

Original Research Article

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Post-operative speech and swallowing in partial glossectomy patients: role of effective rehabilitation

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ABSTRACT

Background: The tongue is a frequent site for oral carcinoma. Quality of life in such patients is often compromised post treatment in terms of speech and swallowing functions. Although swallowing and speech are included in several health-related quality of life scales, postoperative rehabilitation that influences these domains is not very well studied. This study was conducted to assess the speech and swallowing impairment after partial glossectomy for the tongue cancer patients and role of speech therapy and swallowing rehabilitation exercises in effective postoperative rehabilitation.

Methods: 50 patients of carcinoma of the tongue managed with partial glossectomy as the definitive treatment were included in the study. Postoperative rehabilitation was offered to all patients, however 10 defaulted. Improvement in speech intelligibility, articulation and swallowing at 15 days, 1 month, 3 months and 06 months after surgery were recorded.

Results: All three parameters of speech intelligibility, articulation and swallowing which were analysed showed improvements during each follow-up visit. Results obtained for both groups, on comparison showed statistically significant earlier improvement in patients who were receiving rehabilitation therapy versus those who were not receiving any rehabilitation.

Conclusions: Postop speech and swallowing rehabilitation can be an effective tool for improving quality of life. It is imperative to develop easy and simple modules for rehabilitation for patients of oral cancers that can be practiced during the postop follow up and at home with the assistance of family members to ensure uncompromised quality of life post treatment.

Keywords: Oral cancers, Speech intelligibility, Articulation, Swallowing, Rehabilitation

INTRODUCTION

The tongue is a frequent site for oral carcinoma. The size, type and site of the lesion determine the treatment modality. The quality of life of patients with oral cancers is often compromised post treatment. As the tongue plays a pivotal role in the process of mastication, deglutition and speech articulation, problems arise especially in these functions.^{1,2} As all of these three functions are crucial for

the social life of an individual and are easily noticed, patients with tongue cancers have considerable difficulties in avoiding social embarrassment. Therefore, these abilities can be used as a measure of the functional outcome of surgery in patients of tongue cancer.

The follow-up of patients who undergo partial glossectomy includes evaluation for residual, recurrent or new primary malignancy and the provision of

psychological and social support to patients and family members. In addition, patients should be monitored for the development of non-neoplastic morbidity related with surgery such as functional outcomes.³⁻⁵ Postoperative speech and swallowing are held important by patients after primary surgery for tongue cancer.⁶⁻⁸ Although swallowing and speech are included in several scales of health-related quality of life in tongue cancer patients, very few studies have explored the predictive factors that influence these domains.⁹⁻¹¹ Detecting speech and swallowing impairment after oral and oropharyngeal cancer treatment would allow us to provide additional information to patients before treatment and to involve them in therapeutic decision making. Moreover, assessing post treatment impairment could constitute an educational objective in the formation of the multidisciplinary approach.

With the above in mind, a this prospective cohort study was conducted to assess the speech and swallowing impairment after partial glossectomy for the tongue cancer patients and role of speech therapy and swallowing rehabilitation exercises in effective post-operative rehabilitation.

METHODS

50 patients of carcinoma of the tongue with T1 – T2 SCC lesion of the anterior 2/3rd of tongue with clinically negative neck nodes and who were managed with partial glossectomy surgery as the definitive treatment were included in the study. The study was carried out at the Department of Otorhinolaryngology and Head and Neck Surgery, Army Hospital (R&R), Delhi Cantt, a tertiary care referral hospital of the Armed Forces, between December 2016 and March 2018. Patients with T3 – T4 lesions, proven cervical nodal metastasis and managed with other modalities like radiotherapy and chemotherapy were excluded from the study. Cases with lesions involving other subsites of oral cavity and recurrent disease were also not part of the study.

Validated questionnaires for obtaining demographic information, postoperative functional deficits such as speech articulation, intelligibility, and deglutition were used. Speech therapy and swallowing exercise sessions were scheduled for each of these patients. 40 patients attended the rehabilitation sessions regularly (Rehabilitation group/Group I), however 10 patients (Non rehabilitation group/Group II) defaulted. The defaulters were assessed for speech and swallowing function when they reported for oncological follow up.

Speech intelligibility was determined by the evaluation of patients recorded speech. Intelligibility was evaluated as per following categories during each session of rehabilitative therapy –

- Speech is unintelligible,
- Speech intelligibility is difficult,

- Speech is intelligible with careful listening,
- Intelligible speech with noticeable errors,
- Occasional sound errors noticed in continuous speech,
- No sound errors noticed in continuous speech,

Speech articulation proficiency was assessed by using a phonetically balanced word list

Articulation was graded as per the following categories

- Severe articulatory defect/Unintelligible,
- More than three placements defective,
- Three placements defective,
- Three to four consonants defective,
- Two consonants defective,
- No error presents.

Deglutition/swallowing were evaluated by subjective responses to the questions listed in the evaluation by the patient or his attendant (generally this is a spouse or any near relative of the patient).

Patients were evaluated by the speech pathologist immediately after removal of naso-gastric tube. The functions evaluated by the speech pathologist included speech intelligibility, articulation, and the oral phase of swallowing. Before starting the speech therapy and exercises to correct dyslalia, the patients were asked to perform deglutition exercises to improve sucking, blowing ability and the functioning of oral musculature.

Patients were advised to suck saliva forcibly into the pharynx, which most of them learnt within 4-5 days. This helped to improve swallowing abilities. During this period patients were also advised exercises such as moving the tongue in different directions and blowing which helped in improving the function of oral cavity musculature and movement of the tongue which is essential for articulation.

During the next week, speech therapy sessions were started to improve the articulation of different consonants. The speech therapy session averaged 25-30 minutes daily and patients were asked to repeat the exercises for 15 minutes after every 4 hours at home. After 2 weeks the speech therapy sessions were reduced to three times a week and during the fourth week, patients were asked to report twice a week. The patients were assessed after 15 days (F1), one month (F2), 3 months (F3) and 06 months (F4) of surgery. The results so obtained for both groups were compared, statistically analyzed with the chi square test and a p value was obtained.

RESULTS

All the 50 patients in our study belonged to 30–68 years of age group with mean age 44.54 years. 40 patients

(Group I) underwent rehabilitation therapy as scheduled with mean age 44.96 years. 10 patients (Group II) who didn't receive rehabilitation therapy cited their personal problems and reluctance had a mean age of 43.96 years. There were 32 males and 18 females with a Male: Female ratio of 1.77:1 in the study. Patients who received rehabilitation therapy including 26 (65 %) male patients and 14 (35%) female patients with a male female ratio 1.87:1. Patients who did not receive rehabilitation therapy including 06 (60%) male patients and 04 (40%) female patients with a male female ratio 1.5:1.

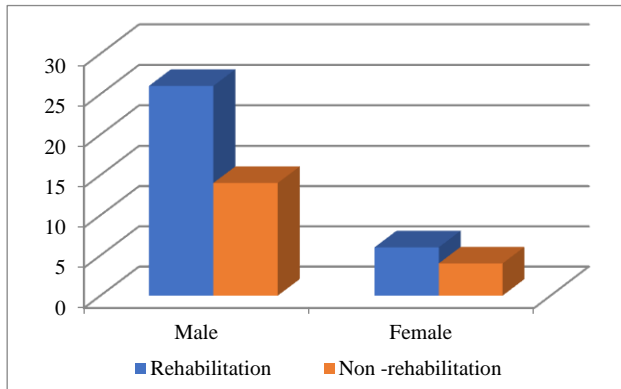


Figure 1: Sex distribution of cases.

Tumor sites were lateral border of tongue (right or left), dorsum of tongue and ventral surface of tongue. Lateral border of tongue either side is most common site (54%) affected. In the rehabilitation group– 62.5% patients were

in stage I and 37.5% patients were in stage II where as in the non-rehabilitation group - 50% patients were in stage I and 50% patients were in stage II.

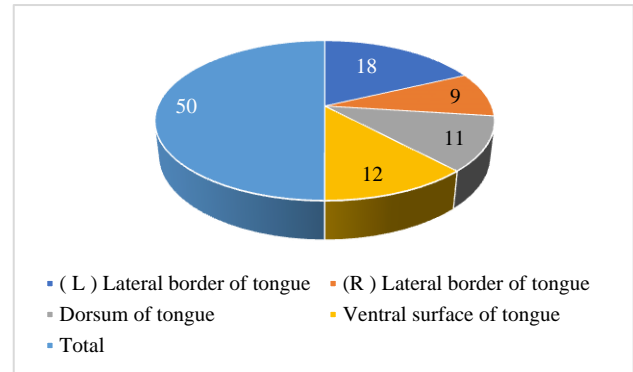


Figure 2: Site of primary lesion.

Evaluation of speech Intelligibility

In the pre-op evaluation of the 40 patients in Group I, 06 (15%) had a noticeable speech error, 08 (20 %) had an occasional speech error and 26 (65%) of the patients did not have any appreciable speech error. In Group II, 03 (30%) had occasional speech error and 07 (70%) patients did not have any appreciable speech error.

Speech intelligibility function assessed as per above criteria during the four follow up visits in both groups is summarized in Table 1 below.

Table 1: Speech intelligibility Group I (N=40) and Group II (N=10).

Assessment criteria	Pre-op		F1		F2		F3		F4	
	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)
Unintelligible	-	-	6 (15)	5 (50)	-	-	-	-	-	-
Speech intelligibility is difficult	-	-	8 (20)	3 (30)	4 (10)	5 (50)	2 (5)	4 (40)	2 (5)	3 (30)
Intelligible speech on careful listening	-	-	14 (35)	2 (20)	11 (27.5)	3 (30)	7 (17.5)	2 (20)	4 (10)	1 (10)
Noticeable sound error	6 (15)	-	12 (30)	-	13 (32.5)	1 (10)	10 (25)	1 (10)	11 (27.5)	2 (20)
Occasional sound error	8 (20)	3 (30)	-	-	12 (30)	1 (10)	12 (30)	2 (20)	10 (25)	2 (20)
No error	26 (65)	7 (70)	-	-	-	-	9 (22.5)	1 (10)	13 (32.5)	2 (20)

P value on chi square test: 0.048758.

Results of both the groups were compared and on statistical evaluation a p value of 0.048758 (statistically significant) was obtained. Thus speech intelligibility recovery in the group of patients that underwent rehabilitation therapy was statistically significantly better than in the non rehabilitation group.

Articulation difficulty evaluation and analysis

In the pre-op evaluation of the patients in Group I, 05 (12.5%) patients had 3–4 defective consonants in speech, 07 (17.5%) patients had 1–2 defective consonants in speech and 28 (70%) patients did not have any appreciable articulation defect whereas in patients of

Group II, 03 (30%) patients had 1–2 defective consonants in speech and 7 (70%) patients did not have any appreciable articulation defect.

Speech articulation function assessed as per above criteria during the four follow up visits in both groups is summarized in Table 2 below.

Table 2: Speech articulation Group I (n=40) and Group II (N=10).

Assessment criteria	Pre-op		F1		F2		F3		F4	
	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)
Severe articulatory defect	-	-	8 (20)	5 (50)	-	4 (40)	-	-		
More than 03 placement defective	-	-	12 (30)	3 (30)	2 (5)	2 (20)	2 (5)	4 (40)	1 (2.5)	2 (20)
03 placement defective	-	-	14 (35)	1 (10)	17 (42.5)	2 (20)	10 (25)	2 (20)	3 (7.5)	3 (30)
03-04 consonant defective	5 (12.5)	-	6 (15)	1 (10)	13 (32.5)	1 (10)	8 (20)	2 (20)	9 (22.5)	2 (20)
02 consonant defective	7 (17.5)	3 (30)	-	-	6 (15)	1 (10)	14 (35)	1 (10)	9 (22.5)	2 (20)
No error	28 (70)	7 (70)	-	-	2 (5)		6 (15)	1 (10)	18 (45)	1 (10)

P value on chi square test: 0.039057.

Results of both the groups were compared and on statistical evaluation a p value of 0.039057 (statistically significant) was obtained. Thus speech articulation recovery in the group of patients that underwent rehabilitation therapy was statistically significantly better than in the non rehabilitation group.

Deglutition/ swallowing evaluation and analysis

In the pre-op evaluation of the in group of patients in Group I, 16 (40%) patients had a fair deglutition function and 24 (60%) patients were under the good category. In

Group II, 04 (40%) patients had fair swallowing function while 06 (60%) patients were under the good category.

Deglutition function assessed as per above criteria during the four follow up visits in both groups is summarized in Table 3 below.

Results of both the groups were compared and on statistical evaluation a p value of 0.02287 (statistically significant) was obtained. Thus deglutition function recovery in the group of patients that underwent rehabilitation therapy was statistically significantly better than in the non-rehabilitation group.

Table 3: Deglutition/swallowing Group I (N=40) and Group II (N=10).

Assessment	Pre op		F1		F2		F3		F4	
	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)	Gp I N (%)	Gp II N (%)
Poor	-	-	27 (67.5)	8 (80)	14 (35)	7 (70)	4 (10)	6 (60)	1 (2.5)	3 (30)
Fair	16 (40)	4 (40)	13 (32.5)	2 (20)	26 (65)	3 (30)	22 (55)	3 (30)	11 (27.5)	5 (50)
Good	24 (60)	6 (60)	-	-	-		14 (35)	1 (10)	28 (70)	2 (20)

P value on chi square test: 0.02287.

DISCUSSION

The present study was undertaken to evaluate speech and swallowing deficit in patients undergoing partial glossectomy and role of postoperative speech and swallowing therapy in effective rehabilitation of these patients. A study by Bacher et al consisted of 25 patients who underwent partial glossectomy for small tongue lesion to see improvement in speech and swallowing after effective rehabilitation, but it doesn't establish any correlation due to lack of a comparative group.¹²

Swallowing and speech are included in several scales of health-related quality of life in tongue cancer patients.⁸⁻¹⁰

The knowledge of swallowing and speech impairment after tongue cancer treatment would allow us to counsel patients before treatment and to involve them in therapeutic decision making and encourage them to participate in rehabilitation therapy for improved results.^{11,13} There are very few studies which highlight the gap in evidence and question the rationale of current speech language pathology rehabilitation following partial glossectomy. Very few experimental studies have analysed consequences of surgery alone for speech or swallowing function. Langendijk et al evaluated swallowing dysfunction after treatment with either radiotherapy or chemoradiation.¹⁴ Dwivedi et al reviewed literature on speech outcomes after any kind of treatment

for oral cavity and oropharyngeal cancer and Weber et al studied multiple functional outcomes after surgery and/or chemoradiation.^{15,16} These studies confirm that factors like tumour size and location have a predictive value for functional outcome, yet they only predict trends rather than quantifying expected treatment effects in individual patients. So far, no randomised studies comparing oral functioning or quality of life, in patients, treated with any of the treatment options, have been described.¹⁷

In literature, the methods used for speech assessment are varied and range from evaluation of single phonemes or words on semiquantitative scales and identification of the spoken word to the testing of communicative intelligibility in questions, descriptions or longer text passages.¹⁷⁻¹⁹ Intelligibility scores are largely dependent on the task type: single word identification lead to an intelligibility percentage of 46.6%, whereas questions read aloud by the partial glossectomized patients are correctly understood in 82.3% of the cases.²⁰⁻²² In our study a parallel assessment of the speech ability was also done with the inputs on intelligibility and communication ability by his/her communication partners, the phonetician/speech therapist and under context-free testing.

In this study, all patients reported postoperative impairment of swallowing was significantly more than speech problems. This is borne out by a study by Nicoletti et al who reported a more complete recovery for speech than swallowing and chewing after oral and oropharyngeal cancer treatment.²³ This could probably be explained due to the higher cortical control of speech than the primal functions of swallowing and chewing, which are largely reflex functions. Another explanation could be the tendency of patients to subjectively overestimate the quality of their own speech.²⁴

In our study, the functional recovery showed better and earlier improvement in speech & deglutition of the partial glossectomy patients who underwent rehabilitation therapy sessions as per schedule in comparison of those patients who did not receive any form of rehabilitation therapy.

In India the patients must travel a lot to reach the big cities. The patients are accompanied by spouse or any other relative. This gives extra financial burden on the family as we do not have proper insurance coverage for medical purposes. Staying away from home for more than two months created anxiety in these patients. Counselling of the patient & the relative if necessary gave additional emotional support to the patient and helped him to come up with the difficulty in better way.

All five-parameter assessed during pre-op evaluation and in follow up till months. During pre-op there was no significant difference found in both groups. Immediate after surgery (1st follow up) speech and swallowing worsens significantly in both groups owing to muscle

loss, pain and chronic irritation. During subsequent follow up there was marked improvement in rehabilitation group in comparison of non-rehabilitation group. On statistical analysis except mobility of tongue rest all parameter found better and statistical significant during 2nd, 3rd and 4th follow up visit. For mobility of tongue results were statistical significant for 3rd and 4th follow up visit.

CONCLUSION

Cancers involving anterior 2/3rd of tongue are usually easy to diagnose in early stages as they can be easily visualised by the patient themselves and the presenting complaints are difficulty in speech and swallowing which are quality of life parameters. Despite of early diagnosis and management, residual compromise in the speech and swallowing functions may result in a less than ideal functional recovery. Introduction of early rehabilitative measures improve the postoperative recovery and functional outcome. All three parameters of speech intelligibility, articulation and swallowing which were analysed in our study showed improvements during each follow-up visit. Immediately after surgery the study parameters worsened in both groups due to post op pain and oedema. From the 2nd follow up visit onward, results obtained for both groups, on comparison showed statistically significant earlier improvement in patients who were receiving rehabilitation therapy as compared to those who were not receiving any rehabilitation.

Oral cancers are a leading cause of morbidity in the Indian population. Proper counselling and motivation for correct and effective management are the most important factors for optimum treatment outcome. Pre-op and post-op speech and swallowing evaluation and rehabilitation can be an effective tool for improving quality of life. It is imperative to develop few easy and simple modules for rehabilitation for patients of oral cancers which can be practiced during the post op follow up and at home with the assistance of family members to ensure uncompromised quality of life post treatment

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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