FUNCTIONAL ASSESSMENT OF FREE RADIAL ARTERY FOREARM FLAP AFTER TONGUE RECONSTRUCTION FOLLOWING HEMIGLOSSECTOMY IN A TERTIARY CARE CENTRE OF CENTRAL INDIA

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ABSTRACT

BACKGROUND

Primary closure following oncosurgical resection of ca. tongue has been found to compromise tongue function in regard to speech and swallowing very badly. In contrast, reconstruction of tongue with free radial forearm flap following oncosurgical resection has shown promising functional tongue

The aim of this study was to assess the function of tongue after hemiglossectomy and reconstruction with free radial artery forearm flap.

MATERIALS AND METHODS

30 Patients who had undergone reconstruction of tongue with FRAF flap following the hemiglossectomy or subtotal glossectomy for ca. tongue.

RESULTS

In 30 patients of tongue carcinoma, hemiglossectomy with modified radical neck dissection with radial forearm free flap reconstruction was done. After 3 months and 9 months follow up, the radial forearm free flap reconstruction in the tongue had acceptable appearance and good tongue mobility with intelligible speech on the basis of modified Washington score. The patient tongue function was improved compared to hemiglossectomised tongue.

CONCLUSION

Data obtained in the present study shows reasonable functional improvement in terms of speech, appearance, swallowing, saliva, chewing, taste, at the end of 3 months. Best functional score was not obtained at that point of time. Further during course of follow up at 9 months the improvement in tongue function was better and statistically significant.

KEY WORDS

Tongue, Free Radial Forearm Flap, Hemiglossectomy.

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BACKGROUND

Squamous cell carcinoma of tongue is a highly malignant condition and results in significant mortality and morbidity. However, early detection and treatment results in better outcome and prolongs survival. The morbidity following extensive resection of tongue results in severe speech and swallowing disturbances and life-threatening aspiration that needs reconstruction.

The ideal method of reconstruction should provide good functional and aesthetic outcome. The field of reconstructive surgery in the head-neck region is a dynamic one and has gone through numerous changes in past two decades. Microvascular free flap technique has largely replaced other techniques.^{1,2,3} Free flaps such as radial forearm flap and anterolateral thigh flap have become the first choice in tongue reconstruction.

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Preservation of function including speech and swallowing, and restoration of appearance are the major goals of reconstruction.

Our technique of free radial forearm flap for reconstruction of tongue following oncosurgical resection in a series of patients could fulfil the reconstructive goals to a great extent.

The free radial forearm flap is a workhorse flap in tongue reconstruction. Its lack of extra bulk, robust vascularity, long vascular pedicle, good calibre of the vessels, relative ease of dissection, flexibility in designing and lack of significant donor site morbidity are among its main advantages. Its low flap loss and complication rate offer the best choice for reconstruction of tongue following oncosurgical resection.^{4,5,6}

Aim of Study

To assess the function of tongue after reconstruction with free radial artery forearm flap following hemiglossectomy for Ca tongue.

Type of Study

Interventional study.

MATERIALS AND METHODS

The present study was conducted in the Department of SURGERY M.Y Hospital and Mahatma Gandhi Medical College,

Indore, over a period of 18 MONTH. We enrolled 30 Patient who had undergone reconstruction of tongue with FRAF flap following the hemiglossectomy or subtotal glossectomy for Ca tongue.⁶⁻¹⁰ They fulfilled all inclusion/exclusion criteria, and all provided written informed consent for the participation. The research protocol was approved by the Institutional ethics and scientific review committee.

Figure 1. Before Hemiglossectomy Mass in Situ

Figure 2. Marking the Flap Before Harvesting the Flap

Figure 3. The Free Radial Artery Flap Pedicled On Its Vasculature Before Harvest

Figure 4. Hemiglossectomy Done with Radial Artery Forearm Flap

Inclusion Criteria

All patients who has undergone reconstruction of tongue with FRAF following the hemiglossectomy or subtotal glossectomy for Ca tongue & coming to M. Y. Hospital, Indore.

Exclusion Criteria

Total glossectomy patients. Patient not reconstructed with FRAF.

Scale

Scales are used for Functional Assessment of Reconstructed Tongue with Free Radial Artery Forearm-

The modified University Of Washington Questionnaire (Rogers SN and Lowe D the University of Washington quality of life (UW-QoL) scale for "Handbook of Disease Burdens and Quality of Life Measures",¹¹⁻¹⁷

<http://refworks.springer.com/DiseaseBurdens/> (2010)

Statistical Analysis

Statistical analysis was done using Stata version 10 (StataCorp, Texas and USA). Students' test, Chi-square test was used for categorical variables.

RESULTS

In 30 patient of tongue carcinoma, underwent hemiglossectomy with modified radical neck dissection and extended supraomohyoid neck dissection with radial forearm free flap reconstruction was done. After 3 months and 9 months follow-up, the radial forearm free flap reconstruction in the tongue had acceptable appearance and good tongue mobility with intelligible speech on the basis of modified Washington score.¹⁸⁻²⁰ The patient tongue function was improved than hemiglossectomised tongue.

Tongue Assessment	No. of Patient	Score							% Best Score	Mean	SD
		0	25	30	50	70	75	100			
Swallowing	30	10	-	20	-	-	-	-	0%	20.00	14.00
Taste	30	8	-	22	-	-	-	-	0%	22.00	13.2
Speech	30	13	-	17	-	-	-	-	0%	17.00	14.8
Saliva	30	15	-	15	-	-	-	-	0%	15.00	15.25
Appearance	30	14	16	-	-	-	-	-	0%	13.3	12.4
Chewing	30	29	1	-	-	-	-	-	0%	1.61	8.03

Table 1. Washington Score at 3 months

Tongue Assessment	No. of Patients	Score							Best Score	Mean	SD
		0	25	30	50	70	75	100			
Swallowing	30	2	-	3	-	12	-	13	43%	74.33	28.90
Taste	30	2	-	6	-	6	-	16	53%	73.33	30.8
Speech	30	1	-	2	-	15	--	12	40%	77	24.10
Saliva	30	2	-	6	-	6	-	16	53%	73.33	33.39
Appearance	30		1	-	6	-	15	8	26	75	19.36
Chewing	30	5	-	-	15	-	-	10	33	58.3	34.35

Table 2. Washington Score at 9 months

The paired 't' test was used to find out the difference between the swallowing at 3 months and swallowing at 9 months. Mean and standard deviation of swallowing at 3 months was 20.00 ± 14.384 and the mean swallowing at 9 months was 73.33 ± 29.400 . and p value obtained was 0.000, which is significant.

Study Parameter	Mean	Std. Dev.	p-Value
Swallowing at 3 Months	20.00	14.384	0.000
Swallowing at 9 Months	73.33	29.40	

Table 3. Comparison of Tongue Swallowing-Functional After Surgery At 3 Months And at 9 Months

The paired 't' test was used to find out the difference between the taste at 3 months and taste at 9 months. The mean taste of at 3 months was 22.00 ± 13.49 and the mean taste at 9 months was 76.67 ± 31.3 . And p value obtained was 0.000, which is significant.

Study Parameter	Mean	Std. Dev.	p-Value
Taste at 3 Months	22.00	13.49	0.000
Taste at 9 Months	76.67	31.3	

Table 4. Comparison of Tongue Taste-Functional After Surgery at 3 Months and at 9 Months

The paired 't' test was used to find out the difference between the appearance at 3 months and appearance at 9 months. Appearance at 3 months was 13.33 ± 12.605 and the mean Appearance at 9 months was 75.00 ± 19.696 and p value obtained was 0.000, which is significant.

Study Parameter	Mean	Std. Dev.	p-Value
Saliva at 3 Months	15.00	15.256	.000
Saliva at 9 Months	73.33	33.97	

Table 5. Comparison of Tongue Saliva-Functional After Surgery at 3 Months and at 9 Months

Data obtained in the present study shows reasonable functional improvement in terms of speech, appearance, swallowing, saliva, chewing, taste, at the end of 3 months. Best functional score was not obtained at that point of time. Further during course of follow up at 9 month the improvement in tongue function was better and statistically significant.

Study Parameter	Mean	Std. Dev.	p-Value
Speech at 3 Months	17.00	15.120	.000
Speech at 9 Months	77.00	24.516	

Table 6. Comparison of Tongue Speech-Functional After Surgery at 3 Months and at 9 Months

The paired 't' test was used to find out the difference between the saliva at 3 months and saliva at 9 months. Saliva mean at 3 months was 15.00 ± 15.256 and the mean saliva at 9 months was 73.33 ± 33.97 and p value obtained was 0.000, which is significant.

Study Parameter	Mean	Std. Dev.	p-Value
Appearance at 3 Months	13.33	12.685	.000
Appearance at 9 Months	75.00	19.696	

Table 7. Comparison of Tongue Appearance-Functional After Surgery at 3 Months and at 9 Months

The paired 't' test was used to find out the difference between the chewing at 3 months and chewing at 9 months. Chewing at 3 months was 1.67 ± 9.129 and the mean chewing at 9 months was 58.33 ± 34.947 and p value obtained was 0.000, which is significant.

Study Parameter	Mean	Std. Dev.	p-Value
Chewing at 3 Months	1.67	9.129	.000
Chewing at 9 Months	58.33	34.947	

Table 8. Comparison of Tongue Chewing-Functional After Surgery at 3 Months and at 9 Months

The paired 't' test was used to find out the difference between the speech at 3 months and speech at 9 months. Speech at 3 months was 17.00 ± 15.120 and the mean speech at 9 months was 77.00 ± 24.516 and p value obtained was 0.000, which is significant.

DISCUSSION

Squamous cell carcinoma of tongue typically affects men in sixth to eighth decades having a strong association with alcohol and tobacco abuse over years. Less than 4% of these lesions have been reported in patients younger than 40 years. Retrospective analysis suggested that the disease runs a more aggressive course in under-40 age group. 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 neck node involvement. In order to achieve a good therapeutic control of the disease, a wide local excision and neck dissection are to be done as a primary procedure.

This oncosurgical resection results in a large three-dimensional defect of the tongue and floor of the oral cavity that impairs speech, swallowing and imposes risk of aspiration. It is therefore prudent to reconstruct the defect with a well vascularised tissue for a good functional substitution. The free radial forearm flap is a workhorse flap in tongue reconstruction. Its lack of extra bulk, long vascular pedicle, good calibre of the vessels, pliability and minimal donor site morbidity are among its main advantages; the flap harvest is relatively easy and good calibre of the vessels is suitable for anastomosis with a high success rate. The free radial forearm flap, therefore, offers the best choice for reconstruction of tongue following oncosurgical resection. In our study, venous congestion occurred in one patient after 48 hours postoperatively and couldn't detect any fresh bleeding point and the flap survived. Thus, our flap survival rate was approximately 92%. Song et al. reported a flap survival rate greater than 90%; Kruse et al. reported that the success rate of free radial forearm flap was more than 95%; Shibahara et al.²¹ reported a total success rate of 100%. It emphasizes

the reliability of free radial forearm flap for reconstruction of head and neck defect.

In Our study we study the functional assessment of tongue on the basis of modified Washington score we asses swallowing, taste, appearance, chewing, speech, saliva on 3 and 9 months respectively., there was a significant Chuah UC, Kamarul T, Sara T study was also shows it to be is significant. difference between the at 3 months and at 9 months, showing the effectiveness of the intervention used.

CONCLUSION

The radial forearm free flap is a viable reconstructive option for tongue defects especially where a thin, pliable flap is needed. Data obtained in the our study shows reasonable functional improvement in terms of speech, appearance, swallowing, saliva, chewing, taste, at the end of 3 months. Best functional score was not obtained at that point of time. Further, during the course of follow up at 9 month the improvement in tongue function was better and statistically significant. However, further prospective studies and quality of life assessments involving greater numbers of patients are necessary for validation of study.

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