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Tremor and Other Hyperkinetic Movements

Reviews

Psychogenic Tremor: A Video Guide to Its Distinguishing Features

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Abstract

Background: Psychogenic tremor is the most common psychogenic movement disorder. It has characteristic clinical features that can help distinguish it from other tremor disorders. There is no diagnostic gold standard and the diagnosis is based primarily on clinical history and examination. Despite proposed diagnostic criteria, the diagnosis of psychogenic tremor can be challenging. While there are numerous studies evaluating psychogenic tremor in the literature, there are no publications that provide a video/visual guide that demonstrate the clinical characteristics of psychogenic tremor. Educating clinicians about psychogenic tremor will hopefully lead to earlier diagnosis and treatment.

Methods: We selected videos from the database at the Parkinson's Disease Center and Movement Disorders Clinic at Baylor College of Medicine that illustrate classic findings supporting the diagnosis of psychogenic tremor.

Results: We include 10 clinical vignettes with accompanying videos that highlight characteristic clinical signs of psychogenic tremor including distractibility, variability, entrainability, suggestibility, and coherence.

Discussion: Psychogenic tremor should be considered in the differential diagnosis of patients presenting with tremor, particularly if it is of abrupt onset, intermittent, variable and not congruous with organic tremor. The diagnosis of psychogenic tremor, however, should not be simply based on exclusion of organic tremor, such as essential, parkinsonian, or cerebellar tremor, but on positive criteria demonstrating characteristic features. Early recognition and management are critical for good long-term outcome.

Keywords: Tremor, psychogenic, parkinsonism

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Introduction

Psychogenic movement disorders (PMDs) are increasingly recognized as a cause of disability, but the diagnosis is still made largely at tertiary care movement disorders centers. The reported prevalence of PMDs varies between 2% and 20% based on the definition and clinical setting.[1] While PMDs are most common in young individuals, particularly women, the gender difference is less evident in children.[2] Psychogenic tremor (PT) is the most common PMD, accounting for approximately 50% of cases. While diagnostic criteria for PMDs, such as the Fahn–Williams[3] and Shill–Gerber,[4] have been proposed, the

diagnosis can be challenging, particularly for a non-neurologist or even a movement disorder novice. Indeed, the inter-rater agreement on diagnosis is poor even amongst movement disorder specialists.[5] There is no diagnostic gold standard and the diagnosis is primarily based on clinical history and examination.

The purpose of this review is to discuss and demonstrate clinical features of PT through clinical vignettes and accompanying videos. This is the first published visual guide to psychogenic tremor highlighting most of its characteristic clinical features. While no one feature is diagnostic, taken together these features can help clinicians arrive at a diagnosis of PT and avoid unnecessary testing or treatment.

Pathophysiology

The pathophysiology of PT is poorly understood, although psychological stressors have been usually implicated. Few studies, however, have evaluated the role of psychological stressors in PMDs. One study compared the role of previous life stress in patients with PMDs to healthy controls and patients with focal hand dystonia.[6] Patients with PMDs reported higher rates of childhood trauma, especially physical neglect and emotional abuse, and fear associated with traumatic events. However, not all patients with PMDs report a history of life trauma. A recent study evaluated the association of stressful physical events preceding PMDs in 50 subjects.[7] Eighty percent of subjects reported a physical event preceding the onset of PMDs and 38% reported symptoms of a panic attack associated with the event. The reported preceding physical events included injuries, infections, neurological disorders, pain, surgery, and vasovagal syncope. These physical events may provide sensory triggers for the subsequent PMDs.

Clinical history

When evaluating a patient with possible PT, the history is as important as the physical examination.[8] PT often has an abrupt onset with rapid progression to maximum severity. Tremor may be episodic with spontaneous remissions in between episodes. Episodes in one limb may spontaneously resolve and then recur in another part of the body. Patients with PMDs have often previously consulted many medical professionals, including neurologists, who have incorrectly diagnosed the patient with various neurological disorders. We estimate that the time from onset of PT to evaluation by a movement disorders specialist at The Parkinson's Disease Center and Movement Disorders Clinic at Baylor College of Medicine is an average of 2–3 years, although in one of our prior series some patients had symptoms up to 14 years prior to our evaluation.[9] Patients with PT and other PMDs often have other unexplained somatic complaints such as fibromyalgia, atypical chest pain, and irritable bowel syndrome.[10] Some may have been previously diagnosed with chronic fatigue syndrome, Lyme disease, or other medical conditions. There is often extensive surgical history of elective or "emergency" procedures. Many patients with PT are allied health care professionals or are somehow connected to the medical profession (e.g., employees of medical insurance companies). Prior history of physical or sexual abuse should be carefully explored. Enquiring about social history is important in order to understand potential psychological stressors at work or at home. Although history of emotional or physical stress may support a diagnosis of PT, it is important to keep in mind that patients with organic disease may have a prior history of stress. Furthermore, some patients may have psychogenic overlay, or embellishment, to their organic tremor. Thus presence of an organic neurological disorder does not exclude the diagnosis of a PMD and vice versa as both can co-exist.

Neurological examination

In the following section we will discuss clinical features of PT. Some of these features may be seen in other tremor disorders, other PMDs, or other psychogenic, also referred to as functional or conversion, disorders.[11] The overall clinical picture including history and examination needs to be taken into consideration when making a diagnosis, as no one clinical finding is diagnostic.

The examination should focus on the presence of features that support the diagnosis of PT (Table 1).

Distractibility

Distractibility refers to the change in tremor amplitude, direction or quality, usually a decrease or cessation of tremor, when volitionally performing other tasks. For example, when speaking to the patient obtaining the history, tremor may be minimal. Asking the patient to perform other tasks, such as finger tapping with the contralateral limb or performing mental tasks such as reciting the months of the year backward, may distract the patient and the tremor in the affected hand changes frequency, amplitude or character. In order to enhance the distractibility the patient may be asked to perform the finger movements in a complicated order (e.g., second, fifth, and third finger).

Clinical vignette #1: Distractibility with motor tasks. A 43-year-old female with a history of depression who presents with episodic tremor and unsteady gait. The tremor started in her legs while undergoing physical therapy postoperatively for cervical stenosis and progressed to episodes of generalized shaking (Video 1).

Clinical vignette #2: Distractibility with mental tasks. A 39-year-old female with a history of chronic pain and anxiety presents with sudden onset right arm tremor. Tremor is mild in the morning and increases in intensity with increased activity. The tremor interferes with many activities and she is now dependent on her daughter's assistance for activities of daily living (Video 2).

Variability

Tremor variability can present as a change in frequency, amplitude, or direction, characteristic of PT. Organic tremor, however, can have variable amplitude often increasing with anxiety. Furthermore, some organic tremor such as the head tremor in patients with essential tremor or cervical dystonia may be quite irregular in rhythm and may change direction (e.g., changing from vertical to horizontal) and does not necessarily indicate PT.

Table 1. Features on Examination Supportive of the Diagnosis of Psychogenic Tremor

• Shaking with changing frequency, amplitude direction, and anatomic distribution
• Movements disappear with distraction maneuver or pressing on a particular spot
• Application of a tuning fork with a suggestion that vibration may increase or suppress the tremor
• Non-patterned abnormal postures and spasms
• Bizarre gait (astasia–abasia), knee-buckling gait, bouncing stance
• Deliberate slowness (with "effort") carrying out requested voluntary movement
• Abnormal speech pattern (hesitant and slow, bursts of verbal gibberish; changing dialects and accents)
• Facial grimacing, alternating facial contractions (may resemble hemifacial spasm)
• Movements and postures incongruous with recognized disease patterns or with expected physiologic abnormalities
• Manifesting exhaustion, excessive fatigue
• Obvious psychiatric disturbances (depression, anxiety)
• Multiple somatizations and undiagnosed conditions
• La belle indifference
• Delayed and excessive startle (bizarre movements in response to sudden, unexpected noise or threatening movement)
• Presence of additional types of abnormal movements that are not known to be part of the primary or principal movement disorder pattern that the patient manifests
• Convergence spasm and other dysconjugate oculomotor abnormalities

Video 1. **Distractibility with Motor Tasks.** The tremor in the hands decreases in amplitude when the patient flexes and extends the opposite hand.

Clinical vignette #3: Variability of frequency. A 56-year-old female presenting with generalized tremor. Tremor started in the right leg, spreading shortly after to the left leg and both arms. Tremor is episodic (each episode lasts up to 20 minutes) and leaves her feeling exhausted. The frequency varies markedly in the same and in different body parts, alternates between the two legs, and involves different body parts or the whole body (Video 3).

Clinical vignette #4: Variability of direction. A 70-year-old retired medical transcriptionist with severe depression who developed intermittent tremor in the right leg after a fall. The tremor then spread to the other leg and both arms but continues to be intermittent. She also has intermittent stuttering speech (Video 4).

Entrainability

Tremor may also be entrainable, i.e., brought into a specific rhythm. This can be demonstrated by asking the patient to flex and extend the wrist of the opposite hand at various frequencies and entrain the tremor in the affected hand to the frequency similar to the voluntary repetitive hand movement.

Video 2. **Distractibility with Mental Tasks.** As the patient recites the months backwards, the tremor of the right hand varies in direction, amplitude, and frequency with frequent pauses.

Video 3. **Variability of Frequency.** The tremor frequency changes in the arms and legs. The tremor frequency of the left hand often decreases and changes direction from flexion–extension to a circular motion. The tremor frequency in the legs increases and decreases throughout the exam.

Clinical vignette #5: Entrainability. A 68-year-old female with sudden onset of right arm tremor while at church. Her right hand tremor is intermittent and accompanied by fluctuating truncal swaying movements, which later evolved into total body rhythmical but irregular movement (Video 5).

Coherence

Tremor in multiple body parts, at the same frequency, is an example of coherence of tremor. Tremor coherence in multiple body parts is suggestive of PT. Furthermore episodes of "total body tremor" are more consistent with PT.

Clinical vignette #6: Coherence. A 79-year-old male with severe depression and sudden-onset upper body tremor. The tremor was first episodic with normal periods in between. Tremor worsened during a cardiac stress test and is now constant with intermittent exacerbations. Tremor improves when lying down (Video 6).

Video 4. **Variability of Direction.** Leg tremor changes direction from vertical to horizontal.

Video 5. **Entrainability.** The patient has a slow truncal tremor that is irregular. When she opens and closes her hands, the truncal tremor entrains to the frequency of the hand movements, increasing and decreasing in frequency.

Suggestibility

PT is often suggestible, and can vary in response to certain stimuli. One way to test for suggestibility is to apply a vibrating tuning fork to the affected body part and suggesting that the vibrating stimulus may alter the tremor.

Clinical vignette #7: Suggestibility. A 55-year-old male with sudden onset of truncal tremor after standing up from the dinner table. This episode lasted for several hours. He continued to have episodes of truncal and limb tremor. Tremor causes unsteady gait and he now uses a walker (Video 7).

Clinical vignette #8: Suggestibility. A 52-year-old medical billing and coding specialist with a history of reflex sympathetic dystrophy who developed tremor the weekend after a hurricane. The tremor occurs in episodes, varies in intensity, at times causing total body tremor. She has intermittent stuttering. She is separated from her husband and lives with her mother (Video 8).

Video 6. **Coherence.** Tremor is present in multiple body parts (both hands and head) all with similar frequency.

Video 7. **Suggestibility.** Truncal tremor increases in intensity after the application of the vibrating tuning fork and a suggestion that "sometimes vibration makes tremor worse".

Psychogenic spirals

Assessing tremor with other tasks such as writing and drawing spirals can also help distinguish PT from other types of tremor. When patients with PT draw a spiral, they can often make deliberate pauses when drawing, and portions of the figure can be of variable amplitude and direction without a consistent oscillatory pattern.

Clinical vignette #9: Psychogenic spiral. A 37-year-old female with bilateral hand tremor for 8 years and a family history of tremor. Tremor is alcohol-responsive and worse with exercise, fatigue, and stress. It has worsened over the past few years. On examination she has some atypical features, including distractibility, suggestibility, and an irregular spiral. She has a combination of essential tremor and PT (Video 9).

Video 8. **Suggestibility.** Tremor of both hands decreases in amplitude and frequency with the application of a tuning fork and a suggestion that "sometimes vibration makes tremor better".

Video 9. **Psychogenic Spiral.** The patient has mild postural and action tremor consistent with essential tremor. She also demonstrates distractibility when performing finger taps and suggestibility with a tuning fork, with reduction in tremor amplitude. She draws spirals slowly, with pauses, and portions of the spiral are irregular, without a consistent oscillatory pattern.

Video 10. **Tremulous Gait.** Tremor in the legs while standing and walking creates a bouncy quality to her gait. Despite this tremor she maintains her balance throughout. There is also deliberate slowness with pauses.

Tremulous gait

PT may present while standing or walking and should be distinguished from myoclonus, titubation and orthostatic tremor. PT patients while walking may have a "bouncy" quality to their gait that is irregular in frequency and direction. Associated features with a psychogenic tremulous gait can be deliberate slowness with pauses in between steps but with normal stride length. There may also be an exaggerated loss of balance in response to a slight pull backwards.

Clinical vignette #10. A 51-year-old female with a history of unsteady gait since 2012 with subsequent surgery for cervical myelopathy. After surgery she developed tremor in her legs while supine, sitting, standing, and walking. She has frequent near-falls, but has never actually fallen (Video 10).

Discussion

The primary aim of this video guide is to use illustrative cases to demonstrate features of PT that help to differentiate this PMD from other movement disorders.

In one study of 127 patients with PT, the following clinical features were considered to be characteristic of PT: abrupt onset (78.7%), distractibility (72.4%), variable amplitude and frequency (62.2%), intermittent occurrence (35.4%), inconsistent movement (29.9%), and variable direction (17.3%).[9] To the extent that essential tremor is often considered in the differential of PT, a study designed to determine which features most reliably differentiate these two tremors enrolled 45 subjects with essential tremor (N=33) or PT (N=12) who were videotaped according to standardized protocol and were then reviewed by a rater who was "blinded" to the diagnosis.[12] The study found that compared with essential tremor, PT subjects were significantly more likely to have a sudden onset of their tremor (66.7% vs. 9.1%, p=0.03), spontaneous remissions (69.2% vs. 15.2%, p=0.03), and a shorter duration of tremor (7.8 $\pm$ 4.0 vs. 28.5 $\pm$2.9 years, p=0.001). As expected, family history of tremor was significantly more common in the essential tremor group (16.7% vs. 75.8%, p=0.001). Compared with essential tremor, a greater proportion of subjects with PT were more likely to demonstrate a moderate-to-marked degree of distractibility with alternate finger tapping (72.7% vs. 26.7%, p=0.01) and mental concentration on serial sevens (58.3% vs. 15.6%, p=0.01). Furthermore, suggestibility with a tuning fork (41.7 vs. 12.1%, p=0.04) was more common in patients with PT than essential tremor.

Another tremor that is often considered in the differential diagnosis of PT is parkinsonian tremor, as many patients consciously or subconsciously attribute their tremor to "Parkinson's disease". Based on a study of 32 patients with psychogenic parkinsonism, patients with this type of PMD were typically found to exhibit an abrupt onset of "shaking", often in response to some stressful event, followed by progressive slowness and early disability.[13] On examination the tremor was easily distractible and, instead of decrementing amplitude when performing repetitive movements typically present in patients with Parkinson's disease, the patients with psychogenic parkinsonism had no decrement when performing rapid succession movements. Furthermore, patients with psychogenic parkinsonism often actively resisted passive movement by the examiner without cogwheel rigidity, typically present in patients with Parkinson's disease. In addition, many patients with psychogenic parkinsonism have "give-way" weakness, stuttering speech, bizarre gait, and a variety of behavioral, sexual, and other motor and non-motor symptoms that are not congruent with typical Parkinson's disease. Their symptoms may respond to a powerful suggestion or carbidopa placebo and they do not develop levodopa-related motor complications.[13] Another study showed that tremor amplitude decreased with additional load in parkinsonian tremor but increased in PT.[14]

In addition to findings typical of PT mentioned above, patients with PT may have other non-physiologic neurologic symptoms and signs that support the diagnosis of PMD. For example, patients may have excessive startle to minimal sensory stimuli, non-anatomical sensory findings such as splitting the midline, or differences in perceiving vibration on opposite sides of the forehead. Convergence spasm, consisting of ocular convergence, miosis, and accommodation associated with dysconjugate gaze is often associated with PMD.[15] There may be give-way weakness or inconsistent patterns of weakness

(e.g., apparent weakness of ankle flexion and extension on confrontational testing, but normal heel and toe walking without foot drop while ambulating), or a Hoover sign.[16] Patients with PMDs may have a bizarre gait, such as astasia–abasia, contorting their bodies from side-to-side while walking but still maintaining balance. When testing postural instability they may have an exaggerated loss of balance to a minimal pull without an actual fall. The examiner should take time to elicit these additional signs as they collectively support the diagnosis of PT.

Ancillary testing

Neurophysiologic testing in patients with PT and other PMDs is generally limited to academic centers and mainly used for research purposes. A variety of tests using an accelerometer, electromyography (EMG), electroencephalography, and other instruments may be employed to demonstrate specific tremor patterns suggesting PT.[17] These tests provide more objective and quantitative measures of tremor, including variability, entrainment, and coherence. The coherence entrainment test involves accelerometers and surface EMG to evaluate for tremor entrainment to the frequency of motor tasks performed with the opposite limb.[18] One study evaluated this test in 35 patients in an attempt to distinguish between PT, dystonic tremor, and normal controls.[18] The coherence entrainment test demonstrated high specificity and sensitivity for distinguishing PT from dystonic tremor and other organic tremors. In those with a clinically definite diagnosis, coherence entrainment was demonstrated in PT patients but not in those with organic tremor. Furthermore, clinically definite PT patients demonstrated coherence of tremor frequency in different limbs compared to those with organic tremor who did not. Tremor coherence between limbs, however, is not seen in all PT patients and one study found tremor coherence in only about 50% of PT patients.[19] The ballistic movement test uses accelerometers and surface EMG to measure the change in tremor when performing a ballistic movement with the opposite hand in response to a visual cue. PT patients demonstrate a transient reduction in amplitude or arrest in tremor when performing a sudden movement with the contralateral arm.[20] The dual task interference measures the reaction time to perform a quick action with the opposite limb. PT patients demonstrate a delay in performing a simple reaction time task with the contralateral limb.[21] Loading the limb with weight and using accelerometers to measure tremor amplitude can also help distinguish PT from organic tremor. Loading the limb tends to increase tremor amplitude in PT, whereas the tremor amplitude decreases in organic tremor with loading.[14] The co-activation sign in PT demonstrated by EMG consists of a tonic contraction of antagonist muscles at the onset of tremor and lasts approximately 300 ms.[14] One study that employed EMG recording found that the co-activation sign and absent finger tremor were the most consistent features that separated psychogenic from organic tremor.[14]

These physiological tests may be helpful in differentiating between patients with PT and organic tremor, although they lack high specificity and sensitivity for a diagnosis of PT.[22] True entrainment, while a useful clinical sign when present, is actually quite rare in PT,[12,22] whereas variability in tremor frequency is much more common. Ancillary testing, while usually not essential for the diagnosis, can provide objective evidence and help convey the diagnosis to a patient.

Single photon emission computed tomography (SPECT), using a ligand that binds to the presynaptic striatal dopamine transporter (DAT), can be used to measure presynaptic neuronal degeneration as seen in Parkinson's disease.[23] The DAT-SPECT can be helpful along with neurophysiologic testing to distinguish psychogenic parkinsonism from Parkinson's disease.[24] A normal DAT-SPECT, however, does not distinguish psychogenic parkinsonism from other organic parkinsonian disorders such as drug-induced parkinsonism and vascular parkinsonism as these latter diseases also have a normal DAT-SPECT.

Conclusion

An early and correct diagnosis of PT is important, as it should lead to prompt treatment and improve the long-term prognosis. The diagnosis is not only based on exclusion of organic causes, but on clinical features characteristic of PT. Neurophysiological studies, although sometimes helpful in difficult cases, are rarely needed to support the diagnosis of PT. Further research into the mechanisms of PT as well as studies evaluating treatment strategies are needed to advance our understanding of this PMD and ultimately improve care for this challenging group of patients.

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