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ABSTRACT

The prognosis for facial nerve palsy (FNP) depends on its severity; recovery from mild or moderate palsy tends to occur spontaneously, whereas patients often fail to recover from severe palsy. The quantitative and objective analysis of the degree of FNP would be preferred to monitor functional changes and to plan and evaluate therapeutic interventions in patients with FNP. Currently, many clinicians use the Yanagihara, House-Brackmann, and/or Sunnybrook grading systems to assess FNP. The advantage of these grading systems is their ease of use in clinics without requiring specialized equipment. Although these assessments are performed by experts, inter- and intra-observer disagreements have been demonstrated. The main problem in these subjective evaluations lies in absence of reliable and precise facial function measurements. Numerous two-dimensional (2-D) assessments have been proposed, however, the limitations of 2-D assessment have been reported. The purpose of this study was to introduce a three-dimensional (3-D) image generation system for the analysis of facial nerve palsy (FNP) and to show the correlation between the severity of FNP assessed by this method and two conventional systems.

Five independent facial motions, resting, eyebrow raise, gentle eye closure, full smile with lips open and whistling were recorded with our system and the images were then analyzed using our software. The regional and gross facial symmetry were analyzed. The predicted scores were calculated and compared to the Yanagihara and H-B grading scores. We analyzed 15 normal volunteers and 42 patients with FNP. The results showed that 3-D analysis could measure mouth movement in the anteroposterior direction, whereas two-dimensional analysis could not. The system results showed good correlation with the clinical results from the Yanagihara ($r2 = 0.86$) and House-Brackmann ($r2 = 0.81$) grading scales. This objective method can produce consistent results that align with two conventional systems. Therefore, this method is ideally suited for use in a routine clinical setting.