

Relined metal denture base: An alternative procedure for atrophied mandibular ridge

Clinical Report

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ABSTRACT

Severe resorption of the mandibular alveolar ridge contributes to instability and discomfort of the conventional acrylic resin dentures. Alveolar ridge resorption may be corrected, in part, by various surgical techniques. But when surgery is not feasible, the need for a mandibular denture that is strong, stable and functional can be met by a metal-based denture.

This article describes the clinical and laboratory procedures to incorporate a metal frame at a pre-determined, controlled position within the prosthesis. This procedure provides not only stability and strength but also ensures space for a resilient liner.

KEY WORDS: Relined metal denture base, severely atrophied mandibular ridge, resilient liner

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INTRODUCTION

A metal-based denture with a soft liner often meet the needs of the patient who has a severely atrophic residual alveolar ridge, demonstrating negative architectural form that would otherwise not adequately tolerate a hard metal-based denture.^[1]

The metal base provides the weight necessary to facilitate retention while maintaining adequate strength in a denture with modest extension.^[2] Advocates claim that the denture aids in retention, if it weighs approximately 30 dwt (46.5 gm).^[3]

When a weighted mandibular denture is indicated, but the supporting edentulous alveolar mucosa is not appropriate for loading with a cast metal base, a metal denture base relined with soft liner can be used. This provides the benefit of additional weight and avoids direct contact between the metal base and the mucosa.^[4]

The soft liner accommodates ridge irregularities and changes such as excessive resorption, minimal keratinized ridge epithelium, thin lamina propria and

diminished resistance to irritation due to nutritional and physiologic problems.^[5]

The approach advocated by the author is a modification of the technique for a metal-based denture with soft liner by Massad.^[1] It differs in that the wax pattern is invested without the cast thereby simplifying the laboratory procedure to flow the refractory material around the beaded wax pattern without entrapping air bubbles.

An added advantage of the proposed technique is that the permanent record base fabricated before registration of a maxillo-mandibular relation is less prone to inaccuracies than Massad's proposal for the base-plate wax being flowed beneath the metal base on the master cast for stable tissue contact.^[1]

Thus this article describes a procedure to fabricate a metal-based denture relined with soft liner that is comfortable for the patient and is easy to adjust. The design uses myostatic borders. Such denture borders do not impinge upon muscle attachments, which can produce dislodging forces. The casting technique used here is cast-less casting and not the model casting

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system. The advantage of this technique is to allow the flow of investment material around the retentive beads, which can be hindered in model casting technique especially on the inner surface due to the proximity of wax to the cast and consistency of investment material, thereby aiding in the casting of retentive beads in metal.

CASE REPORT

A 55-year-old female patient reported to the Department of Prosthodontics for the prosthetic rehabilitation of maxillary and mandibular edentulous ridges.

Medical history revealed that the patient was a known diabetic and was under medication. The patient was edentulous since one year. On examination, the patient had a severely atrophied mandibular ridge with thin, fragile alveolar mucosa. However, the maxillary edentulous ridge was favorable.

Procedure

1. Primary impressions were made with alginate by mucostatic impression technique.
2. A diagnostic mounting was done to check the amount of inter-arch space. Final impressions were made with medium body polyvinyl siloxane impression material to obtain the master cast.
3. Myostatic mandibular denture borders were outlined on the cast. The borders are confined within the muscle attachments and thus will not be affected by muscle movements, further aiding in mandibular retention.
4. To provide adequate relief space, two sheets of 1 mm thick relief wax were placed and sealed to the cast short of the retromolar pad. A window (2 × 2 mm) was cut through the wax on the cast in the anterior midline area [Figure 1]. Tissue stops on the metal frame aid in repositioning it against the working stone cast.
5. The master cast with the wax spacer was duplicated with agar-agar to get a working cast.
6. A lubricant was applied to the duplicated cast for easy removal of the wax pattern. A layer of base plate wax 1 mm thick was adapted on the duplicated cast following the denture borders. A stop of (2 × 2 mm) was placed on the crest of the ridge in the anterior residual alveolar ridge region.
7. Plastic retentive beads were applied on the outer surface of base plate wax. Three sprues of 4 mm diameter and a crucible former were attached to the wax pattern in the standard manner.
8. The wax pattern was lifted from the cast with care to prevent any distortion. Plastic retentive beads were applied to inner side of the wax that was lifted from the duplicated model. These retentive beads

after being cast acted as a mechanical means of retention for hard liner. Care was taken so that the wax in contact with retromolar pad and anterior stop had neither relief nor retentive beads and had direct contact with residual alveolar ridge tissues [Figure 2].

9. The sprued wax pattern was then invested with care such that investment material flowed between the beads and all around the base plate wax. A cobalt-chrome alloy casting was prepared in a standard manner [Figure 3].
10. The metal framework was then transferred to the master cast. Wax was used to fill in the tissue surface of the metal base so that it had direct contact with the residual alveolar ridge.
11. The denture base was invested in a standard manner to replace the wax with heat cure denture base resin between the metal denture base and the tissue-bearing surface.
12. A wax occlusal rim was fabricated on the permanent record base reinforced with metal to record jaw relations, and teeth were arranged. Wax try-in was conducted to verify esthetics, phonetics, occlusal vertical dimension and centric relation.
13. The denture base was invested. Acrylic resin was cured between the teeth and the permanent record base. When the denture was finished and polished, it was re-examined in the patient's mouth for esthetics, phonetics, vertical occlusal dimension and centric relation. The denture was remounted on the articulator to refine the occlusion.
14. Acrylic resin between the tissue bearing surface and cast metal base was removed leaving behind approximately 0.25 to 0.5 mm for the purpose of effective bonding to soft liner. Anterior cast metal support was also removed. This provided approximately 1.5 to 1.75 mm space for soft liner.
15. The denture was then relined with soft liner intra-orally. The liner was allowed to cure intra-orally for 15-20 mins.
16. The relined denture [Figure 4] was delivered to the patient [Figure 5] and home care instructions were reviewed, specific to the liner in particular.

DISCUSSION

A technique is described for designing and making a mandibular denture, for patients with severely atrophied and compromised residual alveolar ridge, or a condition where surgical intervention is not advisable and also not feasible for the patient.

Advantages

1. The weight of the metal frame provides added strength and stability to the denture, and thus is more retentive.



Figure 1: Wax relief with anterior midline window for tissue stop

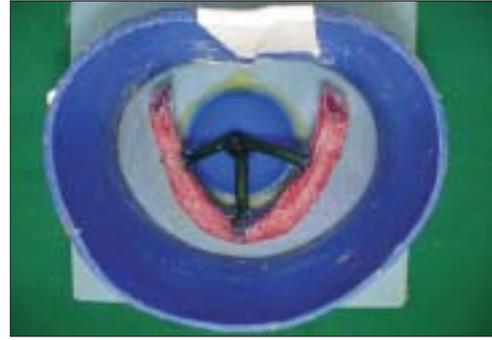


Figure 2: Wax pattern coated with plastic retentive beads ready for investing



Figure 3: Casted metal denture base with retentive beads. (a) outer surface (b) inner surface



Figure 4: (a) Polished and occlusal surface, (b) Tissue surface



Figure 5: Post-insertion view (a) intra-oral view (b) extra-oral view

2. The denture can be relined as and when required.
3. These dentures are dimensionally stable as compared with conventional dentures, as processing changes are less.
4. Less occlusal discrepancies.
5. Long-term cost efficiency.
6. For patients who are medically compromised and for whom surgery is not indicated with flabby tissues in the denture bearing area, reliners can be used safely.^[6]

Disadvantages

1. Added cost.
2. Time consuming and added steps needed.
3. Encroachment of inter-occlusal space.
4. The weight of the denture may be inconvenient initially.
5. Need to frequently reline with soft liner.
6. Tendency of soft liner to support growth of *C. albicans*.^[6]

Indications

1. Patients with atrophied ridges.
2. Patients with compromised neuromuscular coordination, who may drop their dentures.
3. Patients with increased rate of residual ridge resorption.
4. Patients with flabby tissues which may require a soft liner.
5. Patients who are allergic to metal, with a history of denture fractures.^[6]

The need to construct a mandibular denture that is strong, stable and functional can be met by a metal-based denture. The metal base dentures were found to be

8.5 times more resistant to lateral deformation under masticatory forces, than acrylic base dentures.^[7]

Research findings also indicate that all denture resins exhibit dimensional changes during processing. Such warping is likely to be damaging to the tissues that support the dentures. Metal denture bases can aid in conserving the supporting tissues of the denture-bearing areas.^[8]

The metal denture base, with adequate relief space provided for the soft liner, can accommodate ridge irregularities and changes such as excessive resorption, minimal keratinized ridge epithelium, thin lamina propria and diminished resistance to irritation due to nutritional and physiological problems.

Harris has stated that, "if there was a material that would retain those soft, compatible properties as long as one year, most of the chronic complaints in denture service would be eliminated".^[9]

Use of metal base dentures along with denture reliners helps in preserving the health of the residual ridges and soft tissues.^[10,11]

CONCLUSION

The use of metal base or metal mesh within the prosthesis is not a new concept. It differs in that by this approach, the metal denture base is made tissue-compatible by means of a soft liner attached to the especially relieved cast metal denture base.

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