International Journal of Otorhinolaryngology and Head and Neck Surgery
Modi DB. Int J Otorhinolaryngol Head Neck Surg. 2022 Mar;8(3):184-190
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20220466

Original Research Article

Study of functional outcome of free flap reconstruction in oral cavity malignancies

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Received: 22 December 2021
Revised: 01 February 2022
Accepted: 03 February 2022

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ABSTRACT

Background: Oral cavity squamous cell carcinoma are likely to be associated with occult nodal metastasis at presentation so diagnosis is usually late when the disease has already reached an advanced stage, for this reason, neoplasm dimensions of clear margins needs be at least 1 cm around the tumour, which leads to large resections requiring reconstructive surgery with important functional outcomes. The aim can be achieved with the use of micro vascular free flaps that have replaced regional flaps to ensure better functional and aesthetic results.
Methods: A total of 100 patients with oral cavity malignancies were assessed for the functional outcome of cosmoses, speech and swallowing and were compared for each flap using the Fischer's test. Follow up was done at 3 and 6 months after completion of curative treatment.
Results: The failure rate of free fibular flap was 48% which is higher than ALT (18%) and FRAFF (22%). Functional outcome of cosmetic (p=0.38), speech (p=0.58) and swallowing (p=0.10) with pedicle was not as good as free flap for cases of buccal mucosa after failure with free flap.
Conclusions: In carcinoma of buccal mucosa and tongue free flaps offered better functional outcome in terms of cosmesis, speech and swallowing compared to pedicled flaps.

Keywords: Oral cavity, Functional outcome, Free flap reconstruction

INTRODUCTION

Oral cavity squamous cell carcinoma are likely to be associated with occult nodal metastasis at presentation so diagnosis is usually late when the disease has already reached an advanced stage, for this reason, neoplasm dimensions of clear margins needs be at least 1 cm around the tumour, which leads to large resections requiring reconstructive surgery with important functional outcomes. Today this aim can be achieved with the use of micro vascular free flaps that have replaced classical local and regional flaps to ensure oncologic radically along with better functional and aesthetic results on the other hand.[1]

Due to the heterogeneous nature of oral cancer, desired functional and cosmetic results, the coexistence of frequent medical comorbidities and the treatment options should be evaluated through the holistic approach and evaluated before reaching the final plan. The effects of oral cancer surgery can have a serious impact on a patient's quality of life and can impair appearance and functionalities such as speech, mastication and swallowing.[2]

Several flaps, including the anterolateral thigh, fibula osteocutaneous and free radial artery forearm flaps, have emerged important flaps for reconstructing a wide variety of defects. As the anatomy of these flaps has become more familiar, their reliability and versatility have increased. Preserving speech, swallowing and restoring cosmetic appearance are the goals in every reconstruction irrespective of micro vascular free flap or pedicle flap.[3]

Patients receiving radiotherapy after surgery tends to have high levels of problems with swallowing, eating and dry mouth. Functional assessment was performed after the patients had finished chemo radiotherapy, usually over a period of 3 months and 6 months after the reconstruction.[4]

For patients with squamous cell carcinoma of oral cavity, the duration of survival is of primary importance but when considering measurement of treatment outcome, quality of life should be evaluated. The functional outcome in terms of quality of life is not only determined by treating consultant but it's depend on patients own perception. The aim of this study was to assess the functional outcome in oral cancer patients at 3 months and 6 months after treatment. The functional outcome measures one's personal subjective assessment of well-being which can be regarded as a composite scale involving many contributing domains.5 After optimizing quality of life of patients survival of patient can be increased.

Aims and objectives

To study the functional outcome after free flap reconstruction in patients with oral cavity malignancies. To assess early and late morbidities of free flaps reconstructions in surgical management of patients with oral cavity malignancies.

METHODS

Study design

Study design was prospective longitudinal study.

Study duration

The study was conducted for 2 years (from June 2017 to June 2019).

Sample size

The sample size was 100 patients.

Location of study

The study was carried out at Shree Krishna Hospital, Karamsad.

Inclusion criteria

All patients diagnosed with primary squamous cell carcinoma of oral cavity that has undergone management with primary resection and free flap reconstruction were included.

Exclusion criteria

Patients who were not able to maintain follow up either personally or telephonically. Cases having recurrence or residual head and neck malignancies.

Questionnaire to assess functional outcome was filled out.

Table 1: FIGS scale for cosmesis, speech and swallowing.

Functional intraoral Glasgow scale (FIGS) scale for cosmesis, speech and swallowing Cosmetic satisfaction: Very satisfied -1, Somewhat satisfied-2, Neutral-3, Not very satisfied-4, Dissatisfied-5
Speech outcome: Clearly understand always-1, Requires repetition sometimes-2, Requires repetition many times-3, Understood by the relatives only -4, Unintelligible-5
Swallowing outcome: Any food no difficulty -1, Solid food with difficulty -2, Semisolid food only - 3, Liquids only -4, Cannot swallow at all-5 The smaller the number of likert scale the better the outcome. Likert scale of each case was measured and average of all cases from same group was plotted in chart.

Functional outcome of different flaps were assessed at two times at different stages of follow up period of 3 months and 6 months of post treatment. Demographic data like age, gender, staging of the tumour, site of primary tumour, type of flap used for reconstruction were taken into consideration for comparison as per proforma. Detailed evaluation of the postoperative functional outcomes in the form of swallowing, speech and cosmesis along with the due intraoperative and postoperative complications of the flap were done according to proforma. We used functional intraoral glassgow scale (FIGS).

FIGS

The FIGS is a useful and multidimensional scale which is specifically designed for use in oral cavity malignancy patients. This is a likert scale consists of 5 grades scoring which are used to assess the three main domains of functional outcome: Cosmetic satisfaction, speech and swallowing.

Detailed analysis of the functional outcome of all of the patients in the study was done and a comparison was

made of the overall outcome scores with respect to each specific function taking all other variables like site, staging of primary tumour and free flaps used for reconstruction which have been included in the proforma, into consideration.

RESULTS

Figure 5 of functional outcome shows that although cosmetic satisfaction is good in patients with free radial artery forearm flap reconstruction but swallowing outcome shows good result with anterolateral thigh flap reconstruction after three months and six months of completion of treatment. For more advanced lesion of buccal mucosa (T3-Tumour >4 cm and T4-tumour >4 cm and also involves bone, muscles and other surrounding structures) speech and swallowing function were better achieved by anterolateral thigh flap and free fibular osseocutaneous flap.

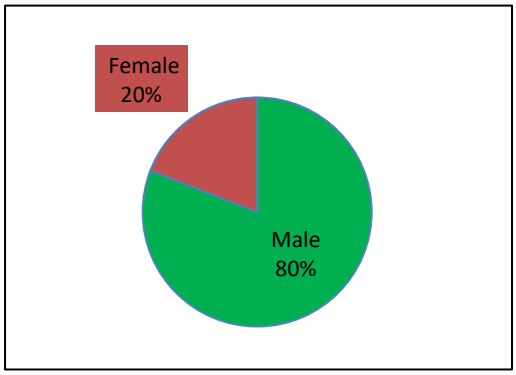

Figure 1: Distribution of cases according to gender.

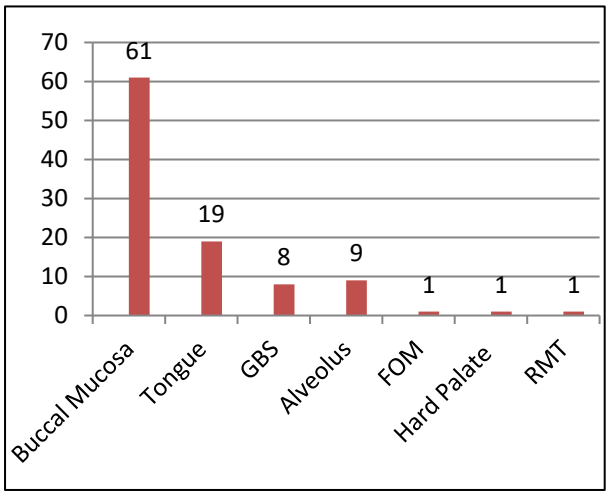

Figure 2: Distribution of cases according to site of primary tumour, N=100.

A total of 100 patients with oral cavity malignancies were assessed. The demographic data showed that oral cavity malignancies is more common in the males (80%) between the age group of 26-50 years with the most common site of cancer being the buccal mucosa (61%).

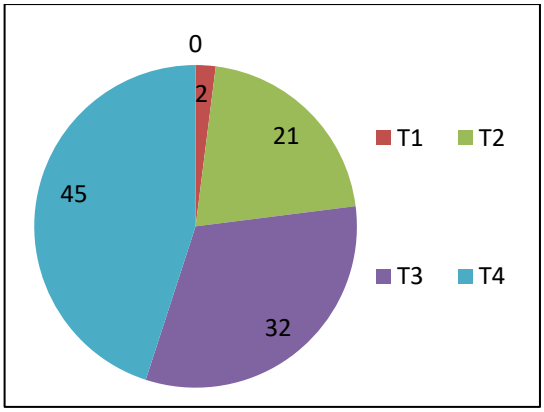

Figure 3: Distribution of cases according to size of tumour, N-100.

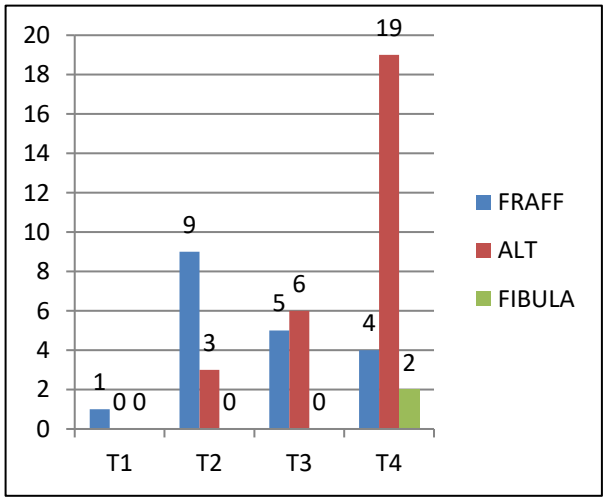

Figure 4: Distribution of cases according to flap used for reconstruction, N-49.

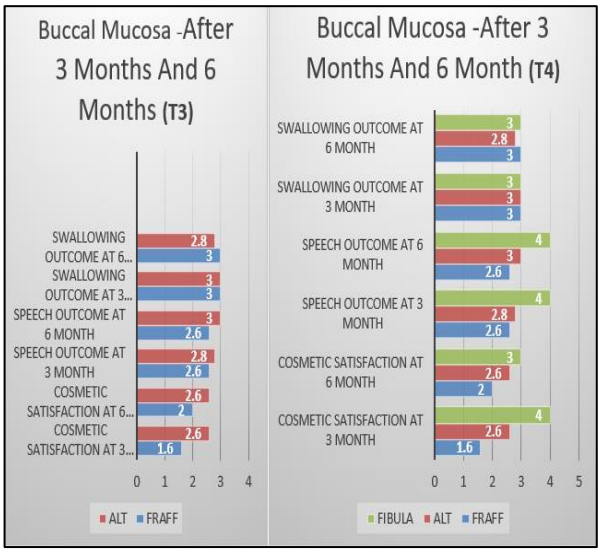

Figure 5: Buccal mucosa after 3 months and 6 months (T3) and buccal mucosa after 3 months and 6 months (T4).

Table 2: Cosmetic satisfaction in patients of SCC Of buccal mucosa and reconstruction with free flap, after the duration of 3 and 6 months.

			Cosmetic satisfaction		Cosmetic satisfaction		3 months	6 months
			Satisfied	Unsatisfied	Satisfied	Unsatisfied	Total	Total
Type flap	FRAFF	Count	8	9	10	19	11	19
		% within Type Flap	42.1%	47.4%	52.6%	100.0%	57.9%	100.0%
	ALT	Count	7	8	20	28	21	28
		% within Type Flap	25.0%	28.6%	71.4%	100.0%	75.0%	100.0%
	Fibula	Count	0	1	1	2	2	2
		% within Type Flap	.0%	50.0%	50.0%	100.0%	100.0%	100.0%
Total		Count	15	34	18	31	49	49
		% within Type Flap	30.6%	69.4%	36.7%	63.3%	100.0%	100.0%

Table 3: Speech outcome in patients of SCC of buccal mucosa and reconstruction with free flap, after the duration of 3 and 6 months.

		Speech outcome (3months)		
Count % within Type Flap		Somewhat understandable	Under-standable	Total
Flap	FRAFF	4	15	19
		21.1%	78.9%	100.0%
	ALT	16	12	28
		57.1%	42.9%	100.0%
	Fibula	2	0	2
		100.0%	.0%	100.0%
Total		22	27	49
		44.9%	55.1%	100.0%

The data also showed that majority of the patients presented at Stage IV of their disease (45%). Study of functional outcome suggested that in 55% cases of carcinoma of buccal mucosa anterolateral thigh flap was used in which speech outcome was understandable in 12 cases, in swallowing outcome 1 patient had no dysphagia out of total 28 cases after the duration of three months.

Speech outcome was understandable in 13 cases, in swallowing outcome 2 patients had no dysphagia out of total 28 cases after the duration of six months. ($p<0.05$) In 52% cases of carcinoma tongue, reconstruction was done with FRAFF. Reconstruction with FRAFF was done in 15 cases and swallowing outcome 5 patients had no dysphagia out of total 19 cases after the duration of three months.

Speech outcome was understandable in 13 cases and in swallowing outcome 5 patients had no dysphagia out of total 19 cases after the duration of six months.

Table 4: Speech outcome in patients of SCC of buccal mucosa & reconstruction with free flap, after the duration of 6 months.

Speech outcome (6 months)		
Somewhat understandable	Understandable	Total
4	15	19
31.6%	68.4%	100.0%
15	13	28
53.6%	46.4%	100.0%
1	1	2
50.0%	50.0%	100.0%
22	27	49
44.9%	55.1%	100.0%

Table 5: Swallowing outcome in patients Of SCC Of buccal mucosa and reconstruction with free flap, after the duration of 3 months.

		Swallowing outcome (3months)			
Count % within type of flap		Mild dysphagia	Moderate dysphagia	No dysphagia	Total
Type flap	FRAFF	12	2	5	19
		63.2%	10.5%	26.3%	100.0%
	ALT	26	1	1	28
		92.9%	3.6%	3.6%	100.0%
	Fibula	1	1	0	2
		50.0%	50.0%	.0%	100.0%
Total		39	4	6	49
		79.6%	8.2%	12.2%	100.0%

Table 6: Swallowing outcome in patients Of SCC Of buccal mucosa and reconstruction with free flap, after the duration of 6 months.

Swallowing outcome (6 months)			
Mild dysphagia	**Moderate dysphagia**	**No dysphagia**	**Total**
13	1	5	19
68.4%	5.3%	26.3%	100.0%
25	1	2	28
89.3%	3.6%	7.1%	100.0%
2	0	0	2
100.0%	0.0%	0.0%	100.0%
40	2	7	49
81.6%	4.1%	14.3%	100.0%

DISCUSSION

Looking at the clinical characteristics of the oral cancer patients, Barrios et al, in their study, showed that most common site affected by squamous cell carcinoma was tongue (47%), Which was showing poor functional outcome (SF-12) for speech and swallowing functions. ($p<0.001$) At our institute patients showed higher incidence for buccal mucosa (61%) squamous cell carcinoma and thus affected cosmetic satisfaction (FIGS-4) and swallowing functions. (FIGS-3) ($p<0.05$) Tongue (19%) was 2nd most common site for malignancy and that had affected speech (FIGS-4) and swallowing function (FIGS-3) significantly. ($p<0.05$).[6]

In our study the data showed that majority of the patients presented at Stage IV of their disease (45%) and functional outcome for speech (44.9%), swallowing (12.2%) and cosmetic satisfaction (30.6%) in advanced disease (stage III, IV) was poor as compared to early stage disease which has functional outcome for speech (54.9%), swallowing (20%) and cosmetic satisfaction (32%). ($p<0.05$) Similarly Souza et al, in their study showed that majority of patients have been diagnosed with advanced stage III (35%) and IV (45%) and functional outcome was poor among 65% of subjects in whom KPS (Karnofsky Performance Status) scores <80%. Social scale was 18 and ($p= 0.0311$).[7]

Hsiao et al assessed all the glossectomised subjects for the articulation and the swallowing function following reconstruction with ALT and FRAFF after the duration of 3 months of the supra-major surgery. In their study the differences in the incidence of the speech and swallowing function between two groups were not significant ($p>0.05$). Clinical speech evaluation, swallowing were assessed in total 33 patients reconstructed with FRAFF, ALT.

Functional results with both flaps were adequate and the groups did not differ significantly between each other for either speech or swallowing. In contrast, our study had total 28 cases of buccal mucosa (T2, T3, T4 lesion) which were reconstructed using ALT flap, in total 19 cases of buccal mucosa FRAFF were used which showed statistical significance in outcome of speech and swallowing function after the duration of 3 and 6 months. Functional outcome for speech (FIGS-1.9) and swallowing (FIGS-1.8) was good with FRAFF for small defects and functional outcome for speech (FIGS-2.8) and swallowing (FIGS-2.8) showed good results with ALT ($p<0.05$).[8]

Figure 1: Patient with squamous cell carcinoma of right buccal mucosa, reconstruction was done with free radial artery forearm flap- Stage T2.

Figure 2: Patient with squamous cell carcinoma of left buccal mucosa, reconstruction was done with anterolateral thigh flap- T4.

In our study ALT flap was showing excellent functional outcome due to its versatility in design, long pedicle with a suitable vessel diameter and the neglected donor site morbidity. The donor sites were all closed directly without complication. This is similar to study done by Hsiao et al. They also measured success rate in the FRAFF flap group in that 33 flaps survived and there was necrosis in 1 flap (success rate 97.1%). In our study there was necrosis of 8 FRAFF out of total 37 FRAFF (success rate in FRF 78%), Out of 46 ALT there was necrosis of 8 flaps (success rate in ALT 82%) and Out of 17 Fibula there was necrosis of 8 flaps (success rate in fibula 52%). In the ALT flap group however, it is usually too thick to reconstruct tongue defects. As the reconstruction of tongue defects often requires a relatively thin skin flap, at present the most widely used flap for tongue defects is the FRAFF flap.[8,9]

The three dimensional reconstruction of the oral cavity using the free anterolateral thigh flap done by Cipriani et al, proved that in majority of cases anterolateral thigh flap (17 cases) was used for reconstruction of oral cavity malignancy due its versatility, large sized vessels, great bulkiness. Speech and swallowing function showed significant outcome after reconstruction with large defects of oral cavity. ($p<0.05$) Which is similar to our study, we used anterolateral thigh flap in 28 cases of buccal mucosa to reconstruct larger defect of composite resections and restored swallowing and speech functions by improving bulk of buccal mucosa. ($p<0.05$).[10]

In case series by Kroll SS, Schusterman MA for pedicle flap, three flaps had total necrosis and success rate was 90%. The cause of flap loss was venous thrombosis in 2 patients and infection was in 1 patient. Our study shows that thrombosis of a free flap pedicle was the most common during the first postoperative week. In our study for T2 lesion of buccal mucosa who were reconstructed with salvage pedicle flap patients were somewhat satisfied with their cosmetic outcome, speech required repetition many times and patient were able to take semisolid food, for T3 lesion of buccal mucosa who were reconstructed with salvage pedicle flap patients were somewhat satisfied with their cosmetic outcome, speech required repetition many times and patients were able to take liquids food, for T4 lesion of buccal mucosa who were reconstructed with salvage pedicle patients were neutral with their cosmetic outcome, speech required repetition sometimes and patients were able to take semisolid food. It is likely that the success rate could be improved if greater care was taken to identify and salvage of failing free flaps. They discussed that pedicle flap has reliable vascular supply & it was used where bulk was needed. In our study pedicle flap were also used as salvage surgery in cases of free flap failure and it showed good versatility making it suitable for reconstruction of various oral cavity defects & hence in both studies pedicle flap continued to be one of the most widely used flap.[11]

Onakoya et al showed that patients aged <65 years old, when compared with those of >65 years of age had decreased functional outcome ($p=0.040$). Similarly in our study cosmetic satisfaction (33%), speech function (32.3%) and swallowing function (4%) was reduced in age group of 26-50 years. In age group >50 years cosmetic satisfaction (41%), speech function (35%) and swallowing function (13%) was comparatively better than younger age group. This group is exposed to their occupational and social environments which make them disable as compare to other disease free population.[11]

Limitations of study

Patients reconstructed with local and other regional flap cannot be assessed. Patient who failed with free flaps and reconstructed with salvage pedicle flap shows poor results due to long morbidity. This is observational study according to patient's perception which may vary.

CONCLUSION

The use of free flaps in reconstruction of oral cavity malignancies after tumour resection should aim at maintenance of functional outcome of cosmesis, speech and swallowing. Future research in this field should employ standardized and reliable evaluation of functional outcome using multiple modalities in well designed studies with longer follow-up.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Tarsitano A, Vietti MV, Cipriani R. Functional results of microvascular reconstruction after hemiglossectomy: free anterolateral thigh flap versus free forearm flap. Acta Otorhinolaryngol Ital. 2013;33:374-9.
2. Joo YH. Guidelines for the surgical management of oral cancer : Korean Society of Thyroid-Head and Neck Surgery Guideline Clin Exp Otorhinolaryngol. 2019;12(2):107-44.
3. Matthew M, Hanasono. Reconstructive surgery for head & Neck cancer patients The University of Texas M.D. Anderson Cancer Center. 2019;12:4-12.
4. Hsiao HT, Leu YS, Liu CJ, Tung KY, Lin CC. Radial forearm versus anterolateral thigh flap reconstruction after hemiglossectomy: functional assessment of swallowing and speech. J Reconstr Microsurg. 2008;24:85-8.
5. Collins SL. Quality of life issues in head and neck cancer management. In: Penzak M (ed.). Current controversies in otorhinolaryngology. New York: Thieme. 2000;101-15.
6. Barrios R, Medina BG, Tsasakos G. Oral and general health related quality of life in patients treated for oral cancer compared to control group. 2015;13(9):1-8.
7. Jenevive P, D.Souza J. Quality of Life of Head and Neck Cancer Patients Receiving Cancer Specific Treatments. JKIMSU. 2013;2(1).
8. Hsiao HT, Leu YS, Liu CJ, Tung KY, Lin CC. Radial forearm versus anterolateral thigh flap reconstruction after hemiglossectomy: functional assessment of swallowing and speech. J Reconstr Microsurg. 2008;24:85-8.
9. Huang CH, Chen HC, Huang YL, Mardini S, Feng GM. Comparison of the radial forearm flap and the thinned anterolateral thigh cutaneous flap for reconstruction of tongue defects: An evaluation of donor-site morbidity. Plast Reconstr Surg. 2004;114:1704-10.

10. Cipriani R, Contedini F, Caliceti U, Cavina C. Three dimensional reconstruction of the oral cavity using the free anterolateral thigh flap. Plast Reconstr Surg. 2002;109:53-7.
11. Paul A. Onakoya. Quality of life in patients with head and neck cancers; J Natl Med Assoc. 2006;98(5):765-70.

Cite this article as: Modi DB. Study of functional outcome of free flap reconstruction in oral cavity malignancies. Int J Otorhinolaryngol Head Neck Surg 2022;8:184-90.