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New tray design in prosthetic management of patients with systemic sclerosis: a clinical report

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Aim: A partially edentulous 28 years-old female suffered from microstomia and hardness of the skin caused by systemic sclerosis. For prosthetic rehabilitation, Elsherbini's Double Spring tray (EDS tray) was fabricated. EDS tray was fabricated by self-cured acrylic resin, during the dough stage, the tray was cut into two halves, then two springs were placed on the labial and lingual aspect of the tray. The idea of the EDS tray is that it can be bent to be easily inserted into the microstomia, once in the oral cavity the push action of the two springs will allow opening of the tray to the original shape. The impression was taken Impregum 3m Impression material. The impression material used should be flexible with high tear strength, to ensure good accuracy of the impression. Elsherbini's Double Spring tray can be an effective design in the rehabilitation of patients with microstomia, due to its simplicity of fabrication, cost effectiveness, and high accuracy.

Keywords: Scleroderma, Microstomia, Prosthesis

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Introduction

Systemic sclerosis (SS) is an auto-immune disease, characterized by an increase and hardening in the connective tissues. SS can cause thickness and fibrosis of all connective tissues in the body organs. Collagen is one of the components of the connective tissue. In sclerotic patients' collagen production increases and hardens, leading to changes in the appearance and texture of the body organs. When localized, sclerosis is termed as scleroderma (hard skin) affecting only the skin. Facial manifestation of sclerotic patients involves mask-like face appearance, thin lips, and muscle atrophy. Dental manifestations involve trismus and microstomia, which were reported in 80% of sclerotic patients. Other dental manifestations include periodontal attachment loss, oral mucosal/gingival fibrosis, gingival recession, and stripping of the attached gingiva, In addition to temporomandibular disorders and resorption of the angle of the mandible; as well as the coronoid process and condyle. [1-3]

Clinical Report

A 28 years-old female suffering from microstomia and hardness of the skin caused by systemic sclerosis was referred to the prosthodontics department for rehabilitation. Intra-oral examination of the maxilla showed a unilateral bounded edentulous space, with 23,24, and 25 teeth missing. Maxillary anterior teeth were proclined labially. In the mandible, bilateral distal extension edentulous spaces were present, with the remaining teeth are 31,32,33, 41,42, and 43. Patient suffered from gingivitis and gingival recession. Removable partial dentures were planned for restoring of the edentulous areas.

For the maxillary arch, a sectional stock tray was used in making of the impression of the edentulous bounded area using an irreversible hydrocolloid, (Hydrogum ZHERMACK.) For the mandibular arch, using pink wax CAVEX, Netherlands, the approximate shape of the arch was recorded. The wax mould was poured with dental stone to form the study cast. On the cast, ELsherbini's Double Spring tray (EDS tray) was fabricated. EDS tray was fabricated by self-cure acrylic resin, during the dough stage the tray was cut into two halves, then two springs were placed on the labial and lingual aspect of the tray (Fig.1)

Figure 1: Elsherbini Double Spring Tray

The idea of the EDS tray is that it can be bent to be easily inserted into the microstomia, once in the oral cavity the push action of the two spring will allow opening of the tray to the original shape (Fig.2).

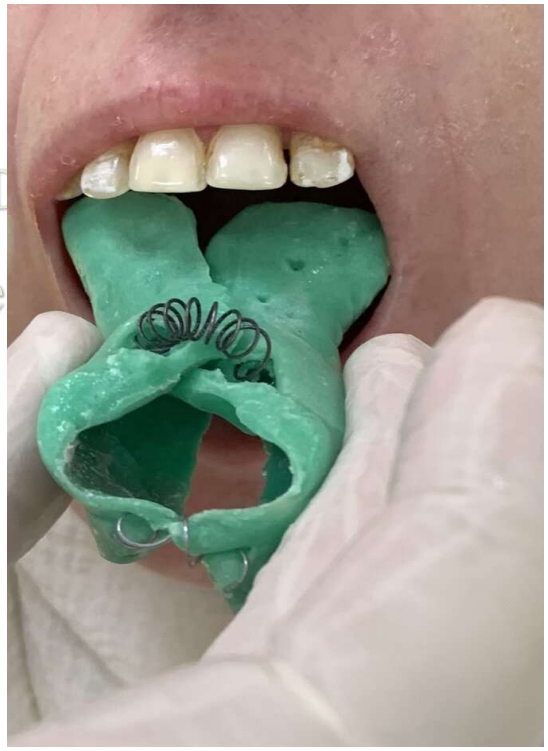

Figure 2: Checking of EDS tray

Impression was taken using elastomeric impression material (IMPREGUM 3M) (Fig.3).

Figure 3: Final Impression taken with EDS tray

Elastic material should be used with the EDS tray to allow removal of the tray from the limited mouth opening. Impression was poured with hard dental stone, and occlusion blocks was fabricated. Setting up of acrylic teeth (Acrylic Resin, ACROSTONE) was made chairside and was tried in directly intra-orally. After confirmation of the occlusion, try-in was sent for processing. Lower RPD was fabricated from conventional acrylic resin ACROSTONE, as the RPD's size was deemed to be small so it can be inserted intra-orally easily. Moreover, inter-arch space in the lower arch was small, which contraindicated flexible resin. For the upper RPD it was fabricated using resin VERSACRYLIC, as it's a bounded edentulous space, enough inter-arch space was present, and for better esthetics. RPD insertion was done, and patient was given the instructions (Fig.4).

Figure 4: Insertion of well fitting RPD

Discussion

Several impression trays design were used in the management of patients with microstomia in general. One of these designs is using intra-oral scanners as, it provides an accurate alternative to sectional tray. But there were anatomical limitations in inserting the scanner and collecting the data.[4,5]

Another technique, after making a CBCT for the upper and lower ridges, data of the length, width of the ridges were collected Then a digital file of another patient's working models with similar dimensions to their patient was superimposed on the CBCT image and then using CAD-CAM technology a special tray was designed and fabricated using the collected data. It was reported there was difficulty in reassembling of the sections of the trays together, especially in completely edentulous patients.[6]

Many techniques used sectional and collapsible tray in the scleroderma cases, with focus on the techniques of connecting the sections of the trays whether hinges, swing-lock attachments, stud attachments, orthodontic expansion screws, pins, bolts, telescope system, rods, clasps, cast locking recesses, and magnets. Off course all have reported expensive cost in the fabrication of such trays. All the previous studies, there is an assembly stage of the tray sections which risk the accuracy of the resulting master cast.[7-10]

In the present study, the technique depends on being simple, cost effective, and most importantly accuracy. The tray is just made of acrylic resin with two springs placed labially and lingually. In this technique, there is no errors which might result in reassembling of the tray parts as in sectional trays. The tray parts remain connected to each other by the double springs through-out the impression making process. Also, the use of a stiff impression material will enhance the splinting of the two sections together.

Conclusion

Elsherbini's Double Spring tray can be an effective design in rehabilitation of patients with microstomia and scleroderma, due to its simplicity of fabrication, cost effectiveness, and high accuracy.

Ethics approval and Patient Consent

Ethics approval was obtained for this study under the number of REC-D 462-5. Prior to starting with the procedure a written consent was signed by the patient after being informed about all details of the procedure.

Funding

No funding received

Data Availability

Available on request

Competing interest

No competing interest

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