INTRODUCTION

Two major factors for a successful complete denture are superior retention and support. This is achievable once a clinician is able to record an accurate final impression and replicating the functional depth of the sulci and entire denture bearing area. However; there may be scenarios where the quality of the denture bearing tissues is not in a favorable state. Resorbed, displaceable or flabby tissue may be present which may give rise to common complaint of a loose denture. The prevalence of flabby ridges was found to be 5% in edentulous mandibles and 24% in edentulous maxilla. It has been reported in the literature that when mandibular anterior teeth cause trauma in the anterior maxillary region because of higher occlusal forces, fibrous tissue hyperplasia occurs and the mucosa becomes highly mobile and loosely attached to the underlying bone. The flabby tissues of residual alveolar ridges could also be a result of extractions which were uncontrolled and unplanned.

Several techniques for overcoming the problem of flabby ridges have been described in the literature. A technique which involves the use of two impression materials has been described in the literature. It involves the use of custom tray with zinc-oxide eugenol over normal tissues and impression plaster over the flabby tissue areas. Crawford & Walmsley have described a technique which involves the use of two trays and the impression is taken with two different materials. These impressions are then oriented intra-orally. Osborne described the technique termed as "window" impression technique in which a custom tray made tray is fabricated with a window over the flabby tissues. Initial impression of the normal tissues is taken using the tray with amuco-compressive impression material. When the material is set, the impression of the flabby tissues is taken through the window using low viscosity impression plaster.

There have been recent advancements in material sciences and newer materials are available in the market having different consistencies and methods of dispensing. A practitioner is thus, able to choose the material that is most suitable for the patient also. The aim of the current paper is to review various methods of management of flabby ridges and to describe the classic window impression technique.

MANAGEMENT OF FLABBY RIDGES

Crawford & Walmsley have described three approaches for the management of flabby ridges: a. Surgical Removal

Surgical removal can be done in patients with no medical...
and dental contraindications and has an advantage that it produces a firm denture-bearing area. This results in fabrication of a prosthesis which is stable and retentive in most cases. However; the procedure should not be performed here there is reduced height of residual alveolar ridges.

The area from where the tissue is excised/removed usually requires replacement with the denture base material which leads to an increase in the overall bulk of the prosthesis. This could actually result in a prosthesis which is un-retentive. It could be argued that although presence of flabby ridge leads to a sub-standard retention of a denture, it may be desirable than having no ridge at all. Ghazali et. al., studied the effects of surgical removal of soft tissues and flabby ridges from edentulous maxillary alveolar ridges in five subjects. Their results indicated that it is beneficial that early surgical removal of the flabby tissues is carried out.

b. Implant Retained Prosthesis

Treatment of edentulous patients using dental implants is considered to be the treatment of choice nowadays. Implant over dentures (IOD) have gained worldwide popularity, acceptance and significantly improve the quality and standard of life for patients with edentulous ridges. The prosthesis retained by dental implants is retentive, stable and often requires good maintenance of both the prosthesis and other components. Continued research related to IODs has resulted in multiple options and combinations for IOD attachment systems with varying success. An IOD, in comparison to fixed implant supported prosthesis is economical initially and the surgical procedure is often easy to perform. However; it is worth mentioning that despite of reduced initial expenses, the cost of maintenance of an IOD could be substantial. As far as time and finances is concerned, the long term maintenance costs are higher. Other factors that could hinder implant placement include discomfort and inconvenience, the general health status of the patient and the risk of complications and failure of endosseous implants. Overdenture abutments, whether it is a retained root or an implant, preserves the height of alveolar bone and helps in stabilization of complete dentures particularly in the lower jaw. The option of retaining roots is a cost effective mean with no invasive therapy. General practitioners should consider retaining the roots as they serve as a useful platform for over-dentures, especially for those individuals who are old aged.

Maxilla has higher prevalence of flabby ridge as compared to mandible and implants in maxillary regions are not as successful as mandibular implants and success rates of about 79% to 82% have been reported. Decreased success rates could have been due to placement of short endosseous implants into high vascular bone with poor volume and low-density.

c. Conventional Prosthodontics

Where implant placement and surgical excision is not an option, conventional prosthodontics techniques are available which may be beneficial in overcoming the problem of flabby ridges. During impression, when mobile flabby tissue is displaced from its resting position, there is a very high probability that an unfavorable denture bearing area is produced. Literature describes two ways of overcoming this problem conventionally. One method is to record a muco-displaceive impression which aims to compress the flabby tissues. This will allow functional support from the flabby tissues and by replicating the contour of the alveolar ridge during function by the occlusal forces. The other way to overcome is by recording a mucostatic impression that aims to gather support from other areas of the ridge and maximizes retention, stability and support.

Many techniques of overcoming flabby ridges have been described in literature. These include the one part impression technique, controlled lateral pressure technique, palatal splinting technique and two part impression technique of the window technique. The author would like to specifically discuss the two part impression/ window technique.

d. Two Part Impression or Window Technique

This classic technique was first described in 1964 by Osborne and it ensures that flabby tissues are not distorted during impression taking as no excessive force is exerted by the tray over mobile tissues. The initial impression is recorded using impression compound and the displaceable tissue is marked on the recorded impression and is transferred to the study cast. A closed fitting custom made tray is constructed which does not cover the displaceable soft tissue. This is usually achieved by creating a window over the flabby tissue area. Border moulding is performed and final impression of the entire supported ridge is recorded using zinc-oxide eugenol impression paste or medium bodied silicone impression material. The impression of the flabby tissues is then recorded by syringing impression plaster or by dispensing the light bodied silicone impression material.

There is a variation in the design of the custom made
tray and it could be completely uncovering the section of the arch or a window may be created in the areas where flabby mobile tissue is present. In majority of the custom made tray types, a modification of the placement of the tray handles is necessary. The window type modification is advantageous since it allows for appropriate border correction before proceeding ahead with the second stage of the impression.

**CASE REPORT**

A 72 year old male patient reported to the Division of Prosthodontics, Ziauddin University Hospital, Karachi, complaining of loose and ill-fitting maxillary and mandibular complete dentures. The patient had been edentulous for the past 9 years and had worn three sets of complete dentures previously. A thorough clinical examination was performed and flabby mobile tissue was observed in the anterior region of the upper arch along-with severely resorbed lower mandibular ridge.

Treatment plan was discussed with the patient and an option of surgical removal of the upper mobile tissue followed by a conventional complete denture and placement of a lower implant retained over-denture. However; patient could not afford the cost of dental implants and was not in a favor of a surgical procedure. It was finally decided that new set of maxillary denture using the "Window Technique" would be fabricated and a new set of mandibular dentures were to be fabricated using the neutral zone impression technique. The management of maxillary edentulous ridge was carried out as follows:

1. Primary impression of the upper edentulous ridge was recorded using high viscosity irreversible hydrocolloid (Cavex Holland, BV) (Figure 1). The impression was poured in the laboratory and preliminary cast was obtained.
2. The flabby mobile tissue was marked on the cast and a custom made tray was fabricated using self-cure acrylic resin. The borders of the custom-made trays were kept 2mm short of the vestibules.
3. A window was created on the custom made trays using acrylic trimming burs. The size of the window opening was determined using the size of the displaceable tissues and two tray handles were constructed (Figure 2).
4. Border moulding for the maxillary arch was carried out using green-stick impression compound (MetroDent) and secondary impression was recorded using zinc-oxide eugenol impression paste (Cavex, Holland, BV). Excess impression material at the peripheries of the window was trimmed away carefully using a scalpel (Figure 3).
5. The impression was re-inserted in the patient's mouth and thin mixed impression plaster was injected through the window over the flabby mobile tissues. The tray was held with light pressure and care was taken to avoid tissue

![Figure 1: Maxillary preliminary impression](image1)
![Figure 2: Custom-made tray with a window in anterior maxillary region](image2)
![Figure 3: Final impression of the maxillary denture bearing area not involving the flabby tissues](image3)
distortion during the procedure.
6. The material was allowed to set and the impression was removed with care, disinfected and sent to the laboratory for further processing (Figure 4).
7. The usual remaining denture fabrication steps were carried out, denture was delivered to the patient and post-operative instructions given.

**DISCUSSION**

Prosthodontic management of flabby ridges can be carried out effectively by various means. The choice of best treatment modality is dependent on various factors including the medical health status of the patient and the degree of displaceability of the flabby tissues. Surgical excision offers promising results but may also lead to decreased sulci depth. It is worth mentioning that surgical intervention i.e. the excision of flabby tissues, bone grafting and implant placement may not always be possible in elderly patients and denture fabrication using the "window technique" may be the only successful alternative.

Osborne J used two different impression materials i.e. zinc-oxide eugenol and impression plaster for flabby ridge management. In their technique, they used two separate trays and impression materials were used to record the normal and the flabby tissues which were related intra-orally. The technique described in the current case report is similar to that of Watson who also fabricated a custom made tray with a window, used impression plaster to record the impression of the mobile flabby tissues and zinc-oxide eugenol to record the impression of the remaining tissues of the maxillary ridge.

Impression plaster is a mucostatic impression material with very limited use in clinical dentistry nowadays. It is very effective in scenarios where minimum displacement of the tissues during impression taking is required. The material is difficult to handle, messy and is not well tolerated by patients. Impressions recorded using impression plasters are also difficult to pour in the laboratory. However; the material is cost-effective, offers good dimensional stability and allows the clinician to control the setting reaction.

The authors would also like to encourage the clinicians to properly record the orientation of the occlusal plane during recording of the jaw relationships. The use of a suitable face-bow and set up of teeth on a semi-adjustable articulator is highly recommended as this will help to establish a suitable occlusal scheme with balancing contacts during excursive movements. If this is not achieved, the denture already seating on mobile tissues will be further destabilized.

**CONCLUSION**

The window technique described in the current paper is simple, cost effective and does not require an additional clinical visit. The materials described in the current case are readily available but authors would still encourage the use of addition cured silicones as they offer better clinical handling and excellent dimensional stability. Effective communication with the dental technician is also encouraged for a better treatment outcome.

**ACKNOWLEDGEMENT**

The authors would like to acknowledge Mr. Abdul Waheed, acrylic technician in the dental laboratory of the department of prosthodontics, Ziauddin University, for his expertise and help during laboratory stages of the denture fabrication.

**Author Contribution:**
HR made the original design of the manuscript, and performed proof reading, AN wrote section 2 and 3 of manuscript and performed proof reading, AS wrote discussion and MZ took photographs and performed proof reading.

**Disclosure:** None disclosed
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