TREMOR

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OUTLINE

• Definition & Classification

• Differential Diagnosis
  – Parkinson’s Disease
  – Essential Tremor
  – Cerebellar Tremor
  – Dystonic Tremor

• Therapy
DEFINITION

• Involuntary and rhythmic oscillatory movements of a regular amplitude and frequency
• Produced by reciprocally innervated muscles.
• Contractions of agonists-antagonists muscles may be alternating or irregularly synchronous.

• Its rhythmic quality helps to differ it from other involuntary movements (i.e. chorea, tics, ballism).
• Involvement of agonist and antagonist muscles distinguishes it from ‘rhythmic myoclonus’.
## CLASSIFICATION

<table>
<thead>
<tr>
<th>Type of tremor</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rest tremor</strong></td>
<td>Tremor that occurs in a body part that is not voluntarily activated and is completed supported against gravity.</td>
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<tr>
<td><strong>Action tremor</strong></td>
<td>Any tremor that is produced by voluntary contraction of muscle, including postural, isometric, and kinetic tremor. The last includes intention tremor.</td>
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<tr>
<td><strong>Postural tremor</strong></td>
<td>Tremor that is present while voluntarily maintaining a position against gravity.</td>
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<tr>
<td><strong>Kinetic tremor</strong></td>
<td>Tremor that occurs during any voluntary movement. It may include visually or non-visual guided movements. Tremor during target directed movement is called intention tremor.</td>
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</table>
1. Physiologic Tremor

Action Tremor
Normal Physiological Tremor

- Postural
- Small amplitude (Virtually undetectable under normal circumstances)
- Frequency 10 Hz.
- Natural resonating oscillation of a limb
- Elicited by holding the arms outstretched with fingers spread apart
Enhanced Physiological Tremor

• WHAT IS IT?

It is not a function of the central nervous system, but a consequence of stimulation of muscular beta-adrenergic receptors by increased levels of circulating catecholamines.

• CAUSES:

• Intense stress, fright, anxiety
• Metabolic disturbances (hyperthyroidism, hypoglycemia, hypercortisolism)
• Pheochromocytoma
• Intense physical exertion
• Withdrawal from alcohol and other sedative drugs
• Toxic effects of several drugs
  – Nicotinic acid
  – Corticosteroids
  – Xantines (coffee, tea, colas)
2. Parkinson’s Disease

Resting Tremor
Parkinsonian Tremor

CLASSIFICATION:

• **Rest Tremor**
  (Suppressed/diminished by willed movement. Reasserts once the limb assumes a new position).

• Sometimes of mixed type: resting + postural/kinetic

LOCALIZATION

• **Unilateral** at onset. **Asymmetric** as disease progresses

• Mainly hands/forearms. Also lower limbs, jaw, lips, tongue.

FREQUENCY

• **3 to 5 Hz**

NOTE: alternating activity of opposing muscle groups, mainly *flexors.*
Early Stage
Unilateral, Small Amplitude, One body part
Advanced Stage
Bilateral, Coarse Amplitude, More body parts
3. Essential Tremor

Postural and Kinetic Tremor
Diagnostic Criteria for Essential Tremor

- Action Tremor (Postural and Kinetic)
- Symmetric
- No other Neurological signs
- Maybe head tremor (like ‘yes-yes’ or ‘no-no’)

Supportive Criteria:
- Long duration (>3 ys)
- Very slow or No progression
- Positive Family History
- Response to Alcohol
Archimede’s Spirals

Normal

Severity
<table>
<thead>
<tr>
<th>Essential Tremor</th>
<th>Parkinson’s Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action tremor</td>
<td>Resting tremor</td>
</tr>
<tr>
<td>More rapid frequency (5-12 Hz)</td>
<td>Slower frequency (3-5 Hz)</td>
</tr>
<tr>
<td>Bilateral at onset</td>
<td>Unilateral at onset</td>
</tr>
<tr>
<td>Symmetrical</td>
<td>Asymmetrical</td>
</tr>
<tr>
<td>Often Familial (30-50%)</td>
<td>Rarely Familial</td>
</tr>
<tr>
<td>Stable or slowly progressive</td>
<td>Progressive</td>
</tr>
<tr>
<td>No other Neurological signs</td>
<td>Associated with slowness, shuffling gait, rigidity, stooped posture, imbalance</td>
</tr>
</tbody>
</table>
4. Cerebellar Tremor

Intention Tremor
Intention (Cerebellar) Tremor

- Coarse and irregular interruption of forward progression of movement.
- Slow-frequency (2-4 Hz)
- Occurs only during the most demanding phases of active performance.
- Always combined with signs of cerebellar involvement.
- It requires for its full expression the performance of an exacting, precise, projected movement.
Figure 15.14  Finger–Nose–Finger Test  (A) Normal individual. (B) An individual with appendicular ataxia. Note that coordinated actions of agonist and antagonist muscles acting on multiple joints, including the shoulder, elbow, and wrist, are required to smoothly perform this movement in a normal fashion.
Cerebellar Tremor
5. Dystonic Tremor

Action Tremor + Dystonia
Dystonic Tremor

• Tremors may be intermixed with dystonic postures.

• When the underlying dystonic signs are not overt, the tremor looks like essential tremor.

• Movement is not entirely rhythmic, sometimes jerky, often intermittent.
THERAPY

HOW TO APPROACH TREMOR
Treatment Goals

- To improve daily functioning and quality of life
- Reduce the severity, not complete resolution
- Medications help mild-to-moderate tremor the best
- Aim for patient satisfaction
Exclude any Secondary Cause

1) Medications
   - β2 adrenergic agonists
   - Valproic acid
   - Lamotrigine
   - Lithium
   - Tricyclic antidepressants
   - Antihistamines
   - Thyroxine
   - Amiodarone
   - Nifedipine
   - Neuroleptics
   - Theophylline
   - Nicotine

2) Blood test
   - Routine haematology and biochemistry to exclude major metabolic problem including renal failure, liver disease +/- alcoholism
   - Thyroid function tests
   - Immunoglobulins and electrophoretic strip
   - Copper/Caeeruloplasmin in young patients

3) Brain CT scan
Parkinson’s Disease

• LEVODOPA (Sinemet®; Madopar®)
  Better absorption if assumed before meals
  **TITRATE SLOW:**
    - Start with 50 mg in the morning
    - Increase by 50 mg every 3-5 days
    - Daily dosage according to weight: 4-5 mg/kg/day
  Range: 300 (100mg tid; normal weight) to 450 mg/day (150mg tid; overweight)

  **MOST COMMON SIDE EFFECTS:**
  Nausea, vomiting. Somnolence. Ankle swelling.
  Elderly may experience confusion or hallucinations (higher risk when cognitive decline).

• Anticholinergics (Artane®)
  **DOSE:** start from 1 tb morning for 3-5 days, increase to 1 mg bd, then increase to 2 mg bd. If well tolerated, possible increase up to 3 mg td.
  **CAUTION** in the elderly
  **SIDE EFFECTS:** confusion, cognitive disturbance, dry mouth, constipation.
**Essential Tremor**

1. **Beta-Blockers**

- **PROPRANOL**

  *TITRATION:*
  
  - Start with 20 mg in the evening
  - Increase by 20 mg every week
  - Reach 80 mg/day (40 mg bid *or* 80 mg sustained release)

  If well tolerated up to 120mg/day

- **MOST COMMON SIDE EFFECTS:**
  

- **NOT TO BE USED** with asthma, insulin-dependent diabetes
Essential Tremor
2. Anticonvulsants

- First line: PRIMIDONE (250mg)

TITRATION:
- Start with ¼ tab at bedtime (62.5mg/day)
- Increase to 1/2 tab and monitor response
- If well tolerated increase to 1 tab (250mg)
- Maximum dose 750mg (Better not beyond 500mg).

MOST COMMON SIDE EFFECTS

NOT TO BE USED with pregnancy, hepatic failure, oral anticoagulants

- Second line: GABAPENTIN, TOPIRAMATE
Essential Tremor
3. Benzodiazepines

• First Line: **CLONAZEPAM**
  Titration: start from 0.25mg bedtime and increase up to 1 mg tid, if tolerated

• Second Line: **Diazepam, Lorazepam, Alprazolam**

**MOST COMMON SIDE EFFECTS:**
Sedation, drowsiness. Unsteadiness.

**CAUTION** with elderly for confusion, memory loss, falls.
Dystonic Tremor

BENZODIAZEPINES

• First Line: **CLONAZEPAM**
  Titration: start from 0.25mg bedtime and increase up to 1 mg tid, if tolerated

• Second Line: **Diazepam, Lorazepam, Alprazolam**

ANTICHOLINERGICS

• **Trihexyphenidyl Hydrochloride (Artane®)**
  DOSE: start from 1 tb morning for 3-5 days, increase to 1 mg bd, then increase to 2 mg bd. If well tolerated, possible increase up to 3 mg td
  CAUTION in the elderly
  SIDE EFFECTS: confusion, cognitive disturbance, dry mouth, constipation.
THANKS for the attention

QUESTIONS??