

Forehead lesion score for facial nerve paralysis evaluation

Wan Syahirah W Samsudin^a, Rosdiyana Samad^a, Mohd Zaki Ahmad^b, Kenneth Sundaraj^c

^a Faculty of Electrical & Electronics Engineering, Universiti Malaysia Pahang, 26060 Pekan, Pahang, Malaysia

^b Department of Otorhinolaryngology, Hospital Tuanku Ampuan Afzan, Jalan Tanah Putih, 25100 Kuantan, Pahang, Malaysia

^c Faculty of Electronics & Computer Engineering Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia

ABSTRACT

Facial nerve paralysis is mostly occurring from a temporary or permanent injury to any of facial nerves which drive the failure of facial nerve function. As a consequence, the facial muscles will not receive the necessary signals from the facial nerves in order to function properly and caused the weakness of facial muscles. This facial paralysis affects both verbal and non-verbal communication which has important function and essential element to the development of an individual. The subjective facial nerve assessment involves the assessment of forehead movement which designates whether the lesion is at the level of the upper motor neuron (has movement on both sides) or the lower motor neuron (no movement on paralysed side). An objective assessment of these lesions will give a great impact in managing the symptoms and limiting the sequelae of the paralysis compared to the subjective assessment. A forehead lesion score was developed in this study to differentiate the two types of lesion of facial paralysis, Upper Motor Neuron (UMN) and Lower Motor Neuron (LMN) lesion. Two potential features were extracted from Gabor filter, Mean Amplitude and Local Energy. The best scale and orientation of these features were chosen after the selection of best threshold value. The accuracy percentage by using the Local Energy feature in classifying the UMN is 100% and LMN lesion is 73%. From the results, a forehead lesion score is developed. As a conclusion, this lesion score has the outstanding ability in specifying the facial lesion types and may become a great aid to clinicians for an efficient facial nerve evaluation.

KEYWORDS

Facial nerve paralysis; Upper motor neuron (UMN); Lower motor neuron (LMN); Bell's palsy; Gabor filter

ACKNOWLEDGEMENT

The research is funded by Fundamental Research Grant Scheme (RDU 160143) and Universiti Malaysia Pahang (UMP). Many thanks goes to the Director General of Health Malaysia as for the permission to publish this paper. The authors also would like to thank the Medical Research and Ethics Committee (MREC) of Malaysia in supporting and giving an approval for the data collection at Hospital Tuanku Ampuan Afzan (HTAA) with a reference number (NMRR- 12-1195-14374).