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Tremor and Other Hyperkinetic Movements

Articles

Clinical Characteristics of Functional Movement Disorders: A Clinic-based Study

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Abstract

Background: Functional movement disorders are recognized as a "crisis" in neurology. We aimed to determine the rate of incidence of functional movement disorder patients at a university outpatient neurology clinic in South Korea, and highlight the clinical and phenomenological characteristics.

Methods: Patients who were assessed by a movement disorders neurologist at a university hospital between March 2016 and May 2017 were screened for functional movement disorders. Demographic and clinical data were reviewed, and the phenomenology of movements was studied.

Results: Of 321 patients evaluated for the chief complaint of a movement abnormality, approximately 10% (31 patients) were diagnosed with a functional movement disorder. The female to male ratio was 7:1 (27 females to four males). The mean age at presentation was 53 years (standard error 3.6 years), and the mean disease duration was 5 years (standard error 1.4 years). Sixty-one percent (19 out of 31 patients) had a past medical history of depression, anxiety, or other psychiatric illnesses. Tremor and speech abnormalities were most prevalent (19 and 12 patients, respectively). Onset was reported to be abrupt in 14 patients (45%). Thirteen (42%) patients were found to have improvement at a follow-up visit, 10 (32%) had no improvement, and eight (26%) were lost to follow-up.

Discussion: Functional movement disorders are not uncommon in the outpatient neurology clinic. Our results confirm that tremor is the most frequent movement occurring in functional movement disorders, and the most commonly affected body parts were found to be the upper and lower extremities. Speech was also found to be frequently involved (39%). Patients with no improvement at follow-up had longer mean disease duration (6.2 years), consistent with previous observations that prolonged symptom duration is associated with poor clinical outcome. Our study results obtained from a Korean population suggest that previous observations on functional movement disorders from other regions hold true in Eastern Asia.

Keywords: Functional movement disorder, psychogenic, conversion disorder, tremor, speech, gait

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Introduction

Functional, often referred to as psychogenic, movement disorders are those that are presumed to be attributable to a psychological cause.[1,2] Contrary to what the term "psychogenic" implies, the movements are regarded involuntary.[3] The movements occurring in functional movement disorders may vary in phenomenology, and more than one type of movement may occur in a single patient. Various body parts may be affected, and speech may also be involved.[4–6]

Historically, functional movement disorders have been referred to by different names such as hysteria or conversion disorder. Although the term psychogenic is currently the most widely used term, it has been proposed that the term functional movement disorder should be used, for both scientific and practical reasons.[1,7] Functional movement disorders are common, and represent approximately 3% of movement disorder clinic visits.[6,8] The diagnosis of functional movement disorder is typically a clinical one.[9] While several diagnostic criteria have been proposed, these are often not used, and for the identification of positive signs for a functional movement disorder such as distractability, entrainability (e.g., tremor entrainability), and variability appears to be more practical in clinical practice.[2,10,11]

To date, several clinic-based studies on the epidemiology of functional movement disorders have been reported.[5,8,12–14] These studies have been mostly conducted in the United States and Europe, and knowledge of the epidemiology and clinical characteristics of this

patient population in other regions of the world such as Eastern Asia is lacking. A recent study of clinical decision-making in functional movement disorders reached the conclusion that experts rely heavily on clinical assessment to make a diagnosis.[9] This clinical assessment was found to be predominantly based on the visual first impression of the patient, neurological examination, and medical history. We aimed to conduct an epidemiological, phenomenological, and clinical investigation of functional movement disorders in a university clinic, to provide information relevant to the epidemiology and clinical characteristics of this disorder found in a functional movement disorders population in Eastern Asia.

Methods

Subjects

The electronic medical records of patients with the chief complaint of a movement abnormality seen at the outpatient neurology clinic of Dongguk University Ilsan Hospital between March 2016 and May 2017 were reviewed. Clinical and demographic features were manually extracted from the electronic medical record system into a movement disorder database. In case of missing information, clarification was sought during routine follow-up visits to the clinic. All patients underwent an interview and examination of their movements by a neurologist trained in movement disorders (J.E.P.). Patients who met the criteria for a functional movement disorder were identified. These criteria include variability, distractibility, and entrainability of the involuntary movements. The medical history was carefully reviewed. Movements of patients who were willing to be videotaped were recorded on the day of their initial visit. The diagnosis of a functional movement disorder was relayed to the patient by the examining neurologist at the first or subsequent visit.

Results

Demographics

A total of 321 patients were identified, of which approximately 10% (31 patients) were diagnosed with a functional movement disorder. The female to male ratio was 6.8:1 (27 females to four males). The age of onset ranged from 17 to 91 years and the mean age at presentation was 53 years (standard error 3.6 years). The mean disease duration was 5 years (standard error 1.4 years) and the mean follow-up period was 5 months (standard error 1.8 months). Fifty-eight percent (18 out of 31 patients) had a past medical history of depression, anxiety, or other psychiatric illnesses. The most commonly reported psychiatric morbidity was depression (17 out of 31 patients). Nineteen (61%) patients acknowledged feeling "stressed" in their daily lives, six patients denied experiencing such feelings, five did not provide the examiner with a clear answer, and one patient was cognitively impaired because of dementia and thus was not able to give a response. One patient reported a history of sexual abuse in her teenage years. Others reported stressful events such as a family member's death, a spouse's business debt, misbehavior of a child, career and academic difficulties, and trouble with friends or family members. One patient reported a positive family history of a movement disorder, which was confirmed to be functional by the examining neurologist (J.E.P.) at a subsequent visit accompanied by the affected family member. Socioeconomic status was not an aspect that was probed because of concern for sensitivity of patients and potential reluctance to provide such details.

Clinical course

Onset was noted to be abrupt (defined as symptom development within a few days) in 15 patients (48%). Thirteen (42%) out of 31 patients were found to have improvement at a follow-up visit, 10 patients (32%) with no improvement, and eight patients (26%) were lost to follow-up. Lost to follow-up was defined as no more than a total of two clinic visits. The subgroup of patients who experienced improvement were found to have a mean disease duration of 2.3 years (standard error 1 year), whereas those who did not experience improvement at follow-up had a mean disease duration of 6.2 years (standard error 2.7 years), and those lost to follow-up 7.9 years (standard error 5.2 years) (Figure 1). For patients who acknowledged depressed mood or high levels of stress, medication was offered as a treatment option and 12 patients (39%) were started on an antidepressant (escitalopram or duloxetine). Seven of the 12 patients were found to have improvement of their movement symptoms, and of the five patients that did not improve, two discontinued the prescribed antidepressant because of side effects (somnolence, fatigue).

Movement characteristics

In 21 patients (68%), more than one body part was affected (the voice was also considered to be an independent body part). Seven patients (23%) were found to have more than one type of movement (tremor, myoclonus, or speech involvement). On the day of their initial visit, 19 patients (61%) were found to have tremor, 10 patients (32%) abnormal speech or voice, seven patients (23%) myoclonus, and five patients (16%) gait difficulty (Supplementary Table 1). Gait abnormality was the least common but varied widely in phenomenology. Gait abnormalities included ataxic gait, scissoring gait, spastic gait, and dromedary gait (characterized as gradually increasing forward flexion of the lumbar spine on walking).

The body parts most commonly affected were the bilateral upper (11 patients, 36%) and lower extremities (11 patients, 36%). The head was the next most commonly involved body part (10 patients, 32%). Other affected body parts included the voice, eyes, face, jaw, shoulders, trunk, and abdomen. Twelve patients (39%) were found to have affected speech or voice. Abnormalities included stuttering,[3] dysphonia,[3] infantile speech,[3] hypernasality,[2] dysarthria,[2] and hypophonia,[1] with some patients having a combination of different speech or voice abnormalities. Nine of these patients were found to have concurrent symptoms of involuntary movements. The mean disease duration of patients with speech or voice abnormalities as the chief complaint was 4.2 years (standard error 2.9 years).

Diagnosis

All patients were given the diagnosis of a functional movement disorder at their first or subsequent visit by a neurologist trained in

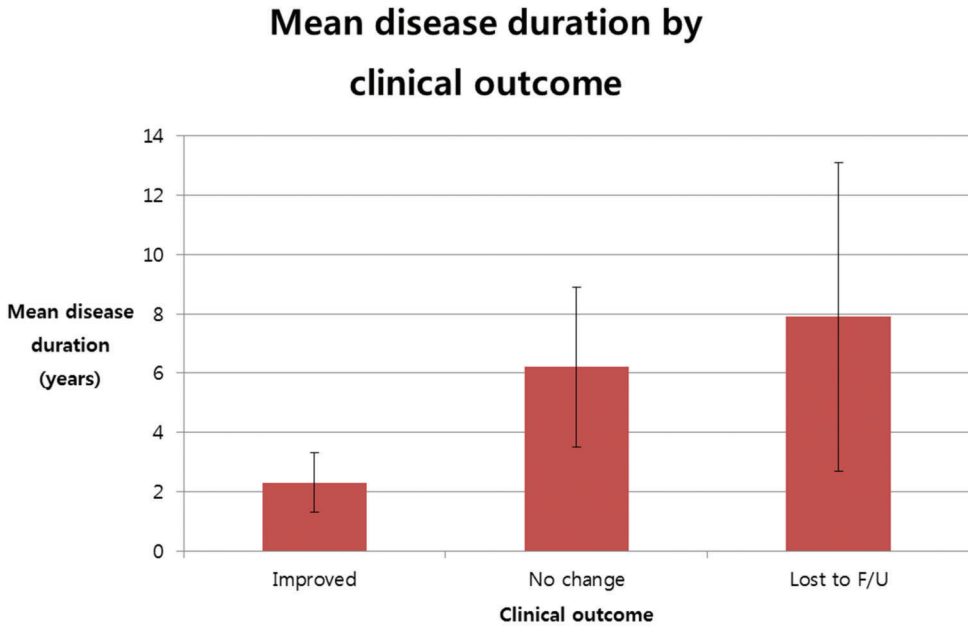

Figure 1. **Mean Disease Duration by Clinical Outcome.** The mean disease duration for the subgroups is shown. Patients who were seen at follow-up and found to exhibit improvement had mean disease duration of 2.3 years, whereas those who had no improvement or were lost to follow-up had mean disease duration of 6.2 years and 7.9 years, respectively.

movement disorders (J.E.P.). When the diagnosis was delivered, certain features of their movements supporting the diagnosis of a functional movement disorder such as distractibility, entrainability, and variability were shared. All but one patient (case 8, 17-year-old female with functional gait) were found to be fully receptive of the diagnosis. Prognosis of the disorder was also discussed clearly and candidly, which was generally relayed as one or more of the following messages: "the hardware, which is the nervous system itself, is fine, but the software is malfunctioning that may be due to psychological factors or stress", and that "generally, there is a better chance of recovery for patients who are receptive of the diagnosis".

Discussion

Functional movement disorders are not uncommon in the outpatient neurology clinic. We found that the proportion of psychogenic movement disorders in our patient population (10%) was higher than that noted in previous studies, ranging from 3% to 5%.[8,13] This may be relative to the fact that the evaluation was conducted by a neurologist trained in movement disorders keen to identify positive diagnostic features of this disorder. We found a female predominance (female/male 6.8:1), and although the age of onset ranged widely (17–91 years), the median age of onset was 54.5 years, falling into the working age population defined as those aged 15–64 years (Organization for Economic Cooperation and Development data, https://data.oecd.org/pop/working-age-population.htm). In our patient population, the most commonly affected body parts were the upper and lower extremities, and speech was also frequently involved, at 32%. We speculate that these patients are likely impacted in their daily activities, although this was not quantified in the current study. Given that the median age of onset is working age, a future study to quantify the level of disability may be worthwhile as the disorder may affect not only the affected individual, but also extend to having an impact on society.

Our study results reveal that the subgroup of patients who were found to improve at a subsequent clinic visit had shorter mean disease duration, while the subgroup of patients whose clinical outcome remained unchanged and those lost to follow-up had longer mean disease duration. This further highlights symptom duration as an important prognostic factor in functional movement disorders. Our results therefore support previous observations that prolonged symptom duration is associated with poor prognosis.[5,7,15] We also confirmed previous reports of tremor as the most frequent movement occurring in functional movement disorders.[8]

In our patient population, the types of psychiatric comorbidity were found to be mostly depression and anxiety, and prevalence was 59%, which is comparable to that described in previous reports.[13] Onset of symptoms was found to be abrupt in 46%, whereas another study reported this to be 62%. Of note, 12 patients who did not have a previous psychiatric diagnosis but acknowledged depressed mood or high levels of stress were started on an antidepressant, and seven of these patients (58%) improved. While this could be a placebo effect and the clinical course should be followed, it is possible that the improvement is relevant to medical treatment of underlying depression or anxiety. However, the present results are limited in that we were unable to perform a standardized psychiatric evaluation; further, while we found a subset of patients to acknowledge depressed mood or stressors, it is still possible that psychiatric comorbidities were underreported.

In our study, the diagnosis was based on the visual first impression, neurological examination of the patient with emphasis on searching for

the presence of positive signs, and medical history, as a previous study has shown that these are most important when establishing a diagnosis of a functional movement disorder.[9] We chose to disclose the diagnosis to the patient clearly, but using a sympathetic approach. It is well known that when the patient is given the vague impression of being a "medical mystery", this may result in further unnecessary medical investigation and prolonged symptom duration. In our study population, the diagnosis of a functional movement disorder was shared with the patient at the first or subsequent visit, and all but one patient appeared to be receptive of the diagnosis. However, it is possible that the eight patients lost to follow-up may have been only outwardly receptive of the diagnosis and possibly sought further evaluation elsewhere.

Our study is not without limitations. As this was a retrospective study based on outpatient encounters, our findings were limited because some patients were lost to follow-up. However, we are cautious to view this as a mere limitation, as it may be another facet of this disorder associated with patients' reluctance to accept the diagnosis. Our study findings show that patients lost to follow-up had the longest mean disease duration (7.9 years) of the three subgroups previously mentioned, and it is possible that this subgroup chose not to follow up in order to pursue further diagnostic evaluation elsewhere. Another limitation of our study is that patients did not receive a standardized psychiatric evaluation that would have allowed for a more detailed assessment of potential psychiatric comorbidities. While some patients revealed such pertinent psychiatric history to the neurologist, it is possible that others may have chosen not to share such information. Our study findings were also based on relatively brief outpatient encounters that are usually not conducive to sharing private information such as sexual, emotional or physical trauma. Therefore, it is possible that such factors considered to be relevant in this disorder were underreported. In addition, information on patients' quality of life or disability was not obtained in a standardized manner: such information would certainly be valuable for understanding the impact of this disorder. Other limitations of this study are that the duration of follow-up was not consistent in all subjects, and patients were evaluated at our institution by a single neurologist trained in movement disorders. Many of these limitations however reflect the real-life setting, as it is common in many countries (particularly in Asia) for clinic visits to be brief and follow-up periods to vary. To date, there are only two studies from Korea for which the text is not available in English, and no studies on this patient population from other Eastern Asian countries.

There have been advances in understanding the neurophysiology of functional movement disorders. Past studies have found that the involuntary movements in patients with functional disorders utilize the voluntary motor system, as demonstrated by the presence of the Bereitschaftspotential (also called movement-related cortical potential).[16–19] More recent studies utilizing functional magnetic resonance imaging (fMRI) of the brain have found that decreased functional connectivity of brain regions involved in the sense of self-agency underlies patients' experience of lack of voluntariness.[20,21] The loss of sensory attenuation (the decrease in the gain of the sensory consequences of one's own actions) has also been observed, which has been found to correlate with the loss of self-agency.[22] While these investigations are important for the enhancement of our understanding of the physiology of this disorder, such testing is usually not feasible to perform in a routine clinical setting, and the diagnosis of a functional movement disorder is often made clinically.

Despite the increasing interest in this disorder and relevant neurophysiological investigation, treatment options are still limited. Positive results have been noted with physical therapy/rehabilitation, including some randomized trials.[15,23–26] Important factors indicative of a better prognosis include acceptance of the diagnosis by the patient, identification and management of concurrent psychiatric disorders and psychological stressors, and the maintenance of a supportive social network.[27] Therefore, while there is no definitive treatment for this disorder, working with the patient to facilitate acceptance of the diagnosis as well as addressing associated psychiatric issues and utilizing physical therapy when feasible are essential to recovery and a better prognosis.

References

1. Hallett M. The most promising advances in our understanding and treatment of functional (psychogenic) movement disorders. *Parkinsonism Relat Disord* 2018;46(Suppl. 1):S80–S82. doi: 10.1016/j.parkreldis.2017.07.002

2. Edwards MJ, Bhatia KP. Functional (psychogenic) movement disorders: merging mind and brain. *Lancet Neurol* 2012;11:250–260. doi: 10.1016/S1474-4422(11)70310-6

3. Edwards MJ, Stone J, Lang AE. From psychogenic movement disorder to functional movement disorder: it's time to change the name. *Mov Disord* 2014; 29:849–852. doi: 10.1002/mds.25562

4. Binder LM, Spector J, Youngjohn JR. Psychogenic stuttering and other acquired nonorganic speech and language abnormalities. *Arch Clin Neuropsychol* 2012;27:557–568. doi: 10.1093/arclin/acs051

5. Kamble N, Prashantha DK, Jha M, Netravathi M, Reddy YC, Pal PK. Gender and age determinants of psychogenic movement disorders: a clinical profile of 73 patients. *Can J Neurol Sci* 2016;43:268–277. doi: 10.1017/cjn.2015.365

6. Hallett M, Weiner WJ, Kompoliti K. Psychogenic movement disorders. *Parkinsonism Relat Disord* 2012;18(Suppl. 1):S155–S157. doi: 10.1016/S1353-8020(11)70048-7

7. Gelauff J, Stone J, Edwards M, Carson A. The prognosis of functional (psychogenic) motor symptoms: a systematic review. *J Neurol Neurosurg Psychiatry* 2014;85:220–226. doi: 10.1136/jnnp-2013-305321

8. Factor SA, Podskalny GD, Molho ES. Psychogenic movement disorders: frequency, clinical profile, and characteristics. *J Neurol Neurosurg Psychiatry* 1995; 59:406–412. doi: 10.1136/jnnp.59.4.406

9. van der Salm SM, van Rootselaar AF, Cath DC, de Haan RJ, Koelman JH, Tijssen MA. Clinical decision-making in functional and hyperkinetic movement disorders. *Neurology* 2017;88:118–123. doi: 10.1212/WNL.0000000000003479

10. Fahn S, Williams DT. Psychogenic dystonia. *Adv Neurol* 1988;50: 431–455.

11. Voon V, Lang AE, Hallett M. Diagnosing psychogenic movement disorders-which criteria should be used in clinical practice? *Nat Clin Pract Neurol* 2007;3:134–135. doi: 10.1038/ncpneuro0408

12. Ertan S, Uluduz D, Ozekmekci S, Kiziltan G, Ertan T, Yalcinkaya C, et al. Clinical characteristics of 49 patients with psychogenic movement disorders in a tertiary clinic in Turkey. *Mov Disord* 2009;24:759–762. doi: 10.1002/mds.22114

13. Thomas M, Vuong KD, Jankovic J. Long-term prognosis of patients with psychogenic movement disorders. *Parkinsonism Relat Disord* 2006;12:382–387. doi: 10.1016/j.parkreldis.2006.03.005

14. Kranick S, Ekanayake V, Martinez V, Ameli R, Hallett M, Voon V. Psychopathology and psychogenic movement disorders. *Mov Disord* 2011;26:1844–1850. doi: 10.1002/mds.23830

15. Nielsen G, Buszewicz M, Stevenson F, Hunter R, Holt K, Dudziec M, et al. Randomised feasibility study of physiotherapy for patients with functional motor symptoms. *J Neurol Neurosurg Psychiatry* 2017;88:484–490. doi: 10.1136/jnnp-2016-314408

16. Shibasaki H, Hallett M. What is the Bereitschaftspotential? *Clin Neurophysiol* 2006;117:2341–256. doi: 10.1016/j.clinph.2006.04.025

17. Erro R, Bhatia KP, Edwards MJ, Farmer SF, Cordivari C. Clinical diagnosis of propriospinal myoclonus is unreliable: an electrophysiologic study. *Mov Disord* 2013;28(13):1868–1873. doi: 10.1002/mds.25627

18. Hallett M. Physiology of psychogenic movement disorders. *J Clin Neurosci* 2010;17:959–965. doi: 10.1016/j.jocn.2009.11.021

19. Terada K, Ikeda A, Van Ness PC, Nagamine T, Kaji R, Kimura J, et al. Presence of Bereitschaftspotential preceding psychogenic myoclonus: clinical application of jerk-locked back averaging. *J Neurol Neurosurg Psychiatry* 1995;58:745–747. doi: 10.1136/jnnp.58.6.745

20. Maurer CW, LaFaver K, Ameli R, Epstein SA, Hallett M, Horovitz SG. Impaired self-agency in functional movement disorders: a resting-state fMRI study. *Neurology* 2016;87:564–570. doi: 10.1212/WNL.0000000000002940

21. Voon V, Gallea C, Hattori N, Bruno M, Ekanayake V, Hallett M. The involuntary nature of conversion disorder. *Neurology* 2010;74:223–228. doi: 10.1212/WNL.0b013e3181ca00e9

22. Parees I, Brown H, Nuruki A, Adams RA, Davare M, Bhatia KP, et al. Loss of sensory attenuation in patients with functional (psychogenic) movement disorders. *Brain* 2014;137:2916–2921. doi: 10.1093/brain/awu237

23. Czarnecki K, Thompson JM, Seime R, Geda YE, Duffy JR, Ahlskog JE. Functional movement disorders: successful treatment with a physical therapy rehabilitation protocol. *Parkinsonism Relat Disord* 2012;18:247–251. doi: 10.1016/j.parkreldis.2011.10.011

24. Nielsen G, Ricciardi L, Demartini B, Hunter R, Joyce E, Edwards MJ. Outcomes of a 5-day physiotherapy programme for functional (psychogenic) motor disorders. *J Neurol* 2015;262:674–681. doi: 10.1007/s00415-014-7631-1

25. Nielsen G, Stone J, Edwards MJ. Physiotherapy for functional (psychogenic) motor symptoms: a systematic review. *J Psychosom Res* 2013;75:93–102. doi: 10.1016/j.jpsychores.2013.05.006

26. Nielsen G, Stone J, Matthews A, Brown M, Sparkes C, Farmer R, et al. Physiotherapy for functional motor disorders: a consensus recommendation. *J Neurol Neurosurg Psychiatry* 2015;86:1113–1119. doi: 10.1136/jnnp-2014-309255

27. Espay AJ, Goldenhar LM, Voon V, Schrag A, Burton N, Lang AE. Opinions and clinical practices related to diagnosing and managing patients with psychogenic movement disorders: an international survey of movement disorder society members. *Mov Disord* 2009;24:1366–1374. doi: 10.1002/mds.22618