Clinical Prognostic Factors for Treatment Outcome in Bell's Palsy: A Prospective Study

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Objective: *To evaluate the clinical factors for predicting the outcome in Bell's palsy patients treated by oral prednisolone.*
Design: *Prospective study in a tertiary-care neurological hospital.*
Material and Method: *Three hundred and eighty cases of acute unilateral lower motor neuron type of facial palsy were enrolled initially from a neurological clinic. After exclusion of the unfulfilled criteria cases, 201 cases of Bell's palsy completed the study protocol and were followed for six months after a seven-day course of 60 mg/day followed by a five-day taper-off dosage of oral prednisolone. A modified House-Brackman facial paralysis grading system was used to evaluate the recovery of facial weakness in the serial follow-up examination. Correlation between demographic data, clinical presenting symptoms and signs, and the final outcome were analyzed by multiple logistic regressions to determine the significant clinical prognostic factors.*
Results: *There was a significant overall recovery of the facial weakness in succession throughout the 12 weeks of the follow-up period. The mean facial muscle scores approached the level of favorable outcome at the twelfth week after treatment. Duration between onset and treatment longer than seven days (RR = 18.87, 95% CI = 4.97-71.53), severe facial paralysis (RR = 5.01, 95% CI = 2.52 – 9.95), hearing defect (RR = 3.01, 95% CI = 1.16-7.84), and history of recurrence (RR = 3.75, 95% CI=1.21 – 11.59) were the significant prognostic factors for unfavorable outcome of treatment ($p < 0.05$).*
Conclusion: *Delayed in initiation of oral prednisolone, severe facial weakness, hearing defect, and history of recurrence were significant prognostic factors determining the poor outcome. To yield a satisfactory therapeutic result, early treatment of Bell's palsy with oral prednisolone should be recommended in cases of severe facial paralysis.*

Keywords: *Bell's palsy, Clinical prognostic factors*

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Bell's palsy is a common disorder of the facial nerve. The incidence ranges from 15 to 40:100,000 people over the world[1-3]. A study showed the common age of onset was 20-39 years old without predilection for sex, age of onset, side of facial involvement, and seasonal prevalence[4]. The definite etiology of the disorder has not been well understood. However, reactivation of the herpes simplex virus infection, latented in the geniculate ganglion of the facial nerve, is a widely accepted pathophysiological mechanism[5-7]. Though up to 90% of the cases have favorable outcome after treatment, the unfavorable ones do present. Some clinical factors such as severity of facial weakness, delay oral prednisolone treatment, severe post auricular pain, age older than 60 years, hypertension or diabetes mellitus, hyperacusia, decreased lacrimation, psychological stress, and severe facial pain predict a poor outcome[8]. In addition, the result of initial electromyography (EMG) and the evidence of more than 90% neural degeneration by electroneurography (ENoG)

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are strong electro-physiological predictors for the poor outcome[9]. Since the limited in availability of neuro-electrophysiologists and the sophisticated electrophysiological equipments in Thailand and other developing countries, the usage of presenting clinical symptoms and signs as prognostic factors seems more practical and may be cost effective. The present study was aimed to determine the significant clinical parameters in predicting the final outcome among the prednisolone-treated Bell's palsy patients.

Material and Method

The authors included all patients aged over fifteen years old who presented with acute unilateral lower motor neuron facial paralysis without central neurological disorders at Songkla Neuropsychiatric Hospital, a 250-bed tertiary care hospital in Muang district, Songkla province from June 1996 to December 1999. Cases with clinical evidences of recent or previous middle ear infection, systemic malignancy or infection, positive serological tests for HIV or syphilitic infection, autoimmune disorders, Ramsay-Hunt syndrome, and recent severe head injury were excluded. Furthermore, in whom treatment with corticosteroids, vitamins or other related agents given by other physicians before attending were also excluded by the history review. Their demographic data and clinical presenting profiles such as age, sex, side of involvement, severity of facial weakness, duration between onset and treatment, pain at mastoid, preceding upper respiratory tract infection, vertigo or dizziness, hypertension, diabetes mellitus, history of recurrence, hearing defect (by tuning fork test) and decreased lacrimation (by Schirmer's test) were recorded. Blood sample tests for complete blood count, blood urea nitrogen (BUN), creatinine, fasting plasma glucose, electrolytes and erythrocyte sedimentation rate (ESR) were done. Screening serological assays for HIV and syphilis were also requested. Chest radiography was done to exclude occult pulmonary infection or neoplasm. A computerized tomographic scan of the brain was performed to exclude intracranial abnormality only in clinically suspected cases, and those with intracranial abnormality found were excluded. The degree of facial weakness was graded initially in the first visit by the modified House-Brackman facial paralysis grading system. The modified grading system was operated by summation of the scores obtained by observation of facial expression at the resting position and the best facial muscle power in three divided regions of the involved side, as shown in the Appendix. A total score below 4 was considered as a severe facial paralysis, (comparable to grades V-VI of the House-Brackman grading system), while a total score between 5-13 was considered as a moderate case (comparable to grades III-IV of the House-Brackman grading system), and a total score between 14-18 was considered as a mild case (comparable to grades I-II of the House-Brackman grading system). This modification was aimed to simplify the grading system and to get more detailed evaluation. After complete initial evaluation, oral prednisolone 60 mg/day in three divided dosages was prescribed for seven days and then tapered off within the next five days by 10 mg/day reduction in a single daily dosage regimen. All of the patients were appointed in a serial follow-up and repeated grading of facial weakness at the 1st, 3rd, 6th, 12th, and 24th week after treatment initiation. All patients were reminded for the appoint date by mail or phone. At the final visit, those who achieved the scores 14-18 were classified as favorable outcome and those whose scores were 13 and below, were unfavorable. All patients were examined and graded for facial weakness only by the first author. Demographic data and clinical profiles were shown in frequency and percentage. Mean and standard deviation of the facial muscle scores were used to demonstrate the recovery. Multiple logistic regression analysis was used to determine the relevant prognostic factors from the demographic and presenting clinical profiles, which were shown by the relative risk and 95% confidence interval. The calculated sample size was at least 153 cases for statistical significance.

Results

Three hundred and eighty cases of acute unilateral lower motor neuron facial paralysis were eligible for the present study. One hundred and sixty cases were excluded according to the exclusion criteria (Ramsay-Hunt syndrome 16 cases, traumatic facial palsy 46 cases, serologically positive for HIV or syphilis infection 4 cases and treatment given before inclusion 94 cases). Nineteen cases dropped out from the present study during the follow-up period by missing the appointment. Therefore, 201 cases were left and completed according to the study protocol. The characteristics of the subjects with Bell's palsy are distributed in Table 1. There were more female (63.2%) than male (36.8%) and most of them were older than 60 years old (72.8%). Ninety percent of the cases were treated with oral prednisolone within 7 days of the onset. Association with essential hypertension and diabetes mellitus were 6.9% and 9.9% respectively.

Table 1. Characteristics of patients with Bell's palsy (n = 201)

Characteristics	n (%)
Age	
Over 60 years	146 (72.6)
Under 60 years	55 (27.4)
Gender	
Male	74 (36.8)
Female	127 (63.2)
Severity of facial paralysis	
Mild	26 (12.9)
Moderate	112 (55.8)
Severe	63 (31.3)
Duration between onset-treatment	
7 days or more	20 (9.9)
Less than 7 days	181 (90.1)
Side of involvement	
Right	123 (61.2)
Left	78 (38.8)
Associated diseases	
Diabetes mellitus	20 (9.9)
Hypertension	14 (6.9)
Others	6 (2.9)
Preceding viral infection	44 (21.9)
Pain at mastoid	66 (32.8)
Vertigo or dizziness	53 (26.3)
Decreased corneal reflex	84 (41.8)
Hearing defect	26 (12.9)
Decreased lacrimation	20 (9.9)
Recurrence	19 (9.4)

The majority of the cases attended our clinic within 7 days of the onset (90.1%). This was due to the acuteness of the facial paralysis, which caused marked discomfort and embarrassment. Significantly, it was the fear of having hemiparesis because of the misunderstanding for stroke. Upper respiratory tract infection (21.9%) was the common preceding illness before facial paralysis began. Postauricular pain (32.8%) and vertigo or dizziness (26.3%) were common associated symptoms at the beginning of the paralysis. Nineteen cases (9.4%) of recurrent Bell's palsy and four cases (1.8%) of pregnancy-related Bell's palsy were also included.

At the initial evaluation, there were 63 cases classified as severe facial paralysis, while 112 and 26 cases were classified as moderate and mild cases respectively (Table 1). There was significant improvement of the mean facial muscle power scores between each consecutive time points from the initiation of treatment through the 12 weeks of the follow-up period ($p < 0.05$) then it became plateau from the 12th to the 24th week, as demonstrated in Fig. 1.

There were only four clinical variables at the presentation that showed consistency as prognostic factors for treatment outcome, as shown in Table 2. Duration between onset and treatment longer than seven days had the highest relative risk of 18.87, and severity of facial paralysis, history of recurrence, and hearing defect were ranged in sequence according to the relative risk.

Discussion

A population-based study showed that the common age of onset of Bell's palsy was 20-39 years old, however, the age of onset as high as 20-59 years old has also been reported[10]. The author has already found no significant preference of involvement in either sex, side of face and age group (stratified into ten-year intervals) in a previous retrospective study[11].

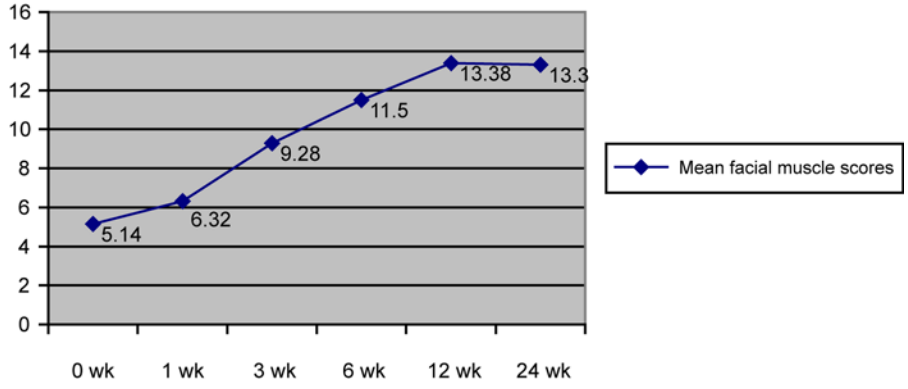

Fig. 1 Mean scores of facial muscle power during the follow-up period

Table 2. Multiple logistic regression analysis of patient variables as prognostic factor for treatment outcome

Variables	Number of cases			RR	95% CI
	Unfavorable	Favorable	Total		
Severity of facial paralysis					
Mild to moderate	24	114	138		
Severe	33	30	63	5.01	2.52-9.95*
Duration between onset and treatment					
Less than 7 days	40	141	181		
7 days or more	17	3	20	18.87	4.97-71.53*
Hearing					
Normal	46	129	175		
Defect	11	15	26	3.01	1.16-7.84*
Recurrence					
No	48	134	182		
Yes	9	10	19	3.75	1.21-11.59*

* Significant different ($p < 0.05$)
RR = relative risk, 95% CI = 95% confidence interval

Appendix. Modified House-Brackman facial paralysis grading system

Score	At rest	Max. Eyebrow elevation	Max eyelid closure	Max angle of mouth elevation
5	Normal, symmetrical facial expression		Normal, symmetrical eyelid closure	
4	Slight weakness noticeable only when closed inspection	Normal, symmetrical eyebrow elevationt	Complete closure with minimal effort and slight asymmetry	Normal, symmetrical of angle of mouth elevation
3	Obvious weakness but not disfiguring, normal and symmetrical tone	Mild weakness of eyebrow elevation (75% of normal)	Complete closure with maximal effort and obvious asymmetry	Move the angle of mouth with minimal effort and slight asymmetry
2	Obvious weakness and disfiguring	Moderate weakness of eyebrow elevation (50% of normal)	Incomplete closure wit maximal effort	Move the angle of mouth with maximal effort and obvious asymmetry
1	Marked asymmetry with drooping corner of mouth, decreased or absent of nasolabial fold	Severe weakness of eyebrow elevation (25% of normal)	Slightly move of eyelid with maximal effort	Slightly move with maximal effort
0	Total paralysis	No eyebrow elevation	No eyelid motion	No angle of mouth motion

The total facial paralysis score is the summation of all scores graded from each part

The limited sample size of the present study may have caused the deviation of the age of onset. The association between Bell's palsy and diabetes mellitus and hypertension was comparable with other large clinical studies[1,4,12].

Like in the present study, Hyden et al[13] found that postauricular pain was the most common associated presenting symptom (45%), while vertigo and other cranial nerves disturbance were found in 8% and 5% respectively. Decreased corneal reflex was the major associated neurological disorder found (41.8%) in the present study, and this was found to be as high as 50% in a larger clinical study[8].

There was a significant improvement of the facial muscle power from the initiation of treatment through 12 weeks of the follow-up period, and then the scores reached a plateau at the total scores approaching 14, which indicated favorable outcome, as shown in Fig. 1. Usually the recovery of Bell's palsy ranges from six weeks to more than one year depending on the severity of the facial nerve injury[14]. A meta-analysis has shown that corticosteroids would improve the rate of recovery in those with complete facial paralysis[15]. Treatment with oral prednisolone within the first week of onset yielded a better outcome regardless of the severity of the facial weakness has been demonstrated[2]. Moreover, oral prednisolone was found to provide more favorable outcome within six months of onset[16]. Therefore, it can be concluded that early treatment with oral prednisolone will hasten the recovery and promote a favorable outcome.

Only four significant clinical presentations predicting the outcome were identified in the present study: delayed initiation of oral prednisolone treatment (more than 7 days), severe facial paralysis (scores < 4), hearing defect, and the recurrence of Bell's palsy. Since the inflammatory process in Bell's palsy can last as long as three weeks[8], the delayed initiation of treatment would allow the extent of injury to progress. Some previous studies confirmed the effect of severity of facial weakness and delayed oral prednisolone treatment on the rate of recovery[2,9,13,16]. Hearing defect and recurrence of Bell's palsy were two additional prognostic factors that have not been mentioned, but were determined in the present study. The involvement of vestibulocochlear nerve may indicate the more extensive inflammation and cause delayed recovery. Since subgroup analysis of the influence of the ipsilateral or contralateral side of recurrence on recovery was not performed, the definite effect of side of recurrence on the outcome could not be concluded. However, recurrence showed no significant correlation with the final outcome in one study[2].

This was the largest prospective clinical study on prognosis of Bell's palsy that has ever been conducted in Thailand. The simplicity of the developed facial paralysis grading system can help even the internists evaluate their patients properly. Since the large volume but low harm of the disorder, combined with the shortage of the resources in many developing countries including Thailand, makes the clinical assessment cost-effective and reasonable for its application in regard to its reliability.

In summary, severe facial paralysis, delayed oral prednisolone treatment, hearing defect, and recurrence are the factors that correlate with unfavorable outcome. Therefore, early treatment with oral prednisolone in Bell's palsy patients will increase the chances of a favorable final outcome.

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ปัจจัยทางคลินิกในการพยากรณ์ผลที่ได้รับจากการรักษาอัมพาตแบบเบลล์: การศึกษาแบบมุ่งหน้า

พรชัย สถิรปัญญา, จุฑารัตน์ สถิรปัญญา

***วัตถุประสงค์**: เพื่อประเมินปัจจัยทางคลินิก ในการพยากรณ์ผลที่ได้รับจากการรักษาผู้ป่วยที่เป็นอัมพาตแบบเบลล์ด้วยการรับประทานยาเพร็ดนิโซโลน*

***การออกแบบ**: เป็นการศึกษาแบบมุ่งหน้าในโรงพยาบาลประสาทวิทยาระดับตติยภูมิ*

***วัสดุและวิธีการ**: ศึกษาผู้ป่วยอัมพาตแบบเบลล์จำนวน 380 ราย ณ คลินิกประสาทวิทยา ที่มีภาวะเส้นประสาทสมองคู่ที่ 7 พิการอันเป็นผลต่อการเคลื่อนไหวกล้ามเนื้อใบหน้าข้างเดียวชนิดเฉียบพลัน หลังจากคัดออกด้วยเกณฑ์การศึกษามีผู้ป่วยจำนวน 201 ราย ที่ครบถ้วนตามแบบแผนการศึกษา และติดตามผลการรักษานาน 6 เดือน หลังจากรับประทานยาเพร็ดนิโซโลนขนาด 60 มิลลิกรัมต่อวันนาน 7 วัน ตามด้วยการลดขนาดยาภายใน 5 วัน ประเมินการฟื้นตัวของภาวะกล้ามเนื้อหน้าอ่อนแรงด้วยระบบการแบ่งระดับแบบประยุกต์เกี่ยวกับอัมพาตกล้ามเนื้อหน้าของ House-Brackman ความสัมพันธ์ระหว่างข้อมูลสถิติ อาการ และอาการแสดงทางคลินิกและผลที่ได้รับจากการรักษาได้รับการวิเคราะห์ด้วยสถิติลอจิสติกแบบถดถอย*

***ผลการศึกษา**: ภาวะกล้ามเนื้อใบหน้าอ่อนแรงมีการฟื้นตัวอย่างมีนัยสำคัญภายใน 12 สัปดาห์ คะแนนกล้ามเนื้อหน้าเฉลี่ยบรรลุถึงผลที่น่าพอใจหลังการรักษา 12 สัปดาห์ ปัจจัยทางคลินิกที่มีนัยสำคัญ ($p < 0.05$) ทางลบในการพยากรณ์ผลที่ได้รับจากการรักษา ได้แก่ ระยะเวลาตั้งแต่เริ่มมีอาการจนถึงการรักษานานกว่า 7 วัน (RR = 18.87, 95% CI = 4.97-71.53) อัมพาตกล้ามเนื้อหน้าชนิดรุนแรง (RR = 5.01, 95% CI = 2.52-9.95) ความบกพร่องในการได้ยิน (RR = 3.01, 95% CI = 1.16-7.84) และประวัติการเป็นซ้ำ (RR = 3.75, 95% CI = 1.21-11.59)*

***สรุป**: การเริ่มให้รับประทานยาเพร็ดนิโซโลนล่าช้า ภาวะอัมพาตกล้ามเนื้อหน้าชนิดรุนแรง ความบกพร่องในการได้ยินและประวัติการเป็นซ้ำ เป็นปัจจัยที่มีนัยสำคัญในการพยากรณ์ในการบ่งว่าผลที่ได้รับจากการรักษาไม่ดี เพื่อให้ผลการรักษาเป็นที่น่าพอใจ จึงแนะนำให้รักษาอัมพาตแบบเบลล์ด้วยการรับประทานยาเพร็ดนิโซโลนตั้งแต่เริ่มแรก*