

# Phonetic Improvement with an Obturator of the Acquired Defect in a Case of Palatal Mucoepidermoid Carcinoma: A Case Report

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## ABSTRACT

**Introduction:** Following surgical resection of palatal mucoepidermoid carcinoma (MEC), the resulting defect is best corrected with surgical reconstruction and rehabilitation. However, the patient's clinical course with ill-defined recurrence resulted in the fabrication of cobalt chromium obturator prosthesis as the best treatment option for reliable restoration. **Case description:** A 48 years old Chinese man was referred for construction of an obturator prosthesis after one year following a wide excision surgery for low grade mucoepidermoid carcinoma of the hard palate. Leaving him with a maxillary defect of Okay Class 1a classification with oronasal communication. He complained of difficulty in speaking, inability to properly chew food and fluid leakage into his nose due to looseness of the previous surgical obturator. An obturator with a cobalt chromium framework was fabricated and silicone material for direct relining is used to provide cushioning and path of insertion to the obturator. **Discussion:** The defect created post surgically had caused several problems such as deglutition and feeding difficulties and changing of the sounds of speech. Such a properly designed obturator prosthesis obtained its retention, support and stability from remaining teeth. Not only it distributed force equally to the remaining teeth and provided cover to the soft tissue defect and the created border between the oral and nasal cavity helping in the improvement of the patient's sound of speech. The silicone substitution part provided a non-traumatic

*distribution of the pressure on tight insertion at areas of the defect and becomes successful in improving patients' speech during monitoring periods with a delay rehabilitation.*

**Keywords:** *Mucoepidermoid tumour; Obturator; Sound of speech*

**Key Messages:** *Uncertainty of the recurrent incidence of mucoepidermoid tumour will resulting in rehabilitation of acquired defect with the obturator. This alternative treatment to the defect is beneficial in improvement of speech during monitoring periods.*

## INTRODUCTION

Mucoepidermoid carcinoma is an epithelial salivary gland neoplasm of which two-third arise within the parotid glands and remaining from minor salivary glands. When it is in minor salivary glands, most frequently it can occur in the palate. Tumor grade, neural invasion, lymph node metastasis, the extension of soft tissue, and microscopic residual disease are factors that have shown a correlation and prognostic indicators for recurrence rates and survival (Bharathi et al., 2014; Gill et al., 2018; Said et al., 2017; Ritwik et al., 2012). For a patient with adenocarcinoma and epidermoid carcinoma, regular inspection of the surgical defects for 3 to 5 years is required before surgical reconstruction is considered (Ritwik et al., 2012). The treatment of oral cavity tumors usually involves a combination of ablative surgery, radiotherapy, and chemotherapy (Beumer et al., 2011).

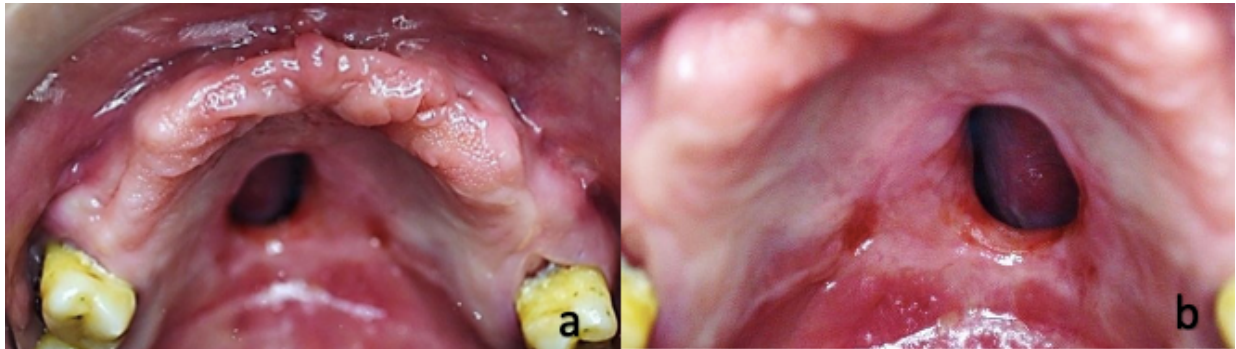
Surgical resection of benign or malignant neoplasms of the maxilla results in a defect that may lead to physical and psychological impairments (Beumer et al., 2011; Said et al., 2017). With the loss of palatal tissue, correct tongue palate contacts are impossible. The defect size and location have a significant impact on the restoration of speech. It can create an imbalance in oronasal resonance and distortion due to oral emission being unconfined within the oral cavity. Open communication between the oral and nasal cavities may occur, accompanied by hypernasal speech, low speech intelligibility, nasal regurgitation of food and liquids, inability to masticate, and facial disfigurement (Beumer et al., 2011; Rieger et al., 2011; Said et al., 2017). Consequently, social behavior and quality of life (QoL) will be adversely affected (Ahmed et al., 2020; Ali et al., 2018; Goiato et al., 2009; Said et al., 2017). Ideally, a surgically treated mucoepidermoid case should be offered with palatomaxillary reconstruction, providing a permanent division between the oronasal. However, these techniques are not suitable for all cases and alteration of treatment modalities with prosthetic rehabilitation was opted (Bharathi et al., 2014; Gill et al., 2018).

The appealing advantages of obturator prostheses are easy in the visualization of the defect site which allows detection of cancer recurrence, reduced cost and rate of hospitalization and the immediate reestablishment of facial morphology as well as oral functions (Beumer et al., 2011; Okay et al., 2001; Rieger et al., 2011). The treatment above was opted as the patient would still need long term follow-up. The objective is to restore and maintain oral function at a comfortably reasonable level during this initial monitoring period. At the same time, improvement of speech is gained by covering the defect area and by reproducing normal palatal contours (Dalkiz & Dalkiz 2018; Sullivan et al., 2008; Rieger et al., 2011). However, the defective area with a thin lining of mucosa will easily be traumatised and oral-nasal communication can be contaminated and increase the risk of the infection. Thus, the purpose of this paper is to report a simplified approach in rehabilitation of the hard palate defect with oral-nasal communication and restored with a prosthesis with a single path of insertion to minimise the trauma to the tissue of the defect area.

## CASE DESCRIPTION

A 48 years old Chinese man was referred to the Prosthodontic Department for the construction of an obturator prosthesis after one year following a wide excision surgery for low grade mucoepidermoid carcinoma of the hard palate. His chief complaints were difficulty in speaking, inability to properly chew food and fluid leakage into his nose due to looseness of the surgical obturator. He was very concerned and considers the symptoms inappropriate to his occupation and as it requires him to meet and communicate with his customers.

Intra orally, he presented with partially dentate maxillary arch Kennedy class IV with a surgical defect on the middle of the hard palate area, extending 6mm to the posterior, right before the fovea palatini (Figure 1). The classification of the hard palate defect that not involving tooth bearing alveolus is Class 1a (Okay et al., 2001; Parr et al., 2005). Generally, the defect margin was healthy with exposure of nasal epithelium with no signs of recurrent tumor. Through-and-through oronasal communication was observed. Severe resorption was noticed at the anterior region area of 12 to 22 of the alveolar ridge and displaceable of tissues were diagnosed as a flabby ridge (Figure 2).



**Figure 1. Intra oral examination. a)Occlusal view of maxillary arch and b)Through and through of oral-nasal communication of palatal defect.**



**Figure 2. Anterior flabby ridge of the upper anterior region (area 12 to 22).**

## PROSTHETIC TECHNIQUE

The steps for making the obturator prosthesis were not different from those for making a conventional partial denture, except for some specific approach in fabricating maxillary obturator with some modification of the impression, mesh-framework of cobalt chromium at defect area and relining of the bulb. At initial, the primary impressions for maxillary and mandibular arches were made using alginate (Kromopan, Lascod, Illinois, USA) (Figure 3). The impressions were then poured to produce study casts and design was prescribed as in Figure 4. Maxillary perforated special trays were constructed using light-cured tray material (Plaque Photo; W+P Dental. Hamburg, Germany) and checked for correct extension in the patient's mouth. The anterior portion of areas 13 to 23 was perforated for selective impression technique. At defect area moulding was done using tracing compound (Impression Compound Type I, Sds Kerr, USA) to capture all the detail. Then a final impression of the maxillary arch was made using alginate (Kromopan, Lascod, Illinois, USA) (Figure 5). The impressions were poured to produce working casts and design for the obturator framework (Figure 6).



Figure 3. Primary Impression of maxillary arch and palatal defect area.

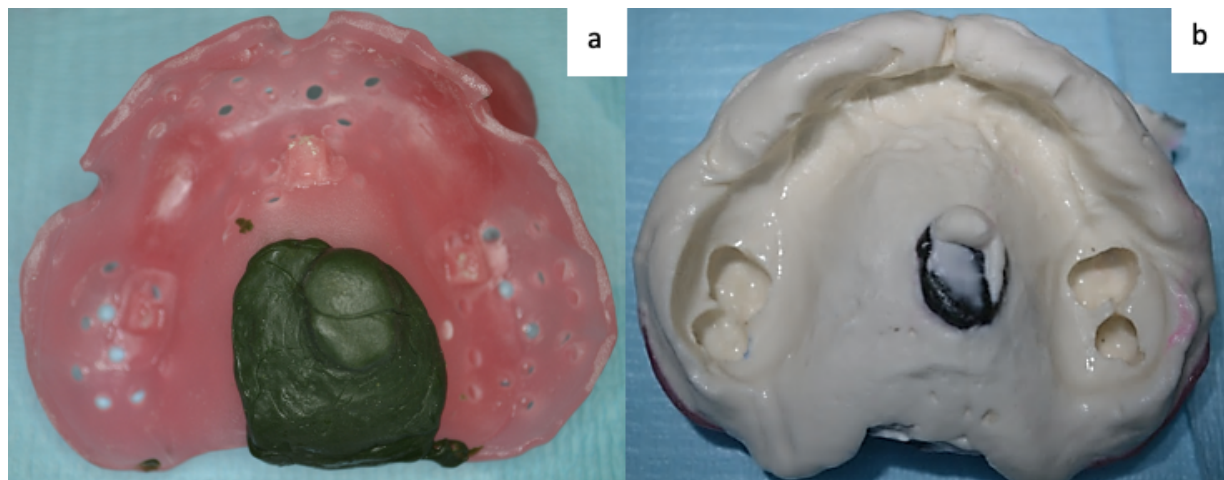
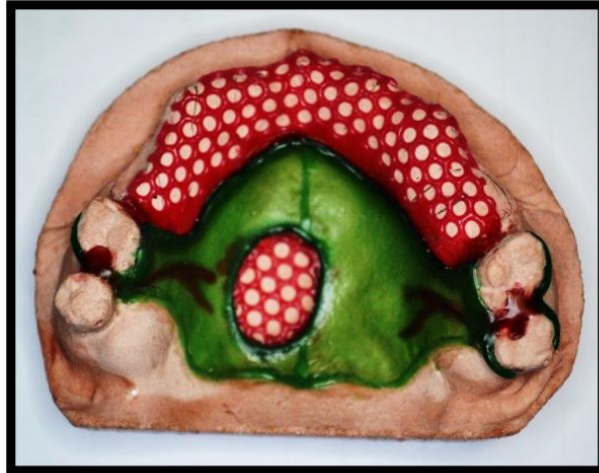


Figure 4. Secondary impression with compound (a) and alginate (b).



**Figure 5. Obturator design of cobalt chromium framework on working cast.**



**Figure 6. Framework cobalt chromium framework**

Try-in of the cobalt-chromium framework was done prior to maxilla-mandibular registration. The steps for registering the intermaxillary relationship as well as aesthetic and functional demands were evaluated. Facebow transfers were done mounted in average value articulator (Protar Evo-4, Kavo, IL, USA). During wax denture trial and obturator installation stages (Figure 7), adequate seal against fluid (water) and air leakage were verified. The patient was asked to sip a cup of water to check for any leakage by checking adequate seal at the posterior extension of the obturator. Then, the speech was evaluated by phonetic and articulatory factors. The occlusion was also checked and adjusted in centric and eccentric movements with articulating paper (Articulating paper; CL, Germany). Post instruction was given regarding insertion and removal of the prosthesis. The patient was also instructed regarding the cleaning of the defect and also home care of the prosthesis.

Upon review, the family's perception and opinion were reckoned. He noticed occasional fluid flowed back from his nasal cavity during drinking but not coming through his nostrils. He also noticed some bloodstain during the removal of the obturator. These however were not disturbing. Upon

investigation with the silicone pressure-indicating microfilm (Fit Checker, GC America, Alsip, IL, USA), there was no pressure and space noted. The bulb was relined with vinylpolysiloxane soft relining (GC RELINE, GC America, Alsip, IL, USA), as semi-permanent lining for a precautionary measure on tight defect area and training to the patient until he adapt and established the path of insertion and removal of his obturator (Figures 8, 9 and 10). The patient was recalled every 2 weeks up to 3 months because of the continuously changing tissue for regular modification and adjustment. He is being monitored and has been satisfied with his prosthesis for 1 year. The relining procedure had resolved his concern and the patient was satisfied with the result and success of his prosthesis as shown from images of patient before and after obturator insertion (Figure 11).



**Figure 7. Trial obturator on working cast.**



**Figure 8. Maxillary obturator with bulb.**



Figure 9. Insertion of maxillary obturator.



Figure 10. Occlusion of maxillary obturator and mandibular denture during insertion.  
a)Posterior right, b)Anterior and c)Posterior left

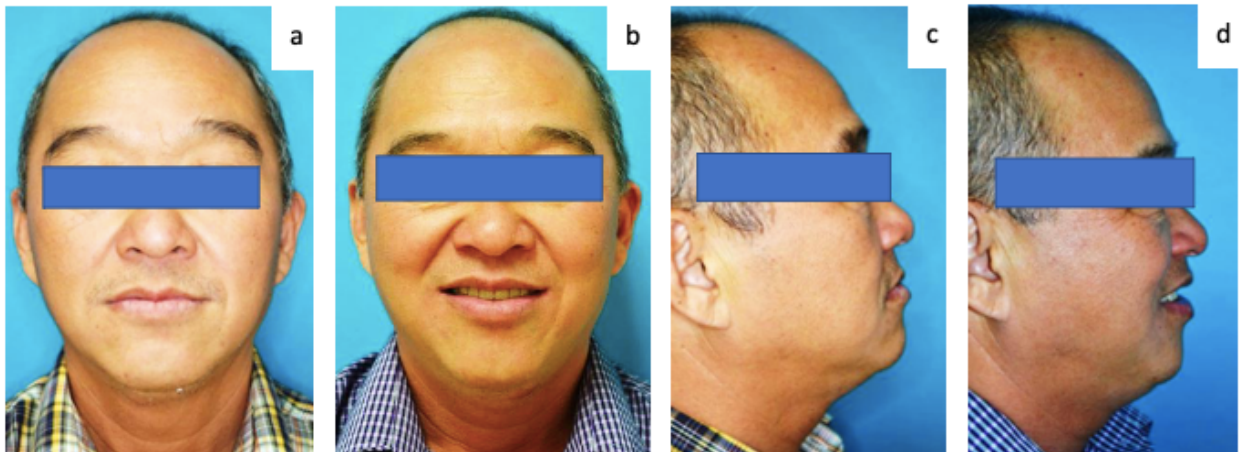


Figure 11. Frontal image before (a) and after (b) insertion of obturator and Profile image of patient before (c) and after insertion (d).

## DISCUSSIONS

This case report describes the fabrication and utility of a maxillary obturator lined with silicone to address patient's concerns and clinical problems. We modified the special tray for a final impression to minimize displacement of the flabby tissue while producing maximum details and at the same time to gain a good and functional seal for the defect. Unless managed appropriately, such flabby ridges can adversely affect not only the support but also the retention and stability of the obturator. Various techniques have been recommended to address the difficulty in making the prosthesis rest on a flabby ridge (Crawford & Walmsley, 2005). Selective impression technique with a window or perforated custom tray has been proposed to help record the flabby area with minimal distortion of mobile tissue. Muco-compressive impression techniques are likely to result in an unretentive and unstable prosthesis as the prosthesis constructed on a model of flabby tissue captured in a distorted state. The use of holes, windows and wax relief reduces the hydraulic pressure and minimizes the displacement of the bearing tissues (Crawford & Walmsley, 2005). This treatment modality was made in keeping with the principle to maintain a balance between stability and retention of the prosthesis along with preservation of healthy tissue at defect area.

The aim and function of the bulb of obturator lined with silicone is to close the defect area and create separation between the oral cavity and nasal cavity (Ahmed et al., 2020; Sullivan et al., 2002). Indication of success and quality of prosthesis is evaluated through speech. Proper evaluation requires a speech pathologist's input through direct videofluoroscopy, indirect cineradiography and airflow pressure measurement (Henningsson et al., 2008). In this patient however, such involvement was not utilized and only phonetic assessment was done (Sell, 2005). In general, normal speech production requires a full closure of oronasal for nasal, palatal and alveolo-palatal sounds (Sell, 2005; Henningsson et al., 2008; Rieger et al., 2011). The nasal cavity act as the primary resonating chamber for consonants is m,n, and ng. Evaluation of these consonants is important to verify the proper separation and seal of the oral and nasal cavity. Palatal consonants on the other hand are pronounced with the middle part body of the tongue against the hard palate (Recasens, 2013). For this, we evaluated the patient's speech in the English consonants of th, sh, zh, and ch. As for the alveolo-palatal sibilants often used in varieties of Chinese such as Mandarin, Hakka, and Wu, as well as other East Asian languages, patient speech in Malay (*banyak*) and Chinese (小 (*xiǎo*)) were assessed.

Proper speech production is perceived as important in the patient's occupation as well as daily living. Air escapes through the nose during the production of any sound in speech give hypernasal quality to the listener. Speech following definitive prosthesis may not be as effective as with surgical reconstruction (Beumer et al., 2011; Dalkiz&Dalkiz, 2018; Sullivan et al., 2002). Occasionally, slight deterioration in speech may be noted following insertion of the prosthesis as it requires neuromuscular and functional adaptation. With a modification of prosthesis and perseverance for adaptation by the patient, these speech deficits can be eliminated or minimized. Sullivan et al., (2002) reported that with the obturator prosthesis, communication effectiveness returns to the level 75% prior to cancer diagnosis.

Air and fluid leakage may occasionally occur following insertion but within tolerable limits. Leakage may occur posteriorly during swallowing due to movement of the soft palate (Beumer et al., 2011; Said et al., 2017). During swallowing, the mandible is closed and braced so that a small space may exist where soft tissue is distended during mandibular movement. The dorsum of the tongue elevates forcefully against the hard and soft palates creates pressure superiorly that may force fluids around the obturator bulb and into the nasal cavity. Dalkiz & Dalkiz (2018) concluded that total closure of defect may be unobtainable, but a sufficient level of obturation usually exists to permit acceptable swallowing and speech. Furthermore, several studies reported that good obturation and stability correlates with improved oral function and enhanced health-related quality of life (Ali et al., 2018; Goiato et al., 2009; Kalaignan & Ahmed, 2021).



## **CONCLUSION**

The patient is fully satisfied with the result as he is able to insert his obturator properly and communicate effectively. The desired outcome for the patient was achieved and become successful as the speech and leakage were also ascertained objectively. Rehabilitation of hard palate with oral-nasal communication needs to take additional care when taking impressions and installing the appliance. Relining the bulb is considered an excellent functional option that reduces traumatized defect areas and can be easily repeated or repaired in case of need.

## **CONFLICT OF INTEREST**

No conflict of interest to declare by any of the authors.

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## **DECLARATION OF INTEREST**

None

## **DISCLOSURE STATEMENT**

The authors do not have any financial interest in the companies whose materials are included in this article.

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