

## Letter to the Editor

---

# A Positive 'Pointing Test' in a Parkinson's Disease Patient

Heidemarie Zach<sup>a,b</sup>, Wieneke L.J. Gerrits<sup>c</sup>, Bart P. van de Warrenburg<sup>a,\*</sup> and Bastiaan R. Bloem<sup>a</sup>

<sup>a</sup>*Radboud University Medical Centre, Donders Institute for Brain, Cognition and Behaviour,*

*Department of Neurology, Nijmegen, The Netherlands*

<sup>b</sup>*Department of Neurology, Medical University of Vienna, Vienna, Austria*

<sup>c</sup>*Department of Psychiatry, Centre for Psychotherapy, Pro Persona Mental Health Care, Lunteren, The Netherlands*

## INTRODUCTION

Various clinical tests have been advocated to differentiate psychogenic tremor (PT) from organic tremor (OT). These include, for example, the change of tremor characteristics upon distraction, entrainment, co-activation or loading [1–3]. The “pointing test” was introduced more recently. In an elegant study, subjects with various types of tremor were instructed to perform a rapid unilateral ballistic movement towards a switch following a visual cue, while tremor was observed in the contralateral hand [4]. Subjects included 11 patients with resting tremor caused by Parkinson's disease (PD), 10 patients with essential tremor (ET), seven with psychogenic tremor, and 10 normal volunteers who purposely imitated tremors. In all patients with psychogenic tremor and in all normal volunteers, the ballistic movement of one hand led to a transient cessation of tremor within the contralateral hand. This clinical observation was supported by polymyography. In contrast, the tremor did not cease in the two groups with organic tremor (patients with PD or ET). The authors suggested that this pointing test might have a relevant role for identifying psychogenic tremor [4]. Schwingenschuh et al. used a variant of the pointing test in their study- which was one test

in a test battery- and partially reproduced these findings, showing a clear tremor pause during the pointing test in 5 of 12 patients with psychogenic tremor [5]. None of 25 patients with organic tremor showed such a tremor pause (test specificity: 100%), although a decreased amplitude during contralateral ballistic movements was noted in four of these 25 patients. Such amplitude reductions during contra-lateral ballistic movements can also occur in PD patients [6], but complete tremor cessation during the pointing test has never been described for organic tremors.

Here, we report an abnormal pointing test in a PD patient with a classic rest tremor, confirmed both clinically and using accelerometry, suggesting that the clinical utility of this test is imperfect.

## CASE REPORT

This 73-year-old man presented with right-sided tremor-dominant PD since 8 years. Initially he was treated with an anticholinergic and pramipexol, followed by levodopa after one year. At the time of presentation, he took levodopa/carbidopa 125 mg and pramipexol 0.6 mg tid, with an adequate treatment response. Neurological examination in the off-state revealed a classic right-dominant rest and jaw tremor, right dominant severe bradykinesia, moderate axial and limb rigidity, a typical hypokinetic gait and mild balance impairment during the pull test (off state UPDRS motor-score: 47, Hoehn & Yahr stage: 2.5). His clinical presentation was consistent

---

\*Correspondence to: Dr. Bart van de Warrenburg, MD, PhD, Department of Neurology, Radboud University Medical Center, PO Box 9101, 6500 HB Nijmegen, The Netherlands. Tel.: +31 24 36 13396; Fax: +31 24 35 41122; E-mail: Bart.vandeWarrenburg@radboudumc.nl.

with idiopathic, tremor-dominant and dopa-responsive PD.

We performed the 'pointing test' as follows: we instructed the patient to grasp a pencil that was located about 70 centimeter away, with his left (i.e. least affected) hand, as fast as possible immediately following a verbal command. Whenever the patient made such an abrupt, brisk ballistic movement, the tremor of his right hand stopped for about 1 second. However, during trials that were performed with a non-ballistic movement (slower movement velocities and/or delayed movement initiation) of the left arm, the right-sided hand tremor was not interrupted (see online video supplement). This abnormal clinical pointing test was substantiated by accelerometry recording (Fig. 1A and B; sensors attached to the dorsum of the hands). This showed a consistent bilateral resting tremor with a frequency between 4.2 and 4.8 Hz (amplitude right > left). Following a rapid ballistic grasping movement of the left hand, a reproducible arrest of the right hand tremor was detected. It typically started around 0.2 seconds after movement onset and lasted for 0.8 to 1.6 seconds (Fig. 1A). A slower ballistic movement of the left arm did not produce this effect, with only an amplitude reduction but not tremor cessation (Fig. 1B).

## DISCUSSION

In clinical practice, distinguishing psychogenic from organic remains challenging, and strict criteria are lacking [1, 2, 5]. Stimulated by encouraging initial reports [5, 7], movement disorder specialists have started to use the "pointing test" in clinical practice. Here, based on observations in a patient with classic tremor-dominant PD, we show that this pointing test may produce a false-positive result, depending on how the test is executed. Specifically, when the

contralateral ballistic movement was performed rapidly (as it should be), the ipsilateral hand tremor was suppressed completely for up to 1.6 seconds. Importantly, this conclusion was based not just on visual inspection of the tremor (which can be challenging if tremor amplitude is low), but the tremor cessation was confirmed objectively using accelerometry. Importantly, the tremor did not stop when the contralateral ballistic arm movement was slow. Apparently, a truly abrupt and fast movement is required to produce a tremor stop. It is possible that a relatively too slow execution of the contralateral movement explained the excellent diagnostic utility noted in earlier work, where tremor continued in all organic tremor patients reported in one study [4] and only showed an amplitude reduction in some organic tremor patients in the other [5]. Slowness in performing the contralateral movement may be a particular problem when examining patients with PD, because of their bradykinesia. Additionally, poor instruction or underperformance may also produce insufficiently rapid ballistic movements, leading to incorrect test interpretations.

The present findings call for a careful standardization and clear instructions when asking patients to perform the "ballistic movement". Currently, many variants of this test exist in clinical practice and in research (e.g. finger-chase-test, grasping either a moving or a static target, pushing a button, closing a switch, or performing rapid wrist flexion-extensions). Such inconsistencies in methodology can unpredictably distort the results. Our variant of the pointing test differs from the initial one, which was proposed by Kumru et al., where the patients had to flip a switch. We cannot fully exclude that the different methodology and the possible challenge for some PD patients to quickly grasp a pen (instead of just flip a switch [4] or chase a pen [5]) might partially explain the divergent

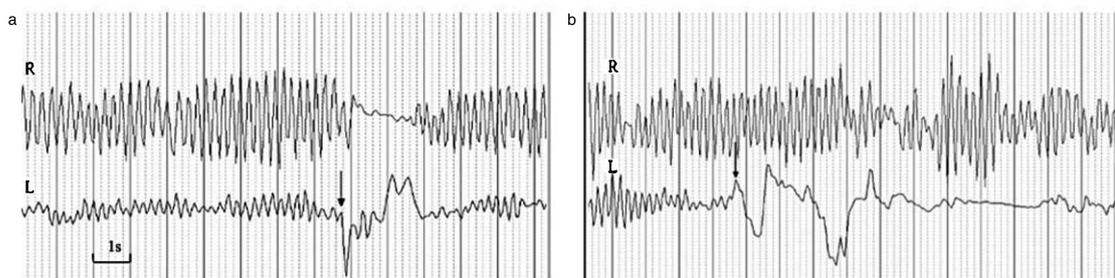


Fig. 1. Accelerometry recordings of the 'pointing test' performed with the left hand. (a) A truly fast grasping movement of the left hand results in a transient arrest of right-sided hand tremor. However, during a slower grasping movement, as depicted in (b), the right hand tremor continues with lower amplitude. R = right hand, L = left hand, vertical arrow indicates onset of grasping movement. Vertical solid lines indicate 1 second; recording parameters: 20 mm/sec and 30 mV/cm.

finding. However, our version is widely used in clinical practice, where no further equipment is available. In contrast to rapidly chasing a pen, which is moved by an examiner in a self-chosen (i.e., not standardized) speed [5], grasping a static object reduces the variability on one end, as the velocity is only dependent on the patient. We modestly propose to execute the test as we used it here, i.e. grasping a static target, which is located about an arm's length away as rapidly as possible immediately after a verbal command, but would also like to stimulate further research and discussions on this test.

The notion that tremor in PD can be suppressed temporarily is not new. Transient disappearance of resting tremor in PD commonly occurs when the affected ipsilateral arm assumes a new posture, although the tremor reappears when the arm is maintained in this new position (re-emerging tremor) [8]. Yet, we believe that the mechanism underlying tremor arrest following a contralateral ballistic arm movement is different. Another possible explanation for tremor suppression in the contralateral arm could be an overflow of muscle activation- or even "mirror movements". Subtle mirror movements are often barely visible with the naked eye, but may still affect resting tremor. Further studies with additional EMG recordings are needed to shed light on this fascinating phenomenon.

Our findings suggest that the diagnostic accuracy of the pointing test is imperfect, which limits its clinical utility to differentiate organic from psychogenic tremor. This report obviously entails just a single patient, and larger studies remain needed to establish the full diagnostic utility of the pointing test.

## ACKNOWLEDGMENTS

We want to thank Michel Verbruggen for the technical support. This research was funded by an Erwin

Schroedinger Grant of the Austrian Science Fund (FWF: J 3723) to Dr. Heidemarie Zach and Prof Bas Bloem was supported by a research grant of the National Parkinson Foundation.

## CONFLICTS OF INTEREST

On behalf of all authors, the corresponding author states that there is no conflict of interest.

## SUPPLEMENTARY MATERIAL

The supplementary video is available in the electronic version of this article: <http://dx.doi.org/10.3233/JPD-150638>.

## REFERENCES

- [1] Bhatia KP, & Schneider SA (2007) Psychogenic tremor and related disorders. *J Neurol*, **254**, 569-574.
- [2] Deuschl G, Bain P, & Brin M (1998) Consensus statement of the Movement Disorder Society on Tremor. Ad Hoc scientific committee. *Mov Disord*, **13**(Suppl 3), 2-23.
- [3] Kenney C, Diamond A, Mejia N, Davidson A, Hunter C, & Jankovic J (2007) Distinguishing psychogenic and essential tremor. *J Neurol Sci*, **263**, 94-99.
- [4] Kumru H, Valls-Sole J, Valldeoriola F, Marti MJ, Sanegre MT, & Tolosa E (2004) Transient arrest of psychogenic tremor induced by contralateral ballistic movements. *Neurosci Lett*, **370**, 135-139.
- [5] Schwingenschuh P, Katschnig P, Seiler S, Saifee TA, Aguirregomez M, Cordivari C, Schmidt R, Rothwell JC, Bhatia KP, & Edwards MJ (2011) Moving toward "laboratory-supported" criteria for psychogenic tremor. *Mov Disord*, **26**, 2509-2515.
- [6] Hallett M (2011) Psychogenic parkinsonism. *J Neurol Sci*, **310**, 163-165.
- [7] Kumru H, Begeman M, Tolosa E, & Valls-Sole J (2007) Dual task interference in psychogenic tremor. *Mov Disord*, **22**, 2077-2082.
- [8] Helmich RC, Hallett M, Deuschl G, Toni I, & Bloem BR (2012) Cerebral causes and consequences of parkinsonian resting tremor: A tale of two circuits? *Brain*, **135**, 3206-3226.