



# MYOFUNCTIONAL THERAPY AS AN AID TO PROSTHODONTIC TREATMENT AFTER HEMIGLOSSECTOMY: A CLINICAL REPORT

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Although several reports describe the prosthetic management of patients after hemiglossectomy, the techniques are related to the fabrication of the prostheses, no reports on maximizing the functional potential of the remaining tongue musculature and surrounding tissues were identified by the authors. This clinical report describes the use of myofunctional therapy as an aid to the maxillofacial prosthodontic rehabilitation of an edentulous patient who was diagnosed with invasive squamous cell carcinoma of the tongue and underwent hemiglossectomy. Myofunctional therapy was introduced before, during, and after the fabrication of conventional maxillary and mandibular complete dentures. Muscle exercises were devised to improve the posture and muscular tonus of the remaining tongue, and thus help with mastication and adaptation to the mandibular denture. Myofunctional therapy improved the posture and function of the remaining tongue, providing acceptable mastication and increased stability of the mandibular denture. (J Prosthet Dent 2012;107:284-287)

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The intrinsic and extrinsic musculature of the tongue, the buccinator, and the orbicularis oris are key muscles in the mastication and swallowing processes.<sup>1</sup> The muscles of the tongue are critical for the manipulation of the food bolus during mastication.<sup>1-3</sup> Abnormal tongue function can lead to poor formation of the food bolus<sup>4</sup> and also interfere with the retention and stability of complete dentures.<sup>5</sup> Completely edentulous patients who undergo hemiglossectomy after being diagnosed with cancer of the tongue suffer from impaired mastication, speech, and poor stability of the mandibular denture.<sup>2,6-8</sup>

Different techniques, such as modified functional impression technique,<sup>6</sup> implant-retained prostheses,<sup>9,10</sup> palatal augmentation prosthesis,<sup>11</sup> neutral zone technique,<sup>12</sup> and mandibular resection prosthesis,<sup>7</sup> have been described for the prosthodontic management of patients after glossectomy. Although these publications have reported on the prosthodontic management of these patients, the techniques reported relate to the fabrication of the prosthesis, with little

attention directed to the management of the remaining tongue musculature and surrounding tissues.

Myofunctional therapy has been suggested for edentulous patients receiving complete dentures to attend to the muscular function altered by the loss of teeth and bone resorption.<sup>13</sup> Improvements in mastication, tongue posture, and denture stability are frequently observed.<sup>14,15</sup> The present clinical report focuses on the use of myofunctional therapy as an adjunctive aid to the prosthodontic rehabilitation of an edentulous patient diagnosed with invasive squamous cell carcinoma of the tongue who underwent hemiglossectomy.

## CLINICAL REPORT

An 81-year-old African American woman presented to the Comprehensive Care clinic at Case Western Reserve University School of Dental Medicine for prosthodontic rehabilitation. The patient had been completely edentulous for 4 years and diagnosed with an invasive squamous cell carcinoma of the tongue. The

tumor had been diagnosed 2 years previously and treated with radiation therapy for 2 months, followed by hemiglossectomy.

The oral examination revealed the resulting anatomic compromise of the left half of the tongue and part of the musculature of the floor of the mouth (Fig. 1). The remaining tongue was noted to be flaccid, to have limited range of motion and altered posture, and to be resting in the anterior region and on the right side of the mandibular alveolar ridge. The residual alveolar ridge had not been included in the surgical resection of the tongue, and the patient had not previously been a complete denture wearer.

An implant-retained mandibular overdenture was initially considered as a treatment option<sup>9,10</sup>; however, to avoid further surgical procedures, the patient chose to pursue treatment with conventional maxillary and mandibular complete dentures. In an attempt to improve muscular function and posture<sup>8</sup> and to help with mastication and adaptation to the mandibular denture, myofunctional therapy was recommended to maximize the func-



**1** Intraoral view of hemiglossectomy defect.



**2** Tongue exerting pressure against palate.

tional capacity of the residual tongue musculature. The therapy was performed before, during, and after the fabrication of the conventional denture prostheses.

The patient was gradually introduced to the muscle exercises<sup>14</sup> and instructed as to the importance of practicing these exercises 4 times a day. At the first appointment, the sequences were repeated at the dental chair under the clinician's supervision until she was able to perform the exercises alone at home. The patient was advised to watch herself in a mirror when doing the exercises. The patient complied with instructions and was motivated to embrace the recommended myofunctional therapy.

The first sequence of exercises was focused on improving the posture of the remaining tongue and to strengthen the musculature of the floor of the mouth. The patient was instructed to place the tongue on the highest portion of the palatal vault and open the jaws as wide as possible. The tongue exerted the maximum possible pressure against the palate for 5 seconds, and a tongue pop was then performed (Fig. 2). This sequence was repeated for 5 minutes. The tongue was also stimulated by contractions to recover the muscular tonus. For that, the tongue was first projected anteriorly and sequences of alternated tapering and relaxation were then practiced for 30 seconds, followed by 10 second rest intervals, over a 5 minute period.

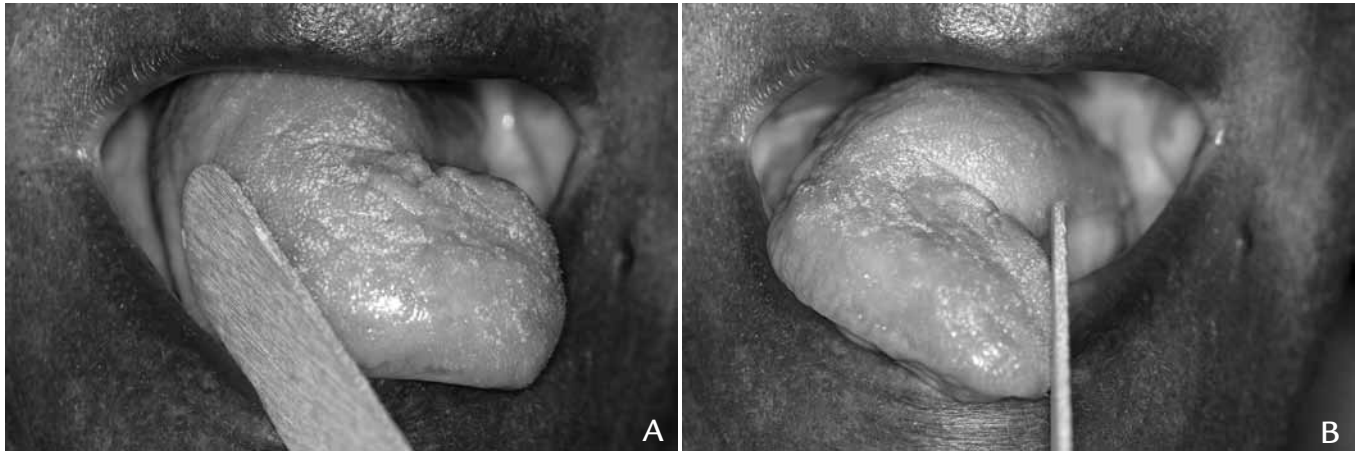
The patient was unable to perform and control tapering at the beginning, so a tongue depressor was used on the lateral surfaces of the tongue to induce and maintain tapering (Fig. 3).

After 7 weeks of myofunctional therapy, an improvement in tongue posture and tonus was observed (Fig. 4), and the prosthodontic treatment was initiated. The patient was instructed to practice the exercises at home throughout the treatment. Preliminary impressions were made of both maxillary and mandibular arches following conventional prosthodontic procedures. During the border molding and final impression of the mandibular arch, a mouth mirror was used to guide the tongue during the functional movements to capture the anatomy of the peripheral turn on the lingual area, including the retromylohyoid region.

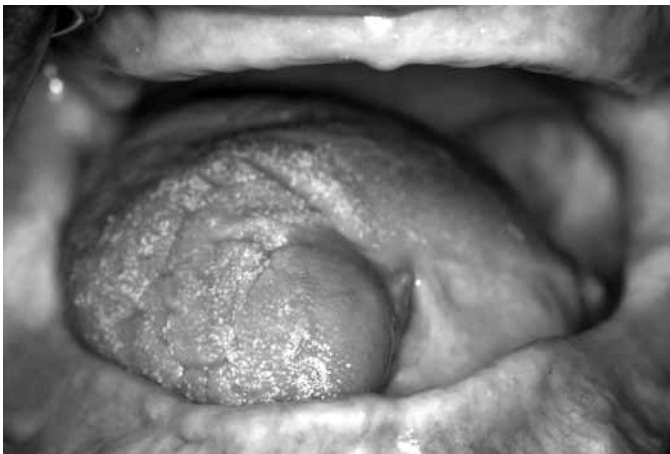
A few days before the scheduled assessment of the trial arrangement of the teeth, the patient suffered a myocardial infarction and underwent open-heart surgery for a mitral valve replacement, which resulted in a delay of 3 months in the provision of the conventional complete dentures. Upon recuperation, the patient returned to the clinic, and at that time it was determined that the treatment should be started from the beginning, including the reinitiation of myofunctional therapy. At that time, hypofunction of the buccinator muscles was noted. The cheeks were flaccid and had suffered ptosis

(Fig. 5). Muscle exercises directed to the buccinators were incorporated into the treatment. The cheeks were stimulated to contract in an attempt to restore muscular tonus by using contraresistance. A tongue depressor was used to push the buccinator out, while the cheek was used as a counterweight against the object, pushing it toward the center of the oral cavity (Fig. 6). This sequence was practiced and repeated for both left and right sides for 5 minute intervals/cycles. The exercises previously prescribed for the tongue were also performed as previously described.

Six weeks after the beginning of the new sessions of myofunctional therapy, the procedures for fabricating the complete prostheses were initiated, and the prostheses were placed 3 weeks later. The patient was instructed in the use and care of the prostheses and instructed to continue the myofunctional therapy exercises at home. At the 24-hour recall, some adjustments were made for sore areas and relief in the area of frenuli attachments. At the 1-week follow-up, the patient did not present any major complaints regarding mastication and stability of the mandibular denture. At the 3-week follow-up, she stated being able to eat and function orally. The conventional mandibular denture prosthesis demonstrated minimal dislodgement during tongue movement. The tongue and the cheeks did not interfere with the denture (Fig. 7).



**3** Use of tongue depressor to help with tongue tapering. A, Right side. B, Left side.



**4** Tongue posture after 7 weeks of myofunctional therapy.



**5** Observed hypofunction of buccinator muscles.



**6** Use of tongue depressor to produce contrarésistance.



**7** Mandibular denture in place 3 weeks after insertion.

The patient was observed for 2 more months, as she continued with the myofunctional therapy.

## DISCUSSION

Electromyography has shown that myofunctional therapy can improve

the morphology and function of oral muscles<sup>16</sup> and may help strengthen some of the tongue muscle function<sup>8</sup> in those patients treated with conventional complete denture prostheses after hemiglossectomy. This strengthened movement of the tongue can facilitate improved adaptation/func-

tion of the mandibular denture.

The indication of myofunctional therapy for patients after hemiglossectomy is determined on a patient-by-patient basis. The degree, extent, and location of the anatomic compromise and muscle involvement after tumor resection can significantly affect

the outcome of the prosthodontic rehabilitation. For the patient described in the report, although the tissue bed and adjacent tissues were affected by radiation treatment, a significant part of the tongue volume (about 65%) and the musculature of the floor of the mouth were preserved.

Although myofunctional therapy may assist in improving prosthetic stability, this type of therapy alone is not effective in treating speech and swallowing impairment caused by a hemiglossectomy. Collaboration with a speech pathologist is therefore indicated, and if the patient's speech issues justify altering the palatal contour of the maxillary denture, a palatal augmentation prosthesis would also be indicated. Myofunctional therapy for the patient was not intended specifically for speech and swallowing improvement; however, it did improve the tongue function and probably played an indirect role in the patient's speech and swallowing. Patients treated with partial glossectomy must adapt to the altered anatomy, which requires reorganization of cortical input from the central nervous system (CNS). Data in the literature reveal that some level of CNS adaptation occurs after hemiglossectomy,<sup>2</sup> indicating that some patients may experience some normalization of tongue function after tumor resection. The muscle exercises were probably integrated into the central adaptive mechanisms, which could also explain the favorable outcomes.

Myofunctional therapy requires the patient's total commitment, cooperation, understanding, and compliance with the recommended frequency of exercises.<sup>13</sup> The patient

must be made aware of the muscular malfunction, shown the means of correction, and encouraged to practice as much as possible. The patient's compliance and motivation in the clinical case presented were essential for its successful result.

## SUMMARY

The use of myofunctional therapy as an aid to the prosthodontic treatment of an edentulous patient who underwent hemiglossectomy is described. Muscle exercises for the tongue were performed before, during, and after the fabrication of conventional maxillary and mandibular complete dentures. A subjective assessment of the myofunctional therapy demonstrated the improved posture and muscular tonus of the remaining tongue, thereby improving masticatory function and stability of the mandibular denture.

## REFERENCES

1. Çöttert HS, Aras E. Mastication, deglutition and speech considerations in prosthodontic rehabilitation of a total glossectomy patient. *J Oral Rehabil* 1999;26:75-9.
2. Haupage S, Peck KK, Branski RC, Hsu M, Holodny A, Kraus D. Functional MRI of tongue motor tasks in patients with tongue cancer: observations before and after partial glossectomy. *Neuroradiology* 2010;52:1185-91.
3. Woda A, Mishellany A, Peyrohn MA. The regulation of masticatory function and food bolus formation. *J Oral Rehabil* 2006;33:840-9.
4. Trawitzki LV, Borges CG, Giglio LD, Silva JB. Tongue strength of healthy young adults. *J Oral Rehabil* 2011;38:482-6.
5. Zarb GA, Bolender CL. Prosthodontic treatment for edentulous patients: Complete dentures and implant-supported prostheses. 12th ed. St Louis: Mosby; 2004. p. 92-3.
6. Ichikawa T, Sato S, Morikawa Y, Matsumoto N. Prosthetic management for edentulous glossectomy patients. *Quintessence Int* 1996;27:599-602.
7. Pigno MA, Funk JJ. Prosthetic management of a total glossectomy defect after free flap reconstruction in an edentulous patient: a clinical report. *J Prosthet Dent* 2003;89:119-22.
8. Rastadmehr O, Bressmann T, Smyth R, Irish JC. Increased midsagittal tongue velocity as indication of articulatory compensation in patients with lateral partial glossectomies. *Head Neck* 2008;30:718-26.
9. Penn M, Grossmann Y, Shifman A, Taicher S. Implant-retained feeding aid prosthesis for a patient following total glossectomy and laryngectomy: A clinical report. *J Prosthet Dent* 2007;97:261-5.
10. Taira Y, Sekine J, Sawase T, Atsuta M. Implant-retained overdenture following hemiglossectomy: a 10-year clinical case report. *J Oral Rehabil* 2006;33:313-5.
11. Marunick M, Tselios N. The efficacy of palatal augmentation prostheses for speech and swallowing in patients undergoing glossectomy: a review of the literature. *J Prosthet Dent* 2004;91:67-74.
12. Ohkubo C, Hanatani S, Hosoi T, Mizuno Y. Neutral zone approach for denture fabrication for a partial glossectomy patient: a clinical report. *J Prosthet Dent* 2000;84:390-3.
13. Plainfield S. Myofunctional therapy for complete denture patients. *J Prosthet Dent* 1977;38:131-7.
14. Boos RH. Preliminary treatment of prosthetic patients. *J Prosthet Dent* 1965;15:1002-9.
15. Klein IE. Discussion of "preliminary treatment of prosthetic patients". *J Prosthet Dent* 1965;15:1010-2.
16. Schievano D, Rontani RMP, Berzin F. Influence of myofunctional therapy on the perioral muscles. Clinical and electromyographic evaluations. *J Oral Rehabil* 1999;26:564-9.

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