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## A Prospective Study of Quality of Life in Patients Undergoing Microvascular Decompression for Hemifacial Spasm

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### Abstract

**Background:** Hemifacial spasm (HFS) is a debilitating movement disorder caused by vascular compression of the facial nerve. The negative effect on quality of life (QOL) in patients with HFS has been well documented and our prior retrospective analysis demonstrated that microvascular decompression (MVD) has significantly improved QOL. Few prospective studies have assessed the QOL benefit of treatments for HFS. This study was conducted to compare the pre- and post-operative QOL of patients with HFS undergoing MVD.

**Methods:** A consecutive series of patients diagnosed with HFS and who underwent MVD surgery during a selected period of time were chosen. Demographic data as well as previous treatment with botulinum toxin were collected, and patients completed a pre-operative and post-operative self-reported QOL survey.

**Findings:** Complete cure was achieved in 65 of the 72 patients, with 2 patients experiencing an adverse effect of partial hearing loss on the ipsilateral side. The post-operative QOL mean score ( $2.38 \pm 7.67$ ) was superior to the pre-operative QOL mean score ( $24.94 \pm 8.62$ ).

**Conclusion:** MVD for HFS patients substantially improved all of the components of the QOL survey, with a spasm-free status achieved in greater than 90% of patients.

**Keywords:** Hemifacial spasm; Microvascular decompression; Prospective; QOL; Facial nerve.

responsible for HFS in the majority of patients [1,2]. The two most widely accepted treatments for HFS are botulinum toxin (BTX) injections [3,4] and microvascular decompression (MVD) surgery [5]. BTX reduces spasms by blocking signal transmission of acetylcholine at the level of the synaptic cleft. MVD relieves vascular compression of the centrally-myelinated portion of the facial nerve, addressing a proposed etiopathogenesis of HFS.

The negative effect of HFS on quality of life (QOL) has been well documented [6-8]. Our group has previously published a retrospective analysis of QOL in patients with HFS undergoing MVD [9]. The results of that study demonstrated that MVD significantly improved patient QOL as determined by an extended version of the validated health-related QOL (HQOL) questionnaire HFS-7 and HFS-8 [6,10]. A more comprehensive understanding of the unbiased effect of MVD on HFS is imperative in order to better understand which patients may benefit from surgical intervention for HFS. Our prior study was limited by inherent biases due its retrospective nature. Therefore, the current study was performed in a prospective fashion encompassing consecutive patients undergoing MVD for HFS at a single institution in order to determine the effect of surgical intervention on QOL.

### Research Methodology

This prospective clinical cohort investigation was approved by the University of Pittsburgh Medical Center Institutional Review Board.

This study comprised a consecutive series of patients undergoing MVD for HFS between March and December of 2015 at the University of Pittsburgh Medical Center, Presbyterian University Hospital. Patients provided written consent for inclusion in this study. Patients were included in this study if they met the diagnostic criteria for HFS by history and physical exam, underwent a diagnostic MVD protocol MRI [11], electrophysiologic testing of facial musculature [12-15], completed both pre- (i.e., at the preoperative clinic appointment) and post-operative QOL (i.e., by telephone at the time of last follow-up) surveys, and were successfully

### Introduction

Hemifacial spasm (HFS) is a debilitating movement disorder characterized by involuntary contractures of the facial muscles. Vascular compression along the centrally myelinated portion of the facial nerve attached to the pons and just beyond is

contacted by telephone for long-term follow up. Demographic data gathered included patient age, gender, laterality of symptoms, as well as history of botulinum toxin injection treatment and MVD. Complications from index MVD were also reported. Surgery was not recommended to any patient if an MRI of the brain did not reveal vascular compression of centrally-myelinated portion of the facial nerve and/or electrophysiologic testing suggested a different facial spasm disorder (e.g. facial myokymia).

## Quality of life measurements

Patients responded to the HFS-8, a validated health related QOL tool, pre- and post-operatively [7]. Items included in the QOL tool. Each item was self-scored on a scale from 0 (does not affect QOL) to 4 (greatest effect on QOL). Using the HFS-8, QOL was measured pre-operatively and post-operatively.

## Clinical follow-up

Electronic medical records were queried for date of surgery. All patients were interviewed pre-operatively and contacted post-operatively by telephone by a disinterested observer (J.C.), and the date of interview was noted. Time from date of surgery to date of interview of patients ranged from 24 to 33 months and represented the duration of follow up. During the telephone interview, patients were also asked to report spasm-free status and incidence of operative complications (e.g., hearing loss and facial weakness).

## Statistical analysis

Descriptive and inferential statistics were performed using VassarStats (Poughkeepsie, NY, USA). Continuous measures are presented as mean  $\pm$  standard deviation. Discrete measures are presented as N (%). Continuous variables were analyzed via Student's t-test for correlated samples. Statistical significance was set a priori at  $p < 0.05$ .

## Data availability statement

Any data not published within this article is available in anonymized form and will be shared by request from any qualified investigator.

## Results

Seventy-four patients met inclusion criteria. Two patients were excluded due to incomplete data. Seventy-two patients were included in the final data analysis. Demographics and surgical outcomes (i.e., spasm-free status at last follow-up) are summarized in **Table 1**.

Fifty-one patients were female with an average age of  $53 \pm 11$  years. Forty-two patients had left-sided HFS. A total of 56 patients reported botulinum treatment prior to MVD, with the majority of patients receiving between 1 and 10 injections. The mean time to the last follow up was  $29 \pm 3$  months. Complete cure (spasm-free status) at last follow up was achieved in 65

(90.3%) patients. Minimal or no improvement in symptoms occurred in 7 (9.7%) patients. Symptom relief occurred immediately in the majority of patients (62 of 72, 86.1%), with 5 (6.94%) experiencing relief in 0 to 12 months, and 5 experiencing relief (6.94%) in greater than 12 months. 50 out of the 56 patients (89.3%) who had previously received botulinum toxin injections experienced resolution of their symptoms with MVD. Three patients (4.2%) underwent repeat MVD, with 2 patients gaining symptom relief and the other reporting decreased frequency of spasms. Two patients (2.8%) experienced partial hearing loss ipsilateral to site of MVD.

**Table 1:** Study demographics and surgical outcomes.

Parameters	No. of Pts (%)
Sex (female)	51 (70.8)
Laterality of spasm (left)	42 (58.3)
Prior surgery	3 (4.2)
Prior botulinum treatment (any)	56 (77.8)
1-10 injections	34 (47.2)
11-20 injections	7 (9.7)
20 + injections	8 (11.1)
Specific number not reported	7 (9.7)
Post-operative resolution of spasm	65 (90.3)
Complication rate	2 (2.8)

QOL analysis showed improvement in all parameters of the HFS-8 post-operatively (**Table 2**). Mean total post-operative QOL scores were superior to mean total pre-operative QOL scores ( $1.94 \pm 6.14$  vs.  $19.97 \pm 6.79$ ,  $p < 0.0001$ ). 61 patients (84.7%) reported the best possible QOL score, i.e. 0, post-operatively. An additional 4 patients reported improvement in all parameters of HFS-8 with a superior mean total post-operative QOL score to mean pre-operative QOL score ( $2.5 \pm 1.91$  vs.  $22 \pm 10.07$ ).

Pre-operatively, the most affected QOL item was "embarrassment" ( $3.31 \pm 1.13$ ); post-operatively, it remained the most negatively rated item ( $0.39 \pm 1.11$ ). Embarrassment was considered to have a severe effect on QOL (QOL rating  $\geq 3$ ) by 58 patients (80.6%) pre-operatively and by 6 patients (8.33%) post-operatively. Avoiding eye contact was the second most affected QOL item, considered to have a severe effect on QOL by 60 patients (83.3%) and 5 patients (6.94%) post-operatively. Difficulty gaining referral for MVD affected 30 (41.7%) of the patients, with 11 (15.3%) reporting a severe impact. Overall, challenges obtaining referral for surgery had the mildest effect on QOL of all items on the survey, reflected in an average pre-operative QOL score of  $0.93 \pm 1.24$  (there is no post-operative correlate for this item). The second-least problematic pre-operative QOL item was watching TV/movies ( $1.58 \pm 1.32$ ). Post-operatively, driving held the best QOL rating ( $0.14 \pm 0.59$ ).

## Discussion

HFS is a movement disorder characterized by involuntary spasms of the facial muscles. Although the etiology has not yet been fully elucidated, a proposed etiology is vascular compression of the centrally myelinated portion of the facial nerve with resultant facial muscle spasms. Treatments for HFS include botulinum toxin injections and microvascular decompression. Botulinum toxin injections essentially exchange facial spasms for paresis, and the treatment must be repeated several times per year [2]. Further, increasing dosage and frequency of injections often leads to the development of neutralizing antibodies causing resistance to treatment. In addition to facial paresis, frequent side effects of botulinum toxin injections include ptosis, dry eyes, and lagophthalmos [16]. Increasingly, patients are electing to proceed with microvascular decompression with complete avoidance of botulinum toxin treatment [9]. While this condition is not life-threatening, HFS significantly impacts the QOL of affected patients, and its debilitating nature has prompted investigation of the effect of different treatment modalities on the resulting physical and emotional disability.

**Table 2:** Hemifacial spasm quality of life questionnaire responses.

Subscales	Pre-op (SD)	Post-op (SD)
Difficulty driving	1.74 (1.33)	0.14 (0.59)
Difficulty reading	2.17 (1.42)	0.22 (0.84)
Difficulty watching tv/movies	1.58 (1.32)	0.21 (0.80)
Felt depressed	2.79 (1.34)	0.25 (0.88)
Avoided eye contact	3.29 (1.19)	0.31 (0.96)
Felt embarrassed about having the condition	3.31 (1.13)	0.39 (1.11)
Felt worried about others' reaction to you	2.82 (1.44)	0.26 (0.90)
Sleep disturbance	2.31 (1.56)	0.17 (0.67)
Total	19.97 (6.79)	1.94 (6.14)

Due to the multi-factorial effect of this disease on subjective parameters, the HFS-8 QOL questionnaire was developed in order to better quantify these parameters pre- and post-operatively [7]. A previous retrospective analysis exploring the impact of HFS on QOL pre-operatively and post-operatively in 209 patients following microvascular decompression noted significant improvement in each QOL subscale as well as total QOL score, with complete remission following MVD in 90% of patients, compared to 77% improvement in patients receiving only BT injections [9]. Other retrospective analyses found similar findings in improvements in QOL subscales following MVD [7,9,17]. However, the validity of retrospective studies are often subject to potential for recall and selection biases, so the current prospective study was conducted to address these issues.

In this prospective clinical cohort investigation, 72 patients undergoing MVD for HFS responded to pre- and post-operative QOL surveys via the HFS-8 scale. Post-operative total QOL score (1.94) was significantly improved in comparison to pre-operative QOL (19.97). Each individual parameter of the HFS-8 improved post-operatively, contributing to the overall superior total post-operative QOL. 61 (84.7%) reported the best possible QOL score post-operatively. Of these 61, all patients achieved complete remission of symptoms. This indicates that the presence of HFS negatively impacts QOL and failure of MVD to relieve symptoms is a major contributor to poor post-operative QOL. In agreement with previous studies [7,8,18], the social impact of symptoms showed the strongest effect on pre-operative QOL. Of these items, embarrassment was the most negatively rated, an aspect that is consistently found to be the most debilitating for these patients, while avoiding eye contact severely affected the most number of patients. Only 2 patients (2.8%) experienced post-operative complications involving partial hearing loss, underlining the relative safety of this procedure.

## Conclusion

The generalizability of this study is limited by its single center, single surgeon design, and in the setting of a large tertiary referral center with considerable expertise with MVD. Due to the selective inclusion of patients who underwent MVD for HFS in this study, QOL scores may not be representative of the entire HFS population as there may be a selection bias for those with more severe illness. In addition, there exists a multitude of scoring systems to assess the effect of medical treatments on quality of life.

In this prospective study of 72 patients with HFS undergoing MVD, all items of QOL as measured by the HFS-8 survey improved after surgery, further validating existing retrospective studies. MVD effectively relieves symptoms of spasm and restores QOL in a majority of patients suffering from HFS.

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