Clinical prognostic factors in patients with idiopathic peripheral facial nerve paralysis (Bell's palsy)

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ABSTRACT

Objectives. The aim of this study was to analyse the clinical prognostic factors that are associated with treatment outcomes in patients with idiopathic peripheral facial nerve paralysis (PFNP). ***Methods.*** The study was performed retrospectively with 80 patients in a tertiary medical center. All of the patients were treated and followed for idiopathic PFNP (Bell's palsy). The patient charts were reviewed for patient demographics and characteristics. The comorbidities (hypertension, diabetes mellitus), the side, grade and duration of palsy, and the acoustic stapedius reflex were analyzed. ***Results.*** Forty-three male and 37 female patients were diagnosed with idiopathic PFNP. Sixty-seven of patients had complete, 13 patients had partial recovery. Of the partial recoveries, 12 patients had Grade 2 and one patient Grade 3 PFNP at the end of primary treatment. Patients tended to have incomplete recovery if they have a diagnosis of diabetes mellitus, but the difference between groups was not statistically significant (p=0.326). A positive stapedius reflex was associated with complete recovery (p=0.023). Patients had much more risk of incomplete recovery if age is more than 40 years (p=0.006). ***Conclusion.*** A detailed history and complete physical examination are very important in peripheral facial palsy. Co-morbid diseases and demographic features such as high blood pressure, diabetes mellitus and advanced age might influence the treatment outcomes.

Introduction

Peripheral facial nerve paralysis (PFNP) is a common health problem with the estimated incidence from 20-30 of every 100,000 individuals [1, 2]. Bell's palsy is the most common cause of PFNP. Taverner [3] described the diagnostic criteria of Bell's palsy that consist of sudden onset of palsy without central neural injury or otologic causes. There are many hypotheses to identify the pathogenesis of Bell's palsy. Herpes simplex virus (HSV-1) reactivation is one of the most widely accepted hypotheses [4, 5]. Also, mumps, rubella and varicella zoster virus infections are the other suspected viral agents in Bell's palsy [6, 7].

Bell's palsy usually completely recovers even if we don't use medical agents. Unfortunately, almost 15% of Bell's palsy has poor prognosis and may cause severe functional problems such as synchinesia, facial spasm and contracture [8]. Some clinical factors are associated with poor treatment outcome despite this excellent prognosis. These are accepted as poor prognostic factors: advanced age, facial pain, hyperacusis, decreasing of eye tear and associated comorbid diseases such as hypertension or diabetes mellitus [9, 10]. The advanced grade of PFNP at the time of primary treatment is strongly associated with poor prognosis. Marsk *et al.* [11] used Sunnybrook grading system and found a strong correlation of poor prognosis with advanced grade. In addition, House-Brackman scoring system and Yanagihara grading system are the other grading systems [12].

Electroneurography is another prognostic tool of PFNP, especially to predict poor prognosis. But it has many limitations; special equipments are needed to perform electoneurography and it is useful after 2 weeks [13].

We analyzed the factors that associated with treatment outcomes in patients with PFNP.

Methods

We conducted a retrospective data analysis in a tertiary referral center from May 2008 to December 2010. We include Bell's palsy patients who visited the hospital within a week after onset. If patients had less than 6 months follow up, they were excluded from the study.

All patients were graded according to House-Brackman facial nerve grading system. Patients were categorized depending on etiologic factors and grade of paralysis. All patients were examined addressing to etiology of the paralysis. Patients were accepted as Bell's palsy if they don't have any sign of neurologic or otologic diseases that associated with PFNP. Patients were ordered for audiogram, tympanogram and stapedius reflex tests.

We used the following treatment strategy for Bell's palsy. Intravenous 250 mg prednisolone administration for the first day and then 1 mg/kg/day oral prednisolone administration that tapered 10 mg every 3 days. If patient is less than 18 years old, we did not use 250 mg intravenous prednisolone administration and started 1 mg/kg/day oral treatment. We added an antiviral agent (valacyclovir) to this protocol if patient admitted within 3 days of onset. We hospitalized the patients if they have diabetes mellitus for close follow-up during the treatment. Facial nerve functions were assessed before and after the treatments. A monthly follow up was performed after the first treatment protocol until complete recovery.

Statistical Analysis

SPSS 16 was used for statistical analysis. Chi-square test and Student's t test were utilized to evaluate the correlation between patient characteristics and poor prognosis. A $p<0.05$ was accepted statistically significant.

Table 1. Distribution of clinical features of cases according to exact recovery and partial recovery groups

Variables		Group 1 (Recovered) (n=67)	Group 2 (Unrecovered) (n=13)	p	Odds ratio (95% CI)
Age	Mean	41.4±18.1	53.1±17.7	0.036	1.037 (1.001-1.075)
	Decades	5 (1-9)	5 (3-9)	0.052	1.404 (0.997-1.977)
Gender	*Male*	37 (55.2%)	6 (46.2%)	-	1.000
	Female	30 (44.8%)	7 (53.8%)	0.548	1.439 (0.437-4.739)
Diabetes Mellitus		19 (28.4%)	6 (46.2%)	0.326	2.165 (0.644-7.283)
Grade of palsy		3 (2-6)	4 (3-6)	<0.001	3.063 (1.711-5.486)
Side	*Right*	35 (52.2%)	5 (38.5%)	-	1.000
	Left	32 (47.8%)	8 (61.5%)	0.363	1.750 (0.519-5.903)
Duration of palsy	*First 24 hours*	42 (62.7%)	9 (69.2%)	-	1.000
	1-3 days	17 (25.4%)	2 (15.4%)	0.472	0.549 (0.107-2.809)
	≥4 days	8 (11.9%)	2 (15.4%)	0.860	1.167 (0.211-6.441)
Stapedius reflex	*Yes*	16 (57.1%)	1 (11.1%)	-	1.000
	No	12 (42.9%)	8 (88.9)	0.023	10.667 (1.171-97.185)

Results

A total of 80 patients including 43 males and 37 females were diagnosed with idiopathic peripheral facial nerve palsy (Bell' palsy). The mean age at the time of diagnosis was 43.3±18.4 years. Sixty-seven out of those patients had complete recovery but 13 patients had partial recovery (Table 1). Group 1 was conducted by patients with complete recovery while Group 2 was including patients with partial recovery.

The mean ages were 41.4±18.1 years and 53.1±17.1 years in Group 1 and Group 2, respectively. Table 1 summarizes the demographics of subgroups. The age at the diagnosis was significantly associated with treatment outcomes ($p<0.05$). Patients had much more risk of incomplete recovery if age is more than 40 years ($p=0.006$). Sex was not significant between the subgroups. Forty patients had left-side PFNP and forty patients had right-side PFNP. The complete recovery rates were 87.5% and 80% in patients with right- and left-side PFNP, respectively. The difference was not statistical significant according to side of paralysis. Thirty-five patients had hypertension and 25 patients had diabetes mellitus at the time of diagnosis. The rates of diabetes mellitus were 28.4% and 46.2% in Group 1 and Group 2, respectively. Patients tend to incomplete recovery if they have diagnosed diabetes mellitus, but the difference was not statistically significant ($p=0.326$). In Group 2, 69.2% of the patients was received the treatment within 24 hours of onset. There was no significant association between rate of recovery and time of diagnosis (Table 1).

We observed complete recovery of those patients with Grade 2 paralysis. One patient had partial recovery of Grade 3 paralysis. Table 2 summarizes the recovery rates addressing to the Grade of paralysis. The grade of paralysis was strongly associated with prognosis ($p<0.001$). One patient underwent facial nerve decompression despite all medical treatments that had complete facial nerve paralysis. Thirty-seven patients were underwent audiologic examination, none of those had hearing loss associated with facial palsy. The rates of stapedius reflex were 57% and 11% in Group 1 and Group 2, respectively. The positive stapedius reflex was significantly associated with complete recovery ($p=0.023$).

Discussion

Anatomy and function of the seventh cranial nerve was described in the early 1800s by Sir Charles Bell [1]. Many prognostic factors have been evaluated in patients with peripheral facial nerve palsy [14-16]. These are the most common analysed factors: Age, sex, side of palsy, hypertension, diabetes mellitus, grade of facial palsy, stapedius reflexes and timing of treatment. Advanced age at the time of diagnosis was found as a poor prognostic factor [17]. Smith and Cull [18] reported the association of healing process with regeneration and central adaptation. Central adaptation decreases with age that explains the poor prognosis in elder patients. Additional, co-morbid systemic diseases (diabetes mellitus, hypertension, etc.) are mostly seen in the advanced age. These co-morbid diseases may play an important role in elder patients. Diabetes mellitus might influence the neuro-degenerative process in patients with Bell's palsy [19].

This association plays an important role in recovery process. The rate of diabetes mellitus was much more in incomplete recovery group in the current study, unfortunately difference was not statistical significant. Further studies should address to analyse type of medication and control status of diabetes mellitus. Wasano *et al.* [20] reported the better outcomes in women patients. They advocated the neuro-regenerative effects of progesterone in these patients. Abraham *et al.* [10] have supported the

Table 2. Distribution of peripheral nerve palsy grades before and after the treatment

| | | | After Treatment | | | | | |
			Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Pre-Treatment	Grade 2	25	25	-	-	-	-	-
	Grade 3	29	28	1	-	-	-	-
	Grade 4	13	7	6	-	-	-	-
	Grade 5	7	4	3	-	-	-	-
	Grade 6	6	3	2	1	-	-	-
	Total	**80**	**67**	**12**	**1**	**-**	**-**	**-**

increased mean arterial pressure as a poor prognostic factor. In our study, neither hypertension nor sex had any effect on the prognosis. We concluded that sex, side of palsy, hypertension and timing of the treatment did not have any effect on the prognosis.

Absence of stapedius reflexes are one of the most known bad prognostic factor in PFNP [21]. Our results are supporting the poor treatment outcomes with absence of stapedius reflexes. The grade of palsy is another important prognostic factor. Patients have much more risk of incomplete recovery, if patients have Grade 4 or more palsy. Also, duration of recovery process is extended in these patients [11, 12]. We found that all grade 2 palsies had complete recovery. However, complete recovery rates were 97%, 58%, 58% and 50% in Grade 3, 4, 5 and 6, respectively.

Pietersen [22] published 1,011 patients with Bell's palsy that did not receive any kind of medication. According to this study, complete recovery rate was in 71% of the patient, incomplete recovery with mild sequel in 13%, and experienced residual weakness, synkinesis and/or contracture in 16% of those. The complete recovery rate was 94% in patients with partial paralysis whilst complete recovery rate was 60% in patients with complete paralysis. Jabor and Gianoli [23] reported that the improved rate of complete recovery if patient has any sign of recovery at third week of onset. On the basis of this finding, electromyograhic study at second week of onset supports us valuable findings addressing to the prognosis.

Systemic glucocorticoids are the main treatment agent of Bell's palsy [24]. Antiviral agents might be the other pharmacologic agent with suspect of Herpes Simplex virus activation as a cause of Bell's palsy. Engstrom *et al.* [25] compared the treatment outcomes of 829 patients with Bell's palsy [25]. They compared the treatment outcomes among the 4 subgroups; prednisolone, valacyclovir, valacyclovir+prednisolone and placebo arm. They reported the extended recovery time if patients do not receive prednisolone treatment. But, there was no significant difference between prednisolone alone and prednisolone plus valacyclovir groups according to recovery time [25]. Hato *et al.* [26] reported improved treatment outcomes of valacyclovir plus glucocorticoid treatment in comparison with glucocorticoid alone. We use glucocorticoids with antiviral agents as a treatment protocol depending on the literature.

Conclusions

A detailed history and complete physical examination are very important in peripheral facial palsy. Co-morbid diseases and demographic features such as high blood pressure, diabetes mellitus and advanced age, pre-treatment grade of palsy might influence the treatment outcomes. More satisfactory information can be given to the patients about their treatment and outcome expectations with the light of current study.

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