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# Analysis of the Prognosis and the Recovery Process of Profound Facial Nerve Paralysis Secondary to Acoustic Neuroma Resection

## Key Words

Acoustic neuroma  
Facial nerve paralysis  
Facial movement  
Recovery process  
Timing of anastomosis

## Abstract

The prognosis and the recovery process of facial nerve paralysis were reviewed in 74 patients who, despite preservation of nerve continuity, showed no facial movement after acoustic neuroma resection. In 50 or 67.6% of patients, facial movement recovered sufficiently so as not to require any reanimation procedures. However, no apparent sign of remission was observed for 7–49 months in the other 24 patients (32.4%), and hypoglossal-facial nerve anastomosis was performed in 20 of these patients. When remission was seen, the first sign of muscle movement appeared most frequently after 3–4 months but, in a small number of patients, it was also seen within 1.5 months or after 5–10 months. Based upon these results, the timing of reanimation procedures for facial nerve paralysis following acoustic neuroma resection is discussed.

## Introduction

On the basis of his experience with over 500 angle tumours, Hitselberger [1] reported that if profound facial nerve paralysis was seen in the immediate postoperative period, functional return could be expected in over 90% of cases when the surgeon felt that the facial nerve was anatomically intact. A similar result was reported by other authors [2]. Previous studies showed that such recovery can occur after 1 year [3] or even as late as after 2 years [2, 4].

To date, however, few detailed investigations have been carried out concerning the recovery process of postoperative facial nerve paralysis in patients with cerebello-pontine angle tumours. This lack of knowledge has often caused difficulties in determining the timing of surgical intervention since no method can precisely predict the long-term prognosis of profound postoperative facial nerve paralysis.

The present study reviews the prognosis and the recovery process of facial nerve paralysis in acoustic neuroma

patients who showed no facial movement in the immediate postoperative period, despite preservation of nerve continuity during tumour resection.

## Subjects and Methods

Seventy-four patients with acoustic neuromas were included in this study. All patients underwent tumour resection by means of the extended middle cranial fossa approach [5, 6] at the Department of Otolaryngology, Keio University Hospital, more than 6 months before assessment. In most patients, profound facial nerve paralysis was recognised when they recovered fully from the anaesthesia, usually 1–2 days after surgery. In a small number of patients, facial movement deteriorated gradually and the face became totally paralysed within 1–2 weeks.

Based on the patients' clinical records, we reviewed the prognosis and the recovery process of facial nerve paralysis in these patients. Attention was paid mainly to the time when, if at all, the first sign of facial movement appeared. We defined this as the time when facial movement improvement reached 10 points according to the revised grading scale of Yanagihara [7] (fig. 1). In our experience, facial movement of this score was considered to correspond to grades V or

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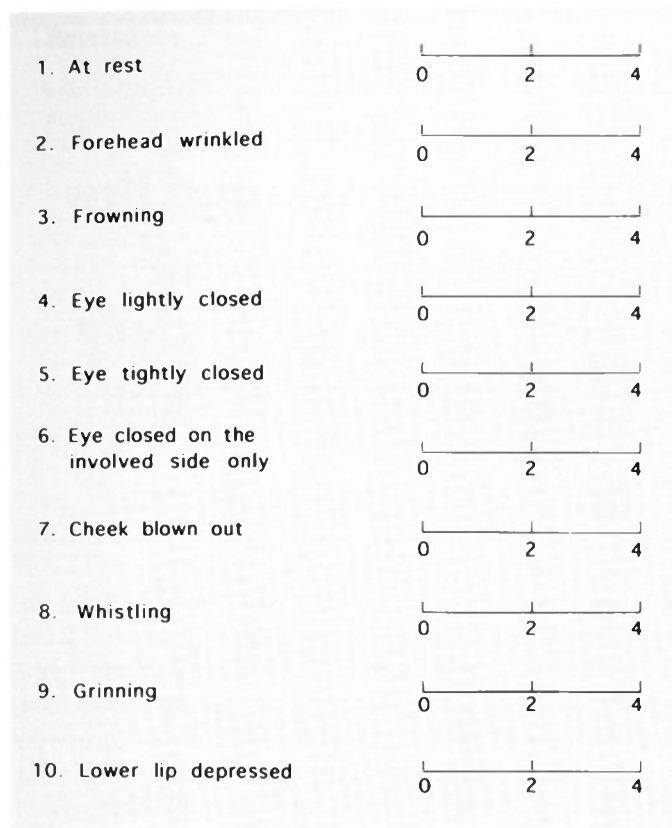


Fig. 1. Revised grading scale of Yanagihara [7].

VI according to the grading system of House and Brackmann [8], although a detailed study has yet to be performed. The effects of age and tumour size on the prognosis were also analysed.

## Results

### Prognosis of Facial Nerve Paralysis

In 50 or 67.6% of patients, facial movement recovered sufficiently so as not to require any reanimation procedures (GR group, table 1). Facial movement of these patients 1 year or more after acoustic neuroma resection was scored 16–32 points (mean, 23.2 points) according to the revised grading scale of Yanagihara [7] (data was available in 28 patients). In our experience [9], their facial movement was assumed to correspond to grade IV or better according to the grading system of House and Brackmann [8].

In the other 24 patients (32.4%), no apparent sign of remission was observed for 7–49 months (mean, 18.4 months, PR group). Therefore, 20 of these patients (27.0%) underwent hypoglossal-facial nerve anastomosis

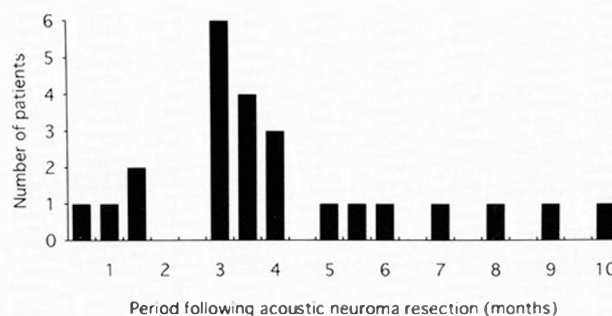


Fig. 2. Time when the first sign of facial movement appeared.

7–33 months after tumour resection (HFA group). This procedure was performed within 1 year in 3 patients, after 1–2 years in 16 patients, and after more than 2 years in 1 patient (mean, 16.5 months). The remaining 4 or 5.4% of patients refused to undergo any further surgical procedures, despite the fact that no sign of recovery had been seen for 15 months or longer (15, 18, 29 and 49 months, RA group).

There was a significant difference in tumour size between the GR group and the PR group ( $p < 0.01$ ). However, no significant difference was seen in age ( $p > 0.05$ ).

### Time of Onset of Remission

Detailed information was available in 24 of the patients of the GR group. As figure 2 shows, the first sign of facial movement appeared within 1.5 months in 4 patients. However, a greater number of patients experienced onset of remission after 3–4 months. Though infrequent, delayed recovery was also observed after 5 months or later and in 1 patient facial movement began to improve as late as after 10 months.

## Discussion

In the present series, when recovery of facial movement occurred, the first sign of muscle movement appeared within 10 months in all patients. This result suggests that recovery of facial movement rarely begins after 1 year or later, though such cases have been reported [2–4]. The possibility that some of the patients of the HFA Group might have had remission if they had not undergone hypoglossal-facial nerve anastomosis is negligible, since the timing of hypoglossal-facial nerve anastomosis in these patients was determined by considering the elec-

**Table 1.** Summary of prognosis

Group	Patients (male:female)	Age at time of tumour resection years (mean)	Tumour size mm (mean)
GR	50 (22:28)	20–66 (47.6)	IC–58 (20.7)
HFA	20 (9:11)	32–63 (47.3)	10–51 (31.1)
PR RA	4 (3:1)	42–65 (54.8)	15–32 (23.5)
Total	74 (34:40)	20–66 (47.9)	IC–58 (24.5)

GP = Good prognosis; PR = poor prognosis; HFA = hypoglossal-facial nerve anastomosis; RA = refusal of anastomosis; IC = intracanal.

trophysiological as well as the anatomical status of the facial nerve at the end of tumour resection.

The difference in the onset of remission (fig. 2) presumably resulted from different underlying pathogeneses. Conduction block with or without associated partial denervation, for example, is considered to be primarily responsible for facial nerve paralysis which showed signs of remission within 1.5 months. On the other hand, facial nerve paralysis whose recovery began after 3 months or later was probably due to axonotmesis with varying degrees of nerve injury. Delayed recovery after 5 months or later might indicate the occurrence of more severe scarring in the intracranial portion of the facial nerve, which hindered maturation as well as regeneration of nerve fibres.

In spite of the indications of some authors [2], the results in the present study suggest that it is not reasonable

to wait as long as 2 years for recovery of facial movement. Even if this delayed recovery were to occur, the long duration of profound facial nerve paralysis would be intolerable to most patients. On the other hand, however, reanimation procedures are not entirely justified within 6 months since the first sign of muscle movement was observed after 7 months or even later in the present series, although this was infrequent, and all of these patients regained serviceable facial movement. The authors who encourage early anastomosis maintain that when hypoglossal-facial nerve anastomosis is performed more than 6 months after tumour resection, recovery of facial movement becomes poorer [10]. However, our previous studies [11, 12] failed to find any difference to justify an additional neural deficit due to sectioning of the hypoglossal nerve. As far as the present study is concerned, it seems to be most reasonable to perform reanimation procedures approximately 1 year after tumour resection if no sign of remission is observed. This delay can be tolerated by most patients.

The fact that tumour size was larger in the PR group than in the GR group probably shows that the facial nerve tends to be more severely attenuated during dissection in larger tumours. Alternatively, it might suggest the existence, though subclinical, of more severe denervation of the facial nerve in larger tumours prior to surgery [13].

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