Available online at www.sciencedirect.com

Journal of Acupuncture and Meridian Studies

journal homepage: www.jams-kpi.com

CLINICAL CASE REPORT

The Effects of Acupuncture on Peripheral Facial Palsy Sequelae after 20 Years via Electromyography

Saulo Fabrin [1,*], Nayara Soares [1], Simone Cecilio Hallak Regalo [2], Edson Donizetti Verri [1]

[1] *Claretiano University Center, Biomechanics and Movement Analysis Laboratory, São Paulo, Brazil*
[2] *Department of Morphology, Physiology and Basic Pathology, Electromyography Laboratory of the Ribeirão Preto Dental School, University of São Paulo, São Paulo, Brazil*

Available online 4 February 2015

Received: Sep 4, 2014
Revised: Jan 13, 2015
Accepted: Jan 15, 2015

KEYWORDS
acupuncture;
electromyographic;
peripheral facial palsy;
sequelae;
stomatognathic

Abstract
Objective: This research used electromyography to evaluate the effects of acupuncture on facial palsy peripheral sequelae.
Methods: The 44-year-old woman who participated in this study presented sequelae resulting from 20 years of peripheral facial nerve palsy (FNP) on the right side and synkinesis in the left eye. In electromyography, the electrodes were positioned on the motor points over the orbicularis oris and the orbicularis oculi muscles to establish myofunctional feedback prior to and after rehabilitation, which consisted of 20-minute sessions of acupuncture once per week for 20 weeks: using manual stimulation at acupoints Yintang, LR3, GB21, CV17, ST2, ST3, ST6, ST7, GB2, and SI19; and Tou-Kuang-Min and ST4 using electrical stimulation with a 4-Hz pulsed current. The subjective pain intensities were recorded.
Results: The root-mean-square (RMS) electromyographic comparative analysis showed greater activation and recruitment of muscle fibers on the right side and a reduced overload on the left side, which promoted a functional evolution of movements and a positive response in the stomatognathic system.

* Corresponding author. Adriano Coutinho, 361 Edifice Mallorca, Apartment 103, Batatais, São Paulo 14300-000, Brazil.
E-mail: saulo.fabrin@gmail.com (S. Fabrin).

pISSN 2005-2901 eISSN 2093-8152
http://dx.doi.org/10.1016/j.jams.2015.01.006

Conclusion: Acupuncture associated with electrical stimulation reversed the peripheral facial paralysis in a short time. Severe sequelae were minimized due to the balance of muscle activation in response to the electrical stimulation provided by the acupuncture needles.

1. Introduction

Bell's palsy is an acute, unilateral paralysis of the face that is also known as idiopathic facial paralysis. The onset of Bell's palsy is the result of a dysfunction in cranial nerve VII, which may be preceded by pain in the mastoid region and may result in either partial or complete paralysis of the facial mimics [1,2], which is a primary means of human communication for expression and identification of feelings and ideas. Because the mobility of the mouth muscles is essential for speaking, facial expression, and eating [2], precise control of the facial muscles produces subtle variations in the muscular physiology, these variations being essential to facial expressivity and to its functions when verbal communication alone is not enough [3,4].

The nervous influx interruption in any one of the segments of the facial nerve [1,2], according to traditional Chinese medicine, causes an obstruction in the movement of energy and blood in the Yang meridians of the face. Invasion of exogenous pathogenic wind and cold associated with internal pathogenic factors (emotions) attacks the body and is likely to damage Yang, reducing the ability of contraction by stagnation and malnutrition of the tissues of the facial muscles. This is when this condition and motor impairment occur [4]. Therefore, the diseaseis a result of an imbalance between yin and yang that may lead to the preponderance of one, determine the characteristics of the disease caused by a sum of internal and external agents, and affect the antipathologic factor (ZHENGQI) of the individuals, forcing them into a pathologic process that will take a course that is determined by the organic entity of each being [5] and manifest itself in the form of facial or eye paralysis, falls, confusion, loss of language, hemiplegia, and fainting [6].

The basic patterns of disharmony characterize the group of signs and symptoms that determine the patient's disease. In traditional Chinese medicine (TCM), these patterns can be analyzed through various points of view: for example, loss of balance of Yin and Yang, the relation to the five movements, and the internal systems [6]. When a disease is being treated, some appropriate measures should be taken into account in relation to the physical and emotional conditions and the age of the patient, considering that the main symptoms may vary at different times and in different environments. These factors may also affect the appearance and the evolution of a disease; therefore, each factor should be carefully considered for the appropriate application and utilization of therapeutic modalities. Climate and emotional changes may have an impact on the physiological functions and on the pathological changes of the body. Consequently, the syndrome, the profile, and the condition of a patient should be analyzed during treatment. Satisfactory therapeutic results can be achieved with a complete and deep analysis [7—9].

Based on these ideas, the main goal of this research was to analyze by means of electromyography the effects of acupuncture after 20 years of sequelae resulting from peripheral facial paralysis.

2. Materials and methods

A 44-year-old woman participated in this study. The patient presented sequelae resulting from 20 years of peripheral facial paralysis on the right side, with synkinesis in the left eye. This study was approved by the Research Ethics Committee of the Claretiano Centro Universitário (number 69/2011; São Paulo, Brazil). The participant was informed about the experiment and agreed to participate by providing her free and informed consent according to resolution 196/96 of the National Health Council of Brazil. The following pieces of equipment were used: an EMG model 810C system (EMG System; Brazil LTDA, Brazil) with disposable electrodes, a Nikon Coolpi S2600 Digital Camera 14.0 MP, systemic acupuncture needles (0.25 mm × 30 mm), facial needles (0.25 mm × 15 mm), tsing, and a TENS unit (Quark, model Diapulsi 990; Brazil).

Prior to treatment, the electrodes for electromyography were positioned on the skin over the orbicularis oris and the orbicularis oculi muscles. After 20 sessions, the procedure was repeated for a myofunctional evaluation to check the effectiveness of the treatment. Photography was used to provide a visual pattern of the morphological changes that occurred in the face to determine the existing asymmetries prior to and after the application of acupuncture.

Systematic acupuncture was applied as follows: manual stimulation was applied at the acupoints Yintang, LR3, GB21, CV17, ST2, ST3, ST6, ST7, GB2, and SI19 and Tou-Kuang-Min and ST4 with electrical stimulation with a 4-Hz pulsed current. The subjective pain intensities of the patient were recorded and are shown in Table 1. Both techniques were applied simultaneously for 20 sessions of 20 minutes each, with a 1 week interval between sessions.

Table 1 Parameters and characteristics of electrical stimulation on ST4 and Tou-Kuang-Min.

Parameters	Characteristics
Current	Pulsed
Stimulation amplitude	Motor
Phase duration	2 ms
Waveform	Bipolar
Stimulation frequency	4 Hz
On/off time	—
Type of contractions	Phasic
Stimulation time	20 min
Frequency of sessions	1/wk

3. Results and discussion

After the acupuncture sessions, no synkinetic movements in the left eye, the formation of a nasolabial fold, and improved mouth symmetry were observed, as described in Table 2. Table 3 shows a comparative analysis of the root-mean-square (RMS) values obtained from the facial movements, the recruitment of the right-side muscle fibers, and the reduction of the overload on the left side. These aspects suggest an evolution of the functional movement and a positive response in the stomatognathic system, contributing to facial symmetry.

Six months after the completion of the rehabilitation and evaluation, the patient continued to maintain evolution of facial movements. These findings corroborate a previous study by Sola [10] that showed improved facial movements in a patient after the first session. In addition, the study showed that after three sessions, the joint pain gradually disappeared and that after six sessions, the patient began to move the corners of the mouth and nose on the affected half of the face [10]. According to Rosa et al [11], 46.7% of patients who submitted to acupuncture treatment for peripheral facial paralysis had a full recovery. The best results were obtained from patients with shorter evolutions of paralysis. However, our study suggests that even patients with long-term sequelae caused by peripheral facial paralysis may present good results.

Yang et al [12] used electroacupuncture, 25-minute sessions for a total of 10 sessions, with a 3-day interval between sessions, for the treatment of facial peripheral paralysis. The treatment was 100% effective in most of the patients who received three courses of treatment. In our study, the sessions were held once per week for 20 minutes. The variability between the therapies demonstrated that even with different intervals between treatments and different frequencies of treatment, acupuncture associated with electrical stimulation produced good results. In the study of Mattos [13], however, the therapies start 10—12 days after the onset of peripheral facial paralysis and not during the acute phase because the facial nerve is ischemic at the time the paralysis occurs and presents edema. An overload of stimuli is believed to cause some change in the myelin layer, leading to reinnervation in undesirable areas and, consequently, spasms and synkinesis [14]. The synkinesis is unrelated to stellate ganglion involvement, according to Xavier et al [15], and would cause a change in the intraocular pressure.

It is worth mentioning that even after 20 years of peripheral facial paralysis, reversing severe sequelae and improving the function of the movements is still possible, even when other treatments have not provided such an effect, because 6 months after the completion of rehabilitation and evaluation our patient continued to maintain evolution of facial movements. He et al [16] evaluated the effectiveness of acupuncture compared to medication in 130 patients between the ages of 8 years and 75 years that had been divided into two groups: the acupuncture and the medication groups. A statistically significant difference was observed between the two groups, with the therapeutic effect being stronger in the acupuncture group.

Table 2 Comparative analyses of photographic images prior to and after 20 sessions of acupuncture.

Signals by photographic analysis	Pre-acupuncture	Post-acupuncture
Synkinesis in the left eye	Yes	No
Formation of nasolabial fold	No	Yes
Lip inward movement	No	Yes
Mouth asymmetry	Yes	No
Asymmetry of the eyebrows	Yes	No

Table 3 Comparison of the electromyographic signals of the orbicularis oris and the orbicularis oculi musclesbefore and after 10 sessions.

	Open R eye	Open L eye	Close R eye	Close L eye	Make a beak (R)	Make a beak (L)
Pre μV	13.70	32.11	11.69	50.20	239.69	432.20
Post μV	15.80	29.18	18.58	31.86	404.87	384.10

L = left side; R = right side.

4. Conclusion

Electromyography confirmed that acupuncture combined with electrical stimulation can reverse peripheral facial paralysis in a short period of time. The severe sequelae were minimized due to a balance of muscle activation in response to the electrical stimulation of the acupuncture needles.

Disclosure statement

All authors declare no conflicts of interest. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sector.

References

[1] Antunes ML, Soares MCM, Vicente AO, Testa JRG, Fukuda Y. Bilateral peripheric facial nerve palsy in acute linfoid leukemia: a case report. *Revista Bras Otorrinolaringo*. 2004;70:261—264.

[2] Jesus LB, Bernardes DFF. Functional characterization of facial mimicry in facial paralysis of face trauma: a clinical case report. *Rev CEFAC*. 2012;14:971—976.

[3] Vasconcelos BEC, Dias E, Dantas WRM, Barros ES, Monteiro GQM. Peripheric facial palsy caused by trauma. *Rev Cir Traumat Buco-Maxilo-Facial*. 2001;1:13—20.

[4] Latorre EIP, Roco OGP, Pasin NA, Undargarím LO. Paralisia facial periférica a frio, terapia por acupuntura: Instituto Superior de Ciências Médicas Carlos J. Finlay. *Revista Arquivo Médico de Camaguey*. 2004;8:1—6.

[5] Martins EIS, Leonelli LB. *A Pratica do Shiatsu*. 1o edicão. São Paulo: Roca; 2002:1—63.

[6] Wen TS. *Acupuntura Classica Chinesa*. 1 ed. São Paulo: Cultrix; 2006:39—44.
[7] Yamamura Y. *Tratado de Medicina Chinesa*. 1 ed. São Paulo: Roca; 1993:10—584.
[8] Maciocia G. *Os Fundamentos da Medicina Chinesa*. São Paulo: Roca; 1996:658.
[9] Schwartz C. *Quatro Patas Cinco DirecÕes*. São Paulo: Icone; 2008:470.
[10] Sola A. Acupuntura e tecnicas relacionadas. *Revista Intern Acupuntura*. 2008;2:132—138.
[11] Rosa MCP, Moreira AFM. Araujo LB, Junior LCM, Motta AR. Comparison between myofunctional therapy and myofunctional therapy associated with acupuncture on treatment for peripheral facial paralysis. *Rev CEFAC*. 2012;12:579—588.
[12] Yang JS, Cui CB, Gao XY, Zhu B, Rong PJ. Cases of peripheral facial paralysis treated by the SXDZ-100 nerve and muscle stimulator. *J Trad Chinese Med*. 2009;29:182—185.
[13] Mattos C. Peripheral facial paralysis: the role of physical medicine and rehabilitation. *Acta Med Port*. 2011;4:907—914.
[14] Soares ACC, Silva RL, Bertolini SMMG. Action of physiotherapy in peripheral facial paralysis case report. *Arq Cieência Saude Unipar*. 2002;6:171—176.
[15] Xavier TVH, Oliveira TR, Mendes TCBS. Treatment of patients with painful blind eye using stellate ganglion block. *Rev Bras Anestesiol*; 2014. http://dx.doi.org/10.1016/j.bjan.2012.12.009 [Date accessed: July 07, 2014].
[16] He L, Zhou MK, Zhou D, Wu B, Li N, Kong SY. Acupuncture for Bell's Palsy. *J Altern Complement Med*. 2009;15:759—764.