Review Article

Single Step Silicone Border Molding technique for Edentulous Impression

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Abstract

Functioning of a complete denture depends to a great extent on the impression technique. Several impression techniques have been described in the literature since the turn of this century when Greene brothers introduced the first scientific system of recording dental impression. Border molding is an important step in the fabrication of complete dentures. Conventional border molding using impression modeling plastic has been time-consuming, molding done in increment and requires repeated placement of tray in the patient mouth. When elastic impression materials are used for making complete denture impression, good results can be obtained with less difficulty and less expenditure of time. This paper describes an impression technique with one stage border molding using putty silicone material as a substitute for low fusing compound and light body silicone as substitute for metallic oxide paste.

Introduction

Border molding is an important procedure in complete denture construction since it promotes the development of border seal which is necessary for the maintenance of contact of the denture border with the adjacent vestibular tissues during rest as well as in functional activity. Border molding is defined as the shaping of an impression material by manipulation or action of the tissues adjacent to the borders of an impression tray.

Impression modeling plastic has been used for border molding impression trays since it was introduced by the Green brothers in 1907. The technique of border molding with this material has certain limitations. As material retain its flow for short time, it
is difficult to complete border molding in one step. It requires separate applications of the material to different sections of the tray borders. So, molding requires multiple placement of tray in the patient mouth. Ideally, the material used for border molding when it is in its plastic state, should contact the entire vestibular sulcus area at one insertion.

As low fusing compound has short manipulation time. It becomes hard soon after it is placed in the mouth; the final border is established before the various functional movements of the vestibular sulcus are completed.

This is not truly possible with low fusing compound to have uniform consistency. To border mold a custom tray with modeling compound and then make a final impression with a free-flowing impression material is a time-consuming procedure, particularly for inexperienced operators. Other limitations of low fusing compound is that heat is used to soften the compound, inexperienced operator may burn the tissue, and patient had anxiety and fear of being burnt, so patient cannot remain relaxed during molding procedure.

Materials which will allow simultaneous molding of all borders reduce the number of insertions of tray for border molding, so, great time is saved. Development of all borders simultaneously avoids propagation of errors caused by mistake in one section affecting the border contour in another section. Woelfel et al.\textsuperscript{1} reported that it required an average of 17 placements to obtain a maxillary final impression using modeling plastic as the border molding material.

The requirements of a material to be used for simultaneous molding of all borders are that it should have sufficient body to allow it to remain in position on the border during loading of the tray. Border molding material should possess a homogenous consistency so that it can offer uniform resistance to displacement by the vestibular tissues. Have a setting time of 3 to 5 minute. Therefore, retains adequate flow for sufficient time to be functionally molded by tissue. Allow some preshaping of the form of border and allow finger placement of material into deficient parts after seating the tray and also can be easily trimmed. Materials like light polymerized resin\textsuperscript{2}, cold cure resin\textsuperscript{3}, perio pack\textsuperscript{4}, tissue conditioner and elastomers\textsuperscript{5} are reported to be used for single step border molding. But elastomeric impression materials are most commonly used as a substitute for low fusing compound as they meet the all of the requirements. The introduction of elastomeric impression materials [6] has made possible new techniques of recording impression for complete denture construction. Heavy body putty silicone has been used for border molding instead of low fusing compound. It can be placed continuously along the entire border of an individual tray, and the border of the tray can be molded at a single stage. In addition, it also had high degree of accuracy, dimensional stability and ease of manipulation.
Technique
Border Molding Procedure with Silicone Putty is described as follows

Construction of Acrylic Resin Impression Tray
Upper and lower preliminary impressions are taken in alginate. Diagnostic Casts are made in the usual manner. Block out undercut on the cast with baseplate wax. One thickness of wax relief is provided over crest and mid palatal raphae in maxillary and over crest in mandibular cast. Construct autopolymerised resin custom tray over relieved diagnostic cast. Check and adjust the extension of tray intraorally.

Border Molding of Tray
- Tray adhesive (UPS Tray Adhesive, 3M ESPE, Seefeld, Germany) is applied over the border, internal and external surface of the acrylic custom tray to facilitate the retention of the silicone border molding material.
- Putty silicone (Express™ Putty Soft, 3M ESPE, Seefeld, Germany) is kneaded and a roll of 3-4 mm width is placed along the entire periphery of the maxillary tray including the posterior palatal seal area, and labial and lingual border of mandible tray. Place the tray in the mouth, making certain to retract the lips to avoid scraping the material from the border. Impression material must be present at all the border if there is any deficient space, transfer some material from adjacent site with finger.
- For the maxilla patient is instructed to relax and perform the normal functional movement’s viz. puckering the lips swallowing, speaking, smiling, Move the mandible from side to side. Whereas for mandible functional movement are pucker the lips, wet the lower lip with tongue, swallow, open and close the mandible slightly, Avoid extreme lateral movements.
- Since the material remains in a plastic state for about 3 to 5 minutes. There is enough time to develop a functional border molding. The material is set when there are no permanent indentation results when the fingernail is intruded into it.
- Examine the border molding; the contour of the border should be rounded. Any deficient area is corrected with a small addition of putty material (Fig 1-2).

Preparation of Tray for Making the Final Impression
Reduce the border on the tray which protrudes through elastomer material, it indicates pressure spot. Remove any material with scalpel that extends internally within the tray. Also remove excess material from the external surface of tray away from the borders. Remove small amount of material from inner and outer surface of border to allow space for thin film of final impression material. Remove wax spacer by heating the wax in warm water. Drill three holes in mid palatal raphe to provide relief in maxillary tray. Tray adhesive applied to internal aspect of the tray.

Impression making
The final wash impression is made (Fig 3) using light-body silicone material (Express™ Light Body, 3M ESPE, Seefeld, Germany). For each impression, dry the mouth thoroughly with gauze. Load the tray with a thin layer of impression material.
Coat the inside of the tray and the border-molding material with the light-body impression material. Seat the loaded tray lightly into mouth. Have the patient made functional border-molding movement as described above in cycles of 20 to 30 seconds until the initial set of the material at approximately 2 minutes.

**Discussion**

One of the limitations of using low fusing compound for border molding is its short manipulation time. It hardens quickly in the mouth and does not remain in a plastic stage till the functional movements of the vestibular and alveololingual sulcular tissues are completed. Stage by stage border molding is questionable. Preferably border molding should be completed at a single stage. In view of these limitations heavy bodied putty silicone has been used for border molding.

A frequent error during border molding is manipulation of the patient’s lip and cheek by the dentist; it does not produce true muscle contraction. Functional movements are recorded only when the patient actively participates in the movement of lip and cheek. During the border molding procedure jaws should be in functional opening position.

For the beginners for mandible, border molding can be done in two steps, i.e. lingual and facial (labial and buccal) border of tray are recorded separately. Similarly, for maxilla labial and buccal border can be recorded in one step and posterior palatal seal area can be recorded in second step.

After border molding with putty, final impression can be taken with either metallic oxide paste or light body elastomer. Metallic oxide paste is contraindicated in patients with dry mouth and in severe undercut as it may distort when removed from undercuts. So, in these patients Polyether or polyvinyl siloxanes are more appropriate materials to be used.

In literature various author reported the use of elastomer for border molding and final impression. Woelfel et al.\(^1\) reported that seven prosthodontic instructors required an average of 17 placements to obtain a maxillary final impression on the same patient using modeling plastic as the border molding material, A variation as great as 6,5 mm in the length of the impression border was found among the impressions. Smith et al.\(^7\) described a technique using a polyether impression material for border molding the complete denture impression trays. The major advantages of this technique were that the border molding could be accomplished in one-step and that the patient's functional movement was used in forming the borders.

Han-Kuang Tan et al.\(^8\) concluded that polyether impression material require less time to complete the border molding process, border recorded were longer and less operator variability when compared with modeling plastic. Lu H et al.\(^9\) and Appelbaum EM et al.\(^10\) concluded that polyvinylsiloxane putty and light-body impression material are well suited for making complete denture impressions. Good results are obtained with less expenditure of time as well as less discomfort and inconvenience for the patient, especially in the hands of an inexperienced operator.
Various survey\textsuperscript{11,12} shows modeling plastic impression compound and zinc oxide eugenol impression paste is most popular material used for complete denture impression. But there is distinct trend for increasing use of polyvinyl siloxane and polyether for border molding procedures and impression of edentulous arches. In coming future because of its advantages, elastomers are definitely going to replace the traditional impression materials.

Thus, an alternative to the conventional method where borders were molded with modeling compound, polyvinyl siloxane putty is recommended for border molding in view of its ideal physical properties, simplicity, accuracy and convenience to the patient and clinician.

References

Figures

Fig 1  Single stage border molding of maxillary impression tray with putty

Fig 2  Single stage border molding of mandibular impression tray with putty

Fig 3  Secondary impression with light bodied silicone