Application of Motor Learning Theory to Teach the Head Impulse Test to Emergency Medicine Resident Physicians with Repetitive Augmented Terminal Feedback from a Video Oculography Device

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INTRODUCTION

- The head impulse test (HIT) is a physical examination maneuver that can assist physicians in differentiating between central and peripheral vertigo.

- The maneuver involves quickly turning the patient's head side-to-side and observing for subtle corrective eye movements that are indicative of peripheral vertigo.

- The literature demonstrates that emergency medicine physicians often perform the head impulse test incorrectly.

- Video-oculography (VOG), the use of a small video camera fitted on glasses to track eye movements, has been demonstrated as one method to improve the ability of physicians to perform the HIT. VOG devices can also provide feedback as to whether the HIT was performed correctly.

- We believe the feedback function of VOG devices can be utilized to teach the muscle memory of the HIT to emergency medicine resident physicians (EMRs).
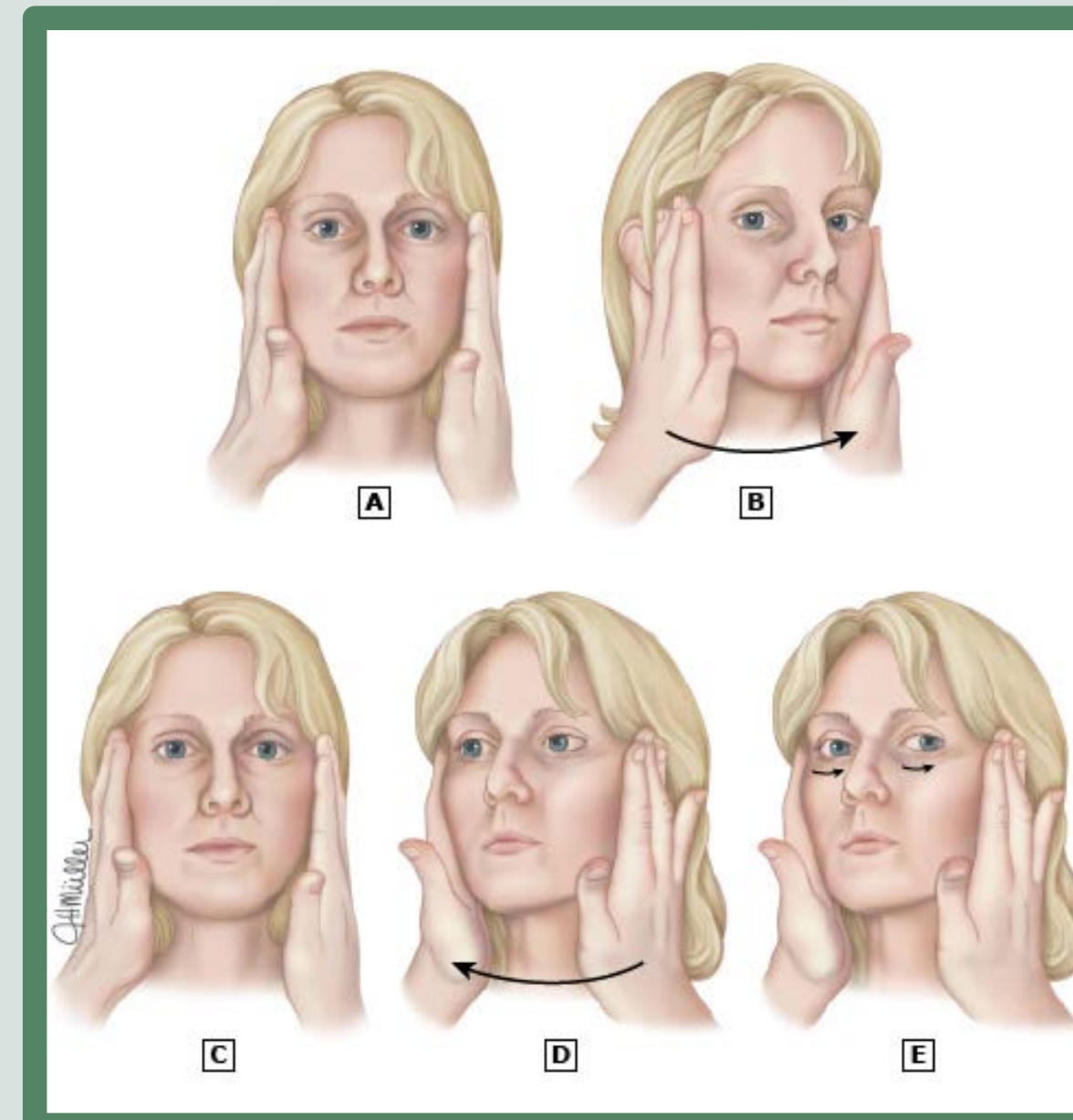
VIDEO OCULOGRAPHY (VOG) DEVICE

Natus® ICS Head Impulse Testing System

https://www.medicalexpo.com/prod/natus-hearing-balance/product-70796-473486.html

HEAD IMPULSE TEST (HIT)

- The patient is asked to fixate on a distant target.
- The patient's head is rotated rapidly by the examiner, first to the left (A to B), then to the right (C to D).
- In a normal response, the eyes remain on target (B).
- In an abnormal response, the eyes are dragged off target (D), followed by a saccade back to the target (E). This response implies a peripheral vestibular lesion on the right.

https://www.uptodate.com/contents/image?imageKey=NEURO%2F52022

MOTOR LEARNING THEORY

- **Augmented Feedback** is from an external source.

- **Terminal Feedback** is after task completion.

- The **external source** is the visual and auditory feedback from the VOG device indicating whether the HIT was performed correctly or incorrectly **after** the maneuver is attempted.

STUDY DESIGN

- **Baseline Testing:**
  - EMRs will perform the HIT 20 times in each direction without feedback and the percentage of correct will be recorded.

- **Practice Sessions:**
  - EMRs will perform 3 sets of 20 HITs in each direction on 3 separate occasions over the course of 2 months with augmented and terminal feedback training.

- **Final Testing:**
  - EMRs will perform the HIT 20 times in each direction without feedback and the percentage of correct will be recorded. This will occur 2 months after the final practice session.

- **Statistical Analysis:**
  - The means and standard deviations from each time point will be graphed and compared to determine if the participants ability to perform the HIT improved with time.

NEXT STEPS

- Use the VOG Device to evaluate dizzy patients in the emergency department.

- Obtain video recordings of abnormal eye movements observed during vestibular maneuvers on patients.

- Structure a teaching session around the videos of abnormal eye movements.

- Teach and reinforce the evidence-based techniques for evaluating and treating dizzy patients to current and future emergency medicine physicians.

- Conduct further medical education research assessing before and after self-perceived and objective knowledge regarding the evaluation and treatment of dizzy patients.