Rotatory Chair Testing

Timothy C. Hain, MD
Director of Vestibular Laboratory
Northwestern Memorial Hospital
Chicago IL

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

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

Active head movement (e.g. VAT)

- Provides similar information to rotatory chair at high frequencies
- As movement is active, there is the potential for contribution of voluntary and neck
- Much less expensive than rotatory chair (about an order of magnitude)

Rotatory stimulus profiles

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

All provide similar diagnostic data. Sum of sines is probably the best

Outcome measures

- Sinusoidal methods
  - Gain and Phase vs. frequency
- Step-response
  - Gain (high-frequency)
  - Time constant (Tc)
- Fixation suppression
  - Gain vs. frequency
### Diagnostic logic

<table>
<thead>
<tr>
<th>Gain</th>
<th>UL</th>
<th>BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (&gt; 0.7)</td>
<td>Reduced</td>
<td>Greatly</td>
</tr>
<tr>
<td>Reduced at low</td>
<td>reduced</td>
<td>reduced</td>
</tr>
<tr>
<td>freq. (&lt; 0.4)</td>
<td></td>
<td>(&lt; 0.4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase</th>
<th>Lead, Tc of 7-10</th>
<th>Lead or no data, Tc &lt; 7</th>
</tr>
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<tbody>
<tr>
<td>Normal, Tc of 15</td>
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### Rotatory 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

- Rotatory 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

### Rotatory 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 rotatory chair tests.

### Rotatory chair testing is the “Gold Standard” for bilateral loss
Bilateral loss can be confused with voluntary suppression

With bilateral loss there should also be:
- Severe vestibular pattern on MVP
- Total response < 20 on caloric
- No OKAN at all

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 values
- Rotatory Chair
  - Abnormal gain and phase
- Caloric
  - 40% weakness
  - 26.5 total response
Suppression pattern
sometimes seen in uncooperative
or malingering patients

- High-frequency gain is reduced
- Phase is normal at all frequencies

Gentamicin toxicity – is there suppression in
this medicolegal case?

MVP shows vestibular
pattern.

Summary: Chair testing

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