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Case Report

Dual surface impression for management of mandibular flat ridge in an elderly patient: A Case Report

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Abstract

Aim: This article described a physiological impression technique to design denture surfaces by the action of the surrounding musculature during functional movements based on "neutral zone concept" in patients with the severely atrophied mandibular ridge.
Methodology: Dual surface impression technique was employed for the fitting and polished surface using silicone impression material.
Results: This technique provided a stable base with correct borders to perform all functional movements of the lips, cheeks, and tongue.
Conclusions: The patient improved the ability to maintain the adaptive muscle behaviors necessary to control the denture movement in function and rest.

Keywords: Impression, flat ridge, elderly

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Introduction

Very old edentulous patients may be at greater risk of developing frailty because of total tooth loss and xerostomia associated with difficulty of eating (1). Edentulous elders usually need special prosthodontic care because of their impaired neuromuscular adaptation combined with sever alveolar bone resorption (2). Fabricating conventional dentures for those patients requires multiple scheduled appointments with high risk of prosthodontic failure. Based on "neutral zone concept", this clinical report describes a physiological impression method to design denture surfaces by the action of the surrounding musculature during functional movements. This method is suitable for fabricating the complete denture for edentulous elders with severely atrophied mandibular ridge.

Materials and Methods

An 84-year-old edentulous female patient was referred to the department of removable prosthodontics for denture fabrication. The patient's

chief complaint was from an existing floating mandibular denture, weight loss, and fatigue during daily life activities. Upon clinical examination, patient had severely atrophied mandibular ridge at the level of the floor of the mouth with protruded sublingual folds (Fig. 1). The denture assessment revealed a technically acceptable complete denture with an arbitrary contoured polished surface (3). Because of fear from surgery, the patient refused to convert the existing mandibular denture into implant-supported overdenture.

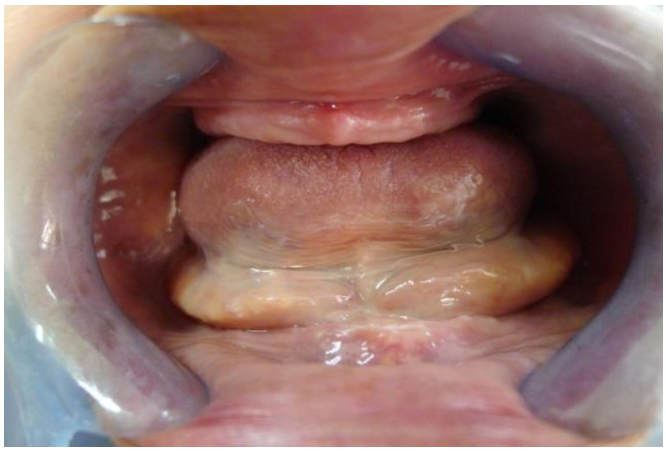

Figure 1. Intraoral view showing severely atrophied mandibular ridge with protruded sublingual folds

Preliminary maxillary and mandibular impressions were made from modified stock trays and red modeling compound (Kerr, USA) to become custom trays. The tray borders were molded and trimmed for proper vestibular extensions. A selective pressure impression technique was performed through relieving the sensitive and undercuts areas in the tissue surface of the tray followed by a final wash with zinc oxide paste (Cavex Outline, Holland). After pouring the impressions into master casts, a maxillary record block was fabricated using auto-polymerized acrylic base and a standard wax occlusal rim. For the mandibular cast, a customized auto-polymerized acrylic tray was constructed with 1 mm wax spacer over the ridge crest. A 0.9 mm stainless steel wire was contoured in a zigzag form along the crest of the tray as a retentive mechanism for the impression material externally.

After intra-oral adjustment and orientation of maxillary occlusal plane, the vertical dimension of occlusion was predetermined using the physiologic rest position by applying softened green compound stick (Kerr sticks, USA) at the molar area of the mandibular tray (Fig. 2). Afterward, the tray was border molded with silicone putty (Zetaplus, Italy), then loaded with light body silicon material and closed mouth impression technique was made for the fitting surface. The patient was instructed to perform tongue and lips movement (blowing, sucking, swallowing, and protruding the tongue) until compete for setting of the impression material (Fig. 3).

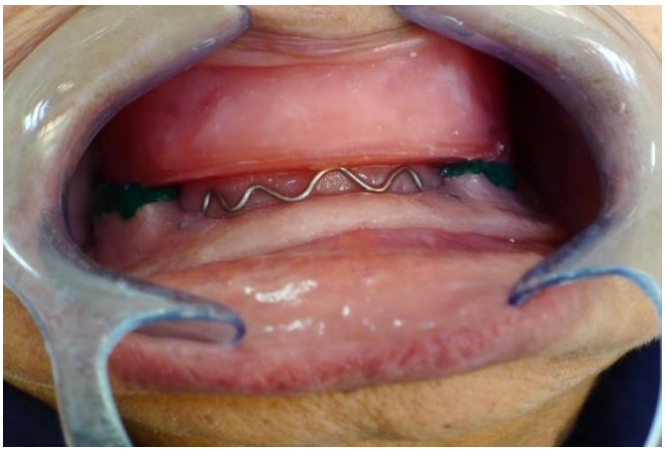

Figure 2. The vertical dimension of occlusion was predetermined using the physiologic rest position by applying softened green compound stick at the molar area of the mandibular tray. A 0.9 mm stainless steel wire was contoured in a zigzag form along the crest of the tray as a retentive mechanism for the impression material externally.

Figure 3. Impression was made for the fitting surface

The polished surface was functionally recorded using a moldable consistency of silicone material (Zetaplus, Italy) prepared as one measure of putty silicone simultaneously mixed to one measure of light body. The silicone material was attached to the wire and adapted to polished surface of the tray. The patient was instructed again to perform actions of her lips and tongue. The appropriate vertical dimension and centric relation were recorded physiologically during this step (Fig. 4).

Figure 4. The polished surface was functionally recorded using a moldable consistency of silicone material.

The impression was boxed, then the fitting surface was poured first with hard stone (Zhermach, Italy) to obtain the mandibular final cast. After stone hardening, the boxing wax was removed and land area was trimmed to make index grooves while preserving the functional record on the cast. The maxillary and mandibular final casts were mounted on average value articulator. A plaster mix was adapted on the facial and lingual surfaces of the functional record representing a plaster index. After plaster hardening, the plaster index was trimmed and separated into right, left and lingual pieces. The functional silicone record was removed and the four pieces were reassembled using the index grooves (Fig. 5).

Figure 5. Right, left and lingual pieces of the plaster indices along with the final cast demonstrating the four pieces cast technique.

A new mandibular record base was constructed and a softened wax was poured into the space formed by the assembled plaster indices after isolation with separating medium. Artificial teeth were arranged first on the mandibular denture base followed by the maxillary base. Then, try-in appointment was performed for patient acceptance before processing the denture into heat cured acrylic resin in a conventional manner. Figure 6 shows the final dentures and Figure 7 shows the patient while wearing the denture.

Figure 6. Final dentures.

Figure 7. Extraoral view of the patient wearing the final dentures. Note the proper support of oro-facial musculature despite the aging wrinkles.

Discussion

Despite failure to fully restore chewing efficiency and bite force, complete dentures still can replace most lost tissues and thus satisfy esthetic and phonetic demands (2). However, unstable mandibular complete denture may occur because of inappropriately contoured polished surfaces (4). In this report, neutral zone concept was adopted for a new alternative technique to decrease the errors of clinical procedures. A fresh mixing putty mass with light body material provided a moldable consistency of the impression material compared to thermoplastic materials (such as a soft wax or thermoplastic modeling compound) which are difficult to handle (5). This was done using a

preparation of a relatively inexpensive condensation silicone with reasonable working time (about 3 minutes) which was sufficient for performing functional movements.

The technique provided a stable base with correct borders for all functional movements of the lips, cheeks, and tongue. Therefore, the mandibular denture could be retained physiologically by pressure from muscular activity and by obtaining the maximal peripheral seal at the borders (4, 5).

Conclusions

The technique improved the patient's ability to maintain the adaptive muscle behaviors necessary for control the denture movement in function and rest.

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