의학석사 학위논문

Characteristics of Perception for Facial Nerve Palsy

– Perception for Facial Nerve Palsy –

안면신경마비의 인지에 관한 특성 연구

2013년 2월

서울대학교 대학원

임상의과학과 전공

문 수 진

Characteristics of Perception for Facial Nerve Palsy

– Perception for Facial Nerve Palsy –

안면신경마비의 인지에 관한 특성 연구

지도 교수 김 영 호

이 논문을 의학석사 학위논문으로 제출함

2012년 10월

서울대학교 대학원

임상의과학과 전공

문 수 진

문수진의 의학석사 학위논문을 인준함

2012년 12월

위 원 장 _____ (인)

부위원장 _____ (인)

위 원 _____ (인)

Characteristics of Perception for Facial Nerve Palsy

− Perception for Facial Nerve Palsy −

By

Sue Jean Mun

A thesis submitted in partial fulfillment of the requirements

for the degree of Master of Science

in Clinical Medical Sciences

in the Seoul National University, Seoul, Korea

December, 2012

Approved by thesis committee

Professor

Professor

Professor

Abstract

Characteristics of Perception for Facial Nerve Palsy

Sue Jean Mun

Clinical Medical Sciences

Graduate School

Seoul National University

Introduction: The aim of this study was to investigate the characteristics of the perception of the facial nerve palsy (FNP).

Subjects and Methods: A questionnaire survey of 200 healthy people was performed between July and September in 2012, using photographs of four patients with four different grades of unilateral FNP (resting, smiling, whistling, closed eyes, and frowning). The questionnaire consisted of questions concerning the identification of FNP, the involved side of the face, the awkward-appearing areas of the face, and the awkwardness of the facial expressions. The education level of the subjects was also surveyed.

Results: One hundred males and 100 females ranging in age from 20 to 69 years were enrolled in this study. The overall rate of identification of FNP was

75.0%. There was no significant difference in the rate of identification of FNP according to the gender or the age of the subjects, whereas the identification rate increased according to the increase in the House-Brackmann grade of the patient's FNP (p <.001, linear by linear test). The overall detection rate of the involved side of the face was 54.5%, and that rate decreased with increasing subject age (p <.001, linear by linear test). The most awkward-appearing area of the face was reported to be the mouth, followed by the eyes, the cheeks, the eyebrows, and the nose. The most awkward facial expression was reported to be smiling, followed by closed eyes, whistling, and frowning. There was no difference in the rate of identification of FNP according to the education level. However, the overall detection rate for the side of the face affected by FNP was higher in the high-education group (p < .001, chi-squared test).

Conclusions: The detection rate for the side of the face affected by FNP was lower than the rate of identification of FNP and was significantly low in the middle-aged/elderly and the low-education level groups. These characteristics must be considered in establishing a new FNP grading system.

Keywords: Facial nerve palsy, perception, House-Brackmann grade

Student number: 2011-21982

Contents

List of Figures and Supplements

Introduction

Facial nerve palsy (FNP) may significantly influence the quality of life of affected patients in both the physical and the psychological realms.[1,2] The initial assessment of facial nerve function in FNP patients is important because it is used in selecting therapeutic modalities and providing a prognosis.

There are various methods to evaluate the severity of FNP. The House-Brackmann (H-B) grading scale was developed by House in 1983, and the modified H-B grading scale was adopted as the universal standard of the American Academy of Otolaryngology-Head and Neck Surgery in 1985.[3] Although several scales, including the H-B grading scale, are widely used, the scales have certain some drawbacks in that assessments are subjective and there is a lack of strong interobserver reliability and reproducibility. These shortcomings have fostered alternative grading systems, including the Burres-Fisch scale, the Nottingham system, and the Sunnybrook facial grading system.[4-8] However, these scales also have drawbacks; for example, they are time-consuming, and they involve complicated calculations.

There may be a difference between an ordinary person's perception of unilateral FNP and the score from an FNP grading system. Although the impaired facial nerve function may have a negative influence on interpersonal relationships and generate profound social distress, there is little information on people's perceptions of paralyzed faces.[9,10] It is important to understand

how ordinary people respond to photographs of patients with FNP to establish a more comprehensive and distinctive FNP grading system. The aim of this study was to investigate the characteristics of the perceptions of unilateral FNP among Korean people without facial palsy.

Subjects and Methods

Subjects

This was a questionnaire study based on responses to a survey. The study was conducted in the Boramae Medical Center between July and September 2012. Two hundred voluntary subjects were asked to view each photograph of patients with FNP and to respond to the survey. Subjects with a diagnosis of FNP, psychiatric illness, treatment for a psychological problem, or mental retardation were excluded from this study. People who had previously undergone facial plastic surgery were also excluded because of possible sensitized responses to facial morphology. The voluntary observers consisted of 100 males and 100 females ranging in age from 20 to 69 years who were divided into age groups of 40 people each. The education level (from elementary school to university) of the subjects was also surveyed.

Questionnaire

Among the 62 unilateral FNP patients with H-B grade II to V FNP who had been photographed making five typical facial expressions (resting, smiling, whistling, closed eyes, and frowning), only 17 patients agreed to allow the use of their photographs for this study. Among them, the five patients' photographs that were the most appropriate as question samples were selected for the questionnaire survey. The photographs of one patient with FNP of H-B grade V were used to produce the sample questions (Fig. 1), and one well-

trained physician explained the questionnaire sample to the subjects and collected the data. Photographs of four patients with FNP of H-B grade II to V were used for the final questionnaire survey (Supplement 1).

The questionnaire items consisted of four questions, including the identification of FNP, the detection of the side of the face involved, and the awkward-appearing facial area and facial expression (Supplement 2). The awkward-appearing facial area was selected from what the subjects could see. Awkward facial expression was rated from 1 to 5, with 1 being the most awkward, among the expressions of resting, smiling, whistling, closed eyes, and frowning. Each subject responded to the questionnaire survey for all four of the patients with FNP of H-B grade II to V.

Statistical analysis

The relationships among the data for the H-B grading scale, the age group, the FNP identification rate, and the side detection rate of FNP were evaluated using a linear by linear test. The relationships between gender, education level, FNP identification rate, and side detection rate of FNP were evaluated using the chi-squared test. The data analysis and statistical tests were performed using SPSS software (version 18.0; SPSS, Inc. Chicago, IL, USA). P value $< .05$ was considered statistically significant.

Consensus and ethics committee approval

This study was approved by the Institutional Review Board of Seoul National University Boramae Medical Center (IRB No. 06-2012-89).

Results

The mean age of the subjects was 44.5 ± 14.1 years. Among the 200 subjects, 170 gave an answer for their education level. Seven (4.1%) of the subjects had graduated from elementary school, 21 (12.4%) of the subjects had graduated from middle school, and 41 (24.1%) of the subjects had graduated from high school. Twelve (7.1%) of the subjects were enrolled in a university, 78 (45.9%) had graduated from a university, and 11 (6.5%) were postgraduate students.

1. Rate of identification of FNP

The average rate of identification of FNP was 75.0% (600 correct answers/800 questions). There was no significant difference in the identification rate of FNP according to either gender or age group. The FNP identification rate increased as the H-B grade of the patient increased: 28.5% for FNP grade II, 80.5% for FNP grade III, 95.5% for FNP grade IV, and 95.5% for FNP grade V (Fig. 2, $p < .001$, linear by linear test). The difference was also present in the male and female groups ($p < .001$, linear by linear test, in each group). However, there was no significant difference between male and female groups for perception of the same H-B grade of FNP ($p = .172$ for grade II, $p = .108$ for grade III, $p = .733$ for grade IV, and $p = .733$ for grade V, linear by linear test).

2. Rate of detection of the side affected by FNP

Among the people who identified FNP (600 correct answers), the rate of detecting the side of the face affected by FNP was 55.5% (333/600). There was no significant difference in the sidedness detection rate according to gender. However, the rate of detecting the side of the face affected by FNP significantly decreased from the 40s age group (Fig. 3, $p < .001$, linear by linear test): 71.4% for the 20s age group, 69.0% for the 30s age group, 46.3% for the 40s age group, 50.4% for the 50s age group, and 41.3% for the 60s age group. There was no difference in the sidedness detection rate according to the increase of H-B grade of the FNP (Fig. 4, $p = .556$, linear by linear test).

3. The most awkward-appearing facial area

The most awkward-appearing facial area in the FNP photographs was the mouth, followed by the eyes, the cheeks, the eyebrows, and the nose (Fig. 5, the areas were not mutually exclusive). The number given to the area concerned increased as the H-B grade of the FNP increased (data not shown). The order of the most awkward-appearing facial areas identified by the male group was somewhat different from that of the female group: the order was mouth, eyes, cheeks, nose, and eyebrows for the male group, whereas the order was mouth, eyes, cheeks, eyebrows, and nose for the female group. There was also a difference in the order of the most awkward-appearing facial area according to the increase of the H-B grade. For H-B grade II FNP, the mouth was the most frequently identified as awkward, followed by the nose

and the cheeks. For FNP of H-B grades higher than II, the mouth was the most frequently identified as awkward, followed by the eyes, the cheeks, and the eyebrows.

4. The most awkward facial expression

The ranking of the awkwardness of the facial expressions among the five expressions shown by the patients with four grades of FNP was smiling, followed by closed eyes, whistling, frowning, and resting (Fig. 6). For the cases of H-B grades II, III, and IV, whistling rather than closed eyes was the second most awkward facial expression (data not shown).

5. Differences of FNP perception according to education level

The overall rate of identification of FNP and the sidedness of the FNP were also analyzed according to the subjects' education level. The subjects were classified into the low-education group (n = 69, 40.6%) when a subject had less than a university education and into the high-education group (n = 101, 59.4%) when a subject had graduated from a university. There was no difference in the rate of identification of FNP according to education level (77.9% of those in the low-education group, 71.5% of those in the high-education group, p = .150, chi-squared test). However, there was a difference in the detection rate of the correct side of the face affected by FNP according to education level. Those in the high-education group exhibited a higher rate

of detection of the sidedness of FNP than did those in the low-education group (Fig. 7, $p < .001$, chi- squared test).

Discussion

Studies have been conducted on how FNP patients feel about their disfiguration.[1,11,12] Some authors have suggested that 50% of FNP patients describe themselves as not effective at expressing emotions such as happiness, disgust, surprise, anger, sadness, and fear.[1] Another study reported that 32.7% and 31.3% of FNP patients had significantly high levels of anxiety and depression, respectively.[11] Interestingly, there was no correlation between the clinical severity of the FNP and participants' experiences of anxiety or depression in another study.[12] Although these studies on FNP included both the physicians' and the patients' points of view, there may be a mismatch in the perception between these two groups. Some authors have reported that physicians evaluated 20% to 30% of the patients with FNP as "cured," whereas these patients experienced minor dyskinesia and did not rate themselves as "cured".[13] There also may be also a mismatch between the points of view of medical professionals and ordinary people when assessing the degree of FNP.

Despite the established impact of FNP on the patients themselves, the perception of the deformities resulting from FNP has been rarely been studied from an observer's point of views. An objective study previously concluded that observers allocated their attention differently when gazing on faces with deformity, compared with those without deformity.[14] Vickery et al. investigated the impact of facial disfigurement on the observers who were the

closest to the patients.[15] They found that the partners of head and neck cancer patients had greater levels of anxiety than did the patients themselves. However, to the best of our knowledge, there is a very limited understanding of how the different allocation of attention affects an ordinary person's perception of a paralyzed face. Because the existence of FNP can have a great impact on the social lives of the patients, the evaluations that are made by physicians should be in good agreement with the perception of members of society.

This study revealed that the overall FNP identification rate was 75.0% and that the identification rate increased as the H-B grade of FNP increased. For further analysis, the rate of identification of FNP according to the increased H-B grade was investigated in each age group. The tendency of an increased rate of FNP identification rate to correlate with an increased H-B grade was identified in each age group, from the people in their 20s to the people in their 60s, with a significant difference ($p < .001$, linear by linear test, for each age group).

The overall detection rate of the sidedness of the FNP was approximately 50%. Ishii et al. reported that the rate of detection of FNP sidedness among patients with H-B grade IV to VI FNP was 83.8% for Caucasians, which suggests that there might be a large cultural difference between two different ethnicities, Caucasians and Asians.[9] FNP is commonly treated with traditional oriental medicine in oriental countries such as Korea and China. In addition, because of the expression used for FNP in oriental medicine, there seems to be a false belief that the lip moves toward the side of the face that is affected

by FNP. This false belief may induce confusion into an ordinary person's judgment of which side of the face exhibits FNP, which might in part explain the significantly low detection rate of the sidedness of FNP in Korea compared to other countries.

Interestingly, the detection rate of the side of the face affected by FNP varied according to age groups. The 20s and 30s groups displayed the detection rates of approximately 70.0%, whereas groups composed of people in their 40s, 50s, and 60s displayed detection rates of approximately 45.0%. The reason for this marked difference in the detection rate of FNP sidedness between the young and the middle-aged/elderly groups remains to be elucidated. Further statistical analysis revealed that one reason was a bias from the education level represented in the two groups. The percentages of those with a high-education level including a university-level education, were 80.6% and 79.4% in the 20s and 30s groups and 59.4%, 42.4%, and 34.3% in the 40s, 50s, and 60s groups, respectively. The false belief for determining the side of the face affected by FNP and the low education level of the members of the middle-aged/elderly group may explain their low detection rate of the side of the face affected by FNP.

Overall, the most awkward-appearing facial area in the patients with FNP was reported to be the mouth followed by the eyes, the cheeks, and the eyebrows. However, the results were somewhat different according to the H-B grade of the FNP. In H-B grade II FNP, in which the eyes are barely affected, the subjects identified the mouth (34 answers), the nose (13 answers), and the cheek (12 answers) as the most awkward-appearing facial areas. The nostril

on the paralyzed side becomes narrower than that on the healthy side due to the paralysis of the muscles that dilate the nostril. The cheek area (the nasolabial fold) becomes less pronounced on the paralyzed side of the face compared to the contralateral healthy side. When those subtle changes in the mouth, the nose and the cheeks are recognized, ordinary people can detect H-B grade II FNP. In FNP cases of more than H-B grade II, the asymmetry in the eyelid and the eyebrow movements becomes prominent; thus, FNP is easily noticed by ordinary people. Interestingly, there was also a difference between the male and female groups in detecting FNP in the different facial areas. Following the mouth, the eyes, and the cheeks, the male group identified the nose, whereas the female group identified the eyebrows as the fourth awkward-appearing facial area.

The most awkward facial expression reported by ordinary people was smiling, followed by closed eyes, whistling, frowning, and resting. This result is in accordance with that of previous study of smiling by FNP patients.[10] Study of impaired affect displayed by FNP patients revealed that normal smiling faces were six times more likely to be classified as positive, whereas smiling paralyzed faces were three times less likely to be placed in that class.[10] The results of this study also demonstrated that the smiles of FNP patients made a negative impression on ordinary people. However, the results for the perception of the other expressions were not in accord with the Burres-Fisch scale in that its scale weight is based on facial muscle movement. Using the Burres-Fisch scale to obtain an average for the degree of FNP, frowning and whistling are each given a weight of 1, resting is given a weight of 2, and

smiling and eye closure are each given a weight of 3.[6] In this study, ordinary people gave the whistling and frowning expressions of the FNP patients more weight than the resting expression. In addition, there may be differences of attention to normal or paralyzed faces among ethnic communities with cultural environments different from each other.

In this study, the subjects' education level influenced their rate of detecting the sidedness of FNP, but not their FNP identification rate. The reason is not clear; however, it is suspected that more logical interpretations might have been applied by the members of the high-education level group than by the members of the low-education group. The authors attempted to divide the education groups differently: the subjects with less than a high school education were placed in the low-education group (n=28), and the subjects who had graduated from high school were placed in the high-education group (n=142). Using this classification, the results also indicated that the high-education group detected the side of the face affected by FNP more accurately than did the low-education group ($p < .001$, Fisher's exact test).

These results on the perception of FNP by ordinary people provide clues for the development of future FNP assessment tools. The sensitivity of an FNP assessment required that subtle changes in the mouth, the nasolabial folds, and the nostrils be detected. There are some limitations in an analysis based on two-dimensional photographs because the protrusions of the cheeks, nose, and lips are somewhat different from the normal in cases of FNP. Sensitive detection of FNP requires analysis of multi-planar photographs or three-dimensional dynamic videos. Some authors have suggested that the

Sunnybrook facial grading system has a more comprehensive and distinctive capacity to score the symmetry of the face at resting than does the H-B grading scale because the former rates the symmetry of voluntary movements and the subtle differences displayed when initiating the movements from rest.[16,17]

Another concern is that the observers may have different levels of inter-observer reliability related to their age group, gender, and education level. Thus, the ultimate method to detect FNP objectively would use a computer program. There have been numerous attempts to measure FNP objectively using programs such as Adobe Photoshop and OKAO Vision®(Omron, Kyoto, Japan).[18-23] These methods may be used as alternatives to the current grading systems or may provide objective tools for measuring FNP in the future.

A study using a chimeric face task with faces composed of a unilateral smiling half-face and contralateral neutral half-faces, which were similar to the unilateral smiling FNP face revealed that the left-side smiling/right-side neutral chimeric faces were judged as "happier" compared to the mirror-image by an intellectually precocious youth group. These findings suggest a high level of right hemisphere involvement during cognitive processing.[24] Moreover, this result suggests that people’s perceptions of faces may have consistent characteristics.

This study had some limitations regarding the methods of study. These limitations include the small number of photographs of the faces of FNP patients that were prepared for evaluation by the subjects and the small number of subjects. This was a small-scale questionnaire study to investigate

the perceptual characteristics of Korean people for unilateral FNP; a larger, well-designed study is needed. This study included a bias due to the ages and genders of the FNP patients depicted in the sample photographs. Another weak point is that the authors excluded synkinetic analysis by using photographs rather than dynamic videos of the patients, which may be an important element of rating FNP.

Despite these limitations, the results of this study may provide new insights into the impact of FNP on interpersonal communication. The results may highlight the existing mismatch between FNP patients and their observers, which can diminish emotional exchanges among them. Thus, physicians should provide comprehensive treatments, including counseling regarding the limitations of communication and their effects. Ideally, the patients and their family members should receive information about the impact of FNP on interpersonal relationships, with the goal of generating awareness of the problem to minimize frustration and misunderstanding between the patients and their family members and friends. Active treatments, such as the correction of facial asymmetry using Botulinum neurotoxin or facial rehabilitation, should be considered for FNP patients to reduce their frustration.[25-27]

Conclusions

The detection rate of the sidedness of FNP by ordinary people was lower than the FNP identification rate and was significantly low in the middle-aged/elderly group and the low education level groups. However, the most awkward-appearing and the second most awkward-appearing facial areas were the mouth and the eyes; these results are compatible with the points of the H-B grading system. These characteristics of ordinary people's perceptions of FNP should be considered for the future establishment of a new FNP grading system.

References

1. Coulson SE, O'Dwyer N J, Adams RD, Croxson GR. Expression of emotion and quality of life after facial nerve paralysis. Otol Neurotol 2004; 25:1014-1019.
2. Ryzenman JM, Pensak ML, Tew JM, Jr. Facial paralysis and surgical rehabilitation: a quality of life analysis in a cohort of 1,595 patients after acoustic neuroma surgery. Otol Neurotol 2005; 26:516-521.
3. House JW, Brackmann DE. Facial nerve grading system. Otolaryngol Head Neck Surg 1985; 93:146-147.
4. Kang TS, Vrabec JT, Giddings N, Terris DJ. Facial nerve grading systems (1985-2002): beyond the House-Brackmann scale. Otol Neurotol 2002; 23:767-771.
5. Murty GE, Diver JP, Kelly PJ, O'Donoghue GM, Bradley PJ. The Nottingham System: objective assessment of facial nerve function in the clinic. Otolaryngol Head Neck Surg 1994; 110:156-161.
6. Burres S, Fisch U. The comparison of facial grading systems. Arch Otolaryngol Head Neck Surg 1986; 112:755-758.
7. Ross BR, Fradet G, Nedzelski JM. Development of a sensitive clinical facial grading system. Eur Arch Otorhinolaryngol 1994:S180-181.
8. Hu WL, Ross B, Nedzelski J. Reliability of the Sunnybrook Facial Grading System by novice users. J Otolaryngol 2001; 30:208-211.

9. Ishii L, Godoy A, Encarnacion CO, Byrne PJ, Boahene KD, Ishii M. Not just another face in the crowd: society's perceptions of facial paralysis. Laryngoscope 2012; 122:533-538.

10. Ishii LE, Godoy A, Encarnacion CO, Byrne PJ, Boahene KD, Ishii M. What faces reveal: impaired affect display in facial paralysis. Laryngoscope 2011; 121:1138-1143.

11. Fu L, Bundy C, Sadiq SA. Psychological distress in people with disfigurement from facial palsy. Eye (Lond) 2011; 25:1322-1326.

12. Bradbury E. Understanding the Problems. Visibly Different: Coping with Disfigurement. Butterworth-Heinemann: Oxford,1997, pp 180–193

13. Ikeda M, Nakazato H, Hiroshige K, Abiko Y, Sugiura M. To what extent do evaluations of facial paralysis by physicians coincide with self-evaluations by patients: comparison of the Yanagihara method, the House-Brackmann method, and self-evaluation by patients. Otol Neurotol 2003; 24:334-338.

14. Ishii L, Carey J, Byrne P, Zee DS, Ishii M. Measuring attentional bias to peripheral facial deformities. Laryngoscope 2009; 119:459-465.

15. Vickery LE, Latchford G, Hewison J, Bellew M, Feber T. The impact of head and neck cancer and facial disfigurement on the quality of life of patients and their partners. Head Neck 2003; 25:289-296.

16. Neely JG, Cherian NG, Dickerson CB, Nedzelski JM. Sunnybrook facial grading system: reliability and criteria for grading. Laryngoscope 2010; 120:1038-1045.

17. Pavese C, Tinelli C, Furini F, et al. Validation of the Italian version of the Sunnybrook Facial Grading System. Neurol Sci 2012 Apr 10; DOI: 10.1007/s10072-012-1025-x

18. Sawai N, Hato N, Hakuba N, Takahashi H, Okada M, Gyo K. Objective assessment of the severity of unilateral facial palsy using OKAO Vision(R) facial image analysis software. Acta Otolaryngol 2012; 132:1013-1017.

19. Kecskes G, Jori J, O'Reilly BF, Viharos L, Rovo L. Clinical assessment of a new computerised objective method of measuring facial palsy. Clin Otolaryngol : official journal of ENT-UK ; official journal of Netherlands Society for Oto-Rhino-Laryngology & Cervico-Facial Surgery 2011; 36:313-319.

20. Neely JG, Joaquin AH, Kohn LA, Cheung JY. Quantitative assessment of the variation within grades of facial paralysis. Laryngoscope 1996; 106:438-442.

21. Pourmomeny AA, Zadmehr H, Hossaini M. Measurement of facial movements with Photoshop software during treatment of facial nerve palsy. Journal of research in medical sciences : the official journal of Isfahan University of Medical Sciences 2011; 16:1313-1318.

22. Sargent EW, Fadhli OA, Cohen RS. Measurement of facial movement with computer software. Arch Otolaryngol Head Neck Surg 1998; 124:313-318.

23. O'Reilly BF, Soraghan JJ, McGrenary S, He S. Objective method of assessing and presenting the House-Brackmann and regional grades

of facial palsy by production of a facogram. Otol Neurotol 2010; 31:486-491.

24. O'Boyle MW, Benbow CP. Enhanced right hemisphere involvement during cognitive processing may relate to intellectual precocity. Neuropsychologia 1990; 28:211-216.

25. Yucel OE, Arturk N. Botulinum toxin-A-induced protective ptosis in the treatment of lagophthalmos associated with facial paralysis. Ophthalmic Plast Reconstr 2012; 28:256-260.

26. Sadiq SA, Khwaja S, Saeed SR. Botulinum toxin to improve lower facial symmetry in facial nerve palsy. Eye (Lond) 2012; 26:1431-1436.

27. Baricich A, Cabrio C, Paggio R, Cisari C, Aluffi P. Peripheral facial nerve palsy: how effective is rehabilitation? Otol Neurotol 2012; 33:1118-1126.

Identification	I think this person has a facial paralysis. (Yes / No)
Side detection	If you say “yes”, the facial paralysis is on his (right / left) side.
Awkward-appearing facial area	Please write all the affected sites that you can see.
Awkward facial expression	Please list the photographs from the most awkward to the least awkward facial expression.

Fig. 1. The sample questionnaire using photographs of a patient with right facial paralysis of House-Brackmann grade V. It consisted of photographs showing five facial expressions, including resting, smiling, whistling, closed eyes, and frowning. The questionnaire items consisted of four questions about the identification of facial paralysis, detection of the paralyzed side, the awkward-appearing facial area, and the awkward facial expression.

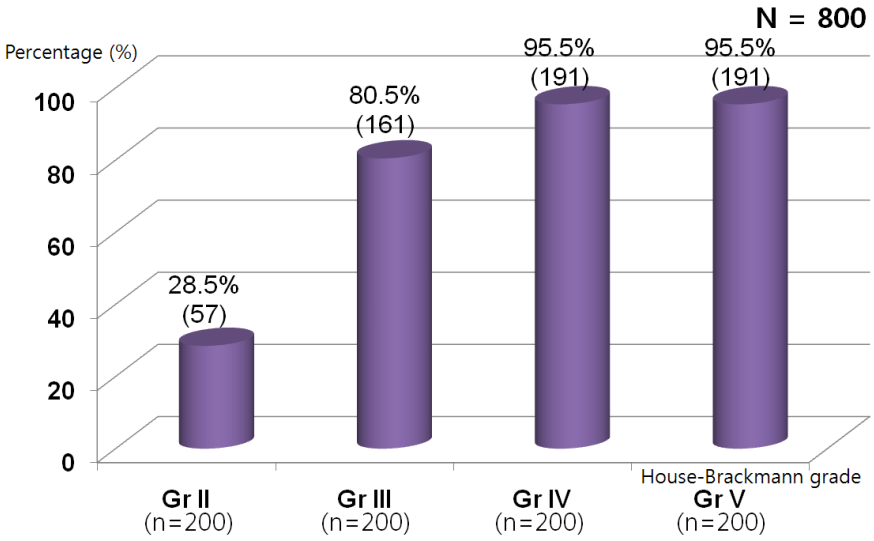


Fig. 2. The rate of identification of facial nerve palsy according to the increase of the patient's House-Brackmann grade. The identification rate increased as the House-Brackmann grade increased ($p < .001$, linear by linear test). Gr: Grade

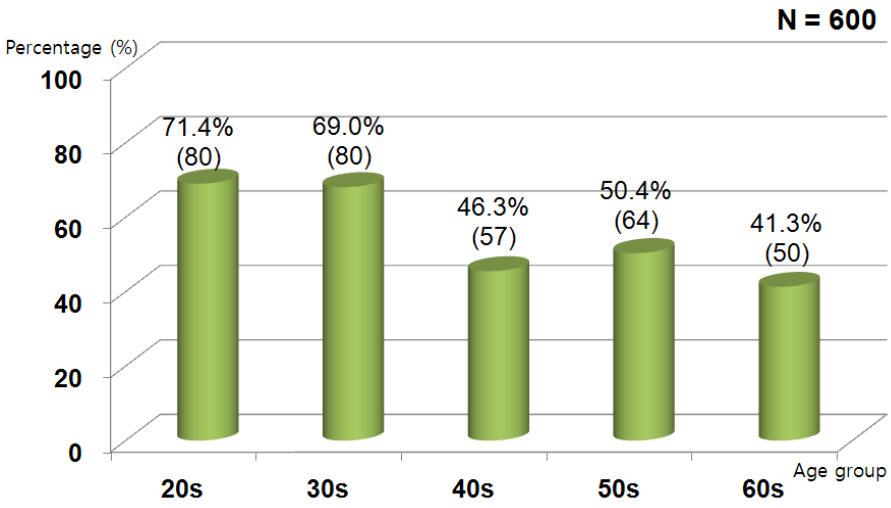


Fig. 3. The detection rate of the side of the face affected by facial nerve palsy according to the increased age of the subjects. The rate of correct side detection decreased significantly with increasing age from 40s age group ($p < .001$, linear by linear test).

20s: twenties, 30s: thirties, 40s: forties, 50s: fifties, 60s: sixties age groups

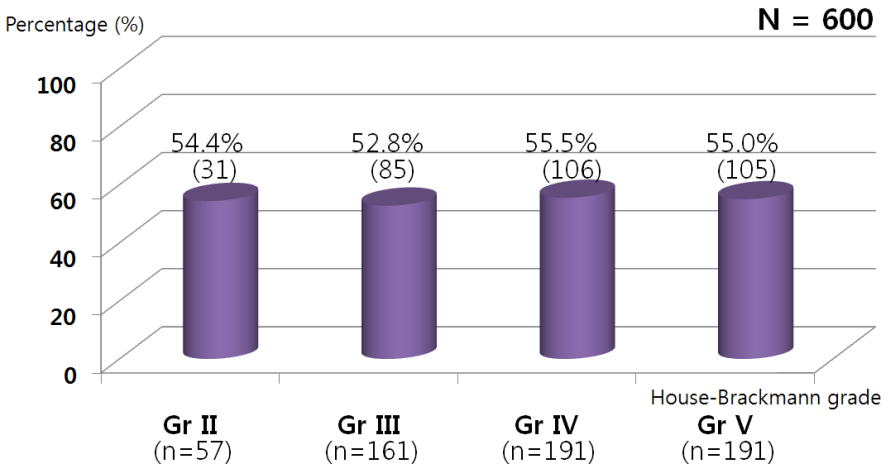


Fig. 4. The detection rate of the side of the face affected by facial nerve palsy according to the increase of the House-Brackmann grade: there was no significant difference in the detection rate of the sidedness of FNP according to the increase of the patient's House-Brackmann grade (p = .556, linear by linear test). Gr: Grade

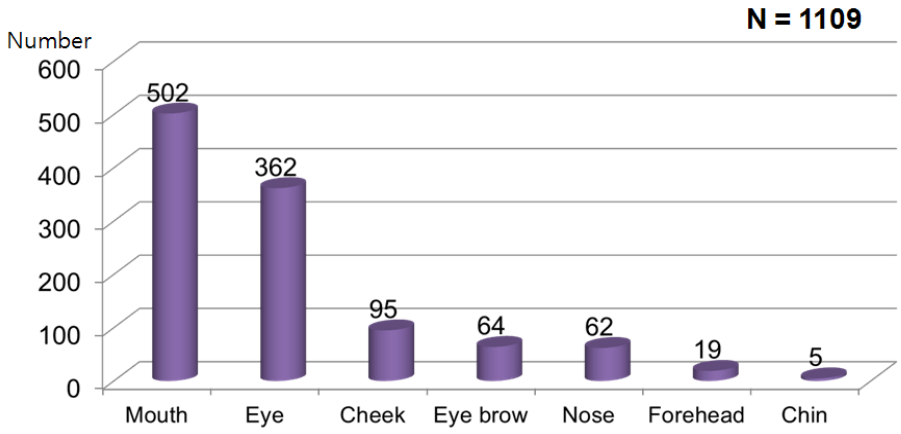


Fig. 5. The most awkward-appearing facial area identified in patients with facial nerve palsy: the most awkward area was the mouth followed by the eyes, the cheeks, the eyebrows, and the nose. (The areas were not mutually exclusive.)

Fig. 6. The most awkward facial expression identified in patients with facial nerve palsy: the smallest number indicates the most awkward facial expression. The most awkward facial expression was smiling, followed by closed eyes, whistling, and frowning.

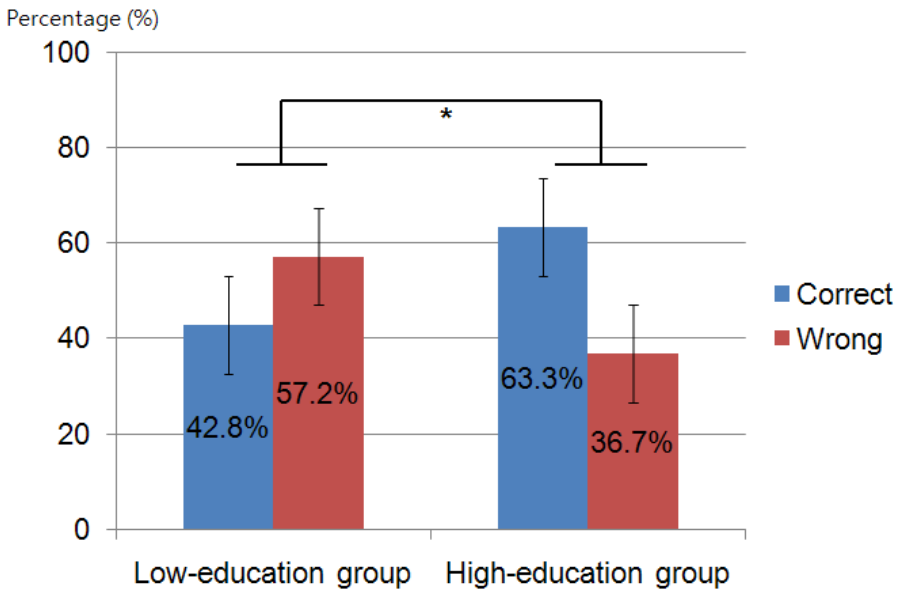


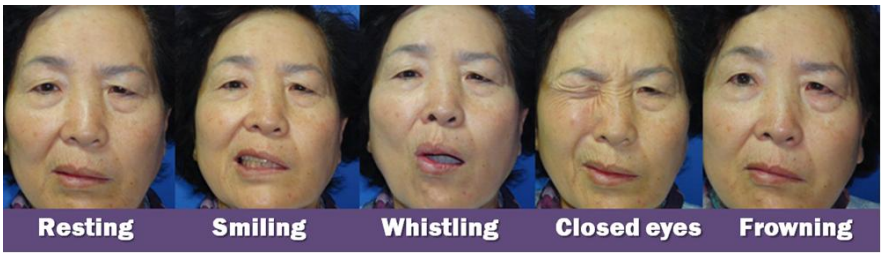
Fig. 7. Differences in the detection rate of the side of the face affected by facial nerve palsy according to the education level: the high-education group exhibited a higher detection rate of the sidedness of the facial nerve palsy compared with the low-education group. (*p < .001, chi-squared test).

Supplement 1. Photographs for the actual questionnaires, FNP: facial nerve palsy, H-B: House-Brackmann

FNP, H-B grade II, right

FNP, H-B grade III, right

FNP, H-B grade IV, left



FNP, H-B grade V, left

Supplement 2. The sample of the questionnaire

The Questionnaire for the Perception of Facial Nerve Palsy

This questionnaire was designed to identify Koreans' common perception for facial nerve palsy.

The results of this questionnaire will be used for academic purposes and all the personal information given here will not be distributed.

The questionnaire is not true/false questions, so fill in all the blanks using your subjective judgment.

(The original copies will be discarded after analysis.)

Please answer the questions typed red.

Thank you for your cooperation.

Code # ( )

Sex: Male ( ) Female ( )

Age: ( )

Final education level:

Sample questionnaire

The photographs were agreed to be used in this study.

Question 1.
I think this person has a facial paralysis. (Yes / No)
if 'yes' for Question 1, continue to answer question 2, 3 and 4.
Question 2.
The facial paralysis is on his (right / left) side.
Question 3.
Please write all the affected sites that you can see. ( )
Question 4.
Please list the photographs from the most awkward to the least awkward facial expression. ( )

국문초록

서론: 안면마비에 대한 인지 특성을 설문으로 평가, 조사하여 현재 사용되고 있는 안면마비 평가법의 적정성을 재고하고자 한다.

대상 및 방법: 본 연구는 2012 년 7 월부터 12 월까지 진행된, 총 200 명의 자발적 참여자를 대상으로 한 설문 연구였다. 설문지는 House-Brackmann (H-B) 2 등급부터 5 등급까지의 일측성 안면마비 환자의 5 가지 표정(가만히 있을 때, 웃는 표정, 휘파람을 부는 표정, 눈을 감은 표정, 이마주름을 잡은 표정) 사진으로 구성되었다. 대상자는 설문지에서 안면마비 유무 및 안면마비가 있는 방향을 선택했고 가장 비대칭적으로 보이는 안면 부위 및 안면 표정 순위를 정하였다. 동의하는 대상자에 있어서는 최종 학력도 조사하였다.

결과: 설문 대상자는 남녀 각 100 명씩으로, 대상 연령은 20 세부터 69 세까지였다. 전반적인 안면마비의 인지율은 75.0%였으며, 성별 및 연령대에 따른 차이는 없었다. 안면마비의 인지율은 H-B 등급이 증가할수록 함께 증가하는 추세를 보였다($p<.001$). 안면마비측 판별율은 54.5%였고 연령대가 증가할수록

감소하는 추세를 보였다(p <.001). 안면 중 가장 비정상적으로 보이는 부위는 입, 눈, 볼, 눈썹, 코의 순서였으며, 안면 표정 중 가장 비대칭적으로 보이는 것은 웃는 표정이었고 눈을 감은 표정, 휘파람을 부는 표정, 이마주름을 잡은 표정 순이었다. 대상자를 학력에 따라 두 군으로 나누었을 때 안면마비 인지율에는 두 군 간의 의미있는 차이가 없었으나, 마비측 판별율은 고학력군에서 더 높았다(p <.001).

결론: 본 연구 결과에서 안면마비 인지율에 비해 마비측 판별율은 낮았고 중장년층 및 교육 수준이 낮은 집단에서 마비측 판별율이 더 낮게 나타났다. 이러한 특성은 향후 새로운 안면마비 등급 체계를 설계할 때 고려되어야 할 필요가 있다.

주요어: 안면신경마비, 인지, House-Brackmann grade

학 번: 2011-21982