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Prosthetic Management of Flabby Hyperplastic Edentulous Ridge Tissue Using Different Clinical Impression Techniques – A Critique Case Series

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Abstract

Flabby tissue is not an uncommon occurrence, especially in old denture wearers with a misfit denture. Frequent denture movements during function initiates a hyperplastic tissue reaction and thus the tissue grows. As the tissue grows further away from the bone, it loses its resiliency and natural normal clinical characteristics. The tissue no longer becomes suitable to support a prosthesis. Historical approaches in managing such cases have been mainly surgical, till it was realized that the tissue growth is reversible which paved way for conservative prosthetic managements. With the advent of elastomeric impression materials, the techniques became numerous and currently there are many techniques described in the literature. With a background of strong basic sciences, this article in the form of case series reviews four commonly used techniques and discusses the pros and cons of each in the light of applied sciences. Four techniques critically analyzed are the putty reline, palatal splinting, sectional impression and window technique. The basis of this critique is the fundamental physical, rheological and clinically relevant properties of each material used with a particular technique. In the light of recent evidence, different techniques have been analyzed and wherever possible, the preferred material or alternative technique has been mentioned.

***Keywords**: hyperplasia, edentulous, mucostatic, selective pressure, impression* plaster

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Introduction

Flabby (adjective meaning soft, mushy, saggy, spongy) tissue has been demarcated as disproportionate movable tissue (GPT), commonly associated clinically with completely edentulous patient frequently associated with old denture use. [1] It is essentially a clinical condition that may be either physiologic or pathologic in nature. The condition is of clinical interest in removable complete or partial dentures since they are either tooth tissue supported or completely tissue supported prosthesis. The ultimate support for any dental prosthesis is the underlying compact bone. A close adaptation of the denture base to the underlying bone ensures better support. [2] Studies have demonstrated that flabby or displaceable ridges are present more in the maxillary arch (24%) than mandibular arch (5%). [3] Although flabby ridge has been generally classified based on tissue character and mobility, [4] it is the management part of flabby tissue which has been getting more clinical attention. Among three traditional approaches mentioned in the literature, surgical and implant treatment is not clinically feasible

in many cases which is why the alternative approach of conventional prosthodontics without surgical intervention tends to be more popular. [5] Whereas most of the flabby ridge cases need an individualized treatment strategy depending upon the severity of the mobile tissue, a comprehensive change in the overall treatment plan is essential. A brief literature appraisal indicates that most of the modifications in conservative management of flabby ridge are focussed on impression techniques and materials. Besides the theory of impression making (mucostatic versus selective impression), [6] the literature also reports modified and/or altered techniques, [7,8] uses of different materials, [9] methods (spacer or perforation, sectional tray or split tray).[10,11] Evidence lack in terms of the most suitable impression technique used in managing a flabby ridge case. The use of elastomeric impression material to relieve traumatized tissues was introduced in 1961,[12] and since then various authors have described various methods of making an impression on a flabby ridge using different approaches with elastomers. Academic interest has prompted the use of recent elastomeric impression materials to be applied in the management of flabby ridges. Likewise, the authors of this article have also come across various cases in which either new methods or new principles have been applied, although not necessarily to be scientifically appropriate. This article is a case series of such new approaches which have been critically evaluated and discussed. A review of basic principles has also been discussed in the light of these different approaches.

Case Reports

Technique 1
(Elastomeric Heavy body/Putty relining)

A completely edentulous patient was treated by a postgraduate student for the complete denture prosthesis in which the patient presented with flabby maxillary anterior ridges (Fig 1A). The flabby area within the alveolar ridge was marked with tissue marking pencil (Faber Castell, India). While outlining the area on the primary cast (Fig 1B), modelling wax (Hyderabad Dental Products, India) for relief on flabby ridge was placed followed by a further application/adaptation of one sheet (2mm) thick wax spacer over entire cast which became a part of the special tray (Fig 1C). An elastomeric impression (Reprosil, Dentsply/Caulk; Milford, DE, USA) using heavy body/ very heavy body was then made of the whole arch except that flabby area, followed by the border molding with the same material (Fig 1D). The wax relief in the flabby area was then removed and a light body impression (Reprosil, Dentsply/Caulk; Milford, DE, USA) was made over the relief area which flowed uncontrollably into the entire denture bearing area (Fig 1E). The light body was extended to the entire area of the heavy body impression. The impression was then poured with a Type-III dental stone (Pankaj Industries, Mumbai, India) and a master cast were thus obtained (Fig 1F) which provided the flabby area under less pressure as compared to the remaining denture bearing areas.

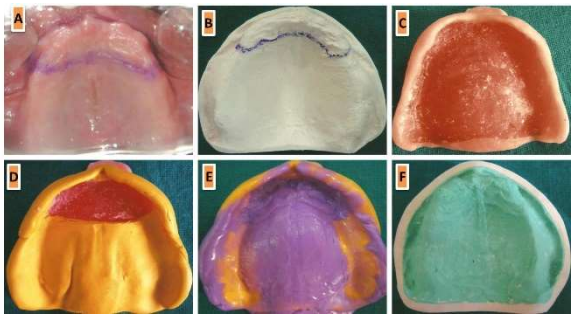

Figure 1: (A) Flabby tissue outlined with tissue marking pencil (B) Primary cast with an outlined flabby area (C) Tray relieved in flabby area and a wax spacer (D) Putty impression with flabby area spacer still present (E) Putty impression relined with light body (F) Master cast retrieved after pouring the final impression.

Technique 2
(Palatal splinting)

An elderly patient aged 72 years was treated with a complete denture prosthesis by a postgraduate student, with the most negative intra oral clinical finding of the patient being maxillary anterior flabby ridge. After making diagnostic impressions with irreversible hydrocolloid (CA 37; Cavex, Haarlem, Holland), the flabby area on the cast was first outlined and relieved with modelling wax (Hyderabad Dental Products, India) (Fig 2 A) following which wax relief was extended posteriorly to include the secondary stress bearing areas (median palatal raphe and Palatine rugae) (Fig 2 B). In this relief area, self cure tray

- acrylic resin (DPI, India) was adapted (Fig 2 C) while three tripod projections were later built on top of it (Fig 2 D). This formed the first part of the tray called the palatal part. A full arch special tray was then fabricated using the same material using a separating medium (Vaseline, Unilever, India) over the first part. The two parts of the tray were thus aligned by tripod projections (Fig 2 E). The tray was removed from the cast to check for any errors at the junction between two sections of trays (Fig 2 F). Clinical step for impression making was then carried by performing border molding (Stick compound, Pinnacle, DPI) of the special tray (Fig 2 G) and verifying the fit of the palatal section after border molding (Fig 2 H). The impression was completed in two steps. First the impression was made of the flabby area with zinc oxide eugenol impression paste (Cavex outline BV, Holland) which was followed by making an impression of the remaining maxillary arch which was done with medium body addition silicone (Extrude and Extrude Extra; Kerr Corp) (Fig 2 I).

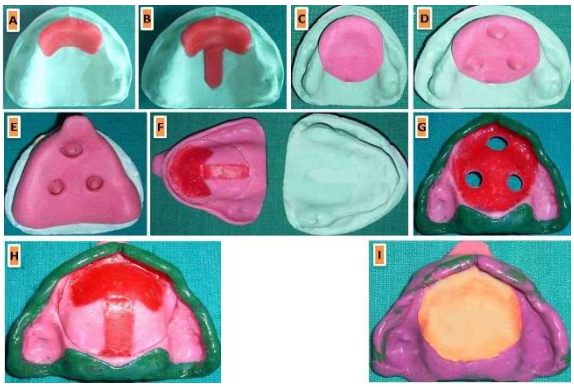

Figure 2: (A) Primary cast with relieve flabby area (B) Flabby relief extended to median palatal raphe (C) Acrylic tray first part (D) with three vertical aligning extensions (E) Self cure tray (second part) covering the first part (F) Both parts observed for fitness (G) Border molding done on second part (H) Border molding along with fitted first part (I) First part of the tray recording flabby tissue with zinc oxide eugenol impression paste while second part using elastomeric impression records the remaining alveolar ridge

Technique 3
(Sectional impression)

An elderly completely edentulous male patient was treated by a postgraduate student for complete denture prosthesis with chief clinical finding being flabby tissue in the maxillary anterior region. After making the primary impressions with irreversible hydrocolloids (CA 37; Cavex, Haarlem, Holland) and pouring the casts with impression plaster (Pankaj Industries, Mumbai, India), the cast was marked to exclude the flabby area and a special tray (Fortex; Lucite Intl, Durham) was fabricated on it. A 3mm diameter stainless steel pin that was angled anteriorly and superiorly was attached to this part of the tray (Fig 3A). The two tray sections were prevented from adhering to each other by a layer of separating media (Vaseline, Unilever, India). The second half of the tray was then prepared which engaged the pin of the first tray (Fig 3B) thus allowing the pin to be aligned with the first tray. Border molding (Stick compound, Pinnacle, DPI) was then performed using both trays in place (Fig 3C) held mainly by the aligned pin. The two sections are separated (Fig 3D) and zinc oxide eugenol (DPI, India) impression was first made in the posterior tray followed by elastomeric impression material (light body) (Affinis; Coltene AG, Altstatten; Switzerland) in the anterior tray (Fig 3E). Any area of overlapping between two impression materials was noted and accordingly either corrected, or repeated either on the impression or on the poured cast (Fig 3F).

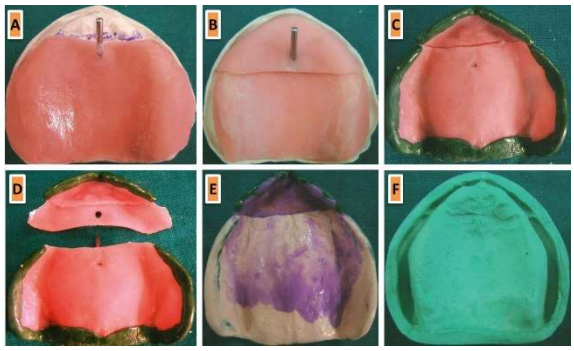

Figure 3: (A) Sectional tray that leaves the flabby area and covers the remaining non pathological area (B) Overlapping second section of the custom tray held using the pin attached to the first part (C) Border molding performed using both trays in place (D) Seperated sections after border molding (E) Final impression with anterior section recorded using light body elastomeric impression material and the posterior section recorded using zinc

oxide eugenol impression paste (F) Master cast obtained after the technique

Technique 4
(Window technique)

An elderly completely edentulous patient wearing dentures previously was treated under the supervision of a postgraduate student for complete denture prosthesis with chief clinical negative finding being presence of excessive flabby tissue in the anterior part of the maxillary residual alveolar ridge (Fig 4 A). Primary impressions were made with irreversible hydrocolloid (CA 37; Cavex, Haarlem, Holland) in a perforated completely edentulous stock tray (Mani Inc., Tochigi, Japan) to minimize the displacement of the mobile tissue. The custom acrylic tray (Fortex; Lucite Intl, Durham) that was designed for the final impression was based on selective pressure impression theory, which requires secondary stress bearing areas to be relieved from pressure during the final impression making. After doing the border molding (Fig 4 B), the special tray was modified by preparing a window that extended 2 to 3 mm on the normal tissue in the flabby area (Fig 4 C). The tray was verified in the patient and adjusted while leaving the entire flabby area exposed through the window (Fig 4 D). Zinc oxide eugenol impression (DPI, India) was then made on this tray (Fig 4 E) following which a layer of impression plaster (Snow White Impression Plaster No. 2, Kerr, Emeryville, California, USA). Was applied with a soft paint brush on the window area (Fig 4 F). Once the material was set the impression was then removed from the area (Fig 4 F) and poured for obtaining the master cast.

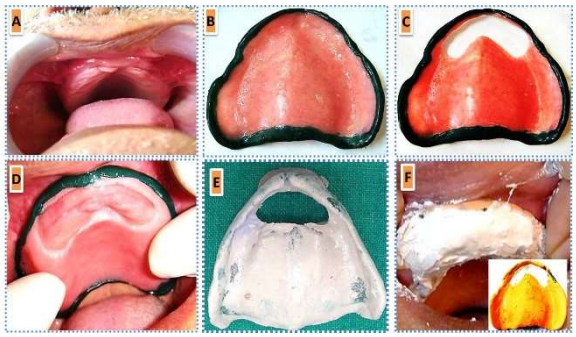

Figure 4: (A) Flabby area in anterior maxillary arch (B) Border molded custom tray with relief over flabby tissue removed (C) Tray cut over the flabby area to present an unconfined window (D) Modified tray tried in the patient to determine any further need for modification (E) Zinc oxide eugenol impression completed except for the window area (F) Impression plaster painted over flabby area and allowed to rebound with completed impression on tissue side (inset)

Discussion

Technique 1: The technique described in this article was originally given by Lynch and Allen. [13] The technique employs the use of three uniform thickness wax sheets on flabby tissue followed by heavy body addition silicone border molding and final impression over normal tissues. Since the technique was first given in the sixties, when elastomeric impression materials mainly used were either polysulfides or condensation silicones, the technique did not receive much attention from both of these materials were quite cumbersome to either the patient or the dentist or both. Even with the advent of modern day addition silicone elastomers, the use of heavy body as a border molding material for complete denture impressions has two fundamental drawbacks. Firstly, the sub mucosa in the vestibule region contains elastic fibers which makes the vestibule highly displaceable. [14] The consistency of elastomeric putty and/or heavy body is high which is mainly due to increased filler content that enhances workability with the material. [15] The only consistency among elastomeric impression material that can be used for border molding is that of either the polyether in a single step border molding or the medium body of addition silicone elastomers. Since, polyether provides the longest working time than addition silicone, the choice of material for border molding in complete denture impression is thus polyether. [16] Secondly, providing an extra spacer over the flabby tissue does not necessarily ensure that the flabby tissue won't be ~~be~~ displaced during impression making. Multiple factors play role in determining the pressure on the tissues which include the tray design (spacer and relief), placement of escape holes, consistency and flow of the impression material during the recording and actual pressure applied by the operator. As long as a special tray is used in the area of flabby tissue, even though multiple holes are provided in it, the tray

remains a semi-confined container and even light body when confined will displace the tissues first and won't allow tissues to rebound back since there is no way for the light body to be displaced out while the tissue is rebounding back. This interaction between the impression material and the tissues is fundamental when planning to record a flabby tissue. Thirdly, while the chances of creating an overextended impression with the use of such impression material are high, it takes away the imperative focus from the flabby area. If the impression is overextended, it will itself be displaced from the denture foundation thus making the recording of the flabby area less mandatory. ~~So~~ in order to record flabby tissue, the final denture extent plays an important role if one wants to maintain the purpose of such impression technique. To minimize the errors, it is more appropriate to perform a conventional border molding with green stick compound and then make the flabby impression using light body elastomer and the remaining with medium body elastomer. Using a putty relined final impression does not fulfill the objectives of selective pressure theory impressions.

Technique 2: This technique was put forward by Osborne with the focus being shifted to making two separate impressions in two separate trays but both belonging to a single unit.[17] Firstly, the palatal tray impression is taken separately with zinc oxide eugenol impression paste. If the flabby tissue is less in amount and displaceble, then the consistency of zinc oxide eugenol is not a factor. However, when flabby tissue is more in terms of quantity and displaceability, than making the impression with zinc oxide eugenol in the palatal tray even with large holes will still compress the flabby tissue within the tray. The amount of relief given in this technique is subjective and thus arbitrary which tends to induce errors that are not easily discernible. Secondly the presence of material within the tray makes alignment of the palatal tray a technique sensitive process. Thirdly, the purpose of the holes is to align the two components of tray rather than to relieve the flabby tissue from any pressure. The clinical consistency of both impression materials is critical. [2] Zinc oxide eugenol tends to set fast initially and even with slight changes in flow makes it less suitable to record flabby tissue, therefore the timing of setting of impression material becomes very sensitive for this technique. The technique also does not allow recorded flabby tissue to rebound, which is the primary advantage of a window technique. [5] Alternately, this technique might serve the principles of recording flabby tissue better if the flabby tissue is recorded either with impression plaster or light body elastomer, while the remaining impression may be made with any of these two compatible materials.

Technique 3: This clinical technique is essentially a modification of the Osbornes technique and was developed by Devlin in 1985. [18] There are two differences in the technique one is the design of the tray which incorporates a pin and the other is an impression of the flabby area with the light body. Light body is perhaps the most ideal material after impression plaster to have the fundamental properties of recording any tissue at rest. But since this technique uses a closed approach to record flabby tissue, the concern remains same as that for other techniques. The concern of confined container ~~which~~ is the basis of developing both selective pressure and minimal pressure impression techniques. [19] Because the two tray components in this technique are attached, therefore it is difficult to even think that the tray will allow rebounding of flabby tissue when desired. Moreover, as mentioned in the technique, when we make the impression of the flabby area minimal pressure has to be applied which is uncontrolled and subjective. Another technical glitch in this technique is the flow of light body over the previous impression taken which leads to surface errors.

Technique 4: The technique described in this case is essentially the same technique as described by Watson. [20] On the normal tissues a mucocompressive/selective pressure impression technique is used while the impression plaster over the window records the tissue in a static condition. The use of zinc oxide eugenol and impression plaster was originally put by Liddelow in 1964.[21] The choice of window is perhaps the best method to ensure that minimal or no pressure is applied to the flabby tissue. Recent studies on different tray designs have found that the tray with window produces least tissue deviations. [1] The application of

impression plaster or any free-flowing material definitely will compress or displace the tissue, but the window ensures that the plaster is not confined within the tray thus allowing the flabby tissue to completely rebound while the plaster setting. [9]

In addition to the above-mentioned techniques, a brief reference to other techniques that have been recently mentioned in the literature using various elastomeric impression materials will provide a background for discussing the various principles of impression making for flabby ridges. Using putty consistency for border molding and regular body for rest of impression while recording flabby in mucostatic form has been advocated by Kazmi et al.[22] A single entire impression in zinc oxide eugenol followed by scrapping in flabby area which is then to be relined by light body elastomer has been mentioned by Agrawal et al.[23] A single impression of the light body polyvinylsiloxane after placing a metal mesh in flabby area which provides a multiple escape mechanism has also been mentioned. [24]

In the wake of so many varieties of impression making, it is imperative to consider the following:

1. The principle objective of impression making in flabby ridge cases is primarily to record the displaceable tissue 'at rest' or 'mucostatic'. [25]
2. Theoretically and principally all three theories of impression making based on pressure (mucocompressive, mucostatic and selective pressure) are implied while managing a case of flabby ridge. Since selective pressure is a blend of mucocompressive and mucostatic (less pressure), the rest of the denture bearing area in any flabby case should be based on selective pressure which means all primary stress bearing areas should be subjected to pressure and all secondary stress bearing areas should be subjected to minimum or less pressure during making of the impression. However, the flabby area has to be recorded at rest (no displacing or compression). ~~In order~~ to record tissue in a rest state, the impression material should either be of such consistency that when pressure is applied through the tray to record the tissues, the tissue displaces the material rather than the material displacing the tissues. Ideally, water is the one material whose consistency cannot displace the tissue unless pressure is applied (confined container). Presently, only two impression materials (impression plaster and light body) have a consistency that matches to that of water. The second factor is the confinement of the material while making such impression. Provision of window is the only way that eliminates the confines of impression material. The other principal advantage of the window is that even if some pressure has been applied to the flabby tissue, the window allows the recoiling of the tissue back to rest position while provision of holes irrespective of the diameter will still restrict the recoiling of mucosa. Thus a window and impression material like impression plaster (or dental plaster) and light body are mandatory to achieve recording flabby ridge at rest.
3. Differentiation between a spacer and a relief is necessary. A relief cannot act as a spacer while a spacer can act as a relief. More number of wax spacers does not necessarily mean the tissues will be recorded at rest. Escape holes for excess impression material, the consistency / flow of the impression material at the time of tissue contact and the rheological properties of the material plays an important role in overall dynamics for recording flabby tissue. Therefore, the use of heavy or medium body elastomers will still displace tissues, even if a window is provided in the area.

There is a basic difference in the pressure application between a conventional selective pressure and the pressure used to record flabby ridge. In conventional selective pressure, the entire denture bearing area is under pressure, however, some are under less pressure than others. At no time there is no pressure at any denture bearing area. In flabby ridge recording, it is no pressure that needs to be created rather than less pressure. Recent studies have shown that the most important deviations that take place are in the anterior and posterior directions, [1] which are detrimental to denture stability.

Conclusion

This article presents a basic overview of the fundamental principles to be incorporated while recording flabby tissue in a completely edentulous patient. Recording the flabby tissue in a static form requires understanding of the physical and rheological properties of impression materials first, followed by the tray

designs and the techniques. The goal is achieved by assuming that the tissues will be displaced by all materials irrespective of the tray design and a provision for allowing the tissue to rebound is therefore essential. The window technique using impression plaster that is painted on the flabby tissue without confining the material seems to be the only technique that fulfills these primary principles.

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