

Economical Prosthodontic Management of Microstomia Patient With Hinge Denture - A Clinical Report With Classification System

Abstract:

Microstomia is an abnormally reduced oral aperture. In the literature, it is not classified by any particular size criteria, rather defined by its effects on function and esthetics. Prosthodontic management of edentulous patients with microstomia is a challenging task. Use of conventional methods for recording an impression and fabricating prosthesis is not effective in such patients. To fabricate well-fitting prosthesis, accuracy of impression recording important anatomic landmarks is essential. Formation of an exacting custom tray and diagnostic cast is critical for final impression accuracy. Provision of a well-fitting prosthesis in microstomia patient will restore esthetics, comfort, and function with oral and systemic patient wellbeing. This paper presents a case report of managing an edentulous microstomia patient with sectional removable prosthesis.

Key-words: Microstomia, Split denture, Sectional denture

Introduction:

The mouth is a cosmetically and functionally mobile organ located in the center of the face.[1] The word Microstomia means Micro- small, and Stoma - mouth, so it is small mouth opening or reduced mouth opening.[2] Microstomic experiences reduced oral aperture resulting in esthetic impairment[3,4] and functional deterioration of the mouth, along with significant limitation of mandibular opening, eccentric mandibular movements and an overall mandibular immobility.[5,6] Microstomia is a congenital, genetic, developmental, and acquired condition[7], it can also be associated with autoimmune diseases that cause connective tissue disorder.[8] A microstomia can occur as a result of trauma[9] (accidental, thermal, chemical, and electric burns)[10] including injury around the perioral tissues as a result of animal bites, ingestion of caustic substances. The microstomia can also result from chromosomal dysfunction like Freeman- Sheldon Syndrome, Treacher Collins, and

Pierre Robin Syndromes[11], Otocephaly, Recessive Dystrophic Epidermolysis Bullosa and Plummer-Vinson Syndrome or Scleroderma. Other causes include microinvasion of muscles of mastication, temporomandibular joint (TMJ) dysfunction syndrome, contracture and scars following surgeries of cleft lips or reconstructive lip surgeries,


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cancers of orofacial region, and head and neck irradiation, reconstruction surgery after skin cancer ablation.[12-16] 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.

Congenital microstomia has rarely been reported.^{17,18} In a study by Patil et al., 38.2% of the reported microstomia cases were due to postsurgical complications and 41.1% cases were due to systemic sclerosis.¹⁹

Restoration and preservation of the dentition in patients with limited oral opening has been a challenging task for dentists.²⁰ The maximum oral opening that is smaller than the size of complete denture can make the prosthetic treatment complicated, especially among edentulous patients, in which oral function, esthetic, comfort, and self-esteem are at its lowest.²¹ Microstomia patients may present with clinical problems including severe facial scarring, reduced width and mobility of lips, and loss of elasticity and altered anatomy of the oral tissues, particularly thickening of the labial and buccal tissues and contraction of the tissues around the mouth.²² These features affect oral health-related quality of life, i.e., compromised chewing, speech difficulty, nutritional needs, social interaction, facial expression and appearance.²³ Furthermore, a diminished intraoral access will affect oral hygiene maintenance and manual dexterity. Therefore, treating such cases of edentulism and microstomia is pivotal not only from a functional standpoint but also from a psychological perspective. The goals of prosthodontic treatment are to restore masticatory function, improve esthetics, restore vertical dimension, establish lip support and competency, reduce drooling, and improve articulation.²⁴ The need for a classification based on diagnosis and overall patient management is lacking. The existing classification on microstomia which is the “index of oral access” (IOA) does not address vertical mouth opening, difficulty in prosthesis fabrication, manual dexterity of the patient, and treatment options. There fore a classification system is used based on the severity of microstomia, to guide practitioners in formulating diagnosis and treatment options according to the complexity of microstomia.[25] (Table 1)

Table 1: Classification systems based on diagnosis and management for microstomia patients

Class	IOA severity	Vertical mouth opening	Accessibility/visibility	Treatment options	Prosthetic fabrication difficulty	Manual dexterity
DM - 1	Mild	Minimally compromised: d: 31-35mm	(i) Denture-bearing areas of the mouth are fully accessible and visible (ii) Impressions and JRR can be recorded easily	(i) Conventional removable dentures (ii) Implant-supported prosthesis (iii) Flexible dentures	Not technique sensitive	Adequate
DM - 2	Moderate	Moderately compromised: d: 21-30mm	(i) Denture-bearing areas of the mouth have moderately compromised accessibility and visibility (ii) Moderately difficult to record impressions and JRR (modification of the tray/ technique is required*)	(i) Surgical correction (ii) Prosthodontic mx: (1) Implants supported/retained prosthesis (2) Flangeless prosthesis (3) Sectional complete removable dental prostheses— various cross pins, bolts, attachments, buttons, and Lego pieces can be used for the locking mechanism (4) Swing lock denture with cobaltchromium framework	Moderately technique-sensitive design, moderately skilled lab/ technician required	Fair
DM - 3	Severe	Substantially compromised: d: 10-20mm	(i) All the denture-bearing areas of the mouth have substantially compromised accessibility and visibility (ii) Extremely difficult to record impressions and JRR	(i) Surgical correction (ii) Prosthodontic mx: Sectional collapsible complete removable dental prosthesis	Highly technique sensitive designs, highly skilled lab/ technician required	Poor
DM - 4	Extreme	Severely compromised: d: <10	(i) Denture-bearing areas hardly visible (ii) Impressions and JRR are not possible	Prosthetic rehabilitation not possible	-	-

DM= diagnosis and management; IOA = index of oral access; mx = management; JRR = jaw relation record; *flexible trays = sectional impression trays using die pins, sectional trays with interlocking-type handle or manually dispensing silicone putty.

Case Report:

A 35-year-old man reported with a chief complaint of inability to chew food due to loss of teeth. History of presenting illness revealed patient had met with a fire accident 12 years back (Fig:1) On examination, he had reduced oral aperture, 20mm interridge distance and 32mm intercommissural width, minimal vestibular depth, along with inelastic buccal and labial tissues as a result of scarring and fibrosis around the corner of the mouth (Fig:2) The patient was completely edentulous wrt the mandibular arch and only 18, 28 were present in the maxillary arch. He displayed adequate manual dexterity and psychological status and belonged to class IV assessment of Prosthodontic Diagnostic Index²⁶ and DM-3 class (Table 1), based on the severity of microstomia. Since patient was not agreed for any surgical intervention to increase opening of the mouth, alternative modified treatment protocol to provide a sectional collapsible complete denture was suggested.

Procedure:

The primary impression was made with impression compound using small size edentulous stock tray. For maxillary impression, the stock tray was sectioned into two parts in the mid-region and a stainless steel hinge (used from a wrist watch) was welded in the centre of the axis connecting the stock tray whereas alginate was used for mandibular impression, dentulous plastic stock tray was used which is sectioned in the midline into two halves. (Fig: 3,4,5,6) After placement, these pieces were stabilized by means of a self-cure acrylic resin block. The preliminary cast was retrieved on which a sectional foldable maxillary custom tray was fabricated with a stainless steel hinge attachment. Border molding was carried out with green stick impression compound (Fig: 7) Following border molding, definitive impression was recorded simultaneously with light body elastomeric impression material (Fig: 8) Maxillary record base was fabricated with the hinge incorporated in the midline making it collapsible in the saggital plane (Fig: 9) Maxillomandibular relationship in centric relation was recorded and transferred to the articulator. Edge to edge occlusal teeth arrangement was performed and satisfactory esthetics and function were achieved (Fig: 10) Finally the maxillary denture was fabricated in two sections which was further attached using a hinge and made into a foldable denture, c-clasp attachments were given for the third molars on first and second quadrant. At the denture insertion, overextension of borders and sharp edges were removed by relieving the intaglio surface using disclosing paste and carbide acrylic bur on a slow-speed motor. Occlusion was adjusted to achieve equilibration in static and functional position of the mandible. The patient was instructed and trained for denture assembly and removal. He was provided post insertion instructions on hygiene, safe storage, maintenance, and regular follow-up to avoid mucosal ulcers and tissue inflammation, denture loss, and treatment failure.



Fig: 1 Preoperative photograph



Fig: 2 Limited Mouth Opening



Fig: 3 Maxillary Edentulous Sectioned Stock Tray with Hinge Attachment

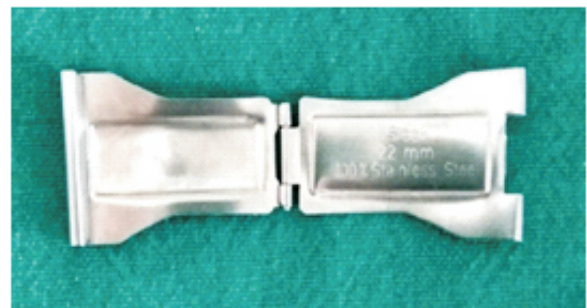


Fig: 4 Hinge Attachment separated from a wrist watch

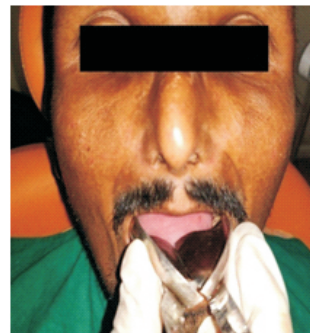


Fig: 5 Foldable Sectional Stock Tray



Fig: 6 Primary Impression

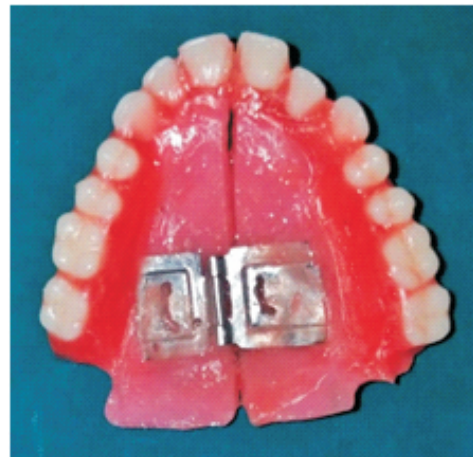


Fig: 10 Maxillary try-in denture & hinge attachment



Fig: 7 Border moulding using a hinge attachment on custom tray

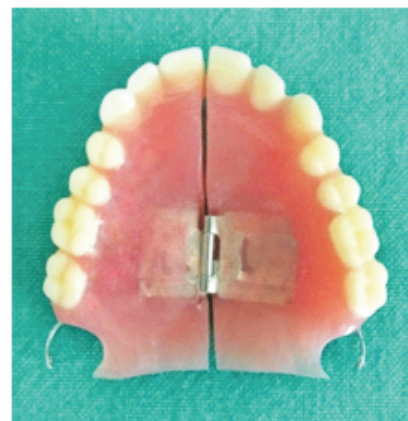


Fig: 11 Foldable maxillary denture with clasp attachment for third molars



Fig: 8 Elastomeric Impression



Fig: 9 Denture base with maxillary occlusal rim & hinge attachment



Fig: 12 Postoperative photograph

Discussion:

Various treatment modalities has been designed which includes surgery,^{27,28} dynamic opening devices called microstomia orthoses²⁹⁻³² and modification of denture design.³³⁻⁴⁷ The insertion of a standard complete arch stock impression tray may be impossible if there is a severely

limited oral opening. Management includes flexible modified stock trays and sectional trays. Sectional and collapsible dentures have been described for these patients with different attachment devices, for example, cast Co-Cr hinges, swing-lock attachments, stud attachments, telescope system, cast locking recesses and locking levers (various pins, bolts, rods, clasps and Lego pieces), orthodontic expansion screws, magnet systems, and so forth.

The patients with microstomia usually find it difficult to insert and remove their dentures, so it seems necessary to invent a new form of denture. In dental literature, there are limited articles describing the method of making impressions for sectional dentures. According to McCord *et al.*⁴⁷ the sectioned dentures were secured by stainless steel post, whereas Cheng *et al.*⁴¹ used a sectional impression tray technique for making impression, and the authors customized the hinge for joining the sectioned removable mandibular complete denture. Suzuki *et al.*³⁴ customized a telescopic system with Co-Cr-Ti alloy using cast on technique. Nair *et al.*⁴⁸ describe a maxillary complete denture consisting of 2 pieces joined by a stainless steel rod with a diameter of 1 mm fitted behind the central incisors. Bedard *et al.*⁴⁹ describe a sectional impression procedure for edentulous patient by using 2 plastic sectional impression trays assembled with Lego building blocks and autopolymerizing resin. Mandibular denture was fabricated by Wahle *et al.*⁴² using a swing lock mechanism. Mandibular sectional dentures were fabricated using dovetail mechanism⁵⁰ and magnets³⁹. Yenisy *et al.*⁵¹ gave a new technique to fabricate mandibular sectional collapsed denture using midline lingual hinge. Collapsed maxillary hinged and mandibular sectional and hinged complete denture with removable partial denture was made by Sharma *et al.*⁵². The use of dual die-pin and sleeve for fabrication of sectional trays was based on the technique advocated by Bachhav and Aras.⁵² Some authors have described the method of fabricating only collapsible dentures and some have described only the sectional ones. Another group of authors have fabricated sectional dentures using hinge and stud attachments for this denture design. Its advantage is the use of a custom-made hinge, which is more durable and less expensive.

Conclusion:

The DM classification presented will assist in diagnosis and management of microstomia patients. The use of sectional removable dentures in the rehabilitation of edentulous patients with microstomia is effective; however, treatment prognosis is dependent on patient motivation and adaptation, case complexity, prosthodontic technique, technical skill, and

maintenance. The maxillary denture was fabricated in sections. Sectional denture with hinge attachment is easy to use for a patient as there is a simple mechanism for locking them and patients are aware of its use. This technique can be done in any dental office or laboratory without using any complicated machinery or parts for sectioning and attaching sectional dentures. This technique is an innovative, practical and economical solution for patients with microstomia. In spite of all, in the current era of digital development, it is believed that microstomia management will become more convenient and efficient. Intraoral scanning, computer-aided design and manufacturing (CAD-CAM), and 3D rapid prototyping can be utilized to produce precise sectional dentures. The hassle of recording manual impression, dental cast replication, and designing can be replaced with a digital workflow. Nevertheless, the use of dental implant-supported fixed prosthesis can add up to improve oral function and patient satisfaction.

Consent:

The patient signed a written ethical consent showing agreement for documentation and presentation of the completed microstomia case.

Conflicts of Interest:

The authors declare no conflict of interest.

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