

INVITED COMMENTARY

Rapid Onset Functional Tic-Like Disorder Outbreak: A Challenging Differential Diagnosis in the COVID-19 Pandemic

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Abstract

During the COVID-19 pandemic, several countries have observed an unexpected increase in the number of adolescents and young adults presenting with rapid onset functional tic-like behaviours after being exposed to social media content of others displaying a similar pattern of functional tics. Many of these patients have been referred to Movement Disorders Clinics with misdiagnoses of late-onset refractory Tourette Syndrome after failing different pharmacological treatments for tics. Tourette Syndrome is a well-known condition with clear clinical diagnostic criteria and which presents with the insidious onset of simple motor and phonic tics in a rostro-caudal evolution starting in early childhood. Clinical and demographic aspects can differentiate rapid onset functional tic-like behaviours from Tourette Syndrome, including the former having abrupt and explosive presentation of severe symptoms, later age of onset, female gender predominance, lack of suppressibility, comorbid anxiety and depression, atypical premonitory urge and history of exposure to social media content displaying tic-like behaviours. This new presentation of a functional neurological disorder may be explained in part by the relationship between social media exposure to tic-like behaviours, and maladaptive response to anxiety caused by life stressors (e.g. COVID-19 pandemic), especially in young individuals. Rapid onset functional tic-like behaviours may be considered a spreading neuropsychiatric disorder that is potentially fostered by the psychosocial impact caused by the COVID-19 pandemic.

Résumé

Durant la pandémie de la COVID-19, plusieurs pays ont observé une hausse inattendue du nombre d'adolescents et de jeunes adultes présentant des comportements fonctionnels de type tic à apparition rapide après avoir été exposés au contenu des médias sociaux d'autres personnes affichant un modèle semblable de tics fonctionnels. Nombre de ces patients ont été adressés à des cliniques de trouble du mouvement avec des diagnostics fautifs de syndrome de Tourette réfractaire d'apparition tardive après avoir échoué à différents traitements pharmacologiques pour les tics. Le syndrome de Tourette est un trouble bien connu dont les critères diagnostiques cliniques sont clairs et qui présente le début insidieux de simples tics moteurs et phoniques dans une évolution rostro-caudale au début de l'enfance. Les aspects cliniques et démographiques peuvent différencier l'apparition rapide de comportements fonctionnels de type tic du syndrome de Tourette, notamment parce que les premiers ont une présentation abrupte et explosive de symptômes graves, apparaissent à un âge plus avancé, ont une prédominance chez le sexe féminin, manquent de suppressibilité, anxiété et dépression comorbides, envie prémonitoire atypique et antécédents d'exposition au contenu des médias sociaux affichant des comportements de type tic. Cette nouvelle présentation d'un trouble neurologique fonctionnel peut s'expliquer en partie par la relation entre l'exposition aux comportements de type tic dans les médias sociaux et la réponse inadaptée à l'anxiété causée par les stressors de la vie (p. ex., pandémie de la COVID-19), surtout chez les jeunes personnes. Les comportements fonctionnels de type tic à apparition rapide peuvent être considérés comme un trouble neuropsychiatrique qui se propage et qui est potentiellement favorisé par l'effet psychosocial causé par la pandémie de la COVID-19.

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Submitted: January 13, 2022; Accepted: June 17, 2022

Introduction

Since 2020, the medical community has witnessed an increase in referrals for the acute onset of severe functional tic-like behaviours among adolescents and young adults (1-5). Although the clinical and psychosocial factors involved in this phenomenon are not yet fully elucidated, clinicians believe it can be partially explained as an effect of social isolation and distress driven by the COVID-19 pandemic and its related restrictions, together with an increased influence of social media in the affected age group. Lately, there have been several publications regarding this abrupt increase in referrals of patients with a similar presentation in several countries including Canada, the United Kingdom, Germany, Australia, and the USA (1,4,6,7).

Often these patients are referred to tertiary centres with a presumptive diagnosis of a late-onset form of Tourette Syndrome (TS). Still, the characteristics of this functional neurological disorder are different from the typical presentation of TS. Differentiation between these conditions can be challenging because of overlapping clinical features and the need for sequential evaluations. In this article we will discuss how to differentiate between TS and functional tic-like behaviours (FTLBs). Moreover, our intention is to raise awareness of the marked increase in the number of cases of this particular neuropsychiatric condition among psychiatrists and other mental health providers. Finally, we will debate the possible causes, focusing on social media influences on youth and the increase in psychological distress (8).

Tourette Syndrome

TS was first described by Georges Gilles de La Tourette in 1885 in France (9). He reported nine patients who presented with involuntary movements and vocalizations, increased startle reactions and repetitions of others' movements and sounds, now described as echopraxia and echolalia (9). After more than a century of research, the modern classification of TS has been refined with clinical criteria that requires the presence of both multiple motor tics and at least one phonic tic for 1 year in a waxing and waning pattern, with onset before 18 years of age. Exclusion criteria require the disturbance not be due to the direct physiologic effects of a substance or a general medical condition (10). TS is a highly prevalent disorder in youth; in Canada, the prevalence of diagnosed TS in adolescents is estimated at 6.03 per 1000 in males and 0.48 per 1000 in females (11). Interestingly, prevalence in male adults is lower at 0.48 per 1000, while prevalence in adult females is essentially unchanged at 0.44 per 1000 (11).

TS has a typical presentation and evolution in its clinical course. Tics usually start at a mean age of approximately six years, beginning with simple tics of the face affecting a single muscle group (12). Classically, tics have a rostro-caudal evolution in their distribution, (12) meaning that it will start affecting the facial muscles and then progressively spread to the trunk, abdomen, and limbs. Simple phonic tics usually appear after simple motor tics. Common initial simple tics are blinking, nose wrinkling, grimacing, eye rolling, throat clearing and sniffing, which may then evolve to tics in the trunk, limbs, and more complex movements or vocalizations. Tics have a waxing and waning frequency with improvement and aggravation of symptoms over periods of days, weeks, or months (13). Complex tics emerge over time and are described as purposeless and patterned movements involving a combination of different muscle groups (14). Common examples are clapping, tapping, and jumping. Symptoms generally reach a peak in severity between 10 and 12 years of age and then slowly subside, with a high chance of improvement by late adolescence (15).

Several characteristics are intrinsically related to tics. One of them is the feeling of an urge to perform the movement with a transient sense of relief after the tic is performed. Researchers and authors with lived experience with TS describe how tics are performed to alleviate this premonitory sensation with a movement or a sound (16, 17). However, not all tics are driven by a premonitory urge and some patients are not aware of their tics and even less so of premonitory feelings (18). Other important additional features are related to tic phenomenology. Tics can be highly suggestible, i.e. they can be triggered by directing the subjects' attention towards the involuntary movements (19). Distractibility is another feature associated with tics, meaning it may fluctuate in frequency and severity when patients' attention is diverted from the tics (19). For instance, it is often noted that tics may diminish when the individual is focusing on other attention-demanding tasks. Finally, tics are suppressible. Usually, in early adolescence, patients become more self-aware of the premonitory urge which may lead to the ability to suppress tics for short periods (20). Suppressing tics usually comes with a feeling of discomfort, at least transiently (20).

TS frequently co-occurs with neuropsychiatric conditions, which are present in approximately 85% of patients (21). Attention-deficit hyperactivity disorder (ADHD) and obsessive-compulsive disorder (OCD) are the most prevalent, but other common associated conditions include anxiety, depression, and disruptive behaviour disorders (21). The impact on quality of life and functioning caused by these psychiatric comorbid disorders can represent the main

Table 1. Main clinical and demographic aspects differentiating Tourette Syndrome (TS) and Functional Tic-like behaviour

Characteristics	Tourette Syndrome	Functional Tic-like behaviour
Age of onset	5 – 7 years old	12 – 25 years old
Gender	Male preponderance	Female preponderance
Tic characteristics	Insidious onset, with predominance of simple motor and phonic tics, rostro-caudal evolution	Abrupt and explosive onset of complex vocalizations consisting of words, phrases and socially inappropriate statements, and large amplitude complex arm and hand movements
Alpha agonists and neuroleptics responsiveness	Gradual positive response	Immediate improvement or unresponsiveness
Family history of TS	Positive in 30% or more of cases	Rarely positive
Neuropsychiatric comorbidities	ADHD, OCD, Anxiety, Depression and Disruptive Behaviour Disorders	Anxiety and Depression
Premonitory urge	Sensory feeling described as a necessity to move, a pressure, tension or burning sensation. Anatomically correlated with tic localization	Nonspecific – may be described as a generalized surge of energy
Influence of social media	Not reported	Tic-like behaviours similar to social influencers reported in several case series

reason to seek medical attention and the primary target of treatment interventions (22).

Rapid Onset Functional Tic-Like Behaviours

The presentation of rapid onset FTLBs shows differences from TS and other primary persistent tic disorders in most of these cases. The main clinical and demographic aspects that help differentiate the two conditions are summarized in Table 1. Usually, rapid onset FTLBs start at a later age, between 12 and 25 years, with a small study showing a median age of onset of 15 years (5). Patients describe an abrupt and explosive presentation of symptoms in hours or days of mostly complex phonic and motor tic-like behaviours with high severity and lack of simple tics (1). Symptom frequency in rapid onset FTLBs has not the typical waxing and waning presentation of TS (5, 23). The localization pattern is usually limbs and trunk in contrast to the typical rostro-caudal evolution of TS. Often, the complex tic-like symptoms include coprophenomena like coprolalia and copropraxia, (6) ranging from 50 to 67% for coprolalia (2, 24) and 20% for copropraxia (24). This is markedly more common than in TS patients, in whom the estimated lifetime prevalence of coprolalia is 14.6% in females and 19.3% in

males, and that of copropraxia is 4.9% in females and 5.9% in males (25). Self-injurious behaviour was also reported to be more common in FTLBs, ranging from 27.7% (24) to 85.7% (26) compared to 14% in TS patients (27). An additional distinguishable characteristic is that the abnormal movements frequently flare when around others and are performed towards them, such as throwing objects in their direction (5). At the same time, rapid onset FTLBs subside when the patient is alone, which differs from tics in primary tic disorders where patients tend to perform a higher number of involuntary movements when alone or unattended (5). Another aspect that can help differentiate these two diagnoses is the presence and description of the premonitory urge. The typical perception of this sensory symptom in TS is described as a necessity to move, a feeling of pressure, tension, or, more atypically an itchy or burning sensation anatomically localized in the same region where the tic is performed (28). In FTLBs the urge is less present (3,5) and can be described in a very non-specific manner, such as a feeling of an energy pulse in the whole body (29).

Initial experience suggests the existence of two different subgroups of patients with rapid onset FTLBs, based on the presence or absence (more common) of a history of simple tics in childhood (1,4). Importantly, in both subgroups FTLBs present with a similarly abrupt onset, are

incapacitating to the patient, and are frequently associated with concurrent, clinically relevant anxiety and depressive symptoms (1). The fact that at least a group of patients have a history of a previous chronic tic disorder is an additional challenge for the diagnosis, and clinicians need a careful evaluation of phenomenology and evolution, which may need serial assessments for a better diagnostic certainty. Interestingly, rapid onset FTLBs share some features with tics seen in TS, including feeling a form of premonitory urge, distractibility and suggestibility, which, even in pre-pandemic times, suggested a potential overlap in pathophysiology between tics and tic-like behaviours (30). However, suppressibility of FTLBs is rare compared to tics described in TS (1,3).

The clinical presentation of rapid onset, pandemic-related FTLBs also shows similarities with the phenomenon of ‘tic attacks’. Interestingly, in a recently published case series all patients with rapid onset FTLBs presented that specific phenomenology (3). Tic attacks have been initially described in TS patients before the pandemic and are characterized as a burst of severe movements triggered by external factors such as noises or visual stimuli (31). Tic attacks usually last several minutes and cause significant distress to the patient. It is hypothesized that these episodes are related to anxiety regarding tics, negative perceptions about tics, and increased attention and misinterpretation of anxiety feelings perceived in the body (31). The patient may translate these sensations as the premonitory urge that leads to tics. As a result of this misinterpretation of anxiety feelings, the tic-like phenomena will lead to more anxiety and, in a vicious cycle, will end up causing ‘tic-attacks’ (31). Like ‘tic-attacks’, rapid onset FTLBs may be directly correlated with inaccurate cognitive perceptions of body feelings related to anxiety symptoms.

TS has a described hereditary pattern, it is estimated that 30% of TS patients have a positive family history (32) whereas rapid onset FTLBs are less likely to show this pattern because of the nature of the condition. The obvious exception is the cases where there is an overlap between a previously diagnosed primary tic disorder and rapid onset FTLBs.

Unfortunately, the burden caused by rapid onset functional tic-like behaviours goes beyond the affected individual and is shared by their families. As many of these patients are adolescents, family dynamics may be abruptly disrupted by how affected these patients are. This sudden change causes interpersonal distress with significant impairment in family members’ quality of life. Severe symptoms are often incompatible with school or work, as it can be virtually impossible for the patient to behave appropriately in social

situations. The result is a more profound social isolation at both personal and professional levels.

Comorbid psychiatric conditions also differ between TS and rapid onset FTLBs. Patients with FTLBs are more commonly diagnosed with anxiety and depression (2). It is possible that a layer of the pathophysiology of this functional disorder is an inadequate response to anxiety brought by different aspects. Treatment can be partly based on improving the response to stressors with cognitive-behavioural therapy to develop strategies to better cope with worries, shift attention from the tic-like movements and provide education regarding this condition (31). This psychoeducation should include the importance of taking a ‘rehabilitation’ approach that involves coping with the tic-like behaviours and optimizing functioning. Considering the possibility of an environmental trigger, another additional aspect to be considered is discontinuing patient exposure to the social media content that induced FTLBs (1, 33).

Preliminary observations report that patients diagnosed with FTLBs have an atypical response to the usual pharmacological treatment for TS. Patients treated with alpha-agonists and neuroleptics responded with either unrealistic rapid resolution which may be related to placebo effect or a complete lack of response (1,3). These anecdotal reports make it even more important to correctly diagnose FTLBs and consequently avoid exposure to potential harm from these medications. Moreover, it may postpone effective treatment. Our own preliminary experience treating rapid onset FTLBs has found that in case of identification of co-occurring anxiety and depression, treatment with cognitive behavioural therapy and selective serotonin reuptake inhibitors has been associated with improvement in FTLBs over a period of six months. Noticeably, more studies are needed to develop an evidence-based approach in this regard. In patients where comorbid mood disorders are not present, a management approach including cognitive-behavioural therapy for functional tic-like behaviours with habit-reversal training has been used. (2, 30)

Prior to the pandemic, available data suggest that FTLBs were very uncommon, representing only 4.9% of the total functional neurological disorders in a movement disorders specialist clinic (34). The increase in reported FTLBs since the onset of the pandemic raises the question: What has precipitated this overwhelming increase in the number of cases? The psychological impacts of the pandemic and its consequences on society can be part of the explanation. The high levels of anxiety and fear of an unknown disease and its implications can be particularly deleterious in people predisposed to developing functional neurological disorders (35). A maladaptive response to the psychological burden

related to these emotions, together with an underlying susceptibility to depression or anxiety, may have resulted in functional neurological symptoms in several individuals in different countries. Evidence shows that a significant part of the population exposed to direct and indirect effects of COVID-19 in Canada, the USA, New Zealand, Australia, and the UK had symptoms of PTSD, anxiety, depression and elevated stress perception (8). The same study showed that people who experienced COVID-19 direct consequences, like losing a job or testing positive for the virus, have a similar spectrum of psychiatric burden as the group which had no direct effect but an anticipatory perception of future negative impacts from COVID-19 (8). Moreover, there was a correlation between COVID-19 social and traditional media consumption with PTSD symptoms leading to greater stress severity and negative emotions (8). These effects might be more intense in adolescents, in which stress is directly correlated with mood disorders (36), and may be amplified by social distancing, increased stress on families and lack of supportive resources (37).

The impact of social media use may be especially important in FTLBs as a possible spread vector. There are multiple profiles in popular applications such as TikTok, YouTube and Instagram that are dedicated almost completely to delivering video content of behaviours that fit the phenomenology of FTLBs. Interestingly the majority of these patients, after careful evaluation, confirm watching videos of these social influencers, and in some cases had posted personal videos of their own abnormal movements (1,3,5). One of the most popular influencers had 14.3 million followers on TikTok in December 2021 (38). Hashtags like #Tourette, #Tourettesyndrome, #Tic, #Tourettes are usually tagged in these videos, the latter alone had 5.1 billion views (39). Moreover, many patients present with motor and phonic tic-like behaviours that are identical to those displayed by the popular influencers such as, for example, “beans”, “woo hoo” and “knock-knock” (2). In a recent paper, Olvera et al. analyzed FTLBs phenomenology from popular videos of social influencers, confirming the presence of previously discussed characteristics, like the presence of the same phonic tic “beans” in 53.6% of the videos, the presence of disruptive and severe tics (89.3%), “tic attacks” (64.3%), coprolalia/copropraxia (93%) and self-injurious behaviour (85.7%) (26). Social media’s overwhelming capacity for dissemination of its content in combination with the psychological distress brought by the pandemic may explain the rise in FTLBs over the past two years. However, in Germany, the increase in patients presenting with rapid onset FTLBs seems to have preceded the WHO announcement of COVID-19 as a pandemic in March 2020. A striking increase in the number of patients with FTLBs began

in June 2019 and it has been proposed to be correlated with social media exposure to tic-like behaviours. It raises the question that being exposed to FTLBs virtual content may produce a similar pathological effect even without the pandemic factor (6).

Rapid onset FTLBs is considered to be part of the broad category of Functional Neurological Disorders (FND). Typical characteristics of FNDs are the abrupt onset of severe symptoms with usually a higher gender preponderance of females (40), as seen in rapid onset FTLBs (1). FND is characterized by neurological symptoms that cannot be attributed to a known neurological disease (10). Functional neurological disease is described in the group of somatic symptoms and related disorders (10) and is also classically referred to as conversion disorder, which implies a conversion of psychological distress to physical symptoms (41). However, in many patients, a clear psychological causative trauma is not found, so this is not a core diagnostic criterion for FND diagnosis any longer (10). The pathophysiology of FND has been better understood lately and the more accepted model includes several components such as attention dysregulation with impaired awareness of body sensations that translate to movement abnormalities (42). Brain connectivity abnormalities have also been described in patients with FNDs in functional brain imaging studies (43, 44). These connectivity changes are implied to generate unexpected activation of motor and limbic cortex areas in patients with motor FNDs in response to emotional stimuli (44). These neuroplasticity defects may potentially explain the increased awareness of the movements, the perception of them as involuntary and the impaired emotional regulation. Often (but not necessarily) the presence of physical or psychological trauma is recognized previous to the onset of functional symptoms (45). Traumatic events combined with individual genetic susceptibility and age may lead to a cumulative load that reaches the threshold to induce functional neurological symptoms (46) including abnormal movements. During the COVID-19 pandemic a substantial increase in the number of patients diagnosed with functional movement disorders occurred, including not only FTLBs but functional tremor, dystonia, myoclonus, stereotypies and multiple movement disorders. (7).

The term mass sociogenic or psychogenic illness has been used in association with rapid onset FTLBs (6) because of similarities between the two conditions. They share characteristics like spreading in a specific group which has been exposed to a source of direct or indirect communication of symptoms in an environment of increased anxiety, like the fear of a catastrophic event (33). In the case of rapid onset FTLBs, social media tic-like behaviours videos disseminate in a specific group that is exposed to an environment

of high levels of anxiety generated by pandemic-related stressors. Mass sociogenic illness usually has a self-limited evolution with complete remission of symptoms (41), even more when establishing a clear communication between physician and patient and if there is an acceptance of the diagnosis (41, 33). The description of a similar phenomenological presentation existed before the combination of pandemic-related stressors and social media. The case of the Le Roy High School in 2012 is an example when 19 teenagers developed rapid onset severe tic-like behaviours, syncope and non-epileptic seizures (47, 48). That specific case was considered a mass sociogenic illness caused by psychosocial stressors in a group exposed to tics from two children previously diagnosed with Chronic Tic Disorder or Tourette Syndrome, being the probable source of symptoms communicated to the other patients (48).

Rapid onset FTLBs is not the only condition found to be impacted by social media usage and COVID-19 indirect psychosocial effects. A recently published article about young adults self-declared as having eating disorders found a direct correlation between social media exposure, fear of COVID-19 and worsening in eating disorders symptoms (49). During the pandemic, an increase in the severity of eating disorder related symptoms has been described, including a substantial increase in the number of hospitalizations witnessed in several countries around the world (50-55). The effect caused by COVID-19 related stressors was found to be significantly severe in adolescents, (54) similar to the affected population with rapid onset FTLBs (5). Regarding the association between eating disorders and social media, previous studies have shown symptoms worsening in patients with higher rates of social media exposure (55-58). The proposed mechanism for this phenomenon suggests that social media is a virtual environment where there are high levels of exposure to a mainstream physical appearance that leads to comparisons, including feedback from peers to posted pictures, stimulating harmful behaviour to achieve unrealistic goals (59). This is aggravated by machine-learning properties in social media that explore commercially the interests of the user by overexposing diet related products and behaviours to achieve a specific body image (59). Comparing eating disorders and rapid onset FTLBs relationship with social media, it is possible that both conditions are influenced by virtually displayed behaviours and images that reinforce aspects of their clinical presentation. Therefore, there is a chance that these external influences may generate or reinforce a pattern of deleterious behaviours in the patient.

Conclusion

The changes in life dynamics during the COVID-19 pandemic unfortunately brought more problems in addition to those directly caused by this infectious disease. Rapid onset FTLBs apparently grew together and under the influence of COVID-19 pandemic psychosocial effects with a severe and explosive onset of tic-like behaviours that negatively impact the quality of life of patients and their families. Recognition of this phenomenon and its pathophysiology may help with the correct diagnosis and how to manage the increasing number of rapid onset FTLBs cases, avoiding unnecessary and potentially harmful treatments.

Acknowledgements

Gabriel Amorelli receives salary support for his clinical fellowship from Paladin Labs.

Conflict of interest

The authors have no conflicts of interest to disclose.

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