


SHORT COMMUNICATION

Functional tics: Expanding the phenotypes of functional movement disorders?

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Abstract

Background and purpose: Until the outbreak reported during the COVID-19 pandemic, functional tics were considered to be a relatively rare clinical phenotype, as opposed to other functional movement disorders such as functional tremor and dystonia. To better characterize this phenotype, we compared the demographic and clinical characteristics of patients who developed functional tics during the pandemic and those of patients with other functional movement disorders.

Methods: Data from 110 patients were collected at the same neuropsychiatry centre: 66 consecutive patients who developed functional tics without other functional motor symptoms or neurodevelopmental tics and 44 patients with a mix of functional dystonia, tremor, gait, and myoclonus.

Results: Both groups were characterized by female sex preponderance (70%–80%) and (sub)acute onset of functional symptoms (~80%). However, patients with functional tics had a significantly earlier age at onset of functional symptoms (21 vs. 39 years). Exposure to relevant social media content was reported by almost half of the patients with functional tics, but by none of the patients with other functional movement disorders. Comorbidity profiles were similar, with relatively high rates of anxiety/affective symptoms and other functional neurological symptoms (nonepileptic attacks).

Conclusions: Patients who developed functional tics during the pandemic represent a phenotypic variant of the wider group of patients with functional movement disorders, associated with younger age at onset and influenced by pandemic-related factors, including increased exposure to specific social media content. Diagnostic protocols and treatment interventions should be tailored to address the specific features of this newly defined phenotype.

KEYWORDS

functional movement disorders, functional neurological disorder, functional tics, neurodevelopmental tics, tic disorder, Tourette syndrome

INTRODUCTION

Functional tics are functional neurological symptoms covering a heterogeneous spectrum of repetitive movements and vocalizations that resemble motor and vocal tics of neurodevelopmental origin [1–3]. Among functional movement disorders, functional tics have traditionally been regarded as relatively rare, with lower prevalence rates compared to functional dystonia and functional tremor, across both youth and adults [4]. However, during the COVID-19 pandemic, there has been an unprecedented increase in adolescents and young adults presenting acutely or subacutely to health services with functional tics [5]. A population-based study in England recently documented a more than fourfold increase in teenage girls who developed ticlike behaviours, often in association with anxiety and/or other mental health comorbidities [6]. These data confirmed earlier reports from different countries, including a large case series from a single specialist centre in England [7]. The wide-reaching effects of the pandemic, including increased exposure to social media content by influencers portraying ticlike behaviours, were listed as possible precipitating factors, and a multinational registry for this newly recognized phenotype was established [4, 8].

The diagnosis of functional movement disorders is based on clinical findings, especially signs of inconsistency and distractibility, which are not observed in focal dystonia or organic forms of tremor and other movement disorders [4]. However, neurodevelopmental tics are characteristically intermittent and distractible, thus posing considerable challenges in terms of differential diagnosis with functional tics [5]. A recent study examining the level of diagnostic agreement of experts in tic disorders using video footage and clinical descriptions showed that it is not possible to reliably distinguish neurodevelopmental tics from functional tics based on clinical phenomenology alone [9]. In addition to sex distribution, useful features informing the diagnosis of functional tics include age at onset, temporal evolution of symptoms, comorbidity profiles, and contextual factors related to tics. In the light of this, a better characterization of the functional tic phenotype within the broader spectrum of functional movement disorders could be of considerable clinical value. We set out to compare the demographic and clinical characteristics of patients who developed functional tics during the COVID-19 pandemic with those of patients with other functional movement disorders.

METHODS

We considered for inclusion in the present study all consecutive patients ($N=109$) who developed functional tics during the COVID-19 pandemic (April 2020–April 2023) and were referred to the specialist Tourette Syndrome Clinic, Department of Neuropsychiatry, National Centre for Mental Health, Birmingham, United Kingdom. After excluding patients with comorbid neurodevelopmental tics ("functional overlay," $n=26$) and patients who presented with other functional movement disorders in addition to functional tics ($n=17$),

we enrolled a total of 66 patients with a clinical phenotype characterized by functional tics only.

Each patient underwent a comprehensive clinical assessment by a behavioural neurologist with >20 years of clinical experience with patients with tics (A.E.C.), who confirmed the diagnosis of functional tics. The assessment was based on the National Hospital Interview Schedule for Tourette syndrome [10], a detailed semistructured interview schedule originally validated in patients with neurodevelopmental tics and adapted for use in patients with functional tics by including key items relevant to functional movement disorders [11]. Demographic and clinical data included sex, age at assessment, age and type of onset, psychological triggers, family history of tic disorder, psychiatric comorbidities, and treatment interventions.

Demographic and clinical data were compared with those collected in 44 patients with other functional movement disorders previously assessed by the same behavioural neurologist at the General Neuropsychiatric Clinic. These patients were extracted from a database of 253 patients with functional neurological symptoms, after exclusion of patients with comorbid Tourette syndrome ($n=5$) and patients without functional motor symptoms (nonepileptic attack disorder, $n=163$; chronic fatigue syndrome, $n=29$; chronic subjective dizziness, $n=12$). In this retrospective study, possible differences between the patient groups were assessed using Fisher exact test for dichotomous variables and the t-test for continuous variables.

RESULTS

Approximately three quarters of patients with functional tics ($n=50$, 76%) qualified for a "clinically definite" diagnosis by fulfilling all three major criteria proposed by the European Society for the Study of Tourette Syndrome (age at symptom onset of 12 years or older; rapid onset and evolution of symptoms; clinical phenomenology) [12]. The remaining 16 patients (24%) qualified for a "clinically probable" diagnosis, having fulfilled two major criteria plus at least one of the two minor criteria (comorbidity profile with predominance of preceding anxiety and affective symptoms; other functional neurological symptoms or somatoform disorders). All 44 patients with other functional movement disorders fulfilled the Fahn and Williams criteria for a "clinically definite" diagnosis: incongruent or inconsistent movements plus at least one feature among other false signs, multiple somatizations, obvious psychiatric disturbance, distractibility, and deliberate slowness [13]. Of these, only five reported multiple functional motor phenotypes (11%). The most frequent phenotypes were functional dystonia ($n=21$, 48%) and tremor ($n=19$, 43%), followed by gait ($n=5$, 11%) and myoclonus ($n=4$, 9%).

The demographic and clinical characteristics of the two clinical samples are compared in Table 1.

Patients with functional tics were significantly younger (23 vs. 46 years) and had a shorter disease duration (2 vs. 7 years) compared to patients with other functional movement disorders, reflecting an

TABLE 1 Demographic and clinical characteristics of patients with functional tics ($n=66$) and patients with other functional movement disorders ($n=44$).

Characteristic	Patients with functional tic disorder	Patients with other functional movement disorders	<i>p</i>
Female sex	47 (71.2%)	34 (77.3%)	0.516
Age at assessment, years	23.1 ± 10.5, range = 13–63	45.5 ± 12.5, range = 17–73	<0.001
Age at onset, years	21.1 ± 10.6, range = 11–61	39.1 ± 13.6, range = 16–68	<0.001
Acute/subacute onset	52 (78.8%)	35 (79.5%)	1
Family history of movement disorders	5 (7.6%)	9 (20.5%)	0.077
Psychological trigger	49 (74.2%)	25 (56.8%)	0.065
Affective disorder	20 (30.3%)	17 (38.6%)	0.413
Anxiety disorder	46 (69.7%)	29 (65.9%)	0.682
Nonepileptic attack disorder	22 (33.3%)	17 (38.6%)	0.685
Pharmacotherapy	32 (48.5%)	36 (81.8%)	<0.001
Psychotherapy	25 (37.9%)	17 (38.6%)	1

Note: Bold indicates statistically significant differences.

earlier age at onset of functional symptoms (21 vs. 39 years; onset under 18 years: 47% vs. 11%). A striking preponderance of females (between 70% and 80%) was observed in both groups. Likewise, an acute/subacute onset of functional symptoms was reported by approximately 80% of patients in both groups. There was a trend for patients with other functional movement disorders to be more likely to have a family history of movement disorders (21% vs. 8%), and for patients with functional tics to report psychological triggers for their symptoms (74% vs. 57%). Of note, exposure to ticlike behaviours posted on social media platforms was reported as a trigger by 31 patients with functional tics (47%) but by none of the patients with other functional movement disorders.

Comorbidity profiles were similar, with approximately two thirds of patients fulfilling diagnostic criteria for anxiety and approximately one third of patients having an affective disorder. Likewise, comorbid nonepileptic attack disorder was present in approximately one third of patients in both groups. Patients with other functional movement disorders were significantly more likely to take pharmacotherapy than patients with functional tics (82% vs. 49%, mostly serotonergic agents), whereas the percentage of patients who received psychotherapy (cognitive behavioural therapy) was slightly less than 40% in both groups.

DISCUSSION

To the best of our knowledge, this is the first study comparing the demographic and clinical characteristics of patients who developed functional tics during the COVID-19 pandemic and those of patients with other functional movement disorders. The two groups presented similar characteristics on most variables, especially female sex preponderance, (sub)acute onset, and comorbidity profiles. However, there were also significant differences, mainly related to the younger age of patients with functional tics.

The prevalence of female sex (>70% in both groups) was broadly in line with a recently reported multicentre cohort of functional movement disorders [14]. However, the proportion of females was lower (27%–56%) in the two largest case series of patients with functional tics reported before the pandemic [1, 2]. Moreover, our patients with functional tics had an earlier age at onset (early 20s) compared to patients with other functional movement disorders from our study (late 30s) and from the cited multicentre study (mid 40s) [14], as well as patients diagnosed with functional tics before the pandemic (mid 30s) [1, 2]. The relatively high rates of comorbid anxiety/affective symptoms and other functional neurological symptoms, such as nonepileptic seizures, were similar to prepandemic series of functional tics and other functional movement disorders [2, 14]. Taken together, these findings suggest that patients who developed functional tics during the pandemic represent a phenotypic variant of the wider group of patients with functional movement disorders, with specific features that could be traced back to pandemic-related aetiological mechanisms. These include relevant social media exposures, as reported by almost half of our patients with functional tics.

Overall, this study provided support to the evidence of a large overlap between different functional movement disorder phenotypes [14]. Our data also suggest a clinical continuum with nonepileptic seizures, with relevant implications in terms of both diagnostic strategies and treatment approaches [11, 15]. Beyond appropriate diagnosis communication and psychoeducation, treatment interventions for functional tics focus on the management of psychological stressors and comorbid psychiatric conditions [3, 4]. The interventions reported in the present study reflect previous findings on the usefulness of cognitive behavioural therapy and serotonergic psychopharmacology in selected patients with functional tics [1, 4].

Our study has limitations. The clinical samples originated from a single specialist centre and included English speakers only. Therefore, our results cannot be considered representative of the

different regions where increases in functional tics have been reported. Referral bias further limits the generalizability of our findings, as all patients were recruited from a tertiary referral centre for more severe and/or complex cases. Finally, the group of patients with functional tics was larger and phenotypically less heterogeneous than the group of patients with other functional movement disorders. Further research is needed to refine the phenotypic characterization of newly identified groups of patients with functional movement disorders and to elucidate their underlying pathophysiological mechanisms.

AUTHOR CONTRIBUTIONS

Andrea E. Cavanna: Conceptualization; investigation; methodology; writing–review & editing; writing–original draft; data curation. **Giulia Purpura:** Writing–review & editing. **Anna Riva:** Writing–review & editing. **Renata Nacinovich:** Writing–review & editing. **Stefano Seri:** Writing–review & editing; supervision.

CONFLICT OF INTEREST STATEMENT

None of the authors has any conflict of interest to disclose.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

- Baizabal-Carvallo JF, Jankovic J. The clinical features of psychogenic movement disorders resembling tics. *J Neurol Neurosurg Psychiatry*. 2014;85:573-575.
- Demartini B, Ricciardi L, Parees I, Ganos C, Bhatia KP, Edwards MJ. A positive diagnosis of functional (psychogenic) tics. *Eur J Neurol*. 2015;22:527-536.
- Ganos C, Martino D, Espay AJ, Lang AE, Bhatia KP, Edwards MJ. Tics and functional tic-like movements: can we tell them apart? *Neurology*. 2019;93:750-758.
- Nilles C, Pringsheim TM, Martino D. The recent surge of functional movement disorders: social distress or greater awareness? *Curr Opin Neurol*. 2022;35:485-493.
- Cavanna AE, Purpura G, Nacinovich R. Neurodevelopmental versus functional tics: the state of the art. *Arch Med Health Sci*. 2022;10:239-246.
- Jack RH, Joseph RM, Coupland CAC, Hall CL, Hollis C. Impact of the COVID-19 pandemic on incidence of tics in children and young people: a population-based cohort study. *EClinicalMedicine*. 2023;57:101857.
- Cavanna AE, Purpura G, Riva A, Nacinovich R, Seri S. New-onset functional tics during the COVID-19 pandemic: clinical characteristics of 105 cases from a single Centre. *Eur J Neurol*. 2023 in press;30:2411-2417.
- Martino D, Hedderly T, Murphy T, et al. The spectrum of functional tic-like behaviours: data from an international registry. *Eur J Neurol*. 2023;30:334-343.
- Rigas A, Mainka T, Pringsheim T, et al. Distinguishing functional from primary tics: a study of expert video assessments. *J Neurol Neurosurg Psychiatry*. 2023; in press.
- Robertson MM, Eapen V. The National Hospital Interview Schedule for the assessment of Gilles de la Tourette syndrome. *Int J Methods Psychiatr Res*. 1996;6:203-226.
- Rather MA, Cavanna AE. Nonepileptic attack disorder and functional movement disorder: a clinical continuum? *Epilepsy Behav*. 2020;106:107028.
- Pringsheim T, Ganos C, Nilles C, et al. European Society for the Study of Tourette syndrome 2022 criteria for clinical diagnosis of functional tic-like behaviours: international consensus from experts in tic disorders. *Eur J Neurol*. 2023;30:902-910.
- Fahn S, Williams DT. Psychogenic dystonia. *Adv Neurol*. 1988;50:431-455.
- Tinazzi M, Geroin C, Marcuzzo E, et al. Functional motor phenotypes: to lump or to split? *J Neurol*. 2021;268:4737-4743.
- Kola S, LaFaver K. Functional movement disorder and functional seizures: what have we learned from different subtypes of functional neurological disorders? *Epilepsy Behav Rep*. 2021;18:100510.

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