

以三葉狀橈側前臂自由皮瓣重建口腔癌術後全軟顎缺損：病例報告

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Total Soft Palate Reconstruction Using Tri-lobed Radial Forearm Free Flap after Wide Excision:

A Case Report

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Background : Soft palate reconstruction of oropharyngeal cancer is a therapeutic challenge. Speech problem and nasal regurgitation can result from a soft palatal defect. Reduction of the size of the velopharyngeal orifice is required to compensate for the lack of mobility in a reconstructed soft palate. Although various methods can be used for reconstruction of soft palate defects, it is difficult to obtain satisfactory results from the perspective of the functional restoration of the soft palate.

Aim and Objectives : We aim to restore the normal palatal anatomy and provide the valve structure to improve postoperative velopharyngeal insufficiency.

Materials and Methods : A case of a 74-year-old male with soft palate squamous cell carcinoma (T3N0M0 stage III) underwent wide excision and modified radical neck dissection. A large volume of tri-lobed radial forearm free flap (RFFF) was folded like neo-uvula and inset the defect.

Results : The postoperative course was uneventful, within 18 months, and he was able to tolerate swallowing function and exhibited understandable speech quality.

Conclusion : Tri-lobed RFFF reconstruction for large soft palate defect after oncologic surgery resulted in satisfactory prognosis for restore velopharyngeal function and it was a feasible option for large soft palate defect reconstruction.

Key words : Soft palate reconstruction, Velopharyngeal insufficiency, Radial forearm free flap

(TEXT)

Introduction:

Soft palate reconstruction of oropharyngeal cancer is a therapeutic challenge. Speech problems and nasal regurgitation can result from a soft palatal defect. This is due to crucial importance of velopharyngeal competence for articulation and swallowing. Reduction of the size of the velopharyngeal orifice is required to compensate for the lack of mobility in a reconstructed soft palate. Although various methods can be used for reconstruction of soft palate defects that occur after wide excision, it is difficult to obtain satisfactory results from the perspective of the functional restoration of the soft palate. Recently, reconstructive options have been significantly expanded and revitalized by the advent of free tissue transfer. The radial forearm free flaps (RFFF) have been widely used for soft palate reconstruction. But the reconstructed soft palate contracts during the healing phase and there is a risk of an increasing space developing between the reconstructed soft palate and posterior pharyngeal wall.¹ This effect is likely to be increased during postoperative radiotherapy as a result of further shrinkage and poor mobility due to fibrosis.² We have modified the RFFF for reconstruction of the soft palate to minimize postoperative velopharyngeal insufficiency.

Materials and Methods:

A 74-year-old male heavy smoker (1 pack of cigarette per day) had no history of systemic disease and chronic medication use. He suffered from soft palate squamous cell carcinoma

(T3N0M0 stage III) (Fig. 1A) and received the wide excision and left modified radical neck dissection by otolaryngological surgeon. The resection involved the total soft palate, posterior and lateral pharyngeal wall, and uvula (Fig. 1B). The defect size of nasal floor was 3 x 3.5 cm and that of soft palate and tonsil was 8 x 6 cm after oncologic surgery. The RFFF was designed with large volume tri-lobed shape skin paddle (about 12 x 9 cm in size) (Figure 1C) for reconstruction, taking into account that the vascular pedicle must emerge from the flap in what would be the most downward area, so as to reach the recipient vessels in the neck without any tension. In the flap setting, the 3 points (A, A', and A'') of skin paddle margin were sutured together to fold as neo-uvula structure to fit the residue mucosal edge of the lateral oropharyngeal wall toward the nasopharynx (Fig. 2A and 2B). It was more suitable for flap setting to the floor of the nasal cavity of total soft palate defect with interrupted buried sutures than other oropharynx reconstruction, because the nasopharynx was totally wide open after oncologic surgery. The flap contralateral skin paddle margin was fixed to the remaining soft palate (Fig. 2C, 2D, and 1D). The donor site skin defect was covered with a split thickness skin graft, which was harvested from the left anterolateral thigh.

The fiberoptic endoscopic evaluation of swallowing (FEES), which is a validated method of objective assessment of swallowing, allowing viewing and recording of the structures and dynamics of the swallowing process, was adopted after 1 month of reconstructive surgery.

Questionnaire was made and scored to evaluate speech intelligibility and swallowing difficulty (Tables 1 and 2). 7 points showed normal speech intelligibility and swallowing ability. The follow-up period was 18 months. Intelligibility was determined by a speech pathologist reviewed and graded a tape of the patient's speech on a scale of 1 to 7 in the Table 1. The patient's deglutition was evaluated by subjective response of bedside swallowing evaluation to the questions listed in the Table 2.

Results:

There was no complication like wound dehiscence, forearm donor side tendons exposure, flap necrosis, and oronasal fistula occurred. The reconstruction provided a permanent separation between the oral and nasal cavities. After postoperative 1 month, the FEES revealed adequate velopharyngeal closure, mild residual over vallecula and pyriform sinus, mild laryngeal penetration, and mild aspiration (Table 3). The soft diet was recommended.

After 6 months, he had achieved good functional recovery and speech and swallowing function were evaluated. Speech intelligibility was 6 points. In assessing swallowing difficulty, score was 6 points. After 18 months follow-up, flap mobility with normal soft palatal elevation was observed on postoperative phonation (Figure 3).

Discussion:

Oropharyngeal cancer accounts for approximately 12% of all head and neck cancers, and that squamous cell carcinoma (SCC) accounts for more than 90% of cancers that occur in the

oropharynx. But SCC rarely occurs at the soft palate and uvula. In cases of advanced soft palate cancer, it can be treated using surgical resection, palliative radiotherapy, and adjuvant chemotherapy.³

The soft palatal area is a dynamic muscular structure, which effectively separates the pathway of the oral and nasal cavities. The soft palate combines pharyngeal walls at the velopharyngeal aperture to function as a valve and to generate the oral pressure required for normal speech resonance and bolus propulsion during swallowing.⁴ Soft palate defects that occur after resection may cause hypernasal speech and food reflux into the nose upon swallowing. Thus, (1) functional mucomuscular soft palate structure to restore speech intelligibility and proper resonance, (2) oronasal obstruction to physically separate the oropharynx from the nasopharynx, (3) rehabilitation of safe and effective swallowing, (4) ability of early detection of recurrent cancer, and (5) maintenance of nasal patency are the ideal goals of reconstruction of the palate.⁵

Prostheses and surgical reconstruction are used for the functional reconstruction of the soft palate. Prosthetic devices have traditionally been used to close soft palate defects. Palatal obturators provide excellent results and remain the reconstruction modality of choice for fixed defects of the hard palate. However, the use of prosthesis for soft palate defects reconstruction often yields poor functional outcomes, even it is relatively easy to perform. Prostheses lack the mobility of the surrounding muscular pharyngeal tube, resulting in

ineffective sealing during dynamic motion in speech and swallowing. Side effects such as mucositis and trismus increase prosthesis-related discomfort and may reduce patient compliance over time. Furthermore, patients with soft palate prosthesis have shown reduced speech intelligibility in comparison with patients who undergo reconstruction by soft tissue techniques.⁶ The prosthesis is also difficult to perform in patients with a large defect or edentulous.⁷

Soft tissue reconstruction is currently preferred over the use of prostheses for the closure of most soft palate defects. Several methods of soft palate reconstruction have been proposed, including the use of split-thickness skin grafts; and local, regional, and free flaps. Among various reconstruction methods, free flap transfer is widely used method to reconstruct total soft palate defect following head and neck cancer surgery recently. The thin, pliable nature of the fasciocutaneous flaps is ideally suited for oropharyngeal reconstructions, especially when the defect involves multiple sites, such as the pharyngeal wall, soft palate, and tongue base. Therefore, the RFFF is the most common and particularly suitable flap to reconstruct soft palate. Its thinness, pliability and ability to maintain a consistent volume and surface area over time facilitate mobility of the reconstructed oral and oropharyngeal structures. It also has 5 to 7 perforator vessels derived from the radial artery.⁸

Numerous operative techniques have been attempted to improve the speech and swallowing functions after wide resection of total soft palate. Rieger et al. analyzed speech

data for patients with half or more of the soft palate resected, followed by reconstruction with soft palate insufficiency repair (SPIR).⁹ Reconstruction with SPIR modification resulted in better speech outcomes. Lee et al. report using a folded radial forearm free flap and palmaris longus tendon sling for Reconstruction of a total soft palatal defect.¹⁰ The authors designed the suspension with the palmaris longus tendon provides a tensile connection between the remnant levator muscle and the pharyngeal muscles, reducing the chances of velopharyngeal insufficiency. Besides, Seikaly et al. reported that larger flaps showed lower nasalance values.¹¹

Natural healing process and adjuvant radiation therapy following ablation surgery can cause considerable loss of flap volume and adjunctive mucosal tissue. To reduce flap contracture and shrinkage, our method of soft palatal reconstruction harvested the RFFF to be as large as possible while avoiding obstruction of the airway and oropharyngeal structures, which could maintain nasal patency. The most recent literature form a general consensus focus on reduction of the caliber of velopharyngeal aperture in an effort to compensate for the lack of mobility in the reconstructed soft palate. By considering the 3-dimensional plane, we folded the tri-lobed shape skin paddle to form the neo-uvula as a valve structure to reduce velopharyngeal orifice, which aim at restoring the normal palatal anatomy. Postoperative speech and swallowing functions were very acceptable. The postoperative FEES observed adequate velopharyngeal closure. The results of speech and swallowing functional

assessment, after 6 months, demonstrate a more acceptable outcome. We could almost clearly understand the speech, although hypernasality was seen in some oral sound sentences. Patient also could consume little solid diet without any discomfort and rarely experienced night-time sleep disturbance. The design of our flap also helps to prevent the flap bulk decreases over time and contracts after postoperative radiation therapy. Based on our observation, after 18 months follow-up, the flap revealed acceptable volume preservation.

In conclusion, large volume tri-lobed RFFF reconstruction for large soft palate defect after oncologic surgery indicates the potential advantage of satisfactory prognosis for restore velopharyngeal function despite some hypernasality. The procedure is a valuable and feasible option to restore velopharyngeal function, although further objective analysis is important to substantiate the result.

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本病例曾於 103 年度台灣外科醫學會暨聯合學術演講會，民國 103 年 3 月 15 日，於臺北榮民總醫院致德樓第 2 會議室整形外科發表口頭演講。

中文摘要

背景：

口咽癌病患中重建軟顎是治療上的一大挑戰，軟顎缺陷會造成言語構音問題和進食時食物從鼻腔返流。於軟顎重建中，須減少顎咽口的大小，才可代償因軟顎缺損所造成的問題。雖然多種方法可用於軟顎重建，術後軟顎功能的恢復仍往往難以獲得滿意的結果。

目的及目標：

我們期望能恢復接近正常軟顎的解剖構造，並且提供類似閘門的結構，以期能改善術後齶咽閉合不全的問題。

材料及方法：

一位 74 歲男性罹患軟顎的鱗狀上皮細胞癌（T3N0M0 第 III 期），接受軟顎腫瘤廣泛性切除以及改良根治性頸淋巴廓清術。我們使用含有大量軟組織的三葉狀橈側前臂自由皮瓣，摺疊成類似新懸雍垂的形狀，並縫合至缺損的部位。

結果：

術後過程良好。追蹤 18 個月，達到可接受的吞嚥功能以及可理解的構音表現。

結論：

因腫瘤切除手術而導致軟顎大面積缺損，以含有大量軟組織三葉狀橈側前臂自由皮瓣重建，對於顎咽閉合功能的恢復可達到令人滿意的結果。因此，用於軟顎大面積缺損的重建，是一個可行的選擇。

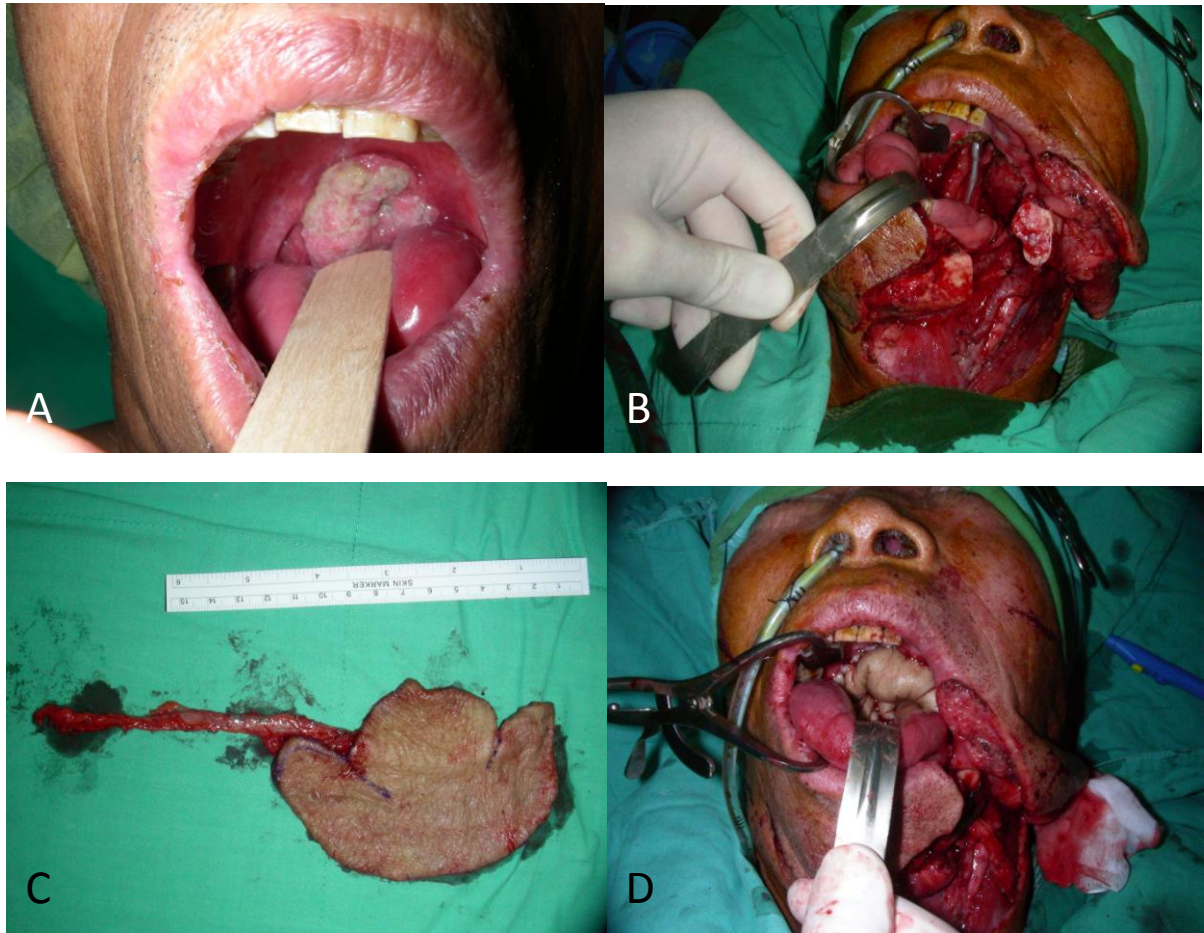
Table 1 Speech Intelligibility Score	
Criteria	Score
No abnormalities in speaking	7
Occasional difficulty in pronunciation	6
Understandable, but abnormalities in pronunciation	5
Understandable if repetitively spoken	4
Understandable only if listened carefully	3
Incomprehensible, but few words comprehensible	2
Understandable only on writing	1

Table 2 Swallowing Functional Score	
Criteria	Score
No difficulty	7
Difficulty in solid diet swallowing	6
Able to swallow soft diet (solid diet only with water)	5
Able to swallow soft diet (unable to swallow solid diet)	4
Difficulty in soft diet swallowing	3
Able to swallow liquid diet	2
Unable to swallow liquid diet	1

Table 3 Fiberoptic Endoscopic Evaluation of Swallowing (FEES) Report

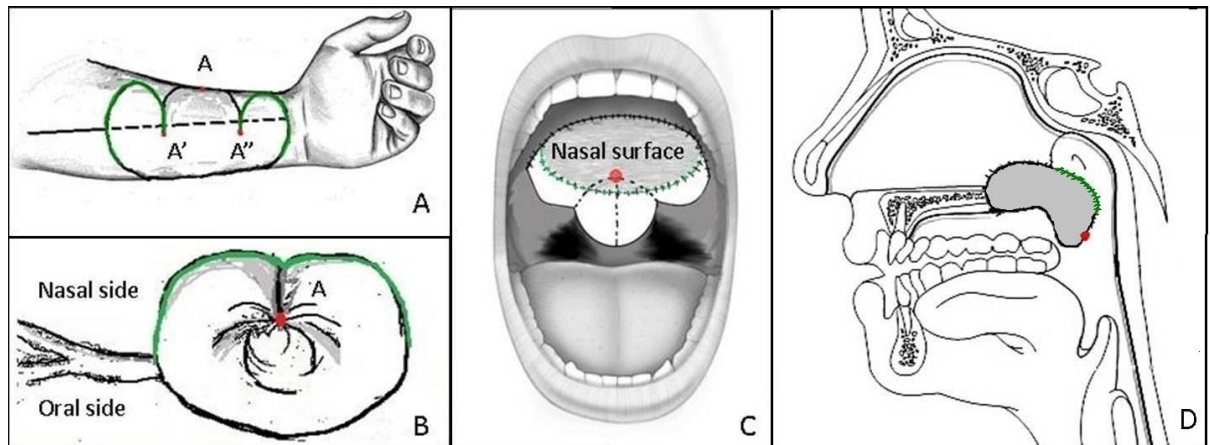
Food character	Semisolid	
Premature leakage	No	
Delayed trigger of pharyngeal swallow	Mild (3-5 sec.)	
Residual	Vallecula	Mild
	pharyngeal wall	No
	Pyriiform sinus	Mild
Laryngeal penetration	Mild	
Aspiration	Mild	
Repeated swallowing	Improved	
Velopharyngeal closure	Adequate	
Glottic closure	Insufficient	
General grading	Mild dysphagia	
Comment: On soft diet at most		

Figure 1



Intraoperative photographs of the patient. (A) Squamous cell carcinoma on the uvula and soft palate. (B) Defect of total soft palate and posterior and lateral pharyngeal wall after cancer ablation surgery by otolaryngology surgeon. (C) Tri-lobed RFFF design. (D) Immediately after flap setting.

Figure 2

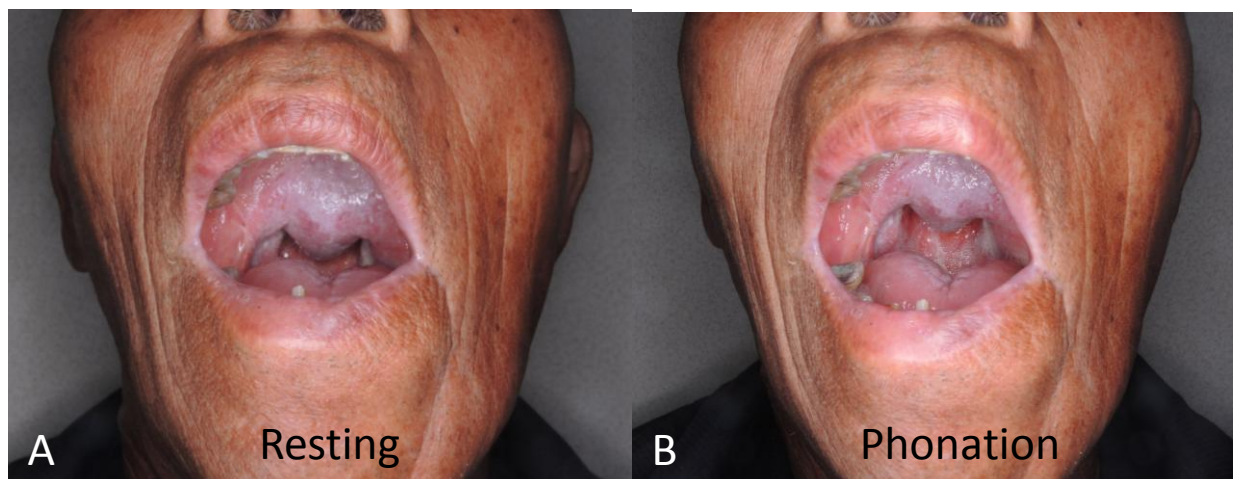


Schematic diagrams illustrated the operative procedures. (A) Design of tri-lobed RFFF. (B)

Three points A, A', A'' folded together as the as neo-uvula. (C) Tri-lobed skin margin (green line) was fixed the nasal surface and contralateral skin for oral and pharyngeal wall defect.

(D) Pharynx sagittal view after flap setting over the total soft palate defect.

Figure 3



Photographs after postoperative 18 months. (A) Flap was noted on the soft palate on resting state. (B) Elevated flap was noted on phonation.