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# CASE PRESENTATION: DENTAL TREATMENT WITH PAP FOR ALS PATIENT

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## **ABSTRACT**

The aim of this study was to evaluate the effect of Palatal Augmentation Prosthesis (PAP) for an Amyotrophic Lateral Sclerosis (ALS) patient. The patient's palatogram was taken during swallowing to assess her lingual function. A PAP was provided to assist her with feeding and swallowing functions. The patient's lingual pressure strength showed increases, and she was able to feed well using PAP. This device was useful for assisting lingual dysfunctions due to various diseases.

**Key Words:** Orofacial Myofunctional Disorders, Amyotrophic Lateral Sclerosis, Palatal Augmentation Prosthesis, Lingual Function

## **INTRODUCTION**

Palatal Augmentation Prosthesis (PAP) is a device used for oral cancer patients (Wheeler, Logeman, Rosen, 1980; Logemann, Kahrias, Hurstm Davis, Krugler 1989) and stroke patients (Ono T, Hamamura, Honda, Nokubi, 2005) with tongue dysfunctions. The aim of this study is to evaluate the effect of PAP for an Amyotrophic Lateral Sclerosis patient.

The tongue plays an important role in oral functions. The tongue moves toward the palate while changing its shape during mastication or swallowing. This function will be disturbed when the tongue can not reach the palate due to atrophy or glossectomy. Consequently, PAP works to support the tongue in touching the palate and recovering lingual function by placing a plate on the palate.

### **Mechanism of PAP**

An increased oral cavity due to alteration of relative oral capacity caused by atrophy or removal of the tongue disturbs the contact of tongue to the palate during the preparatory, oral and pharyngeal stages. Thus, dental treatment with PAP is a prosthetic approach for supporting feeding/swallowing functions. Inadequate tongue contact with the palate may provoke backward movement of tongue base due to declined lingual function, which tends to prevent the tongue movement

toward the palate. The purpose of PAP is also to reinforce these functions. This is an aspect of a functional approach for improving swallowing.

However, the previous studies reported not only PAP for tongue glossectomy cases but also for feeding functions of ALS patients. In addition, there was a paper about PAP for dysarthria (Esposito 2000). Thus, we have been trying to use PAP for ALS patients and evaluate the effectiveness.

### **Clinical Case: Amyotrophic Lateral Sclerosis patient**

ALS, first described in 1869, is a progressive neurodegenerative disease that attacks nerve cells in the brain and spinal cord resulting in muscle weakness and atrophy. [There were reports which showed severe situation according to their life] (Sejvar, Holman, Bresee, Kochanek, 2005; Van den Berg JP, Katmilin, Linderman, Veldink, deVisser, Van der Graff, Van de Berg, LH, 2005). At the onset of ALS, the symptoms may be quite slight and overlooked frequently. The appearance of symptoms and the progression of the illness, the course of the disease are seen as follows: 1) muscle weakness in one or more of the following: hands, arms, legs or the muscles of breathing, swallowing or speech, and fasciculation, 2) cramping of muscles in the

hands and feet, 3) disability of the arms and legs, 4) difficulty in projecting the voice, 5) shortness of breath, difficulty in breathing and swallowing coordination.

### **Case Profile**

This case is a 48-year-old female. Her major diagnosis was ALS with severe dysphagia dysfunction. The chief complaint was difficulty with the transport of the food bolus to the pharynx and inability to swallow. Oral conditions were dentate and tongue atrophy.

### **Palatogram on the PAP**

A palatal plate as the base was fabricated (Figure 1). The patient's palatogram was taken during a dry swallow. Then we could observe whether or not the tongue touched the palate.



**Figure 1. Taking a palatogram**

At first, the patient touched her tongue toward the central part of plate during swallowing inadequately. Therefore we continued to reshape the base plate with dental wax until her tongue contacted the palate in a stable manner.

### **Fitting the PAP**

The PAP was set in the palatal area (Figure 2). The thickness of the palatal plate of the PAP was increased to secure adequate contact of the tongue. Initially the patient complained that the apparatus was quite uncomfortable. However she adjusted to it rapidly with every day use in about one month. After this adjustment period her eating speed increased tremendously.



**Figure 2. Fit the PAP**

### **ASSESSMENT OF FOOD TEST - WITHOUT THE PAP**

The effect of PAP was assessed by the Food Test. The Food Test was described by Ishida and Mukai (2002) as: first, the patient chews 4-grams of test food similar to oatmeal; next, the patient swallows it once; and then the patient opens the mouth to evaluate the amount of food residue on the tongue.



**Figure 3. Food residue without PAP**

In this case without PAP, there was food residue on the patient's tongue surface (Figure 3). This suggested that she could not push her tongue toward the palate adequately to clear the oral cavity.

## **ASSESSMENT OF FOOD TEST - WITH THE PAP**

The efficacy of this apparatus is shown in Figure 4. Food residue decreased tremendously after she received the PAP.



**Figure 4. No food residue with PAP**

### ***Effect of the PAP -Maximum lingual pressure***

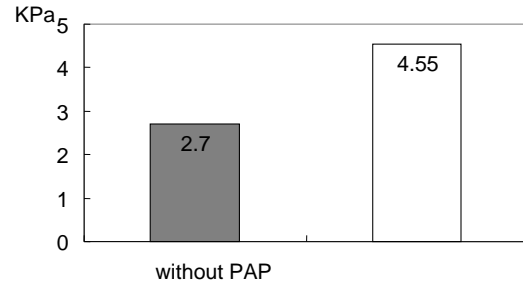
Lingual pressure pushing toward the palate was measured using a pressure sensor. The Handy manometer (ALNIC Co., JAPAN) (Hayashi, Tsuga, Hosokawa, Yoshida, Sato, Akagawa, 2002) was used for measurements of maximum lingual pressure. The lingual pressure against the bubble shaped sensors in contact with the hard palate was evaluated. Measurement was taken five times. The mean values and standard deviations were obtained by averaging the values for five measurements.

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**Figure 5. Effect of PAP for lingual pressure**

According to this result, the lingual pressure with the PAP showed an increase compared to that without the PAP (Figure 5). It is proposed that this was the result of an improvement in lingual function because the tongue could work better during swallowing. In fact, the patient realized that her feeding function improved as there was less food residue after swallowing with this apparatus and she could also eat faster using this device.

## **CONCLUSION**

PAP was useful and effective for an ALS patient who experienced deterioration of lingual function. The authors believe that dentists should contribute their knowledge and techniques to patients experiencing ALS.

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