



## Complete Denture with Sectional-Tray Approach in a Microstomia Patient: A Case Report and Literature Review

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### ABSTRACT

Microstomia refers to any significant decrease in the size of the oral cavity. It can cause difficulty in the fabrication of dentures, and the result of this situation shows a significant decline in quality of life. This study describes a treatment method for preparing a complete denture in an edentulous patient with microstomia due to burns. The present study decided to employ a sectional tray and single unit denture considering the hygienic issue and prolonged durability. The major advantage of this scheme is reducing food impaction between different parts. Eventually, the patient was noticeably satisfied, and aesthetic and functional demands were provided.

### 1. Introduction

Fabricating dentures for patients with limited mouth opening (microstomia) has been considered complicated, and procedures are laborious. Patients with microstomia show significant limitations in mouth opening and mandibular eccentric movements. In healthy people, the opening of the mouth is about 30-50 mm, but when the maximum opening reaches 20 mm or less, the condition is categorized as a microstomia.<sup>[1,2]</sup> This decrease in the maximum mouth opening is not designated as a disease, but it is considered as a manifestation of a disease or a problem. Limitation in mouth opening can be due to congenital disorders, Plummer-Vinson Syndrome, infections, trauma, burns, reconstructive lip surgeries, oral cancers, chemotherapy and radiotherapy, temporomandibular joint disorders, drugs, psychological problems, and collagen synthesis disease like scleroderma.<sup>[1, 3, 4]</sup> Some complications related to microstomia including speech problems, limited access to the oral cavity and poor oral hygiene, Severe dental caries, and difficulty in the rehabilitation of remaining teeth.<sup>[4, 5]</sup>

In burn patients, there is a scar on the face and neck that cause stretching in the lower lip and corners of the mouth and Orbicularis Oris, so limitation in mouth opening is common. In these patients, preventive or corrective splint therapy is considered a possible solution (based on intervention time).<sup>[5, 6]</sup> Pharmacological management, various exercises such as orofacial muscle

exercise and grimacing facial exercises, and static or dynamic splints that hold two commissures at proper positions are mentioned as different solutions in microstomia.<sup>[1, 6, 7]</sup> Also, articles emphasized that using tongue blades and increasing their number during a period is considered a stretching exercise for amelioration restricted mouth, especially in burn cases.<sup>[7, 8]</sup>

Furthermore, inserting and removing prostheses easily, providing functional demand, not damaging the surrounding supporting tissues, and preparing acceptable adaptation and stability are crucial factors for patients with microstomia. In previous articles, various treatment options have been suggested to solve patients with limited mouth opening. A review of the published articles shows several methods for the treatment of prosthesis-candidate patients. Since prosthetic reconstruction in these cases is one of the imperative steps, in each case, assessing the situation and selecting appropriate treatment options is essential.<sup>[8-10]</sup>

### 2. Case Presentation

A 65-year-old female with a completely edentulous upper and lower jaw suffering from microstomia was referred to our Department. Her maximum mouth opening was measured as 26 mm (Fig. 1).

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**Fig. 1. Patient's mouth opening (26mm).**

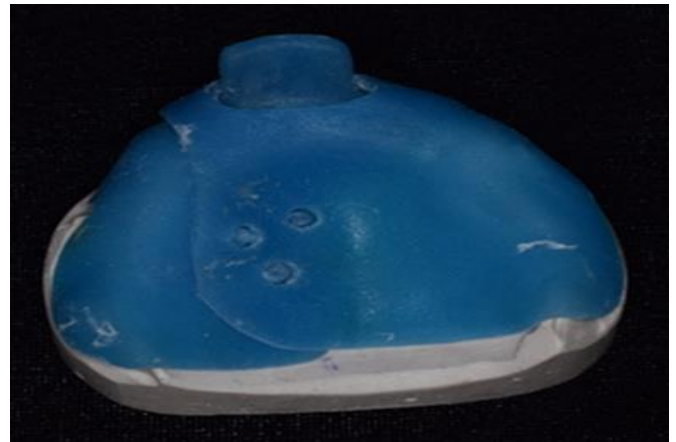
Before referring to this faculty, she was examined by many clinicians in private offices, but they refused patient admission because of difficulty in access to the oral cavity. After performing necessary initial examinations, essential radiographs, possible treatment plans, and treatment steps were proposed. It was found that she suffered microstomia due to a tissue scar caused by a burn in her childhood. Referring to the patient's medical records and her statements. In the patient's history, diabetes and depression were mentioned. Therefore surgery was not considered as a solution for increasing mouth opening. The patient mentioned that clinicians had extracted all her carious teeth for a long time due to limited access to the oral cavity and her economic problems (Fig. 2). Since the patient was completely edentulous in both upper and lower jaws, all treatment options from complete prosthetic dentures to implants have been proposed. However, considering the great limitation in the patient's mouth opening and her current economic condition, a complete prosthesis was chosen.



**Fig. 2. Extraoral photograph of the patient before treatment.**

#### Procedure Steps

The treatment steps for this patient were performed as follows: Since there were no appropriate impression trays to be inserted into the patient's mouth, the primary impression was taken using condensation silicone putty and wash (Speedex, Coltène /Whaledent AG, Altstätten, Switzerland). In the laboratory, a special sectional tray was made so that both parts had a junction area that could be connected in the correct position (Figs. 3 A, B).



**Fig. 3A. Maxillary sectional special tray.**



**Fig. 3B. Mandibular sectional special tray.**

1. Each side of the special tray was separately border-molded using a low-fusing compound (Kerr Corporation, Orange CA, United States). Then, the borders for maxilla and mandible were evaluated. For the upper jaw, first impressions of the right side were taken with eugenol free impression paste (Cavex Outline, Haarlem, Netherlands), then the left part was taken while the right part was inserted, and the left one was matched with this. For the mandible, the impression of the left side was taken first, and the same assembly procedures were exerted for the right one (Figs. 4 A-C).



**Fig. 4A. Maxillary taking impression steps.**



**Fig. 4B. Mandibular taking impression steps.**



**Fig. 4C. Both final impressions.**

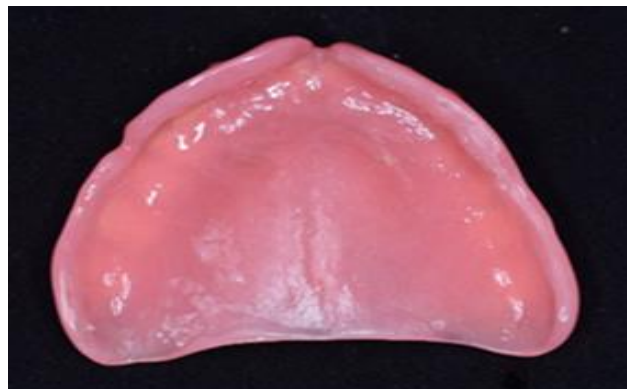
2. To evaluate the possibility of delivering a single unit denture to our patient, we tried an integrated record base and wax rim. Hygienic and mechanical advantages of single unit denture were a priority for choosing this design, and the bulky nature of special trays restricts our preference for preparing it in one part. Then, we first determined the support related to the upper jaw using the maxillary recording base and wax. Next, the height of the mandibular base and wax rim was formed according to the anatomic consideration (corner of the lip should be at the same level of lower wax rim). Afterward, upper wax rim height was evaluated by aesthetic and phonetic criteria. Finally, CR registering was performed for both upper and lower jaws.

3. Then, the teeth were placed, tried in the patient's mouth, and all necessary adjustments and occlusion corrections were conducted.

4. Finally, a laboratory flasking process was carried out. The final dentures' form was one part, the same as regular dentures (Figs. 5 A-D).



**Fig. 5A. Final denture of the upper jaw (polished surface)**



**Fig. 5B. Final denture of the upper jaw (intaglio surface).**



**Fig. 5C. Final denture of the lower jaw (polished surface).**



**Fig. 5D. Final denture of the lower jaw (intaglio surface).**

5. In the final session, "delivering the prosthesis," the patient was instructed in methods of inserting and removing the denture by a rotating way. It was also practiced to learn how to employ the denture., the patient was instructed in all oral and denture-related hygiene protocols and was informed about follow-up sessions (Fig. 6).



**Fig. 6. Extraoral photograph of the patient after treatment.**



### 3. Discussion

Microstomia causes problems such as difficulty mastication, poor oral hygiene, a higher prevalence of periodontal diseases, oral halitosis, and

caries.<sup>[1, 10]</sup> Table 1 categorizes some aspects and procedures which should be considered during the management of cases.<sup>[1, 5, 8, 10]</sup>

**Table 1. Dental consideration of microstomia patients.**

Procedures	Mechanism and details
Pharmacological	Prescription is dependent on the type of disease, but some drugs such as D-penicillamine can interfere with collagen cross-linking and alleviate mouth opening.
Preventive procedures	Controlling diet and avoiding carbohydrates /Recall sessions /Pit and fissure sealants/ Fluoride therapy / Small head soft or electric toothbrushes are useful.
Restorative considerations	Using small devices and micro handpiece / Apply T-band or pediatric matrix during filling / Fiber optic light is beneficial.
Endodontics	Because of difficulty in posterior teeth, do endo treatment only in anterior or strategic posterior teeth/ Apply apex locator instead of intraoral radiographs.
Radiographs consideration	Extraoral radiographs such as OPG are more suitable than periapical x-ray.
Physiotherapy	Stretching facial muscles exercises / Using tong blades or placing fingers at the mouth corner and doing exercises.
Splint therapy	Distance two commissures apart and confronting contraction.
Surgical treatment	Commissuroplasty and using a commissural splint for prevention of relapse.

One of the obstacles during the rehabilitation of these cases is making an appropriate impression. Different methods are discussed, and they are categorized into two main groups: impressions recording without using a stock tray or modified and sectional stock tray.<sup>[4, 9-11]</sup> Moreover, methods of taking impressions can be categorized based on tray design, including plastic sectional impression tray (Lego one with two parts, larger and smaller

sections ),<sup>[12]</sup> two-parts special tray that different approaches can assemble sections (notches at the tray and handle or magnet is embedded in acryl or slot and pin) or two impression trays record different parts of the arch and are covered the same area.<sup>[9-11]</sup> In table 2, different case reports are categorized based on various criteria.

**Table 2. some considerations of preparing dentures for Microstomia patient.**

Study	Type of tray	Type of denture	Advantage	Disadvantage
McCord <sup>[13]</sup>	Sectional tray	Sectional dentures were assembled by stainless steel tubing.	Does not restrict the tongue space Easy to use.	Not mentioned.
Satpathy <sup>[14]</sup>	Sectional tray	Maxilla: buttoned and cross pin sectional denture mandible: key-key way sectional denture.	Cheaper and costly attachments.	Buttons that are used should be replaced regularly and proposed to corrosion. Autopolymerising resin in this technique offers less strength.
Cheng <sup>[15]</sup>	Applied softened impression compound which was supported by wooden spatula for	One piece complete denture.	Using Vinyl polysiloxane for the final impression increase rigidity, flow, and facility in control and mixing.	This type of tray is complicated in the mandible because of its anatomy and saliva.

	primary impression, a single unit custom tray for the final impression.			
Kumar <sup>[16]</sup>	Two parts with stainless steel press buttons.	Sectional denture with stainless steel butt hinges.	Acceptable function, esthetics, and health.	Time-consuming.
Kaira <sup>[17]</sup>	Sectional trays	Sectional denture with buttons.	Easy manipulation and stability.	Not mentioned.
Gauri <sup>[18]</sup>	Sectional tray with key-key way.	Sectional maxillary denture and conventional mandibular denture.	Ease of manipulation, cost-effectiveness and provide support, retention, and stability.	Restricted tongue space and increased laboratory work.
S. Kumar <sup>[19]</sup>	Sectional tray with four metal pins.	Sectional foldable denture with hinge.	Do not need to join the pieces of a sectional denture base intraorally.	Not mentioned.
Geckili <sup>[20]</sup>	Sectional tray mesiodistally along the middle of the palate.	Sectional denture ( 2 segments maxillary base joined lengthwise by a custom-made hinge mechanism; the third segment was then attached to the first two parts using two stud attachments (Vario-Stud-Snap vks; Bredent)).	The use of studs instead of magnets do not lose retention.	The patient had some difficulty in assembling the separate parts.
Cura <sup>[21]</sup>	Sectional tray with four metal pins.	Sectional foldable hinged denture.	Facilitating impression procedures. Stability.	Restricted tongue space.
Watanabe <sup>[22]</sup>	Sectional collapsed trial dentures fabricated with clip hinges and dental magnetic attachments.	Sectional collapsed complete dentures (Co-Cr framework and anterior segments connected to the posterior segments using the Fe-Pt magnets and keepers).	Any size or shape of castable magnetic attachment can be fabricated for prostheses.  Decrease deflection and breakage.	Heat sources such as soldering and brazing reduce magnetic properties.
Shreya <sup>[23]</sup>	Sectional custom tray with press button.	Sectional denture with Stainless steel iron-neodymium-boron button magnets.	Resistance to deflection Decrease breakage. Increase retention economical, quick, and easy.	Risk of compromising function and esthetics.
Saygılı <sup>[24]</sup>	Sectional tray with dowel pins (Using intraoral scanner for preliminary impressions (Carestream 3600; Rochester, NY) and conventional method for the final impression.	Sectional denture with hinge mechanism as a foldable appliance and 2-stud attachment (Vario-Stud-Snap vks; Bredent) patrices in the canine regions.	The practical method in immobile soft tissues and reduced salivary flow. less expensive.	Some errors during scanning.
Tayari <sup>[25]</sup>	Sectional tray	One piece conventional	Better esthetics and	Difficulty in the insertion and

		denture.	Phonetics in comparison to the sectional denture.	removal of the denture.
Balakrishnan <sup>[26]</sup>	Sectional trays using press buttons and pin.	One piece conventional denture.	Better hygiene in comparison to the sectional denture.	Difficulty for placement.
Tulunoglu <sup>[27]</sup>	Sectional tray: mandible:screw type Maxilla: interlocking.	Sectional denture with cast framework, hinge, swinging arm, and lock.	Easy manipulation	More follow up sessions.
Givan <sup>[28]</sup>	Interlocking sectional impression trays.	Maxilla: sectional denture with hinge and plunger attachment Mandible: conventional denture	Assemble both sections of the tray extra orally without distortion. easy locking and separation of the prosthesis.	A gap between two parts of the denture causes seeping of liquid and increases the risk of staining.
Jain <sup>[29]</sup>	Sectional tray with four metal die pins.	Maxilla: sectional denture with magnet. Mandible: conventional denture.	Do not require any special devices minimum cost.	Concern about the loss of magnetic properties after a period of time.
Dewan <sup>[30]</sup>	Maxilla: Sectional tray with nick and notch. Mandible: Sectional tray stabilized by the acrylic bar.	Sectional denture with press button attachments.	Durability No restriction of tongue space, ease of insertion and removal of the prosthesis.	Lab work was hard.

Using different materials which alleviate access to the oral cavity is mentioned in articles. Whitsitt and Battle proposed a method for taking primary impressions from edentulous jaws using silicone putty as a flexible tray layered with low-viscosity silicone to achieve more details.<sup>[31]</sup> Another method explained using flexible materials such as Valplast, which can be inserted easily in microstomia cases and provide retention and considered a solution for aesthetic and functional demands. However, these dentures also have a series of problems that include discoloration, teeth deboning from the denture base, and problems in repairing and relining. Therefore, they are often used as a temporary treatment and do not have a good long-term prognosis.<sup>[32]</sup> Also, while fabricating these dentures, adequate ventilation and masks are required, and fabricating these dentures is technically sensitive and requires great care.<sup>[33]</sup> The present study decided to employ a sectional tray and single unit denture considering the hygienic issue and prolonged durability. We made the single unit denture, and the major advantage of this scheme is reducing food impaction between different parts (which is observed in two or more sectional dentures). Eventually, the patient was very satisfied with the functional outcome and effect of the prosthesis on her appearance.

#### 4. Conclusion

Microstomia is considered a challenging situation that usual methods of reconstruction cannot be applied, so it is necessary to solve the problem of these patients by employing various techniques. Sectional trays were made in the current case, so access to the oral cavity as possible and handling the final impression step was feasible. Also, using one piece denture improved the hygienic aspect and increased patient convenience in the insertion and removal of the denture.

#### Conflict of Interest

The authors declared that there is no conflict of interest.

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