

Prosthodontic management of microstomia employing sectional impression tray

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ABSTRACT

Prosthetic rehabilitation of microstomia patients presents difficulties at all stages as the maximal oral opening is smaller than the size of a complete denture. Such a condition may often result from the surgical treatment of orofacial cancer, cleft lip, trauma, burns, Plummer-Vinson syndrome or scleroderma. Microstomia frequently leads to several incapacitating sequelae such as the inability to masticate, speech problems, impaired delivery of oral hygiene or dental care, and psychological problems secondary to facial disfigurement. Several techniques have been described to use when either standard impression trays or the denture itself becomes too difficult to place and remove from the mouth. This article focuses on a novel fabrication of maxillary sectional trays that could enable easier and competent impression making in a patient with limited oral opening.

KEYWORDS: Complete denture, restricted oral opening, sectional tray

Introduction

Restoration and preservation of the dentition in patients with limited oral opening has been a challenging task for dentists. Microstomic patients may experience a significant limitation of mandibular opening, eccentric mandibular movements and an overall mandibular immobility. Surgery may be considered as a treatment option when the oral opening circumference length is less than 160 mm, but inadequate outcomes of the surgical procedure may result in a scar. Several methods of prosthodontic treatment for patients with microstomia have been presented in the literature and numerous devices to expand the oral commissure have been described.^[1,2] Gradual thickening of the skin around the mouth causes the oral opening to become limited. Furthermore, fibrosis of the salivary glands results in dryness in the mouth resulting in additional complications. The literature contains reports on the fabrication of foldable or collapsible prostheses such as a posterior section with molar and premolar teeth hinging over a second denture base with anterior teeth to reduce the size for insertion and removal. McCord *et al.*, described a

maxillary complete denture consisting of two pieces joined by a stainless steel rod with a diameter of 1 mm fitted behind the central incisors.^[3] Different management techniques to aid prosthetic rehabilitation in such cases include surgical modalities, but unwanted scar formation may further reduce oral opening.^[4]

The prosthetic rehabilitation of microstomia patients presents difficulties at all stages, from preliminary impressions to prosthesis fabrication. Making the ideal impressions is often encountered as the initial difficulty in treating these patients. However, recommended techniques for obtaining preliminary impressions for microstomia patients have included the use of modeling plastic impression compound, the use of stock impression trays with heavy and light body silicone impression materials and flexible impression trays with silicone putty.^[5]

In prosthetic treatment, the loaded impression tray is often the largest item requiring the intra-oral placement. During the impression procedures, wide vertical and horizontal oral opening is required for proper tray insertion and alignment, but is not possible in patients with restricted opening.^[6,7] The overall bulk and the height of typical impression trays make the recording of impressions exceptionally difficult if not impossible because the paths of insertion and removal

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of impressions are compromised by lack of clearance. A modification of the standard impression procedure is often necessary to accomplish this fundamental step in the fabrication of a successful prosthesis. This clinical report presented describes a simple, cost-effective and time-saving method for fabrication of custom sectional trays and prosthesis for a patient with limited oral opening.

Case Report

A 56-year-old male with limited oral opening caused by scleroderma reported to the dental clinic for mandibular and maxillary dentures. On examination, he had limited mouth opening with a maximum diameter 26 mm and 112 mm circumference [Figures 1 and 2]. The maxilla and mandible were completely edentulous and mild xerostomia was also reported.

Proposed Treatment Plan

Various treatment options were discussed and patient agreed for the fabrication of upper and lowers complete dentures using sectional trays for impressions due to the restricted oral opening.



Figure 1: Pre-operative view of patient

Clinical Procedure

Preliminary impressions were made with irreversible hydrocolloid. A small size stock tray was used and flanges were adjusted to make the impressions. Casts were poured in plaster. A custom tray for final impression with 1 mm full arch wax spacer was fabricated on primary casts. For the maxilla, a sectioned impression tray was designed with right and left sections that could be detached and then joined together in the correct original position. For mandibular arch, conventional trays were fabricated.

Maxillary Custom Tray

The custom sectioned tray was made using auto-polymerizing acrylic resin (Meliodent; Bayer UK Ltd., Newbury, United Kingdom). Using a thin cutting disk, tray was sectioned along the midline creating two equal halves [Figure 3a and b].

Anterior stabilization of tray

A notch was placed in the handle of the left section of the tray corresponding to projection on the right section of the tray [Figure 4].



Figure 2: Restricted mouth opening (26 mm diameter)

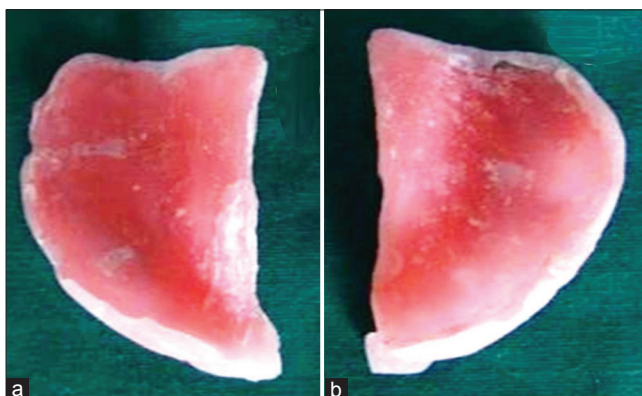


Figure 3: (a and b) Sectioned maxillary custom tray



Figure 4: Anterior notch in tray handle for stabilizing the tray

Posterior stabilization of tray

The stiff metal tongue blades were used. Blades were cut to the desired length and were bent on both ends. The bent ends were lubricated with petroleum jelly and positioned on the tray at desired location. Auto-polymerizing acrylic resin was mixed and placed on tray such that only bent ends were completely covered by acrylic [Figure 5]. On both halves of tray two crevices were formed once the tongue blades were removed [Figure 6]. It was rechecked for fit. Once tongue blade was placed there was no movement and the closely approximated [Figure 7]. The placement of the crevice was such that it did not hinder the border molding and impression procedure. Border molding was performed for each half separately after checking the extensions in mouth [Figure 8].

Light body addition silicone was used for the final impression. The trays were placed in the mouth. The left tray was removed and was loaded with impression material. The left tray was then placed back. After the left impression, the right section of the tray was removed loaded with material and placed in the mouth. The trays were removed

individually from the mouth and were reapproximated outside the mouth.

For the mandibular impression procedure, a conventional custom tray was fabricated as it could be easily placed in the mouth by rotating the tray 90° and inserting. Border molding was completed and medium-body wash impression was made with addition silicone. Maxillo-mandibular relations were recorded and the waxed dentures were tried in the mouth, followed by try in of waxed dentures. Maxillary and mandibular complete dentures were fabricated using conventional techniques and delivered to patient [Figure 9]. At the insertion appointment, the patient was instructed regarding the insertion and removal of the prostheses. Oral hygiene instructions were reinforced, and periodic recall appointments were scheduled.

Discussion

Patients with microstomia who need to wear a removable dental prosthesis often face difficulty of being unable to insert or remove the prosthesis because of restricted opening of



Figure 5: Tongue blades for posterior stabilization of tray

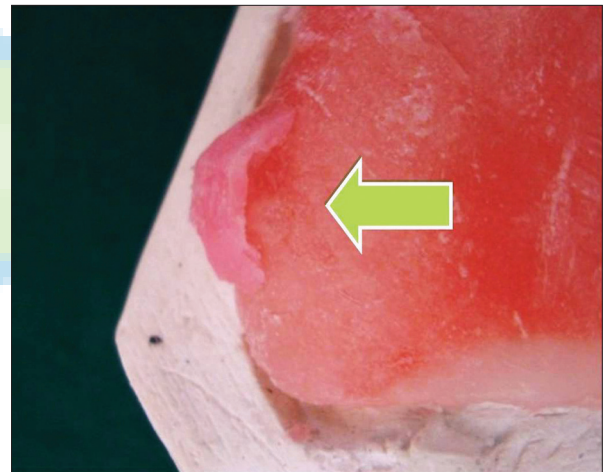


Figure 6: Crevices for tongue blade



Figure 7: Sectioned maxillary custom tray

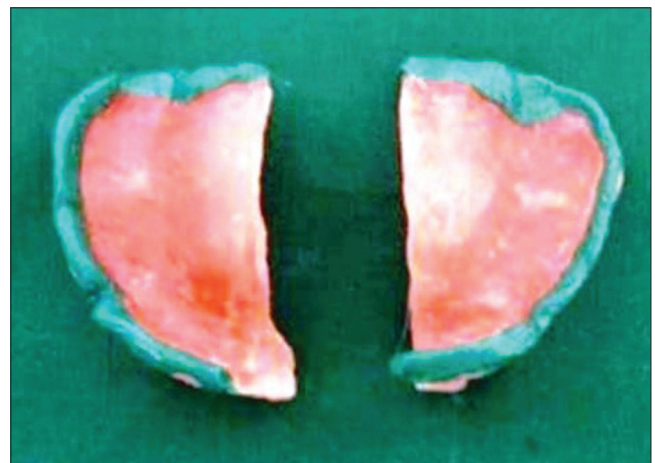


Figure 8: Separately border molded sections of the tray



Figure 9: Finished dentures and post-operative view of the patient

the oral cavity. Scleroderma is an autoimmune multisystem disease associated with vascular abnormalities, connective tissue sclerosis and autoimmune changes. Almost all patients have vascular symptoms that usually predate the development of the fibrotic connective tissue change. Oral manifestations of scleroderma include: Microstomia, xerostomia, periodontal disease, widened periodontal space, and bone resorption at the angle of mandible.^[8] Limited oral opening can pose a major dental problem and the general difficulties of reduced access become even more apparent when providing prostheses. The overall bulk and height of an impression tray makes recording impression exceptionally difficult, if not impossible because the paths of insertion and removal of impressions are compromised by the lack of clearance.

Many authors have advised sectional custom trays and collapsible denture systems with complicated attachment devices. A variety of pins, bolts and Lego pieces have been used for the locking mechanism of sectional impression trays fabricated for patients with limited oral openings.^[9,10] A sectional stock tray system for making preliminary impressions was described by Luebke.^[11] Impressions using sectional trays may be easier for patients with restricted oral openings because the two halves can be inserted independently, removed separately and reassembled extra-orally. Improved fit of the tray was possible because the two halves were separately fitted to each side of the arch to achieve better anatomical adaptation to the soft-tissues. Several stock tray modifications and custom tray designs have been described in the literature.^[12,13] Sectional impression trays have been fabricated using recesses, orthodontic screws, Lego blocks (Lego Systems Inc., Enfield, CT), dowel plug holes and a screw joint for rigid connection, locking levers, interlocking tray segments and flexible impression trays with silicone putty.

The most important requirement when sectional trays are used is the mechanism to accurately adapt and stabilize the two segments of the tray to each other both intra-orally and extra-orally. Also, the technique should not be complicated and allow easy manipulation to decrease patient trauma. Uses of both anterior and posterior locks are important for better stability. The technique for sectional tray described in this report fulfills all these criteria.^[14,15] The interlocking handle aids in the anterior reapproximation while the tongue blades help in posterior reapproximation and stability. The shape of the connecting midline interface between the segment pieces of the tray also ensures stability. This technique is easy and requires little chair-side time for fabrication.

Conclusion

A modification of standard impression procedures is often necessary to accomplish an acceptable impression for the fabrication of a successful prosthesis. Sectional trays are an excellent option for these patients. Such novel design philosophy of impression trays readily provides very simple, quick, trouble-free, cost-effective and readily-available methods of treating patients in whom placement of complete size impression tray is hampered by microstomia.

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