

FREE RADIAL FOREARM FLAP AFTER PARTIAL GLOSSECTOMY FOR SQUAMOUS CELL CARCINOMA OF THE TONGUE

Chuah UC, Kamarul T, Sara T

Department of Orthopaedic Surgery, University of Malaya Medical Centre, 50603 Kuala Lumpur, Malaysia

ABSTRACT: Squamous cell carcinoma of the tongue is a highly malignant condition and results in high mortality and morbidity in patients despite its early detection (1). Early surgical interventions have been found to reduce mortality but in many reports, tongue reconstructions using live grafts have been found to reduce normal tongue function of speech, swallow and taste. In contrast, our report using free radial forearm flap (FRFF) to reconstruct the defect left over after a radical tongue resection in a 38-year-old gentleman with oral cancer has shown promising results. This type of reconstruction has left the patient with a functional and cosmetically acceptable tongue with minimal alteration in recognizable speech. (*JUMMEC 2006; 9(2): 28-31*)

KEYWORDS: Radial forearm flap, tongue reconstruction, free flap

Introduction

Oral cancer is a debilitating condition and although the condition is malignant, early detection has resulted in good results with prolonged survivability. However, due to the aggressive nature of the disease, despite early detection, the morbidity following extensive resection is undesirable. Our technique of using free radial forearm flap (FRFF) has proven to reduce the morbidity of this condition and in addition, to help replace the function of a tongue loss in the resection.

Case Report

A 38 year old Chinese man was referred from Selayang Hospital in May 2005 to University of Malaya Medical Centre with a 4–5 months history of pain and progressive ulcer over the right side of his tongue. He smokes occasionally but has no history of betel nut chewing habit. No family history of cancer is noted.

He was initially seen at our Maxillofacial Department and a biopsy was taken in April 2005. The HPE result confirmed the diagnosis of squamous cell carcinoma (SCC) which was moderately differentiated. Subsequently, he was referred to the Hand and Microvascular Surgical Unit for pre-operative assessment and assistance. On examination, there was a hard mass

noted on the right side of his tongue with an overlying ulcer (Figure 1). The tongue was also oedematous. There were palpable firm lymph nodes on the right side of the neck.



Figure 1. Cancerous lesion found on the tongue which was very similar to one seen in the patient in our report (6)

Correspondence:
Dr Chuah Uei Chyi
Attn: Dr. Tunku Kamarul Zaman Tunku Zainol Abidin
Department of Orthopaedic Surgery
Faculty of Medicine, University of Malaya
Tel: 603-7949 2061
Email: ucchuah@perdana.um.edu.my
Email: tkzrea@yahoo.com

Surgery was performed involving the joint efforts of the Maxillofacial Department, ENT Department and the Hand and Microsurgery Unit. This involved tumour resection and tongue reconstruction. The mandible was split using a surgical saw. This approach offered an excellent exposure to the excision and reconstruction of the tongue. A near total glossectomy was done over the right side. Careful resection and clearance of the tumour margin was performed. While the Maxillofacial team began their resection, radical neck dissection was performed by the ENT team.

Simultaneously, a FRFF was harvested from the left forearm. The defect over the donor site was then closed partially, leaving a minimal area of space devoid of skin without much tension over the surrounding skin. This area was then covered using a split-skin-graft from the left thigh. During this surgery, the radial forearm flap was harvested with a cuff of brachioradialis muscle to facilitate contouring of the reconstructed right tongue. Anastomosis of the radial artery of the flap was performed to the nearby mandibular artery. Successful anastomosis was confirmed with bleeding observed at the edges of the free flap.

The patient recovered well post-operatively. The flap survived and the skin healed. During the follow-up, the patient was able to talk in a recognizable voice and he has no regurgitation or swallowing difficulties. On the third month follow-up, the patient maintains a good life with minimal functional disability.

Discussion

Squamous cell carcinoma of the oral tongue typically affects men from the sixth through the eighth decades of life, usually after many years of alcohol or tobacco abuse. Less than 4% of these lesions occur in patients younger than 40 years of age. Recent reports suggest that there is an increased incidence of oral SCC in the under-40 age group. Retrospective analyses performed suggested that the disease follows a more aggressive course in young patients but there are no significant differences in the outcome exist between the different age groups (1).

There is a 10% mortality noted in the first two years of follow-up in the older age group and 45% in the younger group. Therefore, effort should be made on identifying young patients whose disease behaves aggressively and require radical treatment (1). Metastatic spread of SCC of the tongue is facilitated by its rich lymphatic network and tends to increase with the size of the primary tumour. Approximately 50% of tongue cancers present with lymph node involvement.

Early and recognizable cancer of the tongue often allows surgical intervention as part of the treatment management. However, in order to strike a good therapeutic control of the disease, a wide primary excision is often needed. This is followed by an optional radiotherapy treatment. This procedure usually leaves the patient with a large defect in the tongue and oral cavity. The absence of the tongue will impair the articulation, swallowing and vocalization processes. It is therefore prudent that reconstruction is needed for a good functional substitution for the defect. As for this patient, a non-innervated FRFF was used. As with any surgical reconstruction procedures, four main issues arise:

1. Survivability of patient following surgery;
2. Functional status of the reconstructed tongue;
3. Cosmetic appearance following reconstruction for both donor and recipient sites; and
4. Morbidity as a result of the surgery.

The radial forearm flap is commonly used for reconstruction of tongue defects following tumour excision. This flap is easy to harvest and offers thin tissue with large-caliber vessels. However, its use leaves behind a conspicuous aesthetic deformity in the forearm and requires the sacrifice of a major artery of that limb, the radial artery. The survival rate of FRFF is estimated at 92%. In one study, the disadvantages of the radial forearm flap included donor site morbidity which included partial loss of skin graft (11%), abnormal sensations (26%), poor appearance (8%), and reduced grip strength (11%) (2). In some patients, the donor-site scar of the forearm acted as a social stigma, preventing these patients from leading a normal life (3).

Some surgeons advocate an innervated FRFF in an attempt to produce a more favourable outcome (4). It is their belief that while the flap effectively fills the defect, it serves as an insensate reservoir in which food and saliva can collect. However, a number of studies have shown that very little and insignificant benefit is achieved when compared to an insensate flap (4,5). It has also been suggested that sensory innervated flap other than the FRFF is much more superior as compared to non-innervated flap (4). In their study, the lateral antebrachial cutaneous nerve to the (divided) lingual nerve (4) was used. On the other hand, some authors argued otherwise by saying that although the trend in this study is towards improved function with the innervated flaps, these flaps do not appear to offer major intra-oral functional advantage over the non-innervated flaps, which attain reasonably effective sensory recovery from neural ingrowth, if the lingual nerve is intact (5).



Figure 2. Post-operative picture of reconstruction of the tongue

Other methods of tongue reconstruction following a partial glossectomy were also mentioned in literature. More recently, the anterolateral thigh flap in a thinned form, has been used to reconstruct defects of the tongue with functional results equivalent to that of the radial forearm flap. The advantage of this flap is that it reduces the donor site morbidity as wounds can be closed primarily. Another neurovascular island flap used for reconstruction can be derived from the infrahyoid. With the neurovascular infrahyoid flap, defects of the tongue base can be reconstructed successfully after partial resections or total glossectomies. The main advantage is the voluntary innervations of this flap by means of the ansa cervicalis and the prevention of scarring and atrophy of the reconstructed tongue. This flap, however, is only suitable for small tumours of the tongue and offers very little to the more common situations where wider resections are required. Less commonly, lateral upper arm free flap, pectoralis major flap and a combined brachioradialis-radial forearm flap can be used instead of the FRFF. However, having compared these flaps to FRFF, we have yet to find further advantage other than the fact that the anterior thigh flap offers slightly improved cosmetics.

Functional outcome of a reconstructed tongue is seen by its ability to mimic the original function of a normal tongue prior to the diseased state. In this case, it is to review its function to assist deglutition, speech and taste. It is also important to factor the patient's satisfaction following the surgery. Because

the free flap does not have the taste sensory, the return of taste cannot be expected in our procedure. However, swallowing and speech in this patient has returned to near normal with satisfaction rated very high at three months following surgery. Compared with primary closure of the tongue defect, some authors suggest it is better to reconstruct it with a FRFF when more than 50% of the tongue is resected (1,6). Although previous reports indicated that articulation intelligibility was better in patients who did not receive grafts as compared to those who received grafts, our patient showed otherwise (6). This is because reconstructions with flaps have been accused of interfering with the flexibility and mobility of the tongue which may contribute to articulatory impairment.

On the overall, patient satisfaction for function and cosmesis of the operated sites following any surgery with regards to tongue reconstruction rates high when using flaps as a closure following wide resection of cancer of the tongue (1,2,4,6,7). Although the surgery involved is lengthy and requires the joint effort of various expertise, the outcome for patients with this deadly disease is rewarding with high recovery rates being reported in cases where detection is early. Furthermore, by improving our techniques of using functional flaps as closures as opposed to mere resection, not only can the cancer be treated successfully, the morbidity following surgery can be greatly reduced whilst maintaining the function of resected part.

References

1. Popovtzer A. Squamous cell carcinoma of the oral tongue in young patients. *Laryngoscope* 2004; 114(5): 915-917.
2. Chen C-M. Complications of free radial forearm flap transfers for head and neck reconstruction. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2005; 99(6): 671-676.
3. Boyd B, Mulholland S, Gullane P, et al. Reinnervated lateral antebrachial cutaneous neurosome flaps in oral reconstruction: are we making sense? *Plast Reconstr Surg* 1994; 93(7): 1350-1359; discussion 1360-1352.
4. Kuriakose MA, Loree TR, Spies A, et al. Sensate radial forearm free flaps in tongue reconstruction. *Arch Otolaryngol Head Neck Surg* 2001; 127(12): 1463-1466.
5. Netscher D, Armenta AH, Meade RA, et al. Sensory recovery of innervated and non-innervated radial forearm free flaps: functional implications. *J Reconstr Microsurg* 2000; 16(3): 179-185.
6. http://www.who.int/oral_health/publications/fact_sheet_tobacco/en/index1.html. (accessed 7 Dec 2006).
7. Chuanjun C, Zhiyuan Z, Shaopu G, et al. Speech after partial glossectomy: a comparison between reconstruction and non-reconstruction patients. *J Oral Maxillofac Surg* 2002; 60(4): 404-407.