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Total Edentulism Management: Insights from a Case Report

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Abstract

The transition from partial to complete edentulism is a significant trauma for patients and a challenge for practitioners. When extractions involve the anterior sector, patients are often hesitant to display their condition. Immediate complete dentures address this issue by reducing the aesthetic and psychological impact on the patient. However, the practitioner faces difficulties in clinical procedures, such as taking impressions without prematurely extracting mobile teeth, recording the peripheral border despite malpositioned teeth, and establishing the maxillo-mandibular relationship while considering the mobility of teeth set for extraction. Predicting the volume and size of the ridge post-extraction and assessing aesthetic outcomes through the try-in of the anterior teeth are also critical for success. The effectiveness of an immediate complete denture relies on correct indications and meticulous adherence to clinical and laboratory fabrication procedures. We suggest a detailed clinical case to illustrate the management of a patient candidate for total edentulism, highlighting the importance of following key parameters to mitigate risks of failure that could significantly impact the patient's oral health.

Subject Areas

Dentistry

Keywords

Immediate Complete Denture, Total Edentulism, Dental Prosthesis

1. Introduction

Edentulism is a condition affecting a significant portion of the global population, currently impacting approximately 353 million people [1]. This condition can severely impair patients' quality of life, hindering their ability to chew and speak,

and influencing their self-esteem. In 2021, the global prevalence of edentulism was estimated at 22%, with rates varying significantly by region, reaching up to 37% in South America [2]. In Africa, the situation is particularly concerning, with studies indicating that up to 79.25% of patients in certain urban areas suffer from uncompensated edentulism. Socioeconomic factors, such as economic status and access to dental care, contribute to this alarming situation [3]. Projections suggest that by 2050, over 660 million people (+84.40%) are expected to be edentulous, highlighting the growing urgency to address this issue [1].

The transition to total edentulism can represent both psychological and physical trauma for patients. Therefore, it is crucial to mitigate and facilitate this transition by offering suitable prosthetic solutions. Immediate complete dentures emerge as an effective option in this context. They help reduce the duration of edentulism by providing a prosthetic solution immediately after tooth extraction, thus preventing patients from experiencing a period without teeth [4].

These dentures offer several advantages: they assist in maintaining facial muscle tone, preserve dental aesthetics, and enable nearly immediate masticatory function. However, their management requires careful attention. Each patient necessitates individual analysis and evaluation, making a pre-prosthetic study essential to determine whether alveoloplasty should be performed concurrently with the extraction of anterior teeth [5]. Additionally, the use of a surgical guide is recommended to direct alveoloplasty and ensure proper fitting of the prosthesis, particularly in the presence of bony undercuts around remaining teeth [6].

The success of immediate dentures relies on the meticulous execution of clinical and laboratory procedures. This article presents a case report illustrating the essential clinical steps required to fabricate a functional and aesthetically pleasing immediate complete denture.

2. Case Report

2.1. Clinical Examination

A 61-year-old woman presented for prosthetic treatment due to long-standing uncompensated edentulism and aesthetic concerns. The patient has a history of type 1 diabetes, currently managed with insulin, and maintains optimal glycemic control.

Edentulism is often associated with various systemic health issues, including diabetes, which can exacerbate periodontal disease and affect healing processes. In this patient, the long-standing nature of her edentulism suggests a chronic adaptation to her condition, which may have implications for her overall oral and systemic health.

Clinical examination revealed poor oral hygiene, dental discoloration, and inflamed, edematous marginal soft tissues. Significant supragingival and subgingival calculus deposits were noted, indicative of ongoing periodontal disease.

The patient exhibited multiple missing teeth, contributing to functional limitations in mastication and impaired speech. In the maxilla, missing teeth included

14, 15, 16, 17, 18, 21, 22, 23, and 26. In the mandible, missing teeth were 44, 45, 46, 31, 32, 33, 36, and 37. Notably, teeth 24, 25, and 28 exhibited severe mobility (grade 3), while teeth 34 and 35 displayed moderate mobility (grade 2) with associated gingival recession (Figure 1).

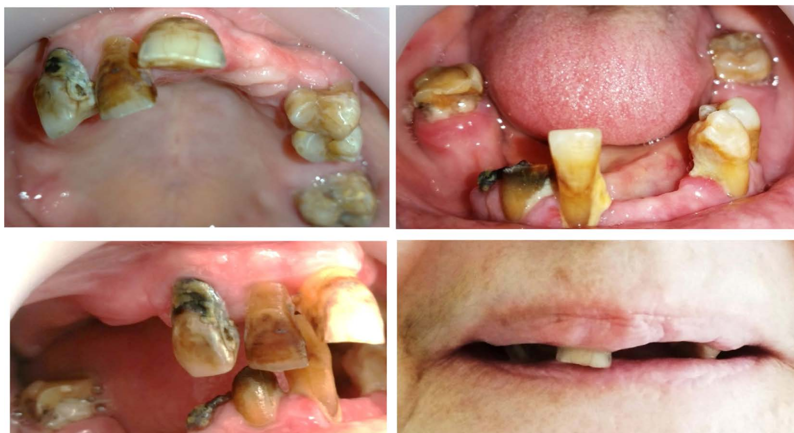

Figure 1. Intraoral view.

Radiographic assessment indicated a significant bone loss, highlighting the advanced nature of her periodontal disease. The remaining dentition presented unfavorable intrinsic (pathological occlusion and mobility) and extrinsic (discoloration and hygiene issues) characteristics, complicating any potential restorative options.

The patient expressed dissatisfaction with the aesthetic appearance of her smile, exacerbated by the absence of anterior teeth (21, 22, 23, 14, 15) and the discoloration of teeth 11, 12, and 13. Her admission symptoms included psychological distress related to her appearance and functional limitations. She adamantly refused to remain edentulous after the extraction of the anterior teeth and requested the immediate fabrication of a new prosthesis following extraction and healing.

2.2. Diagnosis and Treatment Plan

A comprehensive treatment plan was developed, focusing on immediate complete denture fabrication to restore function and aesthetics while addressing the underlying periodontal disease through pre-prosthetic interventions, including possible alveoloplasty.

3. Prosthetic Management

3.1. Pre-Prosthetic Phase

Psychological Approach:

During the initial consultation, the patient had high expectations due to her severe condition, which she did not fully express directly. It was necessary to identify these subjective parameters to understand her expectations better and establish an approach to lay a solid foundation for the practitioner-patient relationship.

Oral Hygiene:

To ensure the resolution of gingival inflammation and reduction of bacterial load, oral hygiene motivation was followed by supragingival and subgingival scaling, along with a prescription of chlorhexidine mouthwash as initial steps.

Extraction of Posterior Teeth:

The posterior teeth were extracted 4 weeks before the start of the prosthetic phase.

3.2. Prosthetic Phase

Primary Impression:

Maxillary and mandibular impressions were taken using irreversible hydrocolloid impression material, and stone casts were prepared (Figure 2).

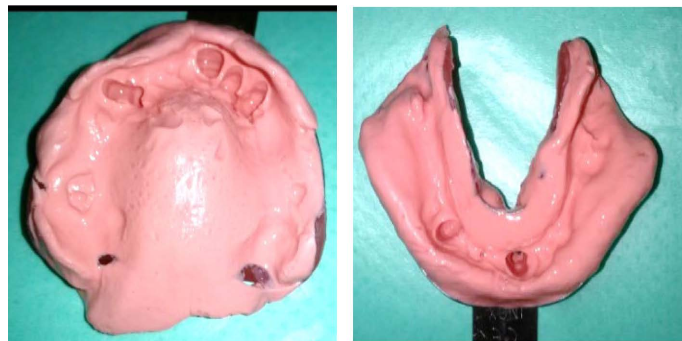

Figure 2. Primary impression using irreversible hydrocolloid impression material.

Secondary Impression:

A custom impression tray was fabricated for the secondary impressions. It adheres to conventional complete denture criteria in edentulous areas with borders spaced 1 to 1.5 mm from the vestibule. In the anterior toothed area, the custom tray must be spaced to accommodate undercuts caused by teeth, with its borders extending to the furthest vestibular bone contours. Secondary impressions were taken in both arches to define the peripheral borders of the future prosthesis. The challenge lies in accurately recording the anterior functional border despite these undercuts.

Maxilla:

Functional borders in the edentulous posterior and velo-palatal zones were recorded using Kerr paste. The anterior borders, with undercuts, were modeled using a high-viscosity polyether (Impregum) to facilitate accurate recording. Surface detailing was done using polysulfide elastomer (Permlastic Regular) (Figure 3 and Figure 4).

Mandible:

Prosthesis borders were refined with polyether, followed by a central impression with polysulfide, similar to the maxilla (Figure 5 and Figure 6).

Determination of Interincisal Point:

The sagittal and frontal position of the interincisal point was correct and was

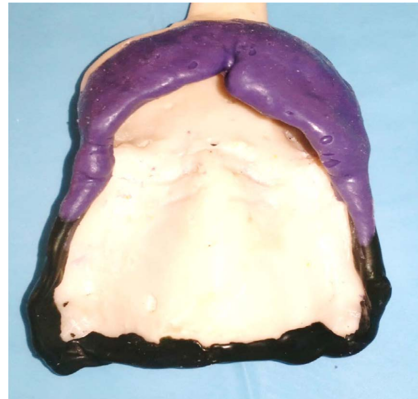

Figure 3. Anterior borders are defined with polyether.

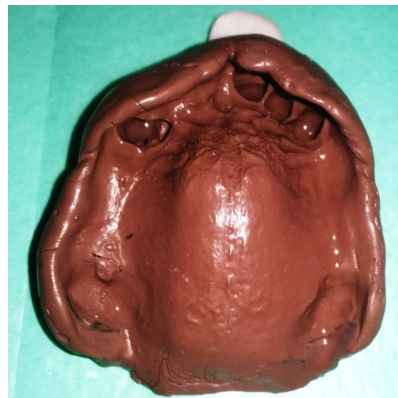

Figure 4. Central impression with polysulfide.

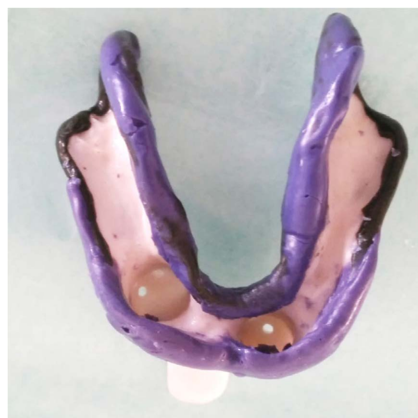

Figure 5. Borders are defined with polyether.

maintained (**Figure 7**). Enamel grinding on teeth 12 and 13 harmonized the occlusal plane (**Figure 8**). Given the absence of residual tooth mobility, the preservation of the incisal point, and the occlusal plane's position, the Fox plane was adjusted close to the maxillary central incisor edge without increasing the wax occlusion rims' height. The wax occlusion rims were further adjusted in the mouth to align parallel to Camper's plane and the bipupillary line in the frontal plane (**Figure 9**). Finally, the maxillary final cast was mounted on an articulator (**Figure 10**).

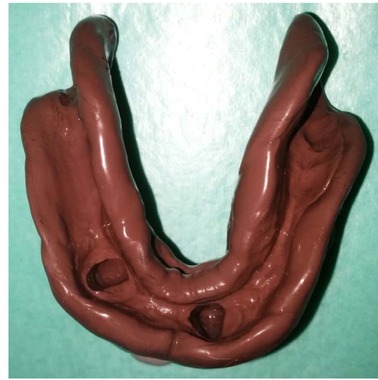

Figure 6. Central impression with polysulfide.

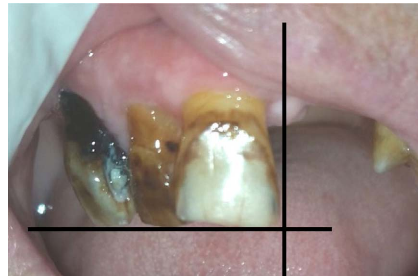

Figure 7. The interincisal point position was kept.

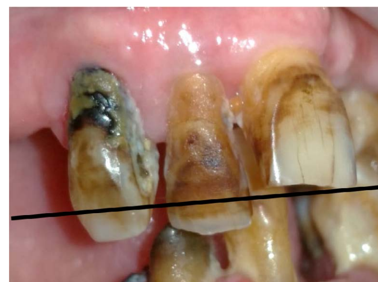

Figure 8. Occlusal plane harmonization.

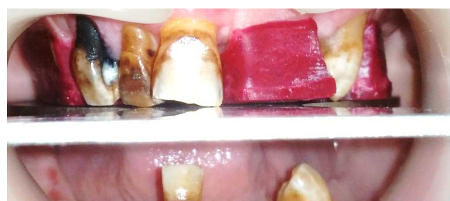

Figure 9. The wax occlusion rims adjusted in the mouth.

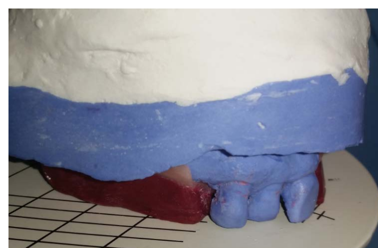

Figure 10. Maxillary final cast mounted on an articulator.

Maxillomandibular Relationship Records:

The occlusal vertical dimension (OVD) is determined according to the conventional complete denture protocol, ensuring no dento-dental contacts are present to avoid engaging proprioception, which could lead to slippage towards the patient's preferred occlusion.

Once both arches meet in a position of neuromuscular equilibrium, the Maxillomandibular relationship (MMR) is recorded using Kerr paste. The centric relationship is established by guiding the patient to place her tongue on the palate, pushing upwards and backward to encourage mandibular recoil.

This recording allowed the transfer of the mandibular final cast to the articulator, with the incisor pin set at zero, as no vertical recording dimension was utilized (**Figure 11**).

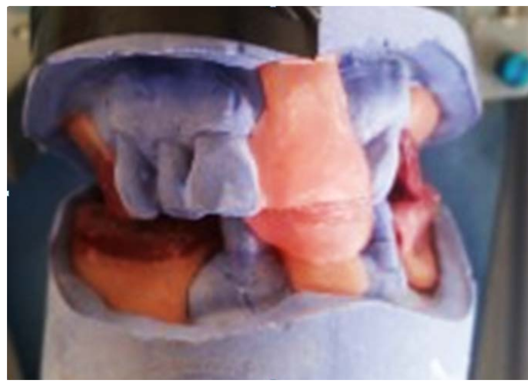

Figure 11. Maxillomandibular relationship records.

Teeth Selection:

Prosthetic teeth are selected based on the shape and size relative to the remaining teeth, with the color chosen to match the patient's hair, eyes, and skin tone.

Try-In of Posterior Teeth:

To achieve centric relation easily, the patient is asked to bite on two saliva-soaked swabs for two minutes, helping to mitigate habitual maximum intercuspation.

The OVD, static occlusion, and orientation of the occlusal plane are assessed, and the quality of intercuspation is compared with that observed on the articulator.

Aesthetic considerations such as tooth size, shape, and color are discussed with the patient.

Modification of the Final Cast:

Osteoplasty is performed opposite the canine cusps to create sufficient space for the aesthetic positioning of the anterior teeth. Initially, the remaining teeth are reduced to their collars using a handheld burr. Subsequently, the vestibular side of the ridge is reshaped with a burr to eliminate undercuts along the insertion axis of the future prosthesis. Finally, the treated area is rounded to remove any aggressive relief and carefully polished with sandpaper in decreasing grits (**Figure 12**).

Teeth are aligned according to the principles of complete dentures, aiming for a balanced occlusion.

After the final model is prepared by the dentist (not the prosthetist), the latter provides an initial setup that is evaluated for necessary revisions. The second setup, judged to be more aesthetic, is completed after a second adjustment of the final cast (Figure 13). The inability to perform an esthetic try-in in the patient's mouth poses a significant challenge in the fabrication of Immediate Complete dentures.

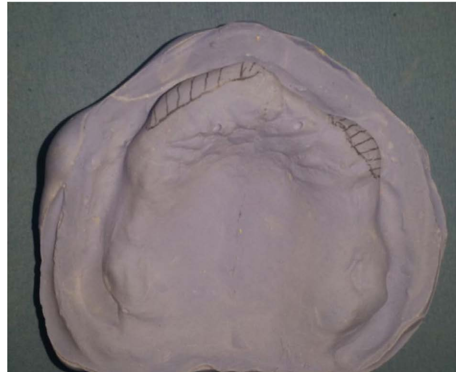

Figure 12. Modification of the final cast.

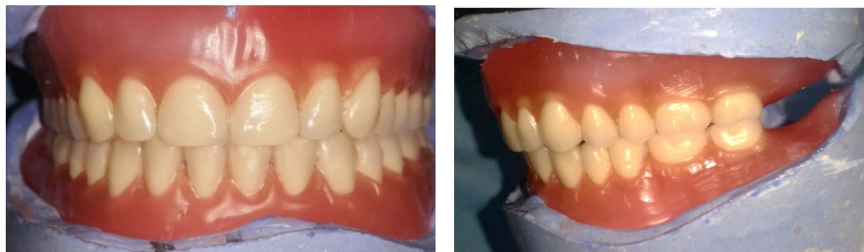

Figure 13. Mounting teeth.

Surgical Guide:

A surgical guide made of transparent resin is used to guide bone resection during surgery.

Surgical Procedure:

The surgical procedure involves the extraction of the remaining teeth (11-12-13-24-42-33). The edentulous ridge is then shaped according to the final cast, using the surgical guide. In the maxilla, a full-thickness flap is raised using a dissector, preserving the mucogingival junction recorded during the secondary impression.

The teeth are then extracted softly. Sockets are meticulously curetted, planned osteoplasty is performed, and the flap is repositioned to its original position with the surgical guide in place.

If mucosal blanching is observed in any area, indicating ischemia due to excessive compression, the underlying bone is resected using a bone bur until the guide reveals uniform mucosal whitening along its intrados (Figure 14). Mucosal edge

coaptation is verified through the transparent base, and any excess mucosa is trimmed with scissors.

Sutures are applied. The complete prosthesis is immediately placed with two saliva-soaked cotton rolls in between for approximately ten minutes to promote hemostasis and reduce postoperative edema (Figure 15 and Figure 16).

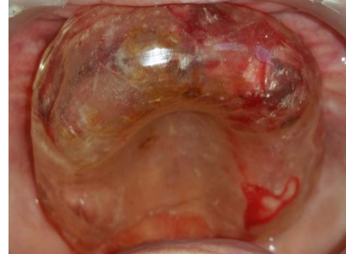

Figure 14. Surgical guide used for edge resection.

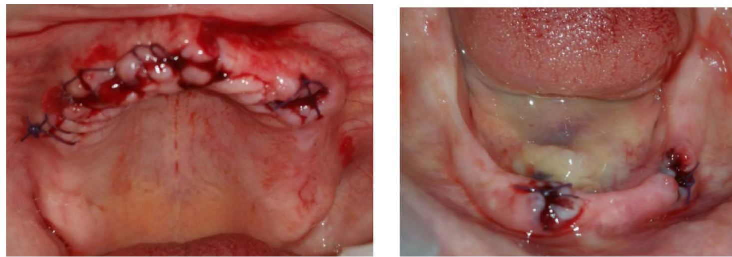

Figure 15. Sutures are applied after osteoplasty.

Figure 16. The complete denture is immediately placed in the mouth.

Immediate Occlusal Equilibration:

Any premature contacts are identified using thick articulating paper and corrected. Static occlusion is verified by ensuring symmetrical posterior contacts and eliminating anterior contacts. Retention and stability of the immediate complete denture are crucial to prevent postoperative complications.

The denture is removed after 48 hours. Examination of the extraction sites and occlusal-prosthetic equilibration are performed during this period.

4. Discussion

Our clinical case addresses the significant challenges associated with the transition to complete edentulism, particularly in patients requiring multiple extractions. The patient presented with longstanding uncompensated edentulism, exacerbated by severe periodontal disease and aesthetic concerns, which profoundly impacted

her quality of life.

Diabetes, known to worsen periodontal issues, further complicated her situation. This combination of systemic health challenges and significant oral health deterioration made traditional approaches to prosthetic rehabilitation more complex.

Successful fabrication of immediate complete dentures necessitates a strong psychological approach from clinicians, along with ongoing patient support during the transition from partial to complete edentulism [7]. Clearly communicating the advantages and limitations of immediate dentures is essential to mitigate potential failures and chronic complaints. By addressing patient concerns and expectations upfront, clinicians can foster a collaborative relationship that enhances adherence to post-operative care and follow-up appointments [8].

Pre-operative oral hygiene and tooth brushing are critical to reduce postoperative complications. Effective plaque control and healthy marginal tissue enhance the accuracy and quality of subsequent impressions [9].

Extracting posterior teeth before proceeding with prosthetic steps is recommended. Bilateral posterior edentulism provides a stable base for prosthetic support, facilitating healing in the anterior region following the extraction of incisors and canines [9]. Physiological crestal bone resorption occurs after tooth extraction, necessitating a waiting period to ensure stable bone support and firm mucosa at extraction sites.

Complete mucosal healing typically occurs within three weeks, with socket fill-in by mineralized tissue completed within three months [10].

There is variability in the recommended healing time before primary impressions can be taken, ranging from three to six weeks to allow for osteo-mucosal healing [8] [11] [12]. Primary impressions aim to accurately capture osteo-fibro-mucosal surfaces, tooth morphology, and vestibular floor positioning in physiological rest [9].

Alginate is preferred for primary impressions due to its low compressive strength and ability to deform during disinsertion to pass undercuts of remaining teeth.

Customized impression trays are tailored to accommodate the specific needs of fully removable prostheses, considering the buccal version of anterior teeth.

During maxillomandibular relationship registration, precise selection of the interincisal point is crucial for aesthetic success, serving as the reference from which prosthetic restoration is constructed [13].

When adjusting the occlusal plane, occlusal rims are typically set two millimeters higher than the residual dental arch to prevent contact with the Fox plane, ensuring a balance between mucosal and dental contact surfaces [9].

The presence of erupted teeth may require adjustments in the transfer plane position, compensated for on the articulator incisal pin. In our case, the egressions were corrected by grinding enamel, and the maxillary and mandibular casts were transferred without modifying the incisal pin after determining the occlusal vertical dimension (OVD) and recording centric relation (RC).

Preparation of casts includes consideration of anticipated surgery and alveolar resorption post-extraction, aligning with prosthetic and aesthetic requirements to avoid instability and occlusal imbalances [14].

For cases requiring minimal extraction and osteoplasty, a simple surgical guide resembling the prosthetic intaglio is suitable, ensuring precision in surgery [9].

The surgical guide ensures optimal adaptation of the immediate prosthesis, thus improving patient comfort. Post-operative pain is reduced, as is the need for prosthetic alterations [15]. Achieving aesthetic success with the prosthesis is pivotal for patient acceptance and integration.

5. Conclusions

Patients often face the challenging transition to complete edentulism when multiple extractions are required. Immediate complete dentures play a crucial role in preserving oral functions and alleviating the distress associated with tooth loss.

Achieving success with immediate complete prostheses necessitates skilled management of the complexities inherent in each clinical situation, including disruption of the occlusal plane, displacement of the incisal point due to tooth eruption, buccal positioning, and tooth mobility. A comprehensive understanding of these factors is essential for optimizing treatment outcomes and enhancing patient satisfaction.

Conflicts of Interest

The authors declare no conflicts of interest.

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