CASE REPORT

Lock and key cast metallic sectional denture: a revised approach for oral rehabilitation of a patient with microstomia

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SUMMARY

Microstomia is a common occurrence in clinical practice that may hinder the conventional prosthetic treatment of edentulous patients. Oral augmentation exercises to increase the vertical opening and sectional or collapsible dentures have been described in the past, which have their own drawbacks and limitations. The present article highlights a new approach for rehabilitation of a patient with microstomia with cast lock and key attachments leading to greater ease for both the patient and the clinician. The chief advantage of this technique is the simple fabrication procedure and the reduction in the denture base thickness, providing a larger intraoral space and thus better comfort to the patient, overcoming the shortcomings of previously described sectional denture bases.

BACKGROUND

Microstomia, defined as an abnormally small oral orifice,¹ may result from surgical treatment of orofacial neoplasms, cleft lips, maxillofacial trauma, burns, radiotherapy or scleroderma.² The contraction of the tissues surrounding the oral cavity may impair the patient's ability to maintain proper oral hygiene and dental procedures, such as molar endodontics and prosthetics, and restorative procedures in the posterior portions of the mouth may become difficult to perform.

The treatment of microstomia is a challenging task for a clinician and are many, varying according to the amount of oral opening. Conservative management includes the use of various microstomia prostheses and exercises to expand the oral opening.^{3–5} Without a surgical operation, prosthetic treatment is difficult for patients with microstomia, especially when the mouth circumference length is less than 160 mm.⁶ Surgical enlargement should be performed carefully to prevent perioral scarring and deformation.

Sectional and collapsible dentures have been introduced for patients with limited intraoral access, which helps in the easy handling, insertion and removal of the prosthesis. A swing-lock^{7 8} and/or simple hinge^{9 10} attachments have been used to connect the 2 segments of such a collapsible denture. With respect to the complete collapsible maxillary denture, the palatal vault impairs a complete folding of the 2 segments, necessitating the fabrication of a collapsible hinged posterior section and a second denture base onto which the anterior teeth are arranged. The drawbacks of such prosthesis are difficult, technique sensitive, expensive fabrication and limitations to be used where manual ability is compromised. A sectional mandibular complete denture with acrylic resin connections in the form of dovetails has been tried, but its main drawbacks are adjustment of occlusion

Figure 1 Pretreatment and post-treatment photographs.

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Figure 2 Limited mouth opening.

(dovetails were created in the region of occlusion), movement of denture segments and decreased strength of resin connections.¹¹

The present article describes the fabrication of a simplified, custom-made sectional denture with a lock and key attachment for a patient with microstomia.

CASE PRESENTATION

A 57-year-old female patient reported to the department of prosthodontics with symptoms such as difficulty in chewing due to lost teeth. Intraoral examination revealed maxillary and mandibular edentulous ridges with a limited mouth opening (figure 1). Medical history revealed her case as an example of a person with burns and trauma. Resultant scarring and contracture of the oral and perioral musculature led to a limited mouth

opening (figure 2). A sectional complete denture was planned and the patient was successfully rehabilitated (figure 1).

INVESTIGATIONS

An orthopantomogram X-ray of the patient was carried out to rule out any abnormal finding in the edentulous ridges (figure 3).

TREATMENT

1. Primary impressions were taken using condensation silicone by hand manipulation as the mouth opening was restricted (figure 3). Secondary impressions were taken by the sectional impression technique using sectional custom trays.^{7 12} Impressions were poured in dental stone (figure 4).

Figure 3 (A) Orthopantomogram and (B) primary impressions.

Figure 4 (A) Sectional custom trays used for making final/secondary impressions. (B) Final/secondary impressions made and (C) then assembled outside. (D) Poured master cast.

2. A 1.0 mm thick wax pattern of the sectional denture base with a 24 gauge stipple sheet was fabricated separately for both the maxillary and mandibular arches excluding 2 mm on all the borders (also the posterior palatal seal in the maxillary arch). The design covered the complete palate and ridge crest in metal and left the denture borders in resin.
3. Both the wax patterns were sectioned at the midline. Three lock and key attachments were made in the sectioned maxillary wax pattern with an autopolymerising acrylic resin, the first in the rugae area, and the second and third in the middle and posterior parts of the hard palate, respectively. Two similar lock and keys (one on each labial and lingual side) were made in the mandibular wax pattern at the midline. Each key had a dimension of $2 \times 1 \times 0.3$ mm which fitted into the lock of the corresponding dimension made in the contralateral segment of the denture base (figure 5).
4. Wax patterns were invested and casted in chrome cobalt alloy. Finished and polished cast bases were processed to permanent denture bases with heat polymerising acrylic resin.
5. Sectional denture bases were tried in the patient's mouth to check the accuracy and fit of the lock and key attachments (figure 6).
6. Jaw relations were recorded after fabricating sectional occlusal rims on the sectional denture bases. Master casts were mounted in the recorded jaw relations and teeth setting was carried out in the conventional manner.
7. Try-in was carried out in the patient's mouth (figure 7). Sectional dentures were invested, dewaxed and processed in the usual manner.
8. Maxillary and mandibular sectional dentures were finished and polished and given to the patient after proper home care instructions and demonstrations on the operation of the lock and key assembly (figures 8 and 9).

Figure 5 Wax patterns of sectional denture bases with lock and keys.

OUTCOME AND FOLLOW-UP

In the beginning, it was difficult for the patient to unite the sectional parts together in the mouth. With practice, the patient accustomed herself to handle the lock and key assembly. Regular 3 month recall visits showed no major problems.

DISCUSSION

Several methods of prosthodontic treatment for patients with microstomia have been presented, and numerous devices to

Figure 6 Try-in of cast metal denture bases with locks inserted into their corresponding keys.

Figure 7 Sectional trial denture, both extraoral and intraoral view.

expand oral commissure have been described.^{3–5} Sectional dentures and collapsed dentures that had a flexible silicone union, attachments or hinges to connect the halves of the dentures have been advocated for severe cases of microstomia.^{7–11} However, these prostheses lack structural durability and failed to maintain uniform retention and stability during masticatory function.

The present technique describes the incorporation of an acrylic resin lock and keys, which can be cast to metal to orient and secure a sectioned maxillary and mandibular complete denture (figure 6). Metal connections in the form of a lock and keys with specific dimensions, direction and design reduced the overall cost and simplified the laboratory technique without additional appliances like hinges, magnets, pins or external attachments. Problems typically related to the inconvenience of a 2-piece denture cannot be encountered. The lock and key pattern can be easily fabricated with autopolymerising acrylic resin in the dental clinic, saving time and expenses. The denture base thickness is reduced in metal, which provides greater ease,

Figure 8 Intraoral view of finished, polished and assembled sectional dentures.

improved fit and strength, high thermal conductivity, increased tissue tolerance, less deformation and more natural sensation for the patient during function. The bulk of the hinges and extra denture attachment is eliminated, providing larger intraoral space and thus better comfort to the patient, as the denture remains in a single block-like normal conventional denture. However, the greatest limitations of the described sectional denture are patients with a high palatal vault or neurological disorders or those with manual disabilities.

Learning points

The present technique for fabrication of a sectional denture has proven to be simple, easy to handle, inexpensive and applicable to geriatric microstomic patients.

- ▶ Sectional dentures are a good conservative approach for patients with microstomia who do not want surgical treatment.
- ▶ The described sectional denture improved patient compliance in terms of denture manipulation, handling, less tissue impingement in comparison to hinged sectional dentures, reduced bulk and natural sensation during function.
- ▶ Clinicians can create simple attachments in sectional dentures to reduce manual dexterity, time and expense of the overall treatment.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

Figure 9 Diagrammatic representation showing an oblique view of sectional denture bases with a close-up of the lock and key assembly.

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