Microstomia is a clinical condition affecting patients who have very small mouths due to orofacial cancer surgery, cleft lips, burns and trauma around the oral cavity, scar tissue after lip surgeries, or the collagen group of diseases including submucous fibrosis and scleroderma.1-3 The oral manifestation of scleroderma includes thin oral mucosa, xerostomia, limited jaw opening, recurrent mouth sores, and dysphagia. Decreased salivary flow results in an increased caries rate, and removable dental prostheses can be problematic.4 Moreover, the intercommisural distance and oral aperture can be reduced as a result of the sclerosis of the facial skin. For most patients, this results in a maximum opening of less than 40 mm. Microstomia can be seen in 80% of patients with systemic scleroderma. Women have a higher risk of the disease than men.5

 Restricted oral opening can be a significant problem for patients with microstomia when seeking dental treatment.6,7 Furthermore, contraction of the soft tissue around the oral cavity makes it difficult to attaining dental care and perform good oral hygiene. As a result, these patients are prone to edentulism. Treatment options include surgical correction to enlarge the mouth and dental implants,9 but if these options are not available, sectional complete removable dental prostheses can be an alternative treatment. Various pins, bolts, attachments, and Lego pieces have been used for the locking mechanism.10-13 In some situations, joining the small pieces of a sectional dental prosthesis intraorally may be a problem because of poor manual dexterity. A cast cobalt-chromium framework with a lingual hinge and a conventional swing lock has been designed as a treatment option.14,15

This dental technique report describes the prosthodontic management of a 61-year-old edentulous man, whose oral opening was limited (intercommissural width approximately 32 mm) as a result of scleroderma (Fig. 1). Simple designs of maxillary and mandibular sectional complete removable dental prostheses were designed as hinged maxillary and mandibular complete dentures that can be folded for denture delivery. This design also prevented denture deflection during function by using the upper part of the prosthesis, minimizing the possibility of breakage. (J Prosthet Dent 2015;114:627-632)
Edentulous custom-made trays were used to fabricate the sectional collapsible complete removable dental prostheses.

**TECHNIQUE**

1. Make the right and left preliminary maxillary impressions separately with modeling plastic impression compound (Impression Compound; Kerr Corp). Trim each half of the impression 4 to 5 mm away from the midline. Then reline each half of the impression alternately with low-viscosity polyvinyl siloxane (Silagum; DMG Chemisch-Pharmazeutische Fabrik). Subsequently, adapt additional modeling plastic impression compound over the 2 halves to index the impression (Fig. 2).

2. Make a preliminary mandibular impression with partial trays and irreversible hydrocolloid impression material (Jeltrate; Dentsply Intl). The right and left trays should cover the mandibular midline.

3. Fabricate a sectional custom maxillary tray from the preliminary cast. Prepare a stepped butt joint along the midline of the sectioned tray; therefore, these 2 parts are detachable (Fig. 3A, B). Fabricate the left
and right sectional custom mandibular trays separately on each cast. Locate the anterior border of the tray at the midline of the arch. Then position the left tray segment on the right cast and verify proper alignment before preparing a stepped butt joint (Fig. 3C, D).

4. Mold the border of each tray segment with a green stick modeling plastic impression compound (Impression Compound; Kerr Corp). Make a definitive impression on both segments of the arch at the same time with low-viscosity polysulfide (Permlastic; Kerr Corp). Place the index over the 2 parts to stabilize the trays. After the impression material has polymerized, remove the index first, and then flex the trays at the junction line and


Figure 5. Mandibular occlusion rim. A, Mandibular occlusion rim with custom-made hinge located in middle of lingual base. B, Collapsed mandibular occlusion rim. C, Collapsed rim inserted in patient.
subsequently remove the tray segments one by one. Finally, pour the impressions with Type IV dental stone (Vel-Mix; Kerr Corp).

5. Prepare the maxillary record base in 2 pieces as the posterior and the anterior segments. Place a custom-made hinge at the midline at 5 mm anterior to the posterior border of the base. Separate the posterior baseplate into left and right sections; therefore, it is foldable. Fabricate the anterior segment and place it over the posterior segment to stabilize the posterior base. Make an occlusion rim (Fig. 4). Fabricate the mandibular record base in 1 piece. Incorporate a custom-made hinge at the midline of the lingual base and section the base at the midline into left and right parts. The base is now collapsible in the horizontal plane (Fig. 5).

6. Record the maxillomandibular relationship in centric relation and mount the definitive casts on a semiadjustable articulator (Hanau H2; Whip Mix Corp).

7. Arrange the nonanatomic artificial teeth (Major Dent; Major Prodotti Dentari) with posterior balancing ramps to obtain eccentric balanced occlusion. At the trial stage, verify the occlusion, speech function, and esthetics.

8. Make a cast cobalt-chromium lingual plate by reducing the wax on the lingual surface of the mandibular trial denture. This lingual plate rests on the occlusal surfaces of the second premolars and the first molars and helps stabilize the left and right segments during function.

9. To attach the anterior segment to the posterior segment of the maxillary denture base, place 2 ball attachments on the posterior base segment with a dental surveyor to obtain parallel paths of insertion on both sides. Adhere 2 ball caps or the female parts on the tissue surface of the anterior denture base with autopolymerized acrylic resin (Takilon; Salmoiraghi Produzione Dentaria). Then finish and polish the complete removable dental prosthesis (Fig. 6).

10. At the delivery appointment, evaluate the denture base extension, relieve excessive pressure of the intaglio surface, and adjust the occlusion to derive simultaneous tooth contact in centric and eccentric position. Instruct the patient to operate the denture assembly, and emphasize oral and denture hygiene. Figure 7 shows the prosthesis in the oral cavity.

DISCUSSION

Although the cast cobalt-chromium swing lock dentures with lingual hinge as described by Wahle et al14 and
Rathi et al.\textsuperscript{15} were easily delivered, they were more costly than this design because of the sophisticated laboratory work required. This design also prevented denture deflection and possible breakage. In addition, retention and stability were achieved during mastication. However, because the denture base is made of acrylic resin, regular maintenance is required to maintain the function and integrity of the dentures. Oral exercises and mouth stretching as recommended by Naylor and Manor\textsuperscript{16} were suggested to maintain the oral aperture and enhance the flexibility of the facial skin. This was to avoid further fibrosis, which could make dental treatment impossible.

**SUMMARY**

By using palatal and lingual midline hinges together with the ball attachment and lingual plate, the sectional collapsible complete removable dental prosthesis was easily inserted, and the prosthesis also provided adequate function for the patient. The limitations of the treatment procedure and the need for continuous maintenance must be emphasized to the patient to avoid tissue ulceration and further fibrosis.

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Corresponding author:
Dr Chuchai Anunmana
Mahidol University
Department of Prosthodontics
6 Yothee Rd, Rajthevi
Bangkok, 10400
THAILAND
Email: chuchai.anu@mahidol.edu

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