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Original Article RECONSTRUCTIVE & AESTHETIC SURGERY

Evaluation of the results of tongue reconstruction using local flaps following partial glossectomy

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ABSTRACT

OBJECTIVE: Tongue reconstruction results following partial glossectomy using primary closure and local tissue rearrangement were evaluated in this study.

METHODS: 7 patients diagnosed with tongue carcinoma were included. Tongue defects were reconstructed using local transposition, advancement and rotation of the remaining tongue tissue and closure of the defect. The patients were evaluated 6 months and 1 year following the surgery.

RESULTS: None of the patients had permanent speech impairments or major swallowing problems following the surgery despite 33% to 50% reduction in tongue length.

CONCLUSION: Unnecessary utilization of microvascular flaps for partial tongue reconstruction should be avoided in partial glossectomy patients in which reduction in tongue length is below 50%.

Keywords: Tongue carcinoma; tongue reconstruction; partial glossectomy.

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Tongue cancer is a type of head and neck cancer that originates from the tissues of the tongue. It typically begins in squamous cells, which are thin, flat cells that cover the surface of the tongue. This type of cancer can affect the anterior (front) two-thirds of the tongue, known as oral tongue cancer, or the posterior (posterior) third, known as tongue base cancer, which is often classified under oropharyngeal cancer. The development of tongue cancer is closely associated with certain risk factors, including tobacco and alcohol use, human papillomavirus (HPV) infection, and a history of other head and neck cancers. Symptoms of tongue cancer can include permanent sores, pain, difficulty swallowing, and speech changes, often causing individuals to seek medical evaluation. Early detection and diagnosis are critical for successful treatment results. Diagnostic procedures may include physical examinations, imaging tests, biopsies, and endoscopic evaluations. Treatment options vary depending on the stage and location of the cancer and may include surgery, radiation therapy, chemotherapy, or a combination of these approaches.

The first step in treating tongue cancer typically involves surgical removal of the tumor. The extent of surgery may vary from partial tongue resection (partial glossectomy) to total tongue removal (total glos-

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sectomy) depending on the size and stage of the cancer. Assessment of defect is the crucial next step. After tumor removal, the surgeon assesses the size and location of the defect in the tongue. This assessment helps determine the best reconstruction approach. Reconstruction following tongue cancer surgery is a critical aspect of the overall treatment plan. Tongue cancer can affect a person's ability to speak, eat, and swallow, so reconstructive surgery aims to restore both function and appearance. The specific approach to reconstruction depends on the extent of the cancer, the type of surgery performed, and the individual patient's needs [1–7].

In this study, we aimed to evaluate the results of tongue reconstruction following partial glossectomy using local tissue rearrangement.

MATERIALS AND METHODS

7 patients diagnosed with squamous cell carcinoma of the tongue between 2015 and 2021 were included in this retrospective study. All the patients were male. Mean patient age was 50±15. Patients with oral floor involvement and/or patients requiring total glossectomy, subtotal glossectomy and hemiglossectomy were excluded from the study. Partial glossectomy patients with T1 and T2 tumors were included. Preoperative and postoperative tongue length was measured in the most protruding position from tip of the tongue to foramen cecum.

Statistics: Mean±SD, range and median were calculated for data variables. Number and percentage were calculated for surgical details, tumor properties and complications. Descriptive statistical analyses were performed using GraphPad Prism software (GraphPad Prism version 10.0.0 for Windows, GraphPad Software, Boston, Massachusetts USA, www.graphpad.com".) Descriptive statistics provide a way to summarize large amounts of data in a clear and understandable manner. By using measures of central tendency, dispersion, position, and shape, along with graphical representations, descriptive statistics offer a comprehensive overview of the dataset's main characteristics.

Ethics: The study follows the ethical standards of the Helsinki Declaration, as revised in 2013. Informed consents were received from all the patients. Any data leading to direct recognition of the patient has been omitted.

Highlight key points

- Reconstruction following tongue cancer surgery is a critical aspect of the overall treatment plan.
- Partial glossectomy defects can be repaired using local tissue rearrangement.
- Despite up to 50% reduction in tongue length no severe speech or swallowing problems were present in our patients 6 months and 1 year after the surgery.

RESULTS

7 patients operated for tongue cancer were included in the study. All the patients were diagnosed with squamous cell carcinoma with punch biopsies prior to the surgery. Mean tumor size was 1.74±0.45 cm. None of the patients had positive lymph nodes in preoperative radiological evaluation. 2 patients with T2 tumors received prophylactic supraomohyoid neck dissection. None of the patients had oral floor involvement. Partial glossectomy and tongue reconstruction were performed on all patients. None of the patients received any major or free flap reconstruction.

In all the patients, tongue defects were reconstructed using local transposition, advancement and rotation of the remaining tongue tissue and closure of the defect. Resected tongue volume was 10.6±3.05 cm^3 (range: 7.29–16 cm^3). Tongue length reduction after surgery was 3.24±0.45 cm (range: 2.7–4 cm). The mean reduction in tongue length was 40.5±5% (range: 33–50%). The patients were evaluated 6 months and 1 year following the surgery. None of the patients had permanent speech impairment. None of the patients had major swallowing problems following the surgery (Table 1).

DISCUSSION

There are several options for reconstructing the tongue and oral cavity after cancer surgery. Primary closure is an option for some cases. The defect can be closed directly without the need for complex reconstruction. This is typically possible for smaller defects or when minimal tissue is removed.

Free flap reconstruction is usually required in patients receiving subtotal or total glossectomy and oral floor involvement. This involves taking tissue from another part of the body (often the forearm, thigh, or abdomen) and transferring it to the tongue to reconstruct both the structure and function of the tongue. The most common free flap used for tongue reconstruction is the radial forearm free flap [8–14].

Table 1. Summary of the results

	Mean	SD	Range
Age	50.28	15.4	30–76
Tumor size (cm)	1.74	0.45	1.2–2.5
Resected tongue volume (cm^3)	10.6	3.05	7.29–16
Tongue length reduction after surgery (cm)	3.24	0.45	2.7–4
Reduction in tongue length (%)	40.5	5	33–50
	Number	Percentage	
Surgery			
Primary closure	3	42.9	
Closure with local tissue advancement	4	57.1	
Local flap from buccal mucosa	0	0.0	
Free flap	0	0.0	
Supraomohyoid neck dissection	2	28.6	
Complications			
Early			
Hematoma	2	28.6	
Infection	3	42.9	
Wound dehiscence	3	42.9	
Late			
Swallowing impairment	0	0.0	
Speech impairment	0	0.0	
Tumor properties			
T1 (Tumor less than 2 cm)	5	71.4	
T2 (Tumor 2–4 cm)	2	28.6	
T3 (Tumor more than 4 cm)	0	0.0	
T4 0	0.0		
Regional Lymph node metastasis		0.0	
Distant metastasis	0	0.0	

SD: Standard deviation.

Local flaps can be used in some cases where nearby tissue can be repositioned to fill the defect. This is known as a local flap reconstruction. Local flaps are used when the defect is relatively small and there is sufficient healthy tissue nearby. For lingual reconstruction oral mucosa and remaining tongue tissue are used for local flaps.

After reconstruction, the patient will undergo a period of recovery and rehabilitation. Speech therapy and swallowing therapy may be necessary to regain or improve speech and swallowing function. Physical therapy may also be required to restore normal mouth movement and strength. Patients who have undergone tongue cancer reconstruction will require long-term follow-up care to monitor for any signs of recurrence and to address any ongoing issues related to speech and swallowing. Tongue cancer surgery can also affect the teeth and jaw. Prosthodontic and dental specialists may be involved in the rehabilitation process to address issues related to dental health and bite function [15–20]. It's important to note that the choice of reconstruction method and the overall treatment plan should be personalized to the individual patient's needs and the specific characteristics of their cancer. Patients should work closely with a team of healthcare professionals, including surgeons, oncologists, speech therapists, and other specialists, to ensure the best possible outcome. Additionally, support from family and caregivers is crucial during the recovery process.

There are several limitations to this study. Since this is a single-center study, number of patients is limited. The date used is self-reported. The measurement of tongue length is another limitation which can be difficult in some cases and there is potential error margin. This is a retrospective study which also limits the results of the study. Lack of available data was a major obstacle when dealing with the retrospective data. Despite these shortcomings there are no similar reports in the literature on the reconstruction of partial glossectomy patients. Due to the scarcity of studies in this field these results are valuable and instructive for the reconstructive surgeon despite the limitations.

Conclusion

Despite 33 to 50% reduction in the length of the tongue in our cases, no significant swallowing or speech impairments were found in our patients. Unnecessary utilization of microvascular flaps for partial tongue reconstruction should be avoided in partial glossectomy patients and these options should be saved for patients with oral floor involvement, total glossectomy and hemiglossectomy patients.

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