

# Exploration of the Nerve Electrophysiological Changes in Treatment of Facial Neuritis through Acupuncture in Combination with Western Medication

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## Abstract

**Objective:** To explore the efficacy of acupuncture in combination with Western Medication on the facial neuritis and the resultant changes innerve electrophysiology.

**Methods:** We selected a total of 100 facial neuritis patients who visited the clinic or were admitted to this hospital between November 2016 and February 2018, and these patients were randomly divided into two groups, the control group and the observation group, 50 in each. Patients in the control group underwent oral administration of prednisone and intramuscular injection of vitamin B12, while those in the observation group received the acupuncture and administration of acyclovir. Following treatment, we evaluated the efficacy and satisfaction of treatment of patients in two groups. Additionally, for patients in the observation group, we also examined the changes in CAMP and EMG of facial nerves and branches, recording indexes including the latency, amplitude and morphology of spontaneous potential and action potential, and carried out comparison with the indexes of the non-affected side.

**Results:** The total effectiveness rates of the observation group and the control group were 97.1% and 75.7%, respectively, and the difference between two groups showed statistical significance ( $p < 0.05$ ); the total satisfaction rates, 91.4% and 75.7%, respectively ( $p < 0.05$ ). In the observation group, there were 35 patients with longer CMAP latency in comparison with their counterparts in the control group, while 50 patients had the significant decreases in amplitudes of the CMAP on the affected side in comparison with those on the non-affected side; at 3 months after treatment, the latency was significantly shortened obviously, without any significant difference when compared to the non-affected side, while the amplitudes of the frontal branch and the zygomatic branches had a significant increase when compared with the levels at the time of diagnosis, whereas comparison between two sides showed no statistical significance. A slight increase was noted in the amplitude of buccal

branches, showing statistically significant difference in comparison with the non-affected side.

**Conclusion:** Acupuncture in combination with the Western medication can massively improve the clinical efficacy and satisfaction of treatment, while nerve electrophysiological examination can better quantify the injury of facial neuritis and the efficacy, showing a promising value in evaluation of prognosis.

**Keywords:** Facial neuritis; Nerve; Electrophysiology; Acupuncture

## Introduction

Facial neuritis, or called as Bell's palsy, is a kind of acute non-suppurative facial neuritis, causing peripheral facial paralysis. Facial neuritis is frequently developed acutely in spring or winter in population at any age, mainly the young or adult males, with a high prevalence. In an early stage, facial neuritis is mainly characterized by the angioedema and demyelination, and in some severe cases, patients may suffer from the axonal degeneration, mainly in the aquaeductus fallopii [1,2]. Clinical treatment mainly concentrates on the medication with hormones or vitamin B, but poor outcome has been gained in some cases [3]. Inappropriate or delayed treatment may result in the sequelae that contributes to the psychiatric dysfunction of patients. The prognosis of facial neuritis depends on the severity of disease and the time of treatment. In this study, we selected a total of 50 patients who visited the clinic or were admitted to this hospital between November 2016 and February 2018, aiming to analyze the nerve electrophysiological changes before and after acupuncture in combination with Western medication for treatment of facial neuritis, and detailed information is reported as follows.

## Materials and Methods

### Diagnostic criteria

- Acute onset with the history of wind cold or viral cold.
- Patients with stiffness, numbness or paralysis on one side of the face, or pains in ear or face patients with sudden deviated mouth, or food retention between the tooth and cheek.
- Patients who failed to frown, expose their teeth, or bulge the cheek, with shallowed or no frontalia, nasolabial groove, or lagophthalmus.
- Patients with dysgeusia at 2/3 of the tongue, or acoustic hyperesthesia. For all enrolled patients, tumor, trauma, Guillain-Barre syndrome or tympanitis were excluded.

### Enrollment criteria

All patients conformed to the diagnostic criteria of peripheral facial neuritis with muscular paralysis on one side of the face. Patients should possess the following symptoms:

- Disappearance of frontalia, or failure to frown.
- Declined or disappeared corneal or blink reflex.
- Shallowed nasolabial groove of mouth to non-affected side.
- Positive Bell sign.
- Failure to bulge or whistle.
- Pains on the affected side.

### Exclusive criteria

- Traumatic facial nerve injuries.
- Central facial palsy.
- Facial neuritis caused by DM-related neuropathy.
- Secondary facial neuritis caused by parotid neoplasms.
- The history of treatment prior to the hospitalization.

### General data

Cases in this hospital were collected from the 100 facial neuritis patients who were admitted to the hospital between November 2016 and February 2018, and were divided into two groups, i.e. the observation group and the control group, 50 in each group. In the observation group, there were 30 males and 20 females, aged between 17 and 67 years old with an average of  $(47.2 \pm 1.4)$  years old; the average of disease course was  $(4.8 \pm 3.1)$  days. In the control group, there were 31 males and 19 females, aged between 16 and 69 years old, with an average of  $(46.8 \pm 3.4)$  years old; the average of disease course was  $(4.4 \pm 3.2)$  days. Statistical analysis of the general data showed that the data between two groups were comparable ( $p > 0.05$ ).

### Methods

**Treatment for control group:** Immediately after onset, patients took prednisone orally for 1 to 2 weeks at a dose of 10 mg/time, 3 times a day, and then the dose was reduced according to the condition. Simultaneously, patients received the intramuscular injection of vitamin B12 at a dose of 0.5 mg/day. A treatment course lasted for 15 days and patients underwent two courses. Treatment for observation group: In addition to the medication for patients in the control group,

those in the observation group also took acupuncture in combination of acyclovir.

**Acupuncture:** Acupoints were selected according to the clinical differentiation: Acute cold phase: Yifeng, hegu and temple. Acute wind-heat phase: Waiguan, fengchi and hegu. Recovery phase: Qianzheng, zusanli and hegu. Meanwhile, they underwent the moxa-moxibustion for qianzheng, hegu and zusanli points. For patients who had difficulty in frowning, yangbai and sibai points were all included, while for those with shallowed nasolabial groove, yingxiang and shuigou points were included, and for those with deviated mouth, chia ch'e and chengjiang points were penetrated with the needle.

In brief, patients were required to keep in supine position or lateral position. Following the regular sanitation against the puncture site, points on the head and face were selected on the affected side, while distant matching acupoints were selected bilaterally. 0.5 to 2.5 cun No. 30 needles were prepared, and straightly, diagonally, or horizontally, needles were inserted at length of 0.3 to 1.5 cun. Needles were manipulated using reducing or reinforcing methods, which depended on the emergence of discharging limp or numb. Moxa-moxibustion was immediately performed following the acupuncture, and the distance was kept to make patients feel warm and comfort with redness on skin. Acupuncture and moxa-moxibustion were performed for 30 min per day, during which patients were closely monitored in case of the fainting during acupuncture or burn injury.

For Western medication, acyclovir was given orally at a dose of 250 mg/time, 4 times per day. Acupuncture and medication were all carried out for 15 days as the first treatment course. Sequentially, acupuncture was continued as above mentioned, while acyclovir was suspended. Two courses later, we evaluated the efficacy for two groups.

**Nerve electrophysiological measurement:** Keypoint muscle electric inducing apparatus manufactured in Denmark was utilized, and during the measurement, patients' skin temperature was kept within 30°C and 35°C. 50 patients underwent nerve electrophysiological examination twice, respectively at 2 weeks and 3 months after onset. Measurement of the neurotransmission: Recording electrodes were placed on the frontalis, zygomatic and buccal branches to detect the potentials, in which the super-strong stimuli were used as the stimulus current. For EMG examination, rest potentials of the frontalis and the orbicular muscle of mouth, motor unit at light contraction and recruitment order were also observed using the copper electrode.

**Functional exercise of mimetic muscle:** Training program was performed for teaching the patients to message the face at the affected side for 10 to 15 min, mainly by rubbing. Immediately, functional exercise was advised for recovery of the mimetic muscle, during which patients should suppress the distracting thoughts to concentrate the mind. Then, moves including forehead wrinkling (frontalis), frowning (corrugator supercilia), eye opening and closing (orbicularis oculi muscle), nose cramping (nasalis) and pout (orbicular muscle of mouth) were

performed by patients for 40 to 50 times/round, 2 to 3 rounds/day. A course consisted of 14 days of training.

**Observation index:** Clinical efficacy and satisfaction of treatment were evaluated for patients in two groups, in which the satisfaction was obtained through questionnaire with a total score of 100 points, including very satisfying, satisfying and poor.

**Criteria for efficacy:** Clinical criteria were stipulated according to the Standards for diagnosis and curative effect of Chinese medical symptom. Cure: Patients without any symptoms or signs, and an excellent recovery in facial muscle. Markedly effective patients with insignificant symptoms or signs, but with slight anomaly in frowning, closing eyes, exposing teeth or air-blowing. Effective: Patients with amelioration in symptoms or signs, but insignificant. Ineffective: Patients with no changes in symptoms or signs, or aggravation.

**Satisfaction criteria:** 90 to 100 points, very satisfied; 70 to 89 points, satisfied; 70 or fewer, unsatisfied.

### Statistical methods

Data were analyzed statistically using SPSS 17.0 software, in which the measurement data were presented as mean  $\pm$  standard deviation, while enumeration data were presented by n (%). T test was adopted for intergroup comparison, and  $p < 0.05$  suggested that the difference had statistical significance.

## Results

### Clinical efficacy

The total effectiveness rates in the observation group and the control group were 98.0% and 76.0%, respectively and the difference had statistical significance ( $p < 0.05$ ) (Table 1). As for satisfaction on treatment, the satisfaction rate in the observation group was 92.0%, significantly higher than 68.0% in the control group ( $p < 0.05$ ) (Table 2).

Group	n	Cure	Markedly effective	Effective	Ineffective	Total effectiveness rate (%)
Observation group	50	30	10	9	1	98.0
Control group	50	16	11	11	12	76

**Table 1:** Comparison of the clinical efficacy between two groups.

Group	n	Very satisfied	Satisfied	Unsatisfied	Total satisfaction rate (%)
Observation group	50	36	10	49	2.0
Control group	50	15	19	16	68

**Table 2:** Comparison of the satisfaction for treatment between two groups.

### Detection of nerve conduction

**Latency:** In 50 patients of the observation group, 35 patients exhibited a longer latency on the affected side at 2 weeks after onset than that on the non-affected side ( $p < 0.01$ ); second examination was performed following 3 months of treatment, and we found the latency was significantly shortened when compared with that at 2 weeks ( $p < 0.05$ ), and the comparison between the affected and non-affected sides showed no evident difference (Table 3).

Branches	Non-affected side	Affected side	
		2 week	3 months
Frontalis branches	2.75 $\pm$ 0.51	3.55 $\pm$ 0.67	2.84 $\pm$ 0.40
Zygomatic branches	2.50 $\pm$ 0.75	3.83 $\pm$ 0.74	2.68 $\pm$ 0.64
Buccal branches	2.83 $\pm$ 0.36	3.31 $\pm$ 0.62	2.93 $\pm$ 0.44

**Table 3:** The latency of nerve conduction of 35 patients before and after treatment.

Branches	Non-affected side	Affected side	
		2 weeks	3 months
Frontalis branches	1.22 $\pm$ 0.23	0.31 $\pm$ 0.15	0.96 $\pm$ 0.30
Zygomatic branches	2.15 $\pm$ 0.58	0.63 $\pm$ 0.24	1.92 $\pm$ 0.41
Buccal branches	1.45 $\pm$ 0.36	0.20 $\pm$ 0.09	0.52 $\pm$ 0.24

**Table 4:** The amplitude of facial nerves before and after treatment of 50 patients.

**Amplitude:** In 50 patients of the observation group, significant reduction was identified in the amplitude of all branches at 2 weeks after onset ( $p < 0.01$ ); following 3 months of

treatment, the re-examination result showed an obvious elevation in frontalis and zygomatic branches in comparison with the level at 2 weeks after onset ( $p < 0.01$ ), with no statistically significant differences; the amplitude of zygomatic branch showed slight recovery at 2 weeks, but was still lower than that on the non-affected side (Table 4).

### EMG results

Two weeks after onset, in 50 patients of the observation group, motor units in the frontalis, orbicular muscle of mouth or at slight contraction on the affected side at 2 weeks exhibited normal morphology but an acute decrease in quantity, and patients failed to accomplish the contraction move; at 3 months, significant ameliorations were noted in the amplitude and average time of the regenerated potentials.

## Discussion

As one of the frequent disease in clinical practice, facial neuritis mainly manifests dysfunction in mimetic muscles. Facial nerve palsy is divided into two types, peripheral and central type: The former is mostly correlated with the cold, wind or viral infection, while the latter mainly refers to the complications of cerebrovascular events. Although nearly 60% of patients can recover without any intervention, there remain 16.7% of patients living with sequelae or insufficient recovery [4-6]. Thus, clinical treatment of facial neuritis requires urgently a safe and effective method. People remain unknown about the pathogen of facial neuritis, and some patients may be affected by local invasion of wind or cold [7]. It is also suspected that spasm of vessels nourishing the local nerves that is caused by the wind or cold may account for the nerve ischemia, edema or suppression, resulting in facial neuritis; or, facial nerves distributed inside foramina Stylomastoideum are suppressed, causing dysfunction in blood cycle and facial neuritis [8, 9]. Evidence suggests the potential correlation between the facial neuritis and viral infection. Murakami et al. reported that facial neuritis is directly caused by the infection of HSV-1, and treatment with the adrenocortical hormone or Vitamin B gains promising outcome with significant mitigation in nerve edema, eradication of nerve suppression and recovery of nerve functions. In 2004, American Academy of Neurology recommended to use the glucocorticoid as the major method in treatment of facial neuritis. It is also reported that the combined medication of acyclovir and prednisone is superior to the single use of acyclovir in treatment of facial neuritis. Acyclovir, a wide-spectrum anti-virus drug, can selectively inhibit the DNA polymerase to block the synthesis of viral DNA, thereby suppressing the RNA transcription and protein translation, and ceasing the viral replication [10, 11].

As for the mechanism of Traditional Chinese medicine, this disease is caused by the invasion of wind and cold into the facial meridians, leading to disharmony of the meridians and stagnation of blood and gas, further depriving the nourishment of the meridians distributed in temple, shaoyang and yangming acupoints. Thus, we selected yangming, temple and shaoyang acupoints for acupuncture. In light of the acute symptoms belonging to the solid symptoms, we selected the yifeng, fengchi and hegu acupoints for acupuncture, so as to dispel the wind

and evil, and invigorate the circulation of blood. In the recovery period, patients manifest mostly the asthenic symptoms, or partly with solid symptoms, and zusanli acupoints can be selected for acupuncture to strengthen the body resistance, eliminate the evil and dredge collaterals. Moxa-moxibustion of the zusanli points can enhance the effect on warming and dredging the collaterals, and dispelling the wind and cold.

In this study, we adopted the acupuncture in combination with the acyclovir for treatment of facial neuritis patients, and evaluated the efficacy on patients. Results suggested that in patients of two groups, the total effectiveness rate in the observation group was 98.0%, significantly higher than 76.0% in the control group, and the difference had statistical significance ( $p < 0.05$ ); the total satisfaction rate in the observation group was 92.0%, also significantly higher than 68.0% in the control group, and the difference had statistical significance ( $p < 0.05$ ). In an early stage, pathological changes of facial neuritis include the nerve edema and demyelination, and in some severe cases, patients may suffer from the axonal degeneration. In nerve electrophysiology examination, prolonged latency can directly reflect the damage to myelination, while decrease in amplitude shows axonal injuries [12,13]. The nerve electrophysiology examination was performed for 50 patients with one-sided facial neuritis in the observation group, and the analysis of CMAP and EMG data were conducted to evaluate the injuries. This method is superior to the conventional method that evaluates the injury by deviation of normal standard, and can exclude the effect of temperature, environment and individual difference, thus reflecting the injury more accurately and objectively.

In this study, among 50 patients in the observation group, there were 35 patients with prolonged latency in branches of facial nerves, indicating the myelination injury; while the reduction in amplitude and spontaneous potentials also reflected the damages in varying degrees to the axons. Following 3 months of combined treatment of acupuncture and Western medication, computer inter-frequency therapy and functional exercise of mimetic muscle, improvement was found in these indicators, suggesting that the combined treatment can gain positive effect on the facial neuritis. Urabe et al. performed a comparative study on 624 patients with facial neuritis, and they found that within 7 days in acute phase, acupuncture is superior to the Western medication, and moreover, patients are free from the sequelae [14]. Everett et al. also conducted a study of 55 patients with facial neuritis, in which patients who were admitted to the hospital at the 12<sup>th</sup> day after onset gained promising outcome after acupuncture. Thus, we infer that acupuncture can warm the meridians, dispel the wind and cold and significantly improve the condition of patients, and that the acupuncture should be adopted as early as possible, because it can help improve the micro-circulation, nourishment of nerve endings and accelerate the nerve regeneration. Functional exercise of mimetic muscle can prevent the muscle atrophy, increase the muscular tone and recover the motor mode of the affect nerve which is conducive to establish the nerve reinnervation [15-17].

Previous studies on the EMG more concentrate on the single branch to reflect the overall status of nerves, while, in this study,

we performed the nerve electrophysiology examination for the frontalis, zygomatic and buccal branches to provide objective evidence for better understanding the facial nerve functions. The results indicated that a decreased amplitude was indicative for the slow recovery at 3 months, in which the recovery of the buccal branch was the slowest, consistent to the clinical study [18,19]. These patients still had the distortion of commissure despite the recovery of eye-closing function after comprehensive treatment.

## Conclusion

In conclusion, diagnosis and nerve electrophysiology examination of facial neuritis may gain different outcomes due to the environment or subjective experience, and the objective, comprehensive diagnostic criteria may work better in reflecting the efficacy and guiding the sequential treatment. Acupuncture in combination with Western medication have the positive efficacy, while nerve electrophysiology examination can evaluate the injury and prognosis of facial neuritis, and the combination of these methods is worthy of being promoted in clinical practice.

## References

- Benjamin EJ, Levy D, Vaziri SM, D'Agostino RB, Belanger AJ, et al. (1994) Independent risk factors for atrial fibrillation in a population-based cohort: The framingham heart study. *JAMA* 271: 840-844.
- Vaziri SM, Larson MG, Benjamin EJ, Levy D (1994) Echocardiographic predictors of nonrheumatic atrial fibrillation. The framingham heart study. *Circulation* 89: 724-730.
- Morillo CA, Klein GJ, Jones DL, Guiraudon CM (1995) Chronic rapid atrial pacing: Structural, functional, and electrophysiological characteristics of a new model of sustained atrial fibrillation. *Circulation* 91: 1588-1595.
- Wijffels MC, Kirchhof CJ, Dorland R, Allesie MA (1995) Atrial fibrillation begets atrial fibrillation: A study in awake chronically instrumented goats. *Circulation* 92: 1954-1968.
- Li D, Fareh S, Leung TK, Nattel S (1999) Promotion of atrial fibrillation by heart failure in dogs: Atrial remodeling of a different sort. *Circulation* 100: 87-95.
- Ausma J, Wijffels M, Thone F, Wouters L, Allesie M, et al. (1997) Structural changes of atrial myocardium due to sustained atrial fibrillation in the goat. *Circulation* 96: 3157-3163.
- Yue L, Feng J, Gaspo R, Li GR, Wang Z, et al. (1997) Ionic remodeling underlying action potential changes in a canine model of atrial fibrillation. *Circulat Res* 81: 512-525.
- Li D, Melnyk P, Feng J, Wang Z, Petrecca K, et al. (2000) Effects of experimental heart failure on atrial cellular and ionic electrophysiology. *Circulation* 101: 2631-2638.
- Shi Y, Ducharme A, Li D, Gaspo R, Nattel S, et al. (2001) Remodeling of atrial dimensions and emptying function in canine models of atrial fibrillation. *Cardiovasc Res* 52: 217-225.
- Ravelli F, Allesie M (1997) Effects of atrial dilatation on refractory period and vulnerability to atrial fibrillation in the isolated Langendorff-perfused rabbit heart. *Circulation* 96: 1686-1695.
- Bode F, Katchman A, Woosley RL, Franz MR (2000) Gadolinium decreases stretch-induced vulnerability to atrial fibrillation. *Circulation* 101: 2200-2205.
- Wijffels MC, Kirchhof CJ, Dorland R, Power J, Allesie MA (1997) Electrical remodeling due to atrial fibrillation in chronically instrumented conscious goats: Roles of neurohumoral changes, ischemia, atrial stretch, and high rate of electrical activation. *Circulation* 96: 3710-3720.
- Sih HJ, Zipes DP, Barbari EJ, Adams DE, Olgin JE (2000) Differences in organization between acute and chronic atrial fibrillation in dogs. *J Am Coll Cardiol* 36: 924-931
- Urabe Y, Mann DL, Kent RL, Nakano K, Tomanek RJ, et al. (1992) Cellular and ventricular contractile dysfunction in experimental canine mitral regurgitation. *Circulat Res* 70: 131-147.
- Everett IV TH, Li H, Mangrum JM, McRury ID, Mitchell MA, et al. (2000) Electrical, morphological, and ultrastructural remodeling and reverse remodeling in a canine model of chronic atrial fibrillation. *Circulation* 102: 1454-1460.
- Boyden PA, Tilley LP, Pham TD, Liu SK, Fenoglio Jr JJ, et al. (1982) Effects of left atrial enlargement on atrial transmembrane potentials and structure in dogs with mitral valve fibrosis. *Am J Cardiol* 49: 1896-1908.
- Fareh S, Villemaire C, Nattel S (1998) Importance of refractoriness heterogeneity in the enhanced vulnerability to atrial fibrillation induction caused by tachycardia-induced atrial electrical remodeling. *Circulation* 98: 2202-2209.
- Satoh T, Zipes DP (1996) Unequal atrial stretch in dogs increases dispersion of refractoriness conducive to developing atrial fibrillation. *J Cardiovasc Electrophys* 7: 833-842.
- Chen YJ, Chen SA, Tai CT, Yu WC, Feng AN, et al. (1998) Electrophysiologic characteristics of a dilated atrium in patients with paroxysmal atrial fibrillation and atrial flutter. *J Intervent Cardiac Electrophys* 2: 181-186.