

Microstomia: Difficult Proposition to Rehabilitate

Vaibhav Jain¹, E Mahesh Gowda², Poonam Prakash³, Vishvsnathe Udayshankar⁴

ABSTRACT

Introduction: The rehabilitation of microstomia patients presents difficulties during fabrication of denture as the maximal mouth opening is inadequate. This condition may result from the surgical treatment of orofacial cancer, cleft lip, trauma, burns, Plummer–Vinson syndrome or scleroderma. The reduced mouth opening also leads to difficulty in speech, mastication and psychological problems secondary to facial disfigurement.

Case report: It is often difficult to apply conventional clinical procedures to fabricate prosthesis for patients who demonstrate limited mouth opening, since it is difficult to follow the protocol of fabrication of prosthesis and also insertion and removal of one-piece prosthesis into the oral cavity. The present case report focuses on rehabilitation of microstomia using sectional prosthesis and intraoral magnets with which enabled easier and competent removal and insertion by the patient.

Conclusion: The sectional denture attached by the magnet can be more comfortably removed and inserted by the patient with reduced mouth opening. It is simple and cost-effective method for rehabilitation of microstomia patient.

Keywords: Oral Submucous Fibrosis, Restricted Mouth Opening, Sectional Denture, Intra Oral Magnets.

INTRODUCTION

A prosthetic rehabilitation of patient is challenging when mouth opening that is lesser than the size of a prosthesis. A microstomia (limited mouth opening) can occur as a result of trauma¹, including injury to facial tissues as a result of animal bites, thermal burns and chemical burns.² The microstomia can also result from chromosomal dysfunction like Freeman-Sheldon syndrome, Recessive dystrophic epidermolysis bullosa and Plummer-Vinson syndrome or scleroderma. Other causes include treatment of cleft lip and cancers of orofacial region.³⁻⁶ The other post-operative complications of surgical treatment of carcinoma include reduced size and movement of tongue, reduced vestibular depth which further complicates the rehabilitation protocol of desired results. Prosthetic rehabilitation of patients with limited mouth opening presents difficulties starting from impressions to final prostheses fabrication. Due to inadequate opening of the mouth, the impression making and fabrication of dentures using conventional methods is often difficult. Various methods have been described in literature for the fabrication of prosthesis using modified treatment procedures.⁷⁻⁹ In this article, a modified treatment protocol has been utilised for the fabrication of sectional denture for maxillary arch and mandibular denture by conventional approach after pre-prosthetic surgical treatment.

CASE REPORT

A 71-year-old woman reported with chief complaint of inability to chew food due to loss of teeth. History of presenting illness revealed patient had a carcinoma of tongue which was surgically treated 2 yr back followed by chemotherapy and radiotherapy. On examination she had a reduced mouth opening of 16.6mm with no vestibular depth on left vestibule of mandibular arch. The both arches were completely edentulous with class 4 type of ridges in both the arches according to PDI classification for edentulous ridges (Fig 1). Various treatment options were discussed, since patient was not agreed for any surgical intervention to increase opening of the mouth, alternative modified treatment protocol using sectional maxillary denture and mandibular complete denture by conventional approach was made. The minimal invasive vestibuloplasty procedure using LASER was performed on mandibular left region extending from lateral incisor area to distal most area of edentulous ridge to get the adequate depth of vestibule followed by placement of surgical stent to maintain the desired depth. Stock tray was sectioned into right and left sections and the primary impression was made using type II high fusing impression compound material (DPI; Pinnacle: India) on each section of the tray. The midline was marked intraorally using intraoral marking pencil from incisive papilla to junction of hard and soft palate region the marking was transferred to each section of the impression, the primary cast from each section was poured using type II dental stone (Kalstone, Kalabhai Karson, Mumbai). The marking got transferred to each section of the cast, the cast was trimmed according to the marking transferred from impression and

¹Resident, Division of Prosthodontics and Crown and Bridge, Department of Dental Surgery and Oral Health Sciences, Armed Forces Medical College, ²Professor, Division of Prosthodontics and Crown and Bridge, Department of Dental Surgery and Oral Health Sciences, Armed Forces Medical College, ³Assistant Professor, Division of Prosthodontics and Crown and Bridge, Department of Dental Surgery and Oral Health Sciences, Armed Forces Medical College, Pune – 411040, ⁴Resident, Division of Prosthodontics and Crown and Bridge, Department of Dental Surgery and Oral Health Sciences, Armed Forces Medical College, India

Corresponding author: Lt Col (Dr.) Poonam Prakash, Division of Prosthodontics and Crown and Bridge, Department of Dental Surgery and Oral Health Sciences, Armed Forces Medical College, Pune – 411040, India

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Figure-1: Pre- treatment



Figure-4: Face bow transfer, try in, finished denture without anterior segment

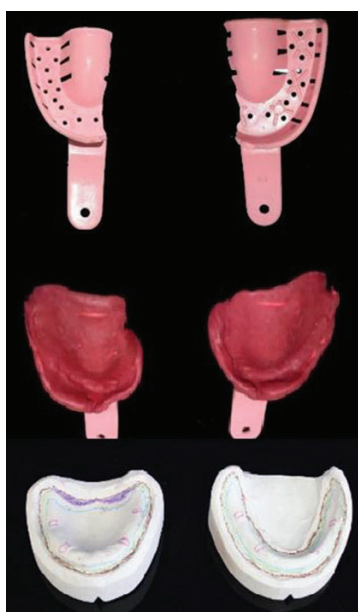


Figure-2: Primary impression and cast



Figure-5: Magnet attached to processed denture and post treatment



Figure-3: Pin parallelism, Custom tray with acrylic block, Master Cast and denture base with occlusion rim

the cast was joined for fabrication of custom tray (Fig 2). The mandibular impression was made and cast was poured using conventional method. The custom impression tray was fabricated using autopolymerising acrylic resin. For custom tray of maxillary arch, a total of 4 metal die pins were selected with same diameter; 2 of these pins were 25 mm long, and the other 2 were 10 mm long, the pins with longer length were attached adjacent to the midline of the tray and short pins were attached near to the ridge and away

from the midline so that metal pins were symmetrical and parallel to the midline. Pin parallelism was evaluated with a milling device and necessary adjustments were made (Fig 3). The custom tray was lubricated with petroleum jelly, and a self-cure acrylic resin block with a 4- 5-mm cross-section that slid tightly on the pins was prepared. The trays were cut into 2 pieces in sagittal plane with a steel disc (Bur no: 952.900.140; Komet, Gebr. Lemgo, Germany) and then joined with the acrylic resin block, which slid onto the pins (Fig 3). The mandibular custom tray was made with self-cure resin in one piece and could be used as single piece in patient mouth.

Impression procedure

The maxillary custom tray was inserted into the patient's mouth in 2 separate pieces: left and right. After placement, these pieces were stabilized by means of a self-cure acrylic resin block. The extension of the borders was evaluated. Border moulding of both trays was done separately using low fusing impression compound (DPI; Pinnacle: India) and final impressions was made with zinc-oxide eugenol impression paste (S.S. White Manufacturing, Gloucester,

England) separately in each tray. The midline was transferred to intaglio surface of each impression by marking intraorally on the palate (Fig 3). The impressions were approximated according to midline and resin block was carefully fitted on the pins, and after it was determined that the mid line joined smoothly, cast was poured with type III dental stone (Kalstone, Kalabhai Karson, Mumbai). For the mandibular impression, the border moulding and final impression were done by conventional method since mandibular tray could be used intraorally as single piece.

Fabrication process

The maxillary denture base was made on the master cast in 2 pieces: right and left using self-cure acrylic resin. These two pieces were joined by 2 mm thick acrylic extension plate whose one end attached to one half of tray and other end attached to another half using press button (snap fasteners: Needles: ind). A press-button has two components - male and female. One of the two components was positioned in a right section and the opposite component was secured in the inner surface of an acrylic extension plate that connected to the right section sectional denture base. Mandibular denture base was made using self-cure acrylic resin on the master cast obtained from final impression of mandibular arch. Wax occlusal rims were fabricated over the denture bases and facebow transfer was done, the maxillomandibular relationship was recorded (Fig 4). The right and left section with occlusal rim is placed on master cast and third self-cure acrylic resin record base from canine to canine was made over the attached denture bases over which maxillary anterior teeth would be arranged. The teeth arrangement was done, try-in of sectional denture was evaluated to verify jaw relations (Fig 4). After try in, maxillary master cast was duplicated, press buttons of right and left sections were removed and the two sections were joined by incorporating wax in between them and processing was done for posterior section with the premolar and molar teeth in conventional manner (Fig 4). The denture base was subsequently trimmed and polished, and the duplicated master cast with processed denture was duplicated and the third section with the incisors and canine teeth on it were also processed and polished with duplicated cast. After processing, the processed denture was again cut into two section and secured by Neodymium-iron-boron magnets. Two pair of magnets of dimension 5mm diameter by 1.5 mm thick were used to connect the posterior right and left segment segments and two pair of magnets of dimension 3mm diameter by 1.5mm thick were used to connect anterior segment to posterior segment at canine region (Fig 4). Mandibular denture was fabricated in single piece.

At the time of denture delivery, only maxillary sectional denture was delivered and to be worn for few days so as to improve patient's adaptability with denture. After that, she was advised to use dentures for both maxillary and mandibular arch. Patient was educated about insertion and removal of dentures along with post insertion and home care instructions. At the follow up visit after 7 days, the patient was

satisfied with the dentures and was able to use the dentures easily with magnetic attachments. Periodic recall was done after every month during which minor adjustments were made as required and the patient was satisfied functionally and esthetically.

DISCUSSION

Prosthetic rehabilitation with complete denture prosthesis in microstomia patient is challenging. Various methods of fabrication and attachments have been used to design a denture which the patient can use easily.¹⁰ Various authors have used orthodontic expansion screws to fabricate sectional trays and other used metal pins and an acrylic resin block to attach the sections of the impression trays. In literature, flexible plastic tray intended for fluoride application was also used to make the preliminary impression.⁸ On one of the sections, they prepared a stepped butt-joint to make a definitive impression. McCord et al⁹ described a complete denture for maxillary arch consisting of 2 pieces joined by stainless-steel rod of 1 mm diameter fitted behind the central incisors. In the present article, we have discussed a combined and modified methods of sectional complete denture fabrication for maxillary arch. The various attachments like - dual die-pins, press-buttons and Nd₂Fe₁₄B (Neodymium-Iron- Boron) magnets were used for denture fabrication. The use of dual die-pin and sleeve for fabrication of sectional trays was based on the technique advocated by Bachhav and Aras.¹¹ Such a locking mechanism provides a greater degree of stability and a precise rigid union of the two sections without increase in bulk. The die-pin also serves as a handle for a section of the custom tray. Press buttons were used to attach the two sections while recording maxillomandibular relations. This is because the length of die pins would interfere in maxillomandibular relation and press button provides a precise union equivalent to die pins. The use of magnetic attachments makes insertion and withdrawal of sectional dentures very convenient for the patient.¹² The use of Fe-Pt (Iron- Platinum) magnetic attachment system to sectional collapsed complete dentures has been shown in various literature.¹³ Fe-Pt magnetic attachments are clinically useful for prosthesis to increase its retention because of their excellent attractive force, but due to its decrease coercivity and magnetisation with time, we preferred to used Nd-Fe-B magnets for joining two sections of the denture.

The Nd₂Fe₁₄B magnets are based on rare earth components and show high intrinsic coercivity, outstanding maximum energy and special coating possibilities as reported by Sagawa and Fujimura.¹⁴ The technique described here for fabricating sectional impression trays and dentures do not require any special devices or complex locking joints. These magnets are easily available at minimum cost. However, the concern regarding loss of magnetic properties after a period of use remains. So as to determine the long-term success of this technique, recall at periodic interval and maintenance are needed. In literature various attachments like pins, bolts, and Lego pieces have been used for the locking mechanism of sectional impression trays fabricated for patients with

limited oral opening as described by Conroy and Reitzik.¹⁶ When mouth opening is limited, joining two pieces of a sectional denture intraorally may be problematic. A foldable, single-piece denture was used for the patient as described by Suzuki in his case report.¹⁷ Care should be taken to fit the hinge along a line connecting the tip of the residual ridge with the posterior edge of the denture and along the midline. Fitting hinge higher than the tissue surface has adverse effect of limiting the tongue volume. However, the multilevel design of the connection line along the midline of the foldable pieces to ensure stability between them. The sectional prosthesis connected by magnets described in this clinical report was convenient in terms of insertion and withdrawal of complete denture and there was no visible fracture or wear observed.

CONCLUSION

This clinical report describes a simple and cost-effective method to fabricate a prosthesis for a patient with microstomia. The use of die-pins, press-buttons and Nd-Fe-B magnetic attachments for making successful sectional impressions and sectional dentures has been described. The sectional complete denture prosthesis attached by magnets for microstomia is one of the options to rehabilitate wherein conventional treatment options are not conducive. Also seen prosthesis are comfortable during insertion and removal of the prosthesis.

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