

Impressing for Excellence: Special Impression Techniques for Compromised Ridges: Case Report

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ABSTRACT

Introduction: Prosthodontic rehabilitation of a patient with compromised edentulous ridges in a conventional manner is a difficult task. Modifications in the treatment procedures should be considered to fulfil the patient's functional and esthetic desires.

Case report: This case report describes various compromised situations like atrophic ridges, flabby ridges and knife edge ridges encountered in a routine clinical practice and modification of treatment plan for each of them.

Conclusion: The treatment modifications for compromised ridges starts from accurate impression making which record maximum denture bearing area without interference with movements. Recording the entire functional denture-bearing area ensures maximum retention, stability and support for the denture during use.

Keywords: Compromised Ridges, Abused Tissues, Flabby Ridges, Knife Edge Ridges, Impression Techniques

INTRODUCTION

Fabrication of removable complete dentures and their clinical performance depends on making accurate impression of the denture bearing and limiting areas. The difficulty to ensure adequate function increases manifold when denture bearing areas are not conducive to optimum function. The performance of a denture prosthesis often depends on basic principles of impression making, i.e. maximum coverage of supporting area, peripheral seal without interference with movements and accurate adaptation without injurious displacement. Recording the entire functional denture-bearing area ensures maximum stability for the denture during use. However, difficulties arise when the quality of the denture-bearing areas are not suitable for this purpose.¹ Residual ridge resorption (RRR) is a complex biophysical process and mostly occurs in mandible during the first year after tooth loss followed by a slower but more progressive rate of resorption thereafter. Mean reduction reported in anterior vertical radiographic bone height during the 1st year after extraction in maxilla is 2-4 mm while in mandible is 4-6 mm, further studies showed that annual bone loss of mandible is 0.4mm and in maxilla is 0.1 mm after 2.5yr² and after 25 yrs. it was noted as 0.2mm in mandible and 0.05mm in maxilla.³ It was also noted that mean ratio of anterior maxillary RRR to anterior mandibular RRR was 1:4.² There is more RRR in mandible than in maxilla, The amount of pressure from bite under the maxillary denture is approx. 12 lb/in² and under mandibular complete denture it is approx. 21 lb/in², because of this the difference in RRR occurs for

both jaws.⁴

The management of resorbed ridges has always a difficult task to the Prosthodontist for many years. Atwood classified residual ridge form into six orders ranging from pre-extraction state (Order I) to the depressed mandibular ridge (Order VI).²

Various compromised residual ridge conditions may include:

- Patient with severely resorbed mandibular ridge (atrophic ridges)
- Flabby or hyperplastic ridge
- Knife edge ridges

This case series describes rehabilitation of four patients with resorbed ridges using admixed, dynamic, window, differential pressure techniques to achieve functionally stable prosthesis.

CASE REPORT

Atrophic ridges

Admixed technique

A 59-year-old female patient reported with the chief complaint of difficulty in mastication, loosening of dentures and poor aesthetics for the past 5 years. The intraoral examination revealed highly resorbed mandibular alveolar ridge (Fig 1). The patient was explained all the possible treatment modalities following which, it was decided to fabricate the denture with modified impression technique and the informed consent was obtained. Primary impression of the edentulous arch was made using irreversible hydrocolloid impression material (Vignette Chromatic,

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Dentsply, Gurgaon) in a metal stock tray. Impression was poured in type III dental stone (Stone Plaster, Neelkanth Menachem, Rajasthan). Special trays were fabricated on the primary cast using auto polymerizing acrylic resin (Rapid Repair, Dentsply, Gurgaon). Extensions of the tray were adjusted to be at least 2mm short of the vestibules on the preliminary cast. Maxillary secondary impression was made using selective pressure impression technique.

McCord and Tyson's admixed technique was used for secondary impression of flat mandibular ridge. Type I low fusing Impression compound (DPI Pinnacle, The Bombay Burmah Trading) and type I low fusing green tracing stick compound (DPI Pinnacle Tracing Sticks, Mumbai) in the ratio of 3: 7 parts by weight were placed in a bowl of water at 60°C and kneaded to a homogenous mass that provides a working time of about 90 seconds. Wax spacer was removed; this homogenous mass was loaded and patient was asked to do various tongue movements. The patient was further rehabilitated with complete denture prosthesis using neutral zone technique.

Dyanamic impression technique

A 62-year-old male patient, reported with the chief complaint of loose lower denture. Patient was an old denture wearer

for past 10 years and got his last denture made 6 months back but was not satisfied with it. The intraoral examination revealed resorbed mandibular residual ridge (Fig.2). Dynamic impression technique was used to record functional impression with maximum denture bearing area possible. A special tray was fabricated with "stops" having dimensions of 3 to 4 mm in length, 2 to 3 mm wide and 2mm high using type I low fusing green stick material on the intaglio surface and in the molar region cylindrical mandibular rests were made at established vertical dimension. Patient was asked to close his mouth so that the mandibular rests fit against the maxillary alveolar ridge. This helps to stabilise the tray in position by preventing anteroposterior and mediolateral displacement during definitive impression. Lingual surfaces of rests are made concave to provide space for the tongue during movements. The impression was made using irreversible hydrocolloid impression material for definitive impression. The patient was asked to make various functional movements like running his tongue along his lips, suck in his cheeks, pull in his lips, and swallowing by keeping his mouth closed, till the impression material hardens for recording the functional state. The impression was visually inspected for error, disinfected and was poured using type III dental stone.



Figure-1a: 3:7 Type I low fusing Imp compound and green stick material; **Figure-1b:** Secondary imp by admixed technique; **Figure-1c:** Beading and boxing of imp; **Figure-1d:** Post treatment intra oral

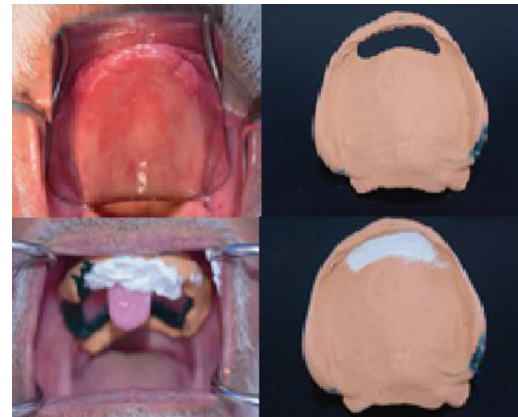


Figure-3a: Pre-treatment maxillary arch; **Figure-3b:** Window preparation; **Figure-3c:** Impression making with Imp plaster; **Figure-3d:** Secondary impression



Figure-2a: Special tray for dynamic imp; **Figure-2b:** Intra oral stops for imp; **Figure-2c:** Secondary imp by dynamic Imp technique; **Figure-2d:** Post treatment Extra oral

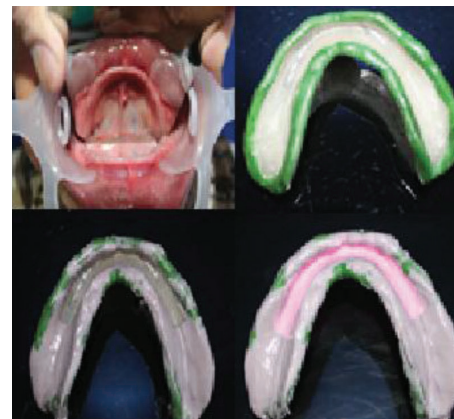


Figure-4a: Pre-treatment mandibular arch; **Figure-4b:** Border moulding; **Figure-4c:** Impression with regular body PVS imp material; **Figure-4d:** Final impression with Light body PVS imp material on flabby area

The patient was further rehabilitated with complete denture prosthesis using monoplane occlusion.

FLABBY OR HYPERPLASTIC RIDGE

Window Technique

A 68-year-old male patient reported to the Department of Prosthodontics with a chief complaint of missing teeth in maxillary and mandibular arches. The patient was an old denture wearer for the last 5 years and described the existing dentures as "loose." The intraoral examination revealed completely edentulous maxillary and mandibular arches. The anterior canine-canine region in maxilla was flabby.

The treatment option of implant supported prosthesis after surgical excision of the flabby tissue was suggested to the patient. Due to unwillingness of the patient to undergo surgical procedure, it was decided to fabricate maxillary complete denture using modified impression technique to record flabby tissue.

Primary impressions of the maxillary and mandibular arches were made with irreversible hydrocolloid impression material (Vignette Chromatic, Dentsply, Gurgaon) using stock trays (Fig. 3), poured with Type III dental stone and the displaceable tissues were identified and marked on the cast. A custom tray with a spacer wax was fabricated on the primary cast. A window was cut in the custom tray which corresponds to the flabby part of the ridge. A blunt instrument was used to determine the relative amount of displacement or mobility of the flabby tissue. After border moulding, the final impression was made with zinc oxide eugenol impression material. The impression material which had escaped through the window was trimmed. The impression was re-seated and type I impression plaster was applied in layers over the exposed flabby tissue with a brush. The material should be stiff enough to be applied with a brush and not fluid enough to drip. The impression tray was carefully removed when the impression plaster had set and checked for reproduction of details for flabby tissues. A separating medium was applied over the plaster part of the impression before pouring it. For mandibular arch selective impression technique was used to make the final impression and patient was further rehabilitated with complete denture prosthesis.

KNIFE EDGE RIDGES

Differential pressure impression technique

A 60 yrs. old female patient reported to the Department of Prosthodontics with chief complaint of inability to chew food due to missing teeth. The intraoral examination revealed completely edentulous maxillary and mandibular arches with very thin (knife edge) ridge present in relation to mandibular arch. The treatment plan was formulated to fabricate complete denture prostheses using modified differential pressure impression technique for mandibular arch.

Primary impressions were made for both maxillary and mandibular arches using type I low fusing impression compound and custom tray was fabricated on the primary cast. After border moulding, a medium bodied polyvinyl

siloxane impression material (Express TM regular body, 3M ESPE, Seefeld, Germany) was used to make final impression. The impression produces displacement of the mucosa over the sharp bony ridge. If it is used to fabricate the final denture prosthesis, there is a potential for the denture to cause soreness secondary to trauma pain in this region. The area of the impression over the sharp ridge was removed with a scalpel blade. The tray was perforated over the sharp ridge. It is important to place numerous large perforations in order to ensure low pressure for the next stage of the impression. Complete impression was made using light body polyvinyl siloxane impression material (Express TM light body, 3M ESPE, Seefeld, Germany). Final Impression for maxillary arch was made using selective impression technique. Maxillomandibular relation were recorded, try-in was done, complete denture prostheses was fabricated by conventional technique.

DISCUSSION

The success of a complete denture relies on the principles of retention, stability and support. The prosthodontist's skill lies in applying these principles efficiently in critical situations. Resorbed ridges are commonly seen in older patients, fabricating a stable denture for such patients is challenging task for a dentist.⁵ The accurate impression for such patients will help to ensure that the complete denture is stable, which provides physiological comfort to the patient.⁶ The surgical therapy to augment the ridge is generally advocated for such patients. However, treatment options like ridge augmentation and implant procedures may not always be possible.⁷ Residual ridge resorption is multifactorial, biomechanical disease that results from combination of anatomic, metabolic, and mechanical determinants. Nutritional deficiency is commonly seen in patients for complete denture prosthesis. Nutritional Deficiencies can produce a number of oral symptoms such as atrophy, oedema, xerostomia, and reduced healing capability. If nutritional deficiencies are suspected, it may be necessary to obtain a medical consultation to identify and correct the specific deficiency.

A number of modified impression techniques for resorbed mandibular ridges have been suggested by various authors such as admixed⁵, functional⁸, all green⁹, and cocktail technique.¹⁰ All these techniques record the primary and secondary load-bearing areas without distortion of the residual ridge. The use of these impression techniques has the following advantages: easily controlled to gain maximum coverage, corrected readily, used to accurately determine the extent of the mucobuccal reflections; used to direct pressure towards the load-bearing areas like buccal shelf area and the slopes of residual ridges.

Displaceable, flabby or hyperplastic tissues are commonly seen in the anterior region of edentulous maxilla opposing mandibular anterior natural teeth or in the mandibular alveolar ridge when extensive bone resorption has occurred and is commonly associated with features of combination syndrome.¹¹ Earlier studies show that prevalence of flabby

ridges vary in either arches, with edentulous maxillae prevalence being 24% and edentulous mandibles 5%.¹² In the conventional Prosthodontic approaches, managing a patient with flabby maxillary ridge using conventional impression techniques is likely to result in an unretentive and unstable complete denture.

Management of a flabby ridge is mainly by three approaches:

- (1) Surgical removal of fibrous tissue followed by conventional prosthodontics,
- (2) Surgical correction of flabby tissue followed by implant retained prostheses which can be:
 - (i) fixed prosthesis,
 - (ii) removable prosthesis,
- (3) Conventional Prosthodontics with modified impression techniques and no surgical intervention^{13,14}

A sharp bony ridge is a frequent problem among the edentulous patients and commonly occurs in the mandible. If present should be identified during the initial assessment by palpation of residual edentulous ridges. When it is conventionally loaded, the overlying mucosa is trapped between the denture base and the bone which leads to pain over the ridge.¹⁵ Knife edge ridge is formed due to rapid resorption of labial and lingual side of the lower anterior ridge, gingiva overlying it becomes rolled and soft tissue proliferates leaving hypermobile ridge crest tissue.

Acc. to Meyer three types of sharp ridges are:¹⁰

- 1) Saw tooth ridge
- 2) Razor like ridge and
- 3) Those with discrete spiny projections.

However, this classification is academic because all of these types can produce pain under denture and need to be managed judiciously.

CONCLUSION

Prosthodontic rehabilitation of a patient with resorbed ridges in a conventional manner is a difficult task. Modification in treatment procedure should be considered to fulfil the patient's functional and esthetic demands. Mandibular dentures made using modified impression techniques exhibit better retention and overall satisfaction.

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