A Simple and Effective Method for Prosthetic Rehabilitation in Scleroderma Patients: A Clinical Report

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Treatment of patients with microstomia due to scleroderma is complicated. Limited mouth opening and altered finger shape present difficulties at every step of the prosthetic rehabilitation. This article describes the prosthetic management of an edentulous patient with severe microstomia induced by scleroderma. From among the existing treatment options and according to the patient's ability and financial considerations, the authors provided a simple prosthetic design that effectively facilitated the patient's rehabilitation. To plan treatment for a patient with scleroderma, it is important to have knowledge about existing complications, alternative methods, and the patient's ability and comfort. *Int J Prosthodont 2014;27:169–173. doi: 10.11607/ijp.3550*

Scleroderma is a chronic, multisystem disorder of unknown etiology characterized by the thickening and fibrosis of skin caused by accumulation of connective tissue.[1] It may be localized or systemic, with the latter presenting as progressive systemic scleroderma or CREST (calcynosis, Raynaud's phenomenon, esophagitis, sclerodactilia, and teleangectasis). In 80% of patients with systemic scleroderma, microstomia is observed. These patients also exhibit clinical symptoms in the mouth and arches. The skin of the face and lips becomes taut, thereby hindering dental treatment, preventing the insertion of dental prostheses, and complicating treatment modalities. Moreover, mucous membranes become thin and tight, subjecting the residual alveolar ridges and denture border extensions to constriction distortion.[2] Facial skin and oral mucosa become thin and taut, with a consequent masklike appearance, severe reduction of oral opening, and a lack of expression. Sclerotic changes in the tongue make speaking and swallowing difficult. Associated finger deformities also contribute to difficulties with denture insertion and removal, while oral hygiene is usually very poor. Denture fabrication is complicated by this limited access to the oral cavity, and sectional dentures must be fabricated. Clinicians who treat patients with debilitating diseases such as scleroderma should also consider the psychologic aspects of treatment, since their prosthodontic management is challenging and demands considerable patience and patient management skills.

Several reports regarding the fabrication of removable prostheses for patients with microstomia have been published. They underscore the associated difficulties with impression making while proposing solutions such as flexible and sectional trays.[3–5] This case report describes an alternative method for making an impression and a technique for the fabrication of a sectional mandibular denture to treat an edentulous patient with scleroderma.

Case History

A 68-year-old Caucasian man with microstomia caused by scleroderma was referred to the Prosthodontic Department of Tehran University Faculty of Dentistry for prosthetic rehabilitation. He had a limited oral opening with a diameter of 30 mm (Fig 1a). The patient also had signs of scleroderma in his face and hands. (Fig 1b).

The mandibular residual ridge was severely resorbed except for the right canine site, which made the mandibular ridge uneven; it appeared that he had retained this single tooth for a long time before extraction. The patient had no experience wearing a removable prosthesis.

Preliminary Impression

The preliminary maxillary impression was made with an edentulous stock tray and irreversible hydrocolloid

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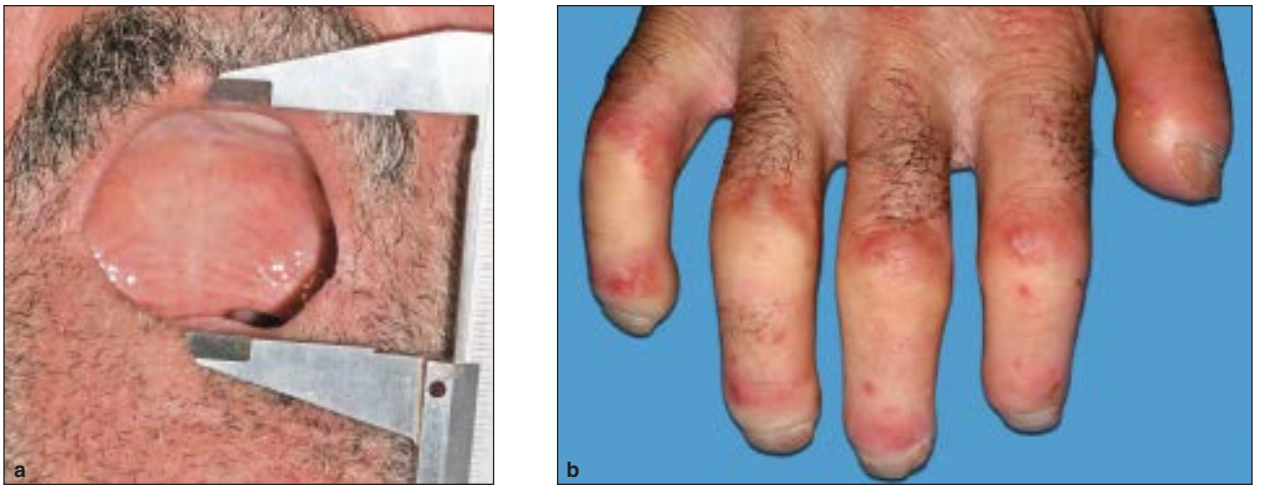

Fig 1 Patient had **(a)** limited oral opening and **(b)** malformed hands.

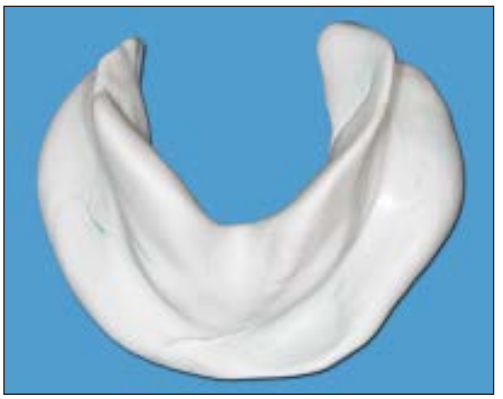

Fig 2 Primary impression of mandibular ridge with silicone.

impression material (Alginate, Zhermack). Although some problems were encountered in placing the tray in the correct manner, by using petroleum jelly on the commissures and an intraoral mirror, it was possible to successfully record the maxillary impression. For the primary mandibular impression, differently sized and shaped stock trays were tried, but because of the limited mouth opening, the insertion of a stock tray was not possible. Therefore, condensation silicone impression material (Speedex, Coltene/Whaledent) was used to make a mandibular primary impression (Fig 2). This impression material has advantages that make it beneficial for certain applications. The impressions of both arches were poured in type II dental stone (Dental Plaster, Pars Dandan).

Final Impression

For the maxillary arch, a single custom tray and, for the mandibular arch, a sectional custom tray were fabricated using autopolymerizing acrylic resin (Acropars, Marlic). The sectional tray was fabricated in two sections held together by locking segments along the midline, including the handle of the tray (Figs 3a and 3b). To ensure the interlocking of the two segments, a circumferential butt joint was designed in the first segment that was overlapped by the second. The border molding process was started with the segment on the patient's left side. Each time this segment was inserted in the mouth with green compound (Impression Compound, Kerr) on its borders, the second segment was placed in its location to be assured of proper placement of both parts. Afterwards, border molding movements were performed.

The border molding continued for the second segment in a similar way (Fig 3c), and the final impression was made with zinc oxide–eugenol paste (Luralite, Kerr) (Fig 3d). After the impression paste set, the acrylic resin segments were detached in the mouth, and the right and left pieces were removed separately. The acrylic resin segments were carefully joined outside of the mouth (the fracture line was smoothly joined). Maxillary and mandibular impressions were then poured with type III dental stone (Elite Model, Zermack).

Fabrication Process

Mandibular movement becomes restricted in scleroderma patients because of facial skin fibrosis and atrophy of the muscles of mastication. In addition, limited jaw movement and a small mouth orifice make recording the maxillomandibular relationship problematic. By making the mandibular record base shorter, along with patient cooperation, this relationship was recorded. After tooth arrangement, esthetic try-in was accomplished, and complete dentures were fabricated using routine laboratory procedures.

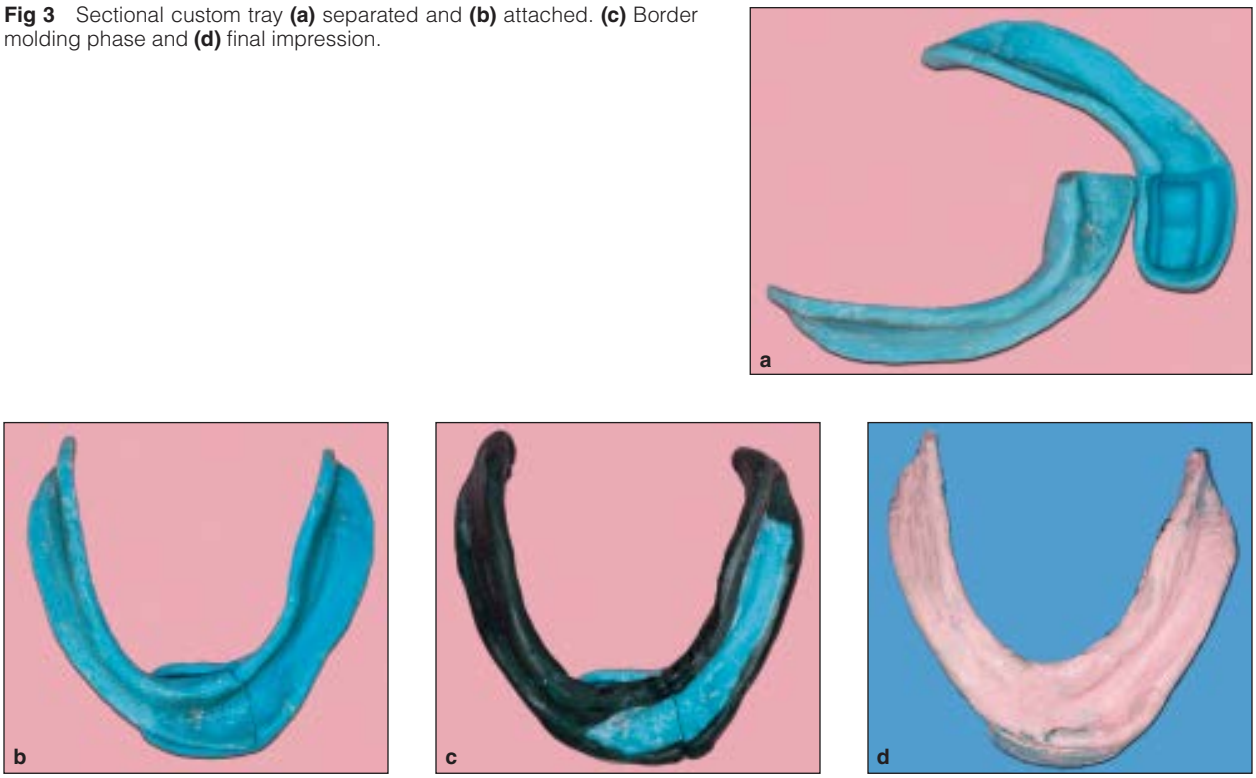

Fig 3 Sectional custom tray **(a)** separated and **(b)** attached. **(c)** Border molding phase and **(d)** final impression.

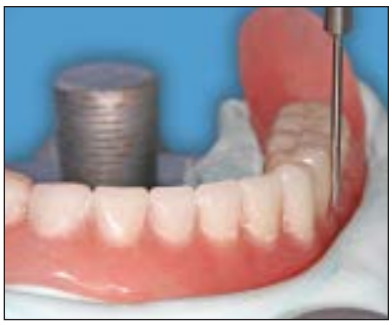

Fig 4 Surveying phase revealed no undercuts.

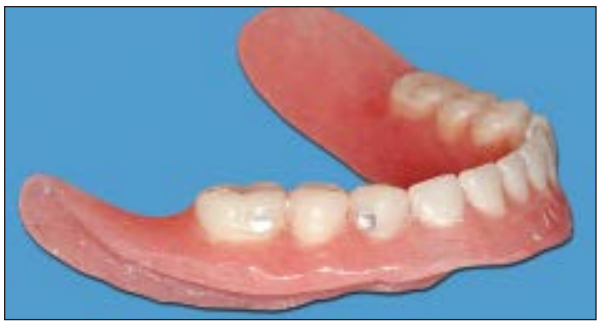

Fig 5 Dimples were prepared on the amalgam fillings.

For the mandibular ridge, the decision was to fabricate a sectional complete denture with a framework to facilitate the joining of the two sections. For this plan, the mandibular denture was surveyed (Fig 4), and since no undercuts were detected on the posterior acrylic resin denture teeth, four dimples were designed on the posterior teeth (two on the distal cervical third of both first molars and two on the mesial cervical third of both first premolars). To preclude wear of acrylic resin due to retentive arm tip, the dimples were formed on the amalgam fillings in these sites (Fig 5).

The wax pattern of the framework was provided on the refractory cast of the mandibular denture (Fig 6a), and the entire pattern was cast by cobalt-chromium alloy (Degussa, Degudent) (Figs 6b and 6c). At the end of the process, the mandibular denture was sectioned between the left canine and first premolar using a disk to create an interlocking shape (keyway) (Fig 7).

Delivery

At the insertion appointment, the occlusion was adjusted and the patient was instructed on how to insert and remove the prosthesis (Figs 8a and 8b). Fortunately, he could do it perfectly and was completely satisfied with the dentures (Fig 9). Oral hygiene instruction was reinforced, and routine follow-up appointments were scheduled.

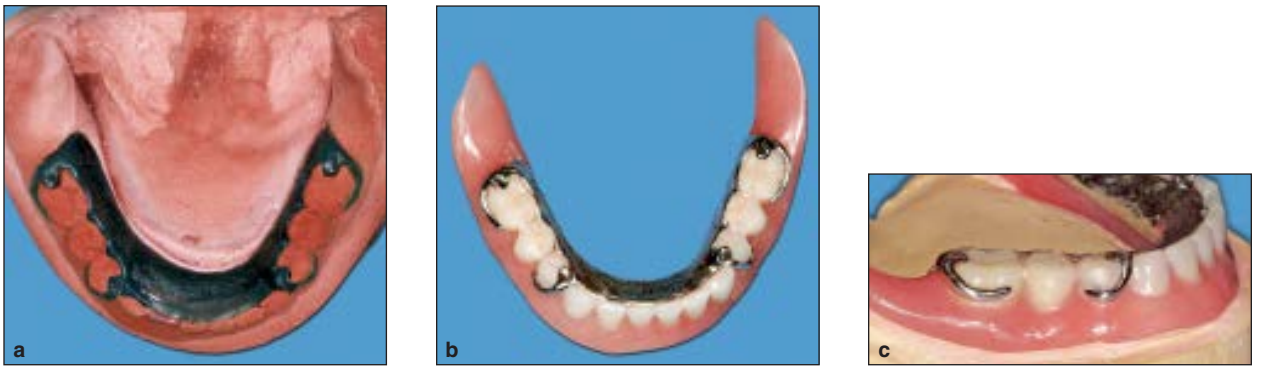

Fig 6 **(a)** Wax pattern of the framework. **(b)** The entire casting framework. **(c)** Note the position of retentive arm tips to the dimples.

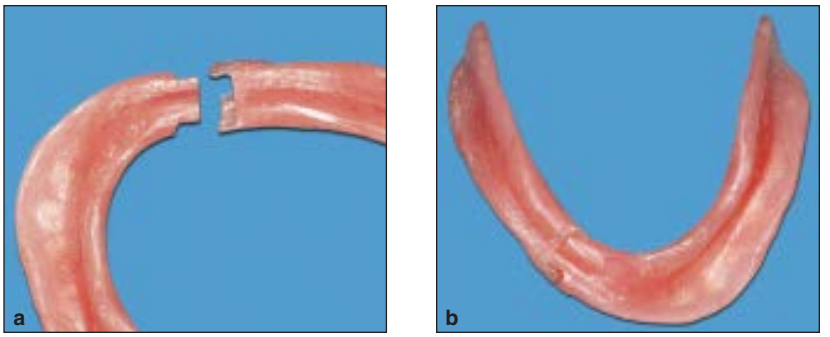

Fig 7 **(a and b)** Interlocking shape (keyway) between two segments of the mandibular prosthesis.

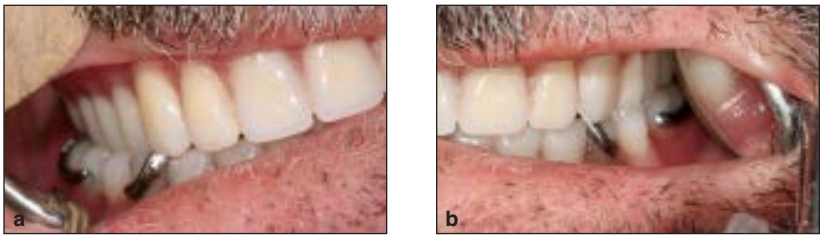

Fig 8 **(a and b)** Definitive prosthesis with clasps in their desired positions.

Discussion

The treatment of patients with microstomia associated with Scleroderma is complicated. The combination of limited mouth opening and mandibular movement, as well as altered finger shape and ability, offer difficulties in every clinical step of the planned prosthetic rehabilitation. Different methods have been proposed for managing these patients.[3–5] Treatment planning considerations include simplicity, ease of future repair services, and the patient's financial concerns—a significant factor in this report.

In planning the present technique, it was first decided to try Lego pieces for joining the sectional tray segments, but they did not provide good stability or interlocking and the result was unsuccessful. Thus, an interlocking shape (keyway) in a new sectional tray was designed. Fortunately, proper positioning of segments was obtained by using this new form of sectional tray. A removable partial denture framework was also part of the prosthesis design and assisted in stabilizing and retaining the relationship between the interlocking segments that composed the mandibular sectional prosthesis. Furthermore, it appears that this framework increased the stability of the mandibular denture, in addition to the retentive arm role, to hold the segments together. Since the metallic lingual plate was immersed in the body of the acrylic resin denture flange and the borders of the lingual plate were even with the acrylic resin, the patient felt comfortable when his tongue touched the plate.

At the first recall appointment, a minor traumatic ulceration was noted on the mandibular ridge mucosa. It was relieved, and subsequent follow-up appointments revealed good prosthesis management, satisfactory function, and healthy tissues.

Conclusion

When planning prosthodontic treatment for a patient with scleroderma, it is important to consider the disease's impact on all of the surrounding tissues along with alternative treatment methods. Patient-mediated concerns, such as facility, comfort, and ability to use the prosthesis, must also be kept in mind.

Acknowledgments

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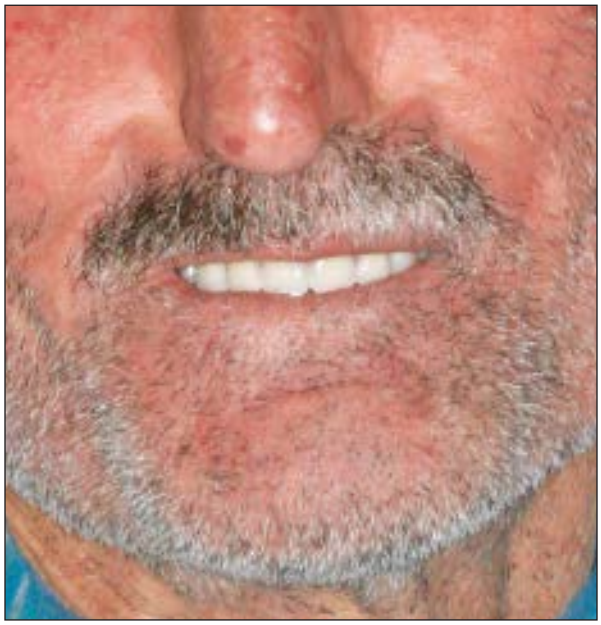

Fig 9 Patient after insertion of maxillary and mandibular prostheses.

Literature Abstract

High-density polytetrafluoroethylene membranes in guided bone and tissue regeneration procedures: A literature review

The authors cited the success of expanded polytetrafluoroethylene (e-PTFE) as a membrane barrier for regeneration procedures but cautioned that its high porosity could increase the risk of early infection. The alternative to e-PTFE is the nonexpanded and dense polytetrafluoroethylene (n-PFTE), which lowers the risk of early infection following surgical procedures. The authors searched the medical databases and found 24 articles that analyzed the use of n-PTFE as a barrier membrane for guided tissue regeneration (GTR) and guided bone regeneration (GBR) around teeth and implants. Admitting that the review was limited, they concluded the following. *(1)* Although promising, more randomized clinical trials with clinical and histologic analyses on n-PTFE membranes are necessary. *(2)* The evidence on the efficacy of n-PTFE membranes for GTR and open GBR procedures (ridge preservation in contained sockets and GBR in immediate implants) is limited. *(3)* The use of n-PTFE alone or in conjunction with grafting materials yielded satisfactory results in open GBR procedures with no evidence of the superiority of one material over another. n-PTFE could be used alone in smaller defects (intact bony walls), while the use of a graft material or a titanium reinforcement may be advantageous in larger defects. *(4)* Three to 6 weeks was the minimum membrane retention time in open GBR procedures depending on defect size and grafting material. *(5)* The scientific evidence on titanium-reinforced n-PTFE membranes and their use in ridge augmentation procedures is lacking.

Carbonell JM, Sanz Martin I, Santos A, Pujol A, Sanz-Moliner JD, Nart J. *Int J Oral Maxillofac Surg* 2014;43:75–84. **References:** 30. **Reprints:** Jose Nart, Departamento de Periodoncia, Facultad de Odontología, Universitat Internacional de Catalunya, Josep Trueta s/n 08195 Sant Cugat del Valle`s, Spain. Email: jose@nartperiodoncia.com—*John Chai, Evanston, Illinois, USA*.