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Tuberosity Flanged Maxillary Complete Denture for Enlarged Tuberosities. Case Report.

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Abstract

This case report describes a conservative prosthodontic approach for treating enlarged maxillary tuberosities using a flanged complete denture. A 56-year-old edentulous male presented with poor denture retention, instability, and pain during insertion, caused by bilateral hypertrophic tuberosities with pronounced undercuts. Clinical and radiographic examination confirmed enlargement without underlying pathology. A maxillary complete denture with specific posterior flanges fabricated from heat-cured PMMA was chosen as treatment plan. The final denture showed good retention, stability, and peripheral seal with minimal adjustments. At the 7-day follow-up, the patient reported no pain, excellent function, and rapid adaptation. This technique offers an effective, minimally invasive alternative to surgery in similar cases.

Keywords: flanged denture; enlarged tuberosities; PMMA.

Background

Retention of maxillary complete denture depends primarily on base adaptation to the prosthetic field, a complete peripheral seal including an accurate posterior palatal seal and a thin continuous saliva film providing adhesion, cohesion and surface tension forces (1).

A critical anatomical landmark is the posterior maxilla at the tuberosity region defined as the convex prominence distal to the last molar and extending toward the pterygoid hamulus which serves for denture border seal and resistance to anterior displacement (2).

In certain patients, however, hypertrophic maxillary tuberosities develop as excessive fibrous or osseous enlargements, often bilateral and projecting inferiorly beyond the residual ridge plane. This enlargements most often results from fibrous and osseous hypertrophy, chronic irritation, hormonal influences, or compensatory growth in long-term edentulism (3-5), creating deep undercuts and reduced inter-tuberosity distance. Such morphology poses significant challenges to conventional polymethyl methacrylate (PMMA) complete dentures, as the rigid acrylic baseplate cannot surpass the prominences without risk of material fracture or insertion trauma (6). Consequently, conventional dentures fail to establish an effective peripheral valve seal, leading to air leakage, loss of suction, and functional instability.

The treatment plan usually adopted in these cases is either surgical, prosthetic or both (3, 7). One of the prosthetic options to overcome these limitations, is to use modified complete denture designs incorporating a tuberosity flanges or pelotes a contoured posterior extension—have been advocated

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(8). This adaptation extends the denture base inferiorly and posteriorly to engage the hypertrophic undercut while preserving border continuity. By increasing the surface area of soft tissue contact and directing sealing forces along the tuberosity slope, the flanged design significantly enhances atmospheric pressure-mediated retention compared to unflanged alternatives.
This case report describes similar tuberosity flanged design of a complete denture fabricated using conventional clinical steps and laboratory processing with heat-cured PMMA.

Case Description

A 56-year-old male was referred for prosthetic treatment at the Department of Prosthetic dental medicine. The patient complained of poor retention and instability of an old maxillary complete denture; difficult and painful insertion due to impingement around the tuberosities; prior attempts at a conventional replacement resulted in frequent painful mucosal ulcers.
Medical history of the patient didn't reveal any contraindications for prosthetic treatment; no general or local illnesses were recorded. The patient was in good general health condition. No allergies and no harmful habits were reported.
Extraoral examination shows no signs of inflammations or abnormalities. Intraoral examinations show good oral health without any signs for inflammation; bilateral hypertrophy of the maxilla in the zone of tuberosity was observed. The patient reported that this finding was present since he was in his 20s.
Panoramic x-ray did not show any abnormalities.
Treatment options were discussed with the patient. We suggested three different options: (1) surgical reduction of tuberosities; (2) implant-retained rehabilitation and (3) conventional complete denture with flanged design. Given the patient's preference to avoid surgery and limited financial resources, option (3) was selected.

Visit 1 – Preliminary impressions

- Stock metal trays for full edentulous maxilla were chosen followed by obtaining an anatomical alginate impression (Fig. 1). Then diagnostic gypsum casts were poured.

- The gypsum casts were observed and then outlined for the dental technician which fabricated a photopolymer custom tray according to the outlining. Vent holes in relieved zones were drilled, a relief space over non–stress-bearing areas were left while close fit over primary stress-bearing areas was completed.

Figure 1. Anatomical impression obtained with fabric metal tray and alginate impression material.

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Visit 2 – Custom tray and border molding

- The maxillary custom tray was used to obtain selective pressure impression (palatal support, relief over the undercuts) with functional border molding.
- Three-layer selective pressure impression were obtained. First functional mapping impressions were taken with (DETAX sta-seal f) with set of functional movements for border molding. Then second layer was used with Oranwash L (Zhermack) where selective pressure was applied. Final wash as a third layer was taken with Oranwash VL (Zhermack) where relief pressure impression were taken (Fig 2).

Figure 2. Functional impression of the maxilla obtained with the individual tray. Cyan color – "C" fun silicone impression material. Orange color – "C" light silicone impression material. Blue color - "C" very light silicone impression material. Custom photopolymer tray was used.

Visit 3 – Recording OVD and RPPLJ

- Wax rims were returned from the dental technician. Determination of OVD using anatomical-physiological criteria and RPPLJ (Reproducible Physiological Position of the Lower Jaw) followed. Then tooth shape and shade were chosen.

Visit 4 – Try-in of tooth arrangement

- Try-in on the primary base in wax with arranged teeth; verification of esthetics, phonetics (/s/, /f/, /v/), and occlusion was completed.

Prosthetic field outlining and finishing lab procedures:

- The final cast was analyzed to define a safe path of insertion for the primary base. Undercut mapping and preliminary design of flange guides (positioned to bypass the most prominent undercuts) was done. The insertion path was horizontal one not vertical. Outlining the borders of the prosthetic field followed.
- Dentures were positioned in the flasks with the arranged teeth. (Fig 3, 4).

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Figure 3. Presenting the wax up of the denture with arranged artificial teeth positioned on to the gypsum model and placed in the flask. Before flasking.

Figure 4. Presenting the wax up of the denture with arranged artificial teeth positioned on to the gypsum model and placed in the flask. After flasking.

- Lost waxing technique was used, then heat curing resign (PMMA) was applied to fabricate the dentures.
- Cleaning and polishing followed then the denture was completed for delivery (Fig 5 – 7).

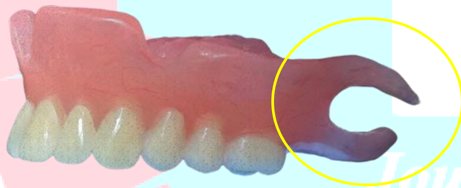

Figure 5. Left view of the maxillary denture. Flanged posterior part of the base is well visible.

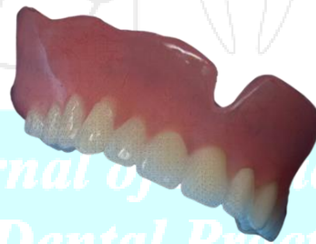

Figure 6. Frontal view of the maxillary denture

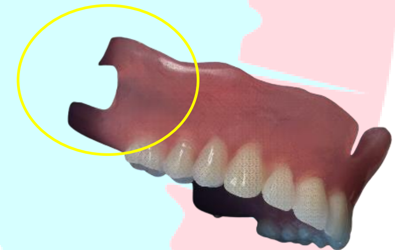

Figure 7. Right view of the maxillary denture. Flanged posterior part of the base is well visible

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Visit 5 – Delivery

- Step-by-step insertion sequence demonstrated to the patient:

1) Insert the primary base along the planned path to full seating (atraumatic, bypassing the undercuts) – with horizontal path of insertion. Removal in reverse order was experienced too.
2) Slide the flanges along the tuberosity prominence to the terminal position until frictional “snap” is felt.

- Assessment of retention, stability, peripheral seal, and occlusion were completed. Minor adjustments were needed.
- Finally hygiene and handling instructions were given.

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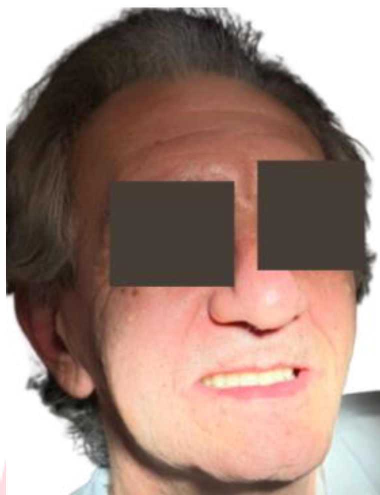
Visit 6 - Follow-Up



On day 7 the patient came for a follow-up (Fig. 8). Observation for sore spots, adaptation, speech and proper mastication was completed. The patient reported no painful experience at any time and very well retention of the denture during chewing and talking. Adaptation to the new denture was completed according to the patient.

Figure 8. The patient wearing the flanged maxillary dentures. Photo is taken in occlusion.

Discussion

Flanged complete dentures, particularly those incorporating extensions in the maxillary tuberosity region, represent a valuable prosthodontic approach for managing anatomical challenges in edentulous patients. These flanges, often fabricated using flexible or resilient materials such as thermoplastic nylon or soft liners, extend into the buccal vestibule and engage undercuts or bulbous areas of the tuberosities, thereby enhancing the overall performance of the prosthesis. This design contrasts with conventional rigid dentures, which may require preprosthetic surgical interventions to eliminate undercuts, and offers a conservative alternative that preserves natural anatomy while optimizing denture function (9).
One of the primary advantages of flanged dentures in the tuberosity region is improved retention and stability. In cases of bilateral undercuts on bulbous maxillary tuberosities—often exacerbated by a shallow buccal vestibule (e.g., limited to 3 mm during mouth opening due to coronoid process interference)—flexible flanges allow for non-rotational insertion and secure engagement of the undercuts without tissue irritation or compromise to border sea (10). By incorporating resilient liners, such as Permasoft, into the flange areas post-processing, the denture achieves full vestibular adaptation, maximizing peripheral seal and minimizing dislodgement during function. This is particularly beneficial in the posterior region, where the tuberosity serves as a key primary support area, providing resistance to lateral forces and rotational movements that could otherwise destabilize the prosthesis (11). Clinical reports demonstrate that such designs eliminate the need for surgical reduction of tuberosities, reducing patient morbidity and treatment time while yielding superior retention compared to block-out techniques alone (10).
Beyond mechanical performance, flanged dentures contribute to enhanced comfort and function. The physiologic contouring of flanges promotes tissue health by distributing occlusal loads more evenly across the tuberosity and residual ridge, reducing pressure points and soreness associated with rigid acrylic bases (12). This approach aligns with anatomic principles, allowing for extended flange height and thickness that accommodate functional tongue and cheek movements, thereby improving mastication, deglutition, and speech (9). In mandibular analogs, flexible lingual flanges

have similarly shown retention gains, suggesting transferable benefits to maxillary designs for holistic denture stability (13).

Aesthetically, labial and buccal flanges in the tuberosity region provide subtle yet meaningful support for perioral tissues. Studies evaluating edentulous profiles indicate that dentures with flanges yield higher subjective ratings of facial esthetics in both frontal and profile views, attributed to better lip fullness and vermilion display, though differences may be clinically minor (e.g., <4 mm on visual analog scales) (13). This is especially advantageous for patients with resorbed ridges, where flangeless designs can accentuate facial collapse (12).

The uses of flanged complete dentures are most pronounced in challenging clinical scenarios, including severe ridge resorption with undercuts (2-4 mm depth), bulbous tuberosities, or congenitally limited vestibular depth10. They are ideal for elderly or medically compromised patients averse to surgery, as the chairside reline procedure for resilient integration simplifies fabrication (13). Additionally, in digitally guided workflows, CAD-CAM milling of flanged bases ensures precise adaptation, further expanding applications to immediate or interim dentures (14).

Conclusion

A flanged maxillary complete denture fabricated with conventional techniques is successful treatment option for enlarged tuberosities. The treatment resulted with atraumatic insertion/removal, reliable retention, while patient reported comfort at short term follow-up.

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