferramenta tem-se mostrado valiosa em pacientes com Schwannoma Vestibular (VS).
Apresentamos um caso de um homem de 64 anos com SV de 6mm no canal auditivo interno esquerdo, detetado acidentalmente numa Ressonância Magnética cerebral. O paciente negou apresentar qualquer sintoma vestibular ou auditivo. O exame físico revelou hipoacusia neurossensorial esquerda ligeira e teste de impulso cefálico positivo para a esquerda. O vHIT mostrou um valor normal de ganho do reflexo vestíbulo-ocular (RVO) em todos os canais semicirculares (CSCs), apesar da presença de sacadas corretivas (SCs) evidentes ao testar os CSCs lateral e posterior esquerdos.
O vHIT é uma ferramenta valiosa para avaliar a função vestibular. Em pacientes com valores normais de ganho de VOR, défices subtis na função dos CSCs podem ser detetados através da presença de SCs, indicando a importância da incorporação do vHIT em avaliações diagnósticas de rotina de pacientes com distúrbios vestibulares.

Palavras-chave: Schwannoma Vestibular, Video Head Impulse Test, Sacadas Corretivas, Reflexo Vestibulo-Ocular

Introduction

The Video Head Impulse Test (vHIT) is a new generation tool used in clinical practice and clinical investigation to document vestibular dysfunction. It relies on advanced technology introduced by MacDougall et al., such as a high-speed head-mounted camera on a pair of tight-fitting goggles with incorporated software that can objectively and precisely calculate head and eye rotation velocity[1].

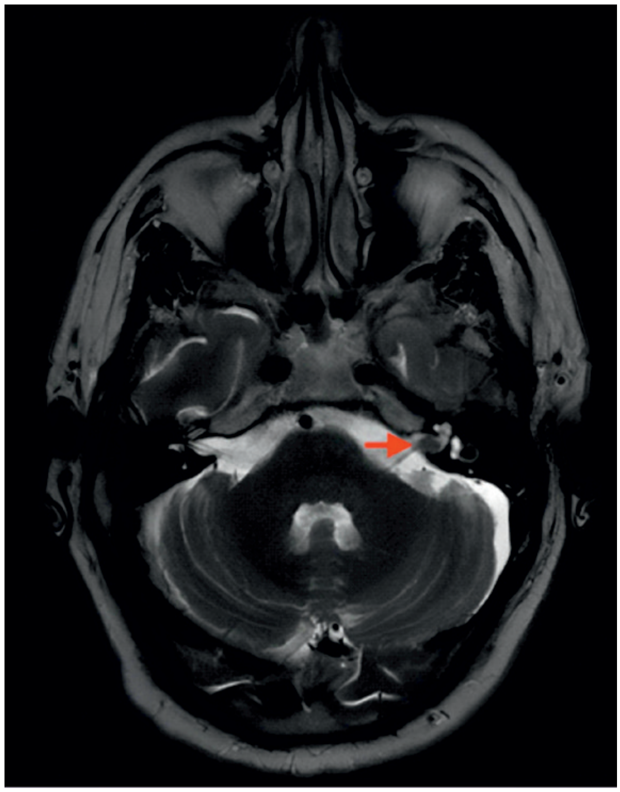
In contrast to other known methods used to evaluate vestibular function, such as caloric tests and the rotatory chair, vHIT can test both vertical plane semicircular canals (SCC), including the posterior (PSCC) and anterior semicircular canals (ASCC). Additionally, vHIT tests high-frequency physiological head movements, elicited by abrupt, passive head rotations in a parallel plane to the tested SCC pair[2,3]. The vestibulo-ocular reflex (VOR) consists of an ocular response in an opposite direction to the head movement, which allows for gaze stabilization despite head rotation. In patients with SCC paresis, which leads to dysfunctional VOR, the eyes cannot successfully compensate for head rotation, and a corrective saccade (CS) occurs. A "covert saccade" is a type of CS that occurs during head rotation and is not observed during the conventional Head Impulse Test (HIT) but can be detected through vHIT. On the other hand, a CS that happens only after head rotation ceases is designated as an "overt saccade" and is usually amenable to detection during HIT[4-6]. The ratio of eye movement to head movement, called the VOR gain, together with both covert and overt CSs are some of the most important findings evaluated in vHIT[4].

Vestibular Schwannoma (VS) is a benign tumor of the vestibulocochlear nerve, typically found in the cerebellopontine angle (CPA). Some of the most frequently associated symptoms include unilateral hypoacusis and tinnitus, as well as vertigo and/or dizziness. However, due to the usual slow growth rate of the tumor, symptoms may not always arise, as subsequent central adaptation occurs in response to gradual peripheral nerve function loss[7,8]. An increasing number of studies highlight the growing role of vHIT in the evaluation of patients with VS. Fujiwara et al. found vHIT to be effective in the evaluation of vertical semicircular canal function in patients with VS[3]. Also, Brown et al. reported a significant association between vHIT and caloric tests in assessing vestibular function in patients with VS[9]. Furthermore, Nam et al. suggested that VOR gain analysis could even have a localizing value in predicting an inferior or superior vestibular nerve origin of VS[10].

Case Presentation

Informed consent was obtained before the writing of this case report. A 64-year-old male was referred to our Ear, Nose, and Throat (ENT) outpatient clinic from the neurosurgery department following the incidental detection of a 6mm vestibular schwannoma in the left internal acoustic canal. The lesion was identified on brain Magnetic Resonance Imaging (MRI) performed to investigate a previously diagnosed developmental venous anomaly in the left corona radiata (Figure 1).

Figure 1
Axial T2 Propeller MRI image showing a 6mm Vestibular Schwannoma located in the left internal acoustic canal (red arrow).



The patient denied experiencing any related symptoms, such as hypoacusis, vertigo/dizziness or tinnitus. During physical examination, the patient's otoscopic examination was normal, and acumetry indicated sensorineural hypoacusis on the left side. The patient had smooth eye movements, with no spontaneous or evoked nystagmus (tested with Frenzel goggles, head shake test, and hyperventilation stimulus). However, the head impulse test (HIT) to the left side consistently showed a CS. An auditory test and a vHIT were scheduled to objectively

Figure 2
Right (red) and left (blue) ear pure tone audiometry

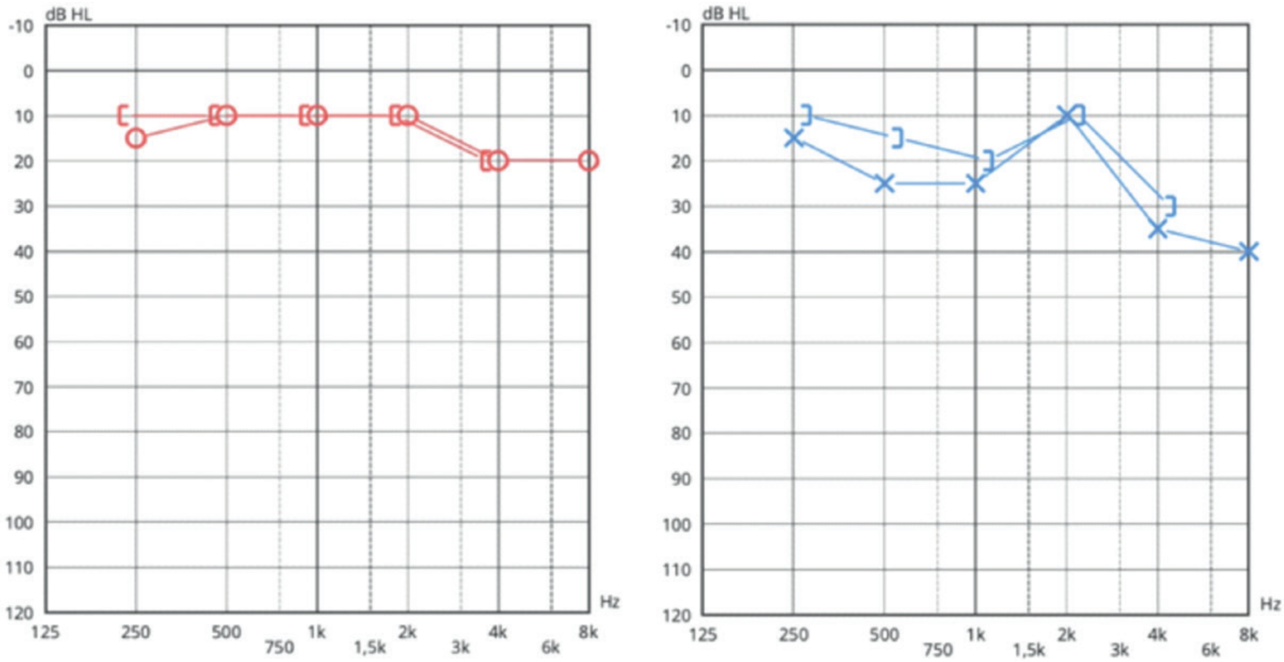
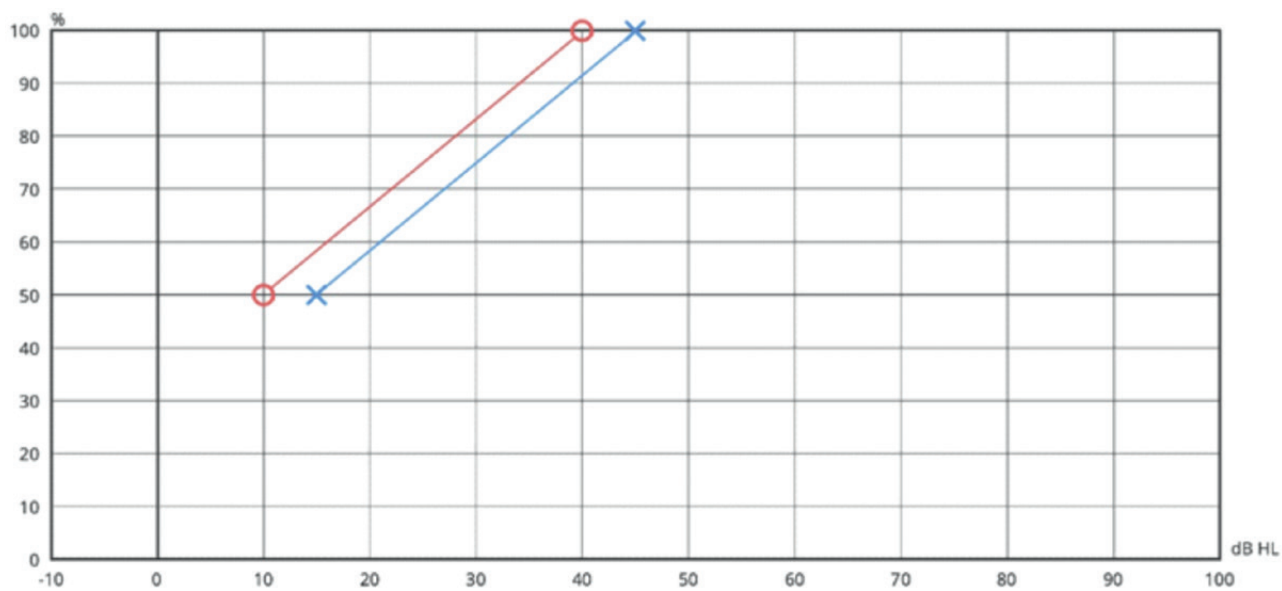


Figure 3
Right (red) and left (blue) ear Speech Reception Threshold and Speech Discrimination score



assess a baseline auditory and vestibular function. The pure tone audiogram revealed mild left sensorineural hearing loss in the high frequencies (4 and 8kHz, as shown in figure 2) with a normal hearing threshold on the right ear. The Speech Reception Threshold (SRT) was 20dB on the right ear and 25dB on the affected ear, with 100% speech discrimination bilaterally (figure 3). A type C tympanogram was found on the left ear and a type A tympanogram was found on the right ear (figure 4). The vHIT showed a normal VOR gain value in all six semicircular canals, despite the presence overt catch-up saccades while testing the left lateral and posterior semicircular canals (figure 5).

Figure 4
Right (red) and left (blue) ear Tympanogram

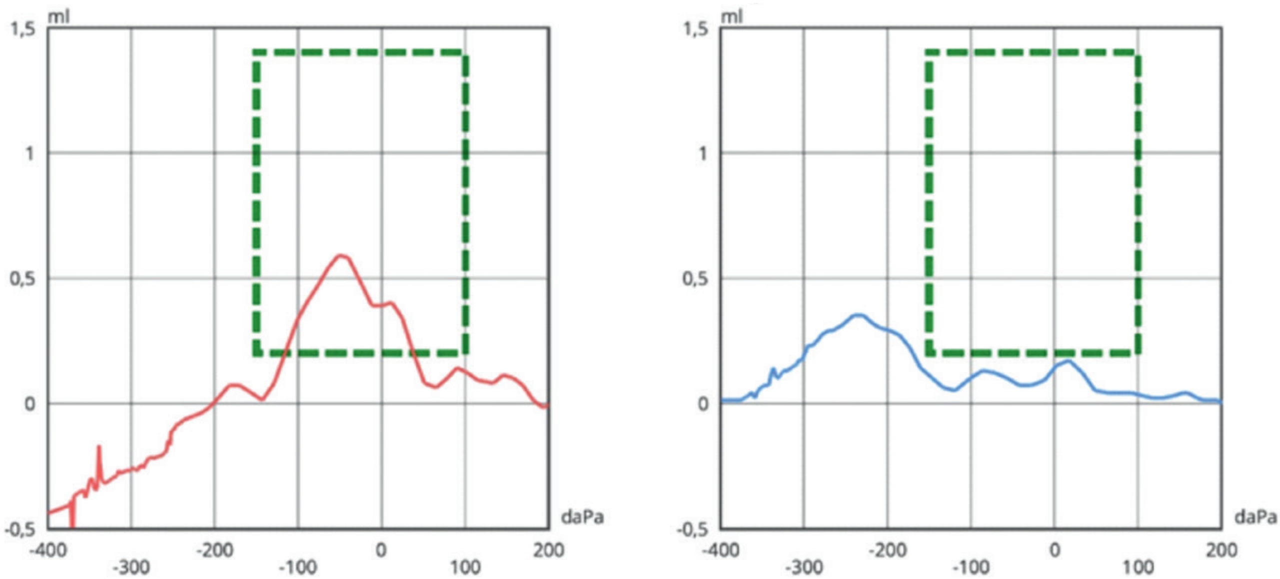
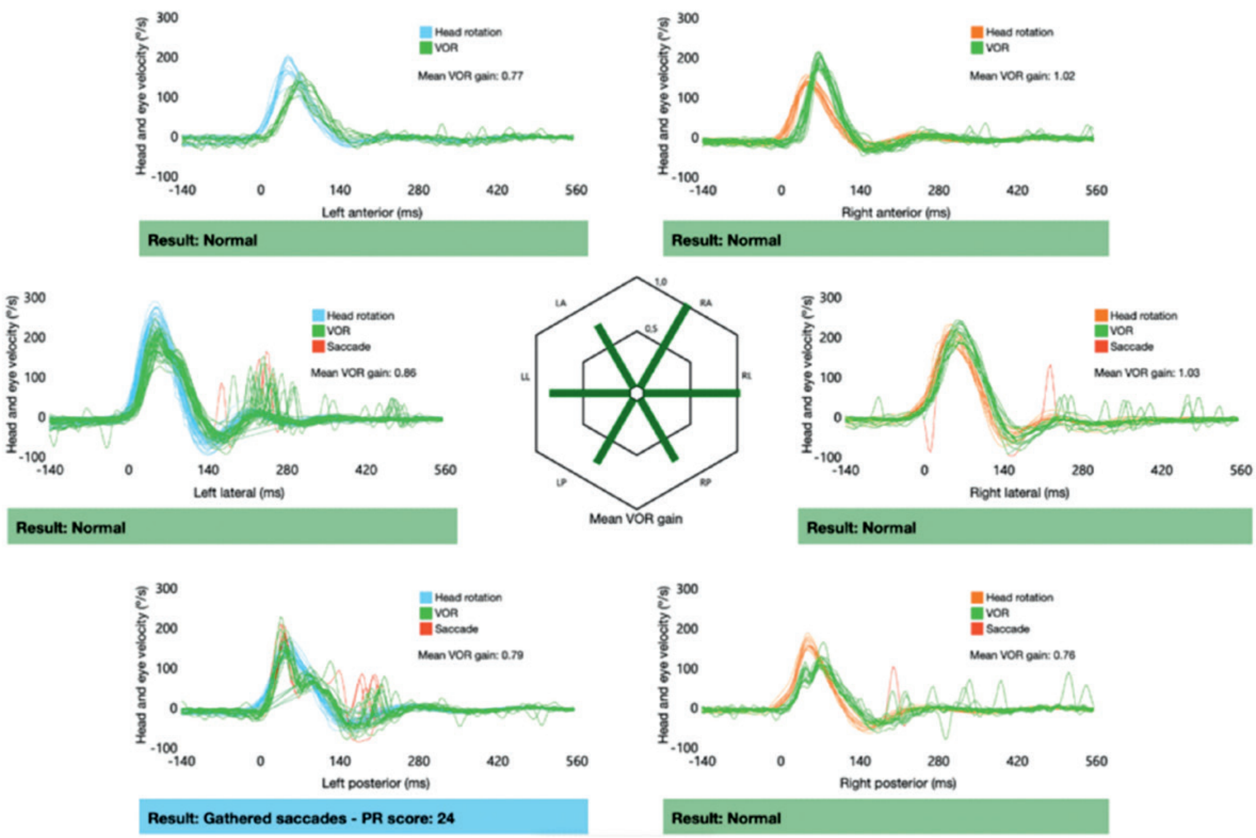


Figure 5
Video Head Impulse Test



Since this was a small, incidental lesion in an asymptomatic patient, annual brain MRI monitoring was chosen as the management approach.

Discussion

The Video Head Impulse Test (vHIT) has been proven useful as a routine diagnostic tool to study SCC dysfunction. As a fast, innocuous, objective, and precise test, vHIT is gradually replacing caloric tests as the first-line exam in the diagnostic approach of patients with suspected vestibular disorders[1,11-13]. Vestibular dysfunction usually manifests as a reduced VOR gain in vHIT evaluation, which is often accompanied by CSs. However, a recently published study mentioned the presence of CSs in patients with normal VOR gain, in the context of pathologies such as Ménière's disease, vestibular neuritis, benign paroxysmal positional vertigo, among others[14]. In that study, the authors evoke the possibility of slight dysfunction of the SCCs in the presence of normal VOR gain values, since no pathologic changes in the amplitude of ocular or cervical Vestibular Evoked Myogenic Potentials were detected. This might just be the case for the individual mentioned in this report, who reported no vestibular symptoms, but showed a slight deficit but normal range VOR gain value in the left lateral and anterior SCCs.

Also, Yang et al. and Rambold et al. previously stated that overt CS can be detected in up to 50% and 30% of normal individuals, respectively, with the latter noting an increasing frequency of CSs with age[5,15]. The unilateral findings in this case are unlikely to be explained by age-related vestibular function loss, as a VS had already already been documented and is a much more plausible explanation.

Although the left ear's VOR gain values were within the normal range, the values concerning the lateral and anterior SCCs were substantially lower than those of the healthy ear. This could indicate a long-term tendency for a decrease in VOR gain in the left side, as the tumor grows and vestibular function worsens. Thus, monitoring the function of SCCs through VOR gain measurement over time may prove to be a useful method to track the progression of vestibular pathologies such as VS. Furthermore, as demonstrated by Schubert et al., overt CSs suggest an uncompensated vestibular deficit[16]. If this is the case, it may indicate a recently developed VS where the central compensation mechanisms have not yet begun, resulting in overt CSs instead of covert CSs. This case highlights that overt CS evidenced in a primary evaluation, even in the presence of normal VOR gain values, should prompt continuous patient follow-up to investigate the underlying reason for this clinical incongruence, namely with a brain MRI. Nonetheless, this is a single case report, and it is premature to extrapolate the findings. Therefore, further cases need to be studied to identify common patterns and uncover additional insights.

This case report underscores the significance of recognizing overt CS as an indication of vestibular dysfunction, even in cases with normal VOR gain values. This is particularly important for ENT doctors, especially those with a specialization in otoneurology, as they are more likely to encounter such cases, and an undiagnosed VS can be a potential underlying cause.

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Data Confidentiality

The authors declare having followed the protocols used at their working center regarding patient data publication.

Protection of humans and animals

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and the 2013 Helsinki Declaration of The World Medical Association.

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Availability of scientific data

There are no datasets available, or publicity related to this work.

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