



Letter to the Editor

Holmes' tremor or functional tremor: Neurophysiological criteria can help diagnosis



I read with much interest the case report 'Holmes' or functional tremor?' by Bocci and coworkers (Bocci et al., 2018) on a patient with mixed rest and action tremor following intracranial dermoid cyst surgery. Although the authors performed a neurophysiological study, the final diagnosis was inconclusive. That case report reflects a classical clinical dilemma regarding the organic or functional origin of movement disorders. In such cases, applying neurophysiological criteria may help with diagnosis.

There are indications regarding that patient that are suggestive of either type of tremor. The lag between surgery and tremor, the intracranial congruent lesion (pontocerebellar angle) and the mixed rest and action tremor would point to organic Holmes' tremor. However, the tremor frequency variations, the frequency entrainment induced by contralateral rhythmic tasks and the fact that contralateral arm movement completely arrests tremor would suggest a functional origin. Not characteristic of Holmes' tremor is the tremor frequency of 5–8 Hz (Holmes' is typically <4 Hz (Deuschl et al. 1998), nor is the video of the patient (showing high frequency tremor and tremor suppression during attention distraction). The authors conclude a possible co-existence of rubral tremor with psychogenic traits.

Clinical and neurophysiological diagnosis of functional tremor is complex because of the great variability in clinical phenotypes (Lang and Voon, 2011). Another difficulty is that studies are typically performed for small series with few clinically documented patients – just 12, for instance, in Schwingenschuh et al. (2016). Diagnosis may also be difficult when the patient has no previous psychopathology and when a functional movement disorder coincides with an organic disorder.

Conceding all the above difficulties, I suggest an alternative conclusion. Based on the Schwingenschuh et al. (2016) study and our own data (Gironell et al., 1997), we have proposed (Gironell, 2016) routine neurophysiological (accelerometry and surface EMG) criteria for the diagnosis of functional tremor as definitive, probable or possible (Table 1). The neurophysiological tests we use are intra-subject frequency variability, tremor suppression during attention distraction, loading, response to ballistic movements, coherence, tonic co-activation and trapping entrainment. Functional tremor is considered definitive when there is intra-subject frequency variability >1.5 Hz or tremor suppression during attention distraction (Table 1). Applying these criteria, we suggest that the patient reported by Bocci et al. (2018) may have definitive functional (psychogenic) tremor. In this case, brain surgery and the lag between surgery and tremor would be a coincidence.

Table 1

Proposed neurophysiological criteria for the diagnosis of functional (psychogenic) tremor (Gironell, 2016).

Definite functional tremor	A positive result for 1 of the following tests
	Intra-subject frequency variability
	Tremor suppression during attention distraction
Probable functional tremor	A positive result for 3 or more of the following tests
Possible functional tremor	A positive result for 2 or fewer of the following tests
	Loading test
	Response to ballistic movements
	Coherence test
	Tonic coactivation
	Tapping entrainment at 1 Hz
	Tapping entrainment at 3 Hz
	Tapping entrainment at 5 Hz
	Tapping performance at 1 Hz
	Tapping performance at 3 Hz
	Tapping performance at 5 Hz

We agree with Bocci et al. (2018) that routine electrophysiological testing results in a high degree of diagnostic certainty regarding functional tremor. We emphasize that neurophysiological criteria applied to functional tremor could help with tremor diagnosis in routine clinical practice.

Conflict of interest

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Alexandre Gironell*

Movement Disorders Unit, Department of Neurology, Hospital de la Santa Creu i Sant Pau, Autonomous University of Barcelona, Catalonia, Spain

* Address: Department of Neurology, Hospital de Sant la Santa Creu i Sant Pau, Av. Sant Antoni Maria Claret, 167, 08025 Barcelona, Catalonia, Spain.

E-mail address: agironell@santpau.cat

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