PREDICTIVE PROPERTIES OF THE VIDEO HEAD IMPULSE TEST (vHIT): MEASURES OF CALORIC ASYMMETRY AND SELF-REPORT DIZZINESS HANDICAP

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INTRODUCTION

- The vHIT, or video head impulse test, uses infrared video to record and quantify the properties of reflexive eye movements in response to fast manual head impulses.
- Measuring the magnitude of these compensatory eye movements, or the “gain,” allows a clinician to assess the electrical output of the lateral semicircular canals and identify potential peripheral vestibular impairments.
- Traditionally, vestibular caloric testing has been considered the gold standard for assessing lateral semicircular canal and/or superior vestibular nerve function.

METHODS

Participants:
- 116 participants (58 males, mean age = 45.6 years old [sd = 14.9]) who underwent balance function testing, including videonystagmography (VNG), video head impulse testing (vHIT), and the Dizziness Handicap Inventory (DHI) during the same appointment.
- Participants were divided into four groups based on their caloric asymmetry data:

<table>
<thead>
<tr>
<th>Group</th>
<th>Caloric Asymmetry (%)</th>
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<tbody>
<tr>
<td>1</td>
<td>0-25</td>
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<tr>
<td>2</td>
<td>26-50</td>
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<tr>
<td>3</td>
<td>51-75</td>
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<tr>
<td>4</td>
<td>76-100</td>
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</tbody>
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Procedures:
- Either alternating bithermal or warm monothermal caloric irrigations were conducted.
- vHIT responses were recorded using a monocular EyeSeeCam. Patients fixated on a 1” x 1” target and the examiner conducted random head impulses in alternating directions.
- The mean differences between eye and head peak velocity (degrees/sec) and latency (msec) were measured at three different times periods (i.e. msec) following the onset of the head impulse.
- A vHIT test was considered abnormal if:
  - Slow phase VOR gain dropped below 0.7.
  - Covert saccades were present in > 50% of trials.

RESULTS

- Figure 5 shows there were no significant differences in mean DHI score compared to vHIT outcomes.
- As represented in Figures 6-7, Bonferroni-adjusted t-tests showed that both ipsilesional and contralateral velocity gain demonstrated significant decreases with increases in caloric paresis, yet not to the same magnitude in the contralateral ear.

DISCUSSION

- No significant correlations (i.e., $p > 0.05$) were found between electrophysiologic test results and self-reported dizziness handicap.
- Our findings agree with previous studies showing a poor relationship between measures of impairment and handicap severity (Pelosi et al. 2013; Jacobson & Calder 2000).
- Previous investigators have commented that in the presence of reduced ipsilesional vHIT gain, the contralateral gain also is reduced, but not to the same magnitude (Mantokoudis et al. 2013).
- We present data that are in agreement with several previous investigations that suggest there is a dissociation between vHIT and caloric asymmetry outcomes (Zellhuber et al. 2013; Mahringer & Rambold 2012).

CONCLUSIONS

- Results of this investigation revealed that self-reported dizziness handicap was not predicted by the outcome of the vHIT.
- Our findings suggest that the vHIT and caloric data are not redundant. Each test provides a unique set of data regarding the integrity of the lateral semicircular canal and state of central nervous system compensation.
- Therefore, the vHIT should be viewed as a complementary aspect of a balance function examination rather than a replacement for caloric testing.

REFERENCES


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