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Comparison of facial synkinesis at 6 and 12 months after the onset of peripheral facial nerve palsy

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ABSTRACT

Objective: To investigate the time course of synkinesis as a sequela of facial nerve palsy so that we are able to determine an appropriate time for deciding the outcome of recovery in patients with facial nerve palsy.

Methods: Nineteen consecutive patients with peripheral facial nerve palsy who developed synkinesis were enrolled. We compared the degree of synkinesis at 6 and 12 months after the onset of palsy. Our investigation consisted of (1) scoring using the Sunnybrook facial grading system and (2) computing the asymmetry (%) in eye opening width. We also judged whether all 19 cases were cured or not based on the treatment outcome criteria of the Japan Society of Facial Nerve Research at 6 and 12 months. **Results:** The synkinesis score based on Sunnybrook facial grading system and the degree of asymmetry in eye opening width during mouth movement deteriorated significantly between the 6th and 12th month after the onset of palsy. One of the cases regarded as “cured” at the 6th month was later judged to be “non-cured” due to deterioration in the synkinesis score at the 12th month.

Conclusion: From our results, synkinesis deteriorated after the 6th month from the onset of palsy. Therefore, we should follow up the degree of synkinesis until at least the 12th month, and the outcome of recovery in patients with facial synkinesis should be evaluated at least 12 months after the onset.

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1. Introduction

The causes of peripheral facial nerve palsy are wide-ranging, with the most common causes being Bell's palsy and Ramsay Hunt syndrome (RHS) [1]. Appropriate treatment with prednisolone or anti-viral drugs allows complete recovery in more than 90% of Bell's palsy [2] and in about 70% of RHS [3]. The remaining patients, however, have some trouble with facial movements. Sequelae can be expected in about 10% of all peripheral facial nerve palsy patients as Bell's palsy accounts for 60% and RHS accounts for 10% of patients with peripheral facial nerve palsy [1]. Therefore, otolaryngologists should not neglect patients who suffer sequelae of facial nerve palsy and appropriate care for these patients is needed. Sequelae of facial nerve palsy, including synkinesis, crocodile tears syndrome and myogenic tinnitus of the stapedius muscle, are thought to be caused by misdirection of facial nerve

axons during regeneration [4,5]. Among these sequelae, synkinesis is one of the most uncomfortable symptoms and reduces the patients' quality of life. It is an abnormal involuntary associated facial movement such as eye closure during smiling and mouth movement during blinking. For the treatment of severe synkinesis, injections with botulinum toxin type A and plastic surgery are often indicated [6].

In Japan, recovery from facial nerve palsy is assessed at 6 months after the onset of facial nerve palsy based the treatment outcome criteria (i.e., a score of more than 36) according to the Yanagihara grading system [7] and less than mild synkinesis [8]. However, the patients in a northern European study on the effects of steroids and anti-viral drugs for Bell's palsy were followed up for more than 1 year [9]. In some cases regarded as “cured” at the 6th month, the sequelae continued to worsen thereafter so that they might be regarded as “non-cured” at 1 year after the onset of facial nerve palsy. The purpose of this study is to investigate whether it is appropriate to assess outcome at the 6th month. Although there are a number of studies on the onset of sequelae [10,11], few have focused on the time course of sequelae.

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In this study, we compared the degree of synkinesis at 6 and 12 months after the onset of peripheral facial nerve palsy. Some of the results have been presented in a preliminary form [12].

2. Materials and methods

A total of 154 patients with peripheral facial nerve palsy visited Hokkaido University Hospital, Japan between January 2005 and December 2007. Of these, 16 patients (10.4%) who showed synkinesis at 6 months after the onset of facial palsy were enrolled in the study. Patients who did not permit the video-recording of their facial movements and who were not observed for at least 1 year were excluded. Three patients who visited Teine-Keijinkai Hospital were also included. Therefore, a total of 19 patients (8 with Bell's palsy and 11 with RHS) were included in this study. Seven patients were male and 12 were female, with a median age of 54 years (range, 23–77 years). Synkinesis was evaluated by visual assessment, with informed consent obtained from each patient. Biofeedback using a mirror or electromyography was not carried out in our cases. Further, as it is speculated that trying to move the facial muscles excessively before a contraction has been observed can result in greater synkinesis [13], we instructed patients not to contract their facial muscles strongly. We also instructed patients to massage their facial muscles by hand.

Facial movements were recorded by video camera at both 6 and 12 months after the onset of palsy. By comparing the two videotapes, we investigated the development of synkinesis over the 6-month period. Our investigation consisted of (1) scoring using Sunnybrook facial grading system and (2) computing the asymmetry (%) in eye opening width. The Sunnybrook facial grading system assesses the face at rest and during voluntary movement, taking into account the range of movement as well as the presence of synkinesis [14]. The composite score is derived by subtracting the resting symmetry score and synkinesis score from the voluntary movement score. This system is precise and reliable for both prospective and retrospective use. In this study, patients with a synkinesis score of greater than 1 point were defined as demonstrating synkinesis. To compute the asymmetry in eye opening width, still images of 3 mouth movements (pursing one's lip, baring one's teeth and puffing one's cheeks) were chosen from the movies and captured. The eye opening widths on both sides of the monitor screen were measured. The ratio of the width of the eye opening on the affected side relative to the normal side was then computed [15]. One case was omitted from scoring using the Sunnybrook facial grading system due to insufficient data. Therefore, the data for the remaining 18 cases were analyzed. We also assessed whether each of the 19 cases was cured or not based

on the treatment outcome criteria of the Japan Society of Facial Nerve Research at 6 and 12 months. Patients with more than 36 points on the Yanagihara grading system and a synkinesis score of 5 points or less on the Sunnybrook facial grading system were regarded as "cured".

The examiner viewed two videotapes for each patient in a randomly set order and was not told which videotape was recorded at 6 and 12 months after onset. Wilcoxon signed-rank test was used to examine statistical significance ($p < 0.05$). This research adhered to the tenets of the Declaration of Helsinki and was approved by our institutional review board.

3. Results

3.1. Sunnybrook facial grading system score

Fig. 1A shows the change in composite score on the Sunnybrook facial grading system between 6 and 12 months. The mean composite scores at 6 and 12 months were 59.9 and 62.2, respectively, indicating that there was no tendency for the composite score to change. On the other hand, the voluntary movement score and synkinesis score demonstrated statistically significant increases, respectively ($p < 0.05$) (Fig. 1B and C). The mean voluntary movement scores at 6 and 12 months were 68.9 and 73.6, respectively, with the mean synkinesis scores being 4.2 and 6.4, respectively. These results showed that facial movement improved and synkinesis became more prominent after the 6th month from the onset of facial palsy. The increase in synkinesis score resulted in a decrease in the composite score, whereas the increase in voluntary movement score resulted in an increase in the composite score. The fact that these two components influenced the composite score in an opposite manner explains the why no change in the composite score was observed.

3.2. The degree of asymmetry in eye opening width

Fig. 2A–C shows a comparison of the asymmetry in eye opening width during mouth movements at 6 and at 12 months. The mean asymmetry in eye opening width during pursing one's lip, baring one's teeth and puffing one's cheeks at 6 and 12 months from the onset of facial palsy were 67.0 and 61.0%, 79.1 and 64.2%, and 69.3 and 55.5%, respectively. The asymmetry in eye opening width during baring one's teeth and puffing one's cheeks both decreased significantly ($p < 0.05$). As with the change in Sunnybrook facial grading system score, the deterioration in synkinesis after the 6th month from onset of facial palsy was again indicated. In one case, although minimal synkinesis was observed at the 6th month after onset, the asymmetry in eye

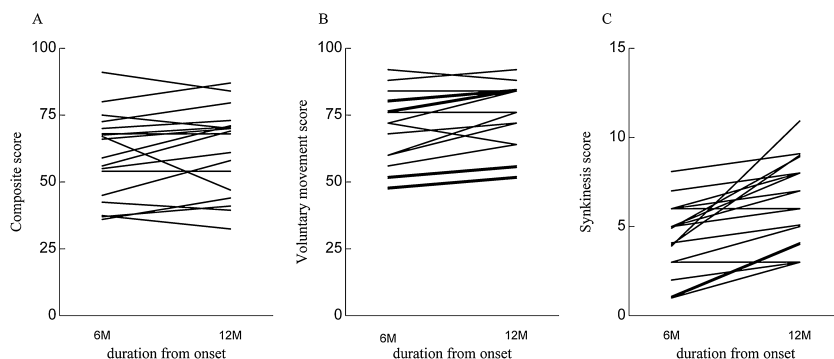


Fig. 1. Changes in composite score (A), voluntary movement score (B) and synkinesis score (C) of the Sunnybrook facial grading system between the 6th and 12th month. Although there was no tendency for the composite score to change, both the voluntary movement score and synkinesis score increased significantly over this period ($p < 0.05$).

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