

RECONSTRUCTION OF THE SOFT PALATE IN ORAL CANCER TO REPAIR AN OPERATIVE DEFECT WITH SPEECH AID PROSTHESIS: A CASE REPORT

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A soft palate defect may result from surgical resection, and its consequences could include hypernasal speech and nasal regurgitation of food and liquids. A speech aid prosthesis fabricated for patients can improve nasal emission during speech, and assist in preventing nasal regurgitation of food. This article presents a case of the reconstruction of a soft palate defect by prosthetic obturation.

Key Words: nasal endoscopy, removable partial denture, soft palate defect,
speech aid prosthesis

(*Kaohsiung J Med Sci* 2007;23:536–40)

Oral cancer is one of the top 10 terminal cancers in Taiwan. The main treatment method is surgery, chemotherapy, radiotherapy or a combination of these techniques. Surgical removal of oral cancers in the soft palate induces phonetic problems due to velopharyngeal insufficiency with obvious hypernasality. Because of oronasal communication, food and liquid regurgitated into the nasal cavity results in swallowing impairment and discomfort of the nasal mucous membrane [1]. Such soft palate defects have been reconstructed by the transplantation of soft tissue, but the surgical defects can cause wounds that are hard to observe, and which may impair restoration of functions. Nowadays, an alternative method is for patients to have obturator or speech aid prosthesis. The purpose of the obturator is to reconstruct postoperative dysfunction of velopharyngeal insufficiency, thereby

improving patients' abilities in speaking and deglutition. This article mainly reports on the treatment experience and procedures for such patients using an obturator for reconstruction therapy.

CASE PRESENTATION

Our patient was a 66-year-old man who was diagnosed in 1998 with verrucous hyperplasia on his tongue. The lesion was surgically removed and the patient had regular follow-ups. In 2003, oral cancer was found in the soft palate, and he underwent radical resection followed by chemotherapy. A review of the patient's history showed that he was prescribed medication for hypertension, and the patient denied having any other systemic diseases. Regarding his dental history, the patient had only received general dentistry treatment, such as full-mouth scaling, filling of cavities, root canal, and tooth extraction, but he had never worn removable partial dentures. The patient had smoked and chewed areca (betel nut) quid for about a 10-year period. Oral examination revealed

Received: June 14, 2006

Accepted: February 16, 2007

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that the patient's maximum mouth opening was 23 mm (Figure 1), bilateral buccal cavities had submucous fibrosis, a soft palate defect was present, and there was chronic gingivitis (Figure 2). After these examinations, he was diagnosed with oral cancer caused postoperatively by soft palate damage. The defective area ranged from the anterior to the posterior: from the hard palate of the second premolar to the uvula, and the last partial alveolar ridge of molars on both sides. In addition, oral submucosus fibrosis, periodontitis, Class V of Aramany's classification [2] and partial edentulism were recorded. The treatment plan was: (1) full mouth scaling; (2) fitting of a removable partial denture and denture framework to extend back in combination with the production of a speech aid prosthesis; and (3) after the installation of the denture, to use fluoride gel to protect the remaining natural teeth and thereafter, to receive regular follow-up treatment.

During the treatment procedures, an alginate impression was made. Surveying and design of the



Figure 1. Oral examination revealed that the patient's maximum mouth opening was 23 mm.

removable partial denture was made following routine procedures. We used an individual tray to conduct precise molding with additional silicon impression material (Take-1; Kerr Manufacturing Co., Romulus, MI, USA), and we designed a partial removable denture framework based on the model and cast it (Figure 3). A working model was used to conduct a try-in of the removable partial denture framework in the mouth, to verify fit and stability. The casting was added to the metal framework in the soft palate as a foundation, using modeling compound (Modeling Compound; GC, Japan) with a high melting point. Then, a functional compound (Iso Compound; GC, Japan) with a low melting point and better fluidity was applied to the foundation. The patient was asked to repeat the motions of swallowing, speaking and moving his head to the left and right, so that wax filled the entire damaged area (Figure 4). Finally, flasking and packing were conducted and the obturator was completed (Figure 5) by spreading the pressure detector on the obturator tissue surface, and by placing it into the afflicted area. The areas pushed apart by the pressure detector were polished, so that the surfaces could be contacted evenly.

DISCUSSION

Because of oral submucous fibrosis, the patient could only open his mouth 23 mm wide, and it was very difficult to simultaneously impress the hard and soft tissue in the mouth with a stock tray. Thus, individual trays were fabricated to extend to the defective soft palate area, in order to take an impression of the afflicted areas with additional silicon impression

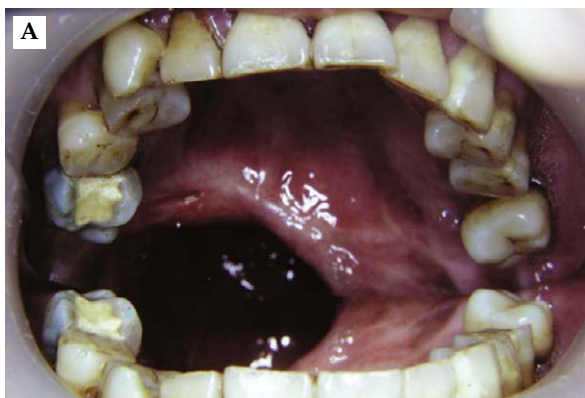


Figure 2. Preoperative intraoral occlusal view; the defect area extended from the hard palate to the uvula.



Figure 3. Occlusal view of the removable partial denture framework on the master cast.



Figure 5. Definitive removable partial denture.



Figure 4. Intraoral occlusal view during border modeling in the maxilla.

material, and to pour a working model from which to make the removable partial denture framework. The range and size of the obturator depended on the remaining velopharyngeal muscle after surgery. The patient's oral submucous fibrosis caused an inflexible oral mucosa. If the obturator was completed by directly combining the removable partial denture framework with resin on the afflicted area on the working model, the suitability of the afflicted area would be inconsistent with the mouth and the model.

For this patient, the removable partial denture framework was stabilized using wax with different melting points and different fluidity; these were especially extended to the damaged areas to conduct molding for the edges. Because the mucous membrane lacks flexibility, and since the afflicted area was in the deepest part of the mouth, the dentist could not use this area for denture support. Therefore, it was essential

that the patient conducted the movements of swallowing, speaking, and moving the head so that the remaining velopharynx could be shaped consistently with the afflicted area. The methods used to record the afflicted area were: use of thermoplastic wax [3], tissue condition, resin [4,5] or a combination of these. In this case, thermoplastic wax was selected because it can undergo readjustments; if there was too much wax, it could be pushed away. It was unnecessary to remove the whole afflicted area to make an impression; it was possible to simply repair the areas that had too much or too little wax. A functional compound with a low melting point and high fluidity gives enough operating time so that the patient can swallow, speak and move his head multiple times. The hardening times for the tissue condition and resin are fixed; there is insufficient time for the patient to complete the shaping of the edges; furthermore, these cannot be repeatedly used, nor can they be directly added to the original material. Wax with different melting points was used in this case, with the hardness of the modeling compound acting as a foundation. With the range of damaged area established for the compound, the small parts were constructed with functional compound. The advantage of this method is that less wax flowed into the throat; however, insufficient wax was left on the sides that needed to be filled, which may have caused discomfort to the patient and the action had to be repeated several times.

As shown on lateral cephalometric radiographs (Figure 6), the soft palate and uvula were replaced by a speech aid prosthesis. Observation over a long period of time showed that there was an improvement

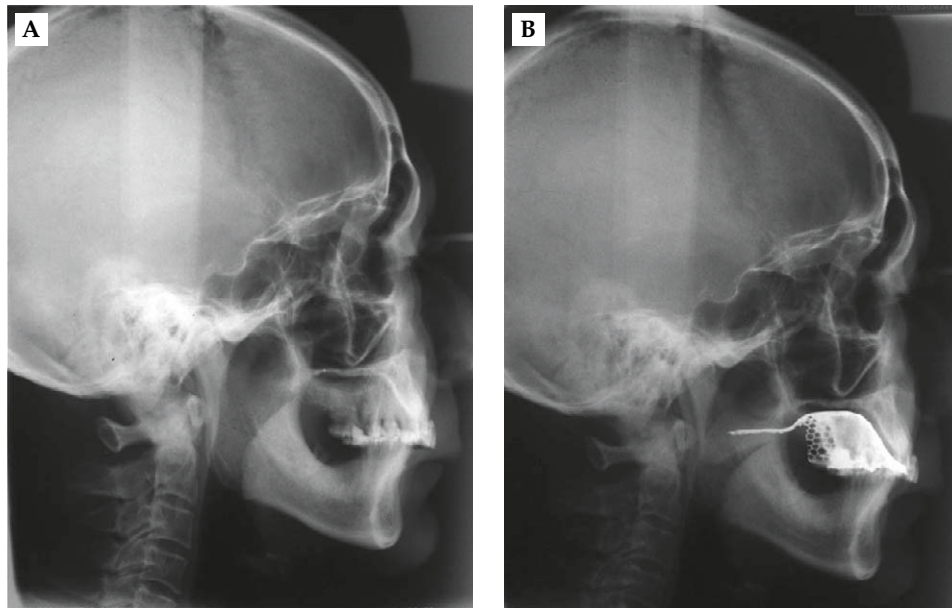


Figure 6. Lateral cephalometric image of the palatal defect: (A) without speech aid prosthesis; (B) with speech aid prosthesis.

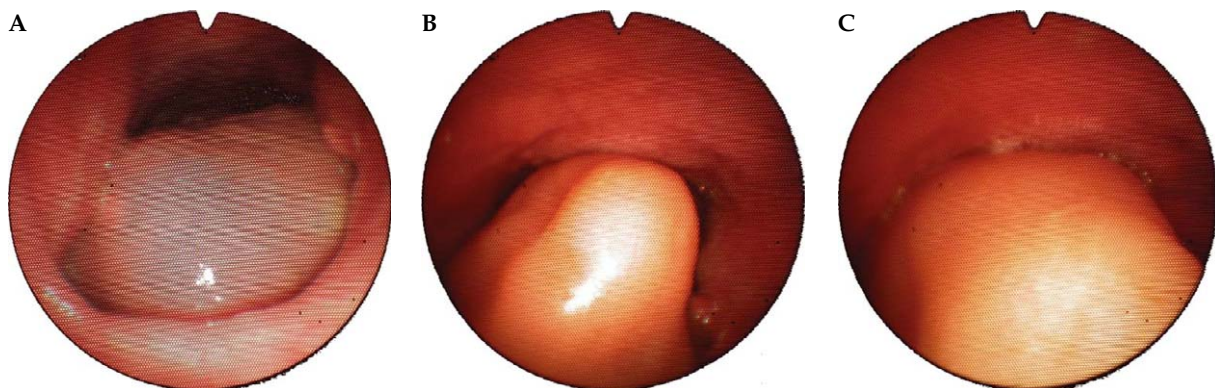


Figure 7. Nasal endoscopic view without and with speech aid prosthesis. (A) The defect area included the soft palate, hard palate and uvula. (B) Velopharyngeal mechanism at rest with prosthesis. Note the space between the prosthesis and lateral pharyngeal walls. (C) Space closure when swallowing with prosthesis.

in the patient's ability to drink, and we found that his speech had progressed. Nasal endoscope (Figure 7) analysis confirmed an apparent improvement in swallowing and phonetic function. The fiber optic cold light source provided sufficient illumination for direct viewing and video recording during speech and swallowing.

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軟顎口腔癌切除術後之缺損以語言贗復體修復之病例報告

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軟顎切除會造成口腔與鼻腔相通導致患者發音時有嚴重的鼻音，且進食會由鼻腔溢流，造成言語及飲食有明顯障礙。此狀況可以製作語言贗復體以改善患者發音與飲食上之不便。本報告則是提出口腔癌術後軟顎缺損以閉塞器進行贗復之病例報告。

關鍵詞：鼻鏡，局部活動義齒，軟顎缺損，語言贗復體

(高雄醫誌 2007;23:536-40)

收文日期：95 年 6 月 14 日

接受刊載：96 年 2 月 16 日

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