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• Research Article

Electrical response grading versus House-Brackmann scale for evaluation of facial nerve injury after Bell's palsy: a comparative study

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OBJECTIVE: There are no convenient techniques to evaluate the degree of facial nerve injury during a course of acupuncture treatment for Bell's palsy. Our previous studies found that observing the electrical response of specific facial muscles provided reasonable correlation with the prognosis of electroacupuncture treatment. Hence, we used the new method to evaluate the degree of facial nerve injury in patients with Bell's palsy in comparison with the House-Brackmann scale. The relationship between therapeutic effects and prognosis was analyzed to explore an objective method for evaluating Bell's palsy.

METHODS: The facial nerve function of 68 patients with Bell's palsy was assessed with both electrical response grading and the House-Brackmann scale before treatment. Then differences in evaluation results of the two methods were compared. All enrolled patients received electroacupuncture treatment with disperse-dense wave at 1/100 Hz for 4 weeks. After treatment, correlation analysis was conducted to find the relationship between electrical response and therapeutic effects or prognosis.

RESULTS: Checking consistency between electrical response grading and House-Brackmann scale: Kappa value 0.028 ($P = 0.578$). Correlation analysis: the two methods were correlated with the prognosis, and electrical response grading ($r_{ER} = 0.789$) was better than the House-Brackmann scale ($r_{HB} = 0.423$).

CONCLUSION: Electrical response grading is superior to the House-Brackmann scale in efficacy and reliability, and can conveniently assess the degree of facial nerve injury. The House-Brackmann scale is suitable for the patients with mild facial nerve injury, but its evaluation quality for severe facial nerve injury is poor.

KEYWORDS: Bell's palsy; facial nerve function; electrical response; House-Brackmann scale; acupuncture and moxibustion

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1 Introduction

Bell's palsy, a common type of one-sided facial paralysis, can result from damage or trauma to the facial nerves, or from acute inflammation of the facial nerve that leaves the skull at the stylomastoid foramen^[1]. Acupuncture is a common method used to treat Bell's palsy, and there is a rich body of clinical experience on this subject^[2].

Currently, electroneurography (ENOG) and electromyography (EMG) are used for evaluation of facial nerve injury, and the House-Brackmann scale is used for motor function assessment^[3,4]. Research has shown that ENOG and EMG are very useful in the qualitative and quantitative diagnosis of facial paralysis^[5], and also can be methods that help in guiding treatment and evaluating prognosis. However, these two kinds of electrophysiology diagnostic methods are invasive and uncomfortable for the patient. Moreover, very specific professional usage guidelines, complex operational procedures, and high testing costs result in poor patient compliance^[5]. If ENOG and EMG are not used, however, there is a distinct lack of objective indexes, and physicians have to rely on clinical experience in order to assess the prognosis. It is therefore useful to develop a convenient method for evaluating the degree of facial nerve injury during a course of treatment.

Our recent study found that the electrical response of specific muscles can reflect the prognosis of patients with Bell's palsy during treatment with electroacupuncture. And the facial nerve injury can be objectively assessed in the course of treatment, which helps clinicians to gauge the patient's condition in a timely and accurate manner. Moreover, this method is more comfortable for patients than electrophysiological diagnostic methods. Based on our previous experiments and clinical experience, we developed a system called electrical response grading, and conducted this trial to compare its efficacy with the House-Brackmann scale.

2 Materials and methods

2.1 Case source

A total of 68 patients with Bell's palsy were enrolled from the Out-patient Clinic of the Department of Acupuncture and Moxibustion, General Hospital of Chinese People's Liberation Army, in Beijing, China from February 2009 to October 2011.

2.2 Diagnostic criteria

In accordance with the diagnostic criteria for Bell's palsy published in *Diagnostic Criteria for Internal Diseases*^[6], the patients were confirmed to have Bell's palsy. (1) Acute or subacute onset; (2) palpebral fissure, eyelids cannot close, weeping, disappearance of forehead wrinkles, cannot

frown; (3) nasolabial groove becomes shallow or even, angle of mouth is low and veers toward the healthy side; (4) absent or decreased sense of taste in the front 2/3 of the tongue, auditory handicap, pain in the mastoid region, sensory disability in the external auditory meatus or auricle.

2.3 Inclusion criteria

The patients were enrolled according to the following inclusion criteria: (1) meet the first three diagnostic items mentioned above; (2) aged 12 years or older, and can make the appropriate facial expressions on the affected side, no matter of the degree of facial nerve injury; (3) are able to follow through with a course of acupuncture treatment; (4) have not received any treatments before enrollment; (5) eligibility was confirmed by a senior acupuncturist who had been trained in the study procedures; (6) written informed consent was obtained.

2.4 Exclusion criteria

The patients were excluded from the trial for any one of the following reasons: (1) secondary facial paralysis caused by cerebrovascular disease, brain tumor, Guillain-Barré syndrome or parotitis; (2) otogenic facial paralysis such as otitis media and mastoiditis; (3) sequelae of previous facial paralysis; (4) children under 12 years of age.

2.5 Electrical response grading

Acupuncture needles were inserted into the frontalis, orbicularis oculi, levator labii superioris and orbicularis oris on the patients' affected sides. HANS electroacupuncture apparatus (WQ1002 Han multifunction electric acupuncture apparatus, Medical Technology Co., Ltd., Nanjing Jisheng) was used with low frequency, disperse-dense wave, at a transition frequency of 1 Hz (disperse wave) and 100 Hz (dense wave). The activity of facial muscles on the affected side was observed. Electrical response was assigned according to the amplitude of muscle contraction, and was classified into four grades: excellent, moderate, poor and no response^[7].

2.6 Treatment methods

Perpendicular or oblique needling was conducted^[8,9] at Yangbai (GB14), Taiyang (Extra), Xiaguan (ST7), Quanliao (SI18), Heliao (LI19) and Jiachengjiang (Extra), at a depth of 15–20 mm. Positive and negative electrodes of three groups of output wires of KWD 808-II electrostimulator (Electronic Instrument Co., Ltd., Changzhou INTI) were connected to the needle handles at the above-mentioned acupuncture points. Disperse-dense wave at 1/100 Hz was selected. The output button was slowly rotated until the maximum tolerated value was reached. The needles were retained for 20 minutes, during which warm infrared ray irradiation was performed behind the ear. After five times, the patients had two days of no treatment, and then the treatments were continuous. There was no limit to the course of treatment; however, if the patients no longer responded after 4 weeks of consecutive treatment, then

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