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Altered cast technique: A case report

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Abstract
In cases of distal extension removable partial dentures (RPDs), traditional impression methods often fall short in capturing the functional form of the residual ridge. The altered cast technique, also referred to as the corrected cast technique, addresses this limitation by enhancing the adaptation of the denture base to the mucosal tissues and ensuring a more even distribution of forces between the teeth and supporting soft tissues. This approach is especially advantageous in Kennedy Class I and Class II arches.
A 60-year-old male patient presented with the chief complaint of missing teeth. Intraoral examination revealed a completely edentulous maxilla and the absence of teeth in regions 36, 37, 45, 46, and 47. Based on clinical findings, a treatment plan was formulated to rehabilitate the patient using a removable partial denture incorporating a functional impression and the altered cast technique to optimize support and stability.
The altered cast technique enhances the fit and functionality of distal extension removable partial dentures (RPDs) by ensuring optimal adaptation of the prosthesis to both tooth and tissue structures. This approach helps distribute occlusal forces more evenly, reducing stress on abutment teeth, preserving the residual ridges, and minimizing movement of the denture base. Studies have demonstrated its effectiveness in improving tissue health, increasing patient comfort, and extending the lifespan of the prosthesis.

Keywords: Distal extension RPDs, functional impression, altered cast

Introduction
DeVan stated that "Perpetual preservation of what remains is more important than the meticulous replacement of what is missing". A removable partial denture can acquire support from teeth, as seen in Kennedy's Class III and Class IV situations, or it may rely on both
tooth and tissue support, as seen in cases like distal extension base RPDs, such as Class I and Class II of Kennedy's classification. [1 ,2]
Relying solely on anatomical impressions can be inadequate for tooth-tissue supported RPDs. [3] It becomes crucial to capture the residual ridge in its functional state.
Cast partial denture made using the altered cast impression technique helps create an environment in which the teeth and the edentulous tissues support the base as compatibly as possible. This involves modifying the original cast framework to create a new cast that incorporates the functional recording of the ridge, especially in posterior edentulous areas. [4]
It equally distributes stress between soft and hard tissues, reduce the load on the abutment teeth, decrease food impaction and preserve the residual ridges, leading to increased patient satisfaction. [4, 5]
This case report describes the various steps involved in altered cast technique.

Case Report
A male patient aged 60 years, came with the complaint of missing upper and lower teeth. The patient presented with completely edentulous maxilla and missing 36, 37, 45, 46, 47 [Figures 1].
The patient was examined and all the treatment modalities were discussed with the patient including implant supported prosthesis. Considering the patients economic constraints, a cast removable prosthesis was planned for the patient.
Maxillary primary impression was made with impression compound and a custom tray was fabricated. The mandibular impression was made with alginate and study casts were obtained.
The mandibular study casts were placed on a surveyor for examination and design of the cast framework. Mouth preparation was done. Mesial rest seat preparation was done on 34, 35, 45 and cingulum rest seat preparation on 33, 43.
Framework trial was done and the fit was verified [Figure 2]. Self cure acrylic resin custom tray was adapted over mesh work minor connector.
Border moulding was done with greenstick compound in both maxillary and mandibular arches and final impression was made with light body elastomeric impression material.
The cast was then altered in the laboratory. Two saw cuts were made perpendicular to each other in master cast. The first cut was made 0.5 mm to 1.0 mm distal to the most distal tooth and perpendicular to the edentulous ridge. This cut was carried from the outer edge of the cast to 6.0 to 7.0 mm medial to the lingual vestibule.
The second cut was made parallel and medial to the edentulous ridge, extending from the most posterior aspect of the cast to the most medial aspect of the first cut.
In the cut surface of the cast, grooves were placed to aid in the retention of the newly poured stone. After ensuring proper seating on the framework on the cast, the final impression was
beaded and boxed and the cast was poured with dental stone [Figure 3]. Finally altered master cast was obtained and checked for metal framework in altered master cast.
Jaw relation, try in and fabrication was carried out in a usual manner [Figure 4]. Denture was delivered to the patient [Figure 5] and post-operative instructions were given. The patient was satisfied with the outcome of the treatment. He was recalled for follow up after a day, 1 month and 6 months. The final prosthesis was functioning satisfactorily.

Fig 1

Fig 2

Fig 3

Fig 4 **Fig 5**

Discussion

The original principles of the altered cast technique, also referred to as the corrected cast technique was introduced by Applegate. [6, 7]

The technique is most commonly employed for mandibular distal extension partially edentulous arches, such as Kennedy's Class I and Class II. It is less frequently used in maxillary arches due to the inherent differences in masticatory mucosa and the type of tissue support provided in the maxilla. [8]

In such cases, the distal extension areas are supported by soft tissues, such as the mucosa and alveolar ridge, rather than by teeth. Unlike teeth, which are stabilized by the periodontal ligament, soft tissues are compressible. This difference in support characteristics creates an imbalance, resulting in uneven force distribution when a conventional cast is used. [9]

The altered cast technique effectively achieves the objective of harmonizing the anatomic form of the teeth with the functional form of the residual ridge by simultaneously recording the surface contours and the ridge under masticatory function. [10] It allows for precise functional adaptation of the distal extension base to the mucosal tissues, thereby enhancing the stability, retention, and support of the removable partial denture [11].

Enhanced tissue adaptation allows for a more balanced distribution of occlusal forces between the tooth-supported and tissue-supported regions, thereby reducing the risk of trauma to both the soft tissues and the abutment teeth. [12]

Leupold [14] and Holmes [15] said that the altered cast impression technique demonstrated the least amount of movement of the base at the time of placement and the most favourable ridge-to-denture-base relationship.

Patients benefit from increased comfort, improved masticatory efficiency, and extended denture longevity as a result of enhanced support and minimized movement. [16]

Conclusion

The altered cast technique is crucial in Kennedy Class I and II cases to

- Accommodate the displaceability of soft tissues
- Achieve a more accurate fit of the distal extension base

- Improve support, retention, and even distribution of occlusal forces
- Extend the lifespan of the prosthesis and enhance patient comfort

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