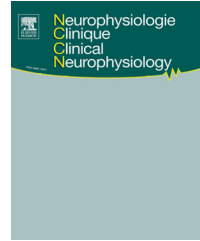




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REVIEW / MISE AU POINT

# Clinical neurophysiology of psychogenic movement disorders: How to diagnose psychogenic tremor and myoclonus



*Neurophysiologie clinique des mouvements anormaux psychogènes : tremblement et myoclonies*

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Movement disorders;  
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Movement preparation;  
Polymyography;  
Frequency

**Summary** Tremor and myoclonus are very common manifestations of psychogenic movement disorders (PMD). In this context, recording of movement disorders aims to provide objective criteria for a positive diagnosis of PMD, independently of the psychological situation. Neurophysiological observations are therefore considered to have a huge impact both on diagnosis and on therapeutic approaches. A specific recording strategy should be employed whenever the medical history or clinical clues raise the eventuality of a PMD. Polymyography coupled to accelerometry is used to demonstrate the major electrophysiological criteria of psychogenic tremor, namely spontaneous variability of tremor frequency and frequency entrainment induced by contralateral rhythmic tasks. Other features, such as paradoxical increase of tremor amplitude with mass loading, co-activation preceding tremor onset and alteration of voluntary contralateral motor performances when tremor is present, are also of interest. The clinical presentation of psychogenic myoclonus is extremely rich and polymorphous and can mimic virtually all forms of cortical, subcortical or spinal myoclonus. Focal, multifocal, axial or generalized jerks can occur. Psychogenic jerks can be sporadic or repetitive, rhythmic or arrhythmic, spontaneous or stimulus-induced. All of these parameters are crucial to determine an individualized neurophysiological strategy. Polymyography is critical to identify a ballistic pattern or a discordant or non-reproducible temporo-spatial organisation of the jerks, but has usually to be completed by other potentially decisive approaches. Reflex psychogenic myoclonus for example displays stimulus-response delays that are too long and variable. Spontaneous psychogenic jerks may be also preceded by a pre-movement potential, detectable by jerk-locked-back-averaging methods.

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**MOTS CLÉS**

Mouvements anormaux ;  
 Psychogène ;  
 Tremblement ;  
 Myoclonies ;  
 Préparation du mouvement ;  
 Polymyographie ;  
 Fréquence ;  
 Réflexe

**Résumé** Les mouvements anormaux psychogènes prennent très fréquemment la forme de tremblements ou de myoclonies. L'objectif de l'enregistrement des mouvements anormaux est d'apporter des arguments objectifs de diagnostic positif, indépendamment du contexte psychologique. Les observations neurophysiologiques peuvent avoir un impact important sur l'issue diagnostique et la démarche thérapeutique. Une stratégie spécifique d'examen doit être mise en œuvre dès que la nature psychogène du mouvement est évoquée sur des indices cliniques. La polygraphie musculaire couplée à l'accélérométrie est l'examen de base qui permet de démasquer les deux critères électrophysiologiques majeurs de tremblement psychogène, que sont la variabilité spontanée de fréquence et l'entraînement de fréquence induit par des tâches motrices compétitives rythmiques, ainsi que l'augmentation d'amplitude sous l'effet du poids, le signe de co-activation et l'altération des performances motrices contralatérales en présence du tremblement. La présentation clinique des myoclonies psychogènes est riche et polymorphe et peut mimer différentes formes de myoclonies, corticales, sous-corticales ou spinales. Les myoclonies psychogènes peuvent être focales, multifocales, axiales ou généralisées ; leur survenue peut être sporadique ou répétitive, rythmique ou arythmique, spontanée ou induite par les stimulations. Tous ces paramètres sont essentiels pour déterminer une stratégie neurophysiologique individualisée. La polymyographie est essentielle pour identifier un pattern balistique ou une organisation temporo-spatiale discordante ou non reproductible, mais doit être généralement complétée par d'autres approches. Les myoclonies psychogènes réflexes sont caractérisées par des délais de réponse aux stimulations longs et variables. La présence d'un potentiel de préparation au mouvement apporte un argument en faveur de la nature psychogène de myoclonies spontanées.

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## Introduction

Psychogenic movement disorders (PMD) are common. As highlighted by Brown and Thompson [4], fifty percent of patients with a PMD improve to some degree and only one-third resolve. These patients with better outcome tend to have a shorter duration of movement disorder, suggesting that early diagnosis and treatment may be important. Clinical features suggestive—but not diagnostic—of PMD are the sudden onset of an inconsistent and variable movement disorder, which is incongruous with typical “organic” movement disorder. Other clues are marked reduction of the abnormal movement with distraction, dramatic increase in severity and complexity of movement induced by direct observation and the occurrence of spontaneous periods of remission. The evidence of underlying psychopathology and associated psychogenic symptomatology is also suggestive, but not necessarily diagnostic of a psychogenic etiology. More convincing, if detected, is the disappearance of the movement disorder when supposedly unobserved or following suggestion or placebo [4,31].

The neurophysiological examination is regularly crucial in diagnosing PMD, assisting the clinician in evaluating these patients. In this setting, the recording of movement disorders aims to provide objective criteria for a positive diagnosis of PMD, by using measurable features, independently of the psychological context. Neurophysiological observations thus have a huge impact on both diagnosis and therapeutic approaches. Additionally, in some cases, visualisation of neurophysiological data helps the physician guide the patient towards better understanding of his symptoms, opening a window towards recovery.

A specific recording strategy should be performed whenever the medical history or clinical clues raise the possibility of a PMD or when the electrophysiological criteria of an

organic abnormal movement cannot be identified. As clinical neurophysiological testing can be helpful mainly in diagnosing psychogenic myoclonus and tremor, and can lead to definite diagnosis, we will focus on both these aspects in this review.

## Psychogenic tremor

Tremor is a frequent manifestation of PMD. After a reminder of the clinical clues of psychogenic tremor, the neurophysiological tools that should be used to reveal objective positive signs in comparison to the classical characteristics of tremors of organic origin will be detailed in the following section. Psychogenic tremor should be distinguished chiefly from pyramidal clonus and organic tremors such as enhanced physiologic tremor, parkinsonian tremor, dystonic tremor, and odd tremors, in order to allow optimal management.

Aside general clinical features, relevant criteria revealed by electrophysiological study in psychogenic tremor are:

- spontaneous variability of tremor frequency;
- frequency driving induced by contralateral rhythmic tasks;
- paradoxical increase of tremor frequency and amplitude with mass loading, and;
- co-contraction preceding tremor onset (co-activation sign).

By contrast, organic tremors have a stable frequency that cannot be driven to another one and are classically amplified by contralateral tasks. When clinical red flags are present, a specific recording protocol should be proposed in order to unmask these features. This is based on simultaneous

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