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Psychogenic tremor and related disorders

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■ **Abstract** Psychogenic tremor is the most common form (55%) of all psychogenic movement disorders. Almost 75% of presenting patients are female. Onset is often abrupt. Preceding events include work related injuries and other accidents. Important clinical characteristics include variability of direction, amplitude and frequency. A positive entrainment test, presence of the co-contraction sign, absence of finger tremor and slowness of voluntary movements are suggestive of psychogenic origin. Co-morbidity with psychiatric disorders is common and includes somatoform disorders (35%), such as pain, diffuse sensory loss, conversion disorders and depression (14%). One fifth

(21%) of patients are involved in litigation or compensation issues. Diagnosis is based on history, clinical signs and investigations. A multimodal approach including neuropsychiatric evaluation and psychotherapy should be offered. Prognosis, however, is relatively poor particularly if the condition has persisted for over a year and in the long-term up to 80–90% of patients continue to have abnormal movements.

■ **Key words** tremor · psychogenic movement disorder · entrainment · co-contraction sign · distractibility

Introduction

The term “psychogenic” is derived from a Greek word meaning “created by the soul” and is applied to diseases that cannot be attributed to a certain lesion or dysfunction of a system. Among the psychogenic movement disorders (PMD), tremor is one of the most common forms and was even recognised by Gowers as a manifestation of hysteria, interestingly quite commonly in women with suspected hysterical paralysis [13].

Epidemiology

Psychogenic neurological conditions account for 1–9% of admissions to neurological units [8]. In one recent report, 517 cases of PMDs were seen over 5 years at a large movement disorder specialist referral centre, 127 (55%) of whom had a tremor disorder, followed by dystonia (39%), myoclonus (13%), tics (6%), gait disorder (3%) and parkinsonism (2%) [14]. Obviously a mixture of movements can occur as well. The incidence of psychogenic disorders

has been recently increasing possibly because of improvement and recognition of common movement disorders by neurologists [14].

Demographic characteristics

PMDs are more common in women on the whole except for parkinsonism for which both sexes are equally predisposed [9, 15, 17, 22, 14]. In the study by Jankovic and Thomas [14] of 127 cases of psychogenic tremor, 72% were female, the mean age at first evaluation being 43 years (+/- 14 years) and the mean duration of symptoms was 4.6 years [14].

Clinical manifestations

The onset of the disease is abrupt in a large number of patients with PT as in other PMDs [14, 15, 17]. Precipitating factors such as work related injuries and motor-vehicle accidents are a common feature [19]. 43% of the patients studied by Lang et al. [19] and 77% studied by Morgan et al. [23], presenting with psychogenic tremor/parkinsonism had unilateral symptoms, typically involving the dominant hand side. However, although wrists, elbows and shoulders are commonly affected, fingers are rarely involved, unlike typical Parkinson's disease (PD) [6]. Clinically, PT can be present at rest and persist even during position and intentional movements, at the same frequency [17].

One important characteristic, however, is variability. Variability in PT may be seen in direction (e.g. from supination - pronation orientation to flexion - extension) [17], amplitude (e.g. when a limb is weighed) [5] and frequency [15]. The tremor may increase when the attention is drawn to the affected limb, or when the patient is asked about it and can improve dramatically or even disappear when the patient's attention is withdrawn from the area involved [3]. Similarly, the tremor may decrease if the patient is distracted by mental activity (e.g. mental arithmetic), or complex motor tasks (e.g. finger-to-nose test and tandem walking) [7].

Entrainment, meaning change of the original tremor frequency to match the frequency of a repetitive task performed in another limb (e.g. tapping), or side to side tongue movements [15] is also common in PT. However, it must be kept in mind that parkinsonian rest tremor, e.g. in idiopathic PD, quite often appears when the patient is walking or being distracted. Koller and Biary [16] suggested that PD patients are capable of voluntarily suppressing their tremor (for an average of 48 seconds), if they are allowed to concentrate on it, in contrast to the psychogenic patients where the opposite tends to happen.

Lang et al. [19] pointed out that in PT classic limb rigidity is uncommon and when it is present, the examiner has a sense of voluntary resistance. This also subsides when the patient is distracted. Deuschl et al. [6] suggested that this resistance is due to co-activation of agonist and antagonist muscles in PT which is supported by clinical evaluation and EMG analysis.

Voluntary movements can appear to be slow; however, this is not due to true bradykinesia with typical arrests in movement [19]. In patients with PT slowness is present throughout the performance of rapid repetitive and alternating movements, but without the fatiguing and decreasing amplitude that is seen in true parkinsonian patients. The patients often seem to struggle and put more effort than needed to perform the tasks. They are grimacing, sighing and look 'exhausted' and may use their whole body in order to do a minor movement.

Walking can be slow and stiff, with reduced or even absent arm swing on the affected side. The patients can respond in a theatrical way on postural stability testing and tandem walking, flinging up both their arms (even the affected one) equally and symmetrically and retropulsing but never falling. An exaggerated "startle", when the backwards pull test is performed to test postural stability, is often seen.

Careful history will reveal multiple other somatic symptoms, such as generalized fatigue, nonspecific pains, memory disturbance and impaired vision. They also often have signs of give-away weakness of a limb and non-anatomic sensory loss.

Diagnosis

Fahn and Williams [9] published a classification of psychogenic dystonia, which can be applied to all PMDs. According to this, a movement disorder can be classified as (1) *documented*, meaning symptoms are relieved by psychotherapy, suggestion, or placebo, or the patient is witnessed as being free of symptoms when left alone; (2) *clinically established*, meaning the movement disorder is inconsistent over time or is incongruent with the classic condition and any of the following are present: other definitely psychogenic neurological signs, multiple somatizations, or an obvious psychiatric disturbance; (3) *probably psychogenic*, meaning that movements are inconsistent or incongruent with the classic movement disorder but no other features provide support for a diagnosis of psychogenicity, or that the movement disorder is consistent and congruent with the classic disorder but other features of psychogenicity are present; or (4) *possibly psychogenic*, meaning it is suspected that the movements are psychogenic if an obvious emotional

Table 1 Clues suggesting that a movement disorder may be psychogenic. (Miyasaki et al, 2003; Sa et al, 2004)

A) Historical
1. Abrupt onset
2. Static course
3. Spontaneous remissions
4. Obvious psychiatric disturbance
5. Multiple somatizations
6. Employed in health profession
7. Pending litigation or compensation
8. Presence of secondary gain
9. Young age
B) Clinical
1. Inconsistent character of movement (amplitude, frequency, distribution, selective ability)
2. Paroxysmal movement disorder
3. Movements increase with attention or decrease with distraction
4. Ability to trigger or relieve the abnormal movements with unusual or non physiological interventions. (e.g trigger points of the body)
5. False weakness
6. False sensory complaints
7. Self-inflicted injuries
8. Deliberate slowness of movements
9. Functional disability out of proportion to exam findings
10. Movement abnormality that is bizarre, multiple or difficult to classify
C) Therapeutic responses
1. Unresponsive to appropriate medications
2. Response to placebos
3. Remission with psychotherapy.

disturbance is present. Most PT patients would fall into the “documented” or “clinically established” categories [14].

The first clues of psychogenicity in a patient presenting with tremor can be obtained by history (Table 1. A). This may include a history of a psychiatric disease, or a long medical history involving multiple operations, admissions in hospitals and a long catalogue of diagnostic tests previously done. Events prior to the onset of the disease, such as accidents, stressful situations, or work-related injuries with litigation or compensation pending, can be indicative of a possible non-organic cause of the symptoms. An impressive fact is that psychogenic movement disorders are more frequent in people employed in health professions [10, 15, 17] and in those who have witnessed the organic form of the disorder (e.g. idiopathic PD) in other family members.

Elements in clinical examination are also revealing as well as responses to therapeutic procedures (Table 1. B). The use of placebo as diagnostic and therapeutic procedure remains controversial, as it gives rise to ethical considerations and can affect the physician-patient relationship. It is suggested by Sa et al. [26] that the use of placebo should be reserved for cases in which the diagnosis of psychogenicity remains uncertain after a thorough investigation and follow-up. It can also prove useful in the differential

diagnosis of complex movement disorders and in cases where organic and psychogenic aetiologies coexist [18, 22]. Sodium amytal can be used alternatively, as it may ameliorate PT [27]. Furthermore, spontaneous remissions and improvement of symptoms with psychiatric consultation and psychotherapy are strongly suggestive of psychogenic origin of them [10]. Admission to hospital can prove beneficial, as it allows continuous observation of the patient, as well as psychiatric estimation and intervention, and will convince the patient that the physician pays the appropriate attention to the patient’s complaints [10, 26]. Routine blood tests including haematology and screening tests for liver and renal function should always be performed; in particular screening tests for thyroid dysfunction as well as serum copper and caeruloplasmin to exclude Wilson’s disease which can both present with tremor and are both treatable. Investigations including imaging (CT and MRI) may be useful in order to exclude a structural lesion, particularly if the tremor is asymmetrical or unilateral, has features of a rubral tremor or began with a sudden onset, features that may be present in vascular or demyelinating disease. As PD and other parkinsonian disorders have a presynaptic dopaminergic defect, dopamine transporter (DAT) SPECT and Fluorodopa (^{18}F -dopa) PET scans, may be useful to differentiate PT from organic parkinsonian conditions. However, PET is not easily available and does not play a role in routine clinical investigation. One should also keep in mind that DAT SPECT and ^{18}F -dopa PET scans can be normal in dopa responsive dystonia-parkinsonism (DRD), manganese and neuroleptic induced parkinsonism, akinetic-rigid Huntington’s disease, X-linked parkinsonism and other conditions [19] which may all present with tremor. There are also a small number of PD/PD-like patients in whom scans are found to be apparently normal [29]. In any case, an abnormal result on DAT or ^{18}F -dopa PET would be in favour of organic parkinsonism [28].

Electrophysiological studies, including EMG, accelerometry [30] and frequency analysis [2] have been reported in the literature for the establishment of the psychogenic origin of the tremor, but they do not have much use in the day to day clinical service. PT has a frequency of less than 6 Hz, as hardly anyone can produce a voluntary tremor over 7 Hz [7]. Large fluctuations in tremor’s amplitude (e.g. with weighing) and frequency and also improvement of tremor with distractibility are noted during the examination. It should, however, be kept in mind that patients with PD or essential tremor can also demonstrate variations in tremor amplitude with stress or emotion, but these are only minimal [17]. Zeuner et al. [30] used accelerometry to measure frequency changes during tapping in a group of PT patients and a group with

parkinsonian and essential tremor patients. They concluded that a significant absolute change in tremor frequency and marked variability in tapping was noted in PT patients and suggested that the change in frequency is more characteristic than entrainment in those patients.

It should be emphasized that some patients with organic movement disorders can demonstrate additional psychogenic symptoms, which usually affect the same part of the body as the underlying organic MD [25].

Making the diagnosis is a challenging issue and should be established with extreme caution, preferably by a movement disorders specialist or an experienced neurologist.

Psychiatric diagnosis

It would be useful to define some of the conditions seen in patients with psychogenic disorders, according to American Psychiatric Association's DSM-IV (1995) [1]. In *somatoform disorders*, the symptoms suggest a general medical condition but these cannot be fully explained by the presence of a specific medical disorder, exposure to a substance, or by any other mental disorder. Symptoms cause significant distress or impairment in social, occupational or other areas of functioning. They are not intentionally produced or feigned. They include somatization and conversion disorders. *Somatization* disorders are characterized by repeated complaints of physical illness unrelated to organic cause resulting in medical treatment or significant impairment in social, occupational or other areas of functioning. Complaints include pain, gastrointestinal problems like vomiting or diarrhoea, sexual symptoms and pseudoneurological symptoms. Onset before the age of 30 years and occurrence over a period of many years is one of the DSM-IV criteria. A *conversion disorder* is characterised by symptoms or deficits affecting voluntary motor or sensory function that suggest a neurological or other medical condition but cannot be fully explained by a general medical condition. Onset is usually preceded by conflicts or other stressors. In contrast, *factitious disorders*, such as Munchausen's syndrome, are intentionally produced and the motivation for the patient is to assume the sick role. Similarly, in *malingering* the symptoms are intentionally produced and motivated by external incentives (e.g. avoiding work or military duty, or obtaining compensation).

The establishment of the underlying psychiatric disorder in PT and all other psychogenic disorders, although crucial for the diagnosis and treatment, is not always possible. In one series [19] of 14 patients of psychogenic parkinsonism, there was evidence of

somatoform disorders, especially conversion disorders (29%) and depression (35%) in some patients. Litigation or compensation issues were also present in some (35%), whereas the psychiatric disorder could not be clearly identified in three of them (21%). In other series, regarding other PMDs, the most common psychiatric diagnoses were depression, anxiety and conversion and somatization disorders [8, 15, 17].

Additional pathophysiological considerations

In addition to the clinical indicators the diagnosis of PT may be supported by physiological studies. In this regard using quantitative accelerometry [5] the "co-activation sign" manifested by muscle activation in finger flexors and extensors about 300 ms before the onset of tremor could be demonstrated in 15 patients. This finding is different from the tremor recorded in patients with PD where tremor bursts start immediately. In addition to the co-activation sign as mentioned above, absent finger tremor was a feature separating PD from organic tremor. In contrast organic tremor in which amplitude dampens with loading (500 or 1000 grams) patients with PT had an increase in amplitude of their tremor with such loading. Zeuner et al. [30] demonstrated that in contrast to essential tremor and parkinsonian tremor patients with PT have larger tremor frequency changes and higher individual variability while tapping. McAuley et al. [20] used a coherence entrainment test as another electrophysiological technique to be able to differentiate between psychogenic on one hand and dystonic and other organic tremors on the other hand. Recently, Raethjen et al. [24] have studied 15 patients with PT diagnosed by established criteria and tested electrophysiologically. In seven of the 15 patients a significant coherence between the two hands was seen. In the remaining eight patients, however, there was independent oscillation. Despite this clinical presentation, tremor frequency and amplitudes there was not significant difference between the two groups. They concluded that there may be two pathogenetic mechanisms underlying PT. Bilateral voluntary movements are typically coherent. Thus, coherent PT would be in keeping with voluntary produced oscillation. Absent coherence, however, is an indication of another possible non voluntary mechanism like myoclonus or enhanced physiological tremor.

The tests mentioned above, however, are not available in the day to day context, furthermore none of these are diagnostic on their own and have to be used in association with the clinical features. PT is not a diagnosis of exclusion but with the correct clinical features and the physiological techniques diagnosis can be made in a large proportion of cases.

Treatment

When the diagnosis of PT is established, it should be presented to the patient with extreme caution and a non-judgemental character, in order that trust and acceptance will be gained. It should be pointed out that the tremor disorder is not due to a lesion of the nervous system and that remission may be possible. Appropriate neuropsychiatric approach and evaluation should be suggested, especially to those that had a long standing disease with multiple investigations and ineffective treatments [26]. It is important that the patient is approached in a way that does not make him feel that he is “crazy”. It was suggested by Ford et al. [12] that a possible neurobiological explanation for the patient’s symptoms could be presented. It should, perhaps, be explained that the mind and the body are in strong association with each other and that the dysfunction of the one can affect the other, as it happens with a numerous other diseases [10]. A psychiatrist should be involved, preferably early in the course of the investigation providing psychotherapy and positive reinforcement. Cognitive behavioural therapy (CBT) should also be considered. As discussed earlier, the use of placebo is controversial and should be used only for the establishment of the diagnosis [10]. Alternatively, mild antidepressants and anxiolytics can be used for the management of underlying depression and anxiety, along with a periodical neurological assessment [18].

Prognosis

The prognosis for functional recovery is variable and relatively poor. In a follow up study of patients with medically unexplained movement disorders, the presenting symptom remained unchanged in 14% of the patients, while in 38% of them it had worsened [4]. A prospective study done by Feinstein et al. [11] regarding the psychiatric outcome in patients with PMDs, revealed that there was a persistence in abnormal movements in more than 90% of the patients. In Lang’s series [19], two patients had spontaneous long remissions, one had complete but short remission; another had marked but incomplete response to psychotherapy and haloperidol. Generally, in all psychogenic movement disorders, the prognosis depends on the underlying psychiatric disorder, the acute or insidious onset and the course of the disease, the premorbid functioning and the presence of an identifiable trigger. The prognosis is believed to be better when the onset of the disease is acute, with a short duration of symptoms and when there is a

specific emotional event that preceded the onset of the disease of a previously healthy individual [18]. Conversion disorders with recent onset are considered to have better prognoses than factitious disorders and malingering that usually respond poorly and unpredictably [21].

CONCLUDING SUMMARY OF CLINICAL CLUES WHICH MAY SUGGEST A PSYCHOGENIC TREMOR DISORDER IN A GIVEN PATIENT

1. *Sudden onset*: most patients with psychogenic tremor may have a rather acute onset and may have many remissions or relapses. Obviously vascular lesions, for example, rubral tremor may present acutely and has to be kept in mind but a sudden onset should raise the suspicion of psychogenic tremor.
2. *Unusual combination* of rest, postural and action tremor.
3. *Variability of tremor frequency*. Tremor frequencies can be differentiated clinically if they differ for more than 1.5 –2.0 Hz between different limbs. In patients with psychogenic tremor larger changes are sometimes observed that can be regarded as sign of psychogenic tremor. Organic tremors usually do not show such large variations (Deuschl et al, 2005).
4. *Other features* including excessive fatigue, difficulty in making movements.
5. *Distractability*, the patient may be observed for an extended period of time and may have been noticed to have a decrease in amplitude or waxing and waning of amplitude. Sometimes distraction like loading the patient mentally, counting backwards or performing complicated tasks may cause the tremor to disappear. Again one has to keep in mind that resting tremor in PD may cease with action or distraction but overall distractability may be suggestive of psychogenic tremor.
6. *Entrainment, co-contraction and absence of finger tremor*: Entrainment is a formalised way to test distractability clinically. The patient is asked to perform rhythmic voluntary movements with the less affected hand. This may lead to a change in tremor frequency of the affected limb. Co-contraction is another important sign for the diagnosis of psychogenic tremor tested by moving the limb around one joint and feeling for resistance in both directions during tremor. The finger tremor is generally considered to be absent in psychogenic tremor with tremor being more proximal at the wrist or proximal joints.

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