

〈Case Report〉

A case of facial paralysis with swallowing disorder in the pharyngeal phase

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ABSTRACT Facial nerve paralysis leads to swallowing disorder in the oral and oropharyngeal phases. However, swallowing disorders in the pharyngeal phase have also been reported. We report a case of a male adult patient who was diagnosed with herpetic pharyngolaryngitis and right auricular shingles and prescribed an anti-herpes drug. Fourteen days later, right facial nerve paralysis was observed. He was diagnosed with Hunt syndrome, and steroid pulse therapy was started on the same day. A fluoroscopy swallow study revealed that the hyoid bone was leaning to the right when moving forward (lateral view) and that the shadow of the liquid in the pharyngeal cavity was lower on the right (anteroposterior view). The patient was instructed to perform facial massage and swallowing exercises. Approximately 3 months after the onset of facial nerve paralysis, the inclination of the hyoid bone and the shadow of the liquid in the pharyngeal cavity disappeared, and the facial nerve paralysis was cured. We believe that the elevation of the hyoid bone was impaired on the paralyzed side because of posterior abdominal digastric and stylohyoid muscle paralysis. When evaluating the swallowing function in patients with facial nerve paralysis, both the oral and pharyngeal phases should be evaluated.

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Key words : Facial nerve paralysis, Swallow disorder, Pharyngeal phase

INTRODUCTION

Patients with facial nerve paralysis have problems not in cosmetology but also in swallowing function. Problems in swallowing function is considered to mainly occur in preparatory and oral phase. In 2002, Secil *et al.* reported that the patients with facial nerve paralysis have swallowing disorder in pharyngeal phase because the dysphagia limit of the patients with facial nerve paralysis became

as same as the healthy person when facial nerve paralysis was repaired¹⁾. Since then, there are few reports which focused on swallowing disorder of the patients with facial nerve paralysis in the pharyngeal phase. It has not been clarified yet. We report a case in which the abnormalities in the pharyngeal phase disappeared when the facial nerve paralysis was improved.

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CASE REPORT

The patient was a man in his 60s who has hypertension and dyslipidemia as comorbidities. On October 15, he became aware of sore throat in eating, so visited an otolaryngologist, and was diagnosed with herpetic pharyngolaryngitis and right auricular shingles. He was prescribed an anti-herpes drug. On October 29, right facial nerve paralysis appeared. He was diagnosed with Hunt syndrome at our hospital and steroid pulse therapy was started on the same day. At the same time, he was consulted to our department for purpose of swallowing function evaluation and rehabilitation for facial nerve paralysis. At the first time, he had Yanagihara 40-points system²⁾ 8/40, no sign of curtain, and only lip sound was distorted. He was able to eat a normal food. His score of the modified water swallow test was 5 points³⁾. But his score of the Eating Assessment Tool (EAT-10) was 12/40⁴⁾. Question 3 was one point lower in the right-handed neck rotation than in the left-handed rotation.

Question 3 and 4 was one point higher and one point lower respectively in the left-handed neck rotation (Table 1). On October 30, Fluoroscopy Swallow Study was performed. The hyoid bone lean to right side in the timing of the hyoid bone going forward in lateral view (Fig. 1). The shadow of the liquid in pharyngeal cavity was lower on the right side in the A-P view (Fig. 2). At the time of the examination, facial massage and exercises for swallowing were instructed. At the time of re-examination about 3 months after the onset of facial nerve paralysis, the facial nerve paralysis was cured with a Yanagihara 40-points system 40/40. His score of EAT-10 was 7/40. The inclination of the liquid shadow in the pharyngeal cavity disappeared in A-P view (Fig.2). His score of EAT-10 in both right and left neck rotation was not different from natural position.

DISCUSSION

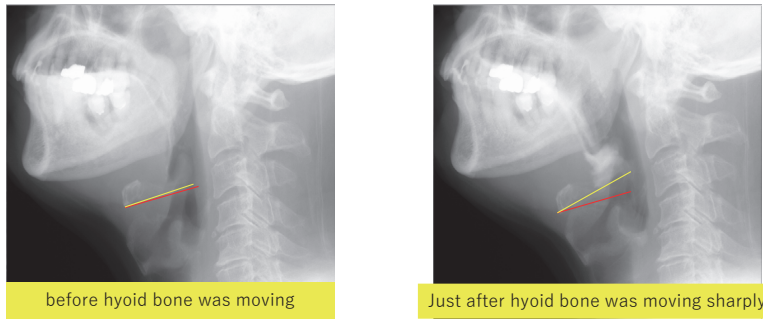
We experienced a case in which the laterality of the pharyngeal cavity improved with the healing

Table 1. EAT-10 score

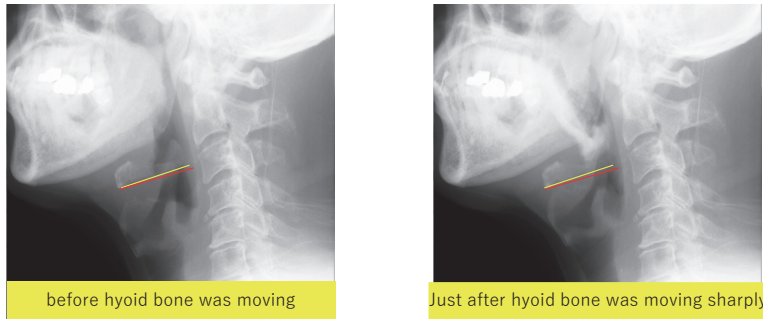
| No. | Questions | Before healing (no rotation) | Before healing (right rotation) | Before healing (left rotation) | After healing (no, right, left rotation) |
|-----|---|---------------------------------|------------------------------------|-----------------------------------|--|
| 1 | My swallowing problem has caused me to lose weight. | 1 | 1 | 1 | 1 |
| 2 | My swallowing problem interferes with my ability to go out for meals. | 1 | 1 | 1 | 0 |
| 3 | Swallowing liquids takes extra effort. | 2 | 1 | 2 | 0 |
| 4 | Swallowing solids takes extra effort. | 2 | 2 | 1 | 1 |
| 5 | Swallowing pills takes extra effort. | 2 | 2 | 2 | 1 |
| 6 | Swallowing is painful. | 1 | 1 | 1 | 1 |
| 7 | The pleasure of eating is affected by my swallowing. | 1 | 1 | 1 | 1 |
| 8 | When I swallow food sticks in my throat. | 1 | 1 | 1 | 1 |
| 9 | I cough when I eat. | 0 | 0 | 0 | 1 |
| 10 | Swallowing is stressful. | 1 | 1 | 1 | 0 |
| | Total score | 12 | 11 | 11 | 7 |

※ 0 = no problem, 1, 2, 3, 4 = severe problem

Before healing of facial nerve paralysis, one point for question3 (Swallowing liquid takes extra effort) in right head rotation position decreased and one point for question4 (Swallowing solids takes extra effort) in left head rotation position decreased. After healing, the same score is in all position.



A. Lateral view of fluoroscopy swallow before healing of facial nerve paralysis



B. Lateral view of fluoroscopy swallow after healing of facial nerve paralysis

※ Red Line: central vertical ridge of body – to – Right greater hone angle
 ※ Yellow Line: central vertical ridge of body – to – Left greater hone angle

Fig. 1. Lateral view of fluoroscopy swallow before and after healing of facial nerve paralysis. A. Red and Yellow line were parallel before the hyoid bone was moving, but not just after the hyoid bone was moving sharply. B. Red and Yellow line were parallel before and just the hyoid bone was moving sharply.

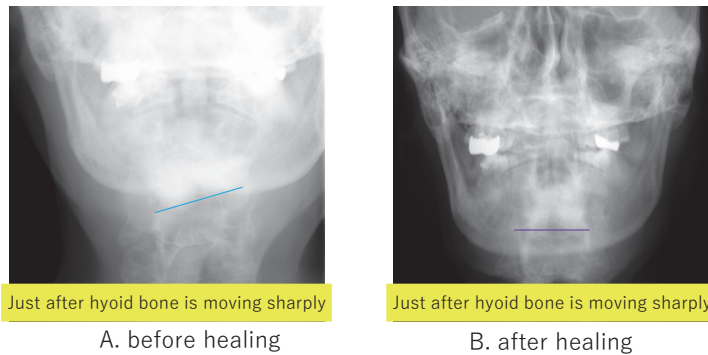


Fig. 2. Anteroposterior view of fluoroscopy swallow before and after healing of facial nerve paralysis. A. The right side of the bolus shadow is lower than the left side. B. The right side of the bolus shadow is at the same level as the left side.

of facial nerve paralysis. Hunt's syndrome is caused by the reactivation of the varicella-zoster virus, which cause shingles in the pinna, ear canal, and oropharynx. Hunt's syndrome also presents

with facial nerve paralysis and 8th cranial nerve symptoms such as dizziness and hearing loss. Although rare, Hunt syndrome presents with cranial neuropathy associated with the pharyngeal stage of

swallowing⁵⁾. In this case, the sign of curtain was not observed and only the lip sound was distorted at the time of facial nerve paralysis, which suggested that there was no glossopharyngeal nerve and vagus nerve disorder associated with the pharyngeal stage. Muscles related to eating and swallowing include facial muscles around the mouth, masticatory muscles, tongue muscles, supraclavicular muscles, sublingual muscles, soft palate muscles, pharyngeal muscles. Almost muscles related to the pharyngeal stage are controlled by the trigeminal nerve, glossopharyngeal nerve, and vagus nerve, while the digastric muscle posterior abdomen and the stylohyoid muscle are controlled by the facial nerve. Orsbon *et al.* reported that the styloglossus muscle is involved in pressure regulation in the oral cavity⁶⁾. Pearson *et al.* reported that the digastric muscle posterior abdomen and the styloglossus muscle are involved in the hyolaryngeal elevation⁷⁾. Because the hyolaryngeal elevation is not performed only by the digastric muscle posterior abdomen and the stylohyoid muscle, it is not clear how change of swallowing when only the digastric muscle posterior abdomen and the stylohyoid muscle are impaired. The inclination of the hyoid bone in the lateral view of fluoroscopy and the liquid shadow in A-P views before the facial nerve paralysis improved disappeared after the healing of facial nerve paralysis. And so, it is considered that the elevation of the hyoid bone was impaired on the paralyzed side due to the paralysis of the digastric muscle posterior abdomen and the stylohyoid muscle (Fig. 1, 2). In other words, it may be that the image of fluoroscopy swallow before the improvement of facial nerve paralysis in this case presented a swallowing movement in the pharyngeal phase in which the digastric muscle posterior abdomen and the stylohyoid muscle were impaired.

Head rotation swallow is a procedure that is expected to reduce pharyngeal residue and prevent aspiration by swallowing by rotating the neck to the

side with poor pharyngeal function (affected side)⁸⁾. In this case, the feeling of difficulty in swallowing solids was weakened in the left rotation position. In this case, the functions of the digastric muscle posterior abdomen and the stylohyoid muscle on right side were impaired, so it was predicted that swallowing disorder would be improved by performing right side rotation. However, when he ate the solid food, the left side rotation improved the feeling of swallow. In healthy subjects, the movement of the hyoid bone anteriorly and superiorly causes a sharp decrease in the volume of the pharyngeal cavity. Since the digastric muscle posterior abdomen and stylohyoid muscle act on this hyoid bone movement⁹⁾, the volume reduction of the pharyngeal cavity is insufficient on the right side, and so solid matter may move easier because of reduction of resistant.

Little is known about the pharyngeal phase disorder associated with facial nerve paralysis. Secil *et al.* reported that the existence of pharyngeal phase disorder with facial nerve paralysis¹⁾. In this report, the dysphagia limit of patients with facial nerve paralysis became the same as that of healthy persons when the facial nerve paralysis was impaired. And in this report, this result was related to the impairment of muscles around mouth fissure and dysgeusia associated with facial nerve. However, no mention was made of the impairment of muscles associated with the pharyngeal phase of swallow. De sort *et al.* reported that eating and drinking problems in patients with unilateral peripheral facial nerve paralysis was related to the number of compensatory actions, such as using hand to close the paralyzed lips, repositioning the head, and so on, but not to the Sunnybrook Facial Grading System. And so the eating and drinking problems with unilateral peripheral facial nerve paralysis was mainly related to the oral phase of swallowing¹⁰⁾. In this case, it was suggested that the effect of facial nerve paralysis on swallowing was not only the

disorder of perioral muscle but also the pharyngeal phase through the disorder of the digastric muscle posterior abdomen and the stylohyoid muscle.

In the future, when evaluating the swallowing function of facial nerve paralysis, it will be necessary to evaluate not only the oral phase preparation to oral phase but also the pharyngeal phase. It is also interesting that when these two muscles were impaired, the feeling of swallowing of head rotation was different from expectation. These two muscles controlled by facial nerve may be associated with the feeling of extra effort in swallowing. And the mechanism of effect on the feeling of extra effort in swallowing may be different between liquid and solid because feeling of extra effort in head rotation swallowing was different between liquid and solid. This is next question.

CONCLUSIONS

In this study, we experienced a case in which a disorder of pharyngeal phase was observed in patient with facial nerve paralysis. In the future, when evaluating the swallowing function of the patient with facial nerve paralysis, it is necessary to evaluate not only preparatory and oral phase, but also pharyngeal phase. It was suggested that the digastric muscle posterior abdomen and the stylohyoid muscle may be involved in feeling of extra effort in swallowing.

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