Case

Modification of custom tray and occlusal scheme in edentulous with abnormal relationship and compromised ridge

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ABSTRACT
Complete denture treatment in compromised ridges with class III jaw relationship are a challenge for prosthodontist because difficult to obtain a maximum denture bearing area in compromised ridges and to fulfil favorable functional and esthetics teeth arrangement. The purpose of this paper is to describe the modification of the custom tray, impression technique and teeth arrangement in edentulous case with flabby ridge, flat ridge and class III jaw relationship. A 58-year-old man came to Dental Hospital of Universitas Sumatera Utara with a chief complaint his loose denture was broken. Intraoral examination, full edentulous with flabby ridge on anterior region of maxilla, left and right maxillary tuberosity, flat ridge in maxilla and mandible with a class III jaw relationship were observed. The treatment planning included modifying custom tray and occlusal scheme. The modified custom tray of maxilla consists of dual tray with magnet retained which are made of autopolymerizing acrylic resin and thermoplastic vacuum formed. Cocktail impression technique was used on mandible. A modified buccalized occlusion scheme to obtain good function and esthetic in class III jaw relationship. By these modification techniques, great outcome was obtained in terms of retention, stability, esthetics and functionality.
Keywords: flat ridge, flabby ridge, class III jaw relationship, occlusal scheme, custom tray

INTRODUCTION

According to 9th of Glossary of Prosthodontic Terms, residual ridge resorption is a term used for the diminishing quantity and quality of the residual ridge after the teeth are extracted.[1] Residual ridge resorption is a chronic, progressive, irreversible and cumulative disease. It is a main concern in making treatment plan as a prosthodontist to do proper impression techniques and measures to minimize the residual ridge resorption, such as flat and flabby ridges.[2]

Flabby ridge is an excessive or mobile soft tissue on maxilla or mandile ridge.[1] Masticatory forces can move this denture-bearing tissue area, leading to altered denture positioning and loss of peripheral seal, that can make the denture become unstable in function and appearance, unless it is managed appropriately by special impression technique.[3]

Abnormalities in jaw relations exist mainly in two forms, i.e. maxillary protrusion and wider upper arch, and mandibular protrusion and wider lower arch. Abnormal jaw relationship can cause bad appearance, the replacement of teeth for people who had a class II or class III jaw relationship presents some special problems, and the occlusion will need to be planned in relation to the disharmony.[4]

Flat ridges, also called atrophic ridge, is unable to provide good resistance to vertical or horizontal movement.[3] Ridge augmentation and implant treatment are generally indicated for such patients. However, treatment option of ridge augmentation and implant procedures may not always be possible and conventional dentures can have an equivalent positive impact on the health-related quality of life. Support, retention and stabilization of denture are the fundamental consideration for prosthesis success.[5,6]

Severe resorption of the maxillary and mandible ridge results in unstable and non-retentive dentures with associated pain and discomfort. These problems are more frequently appeared in mandible due to lesser denture bearing area and other anatomical limitations.[3]

Therefore, in this case report with class III jaw relationship, flat and flabby ridges, in order to obtain good retention, stabilization, and better appearance, we will modify the impression custom tray on maxilla and mandible and used modified buccalized occlusion (BO).

CASE

A 58-year-old male patient came to the Dental Hospital of Universitas Sumatera Utara with complaint of difficulty in chewing food due to the absence of teeth in the oral cavity and had worn complete denture but the old dentures were broken. Intraoral examination showed flat ridges on maxilla and mandible (Fig.1), the presence of flabby tissue in the anterior region and tuberosity of the maxilla.

Extra oral examination showed that the patient's face was ovoid and prognathic (Fig.2A,B). Based on clinical examination and tentative vertical dimen-

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sion, the diagnosis is full edentulous with flat and flabby ridge with class III jaw relationship (Fig.2C).

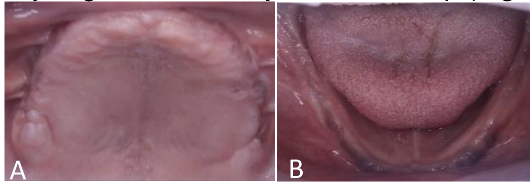

Figure 1A maxilla; **B** mandible

Figure 2 Patient's face, **A** frontal view; **B** lateral view; **C** vertical dimension tentative showing class III jaw relationship

MANAGEMENT

The initial stage was marking the flabby ridge using gentian violet. Preliminary impression with stock tray and irreversible hydrocolloid was done to get a diagnostic model. Tentative vertical dimension is to determine the patient's jaw relationship as a treatment plan requirement. Modification of the maxillary custom tray is done by using dual tray on the maxilla. Wax spacer was 2-3 mm in the first tray on flabby ridge and 1-1.5 mm in the non-flabby ridge. Stopper was made on the buccal shelf and then the wax was coated with autopolymerizing acyrilic resin (AAR). The first layer is AAR which covered the entire maxillary boundary structure except the flabby ridge on the anterior region and the maxillary tuberosity (Fig.3A).

Figure 3A Autopolymerizing acrylic resin (Tray I); **B** TVF with magnet retained (Tray II); **C** Dual tray (combination of Tray I and II)

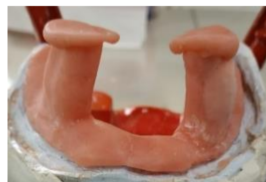

Figure 4 Mandible's custom tray

Before AAR set, 4 magnets (4 mm in diameter, 2 mm in thickness) were placed in front of tuberosity and on the palate in tray I then 4 magnets in the tray II. Second layer was made of thermoplastic vacuum formed (TVF). Wire was placed as dual tray's handle on the palate (Fig.3B,C).

Mandible custom tray was made using AAR without spacer with cocktail impression technique. The lingual portion of custom tray is concave to facilitate tongue movement. Mandible rest in the posterior area with a height such as the vertical height of the tentative vertical dimension (Fig.4). Putty was placed on the top of mandible rest to reduce pain while taking impression.

Border molding was done using heavy body polyvinyl siloxane and definitive impression of the maxillary was done using a medium body on non-flabby and light body on flabby ridge. Escape hole in the TVF as a place for the entry of the light body impression material (Fig.5).

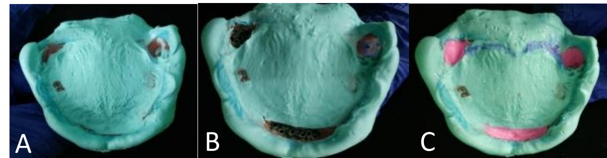

Figure 5A Medium body impression; **B** removal of wax spacer and making escape hole on tray II on flabby region; **C** secondary impression

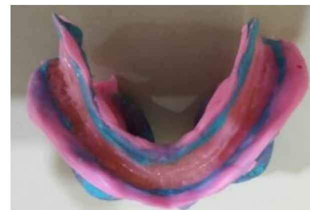

Figure 6 Definitive impression on mandible

Close mouth impression technique on mandible; the patient is advised to close his mouth so that the mandible rests fit on the maxillary alveolar ridge and the patient was instructed to move the tongue left, right and up, sticking out the tongue and sucking in his cheek for recording the functional state of oral structures till the impression material set (Fig.6).

Figure 7A Facebow transfer; **B** modification of buccalized occlusion; **C** lower denture with a metal reinforced

Definitive vertical dimension taking and facebow transfer was done (Fig.7A). Arrangement of the teeth is done using a modified BO scheme; in which the maxillary posterior buccal cusp is in contact with the central fossa of the mandibular posterior teeth (Fig.7B). Maxilla teeth use anatomical teeth and the mandible use non-anatomical teeth. Complete denture was fabricated by conventional

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technique which the lower use metal mesh to reinforce the denture (Fig.7C). At the next appointment, dentures were delivery in the mouth (Fig.8). Follow up of patient was done and the patient was satisfied in esthetic and functional.

Figure 8 Insertion of the denture (frontal and lateral view)

DISCUSSION

The fabrication of a stable lower denture is a difficult thing for dentist especially in the compromised ridge case. The journey to successful denture fabrication starts from accurate impressions that will help the complete denture become retentive and stable which provides physiological comfort to the patient.[7] In this case, close mouth impression with cocktail technique was used on the mandible where there was a modification of the custom tray in the form of a mandibular rest.

The cocktail technique has the advantages in reducing the effect of muscle dislocation on improper extension of the denture boundaries and exploiting the possibilities of active and passive tissue fixation of the denture. Mandible rest of maxillary alveolar ridge provides the advantage of stabilizing the custom tray by preventing horizontal displacement of the tray during definitive impression.[6,8,9]

The success of any complete denture depends on three things: retention, stabilization and support. Prosthodontist's skill is needed in the application of denture cases with more complicated conditions. Impressions in the fabrication of complete dentures are not only for retention and stabilization purposes but also for the mucosal area which must be maintained without distortion especially in flabby ridge.

Management of a flabby ridge is mainly by three approaches, that is 1) surgical removal of fibrous tissue followed by conventional prosthodontics; 2) surgical correction of flabby tissue followed by implant retained prostheses which can be fixed or removable prosthesis; 3) conventional prosthodontics with modified impression techniques and no surgical intervention.

In treating this flabby tissue, a dual tray which consist of AAR as tray I and thermoplastic vacuum formed as tray II with magnet retained as retention between tray I and II was used. The purpose is to deliver mucostatic impression which minimize pressure on flat and flabby ridges.[8]

The jaw relation is the relationship between maxilla and mandible. The relationship between maxilla and mandible is class III jaw relationship which is an abnormal relationship in this case because the maxilla experiencing greater resorption than the mandible.[10]

The BO provides minimal occlusal adjustment, and minimal surface contact between maxilla and mandible. So, the pressure is lesser due to movement and better retention of the full denture provides without any empty dark space between the maxillary and mandible buccal cusps in the centric position.[11]

In this case, a modified BO was used which the buccal cusps of the maxilla posterior teeth contact with the central fossa of mandible posterior teeth. The retention and stabilization of the complete denture in this patient appeared to be good at the control after post-insertion of the complete denture.

It is concluded that by modifying the custom tray on maxilla to get definitive impression on the flabby and flat ridges, cocktail impression technique on the mandible and arranging the teeth with a modified BO, satisfactory results were obtained in the patient both aesthetically and functionally.

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