

Functional Speech and Voice Disorders: Case Series and Literature Review

David S. Chung, BS,¹ Chelsea Wettroth, BA,¹ Mark Hallett, MD,¹ and Carine W. Maurer, MD, PhD^{1,2,*}

Abstract: **Background:** Functional disorders of speech and voice, subtypes of functional movement disorders, represent abnormalities in speech and voice that are thought to have an underlying psychological cause. These disorders exhibit several positive and negative features that distinguish them from organic disorders. **Methods and Results:** We describe the clinical manifestations of functional disorders of speech and voice, and illustrate these features using six clinical cases. **Conclusions:** Functional disorders of speech and voice may manifest in a variety of ways, including dysphonia, stuttering, or prosodic abnormalities. Given that these disorders have been understudied and may resemble organic disorders, diagnosis may be challenging. Appropriate treatment may be quite effective, highlighting the importance of prompt and accurate diagnosis.

Introduction

Functional (or psychogenic) disorders of speech and voice (FSVDs) are common among patients with functional movement disorders (FMDs), with prior studies reporting that between 16.5% and 53% of FMD patients exhibit a comorbid functional abnormality in speech or voice.^{1–4} Like other functional neurologic disorders, FSVDs can be challenging to diagnose, as symptoms may resemble those of organic motor speech disorders (MSDs), and both disorders may coexist. Patients are often reluctant to accept the diagnosis, and many physicians hesitate to make a diagnosis of functional neurologic disorder out of fear of overlooking an underlying organic disorder.⁵ FSVDs have often been underemphasized or ignored, and their incidence and prevalence have yet to be clearly established.⁶ Early identification of these disturbances as functional is critical, as it can lead to appropriate behavioral management and avoid unnecessary additional testing. Here, we discuss the general characteristics of FSVDs and explore their clinical manifestations with clinical cases. Treatment strategies for these disorders have been discussed elsewhere.^{7–9}

Clinical Manifestation of FSVDs

FSVDs can exhibit several red flags that can help distinguish them from organic MSDs (Table 1). In contrast with MSDs, patients with FSVD often exhibit inconsistencies and considerable variability in their speech or phonation,¹⁰ and their symptoms may alter considerably with distraction or suggestibility. Patients with FSVDs may also exhibit struggle behavior resulting in exaggerated facial movements, including marked facial grimacing, lip pursing, eye blinking or contraction of the periorbital, lower facial muscles or platysma during attempted speech. Patients complaining of weakness may paradoxically exhibit speech with a strained quality or exaggerated facial posturing that is inconsistent with their complaint of weakness.⁶ Deficits in patients with FSVDs also have a greater potential for reversibility than those in MSD patients. While speech therapy rarely provides dramatic improvement for patients with MSDs, several studies have documented that a short course of speech therapy can be quite effective for a substantial portion of patients with FSVDs.^{11,12} One study demonstrated that 77% of patients with acquired functional stuttering were able to

¹Human Motor Control Section, Medical Neurology Branch, National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, MD;

²Department of Neurology, Stony Brook University School of Medicine, Stony Brook, NY

*Correspondence to: Carine W. Maurer, MD, PhD, Stony Brook University School of Medicine, Department of Neurology, Health Sciences Center, T12-020, Stony Brook, NY 11794-8121; carine.maurer@stonybrookmedicine.edu

Keywords: functional movement disorders, functional neurological disorder, functional speech disorder, psychogenic movement disorders, psychogenic speech disorder.

Relevant disclosures and conflicts of interest are listed at the end of this article.

Received 22 November 2017; revised 21 January 2018; accepted 14 February 2018.

Published online 6 April 2018 in Wiley InterScience (www.interscience.wiley.com). DOI:10.1002/mdc3.12609

TABLE 1 Red Flags for Functional Speech and Voice Disorders

- Suggestibility
- Distractibility
- Acute onset
- Variable severity during different speech examination activities
- Paradoxical increased muscle contraction with fatigue
- Potential for rapid reversibility or improvement of symptoms
- Denial or indifference to abnormal speech/voice

achieve nearly normal, if not normal, speech within two therapy sessions.¹³

FSVDs can manifest in a variety of different ways (Table 2). A small number of studies have provided detailed phenomenological characterization of these patients (Table 3). Different phenomenologies present with varying frequencies across these studies; this variance is likely due (in part) to small sample sizes and the lack of a standardized classification system for FSVDs. These studies have demonstrated that FMD patients with a comorbid FSVD closely resemble those without FSVD in terms of sex, age of onset, and underlying psychiatric comorbidities (Table 3).

Functional voice disorders present as non-organic abnormalities affecting phonation. There are two main types of functional voice disorder: psychogenic voice disorder (PVD) and muscle tension voice disorder (MTVD). PVD manifests as a sudden onset of aphonia or dysphonia with a loss of voluntary control of the voice. Aphonia can present with a whisper, and dysphonia may feature breathy falsetto, hoarseness, or vocal production of two separate tones.¹⁴ MTVD presents with the gradual onset of dysphonia, and is secondary to excessive tension in the para-laryngeal musculature.¹⁴ MTVD is often mistaken for spasmodic dysphonia; however, spasmodic dysphonia and MTVD differ in terms of task-dependency, with spasmodic dysphonia more likely to show differential performance across different phonetic contexts.¹⁵ MTVD has also been shown to more readily improve with speech therapy. The classification of MTVD as functional remains controversial.^{16,17} As a result, the concepts of primary MTVD, dysphonia occurring in the absence of concurrent organic vocal cord pathology, and secondary MTVD, dysphonia in the

presence of an underlying organic condition, have arisen.¹⁶ Primary MTVD, although it may exhibit similar clinical manifestations to other organic voice disorders, lacks the pathology, such as structural changes to the vocal folds or cartilages, to sufficiently account for its symptomatology,¹⁴ and is most consistent with a functional etiology.

Functional speech disorders present as non-organic disorders affecting speech and articulation, including functional stuttering, functional prosody, and functional abnormalities in articulation.

Generally defined as involuntary dysfluency in speech, stuttering manifests as repetitions of syllables or words, speech blocks, or extended pauses between sounds, and can be organic or functional in nature. Functional stuttering (FS) may be differentiated by indifference towards abnormal speech, or presentation of an accent on the wrong syllable. Importantly, acquired organic stuttering often presents with dysarthria, aphasia, or apraxia of speech; the absence of these features is a red flag for a functional etiology. An individual with FS may exhibit variable moments of fluent speech interspersed among periods of significant stuttering, or vice versa. Stuttering on every sound, syllable, or word may also point to an excessive consistency that can suggest FS. Epidemiologically, FS is equally prevalent among males and females, contrasting with the 3:1 male:female ratio observed in patients with organic stuttering.^{13,18–20}

Disturbances in prosody, the rhythmic and intonational aspect of language, can suggest the presence of an FSVD. While organic neurologic disease can also cause prosodic disturbances, variability of prosody and the absence of dysarthria, aphasia, or speech apraxia are suggestive of a functional etiology.^{21,22} Foreign accent syndrome (FAS) is a type of prosodic disturbance causing patients to speak in a non-native accent; FAS can have either an organic etiology, often linked to dominant hemisphere vascular or traumatic lesions, or a functional one.^{23,24} Patients with organic FAS exhibit a fixed speech deficit and cannot produce additional accents without considerable effort. In contrast, patients with functional FAS can exhibit variability of their accent, and are often able to imitate other accents with relative ease. They may also exhibit stereotyped behavioral mannerisms that would not be present in cases of organic FAS.²³ In addition to FAS, functional prosodic disturbances may manifest as infantile or childlike prosody, sometimes referred to as “babytalk”; this childlike

TABLE 2 Clinical Features and Characterization of Functional Speech and Voice Disorders

Primary abnormality	Clinical features suggestive of functional etiology
Psychogenic Voice Disorder	Sudden onset of aphonia or dysphonia
Muscle Tension Voice Disorder	Similar difficulty in vocal expression during vocal tasks regardless of phonetic context
Stuttering	Excessive consistency: stuttering on every syllable, sound, or word Excessive variability Presentation of accent on the wrong syllable Absence of dysarthria, aphasia, or apraxia or speech
Foreign accent syndrome	Ability to produce additional accent(s) with relative ease Variability of accent May exhibit stereotypical behaviors associated with the accent
Childlike prosody	Infantile speech, infantile gestures and facial expressions
Articulation abnormalities	Lingual, jaw, or facial weakness inconsistent with articulatory imprecision on tasks unrelated to speech Wrong-way tongue deviation with hemiparesis

TABLE 3 Overview of Studies Detailing Characterization of FSVDs

Study	% FMD patients with FSVD	Phenomenological characterization of FSVD	Age of onset FMD	Sex (F/M)	Psychiatric comorbidities ^a
Baizabal-Carvallo & Jankovic, 2015. ³	16.5% (30/182)	Stuttering: 53.3% Speech arrest: 13.3% Hypophonia: 6.7% Dysphonia: 6.7% Prosodic abnormality, including FAS: 6.7% Mixed FSD: 13.3%	40.3 ± 14.9	23/7	N/A
Maurer <i>et al.</i> , unpublished. ^b	42% (25/63)	Stuttering: 9.5% Speech arrest: 16% Hypophonia: 6% Dysphonia: 8% Prosodic abnormality, including FAS: 13% Articulation abnormality: 11% Mixed FSD: 19%	37.8 ± 13.5	23/2	Anxiety disorder: 56% Mood disorder: 40%
Fasano <i>et al.</i> , 2012. ²⁵	43% (20/46) ^c	Stuttering: 10% Articulation abnormality: 55% Other ^d : 35%	N/A	N/A	N/A

Abbreviations: F, female; FMD; functional movement disorders; FSVD, functional speech and voice disorders; M, male; N/A, not applicable.
^aPsychiatric comorbidities assessed using the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Version IV-TR, Patient Edition (SCID-I/P).²⁶

^bInclusion/exclusion criteria for this study cohort can be found in reference.²⁷

^cThis study only included patients with functional facial movement disorder.

^dCharacterized as “burst of verbal gibberish.”

prosody may be accompanied by infantile facial expressions and gestures.⁶

While articulation distortions associated with organic causes can range in severity, functional articulation problems are usually not subtle. Functional distortions in articulation can be associated with inconsistent lingual, jaw, or facial weakness on tasks unrelated to speech. If hemiparesis is present, a wrong-way tongue deviating away from the hemiparetic side is consistent with an underlying functional disorder, and can be suggestive of a functional articulation abnormality.^{6,25}

Here, we present six cases that illustrate different clinical manifestations of FSVDs.

Case 1

This 29-year-old female with an eight-year history of abnormal involuntary movements displayed highly variable speech abnormalities, including childlike prosody and intervals of slow, deliberate speech with long pauses prior to speech initiation. She manifested struggle behavior in the form of intermittent facial grimacing and functional lower face dystonia that profoundly impacted her speech. Speech findings were distractible, and worsened noticeably during explicit examination of speech (Video 1, Segment A).

Case 2

Three years prior, this 59-year-old female presented with sudden onset of facial pain, involuntary tongue movements, and severely impaired speech. Several weeks later, she developed gait and balance difficulty and her speech deteriorated to the point where she was unable to talk for several months. At the time this video was taken, her gait had normalized, and her speech had significantly improved, although she continued to exhibit several characteristics of FSVD,

including functional prosodic disturbance, with intermittent childlike speech prosody, resulting in part from forward pursing of the lips and forward positioning of the tongue. Her unusually high-pitched voice also contributed to the childlike impression of her verbal output. In addition to childlike speech prosody, the patient also exhibited downward retraction of her lower face during speech, simulating a central facial droop (Video 1, Segment B).

Case 3

This previously healthy 46-year-old male presented with sudden onset of involuntary facial spasms, and posturing of the trunk and extremities five weeks prior to presentation. His speech was characterized by frequent pauses and intermittent stuttering. The struggle behavior exhibited during his dysfluent speech, including distractible facial grimacing and excessive platysmal contraction is consistent with a diagnosis of FSVD (Video 1, Segment C).

Case 4

This 38-year-old female acutely developed changes in her voice while speaking on the telephone with her boyfriend. Voice abnormalities were reported to be episodic, with occasional normal voice. Clinical examination showed dysphonic speech accompanied by distractible struggle behavior with facial grimacing and repeated pauses scattered throughout her spontaneous speech (Video 2, Segment A).

Case 5

This 67-year-old female experienced the sudden onset of stuttering speech and aphonia. While her stuttering improved with Prozac and a brief course of speech therapy, she continued to exhibit

whispering quality of her speech. Despite this inability to generate normal volume of voice during spontaneous speech, she is able to generate normal volume during an episode of abnormal involuntary movements (Video 2, Segment B).

Case 6

This 57-year-old female reported paroxysms of abnormal speech lasting up to one month in duration; the patient and her family noted normal speech in between episodes. At the time of our encounter, the patient exhibited slow, deliberate speech with articulation and grammatical errors, and spoke with childlike prosody. When repeating simple sounds, she perseverated and exhibited inconsistent speech abnormalities (Video 2, Segment C).

Conclusions

We have described the general characteristics and common phenotypic manifestations of FSVDs, and illustrated these using clinical cases. FSVDs exhibit a broad spectrum of clinical manifestations, some of which resemble organic disease. Although strategies used to identify FSVDs have been established, diagnosis of FSVDs remains complicated, underscoring the need for further study. Moreover, while dysphonia, stuttering, and prosodic abnormalities are common among FSVDs, it is important to realize that any aspect of speech or phonation may be affected. There is a greater need for attention toward FSVDs to improve the reliability of diagnoses and guide patients to proper treatment.

Author Roles

1. Research Project: A. Conception, B. Organization, C. Execution; 2. Statistical Analysis: A. Design, B. Execution, C. Review and Critique; 3. Manuscript Preparation: A. Writing the First Draft, B. Review and Critique.

D.C.: 1B, 1C, 3A, 3B

C.W.: 1B, 3B

M.H.: 1A, 1B, 3B

C.W.M.: 1A, 1B, 1C, 3A, 3B

Disclosures

Ethical Compliance Statement: The authors confirm that the approval of an institutional review board was not required for this work. All persons gave their informed consent prior to their inclusion in the study. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this work is consistent with those guidelines.

Funding Sources and Conflicts of Interest: This study was supported by the NINDS Intramural Research Program. The authors declare that there are no conflicts of interest relevant to this work.

Financial Disclosures for the previous 12 months: DC, CW, and CWM have nothing to disclose. Dr. Hallett serves as Chair of the Medical Advisory Board for and may receive honoraria and

funding for travel from the Neurotoxin Institute. He may accrue revenue on US Patent #6,780,413 B2 (Issued: August 24, 2004): Immunotoxin (MAB-Ricin) for the treatment of focal movement disorders, and US Patent #7,407,478 (Issued: August 5, 2008): Coil for Magnetic stimulation and methods for using the same (H-coil); in relation to the latter, he has received license fee payments from the NIH (from Brainsway) for licensing of this patent. He is on the Editorial Board of approximately 20 journals, and received royalties and/or honoraria from publishing from Cambridge University Press, Oxford University Press, and Elsevier. Dr. Hallett's research at the NIH is largely supported by the NIH Intramural Program. Supplemental research funds have been granted by Merz for treatment studies of focal hand dystonia, Allergan for studies of methods to inject botulinum toxins, and Medtronic, Inc. for a study of DBS for dystonia.

References

- Hinson VK, Cubo E, Comella CL, Goetz CG, Leurgans S. Rating scale for psychogenic movement disorders: scale development and clinimetric testing. *Mov Disord* 2005;20(12):1592–1597.
- Saifee TA, Kassaveti P, Parees I, et al. Inpatient treatment of functional motor symptoms: a long-term follow-up study. *J Neurol* 2012;259(9):1958–1963.
- Baizabal-Carvalho JF, Jankovic J. Speech and voice disorders in patients with psychogenic movement disorders. *J Neurol* 2015;262(11):2420–2424.
- Baizabal-Carvalho JF, Jankovic J. Functional (psychogenic) stereotypies. *J Neurol* 2017;264(7):1482–1487.
- Hinson VK, Haren WB. Psychogenic movement disorders. *Lancet Neurol* 2006;5(8):695–700.
- Duffy JR. Functional speech disorders: clinical manifestations, diagnosis, and management. *Handb Clin Neurol* 2016;139:379–388.
- Deal JL. Sudden onset of stuttering: a case report. *J Speech Hear Disord* 1982;47(3):301–304.
- Carding PN, Horsley IA, Docherty GJ. A study of the effectiveness of voice therapy in the treatment of 45 patients with nonorganic dysphonia. *J Voice* 1999;13(1):72–104.
- Sudhir PM, Chandra PS, Shivashankar N, Yamini BK. Comprehensive management of psychogenic dysphonia: a case illustration. *J Commun Disord* 2009;42(5):305–312.
- Binder LM, Spector J, Youngjohn JR. Psychogenic stuttering and other acquired nonorganic speech and language abnormalities. *Arch Clin Neuropsychol* 2012;27(5):557–568.
- Sapir S, Aronson AE. The relationship between psychopathology and speech and language disorders in neurologic patients. *J Speech Hear Disord* 1990;55(3):503–509.
- Mahr G, Leith W. Psychogenic stuttering of adult onset. *J Speech Hear Res* 1992;35(2):283–286.
- Baumgartner J, Duffy JR. Psychogenic stuttering in adults with and without neurologic disease. *J Med Speech Lang Pathol* 1997;5(2):75–95.
- Baker J. Functional voice disorders: Clinical presentations and differential diagnosis. *Handb Clin Neurol* 2016;139:389–405.
- Roy N. Differential diagnosis of muscle tension dysphonia and spasmodic dysphonia. *Curr Opin Otolaryngol Head Neck Surg* 2010;18(3):165–170.
- Van Houtte E, Van Lierde K, Claeys S. Pathophysiology and treatment of muscle tension dysphonia: a review of the current knowledge. *J Voice* 2011;25(2):202–207.
- Behlau M, Madazio G, Oliveira G. Functional dysphonia: strategies to improve patient outcomes. *Patient Relat Outcome Meas* 2015;6:243–253.
- Roth CR, Aronson AE, Davis LJ, Jr. Clinical studies in psychogenic stuttering of adult onset. *J Speech Hear Disord* 1989;54(4):634–646.
- Salmelin R, Schnitzler A, Schnitz F, Freund HJ. Single word reading in developmental stutterers and fluent speakers. *Brain* 2000;123(Pt 6):1184–1202.

20. Vossler DG, Haltiner AM, Schepp SK, et al. Ictal stuttering: a sign suggestive of psychogenic nonepileptic seizures. *Neurology* 2004;63(3):516–519.
21. Bakker JI, Apeldoorn S, Metz LM. Foreign accent syndrome in a patient with multiple sclerosis. *Can J Neurol Sci* 2016;31(02):271–272.
22. Chanson JB, Kremer S, Blanc F, Marescaux C, Namer IJ, de Seze J. Foreign accent syndrome as a first sign of multiple sclerosis. *Mult Scler* 2009;15(9):1123–1125.
23. Lee O, Ludwig L, Davenport R, Stone J. Functional foreign accent syndrome. *Pract Neurol* 2016;16(5):409–411.
24. Keulen S, Marien P, van Dun K, Bastiaanse R, Manto M, Verhoeven J. The posterior fossa and foreign accent syndrome: Report of two new cases and review of the literature. *Cerebellum*. 2017;16(4):772–785.
25. Keane JR. Wrong-way deviation of the tongue with hysterical hemiparesis. *Neurology* 1986;36(10):1406–1407.
26. First, M. B., Spitzer, R.L., Gibbon M., and Williams JB. *Structured Clinical Interview for DSM-IV-TR Axis I Disorders-Patient Edition (SCID-I/P, 1/2007 revision)*. In: NYSPI, editor. Biometrics Res. New York; 2002.
27. 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(6):564–570.

Supporting Information

A video accompanying this article is available in the supporting information here.

Video S1. Segments A, B, and C show cases 1, 2, and 3, respectively. The patient in case 1 exhibits childlike speech prosody and excessively slow speech during explicit examination that improves considerably during casual speech. During examination of speech, the patient exhibits prominent functional lower facial dystonia whose severity rapidly fluctuates. The patient in case 2 also exhibits fluctuations in prosody, occasionally exhibiting childlike prosody, as well as intermittent downward retraction of the lower face during speech. The speech of the patient in Segment C (case 3) is significantly affected by intermittent facial spasms and excessive platysmal contraction (characteristic of “struggle behavior”); exaggerated stuttering also contributes to a halting nature of his speech

Video S2. In addition to “struggle behavior,” the patient in Segment A (case 4) exhibits a whispering quality to her voice that would be characterized as a functional aphonia. She is able to generate normal speech volume when vocalizing the “ah” sound. The patient in Segment B (case 5) illustrates whispering quality of her voice during casual speech; this functional aphonia appears to abate during an episode of abnormal involuntary movements of the trunk and extremities. Segment C shows case 6, whose speech is remarkable for slow, deliberate, childlike prosody, and inconsistent articulation and grammatical errors.