

MODIFICATION OF IMPRESSION PROCEDURES WITH THE USE OF CUSTOM SECTIONAL TRAYS FOR A MICROSTOMIA PATIENT – A CASE REPORT

* Jothipriya Balakrishnan, **S. Anilkumar, *** Sandhya Gopalakrishnan, ****Anish VJ,
* Sreeja K. Nanukuttan, * Unnikrishnan PT

*PG student, ** Prof & HOD, Department of Prosthodontics, ***Assistant Professor, Department of Prosthodontics, Government Dental College, Kottayam****Consultant Prosthodontist, Thiruvalla, Department of Prosthodontics | Corresponding author: Dr.Jothipriya B. Balakrishnan, Email: joe9491@gmail.com

Abstract:

Impression making is considered to be an important step in the fabrication of any fixed or removable prosthesis. However certain pathologic conditions such as Oral submucous fibrosis associated with reduced mouth opening critically hamper the impression making procedure. Proper orientation of impression tray in such patients becomes extremely difficult due to reduced resiliency of tissues and obliteration of vestibular spaces. The problems encountered in fabrication of complete denture for these patients especially during impression making are overcome by the use of sectional trays. This article focuses on use of sectional trays during preliminary and final impression making procedure for an edentulous patient with oral submucous fibrosis.

Introduction

Restricted mouth opening impose a great challenge to the dentist in performing any intraoral procedure. This is commonly associated with conditions like orofacial cancer surgeries, scleroderma, traumatic injuries, temporomandibular joint disorders, oral submucous fibrosis etc... Oral submucous fibrosis is one of most common pathology associated

with reduced mouth opening. Oral submucous fibrosis (OSMF) is defined as a chronic disease of the oral mucosa characterized by inflammation and progressive fibrosis of the lamina propria and deeper connective tissue layers. A number of factors trigger the disease process by causing juxta epithelial inflammatory reaction in the oral mucosa. Suggested contributory factors include areca nut chewing, ingestion of chillies, nutritional deficiencies, genetic and immunologic processes and other factors. OSMF is a potential premalignant condition with an incidence of oral cancer in 3-7.6% cases.¹ The presenting symptoms of OSMF are burning pain, progressive inability to open the mouth with difficulty in mastication and swallowing. It is most common between 20 and 40 years of age with a female:male ratio of 3:1¹. This condition is prevalent among geriatric patients with partial or complete edentulism. Restoring function becomes a challenge to the prosthodontist due to patient's clinical presentation.

Several methods have been described for use when a standard impression tray becomes difficult to be inserted or removed from the mouth. During impression making, modification of standard impression procedure is required to accomplish

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the fundamental step in fabrication of successful denture. Use of sectional trays can overcome the problem of reduced access to the oral cavity during impression making.

This clinical report describes the use of sectional trays for preliminary and final impression for the patient with reduced mouth opening due to Oral submucous fibrosis.

Case report

A 65 year old female patient (fig: 1a & 1b) treated with intralesional therapy for chronic oral submucous fibrosis reported to the Department of Prosthodontics with a chief complaint of difficulty in chewing due to loss of teeth. Intraoral examination revealed the presence of palpable fibrotic muscle bands on right and left buccal mucosa and restricted mouth opening. The diameter and circumference of her mouth were measured, and found to be 30mm (fig: 1c).

Prognosis and probable prosthetic treatment options were explained to the patient and informed consents were obtained.

Procedure:

1. Primary impression using custom fabricated sectional trays.
2. Final impression using custom fabricated sectional trays with press buttons
3. Permanent base fabrication
4. Jaw relation
5. Try-in.
6. Prosthesis delivery

Maxillary primary impression using custom fabricated sectional trays.

Difficulties faced in Prosthetic rehabilitation of microstomia patients begin from the preliminary

impression due to minimal mouth opening and tongue rigidity. Hence the maximum mouth opening does not accommodate even the smallest of the impression trays². Insertion and removal of impression trays are often very difficult. To overcome this problem, various modification in tray fabrication have evolved which includes the use of sectional trays² and flexible trays³ that could be assembled extraorally.

Impression Making

For making maxillary primary impression modified stock metal tray was fabricated according to the technique illustrated by K. Ashwini Kumar et al⁴

In this method, a stock metal tray was selected by measuring the width of residual ridge using caliper. The area to be sectioned was marked on the tissue side of the tray. Later, Dental stone was poured into the impression tray and cast was made. This cast acted as a guide for the sectioned stock tray. The tray was sectioned into two along the line previously marked using a diamond disk and the magnets were attached to the sectioned handles with a designed reorientation mechanism.

Impression was made in two steps. The impression of one half of the arch was made first followed by impression of the other half. Monophase medium viscosity impression material (Elite impression material, Zhermack Italy) was used.

At first, the tray adhesive was applied on the both sections of the tray and allowed to dry for 5min. Then the first segment of the modified impression tray was loaded with elastomeric impression material (Elite impression material, Zhermack, Italy) and the impression of the corresponding side of the arch was made. The excess material extending medially beyond the tray was cut off, followed which petroleum jelly was applied onto the cut surface. Next, the second segment of the tray was verified for proper orientation and impression of the second half was made without disturbing the first half. At this point, magnet incorporated,

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helped in holding the two segments of the tray. The impression was taken out in segments and was reoriented outside the mouth (fig: 2).

The impression was poured in dental plaster and a preliminary cast was obtained.

For mandibular impression, a stock metal tray was used according to the width of ridge.

Choosing an appropriate tray which was inserted without any difficulty, allowed us to use a single stock tray without sectioning and impression was made using impression compound in a conventional manner.

Maxillary Final impression using custom

fabricated sectional trays using press buttons:

A 2mm thick wax spacer (Maarc Modelling wax, New Delhi) was adapted onto the maxillary primary cast and sectioned vertically along the midline into two halves. Maxillary custom impression tray was fabricated using autopolymerising acrylic resin (DPI-RR Cold cure clear) in two steps.

For the first segment, wax spacer was placed on the cast and autopolymerizing acrylic resin was adapted over it. A tapered brass die pin of 8mm long was placed at an angle of 45° anteriorly in the region of incisive papilla. This die pin served as tray handle for this half of tray and also as a component of anterior locking. Posteriorly, female



Fig 1a: Preop : Frontal view



Fig 1b: Preop: Profile view



Fig 1c: Limited mouth opening



Fig 2 Maxillary primary impression made using modified stock tray



Fig 3a: Modified custom tray separated
Anteriorly : Die pin serves as anterior lock
Posteriorly: Press buttons serves as Posterior lock



Fig 3b: Modified custom tray pressed against each other, placed in primary cast



Fig 4a :Sectional border moulding separated



Fig 4b: Modified trays with Sectional border moulding approximated to each other

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part of press buttons were placed over the palatal shelf 1cm away from midline that served as a component of posterior lock.

After complete polymerization of first segment, petroleum jelly was applied over the die pins and also into the set acrylic to prevent fusion of two segments. The second half of wax spacer was adapted and acrylic resin was adapted over it to form the second segment.

Anteriorly, acrylic resin was directly adapted around the die pin forming a tray handle in the second segment. Posteriorly, the acrylic plate was extended medially over the first segment, consisting of male part of press button forming the posterior lock (fig: 3a& 3b).

The tray was checked intraorally, extensions

were evaluated. Sectional border moulding was completed using low fusing green stick compound (DPI)(fig: 4a & 4b). Impression of first half of tray was made and the excess material was cut off to flush with second half tray. The cut surface was lubricated using petroleum jelly and impression of second half tray was made. At this point the tray should be squeezed at the handle and once precise fit was ensured, snap fit buttons were pressed firmly and allowed the material to set. Later, snap fit buttons were unpressed and removed separately (fig: 5a). Outside the mouth, trays were reassembled (Fig :5b) following which conventional prosthodontic protocol of boxing and pouring with type III gypsum material was followed to create a definitive cast.

A Light body polyvinylsiloxane (Elite, Zhermack, Italy) impression material was used. A step by step



Fig:5a:Maxillary final impression made and trays are removed separately



Fig:5b: Maxillary final impression. Modified custom trays joined together outside the mouth



Fig:6:Mandibular final impression made using Light body elastomeric impression



Fig:7a:Side view



Fig:7b:Frontal view

Upper and lower occlusal rims mounted on Mean value articulator with centric relation record



Fig:8:Try in stage



Fig:9:Post op view

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procedure for making definitive impression was carried out based on novel technique suggested by Suryakant.C.Deogade³.

For Mandibular final impression, sectioning of tray was not required as the whole of custom tray was inserted without difficulty. Hence, the conventional procedure for final impression making was followed (fig: 6) and definitive cast was obtained

The handle of the tray was fabricated using acrylic resin blocks and commercially available press buttons were used as locks which have a male and female part. The handle with the press buttons function as anterior and posterior locks

Jaw relation, Try in & Prosthesis delivery

With the obtained master cast, a permanent base was fabricated. At this point, it was possible to place the denture as a single piece, which eliminated the need for construction of a sectional denture which though would be convenient for placement would be difficult in hygiene maintenance.

Maxillomandibular relationship was recorded and mounted on an articulator (fig:7a & 7b). Teeth arrangement was done; and the setup was tried in patient's mouth (fig: 8). The maxillary and mandibular complete dentures were then acrylized conventionally in heat polymerizing acrylic resin (DPI)(fig:9).

Discussion:

Rehabilitation with conventional complete denture for microstomia patients is a challenging task due to decreased perimeter of the oral cavity. Presence of fibrotic buccal mucosa makes manipulation of muscles for border moulding extremely difficult. To overcome these problems, several modifications in tray fabrication have been illustrated in the literature. Use of flexible trays and sectional trays provide a helping hand in impression procedures. Whitsitt and Battle⁵ described a technique for making flexible impression trays for a microstomia

patient. He had utilized silicone putty material (Optosil, Unitek Corp., Monrovia, Calif.) that can be inserted and molded in the mouth before it sets. Due to its flexible nature, the silicone tray can be easily inserted and removed. Various authors have suggested different techniques for fabrication of sectional trays. 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^{6,7}. Sectional impression trays have been fabricated using recesses, orthodontic screws, Lego blocks (Lego Systems Inc., Enfield, CT), dowel plug holes with a screw joint for rigid connection, locking levers, interlocking tray segments and flexible impression trays with silicone putty.

K. Ashwini Kumar et al⁴ described a technique of making sectional trays for maxillary impressions in which magnets were attached to the sectioned handles with a designed reorientation mechanism. Vamsi Krishna CH et al⁸ described simple and economic methods of fabrication of two-piece custom sectional trays for patients with oral sub mucous fibrosis.

A sectional stock tray system for making preliminary impression was described by Luebke⁹. 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. The important requirement while fabricating a sectional tray is the mechanism employed to accurately adapt and stabilize the two segments of the tray to each other both intra-orally and extra-orally. The technique should allow easier manipulation to decrease patient trauma. Use of both anterior and posterior locks is important for better stability. The technique for sectional tray described in this report employs the use of lock pins and press button which fulfills all the criteria.

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A maximal opening smaller than the size of a complete denture can make prosthetic treatment challenging.

Summary

Modifications in procedural techniques help to overcome the technical difficulties faced during prosthetic management of patients with oral submucous fibrosis. The technique employed for tray fabrication is a combination of two different lock mechanisms, which facilitated the operator to obtain accurate impressions for patients with restricted mouth opening. These sectional tray designs are easier to fabricate, less time consuming and requires relatively inexpensive locking mechanisms.

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