Tremor

See separate related article Abnormal Involuntary Movements.

Tremor may occur as a symptom or sign of an underlying disease or as an exaggerated physiological phenomenon. It is not a diagnostic term. It can be defined as a rhythmic oscillatory movement of a body part, resulting from the contraction of opposing muscle groups.

The vast majority of tremor seen in the primary care setting is due to 'essential tremor' (ET). This condition has previously been termed as benign or familial essential tremor. The term 'benign' should be dropped, as although the majority of sufferers do not have significant sequelae as a result of the condition, it can be very troubling and in some cases disabling.

Epidemiology of essential tremor

- ET is thought to affect 0.4-6% of the population.\(^1\)
- Men and women are equally affected.
- Approximately 50% of ET cases are familial with autosomal dominant inheritance.
- The onset of familial ET is usually during childhood, whereas sporadic ET usually occurs in those over 40 years of age.\(^2\)

Other causes of tremor

- Physiological tremor.
- Exaggerated physiological tremor due to illness, fever, hyperthyroidism, anxiety states, etc.
- Post-traumatic/post-neurosurgical tremor.
- Medication/drug-induced.
- Multiple sclerosis.
- Parkinsonism and Parkinson's-plus syndromes - eg, multiple system atrophy, progressive supranuclear palsy
- Metabolic derangement - eg, electrolyte disturbance, renal and hepatic failure.
- Wilson's disease.
- Cerebellar disease.
- Basal ganglia lesions.
- Dystonias.
- Other movement disorders - eg, tardive dyskinesia, cerebrovascular disease.
- Writer's cramp or tremor.
- Psychogenic tremor.
- Arsenic, heavy metal, organophosphate or industrial solvent poisoning.
- Vitamin deficiency (especially B1).

Classification of tremors

Tremors can be initially classified as rest or action tremors.\(^1\) Rest tremors occur when the body part is supported against gravity - eg, hands at rest in one's lap. Mental stress or general movement makes rest tremors worse. Action tremors are further subdivided into static, postural or kinetic tremors:

- **Static** - occurs in a relaxed limb when fully supported at rest. Causes include Parkinson's disease, Parkinsonism, other extrapyramidal diseases and multiple sclerosis.
• **Postural** - occurs when a part of the body is held in a fixed position against gravity (it can also remain during movement). Types include physiological tremor, exaggerated physiological tremor (eg, thyrotoxicosis), anxiety states, alcohol abuse, drugs (see below), heavy metal poisoning, neurological diseases, Wilson's disease, neurosyphilis, peripheral neuropathies, essential (familial) tremor and task-specific tremors such as primary writing tremor.

• **Kinetic or action tremor** - occurs during voluntary active movement of an upper body part. If action tremor worsens as goal-directed movement approaches its intended target, this is intention tremor (indicative of a cerebellar cause). Associated with brainstem or cerebellar disease, including multiple sclerosis, spinocerebellar degenerations, vascular disease and tumours.

**Presentation**

It is often described by sufferers as a trembling or quivering movement or sensation.

**Symptoms**

• **Essential tremor (ET):**
  - This is usually a distal symmetrical postural tremor of the upper limbs, usually of low amplitude with a fairly rapid frequency of 8-10 Hz.
  - It may initially be transient but usually progresses to become persistent.
  - The neck muscles may be involved, causing tremor of the head (about 40% of cases). Voice, face and jaw muscles may be involved.[5]
  - Frequency of the tremor tends to remain constant but amplitude is highly variable depending on emotional and physiological state.
  - Background tremor amplitude tends to progress over the course of years.
  - Some degree of control over the tremor, exerted by concentration on a task or via execution of a skilled manual repertoire, is common.
  - Tremor does not occur during sleep.
  - Most report improvement of tremor following alcohol ingestion.
  - It may be difficult to distinguish from exaggerated physiological tremor, that caused by hyperthyroidism/fever or tremor due to medications; these causes should always be borne in mind before diagnosing ET.

• **Physiological tremor:**
  - Can occur in a state of normality or in an exaggerated form, due to a precipitant such as anxiety, hyperthyroidism, hypoglycaemia, caffeine excess, fever, medication, etc.
  - It is usually associated with certain postures.
  - It is usually bilateral, symmetrical and non-progressive over time.
  - There may be a family history but this is less often than in ET.
  - Other motor symptoms should not accompany the tremor.

• **Secondary tremors due to neurological disease:**
  - Individual presentation is highly variable depending on the underlying cause. Enquire about symptoms of specific diseases such as Parkinsonism, dystonias, cerebellar syndrome, symptoms in other parts of the body, constitutional symptoms and problems with gait and balance. Tremor is not usually the only motor symptom.
  - More than 70% of patients with Parkinson's disease have tremor as the presenting feature. This tremor is typically asymmetrical, occurs at rest and becomes less prominent with voluntary movement.

• Psychogenic tremors are usually characterised by an abrupt onset, spontaneous remission, changing tremor characteristics and absence during distraction.[4]
  - Tremor may be worsened by lithium, antidepressants, bronchodilators, neuroleptics, amiodarone, procainamide, prednisolone, cinnarizine, ciclosporin, metoclopramide, methylphenidate and sodium valproate, caffeine (or other stimulants), sympathomimetics (eg, salbutamol, L-dopa and associated anti-Parkinsonian drugs), theophylline, thyroid hormones and recreational drug use.
  - Withdrawal from medication, including alcohol, may also cause tremor.

**Examination of the patient with tremor**

The presence of any hard neurological signs suggests a secondary tremor due to underlying neurological disease.
Assess general appearance. Note whether the face gives any clues such as oromotor dystonia (may be tardive dyskinesia) or mask-like appearance (consider Parkinsonism).

Observe the symptomatic movements. Consider whether this is tremor, chorea, dystonia or another movement disorder.

Ask the patient to hold their arms out in front of them with palms initially facing up, then down.

Ask the patient to adopt a posture or movement that they know brings on the tremor.

Look carefully at the hands and forearms. Note whether there a classical 'pill-rolling' Parkionsonian tremor.

Estimation of the frequency of the tremor is quite difficult without regular practice.

Perform a full screening peripheral neurological examination checking muscle tone, power, coordination, reflexes and sensation.

Observe gait, test for rigidity and bradykinesia indicating Parkinsonism.

Test cerebellar function by assessing speech (tongue-twisters), balance, finger-nose pointing and dysdiadochokinesia (inability to rapidly alternate movement - eg, pronation and supination of hand at wrist held on outstretched contralateral palm).

A screening cranial nerve examination can be useful in detecting neurological disease.

Investigations

It is unusual to need to investigate patients with tremor if they appear to have a characteristic presentation of essential or physiological tremor.

- Trials of reducing or stopping medication may be useful to determine an iatrogenic cause.
- Electromyography (EMG)/accelerometry may be used as an objective neurophysiological measure of the tremor frequency but should be used only occasionally to answer specific questions about a tremor.
- If there is reason to suspect metabolic derangement then U&Es, LFTs and FBC may be helpful.
- Check TFTs if there is a possibility of thyroid disease.
- Wilson's disease is diagnosed by measuring blood and urinary copper levels and caeruloplasmin assay. Wilson's disease should be considered in any child or young adult with unexplained liver abnormalities and also in patients with movement disorders.[5]
- If underlying CNS disease is suspected then CT/MRI imaging and/or neurological referral should be considered.

Management

Treatment of tremors is often challenging; although several drugs are available, the response may be unsatisfactory for many patients.[6]

Essential tremor (ET)

Most cases of ET fall into the following four categories:[7]

1. Mild tremor, which produces no functional or psychological disability/handicap and does not require treatment.
2. Mild-to-moderate tremor-producing disability only where there is tremor exacerbation in stressful situations such as social occasions or public speaking. These patients can be treated intermittently as necessary for these occasions.
3. Those cases with persistent disability/handicap because of tremor. These patients need continued therapy to improve daily life function.
4. Those cases that have persistent handicap but where tremor persists despite appropriate pharmacotherapy. Alternatives to conventional pharmacotherapy should be considered in these cases.

The decision to initiate treatment is largely up to the patient, based on his or her perception of quality of life.

- Propranolol and primidone are the effective drugs to date.[7] However, propranolol and primidone can cause side-effects (especially in the elderly) and interact often with drugs usually used in older people.[8]
- Topiramate, atenolol, and alprazolam are probably effective and clonazepam is possibly effective.[9]
• Medications that probably do not adequately treat ET include levetiracetam and pregabalin. Gabapentin appears to improve ET when used as monotherapy but not when used as adjunct therapy. Sotalol has been found to be probably effective in treating ET in previous reviews but it may be associated with arrhythmias and should not be routinely recommended.[10]
• Botulinum toxin A can be used for head tremor.[7]
• Deep brain stimulation (DBS) has become a well-accepted therapy to treat movement disorders, including ET.
• Thalamotomy or thalamic DBS has been shown to be effective in improving motor symptoms and also quality of life.[11]
• DBS offers the opportunity to selectively modulate the targeted brain regions and related networks. In addition, stimulation can be adjusted according to individual patients’ demands and stimulation is reversible.[12]
• The combination of high-intensity focused ultrasound (HIFU) with MRI guidance known as MR-guided focused ultrasound (MRgFUS) appears to be particularly promising to ablate tissues located deep in the brain. The safety and effectiveness of this method have been observed in Parkinsonian and ET as well as in neuropathic pain.[13]

Physiological tremor
• Usually, this requires no active treatment.
• If anxiety is a provoking factor then cognitive behavioural/relaxation therapy or antidepressant treatment may be helpful. See separate Generalised Anxiety Disorder article.
• Other underlying causes should be excluded and the patient then reassured that the condition is non-pathological and non-progressive. Practical coping strategies utilising methods known by the patient to reduce the tremor should be encouraged.

Secondary tremor due to neurological disease
Treat as recommended for the parent disease. See relevant separate articles Parkinsonism and Parkinson’s Disease and Multiple Sclerosis.

NB: always bear in mind the effect that medication or other drug use may be having on tremor when deciding on an appropriate treatment strategy and consider trials of dose reduction or discontinuation of candidate medications before trialling new medication to treat tremor.

Complications
Although there are differences between the two major tremor disorders, ET and Parkinson’s disease, tremor has been shown to impact on several domains of quality of life, from physical to psychosocial, in a large proportion of both groups of patients.[14]

Aside from its associated motor features, ET affects cognition in some patients and mood and morale. It has been associated with increased risk of mortality in the elderly.[15] A small proportion of those with the condition may be extremely disabled by it, severely affecting their employment and social prospects.

Prognosis
• ET is generally considered to be a neurodegenerative disease.[16]
• Factors predicting likely progression include asymmetric tremor, unilateral onset of the initial tremor and age of onset. If the tremor occurs before the age of 40 years then the rate of progression is low.[16]
• The average annual increase in tremor severity from baseline has been estimated to be between 3.1% and 5.3%.[16]
• However, there is no cure for ET, nothing available slows its progression, the symptomatic drug benefit declines with time and the life expectancy in ET is normal.[7]
• Physiological tremor is usually non-progressive and has an excellent outlook if underlying causes are treated or excluded.
• Tremors due to primary CNS disease carry the prognosis associated with the parent disease.
• Drug-induced tremors usually respond to withdrawal of the culprit medication. However, those used for very long periods can occasionally cause persistent tremor even after their withdrawal.
Further reading & references

5. Management of Wilson’s disease; European Association for the Study of the Liver (2012)

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