Rotatory Chair Testing 2008

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Rotatory Chair Overview

- Rotational chair tests the lateral canals
- Both sides are stimulated simultaneously
- Much more expensive than ENG
- Gold-standard test for Bilateral vestibular loss
- Useful to validate caloric paresis

5 sensors, 2 tests

- Clinical Correlate: can only measure 2/5 -- lateral canal and saccule with available vestibular tests.
- Rotatory chair measures lateral canal.

Active head rotational testing

- (Vorteq/VAT)
  - Voluntary movement of head, measure eyes.

Vorteq Output

- Provides high frequency gain information
- Also tests vertical canals/saccule (together)

Rotatory Chair

Provides low and high frequency data that partially overlaps with AHR.
Rotatory Chair Method

- A moderately powerful motor is attached to a chair
- An attempt is made to characterize the performance of the vestibular system using a range of frequencies

Rotatory stimulus profiles

- Sinusoidal rotation (easy, predictable)
- Sum-of-Sines (SOS) - unpredictable
- Step responses - predictable

All provide similar diagnostic data.

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Outcome measures

- Sinusoidal methods
  - Gain and Phase vs. frequency
- Step-response
  - Gain (high-frequency)
  - Time constant (Tc)

Diagnostic logic

<table>
<thead>
<tr>
<th>Normal</th>
<th>UL</th>
<th>BL</th>
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</thead>
<tbody>
<tr>
<td>Gain</td>
<td>Normal (&gt; 0.7)</td>
<td>Reduced at low freq.</td>
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<tr>
<td>Phase</td>
<td>Normal, Tc of 15</td>
<td>Lead, Tc of 7-10</td>
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Rotary chair testing for central disorders?

- Usually gain/phase responses are unaffected
- Occasionally may have abnormally increased gain or unusual patterns of gain.
- Fixation suppression is often impaired

Normal Rotation Test

Rotary chair tests are often normal in many common types of dizziness:

- BPPV (20% of all vertigo)
- Migraine associated vertigo
- Meniere’s disease
- Perilymph fistula
- Anxiety
- Occasional unilateral vestibular loss patients

Rotary chair in unilateral loss

- Not such a good test for unilateral loss (calorics are better, or vibration!)
  - No good way to separate unilateral loss from partial bilateral loss
  - Sometimes is in error - some persons with good evidence for unilateral loss have (barely) normal rotary chair tests.

Rotary chair testing is the “Gold Standard” for bilateral loss

Bilateral Loss

Acoustic Neuroma
Why do rotatory chair testing?

- Bilateral loss – best, “gold standard” test
- Validate caloric asymmetry
- Detect suppression of responses

Caloric testing is insensitive to Bilateral Paresis

- Criterion for BVL is total response < 20
- Normal total response is 100
- **Must lose 80% of caloric response**
- Rotatory chair testing easily detects unilateral vestibular loss (50% loss).
- Problem is anatomic variability in caloric responses. False positives also a problem.

Example: Bilateral Paresis with nearly normal caloric responses

- Abnormal R-chair and/or Active head test
- Absent VEMP’s
- Vestibular pattern on CDP (posturography)
- Total response < 20 on calorics
- Failed DIE test on exam

Bilateral loss can be confused with voluntary suppression

Summary: Chair testing

1. Supplements caloric test – when normal contrary to caloric, should consider caloric technical factors (like wax).
2. Poor test to establish side of lesion
3. Gold standard for bilateral loss