



FABRICATION OF PALATAL AUGMENTATION PROSTHESIS FOLLOWING PARTIAL GLOSSECTOMY

KEYWORDS

Partial Glossectomy, Palatal Augmentation Prosthesis, Phonation, Deglutition, Rehabilitation

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ABSTRACT

The tongue is one of the most frequent sites for cancer, represents almost 26% of all oral cancers and 0.7 % of all carcinomas. Surgical closure or reconstruction following resective surgery can be divided into these general categories: Primary closure, Skin Grafts, Pedicled flaps and Microvascular free flaps. The post surgical morbidity results in speech deficits. Speech disorders in glossectomised patients can fall into categories of impaired articulation, reduction in intelligibility of speech, altered oral and nasal resonance and impaired voice quality. The treatment plan varies according to the size and location of the lesion. Prosthodontic management of articulation disorders form a crucial part of post- surgical intervention program. With total glossectomy, the prosthetic approach is initiated with a mandibular prosthesis where as, in partially glossectomised patients, a maxillary prosthesis is constructed with an augmented portion added to the palatal base. Sometimes the palatal-augmentation prosthesis is used as a training device.

INTRODUCTION:

In the entire realm of human physiology, the tongue perhaps is the most complicated muscular mechanism which has the most varied functions, unusual motility, and important in social contacts.¹ It is the muscular organ of deglutition; taste and speech which bulges from the floor of the mouth and the posterior part forms the anterior part of the oral part of pharynx.²

The tongue is one of the most frequent sites for cancer, represents almost 26% of all oral cancers and 0.7 % of all carcinomas.³ Surgical closure or reconstruction following resective surgery can be divided into four general categories: Primary closure, Skin Grafts, Pedicled flaps and Microvascular free flaps. Researchers indicate that patients closed primarily or with skin grafts have better post surgical swallowing function than those reconstructed with pedicled or free flaps.⁴

The post surgical morbidity results in speech deficits. Speech disorders in glossectomised patients can fall into categories of impaired articulation, reduction in intelligibility of speech, altered oral and nasal resonance, impaired voice quality and reduction in global speech proficiency.⁵ Speech is a social tool which limits communication. This can be mentally and socially unacceptable and can prove devastating to the psychology of the patient.

The treatment plan varies according to the size, type and location of the lesion. Prosthodontic management of articulation disorders form a crucial part of post- surgical intervention program. With total glossectomy, the prosthetic approach is initiated with a mandibular prosthesis where as, in partially glossectomised patients, a maxillary prosthesis is constructed with an augmented portion added to the palatal base. The functional capabilities of the tongue with this kind of prosthesis depends on its residual movement. Sometimes the palatal-augmentation prosthesis can be used as a training device while the tongue recovers its function. In some patients this could be used as a definitive prosthesis.⁶

This case report describes a case of hemiglossectomy where a prosthetic tongue substitute improved both speech and swallowing. Although the data presented are specific to one patient, the procedures used in designing and evaluating the prosthesis are applicable to prosthetic treatment plan of any patient with partial glossectomy.

CASE REPORT:

A 40 year old male was referred to the department of prosthodontics, Institute of dental sciences from the department of surgical oncology, institute of medical sciences & SUM hospital. Intra oral examination revealed an ulcero-proliferative growth measuring 2 into 2 cm at the right lateral border of the tongue (figure 1). The histopathology report was suggestive of a well differentiated squamous cell carcinoma (T₂N₃M₀). Diagnostic impressions were made with an irreversible hydrocolloid for future reference.

After thorough clinical examination and investigations, it was planned for a partial glossectomy with primary closure followed by radiotherapy.

PROSTHODONTIC MANAGEMENT:

The patient was referred back to the department of prosthodontics for rehabilitation following the surgery and 03 months post radiotherapy treatment.

Intra oral examination revealed partial glossectomy involving the right lateral region of the tongue and part of the corresponding floor of the mouth with satisfactory healing of surgical site (figure 2). The patient complained of difficulty in swallowing and had speech deficit problems. Following patient's consent, an interim acrylic prosthesis was planned to rehabilitate the patient.

PROCEDURE

Impressions for maxillary and mandibular arches were made using irreversible hydrocolloid (Zelgan 2002; Dentsply India Pvt Ltd,

Gurgaon, India). After disinfecting the impressions with 2 % glutaraldehyde, casts were poured using Type III dental stone (Orthokol; KalaBhai Pvt Ltd, Mumbai, India) and models were prepared. Custom trays were fabricated with self cure acrylic resin (DPI-RR; Dental Products of India Ltd, Mumbai, India) and was adjusted in the patients mouth. A functional impression was then made using the custom tray with tissue conditioner (Viscogel) to compensate for the linguopalatal defect during speech and swallowing. Additionally mandibular lingual flange of the acrylic tray was intentionally thickened to fill the gap created by resection of the right side tongue and was relined using tissue conditioner. (VISCOGEL)

This was followed by fabrication of a plaster index to facilitate proper tissue contouring of the wax up prosthesis for both the maxillary and mandibular augmentation prosthesis.

Try- in was done with the help of self cure acrylic resin record base and modeling wax (Modelling Wax; Dental Products of India Ltd, Mumbai, India). The final tissue contouring of the modeling wax was done intraorally by softening the superior surface of the modeling wax and asking the patient to do functional movements during phonetics and swallowing. Patient was asked to pronounce the linguoalveolar sounds like k and g, to trace the posterior palatal area and t and d to trace the anterior palatal portion. Functional wax was used for final tracing. Then the final prosthesis was cured with heat cure acrylic resin (DPI-Heatcure; Dental Products of India Ltd, Mumbai, India). The augmented part was intentionally made hollow to ensure lightness in the prosthesis. The mandibular flange was thickened in the medial side towards the defect to immediately compensate the lost tissue to make the patient unaware of the void in the tongue space (figure 3).

DISCUSSION

The rehabilitation of chewing, swallowing and function of speech by means of prosthetic management is a challenging endeavor for both the clinician as well as the patient⁷. Restoring the lost function of a highly movable tongue by designing a static prosthesis has its own limitations.

However, keeping the role of tongue in view, a mandibular or palatal augmentation prosthesis when constructed meticulously, compensates for the lost tongue-palatal contact, with significant improvement in phonetics and chewing.

If the palatal vault is lowered sufficiently to permit optimal tongue movements for swallowing, speech is adversely affected⁸. Hence in order to avoid using alternative augmentation prosthesis separately for speech and swallowing, the authors considered using both palatal as well mandibular augmentation prosthesis in this particular case. This design gives an added advantage of minimizing the thickness of palatal augmentation, thereby improves both phonation and deglutition.

A dentulous patient treated with partial glossectomy and radiation therapy, in the absence of mandibular resection, may have difficulty in speech and swallowing. This might be because of loss of tissue in the region of fibrosis secondary to radiation therapy. Prosthodontic rehabilitation consists of augmenting the maxillary prosthesis to a lower the palatal level for better palatal-tongue interaction.⁶ This will result in better speech and effective swallowing.

Additionally in case the linguoalveolar fricatives like (s) and (z) are not clear, a different kind of modification can be done. A narrow, sharp groove carved in the midline of the palatal prosthesis can, by directing the air stream, improve the production of these sounds.⁹ However, in the present case there was significant improvement in both phonetics as well as swallowing. Hence the placement of any such modification in the design of the prosthesis is optional and is case specific.

The prosthetic tongue and the palatal augmentation prosthesis cannot replace the intricately mobile structure of the tongue, which is capable of infinite movements in swallowing and speech. The construction of a prosthesis provides the total or partial glossectomy patient with a certain degree of comfort and function.

The tongue prosthesis can be fabricated either using flexible silicone rubber or rigid acrylic resin. In spite of silicone being the material of choice owing to its light weight and life-like appearance, PMMA was preferred over silicone. (figure 4) Silicone has a limited lifespan apart from being expensive. More importantly it provides a favorable environment for microbial growth in presence of oral fluid⁹.

Moreover the maxillary acrylic prosthesis was made hollow to make the prosthesis as light in weight as possible (figure 5). Since, resin is an extremely poor thermal conductor, the heat generated in a thick segment of resin cannot be dissipated. As a result, the peak temperature of this resin may rise well above the boiling point of monomer leading to porosity within the processed denture base¹⁰.

SUMMARY & CONCLUSION

The rehabilitation of speech seems to be the most important factor in re-establishing interpersonal communication in patients who have undergone total or partial glossectomy. After surgery the quality of voice & resonance are compromised because of changes in oral cavity volume, and articulation is affected as the tongue is unable to assume the normal position to provide valuing action needed for precise articulation. The rehabilitation of swallowing also plays an important role in socialization.

Oral rehabilitation through prosthetic management can aid in alleviating these problems. The prosthetic rehabilitation approach described lowers the palatal vault with a false palate to enable the tongue to function against it during speech and swallowing. The prosthetic management may not completely replace the complex function of the tongue, but certainly can cater to the need of the patient to a greater extent by improving the quality of life.

LEGENDS TO FIGURES



Figure 1: Intra oral pre-operative view.



Figure 2: Post-Operative view depicting the excised part of the tongue

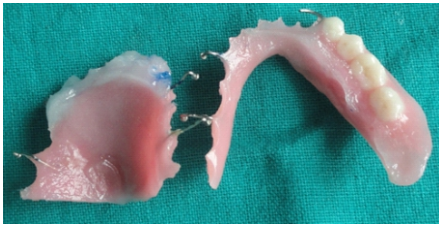


Figure 3:Palatal Augmentation Prosthesis and Mandibular Removable Partial Denture with thickened lingual flange.(Functional impression with tissue conditioners)



Figure 4: Intra oral view depicting the mandibular removable partial denture with thickened lingual flanges.



Figure 5: Hollow Palatal Augmentation Prosthesis.

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