

CASE REPORT

Physiotherapy Outcomes in a Male Patient with Post-Traumatic Bilateral Facial Nerve Paralysis: A Case Report

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Abstract

Bilateral Facial Nerve Paralysis (FNP) due to the temporal bone fracture is rare condition. Management of the bilateral FNP is challenging. There is no study on the results of the physiotherapy in bilateral FNP. This report represented the outcomes of physiotherapy in a twenty-one years old, male patient with bilateral FNP. The functional status of the patient progressed from grade V to grade II in House-Brackmann classification. His facial symmetry also improved. The physiotherapy methods, such as massage, electrical stimulation, exercises, are useful to restore the normal facial function in this case. In conclusion, physiotherapy approaches also are effective in the treatment of bilateral FNP. It can be used as an alternative in the conservative treatment of FNP.

Key words: Physiotherapy, facial muscle, facial nerve paralysis, temporal bone fractures

Introduction

Bilateral facial nerve paralysis (FNP) is one of the rare conditions for a physiotherapist. Its incidence is 1/5.000.000 in the world (Keane, 1994). Temporal bone fracture is a well-known cause of facial paralysis, and is responsible for approximately 3 percent of bilateral FNP (Li et al., 2004). The treatment of bilateral FNP often requires a multidisciplinary approach. In general, the earliest surgery is the first choice for treatment in severe FNP (Bascom et al., 2000). Therefore, though physiotherapy is included in the multidisciplinary approach, physiotherapists are rarely encountered with these patients in the clinic. They mostly treat Bell's palsy and report positive results (Pereira et al., 2011). Here in this report showed the physiotherapy outcomes of bilateral FNP in a male patient.

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A twenty-one years old male patient referred to us with bilateral paralysis in the facial muscle due to falling down from 8th floor, nearly one month ago. He reported that his consciousness was closed, the score of Glasgow Coma Scale score was 7/15 in the first week after the accident. The audiometric examination, showed any conductive/sensorineural hearing loss. A high-resolution Computed Tomography (CT) of the head showed bilateral temporal bone fractures. Furthermore, the transverse fracture of right petrous bone was extended from squamous portion. The longitudinal fracture of left petrous bone fracture was distinctly (Fig. 1). The other cranial nerves were intact and there was no neurologic deficit. Only the facial nerve was disturbed with periferal involvement. The grade of House-Brackmann (HB) classification of bilateral facial paralysis was VI during hospitalization period. He started 25 mg prednisolone twice a day after the onset of paralysis and he used it during a month. In additionally, he did not receive any medical treatment. The patient was recommended to consult the physiotherapy clinic.

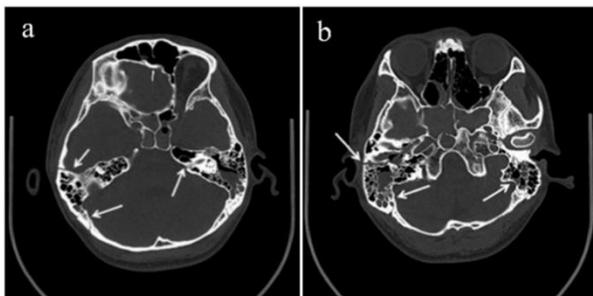


Figure 1(a,b): High-resolution CT scan showing bilateral temporal bone fractures

When the patient consulted to us, nearly six weeks after the onset of FNP, he was seen that in the grade V of HB. There was more pronounced paralyzed in the right side of the face when compared with the left side. The function of 5 facial muscles was evaluated: the frontalis, orbicularis oculi, major zygomatic, orbicularis oris, and corrugator supercilii. He had difficulty to initiate pursed lip. He could not close the right eye, whereas he could close the left eye. However, the closure was not complete. He complained of dry eyes, so he closed manually his eyes and used eye pads and drops. Any motion on the forehead was not observed. However, the contraction was taken between the eyebrows. He was compensating the

movements of the eyebrows with cervical motion. Both nasolabial fold was weak. After initial neurological examination, his first electrodiagnostic testing was done by the therapist through the diagnostic characteristics of Chattanooga Intellect Advanced Combo. The Strength-Duration Curve (SDC) was taken to the type of nerve injury (Friedli and Meyer, 1984). The results showed sign of axonal degeneration. The reobase and chronaxie values were 1.7 mA and 40ms (Fig. 2). The photography of voluntary facial expressions was taken. The patient was informed that these photographs could be used clearly in this report. The patient was evaluated three times (before treatment, after treatment and at follow up period of 3 months later). Because the patient lived in a different city, the 3rd evaluation was based on photographs, so results of SDC are missing. A different physiotherapist evaluates the patient to prevent bias.

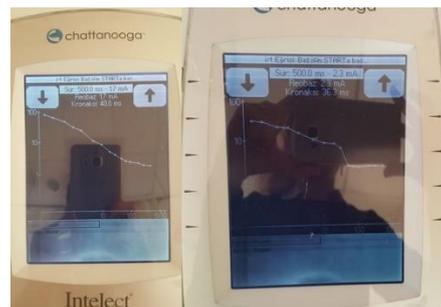


Figure 2: The illustration of the Strength-Duration Curve

He received total thirty sessions of treatment (during 6 weeks, per week 5 sessions, 60 minutes for every session). His treatment program consisted of massage, Neuromuscular Electrical Stimulation (NMES) to facial muscles, and facial exercises based on Proprioceptive Neuromuscular Facilitation (PNF) techniques. All patients were given home exercise program, that described below.

The infrared therapy was applied to prepare the muscles for massage, for 20 minutes, before the face massage. Face massage was used to regulate normal muscle tone following infrared therapy, through stroking and kneading (Diels, 2000).

Galvanic current (rectangular monophasic waveform) was used to stimulate the facial muscles. The on period of the current was 100 msec. and the off period was 500 msec. to avoid the fatigue in muscle fibers (Şimşek et al., 2015). The stimulation was applied through Chattanooga

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Intellect Advanced Combo. The pencil electrode was used as active electrode, which was placed over the motor point of each muscle, whereas the carbon electrode was placed over the ipsilateral biceps brachii. The intensity was increased until the externally observed contraction. Thirty contractions of three set was taken from each muscles (Tuncay et al., 2015). The resting interval was given each thirty contractions.

Exercises were done by using a mirror to take visual feedback and check the correctness of the movement. Each exercise was repeated 10 times. The facial exercises were conducted according to (PNF) technique: rhythmic initiation, repeated contractions, tapping of the muscle belly and tendon. The propagation feature of PNF techniques between the muscles facilitate the contraction in weaker muscles. Rhythmic initiation was used when the patient could not have started the movement. This technique improves the coordination and initiate the movement. If the function was achieved by the patient, the physiotherapist progressed the exercise from passive range of motion to manually resistive. Repeated contractions was utilized through the range to increase contribution of the muscle fibers, when the therapist feels that the contraction is decreasing. The repeated contractions may be requested at any point during the movement. Tapping on the muscle belly and tendon could also facilitate the weak contraction (Sardaru et al., 2013). The exercises based on PNF techniques were that closing his eyes, raising his eyebrows, frowning, wrinkling his nose, smiling with closed mouth, smiling with showing the teeth, pursing the lip, moving upward and downward direction the angle of lips, closing his mouth, inflating the cheek, that were applied by the author's assistance.

The home program consisted of the same exercises which were executed in the session. In additionally, the blowing balloon, and the reading loudly the vowels in front of the mirror were given the patient who repeated each exercises 5 times a day, 10 repetitions.

At the end of the study his HB grading was improved grade III. The result of the last electrodiagnostic testing improved in the direction of regeneration, the curve shifted to the left. The reobase and chronaxie values changed 2.3 mA and 36.3 ms. The right hemifacial muscles did not get resistance for 6 weeks, whereas after 3 weeks, he

could initiate facial expression. However, the movements in the right hemifacial could not be completed at the end of the therapy. The some of the left hemifacial muscles, corrugator supercillii and frontalis, got the resistance. His right orbicularis oris was more effective to purse lip. Both nasolabial fold was distinct. He could close the eyes and the closure of the left eye was stronger than the right one. The left frontalis could contract efficient, whereas the right frontalis was inefficient, only the contraction was taken. The frowning of the eyebrows was visible (Fig. 3-7).



Figure 3: The improvements in the closing eyes



Figure 4: The improvements in the pursing lip



Figure 5: The improvements in the smiling with showing the teeth



Figure 6: The improvements in the frowning the eyebrows



Figure 7: The improvements in the raising the eyebrows

The last evaluation which is at the follow-up period, 3 months after the treatment, was done on the photography (Fig. 3-8). His HB grading progressed to grade II. He could close his eyes without the need of maximum effort. He could frown and raise the eyebrows symmetrically. He could smile while he shows teeth. He could purse lip in the middle line. His resting facial symmetry and coordination between face muscles was excellent (Fig. 8).



Figure 8: The coordination and symmetry in the facial muscles

Discussion

Facial expression is essential for an effective human communication. Loss of facial expression after facial nerve injury have a great impact on the psychosocial conditions of the patients (Kiese-Himmel et al., 1993). Therefore, FNP should be treated immediately to restore facial function and

the decrease the psychosocial impact on the patients. Treatment of FNP included pharmacologic therapy, physical therapy, chemodenervation, and surgical interventions. Massage, thermotherapy, NMES, facial exercises, and biofeedback are approaches of physical therapy that have been used for unilateral FNP (Teixeria et al., 2011). In my knowledge, there is no study about physiotherapy outcomes of bilateral FNP in the literature. The present report showed that the physiotherapy is effective to improve the facial function after the post-traumatic bilateral FNP in a male patient.

Bilateral traumatic FNP occurs after longitudinal petrous fractures across the skull base. Longitudinal fractures of the petrous bone account for 90% of all fractures and causes bilateral FNP in 10-25% of patients (Li et al., 2004). The recovery of the longitudinal fractures is better than the transverse fractures, so the physiotherapy and rehabilitation program may also have resulted successful for this case.

Rehabilitation of nerve injury is difficult for complete recovery. The success of rehabilitation is related to the type of injury, acute or late-onset, severity of paralysis, localization of the injury, the time for initiation of physiotherapy, and the patient's compliance. Almost complete recovery was seen in this case, 5 and a half months after injury. He reported that he was pleased with his development. The patient's positive thoughts about the treatment shows that physiotherapy can be used as an alternative method after the bilateral FNP.

The numerous modalities in physiotherapy are used for treatment of Bell's palsy (Brach and Van Swearingen, 1999), however there is lack of high quality evidence to support the use of these strategies. Electrical stimulation, exercises, biofeedback, manual therapy, shortwave and laser were evaluated in some studies, but only trials involving electrostimulation and exercise had the minimum methodological quality (Teixeria et al., 2011). The use of NMES for nerve palsy is still controversy. Cederwall et al. reported that NMES was harmful for reinnervation (Cederwall et al., 2006). In contrast, Foecking et al. showed that NMES enhanced the regeneration in rats (Foecking et al., 2012). Tuncay et al. highlighted that the positive improvements occur when NMES combined with the conventional therapy (Tuncay et al. 2015). Similar to this study, in present report, NMES was used together infrared therapy,

massage, exercises based on PNF techniques, showed successful functional outcomes of physiotherapy.

In the treatment of FNP includes also other medical treatment methods and surgery. Bodonez et al showed that good results (grades I to II on the HB scale) were obtained in 63% of cases (n=38) after medical management and in 39% of cases (n=26) after surgical treatment in patients with facial paralysis following temporal bone fracture. However, they also showed poor improvement in 13% of medically-treated patients and 42% of surgically-treated patients (Bodonez et al. 2006). The choice of the treatment method may vary depending on the extent of the injury, patient compliance and patient characteristics.

Besides physiotherapy approaches, the evaluation method is also important. Which treatment is applied in the treatment of facial paralysis, it is also necessary to evaluate the treatment outcomes through an objectively and visibly method. The assessment by photograph was practical to determine the improvement of facial function. In this case, the assessment by photograph has made visible the improvement of the facial function in time. This method provides a concrete proof of the treatment outcomes to the patient, thus contributing to the emotional state of the patient.

The lack of last SDC results is limitation for the present case report. Further studies are needed controlled, larger sample of size to determine the efficiency of physiotherapy in bilateral FNP with different severity.

Informed Consent: The written consent form was taken from the patient.

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