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Case Report

Effect of palatal augmentation prosthesis on pharyngeal manometric pressure in a patient with functional dysphagia: A case report

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ABSTRACT

Patients: A 53-year-old institutionalized male patient with a history of postoperative bilateral hypoglossal nerve injury was admitted for treatment of dysphagia. He experienced dysphagia involving oral cavity-to-pharynx bolus transportation because of restricted tongue movement and was treated with a palatal augmentation prosthesis (PAP), which resulted in improved bolus transportation, pharyngeal swallowing pressure, and clearance of oral and pharyngeal residue. The mean pharyngeal swallowing pressure at tongue base with the PAP (145.5 ± 7.5 mmHg) was significantly greater than that observed immediately after removal of the PAP (118.3 ± 10.1 mmHg; $p < 0.05$; independent t-test). Dysphagia rehabilitation with the PAP was continued. Approximately 1 month after PAP application, the patient could orally consume three meals, with the exception of foods particularly difficult to swallow.

Discussion: The supporting contact between the tongue and palate enabled by the PAP resulted in improvement of bolus transportation, which is the most important effect of a PAP. The increase in pharyngeal swallowing pressure at the tongue base because of PAP-enabled tongue-palate contact might play an important role in this improvement. Since a PAP augments the volume of the palate, it enables easy contact between the tongue and palate, resulting in the formation of an anchor point for tongue movement during swallowing. Thus, application of a PAP increases the tongue force, especially that of the basal tongue.

Conclusion: A palatal augmentation prosthesis helps improve pharyngeal swallowing pressure at the basal tongue region and might contribute to the decrease of oral as well as pharyngeal residue.

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1. Introduction

A palatal augmentation prosthesis (PAP) is an intraoral prosthesis used for the treatment of dysphagia and dysarthria by enabling contact between the tongue and palate. In patients with dysphagia, application of a PAP generally results in the improvement of bolus transportation from the oral cavity to the pharynx. Cantor et al. were the first to report on the application of a PAP in patients with oral cancer and dysphagia [1]. Although palatal augmentation with a PAP has been mainly used in patients with oral cancer [2-4], it has been widely applied in recent years to address the functional problems of dysphagia caused by conditions such as cerebrovascular and neurodegenerative diseases [5-7], and its efficacy in a few cases has also been reported.

We encountered a patient with dysphagia with postoperative bilateral hypoglossal nerve palsy, which was improved by the application of a PAP. There are no reports in literature regarding the comparison of pharyngeal swallowing pressure with and without PAPs in patients with dysphagia. In this study, we have evaluated the effect of a PAP on pharyngeal pressure at the tongue base, bolus transportation, and pharyngeal residue.

2. Outline of the case

A 53-year-old institutionalized male patient with a history of postoperative bilateral hypoglossal nerve injury was admitted to our rehabilitation ward for the treatment of dysphagia. He exhibited unimpaired consciousness, and all of his teeth, except for two mandibular left molars, were retained. Lip and soft-palate movements were normal. The patient exhibited decreased facial sensation, and there were no anatomical abnormalities apart from tongue atrophy. His injury had been caused during surgery for medullary hemangioblastoma. The patient had been admitted for rehabilitation of dysphagia a month after surgery. He experienced dysphagia involving bolus transportation from the oral cavity to the pharynx because of restricted tongue movement. Issues related to the tongue included non-contact with the palate and limited range of motion during swallowing.

At the time of admission, the patient could not eat orally, and his main method of food intake was nasogastric tube feeding (Food intake LEVEL scale [FILS] score, 1) [8]. Initial rehabilitation of dysphagia was performed by balloon dilatation and training for eating jelly orally, after the first videofluoroscopic swallowing examination (VF). The third VF at 8 months post-surgery revealed oral and pharyngeal residue and inadequate bolus transportation to be the main complications of dysphagia (Figs. 1 and 2). Although there appears to be laterality of tongue movement in Fig. 1, the same was not observed clinically. During swallowing, the patient, of his own volition, tucked his chin to aid bolus transportation and decrease the amount of pharyngeal residue. However, VF findings revealed this maneuver to be ineffective. Therefore, in order to improve bolus transportation and clearance of oral and pharyngeal residue, we decided to employ a PAP. At this



Fig. 1 – Oral residue (spinach puree).



Fig. 2 – Pharyngeal residue visualized upon videofluoroscopic swallowing examination.

time, the status of oral intake of the patient was nil, and swallowing training with a small quantity of food was administered (FILS score, 3). The PAP was applied on the day after the third VF.

The PAP was fabricated using tissue conditioning material (Tissue Conditioner II; SHOFU Corp., Kyoto, Japan). An acrylic resin plate was placed on the palatal side of the maxilla, following which the tissue conditioning material was added in the palatal region. Then, the patient was instructed to perform dry swallow to the maximum extent possible in order to obtain a functional impression of the tongue during swallowing (Fig. 3).

The findings of VF after 2 weeks of PAP application revealed an improvement in bolus transportation and decrease in not

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