Tremor 101

Umer Akbar, MD
Assistant Professor, Brown University
Movement Disorders Program,
Rhode Island Hospital & Butler Hospital

Objectives

• Recognize and describe the qualities of common types of tremor
• Overview of treatment options for tremors

Importance of tremors

They cause problems
  functional impairment
  embarrassment
  "annoyance"
  fatigue
They indicate an underlying disease state
Tremor

- What is it?
- Who's affected?
- Where does it occur?
- When does it start?
- Why treat it?
  - How?
Tremor

- ET
- PD
- Dystonic tremor
- Enhanced physiologic tremor
- Medication induced
- Orthostatic tremor
- Holmes (cerebellar) tremor

Tremor

- A rhythmic oscillatory movement of a body part

Tremor

- Distribution
  - Head
  - Tongue
  - Voice
  - Trunk
  - Limbs
    - Hand
    - Foot
Tremor

**Latency of Reemergent Tremor**

<table>
<thead>
<tr>
<th>Latency (s)</th>
<th>Essential tremor (mean + SD)</th>
<th>Parkinson disease (mean + SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10 - 0.30</td>
<td>0.62 ± 0.34 (0.20 - 1.20)</td>
<td>1.10 ± 0.70 (0.10 - 3.00)</td>
</tr>
</tbody>
</table>

**TABLE 30.5** Categorization of tremors

<table>
<thead>
<tr>
<th>Type</th>
<th>Cause</th>
<th>Location</th>
<th>Movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest</td>
<td>Parkinson disease</td>
<td>Cerebellar/midbrain</td>
<td>Kinetic</td>
</tr>
<tr>
<td>Action</td>
<td>Essential tremor</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Postural</td>
<td>-</td>
<td>GM - thalamus (if it's a symptom)</td>
<td>-</td>
</tr>
<tr>
<td>Kinetic</td>
<td>-</td>
<td>gm - thalamus</td>
<td>-</td>
</tr>
</tbody>
</table>
Essential tremor

ET

Epidemiology
- One of the most common tremor disorders in adults
- Population study prevalence estimates range from 0.4%-6%
- Both incidence and prevalence increase with advancing age
- Bimodal distribution of age at onset

ET

Disease Characteristics
- Characterized by kinetic and postural tremor:
  - upper limbs (~95% of patients)
  - head (~34%)
  - lower limbs (~30%)
  - voice (~12%)
  - tongue (~7%)
  - face (~5%)
  - trunk (~5%)

- Criteria for definite and probable ET include:
  - in the absence of other neurological signs
  - abnormal bilateral postural or kinetic tremor of the hands
  - isolated tremor of the head if there is no evidence of dystonia
Disease Characteristics (continued)

- Tremor amplitude increases over time
- Increasing difficulty with fine motor tasks
- Potential physical and psychosocial disability
- Referred to as a “benign” condition
  - doesn’t reduce life expectancy
  - doesn’t cause symptoms besides tremor and gait abnormalities
- Typically improves with ETOH
- Usually + family history, but not always

Evidence-based recommendations for treatment of ET

- Propranolol and primidone reduce limb tremor (Level A)
- Alprazolam, atenolol, gabapentin (monotherapy), sotalol, and topiramate (Level B)
- Propranolol reduces head tremor (Level B)
- Clonazepam, clozapine, nadolol, and nimodipine (Level C)
- Botulinium toxin A in limb, head and voice tremor (Level C)
- Chronic DBS and thalamotomy (Level C)
- Surgical treatment of head and voice tremor and the use of gamma knife thalamotomy (Level U)
Parkinson’s disease tremor

1. Tremor at rest, resolves with movement
2. Usually asymmetric
3. Fingers>hands>chin>feet/legs
4. Look for other cardinal features to make diagnosis: stiffness, slowness, stability problems

PD Treatment of tremor

1. Treatment response to medication is unpredictable
   A. L-Dopa, dopamine agonists, anticholinergics, amantadine
   B. “Alternatives”: clozapine, mirtazepine, propranolol
2. DBS is most effective treatment
Severe PD tremor

PD Tremor after clozapine 25

Physiologic tremor

Physiologic tremor enhanced by:
- Emotion – anxiety stress
- Exercise, fatigue
- Beta-agonists
- Dopaminergic drugs
- Stimulants
- Valproic acid
- Carbamazepine
- Verapamil
- Epinephrine
- Psychiatric drugs
- Caffeine
- Cytosporine
- Interferon, and Flunitrazepam (5-7)
- Stress
- Endocrine: hypoglycemia, thyrotoxicosis, pheochromocytoma, adrenocorticosteroids
- Toxin: mercury, lead, alcohol withdrawal
**Task specific tremor**
1. Tremor that occurs only during specific tasks, usually writing (primary writing tremor)
2. Difficult sometimes to distinguish from dystonia with tremor

**Position dependent tremor**
1. Occurs only in certain positions
2. Typically affects fingers or leg
3. Probably not a pathological entity

**Psychogenic**
1. Acute onset
2. Intermittent
3. Variable frequency and amplitude
4. Variable limb involvement
5. Distractible
6. Often combines elements of different tremor types (resting, action, sustention)
Psychogenic

R hand dystonia with tremor

Other tremors
1. Hyperthyroid-fast ET
2. “Rubral” tremor-cerebellar findings plus rest, sustension, action
3. Drug induced tremors-fast ET
4. With dystonia-variable
Torticollis & head tremor

Orthostatic tremor

- First described by Ken Heilman 1984
- Fast, 14-16 Hz
- Involves mainly legs, sometimes arms
- Present while standing
  - Improves with sitting, walking
  - Feeling of unsteadiness and calf cramps
- Associated with ET and family hx of ET
- Tx: clonazepam (drug of choice)
  - Gabapentin also effective

Orthostatic tremor
Palatal tremor

- AKA Palatal myoclonus
- Rhythmic contractions of the soft palate
- Acute or chronic lesions involving the Guillain–Mollaret triangle linking dentate nucleus with the red nucleus via the central tegmental tract to the inferior olivary nucleus.
- Symptomatic palatal myoclonus (SPM) usually persists during sleep,
  - Contractions of the levator veli palatini, innervated by the facial nucleus and nucleus ambiguous
- Essential palatal myoclonus (EPM), frequently associated with an ear-clicking sound, disappears with sleep
  - Muscle agonist is the tensor veli palatini, which opens the eustachian tube and is innervated by the trigeminal nerve.
- Tx: clonazepam

Summary

<table>
<thead>
<tr>
<th>Tremor Disorders From the Consensus Statement on Tremor</th>
<th>Tremor Frequency</th>
<th>Activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign essential tremor</td>
<td>6–12 Hz</td>
<td>Postural</td>
</tr>
<tr>
<td>Orthostatic tremor</td>
<td>12 Hz±</td>
<td>Postural</td>
</tr>
<tr>
<td>Task- and position-specific tremor</td>
<td>4–12 Hz</td>
<td>Goal-directed movement</td>
</tr>
<tr>
<td>Unclassified tremor</td>
<td>4–12 Hz</td>
<td>Postural</td>
</tr>
<tr>
<td>Physiologic</td>
<td>5–12 Hz</td>
<td>Postural</td>
</tr>
<tr>
<td>Dyssynergic</td>
<td>4–8 Hz</td>
<td>Postural; goal-directed movement</td>
</tr>
<tr>
<td>Parkinsonian tremor</td>
<td>6–8 Hz</td>
<td>Rest</td>
</tr>
<tr>
<td>Cerebellar tremor</td>
<td>2–4 Hz</td>
<td>Goal-directed movement</td>
</tr>
<tr>
<td>Holmes' tremor</td>
<td>2–4 Hz</td>
<td>Rest; goal-directed movement</td>
</tr>
<tr>
<td>Palatal tremor</td>
<td>1–5 Hz</td>
<td>Rest</td>
</tr>
<tr>
<td>Neuropathic</td>
<td>5–10 Hz</td>
<td>Postural</td>
</tr>
<tr>
<td>Drug-induced and toxic tremor</td>
<td>2–10 Hz</td>
<td>Postural</td>
</tr>
<tr>
<td>Psychogenic</td>
<td>5–10 Hz</td>
<td>Postural</td>
</tr>
</tbody>
</table>