Video head impulse test

In 1988, Halmagyi et al. introduced impulsive testing of semicircular canal (SCC) function measured with scleral search coils and showed that it could accurately and reliably detect impaired function even of a single lateral canal. Later they showed that it was also possible to test individual vertical canal function in peripheral and also in central vestibular disorders and proposed a physiological mechanism for why this might be so. For the next 20 years, between 1988 and 2008, impulsive testing of individual SCC function could only be accurately done by a few aficionados with the time and money to support scleral search-coil systems—an expensive, complicated and cumbersome, semi-invasive technique that never made the transition from the research lab to the dizzy clinic. Then, in 2009 and 2013, they introduced a video method of testing function of each of the six canals individually. Since 2009, the method has been taken up by most dizzy clinics around the world, with now close to 100 refereed articles in PubMed. In many dizzy clinics around the world, video Head Impulse Testing has supplanted caloric testing as the initial and in some cases the final test of choice in patients with suspected vestibular disorders. They consider seven current, interesting, and controversial aspects of video Head Impulse Testing: (1) introduction to the test; (2) the progress from the head impulse protocol (HIMPs) to the new variant—suppression head impulse protocol (SHIMPs); (3) the physiological basis for head impulse testing; (4) practical aspects and potential pitfalls of video head impulse testing; (5) problems of vestibulo-ocular reflex gain calculations; (6) head impulse testing in central vestibular disorders; and (7) to stay right up-to-date—new clinical disease patterns emerging from video head impulse testing. With thanks and appreciation we dedicate this article to our friend, colleague, and mentor, Dr Bernard Cohen of Mount Sinai Medical School, New York, who since his first article 55 years ago on compensatory eye movements induced by vertical SCC stimulation has become one of the giants of the vestibular world [1)].

Identification of the nerve of origin in vestibular schwannoma (VS) is an important prognostic factor for hearing preservation surgery. Thus far, vestibular functional tests and magnetic resonance imaging have not yielded reliable results to preoperatively evaluate this information. The development of the video head impulse test (vHIT) has allowed a precise evaluation of each semicircular canal, and its localizing value has been tested for some peripheral vestibular diseases, but not for VS.

To correlate patterns of semicircular canal alteration on vHIT to intraoperative identification of the nerve of origin of VSs.

A total 31 patients with sporadic VSs were preoperatively evaluated with vHIT (gain of vestibule-ocular reflex, overt and covert saccades on each semicircular canal) and then the nerve of origin was surgically identified during surgical resection via retrosigmoid approach. vHIT results were classified as normal, isolated superior vestibular nerve (SVN) pattern, isolated inferior vestibular nerve (IVN) pattern, predominant SVN pattern, and predominant IVN pattern. Hannover classification, cystic component, and distance between the tumor and the end of the internal auditory canal were also considered for analysis. : Three patients had a normal vHIT, 12 had an isolated SVN pattern, 5 had an isolated IVN pattern, 7 had a predominant SVN pattern, and 4 had a predominant IVN pattern. vHIT was able to correctly identify the nerve of origin in 89.7% of cases (100% of altered exams).

The pattern of semicircular canal dysfunction on vHIT has a localizing value to identify the nerve of origin in VSs [2)].

A pilot case-control study included eight patients undergoing surgical labyrinthectomy, divided into two groups: four patients who received pre-operative intratympanic gentamicin and four patients who did not. The post-operative six-canal video head impulse test responses and length of in-patient stay were assessed.

The average length of stay was shorter for patients who received intratympanic gentamicin (6.75 days; range, 6-7 days) than for those who did not (9.5 days; range, 8-11 days) ($p = 0.0073$). Additionally, the gentamicin group had normal post-operative video head impulse test responses in the contralateral ear, while the non-gentamicin group did not.

Pre-operative intratympanic gentamicin improves the recovery following vestibular schwannoma resection, eliminating, as per the video head impulse test, the impact of labyrinthectomy on the contralateral labyrinth [3].

Tumor factors that influence vestibular function in vestibular schwannoma (VS) have not been properly described. We evaluated whether cystic VSs have different vestibular function than solid VS. Tumor size on vestibular function was also evaluated.

Cross-sectional study.

Tertiary referral center.

Forty-one cases of sporadic, untreated VS.

Evaluation with video head impulse test and MRI.

Tumors were classified as solid, heterogeneous, or cystic and by size using the Hannover classification. Vestibulo-ocular reflex (VOR) gain was correlated to tumor size and cystic status.

Large VS had worse VOR gain than small lesions ($p<0.001$). Cystic lesions had lower VOR gain than all other tumors ($p=0.001$), Hannover T3 and T4 ($p=0.014$), Hannover T4 ($p=0.015$), solid tumors ($p<0.001$), solid Hannover T3 and T4 ($p=0.003$), and solid Hannover T4 ($p=0.008$). Heterogeneous VSs had lower VOR gain compared to solid tumors ($p=0.02$), solid Hannover T3 and T4 ($p=0.08$), and solid Hannover T4 ($p=0.14$). Heterogeneous and cystic VSs had lower VOR gain than solid tumors ($p<0.001$), solid Hannover T3 and T4 ($p=0.004$), and solid Hannover T4 ($p=0.02$). VOR gain of solid T4 lesions was not significantly lower than solid Hannover T1-T3 ($p=0.33$).

Cystic status is directly associated with a worse vestibular dysfunction. Size did not significantly impact vestibular function in solid VS [4].

Unclassified

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