

# Distinguishing features of psychogenic (functional) versus organic hemifacial spasm

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**Abstract** Hemifacial spasm (HFS) is one of the most common presentations in patients with cranial psychogenic (functional) movement disorders (PMD). Medical records and videos of patients with PMD and HFS were reviewed to identify those with psychogenic HFS and to compare the phenomenology of psychogenic HFS with organic HFS. We identified 18 (9.8%) patients with psychogenic HFS from a cohort of 184 patients with PMDs. There were 14 (78%) women and 4 men, with a mean age at onset of  $33 \pm 13.5$  years. These were compared with 37 consecutive patients with organic (primary) HFS. Patients with psychogenic HFS were significantly younger and had more frequently tonic muscle contractions, bilateral asynchronous hemifacial involvement, isolated lower facial involvement, downward deviation of the mouth's angle, and lack of the "other Babinski sign" compared to those with organic HFS. Other features such as ipsilateral downward movements of the eyebrow; associated tremor, dystonia and hemi-masticatory spasms were more frequently observed in patients with psychogenic HFS but these differences did not reach statistical significance. Lack of other Babinski sign and tonic muscle contractions showed the highest sensitivity (1.00 and 0.87, respectively), whereas downward mouth's angle

deviation showed the highest specificity (1.00) for the diagnosis of psychogenic HFS. Besides other features such as suggestibility, distractibility, periods of unexplained improvements observed in most patients with PMDs, several clinical features, such as tonic muscle contractions, downward mouth's angle deviation, predominant lower facial and bilateral involvement, may be helpful in distinguishing psychogenic from organic HFS.

**Keywords** Hemifacial spasm · Cranial movements · Psychogenic · Movement disorders

## Introduction

Hemifacial spasm (HFS) is characterized by intermittent, involuntary contractions of one side of the face [1]. Organic HFS is classified as "primary" when the movements are presumably caused by vascular compression of the ipsilateral facial nerve and "secondary", when other causes such as posterior or middle cranial fossa tumors, trauma, demyelination or infections are identified [2]. Psychogenic (functional) movement disorders (PMDs) can involve any part of the body, including the cranial muscles [3, 4]. Among cranial PMDs, HFS is one of the most common presentations [5, 6]. In this study, we aim to identify the distinguishing features of psychogenic HFS by comparing this movement disorder with organic HFS.

## Materials and methods

We carried out a retrospective review of 184 medical records of patients with PMDs evaluated during a 2-year period by movement disorders specialists at the

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Parkinson's Disease Center and Movement Disorders Clinic (PDCMDC), Baylor College of Medicine. Diagnosis was based on the Fahn-Williams criteria [7]. Additionally, we studied a cohort of 40 consecutive patients with organic (non-psychogenic) HFS, evaluated at the PDCMDC during a 3-year period overlapping with the period of patients with PMDs, presumably mostly caused by vascular compression of the ipsilateral seventh cranial nerve. Organic HFS usually may have brain imaging if there are atypical features, such as facial weakness or sensory deficit (e.g., absent corneal reflex). We excluded three patients with organic HFS because of clearly identifiable lesions in the midbrain or middle cranial fossa (multiple sclerosis, schwannoma) or incomplete information. In addition to a careful review of the clinical and demographic data we analyzed all videos of patients previously diagnosed with psychogenic and organic HFS to identify their clinical features. All patients or their legal guardian provided written informed consent for videotaping approved by the Baylor College of Medicine Institutional Review Board for Human Research.

## Statistics

Data were summarized in means  $\pm$  standard deviations, range, and percentages. The independent *T* test was used to compare means between groups. The Chi-squared test and the Fischer exact test were used to compare proportions between groups. Additionally, we calculated sensitivity and specificity for statistical significant different clinical features between psychogenic and organic HFS, as well as receiver operating characteristic (ROC) curves. All statistical evaluations were performed using SPSS version 22, a *P* value  $<0.05$  was considered statistically significant.

## Results

From our cohort of 184 patients with PMDs, we identified 18 (9.8%) with psychogenic HFS, 14 (77.8%) were women, mean age at onset of  $33 \pm 13.5$  years. Detailed phenomenologic evaluations were not available in three patients with psychogenic HFS and they were excluded from the analysis. Thus, a total of 15 patients with psychogenic HFS had full evaluations and were included in this study. Compared with patients with other types of PMDs, no difference was observed in mean age at onset ( $P = 0.187$ ), age at evaluation ( $P = 0.162$ ) or gender distribution ( $P = 0.485$ ). However, a trend towards a higher frequency of associated psychogenic dystonia was observed in patients with psychogenic HFS compared with patients with other PMDs: 61 versus 38.5% ( $P = 0.064$ ).

Compared to 37 patients with organic HFS, the 15 with psychogenic HFS were younger ( $P = 0.001$ ), were more

likely to have asynchronous bilateral facial contractions ( $P = 0.001$ ), tonic muscle contractions (lasting more than 3 s) ( $P = 0.001$ ), isolated lower facial involvement ( $P = 0.006$ ), and downward deviation of the mouth's angle ( $P = 0.001$ ). Although ipsilateral downward movements of the eyebrow, contralateral eyebrow elevation, and associated tremor, dystonia and hemi-masticatory spasms were more common in psychogenic cases compared with organic HFS cases, these differences did not reach statistical significance. On the other hand, the "other Babinski sign" ( $P = 0.001$ ), phasic muscle contractions ( $P = <0.001$ ), upper facial involvement ( $P = 0.006$ ) and lateral deviation of the mouth's angle ( $P = 0.001$ ) were statistically more frequently observed in patients with organic HFS (Fig. 1) (Videos 1–3). No differences in the frequency of platysma contractions were observed between groups (Table 1).

Lack of the other Babinski sign and tonic muscle contractions had the higher sensitivity for the diagnosis of psychogenic HFS (1.00 and 0.87, respectively); however, the highest specificity was observed for ipsilateral downward mouth's angle deviation (1.00), followed by isolated lower facial involvement (0.97), bilateral HFS (0.97), and tonic muscle contractions (0.97); the latter feature had the highest area under the ROC curve (0.920), such area did not improve when analyzing this feature with lack of other Babinski sign (Table 2).

Psychiatric comorbidities in subjects with psychogenic HFS were common, including: depression diagnosed in five patients and anxiety in one patient, la belle indifférence was observed in a single patient, although the latter is not considered a reliable sign for psychogenic or conversion disorders [8]; regarding potential triggers of PMDs: trauma was reported by four patients; severe stressors by five; medications by one; history of sexual abuse by one and migraines by one patient. All patients with organic HFS were treated with botulinum toxin (BoNT), with marked benefit in all cases; two of these patients were referred for surgical decompression. A single patient with psychogenic HFS was treated with BoNT with mild benefit. All patients with psychogenic HFS were referred for stress management or psychological counseling with moderate benefit.

## Discussion

In a previous study of patients with HFS from our clinic, we found that 7% were of psychogenic origin [1], similar to the 9.8% frequency in the present study. Although both disorders, psychogenic and organic HFS, are characterized by predominantly unilateral facial contractions occurring mostly in women, psychogenic HFS is associated with



**Fig. 1** **a** Typical example of organic HFS; **b** right-sided “other Babinski sign” in a patient with organic HFS; **c** Ipsilateral left-sided eyebrow depression in psychogenic HFS; **d, e** isolated hemi-upper lip contractions in two patients with psychogenic HFS; **f, g** bilateral

asynchronous psychogenic HFS with changing patterns including *downward* (**f**) and *upward* (**g**) deviation of mouth’s angle; **h** isolated hemi-lower lip contractions (an uncommon presentation of psychogenic HFS)

younger age at onset more frequent presence of tonic and bilateral asynchronous hemifacial muscle contractions, isolated lower facial involvement, ipsilateral downward deviations of mouth’s angle, and lack of the other Babinski sign, all these features showed a high diagnostic specificity for psychogenic HFS; whereas tonic muscle contractions and lack of the other Babinski sign also showed high sensitivity and the highest diagnostic accuracy according to the area under the ROC curves.

None of our patients with psychogenic HFS exhibited the “other Babinski sign”, contraction of the ipsilateral frontalis muscle with elevation of the eyebrow (Fig. 1a, b) [9]. This differentiating feature was also noted in another series of psychogenic HFS [6]. This sign was first reported by Joseph Babinski in 1905, who suggested that such simultaneous contractions were not reproducible at will, indicating that HFS was not the result of a psychological problem [10]. Although characteristic of organic HFS [9, 10], patients with psychogenic HFS instead of upward elevation tend to have downward deviation of the ipsilateral eyebrow (Fig. 1c).

While organic bilateral HFS has been reported, usually occurring asynchronously because of two separate and distinct occurrences of HFS in the same individual [11], bilateral facial involvement often suggests a psychogenic etiology (Video 1). The prevalence of bilateral HFS in non-psychogenic patients has been reported to be about 2.6%, with a mean latency of 33.3 months for the contralateral side to be affected [12]. In contrast to 3.3% frequency of bilateral HFS in 61 patients with psychogenic facial spasms described by Fasano et al. [6], in our series 40% of patients with psychogenic HFS had bilateral, synchronous or asynchronous, involvement (Fig. 1f, g).

Isolated lower facial involvement is another feature that is more likely observed in patients with psychogenic HFS, which contrasts with the frequent initial involvement of periorbicular muscles in organic HFS [13]. Isolated deviation of the upper lip was observed in 4 cases (Fig. 1d, e; Video 2) while isolated deviation of the lower lip was observed in a single case in our series (Fig. 1h; Video 3). Platysma contractions were observed in 61% of cases in another study, usually combined with downward deviation

**Table 1** Comparison of clinical features between patients with organic (primary) and psychogenic hemifacial spasm from this study

	Organic <i>n</i> = 37 (%)	Psychogenic <i>n</i> = 15 (%)	<i>P</i> value
Age at onset	49.9 ± 13.1	33 ± 14.3	0.001
Age at evaluation	57 ± 12.8	38 ± 14.1	0.001
Gender (female)	23 (62)	11 (73.3)	0.443
History of facial palsy	6 (16.2)	0	0.165
Family history of HFS	2 (5.4)	0	1.000
Bilateral HFS	1 (2.7)	6 (40)	0.001
Type of contractions			
Tonic	1 (2.7)	13 (86.6)	0.001
Phasic	36 (97)	3 (20)	<0.001
Eyebrow deviation			
Other Babinski sign	26 (70.2)	0	0.001
Ipsilateral downward movement	2 (5.4)	4 (26.6)	0.05
Contralateral upward movement	3 (8.1)	3 (20)	0.338
Zone of involvement			
Upper face	36 (97)	10 (66.6)	0.006
Lower face	29 (78.4)	14 (93.3)	0.257
Isolated upper facial involvement	8 (21.6)	1 (6.6)	0.257
Isolated lower facial involvement	1 (2.7)	5 (33)	0.006
Platysma muscle contractions	27 (73)	7 (46.6)	0.07
Mouth's angle deviation			
Upward	3 (8.1)	3 (20)	0.338
Downward	0	7 (46.6)	0.001
Lateral	26 (70.2)	2 (13.3)	0.001
Associated abnormal movements			
Hemi-masticatory spasms	1 (2.7)	3 (20)	0.067
Dystonia	5 (13.5)	6 (40)	0.058
Tremor	10 (27)	6 (40)	0.508
<i>HFS</i> hemifacial spasm			

**Table 2** Summary of diagnostic tests indicators for discriminatory clinical features of psychogenic versus organic hemifacial spasm

	Sensitivity	Specificity	Area under ROC curves
Tonic muscle contractions	0.87	0.97	0.920
Lack of the other Babinski signs	1.00	0.70	0.851
Ipsilateral downward mouth's angle deviation	0.47	1.00	0.733
Bilateral hemifacial spasm	0.40	0.97	0.686
Isolated lower facial involvement	0.33	0.97	0.653

of the lower lip and mouth angle “smirk” [6]. Platysma contractions were common in both groups in our study.

Although families with PMDs and with genetic forms of HFS [14, 15] have been described in the literature, none of our patients with psychogenic HFS had a family history of HFS, similar to other studies [16]. Besides HFS, tremor and dystonia were the most common movements observed in psychogenic patients [17]. Psychogenic hemi-masticatory spasms were observed in 20% of our patients, this feature uncommonly co-exists in patients with primary HFS [1].

Differences between primary and psychogenic HFS are summarized in Table 3.

## Conclusions

In conclusion, several features distinguish psychogenic from organic HFS. The presence of early age at onset, tonic muscle contractions, bilateral asynchronous involvement, isolated lower facial involvement, downward deviation of



**Table 3** Summary of features distinguishing organic from psychogenic hemifacial spasm

	Organic	Psychogenic
Typical age at onset	Early 50s	Early 30s
Gender predilection	Female	Female
Type of muscle contractions	Phasic	Tonic
Side involvement	Unilateral	Unilateral and bilateral
Family history	Uncommon	Very uncommon
Comorbid arterial hypertension	Probably more common than general population	Probably no more common than general population
Other Babinski sign	Very common	Very uncommon
Isolated lower facial involvement	Uncommon	Common
Downward deviation of mouth's angle	Very uncommon	Common
Somatization	Uncommon	Common
Exacerbation with stress, fatigue and anxiety	Common	Common
Exacerbation with voluntary facial muscle movement	Common	Uncommon
Vascular abnormalities in the posterior fossa	Common	Probably no more common than general population*
Presence during sleep	Common	Uncommon

\* Observed in 6–20% of normal control subjects [2]

the ipsilateral mouth's angle, and lack of other Babinski sign, are among the most distinctive features of this condition with high specificity, besides other features typically observed in PMDs, such as suggestibility, distractibility, or periods of unexplained fluctuations. All these features should be identified in order to avoid unnecessary treatments such as surgical decompression of the facial nerve. Although BoNT therapy may result in some improvement in patients with psychogenic HFS, stress management and psychological counseling should be promptly provided to these patients.

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**Compliance with ethical standards**

**Conflicts of interest** None for both authors.

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