ABSTRACT

Objectives
1. Compare ENoG values in patients with facial palsy using two different methods, the midline method that records compound muscle action potentials (CMAPs) from the orbicularis oris muscle - the standard muscle for facial ENoG - and five electromyograms that records five CMAPs from five different muscles.
2. To determine whether the ENoG value obtained with the midline method reflects entire facial nerve degeneration.

Methods
Forty patients with facial palsy were enrolled. CMAPs were recorded using the midline method, in which the anode was placed on the mental protuberance and the cathode was placed on the philtrum. Additionally, five electromyograms were recorded by placing the anode on the skin over five facial muscles (frontalis, orbicularis oculi, nasalis, orbicularis oris, and depressor anguli oris muscles). ENoG values recorded using the two methods were compared.

Results
The ENoG values of the five facial muscles did not differ from those obtained using the midline method. The total ENoG value calculated by summing five CMAPs from five facial muscles, which is considered to reflect total facial nerve degeneration, was not significantly different from that using midline methods; moreover, a strong positive correlation coefficient \( r = 0.87 \) was found between them.

Conclusion
The midline ENoG method that records CMAP from the orbicularis oris muscle reflects entire facial nerve degeneration. The ENoG value calculated from the orbicularis oris muscle might be suitable to evaluate the total prognosis of facial palsy.

INTRODUCTION

Estimating the degree of facial nerve damage and evaluating the prognosis of facial nerve paralysis are most important to patients. Procedures that aid in prognostication include facial movement scoring scales, the nerve excitability test (NET), electromyography (ENoG), and stapedial reflex measurements. Among these procedures, ENoG is widely used.

We proposed new electrode positions for measuring compound muscle action potentials (CMAPs) from the facial muscles [1,2], in which the anode is placed on the mental protuberance and the cathode is placed on the philtrum over the orbicularis oris muscle, called the midline method. This method is simple in terms of electrode setting and is not influenced by any resting asymmetry of the face in patients with unilateral facial nerve paralysis. However, whether ENoG using the midline method actually reflects the degree of damage in the entire facial nerve remains controversial.

In the present study, we compared ENoG values in patients with facial nerve paralysis using two different methods, the midline method and five electromyograms, to reveal whether the ENoG value obtained with the midline method reflects total facial nerve degeneration.

PATIENTS AND METHODS

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RESULTS

Table 1: ENoG values obtained using the midline method and from five electroneurogram recordings for each facial muscle.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>ENoG value (% mean ± SE)</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midline method</td>
<td>26.4 (± 3.6)</td>
<td></td>
</tr>
<tr>
<td>5 electroneurogram recordings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frontal muscle</td>
<td>25.3 (± 4.9)</td>
<td>0.48</td>
</tr>
<tr>
<td>Orbicularis oculi</td>
<td>29.8 (± 4.7)</td>
<td>0.75</td>
</tr>
<tr>
<td>Nasalis muscle</td>
<td>35.7 (± 5.0)</td>
<td>0.77</td>
</tr>
<tr>
<td>Orbicularis oris muscle</td>
<td>28.7 (± 4.2)</td>
<td>0.77</td>
</tr>
<tr>
<td>Depressor anguli oris muscle</td>
<td>29.8 (± 3.7)</td>
<td>0.76</td>
</tr>
<tr>
<td>Total from 5 muscles</td>
<td>29.1 (± 3.6)</td>
<td>0.87</td>
</tr>
</tbody>
</table>

DISCUSSION

ENoG values obtained using the midline method did not differ among the five studied facial muscles. Correlation coefficients for ENoG values between the midline method and five electromyogram recordings ranged from 0.48 in the frontal muscle to 0.77 in the nasalis and orbicularis oris muscles. Moreover, ENoG values obtained using the midline method showed strong positive correlations with total ENoG values calculated for the five facial muscles. These results suggest that the ENoG value obtained using the midline method may reflect the degree of the entire facial nerve damage in patients with facial nerve paralysis, and may be considered representative facial nerve ENoG values.

CONCLUSIONS

We recommend the midline method as a superior ENoG technique for prognostic diagnosis in patients with facial nerve paralysis, because the ENoG value appears to reflect total facial nerve degeneration, setting of the electrodes is easy, and a more accurate prognosis can be obtained compared with the standard method.

References