Treatment for Patients With a Functional Neurological Disorder (Conversion Disorder): An Integrated Approach

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Which of the following reflects a DSM-5 criterion for conversion disorder (functional neurologic symptom disorder)?
  A. Symptoms of altered voluntary motor, cognitive, or sensory function.
  B. Clinical findings compatible with a recognized neurologic condition.
  C. Symptom onset following an identified stressor.
  D. Evidence of intentional production of neurologic symptoms.

"Ms. A," a 29-year-old woman, was referred for a second neurologic opinion. Several months earlier, she woke with a pins-and-needles sensation involving both legs from the knees to the toes. The following day, she could not move her legs without help from her fiancé. Several hours later, she developed transient numbness of the left arm. Alarmed by her increasing symptoms, she presented to the emergency department. A brain and cervical MRI with gadolinium contrast showed no abnormalities. The patient was discharged with neurologic follow-up. Results of an electromyogram and nerve conduction study of the upper and lower extremities were normal. Later, because of increasing back and diffuse leg pain, the patient underwent a lumbar MRI, which also showed no abnormalities. She continued to experience lower extremity weakness and paresthesias as well as back and leg pain. No diagnosis was made. The patient had been unable to work since her symptoms began.

Ms. A had a history of posttraumatic stress disorder related to a rape in college. She still endorsed presence of frequent nightmares and flashbacks related to the experience. She denied hypervigilance or avoidance related to her trauma. She denied any history of depression or other anxiety symptoms.

On examination the patient had diffuse lower extremity weakness with variability of effort (the strength of her lower extremities did not consistently show the same response, as would be expected in a physiological motor deficit). Her reflexes were normal and there were no pathological reflexes. Sensation to pinprick was decreased in both legs without a sensory level or a dermatomal pattern (if a patient has a spinal cord abnormality, a sensory level would be an expected finding, or if there were cauda equina involvement, the sensory loss should conform to that of multiple sensory dermatomes). The patient's vibratory sense was diminished over the thoracic but not the lumbar vertebrae or in her lower extremities (this is inconsistent with a neuroanatomical basis for vibratory sensory loss). She could stand using a walker, but she was slow to initiate movement and tended to collapse at the knees (the gait disorder was inconsistent with her normal motor examination).

A diagnosis of a functional neurological disorder (conversion disorder) was made on the basis of the positive findings of the neurological examination. These included the normal motor, nonphysiological findings of the sensory examination and a gait disorder that was inconsistent with the normal findings of the motor examination.

The care of patients with functional neurological disorders overlaps both the neurology and psychiatry specialties. It is often the case that neither provider thinks that he or she should be the treating clinician, and as a result, this patient group can suffer a substantial gap in care. Here, we illustrate a practical approach toward integration of care to appropriately treat patients with functional neurological disorders.

DEFINITIONS

The chapter on somatic symptoms and related disorders in DSM-5 encompasses several psychiatric disorders for which the primary feature is a symptom related to a physical or health-related complaint. The diagnostic criteria for somatic symptom disorder require that the patient have one or more

somatic symptoms for at least 6 months. Patients may or may not have a medically diagnosed condition to explain their symptoms, but they should meet psychobehavioral criteria (excessive behaviors, health concerns, or anxiety in the context of the somatic symptoms) (1). In a functional neurological disorder (also called conversion disorder or functional neurological symptom disorder), the cardinal symptom is limited solely to neurological symptoms. Functional neurological symptom disorder is within the DSM-5 chapter on somatic symptom and related disorders but is distinct from somatic symptom disorder. Patients with a functional neurological disorder have symptoms of altered voluntary motor, cognitive, or sensory function that are not compatible with any recognized neurological condition (1). The DSM-5 criteria state that the clinician must establish evidence of preserved physiological function despite the presence of a neurological symptom. For instance, in the case of functional limb weakness, the clinician must demonstrate, through a neurological examination, that the affected limb has preserved strength when tested with specific maneuvers to uncover that finding. In other words, the diagnosis is made on the basis of the positive findings of the examination demonstrating preserved neurological function. DSM no longer requires that there be any temporal relationship between psychological factors and the onset or worsening of the disorder, although the association with psychological stressors remains a specifier. In addition, the criterion that patients are not intentionally producing their symptoms has been abandoned. Disability in functional neurological disorders is like that of structural disease, and neurological outcome at 8 months is poor, with over 50% of patients showing no improvement (2). Neither patients with a somatic symptom disorder nor those with a functional neurological disorder are presumed to fabricate their symptoms volitionally.

EPIDEMIOLOGY

Studies determining the incidence of functional neurological disorders are confounded by how the diagnosis was established and the specific patient population studied. Stefánsson et al. (3), using data from a large psychiatric registry as well as a psychiatric consultation service, found the annual incidence of functional neurological disorders to be 22 per 100,000 in patients from Monroe, New York. In the case of Ms. A in the vignette, the diagnosis of a functional neurological disorder was made by the neurologist. In ambulatory neurology clinics, approximately one-third of new patients have medically unexplained symptoms, the second most common diagnostic category after headache (4). Although "medically unexplained symptoms" is not synonymous with a functional neurological disorder (the former is not a psychiatric diagnosis and only implies unknown etiology, whereas the latter requires that specific diagnostic criteria be met), the evaluation of a patient with a medically unexplained symptom in the context of a neurological complaint should always raise clinical suspicion

of, and prompt further evaluation for, a functional neurological disorder.

Studies show that a majority (78%–93%) of patients with functional neurological disorders are women (5, 6). Up to two-thirds of these patients have significant psychiatric disease, with a history of depression and a history of trauma being the most common psychiatric comorbid conditions (7–9). Dissociative symptoms and personality disorders are also prevalent in this patient population (10).

NEUROBIOLOGY AND PSYCHOPATHOLOGY OF FUNCTIONAL NEUROLOGICAL DISORDERS

The neurobiology of functional neurological disorders is not well understood. However, volumetric studies of the brain, physiological testing, and functional imaging have begun to provide insights.

Structural Abnormalities

Volumetric MRI studies show evidence of differences in both cortical and subcortical brain anatomy in patients with functional neurological disorders. A group studying patients with motor functional neurological disorders with unilateral limb weakness found decreased volumes in the lentiform, thalamic, and caudate nuclei (11). Others looking at patients with motor conversion disorder compared with age-matched comparison subjects found significantly smaller thalamic volumes bilaterally in the patient group (12). A variety of cortical changes have been seen. For instance, patients with motor functional neurological disorders have been found to exhibit increased thickness of the premotor cortex bilaterally, whereas those with psychogenic nonepileptic seizures showed cortical atrophy of the motor and premotor regions in the right hemisphere and bilateral cerebellar atrophy (13, 14). Whether these changes are primary or secondary to changes in neural circuitry is unknown. While the lack of macroscopic brain alterations has traditionally been a core feature of functional neurological disorders, changes in gray matter volume are now well recognized in psychiatric disorders, such as major depression, bipolar disorder, and posttraumatic stress disorder (PTSD) (15, 16), as well as somatic symptom disorder with pain (17). Functional neurological disorder is no exception to these findings.

Physiological Studies

Electromyography in patients with functional neurological disorders with motor symptoms shows a decreased interference pattern. This finding can be seen in patients either with poor effort or with a lesion involving the corticospinal tract. In a set of experiments comparing healthy subjects and individuals with motor manifestations of functional neurological disorders (18), both groups were found to have normal motor evoked potentials. When the groups were then asked to imagine moving the affected limb, the patients with a functional neurological disorder had smaller motor evoked potentials compared with the healthy subjects during motor

imagery tasks. This finding suggests that although the structural motor pathways are preserved in motor functional neurological disorders, there is an alteration in the pathways involved in motor planning. Similar studies have been done using evoked potentials in patients with sensory, visual, hearing, and movement disorder manifestations of functional neurological disorders (19–22). These studies show normal function of the primary pathways (motor efferent systems and the sensory afferent pathways) but alterations at the level of premotor and sensory association cortex processing.

Functional Imaging Studies

Neural network dysfunction may underlie the symptomatic manifestation in functional neurological disorders. This is evidenced by multiple studies across different functional neurological symptoms. Functional MRI studies have shown that patients with functional neurological disorders activate their brain differently than do healthy subjects simulating a similar condition. For example, patients with motor functional neurological disorders show hypoactivation of cortical and subcortical motor pathways, and those with visual functional neurological disorders show hypoactivation in either the visual association or primary visual cortex (23). Additional studies point to dysfunction in sensorimotor integration, with hypoactivation of the right temporal parietal region possibly resulting in loss of agency, validating the patient's experience that functional neurological disorders are involuntary (23, 24). Functional neurological disorders are associated with high rates of trauma (25). Alterations in the mechanisms of emotion regulation and cognitive control in PTSD (where an overactive amygdala is not properly inhibited by medial prefrontal areas) (26–28) may indirectly offer a model of neurobiological dysfunction in functional neurological disorders. Abnormal emotion regulation and cognitive control patterns (possibly facilitated by past trauma history) may secondarily lead to brain activation changes and interfere with motor planning and self-regulation in individuals who are vulnerable to experiencing functional motor manifestations (29, 30).

Psychological Underpinnings

Different psychological theories hypothesize how psychological and cognitive processes give rise to functional neurological symptoms. The classical Freudian theory postulates that intolerable affect is "converted" into somatic symptoms. Theories focusing on dissociative processes, originally postulated by Pierre Janet, frame functional neurological disorder as an "autosuggestive disorder," with symptoms being like those seen in hypnotic states. Compartmentalization and detachment are specific dissociative mechanisms involved in the origin of the symptom. Finally, a theory on cognitive hierarchy models explains functional neurological disorder as the result of an alteration in the allocation of attentional resources in certain sensory states, leading to activation of dysfunctional sensory and motor networks (26).

DIAGNOSIS AND EVALUATION

The diagnosis of a functional neurological disorder is based on findings in the neurological examination (or other tests) demonstrating that the symptom is incompatible with a structural neurological illness (31). In the case presented here, for example, Ms. A had diffuse weakness with variability of effort, sometimes giving full strength and at other times able to give only minimal strength, which is not consistent with the pattern seen in structural neurological disease. In addition, Ms. A's deep tendon reflexes were normal, and pathological reflexes such as those expected in corticospinal disease (the Babinski reflex) were absent. Ms. A's sensory examination was likewise consistent with a functional problem, with loss of vibratory sense over the thoracic vertebrae but not in the lower extremities. There are many maneuvers neurologists can utilize to establish that the patient's symptoms are not attributable to structural causes (Table 1) (32, 33). In the case of psychogenic nonepileptic seizures, a subtype of functional neurological disorder, an electrophysiological study that demonstrates normal electrophysiological function at the time of a seizure-like episode (via video EEG monitoring), coupled with signs suggestive of psychogenic nonepileptic seizures, would satisfy the diagnostic criteria (34).

A literature review (35) showed that the diagnosis of a functional neurological disorder can be made reliably, with a misdiagnosis rate of about 4%. Additional testing should be directed toward excluding other specific diagnostic possibilities and should be limited. Extensive testing gives the impression of diagnostic uncertainty and is both expensive and unproductive. Unnecessary testing may also cause iatrogenic injury and may demonstrate incidental findings that can cause physicians to initiate further testing and procedures that are likely unnecessary (36).

MAKING THE DIAGNOSIS

Patients with functional neurological disorders may present for evaluation to either a neurologist or a psychiatrist. The evaluating clinician's role is to establish the diagnosis, deliver the news in a way that makes sense to the patient, and engage the patient in treatment. There should be collaboration among treating clinicians to ensure agreement on the diagnosis and treatment plan. While the diagnosis is based on positive findings of the examination, a comprehensive screening of psychiatric risk factors should be conducted early in the process to identify predisposing, precipitating, and perpetuating factors that need to be addressed promptly (37).

Once it is clear that the patient's symptoms and findings are consistent with a functional neurological disorder, the patient should be informed. Not providing the patient with a clear diagnosis can result in a delay in treatment as well as additional unnecessary consultations, testing, and emergency department visits. The pitfall of not making a clear diagnosis

TABLE 1. Neurological Examination: Clues That the Patient Has a Functional Disorder

Sign	Sensitivity, Specificity	Functional Neurological Disorder	Definitions	Comment or Example
Motor				
Variable strength	Sensitivity 63%, specificity 97% (32)	Present	Give-away weakness is inconsistent	Collapsing weakness: as the examiner applies different levels of force, the patient's resistance varies
Hoover's sign	Sensitivity 94%, specificity 99% (32)	Present	Hoover's test: the expected response is that the normal limb heel pushes down against the examiner's hand as the patient tries to raise the weak leg's hip	Positive Hoover's sign: if the examiner does not feel the "normal" leg's heel pushing down as the patient flexes the hip of the "weak" limb, this suggests functional weakness
Inconsistent examination	Sensitivity 13%, specificity 98% (32)	Present		The patient can rise from a chair but is unable to lift either leg off the examination table
Co-contraction	Sensitivity 17%, specificity 100% (32)	Present	When both agonist and antagonist muscles are activated	When asked to flex the elbow, both biceps and triceps are activated
Hemiparesis in a nonpyramidal pattern	Not validated (32)	Diffuse weakness		Pyramidal weakness: extensors are weaker than flexors in the arm and flexors are weaker than extensors in the leg
Babinski sign	Expert opinion	Absent		
Tremor				
Entrainment	Sensitivity 91%, specificity 91% (33)	Present		The tremor frequency switches to match the frequency of a voluntary rhythmical movement performed by the unaffected limb
Distraction affecting the tremor	Sensitivity 92%, Specificity 94% (33)	Significant		The tremor changes when the examiner has the patient perform tasks like counting backward
Variability	Sensitivity 22%, specificity 92% (33)	Significant		The amplitude and characteristics of the tremor vary during the examination
Sensory				
Pattern of numbness	Sensitivity 74%, specificity 100% (32)	Not anatomic		Sensation normalizes at hip or shoulder
Splitting the midline	Sensitivity 20%, specificity 93% (32)	Present		The sensory nerves do not end precisely at the midline
Splitting of vibration	Sensitivity 95%, specificity 14% (32)	Present		The frontalis is a single bone, so vibration sense should be the same bilaterally
Gait				
Dragging leg	Sensitivity 8.4%, specificity 100% (33)	Present		Patients with pyramidal weakness circumduct their leg
Excessively slow gait	Not validated (33)	Present	Slowness in all aspects of gait	Patients with bradykinesia display the most prominent slowness with gait initiation
Inconsistent with known neurological disease	Not validated (33)	Present	Noneconomic, requires more rather than less effort	Knee buckling without a fall requires more strength at knee extensors
Consistently falls to or away from examiner	Not validated (33)	Present	Test with the Romberg maneuver	Significant sway, often after a latency

is evidenced in the case described here, as the patient presented for a second opinion without an established diagnosis. Giving a clear diagnosis can itself be therapeutic for some patients, and it diminishes the concern they may have that they are suffering from some obscure neurological illness (38).

The explanation of the diagnosis needs to make sense to the patient. Showing the patient the inconsistencies on examination and explaining how preserved physiological function is ascertained is extremely helpful (39). It is not helpful simply to inform patients which conditions they do not suffer from; rather, it is preferable to focus the discussion on the uncovered diagnosis. Clinicians must carefully explain the term "psychogenic" so the patient does not misinterpret it to imply that he or she is feigning or malingering, which is not correct. Ms. A was told that she had a "functional neurological disorder." She was shown the inconsistencies on her examination and told that the problem came from an alteration in the integration of motor and sensory function, rather than from permanent damage to her motor and sensory systems. In addition, she was reassured that having a functional neurological disorder is common and treatable and that she has the potential for complete recovery. This information can be reinforced with a clinic letter copied to the patient and other treating clinicians, along with providing the address of a web site where further information can be found (http://www.nonepilepticattacks.info or http://www.neurosymptoms.org) (40). Specific communication strategies to deliver the diagnosis of psychogenic nonepileptic seizures have been described in detail, and some of them have been piloted in clinical settings (41, 42).

After the diagnosis is presented, the next step is to discuss treatment. Given that there is no permanent neurological impairment, there is the capacity for full neurological recovery. Treatment can be described as a form of "brain retraining" in how the brain organizes motor or sensory function and how the brain learns to relate and respond to thoughts and feelings that interfere with motor or sensory function, which can lead to neurological manifestations. If the patient has established health care providers, it is essential to communicate with them to ensure that they understand the new diagnosis.

Both neurologists and psychiatrists may need to follow these patients until they show improvement. Inadequate follow-up of patients with a functional neurological disorder is not best practice for several reasons. First, such patients commonly develop other functional symptoms. Having a preserved connection with the clinician who previously diagnosed their functional neurological disorder can help expedite an evaluation and confirm (or refute) the presence of a new functional symptom. Second, by remaining involved in the patient's care, the physician is sending a message to the patient that the symptoms are important and real, whereas not recommending follow-up gives a message to the contrary.

Part of the ongoing role of the physician is to promote an integrated treatment approach and to help the patient establish a connection with mental health clinicians or other specialists, such as physical therapists, if indicated. One approach to encourage follow-up with a mental health clinician is to discuss the role of accumulating factors in facilitating and reinforcing the presence of the neurological symptoms, even when the patient does not see a clear connection between those factors and the physical symptom itself. Emphasis should be placed on the brain's ability to translate the effect of such factors into neurological symptoms.

Ms. A endorsed a good deal of work-related stressors (a possible precipitant) as well as nightmares and flashbacks related to her rape. Trauma is a predisposing factor, and ongoing PTSD symptoms can precipitate and perpetuate functional neurological symptoms. Ms. A was quite amenable to seeing a mental health provider and agreed to see a psychiatrist. However, engaging patients in treatment is often difficult, because they may not acknowledge any link between potential psychological factors and their symptoms and may further perceive that the clinician views their illness as not real. When that is case, reviewing how the diagnosis was made, acknowledging that the disorder is not volitional, and discussing how perpetuating factors contribute to the patient's disability can be helpful.

TREATMENT

Psychiatrists, other mental health clinicians, and neurologists need to understand how the diagnosis of functional neurological disorders was made and be comfortable treating this patient group. For instance, one study found that psychiatrists were much less likely than neurologists to believe in the accuracy of video EEG in the diagnosis of psychogenic nonepileptic seizures (43). If the diagnosis is not felt to be accurate, this may lead to more unnecessary referrals, and patients will be unlikely to accept the diagnosis and treatment plan. Initial referral to a mental health professional should help reframe the diagnosis and lead to acceptance of the treatment plan. Identifying vulnerability traits that make patients susceptible to a functional neurological disorder, such as avoidance tendencies, alexithymia, and somatoform tendencies, will create a framework for treatment (37, 44).

Patients with a functional neurological disorder have an increased number of psychiatric conditions, including depressive disorders, anxiety disorders, PTSD, and hypochondriasis (45, 46). The evidence for antidepressant treatment in functional neurological disorders comes from a few uncontrolled studies. No randomized placebo-controlled trials have demonstrated efficacy of any particular antidepressant for this disorder (47, 48). Therefore, choosing which antidepressant or anxiolytic medication is most appropriate, if any, should be based on treatment of the identified psychiatric comorbidities. Clinical judgment should be used as to when it is appropriate to initiate medications to treat comorbid psychiatric conditions.

Psychotherapy should be explained in terms of how it will help the patient's symptoms. Participation in a treatment

process that changes "the way the brain processes information" is essential to minimize the tendency to express distress through physical symptoms and to create new behaviors that break the established, unconscious pattern that leads to those symptoms. A similar argument can be made about participation in physical therapy (PT), where the goal is to change the processing of complex motor programs and to facilitate engagement in more adaptive patterns of movement or gait. A stepwise approach to psychotherapy is recommended. This includes having patients keep a diary of their symptoms and their precipitants to begin to generate a chain analysis as well as giving them strategies to help rescue them from pervasive symptoms.

Physical Therapy

There is evidence that PT is helpful in treating the motor and gait manifestations of functional neurological disorders (49, 50). In a randomized controlled crossover study of 60 patients with a psychogenic gait disorder who were randomly assigned to receive immediate treatment with inpatient PT or treatment after 4 weeks (control group), the benefit of the 3-week inpatient course of PT was substantial, and it was maintained even a year after PT was completed (51). Other studies have validated the efficacy of PT in motor manifestations of functional neurological disorders (52). These studies have led to the development of an expert consensus recommendation supporting the use of PT in the treatment of motor functional neurological disorders (53). PT demonstrates to patients their capacity for normal movement, educates them about their condition, and helps limit maladaptive motor responses. Both the intensity and the educational component of the PT program appear to be important factors for success. If the physical therapist is not familiar with functional neurological disorders, the referring clinician should provide him or her with the consensus guidelines and be available as a resource for ongoing consultation. The patient in our case vignette was referred to PT and given a follow-up appointment with neurology, in addition to seeing a psychiatrist.

Cognitive-Behavioral Therapy

Cognitive-behavioral therapy (CBT) has also been shown to be beneficial in treating functional neurological disorders (54). CBT includes education about functional neurological disorders and the stress response cycle, trains patients in stress management techniques and new behavioral responses, and helps patients identify and change unhelpful thought patterns that reinforce their symptoms. Randomized pilot studies have shown efficacy for CBT in the treatment of psychogenic nonepileptic seizures (55, 56). The use of a self-guided CBT booklet has been shown to reduce symptom burden at 3 and 6 months, and the difference between this treatment benefit and standard medical care was found to be statistically significant (57). CBT treatment workbooks that have been validated in randomized clinical trials can be recommended to help patients (and mental health providers) understand the diagnosis and develop the necessary skills

to overcome their symptoms (57, 58). CBT is the preferred treatment modality for patients with episodic symptoms, such as psychogenic nonepileptic seizures.

Other Treatment Modalities

Hypnosis has proven effective in randomized controlled trials in functional neurological disorders (59). A time-controlled trial of immediate and delayed short-term psychodynamic psychotherapy showed benefit in reducing psychogenic movements, both when the treatment was provided immediately after diagnosis and when it was started 3 months later (60). Other uncontrolled interventions studied in functional neurological disorders include a variety of psychotherapies, such as psychodynamic psychotherapy (61–63), prolonged exposure (for those with comorbid PTSD) (64), mindfulness-based psychotherapy (65), inpatient programs (66), psychoeducational interventions (67), and transcranial magnetic stimulation over the motor cortex (68).

When Ms. A returned to clinic 4 months later, she was walking unassisted. She still had complaints of motor and sensory symptoms, but examination produced no nonphysiological findings. She had been treated regularly with an antidepressant for PTSD and PT for her functional neurological disorder. Furthermore, she had begun a transition back to work on a part-time basis.

CONCLUSIONS

Most patients with functional neurological disorders will require an integrated multidisciplinary approach to treatment. The diagnosing clinician should communicate with the treating physical therapist and/or mental health clinician, and everyone should agree on the treatment plan. The mental health clinician should keep communication open with the referring provider to clarify any doubts about diagnosis. Other established health care providers should be informed of the functional neurological disorder diagnosis, as patients may present with other physical symptoms of uncertain origin, and there should be agreement on the message among all providers and minimization of unnecessary treatments.

Functional neurological disorders are truly at the intersection of neurology and psychiatry: patients present with neurological symptoms that are a manifestation of a neuropsychiatric disorder. Dualistic thinking is not helpful for these patients, as neurological symptoms and emotional functioning need to be viewed as influencing each other. Integration of care is needed for this patient group.

A. Symptoms of altered voluntary motor, cognitive, or sensory function.

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