



ORIGINAL ARTICLE

Reduction in Posterior Semicircular Canal Gain by Age in Video Head Impulse Testing. Observational Study[☆]



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KEYWORDS

Age;
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Abstract

Introduction and objectives: In-depth assessment of the vestibulo-ocular reflex with the new video systems available provides information on various previously unidentified characteristics in patients with peripheral vestibular disorder.

The aim of this work is to quantify how often pathological gain (uni- or bilateral) in the posterior semicircular canal (PSC) gain appears in video head-impulse testing (vHIT) with preservation of the gain in the rest of the semicircular canals, and to analyse the relation of this frequency with patient age and/or diagnosis.

Methods: This was a prospective observational study on adults referred to our unit between June 2012 and February 2014. Age, sex, pathological antecedents, prior history of vestibular pathology, diagnosis, and time of evolution of the clinical picture and its characteristics were recorded. Each patient underwent a complete otoneurological examination, including vHIT (Otometrics®). Depending on suspected diagnosis, patients also received cervical vestibular evoked myogenic potential (VEMP) testing, tonal audiometry, and speech test, as well as assessment by Neurology and/or nuclear magnetic resonance or computed axial tomography scan imaging study.

Results: In all, 363 patients were assessed; 57 (16%) patients (33 males and 24 females; mean age, 57±15 years) showed pathological PSC gains, 46 (81%) unilateral and 11 (19%) bilateral. Ménière's Disease was the most frequent diagnosis, followed by benign paroxysmal positional vertigo (27%). Patients with unilateral involvement were younger than those with bilateral (55 vs 68 years; $P=.03$). In the patients with bilateral involvement, PSC gain and age were related (-0.7 ; 0.04) and the gain value was symmetrical in both ears (0.7 ; $P=.05$). The gain in the anterior and horizontal canals tended to decrease with age, but without statistical significance in our sample.

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PALABRAS CLAVE

Edad;
Test del impulso
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Canal semicircular
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Conclusions: Of the patients referred for an otoneurological consultation, 16% showed pathological PSC gain (unilateral in 81% and bilateral in 19% of the cases). This gain involvement was attributable to age when the gain was bilateral and symmetrical.

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Reducción de la ganancia del canal semicircular posterior en el test del impulso cefálico con la edad. Estudio observacional

Resumen

Introducción y objetivos: La evaluación detallada del reflejo vestibulo-ocular con los nuevos sistemas de vídeo disponibles, proporciona información sobre algunas características no identificadas previamente en pacientes con vestibulopatía periférica.

El objetivo de este trabajo es cuantificar la frecuencia de aparición de ganancias patológicas, uni- o bilaterales, del canal semicircular posterior (CSP) en la prueba de impulso cefálico vídeo asistida (vHIT) con preservación de la ganancia en el resto de los canales semicirculares, y analizar su relación con la edad y/o el diagnóstico del paciente.

Métodos: Estudio prospectivo observacional en adultos entre junio de 2012 y febrero de 2014. Se analizó la edad, género, antecedentes patológicos, historia previa de patología vestibular, diagnóstico, tiempo de evolución del cuadro clínico y sus características. Se completó un examen otoneurológico completo, un vHIT (Otometrics®), y según la sospecha, potenciales evocados vestibulares miogénicos cervicales (cVEMP), audiometría tonal, logaudiometría así como una evaluación por Neurología y/o un estudio de imagen.

Resultados: Trescientos sesenta y tres pacientes fueron evaluados: 57 (16%) pacientes (33 varones, 24 mujeres, edad media 57 ± 15 años) mostraron ganancias patológicas del CSP, 46 (81%) unilateral y 11 (19%) bilateral. El diagnóstico más frecuente fue la enfermedad de Ménière, seguido del VPPB (27%). Los pacientes con afectación unilateral son más jóvenes que los pacientes con afectación bilateral (55 vs 68 años; $p=0,03$). En los pacientes con afectación bilateral, la ganancia del CSP es simétrica en ambos oídos (0,7; $p=0,05$) y se relaciona inversamente con la edad (-0,7; 0,04) y el valor de ganancia. La ganancia de los canales anteriores y horizontales tiende a disminuir con la edad, pero sin significación estadística en nuestra muestra.

Conclusiones: El 16% de los pacientes remitidos a una consulta de otoneurología muestran ganancias patológicas del CSP, unilateral en el 81% y bilateral en el 19% de los casos. Esta afectación de la ganancia es atribuible a la edad cuando es bilateral y simétrica.

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Introduction

The peripheral vestibular system bilaterally comprises five organs: three semicircular canals (anterior, posterior, and horizontal or lateral) and two otolith organs (utricle and saccule). Vestibular dysfunction may be a reflection of a disorder of any of these five parts, in isolation or combined.¹

Recent studies in the healthy population of the United States demonstrate a deterioration of vestibular function with age,^{1,2} this affects the semicircular canals more than the otolith organs. It seems that this disorder occurs after the age of 40, and affects between approximately 21% and 35% of people aged over 40, and 69% of people over 70.³⁻⁸ However, the pathophysiological mechanism behind this is still not known.

Vestibular dysfunction in patients of advanced age seriously affects their quality of life, cognitive, and emotional status and considerably increased their risk of fall,^{2,3,9} one of the principal causes of morbidity and mortality in people of advanced age.^{10,11} The economic cost incurred by increased needs and the loss of independence caused by falls has a tremendous social impact, and is a vitally significant health problem in this age group.^{12,13}

Each of the receptors located in the semicircular canals can be studied individually by head-impulse testing (HIT), which was clinically systematised by Halmagyi and Curthoys and has recently started to be assisted using video-camera systems and eye velocity/head velocity recordings (vHIT).^{14,15} This comprises an evaluation of vestibulo-ocular reflex gain studying eye velocity during and after stimulation of the relevant semicircular canal by means of a

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