



A Full Mouth Rehabilitation Restoring Function And Aesthetics: A Case Report

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ABSTRACT

Background: This case report describes a middle-aged patient with pain in the right posterior mandibular molar and multiple missing teeth. The treatment plan involved a multidisciplinary approach, including periodontal therapy, non-surgical extraction, restorative and endodontic treatments, and then prosthetic rehabilitation.

Purpose: The treatment plan focused on achieving proper occlusion and improving the patient's aesthetic appearance.

Methodology: The treatment plan for the patient started with clinical and radiographic assessment, including panoramic and multiple periapical X-rays. Following the diagnosis, a comprehensive treatment plan was developed, which involved functional crown lengthening, several restorative procedures were performed. Additionally the placement of zirconia full-coverage restorations and porcelain-fused-to-metal fixed partial dentures.

Conclusion: An integrated treatment approach is essential for achieving optimal results in full-mouth rehabilitation. Effective treatment planning necessitates a thorough evaluation of the underlying causes, medical history, and factors related to the patient's oral health. Significant improvements were observed in both aesthetics and function.

KEYWORDS

Full Mouth Reconstruction, Minimal Invasive Approach, Restorative and Prosthetic Rehabilitation, Digital Technology.

1. Introduction

Oral rehabilitation is a term that broadly describes efforts to restore the functionality and aesthetics of a person's oral health. While it is often associated with the restoration of all the teeth in patient's mouth, it can also apply to situations where only damaged or problematic teeth are treated (1). The aim is to improve the patient's quality of life by achieving a harmonious balance between functionality and aesthetics (1).

Poor oral hygiene is a primary contributor to various oral health problems, including gingival and periodontal diseases, as well as tooth decay, all of which can significantly impact an individual's quality of life (2,3,4). Among these conditions, dental caries is a common chronic infectious disease with a multifactorial nature. It develops when cariogenic bacteria adhere to the tooth surface and metabolize dietary sugars, producing acids that gradually demineralize the tooth structure and may eventually lead to tooth loss (2). The severity of dental caries and the patient's oral hygiene practices both play a critical role in determining disease progression and prognosis.

Comprehensive rehabilitation of a mouth with multiple carious lesions can greatly improve a patient's quality of life. The success of treatment relies heavily on selecting the appropriate restorations for both decayed teeth and those teeth that have undergone endodontic therapy (5,6).

The multidisciplinary approach involves a thorough examination, diagnostic mounting, and a step-by-step planning process (5). The combination of adhesive cementation, advanced ceramic materials, and computer-aided design/computer-assisted manufacture (CAD/CAM) technology offers a reliable method for full-mouth rehabilitation. The digital workflow has proven to enhance clinical efficiency by reducing impression time, increasing patient satisfaction, and improving time management. However, the outcomes vary depending on the time required for adjustments (7,8,9).

This case report describes the use of digital technology in full-mouth reconstruction for a patient with significant oral health issues. Oral health was compromised by tooth loss, decay, and smoking. Preventing recurrence requires addressing lifestyle and socioeconomic factors. (10).

CASE BACKGROUND

A 27-year-old male patient sought treatment at the outpatient clinic of the Arab Academy for Science, Technology, and Maritime Transport, College of Dentistry, presenting with pain in the

right mandibular third molar and missing teeth. The patient works and lives in El-Alamein, Egypt. The medical history revealed no significant illnesses; his dental history included previous amalgam restorations at tooth number. #36 #47.

EXTRA-ORAL EXAMINATION

The extra-oral examination revealed facial symmetry, absence of palpable lymph nodes, and normal mandibular movement. The frontal view displayed balanced facial thirds with parallel horizontal and vertical lines. The lateral view showed a slightly convex profile and a normal nasolabial angle within the range of 165–175 degrees. According to the E-line concept, the upper lip was positioned 4 mm behind the line, and the lower lip was 2 mm behind the line. The oblique profile revealed no midface deformities, though prominent nasolabial folds were noted (Fig. 1).

All extra- and intra-oral photographs were taken using a mobile phone camera with an external professional twin light, utilizing retractors and mirrors for assistance.

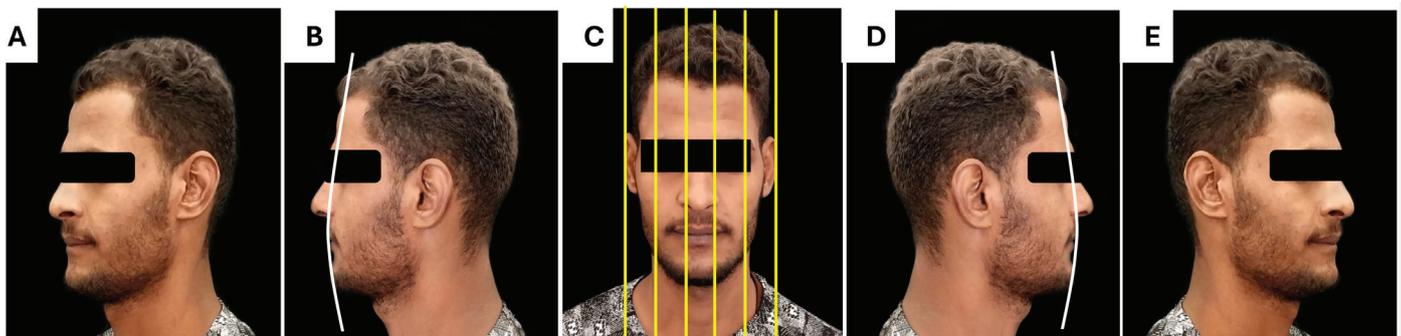


Figure 1: Extra-oral Examination Photographs.

(A): Left oblique view (B): Left lateral view. (C): Frontal view. (D): Right lateral view. (E): Right oblique view.

INTRA-ORAL EXAMINATION

The frontal view revealed generalized marginal redness with rolled margins, blunt interdental papillae, generalized marginal softness and edema, thick scalloped biotype, and matt surface texture. Brown staining was evident, alongside mild fluorosis as categorized by Dean's fluorosis index (3).

The occlusal view revealed a U-shaped arch with notable findings, including multiple remaining roots (#15 and #46) and several edentulous spaces.

The periodontal examination revealed the highest probing depth of 5 mm and a clinical attachment loss of 4 mm in tooth #34 and tooth #38, which exhibited grade I mobility (Fig. 2).

Radiographic analysis, including panoramic and periapical X-rays, demonstrated horizontal bone loss associated with the mandibular anterior teeth and premolars. Additional findings included angular bone loss related to tooth #27, as well as periapical radiolucency at tooth #35 (Fig. 3).

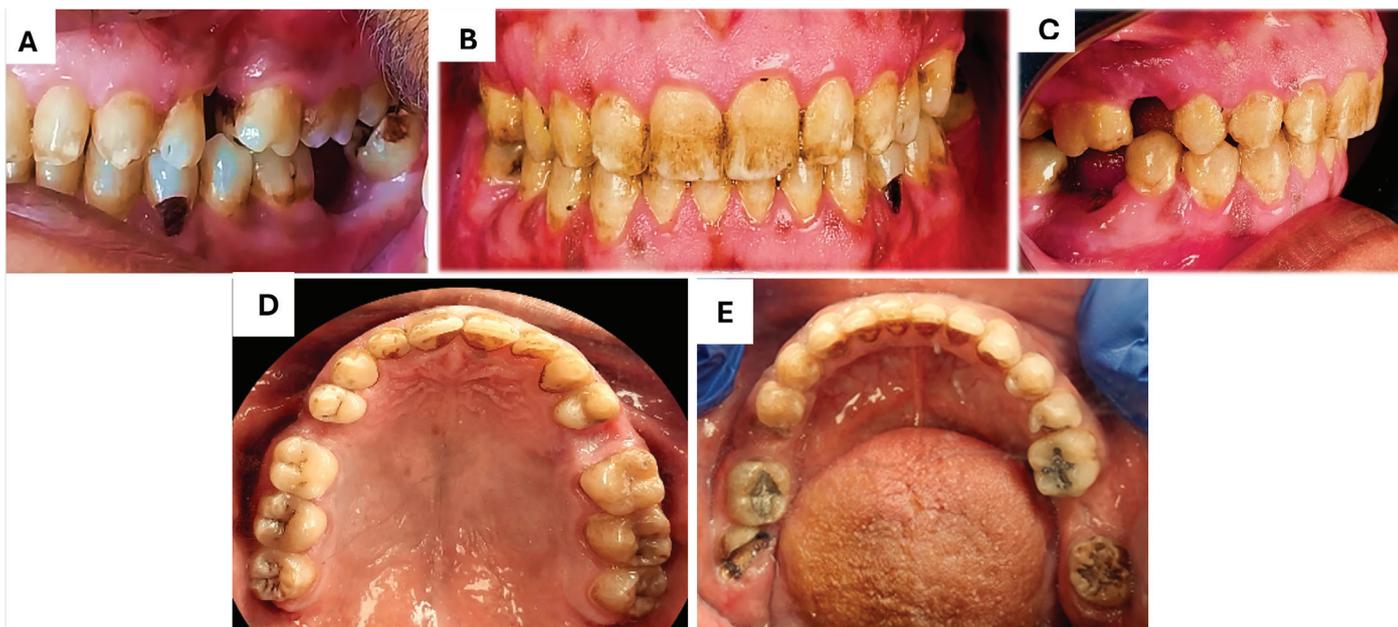


Figure 2: Intra-oral Examination Photographs.

(A): Left lateral view. **(B):** Frontal view. **(C):** Right lateral view. **(D):** Maxillary occlusal view. **(E):** Mandibular occlusal view.



Figure 3: Panoramic x-ray showing: Horizontal bone loss related to mandibular anterior teeth and premolars, angular bone loss at #27, and periapical radiolucency at #35.

2. Diagnosis and Analysis

The periodontal diagnosis was generalized periodontitis, classified as stage II, grade C, with smoking identified as the grade modifier. A generalized bleeding score of 39% was found. Based on these findings, the overall prognosis was determined to be fair.

The endodontic evaluation of tooth #35 indicated a non-vital pulp, accompanied by a periapical lesion. The restorative assessment, based on G.V. Black's classification, identified carious lesions as follows: Class I in teeth #17, #27, #28, and #38; Class II in teeth #14, #16, #24, #26, and #45; and Class V in tooth #34. Additionally, recurrent caries with defective amalgam restorations were noted in tooth #36.

The prosthetic evaluation identified multiple missing teeth (#15, #25, and #46) requiring replacement. A comprehensive case analysis included a caries risk assessment using the DMF and DMFS indices, which revealed a DMFT score of 18 and a DMFS score of 24. According to CAMBRA analysis, the caries index was determined to be +8, indicating a high risk of caries. All dental and periodontal charting data were systematically documented using digital software (Derec, Switzerland). Primary impressions were made for both arches, and the casts were then mounted on a mean-value articulator. The case analysis was carried out using the diagnostic casts, panoramic X-ray, and several periapical X-rays.

3. Clinical Management

Phase I: Stabilization Phase:

Objective: Control infection, inflammation, and eliminate sources of pain or pathology.

1.1 Periodontal Therapy:

Non-surgical periodontal therapy including both supra- and subgingival scaling and root planing using manual scalers (Sickle and Jacquette scalers) and universal curettes (2r-2l and 4r-4l) were performed. (Nordent, USA). Pocket irrigation with tetracycline, dissolved in saline, was performed to reduce inflammation (**Fig. 4**).

The patient was instructed to brush twice daily and use chlorhexidine mouth wash (Hexitol, Egypt) twice daily for one week. Oral hygiene practices were reinforced, and plaque levels were reassessed after two weeks.



Figure 4: (A): Preoperative photograph. (B), (C): After scaling and irrigation with tetracycline HCL.

1.2 Non-Surgical Extraction

Non-restorable teeth #48 and #18 were extracted using bayonet forceps (Medesy, Italy distributed by Henry Schein Dental). The remaining roots of teeth #15 and #46 were removed using a straight elevator (GDC, Germany – sourced via Al Mokawloon Dental Supply, Egypt). After a healing period of six weeks, the extraction sites for teeth #15 and #46 were fully healed and ready for the fabrication of a fixed partial denture.

Caries Control and Temporary Restorations

All deep caries in teeth #14, #16, #17, #26, #24, #27, #28, #34, and #38 were removed using ceramic burs (CeraBur, Germany) with a low-speed handpiece. For tooth #45, cavity preparation was carried out by using round diamond bur (KG Sorensen, Brazil) to remove all decay and temporization was performed using intermediate restorative material as RMGI (Fuji II LC, GC Corporation, Japan) (**Fig.5 & Fig.6**). The defective amalgam restoration in tooth #36 was sectioned using carbide burs.

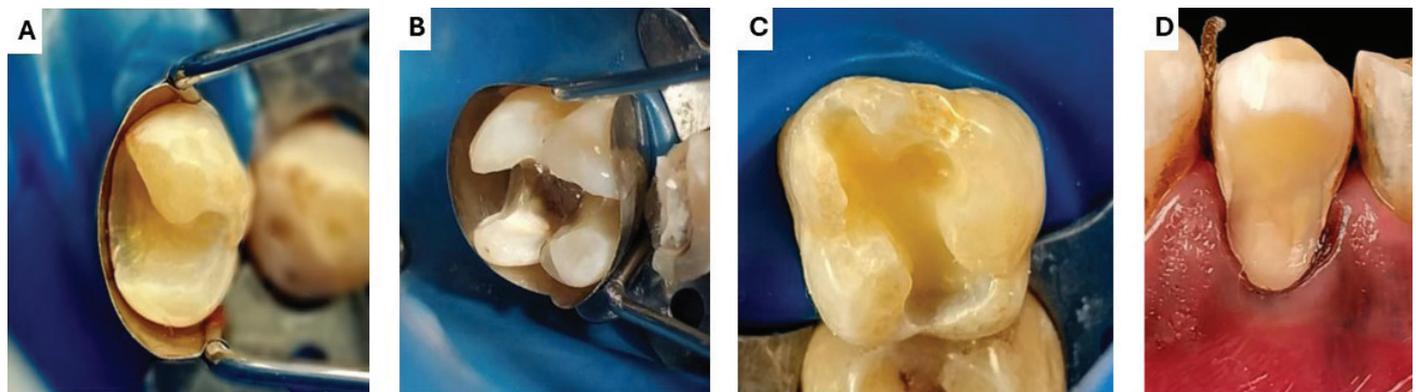
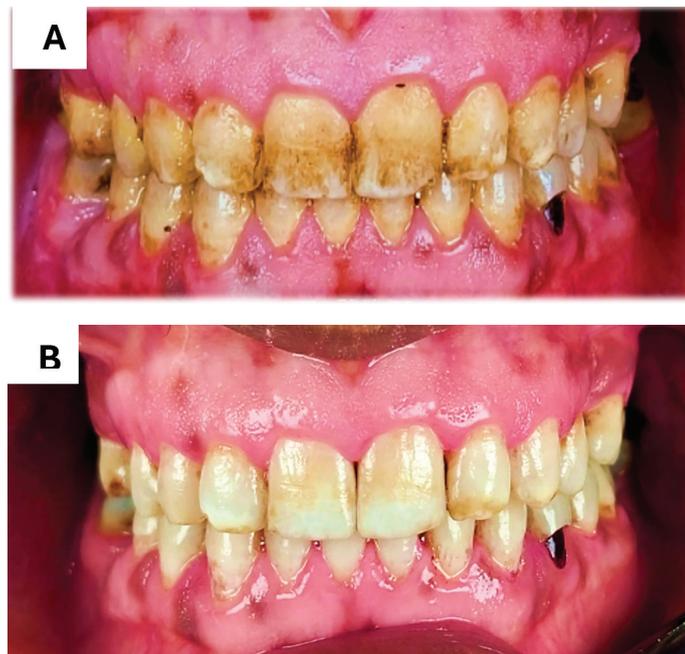


Figure 5: (A) Class II cavity preparation. (B) MOD cavity preparation. (C) class I cavity preparation. (D) class V cavity preparation

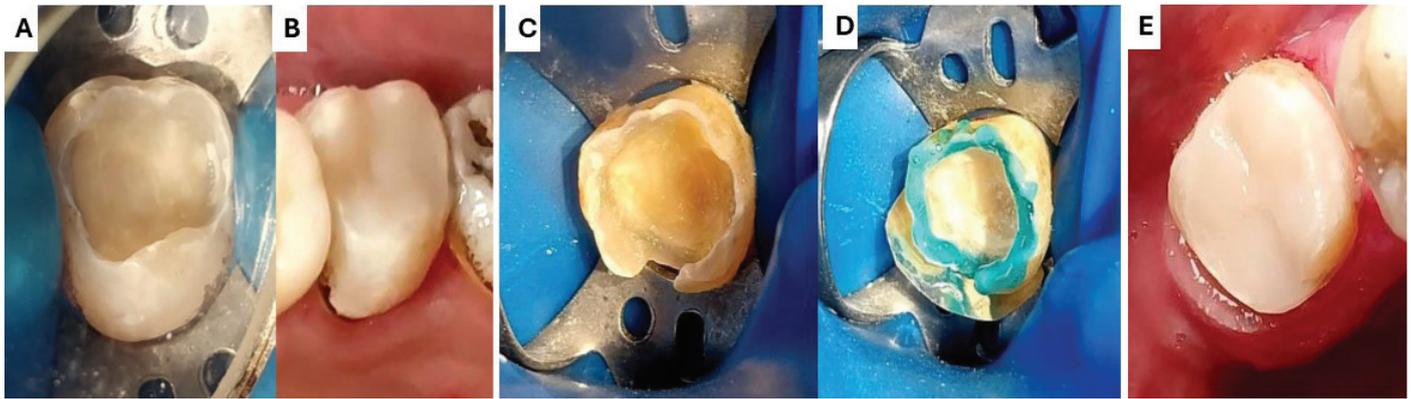


Figure 6 : (A), (C): Class I cavity preparations. (B), (E): final composite restorations. (D): selective etching technique

2. Phase II “Preparatory Phase”

Objective: Prepare the foundation for definitive treatment, including endodontic, surgical, and restorative build-up.

2.1 Endodontic treatment (Tooth #35).

This phase began with the endodontic treatment of tooth #35. The caries were removed, and an access opening was created using a rose head bur, safe-end burs, and an endo probe (DG16, Nordent) to scout the canals. The first step involved restoring the deep missing lingual wall using the ‘A Deep Margin Elevation Protocol.’ A circumferential stainless-steel matrix (TOR. VM, Russia) was placed around the tooth to seal the cervical margin. The deep margin was then elevated with a highly-filled flowable and condensable composite restoration. The initial file used was 15 mm, and the working length was determined to be 21.5 mm. The actual working length was confirmed both with an apex locator (Dpex V, Woodpecker, China) and radiographically via a periapical X-ray under complete isolation.

Using the crown-down technique with the ProTaper manual system, the irrigation protocol was performed with 2.5% sodium hypochlorite (Chorox, Egypt) for 5 minutes, delivered with a side-vented needle. This was followed by a 5-minute irrigation with 17% EDTA solution, saline, and a final irrigation using chlorhexidine (CHX). Master cones were verified using three techniques: clinical tactile sensation, the ‘true tag-back’ method, and radiographically. Obturation was completed using the cold lateral compaction technique with a resin sealer (Nexobio T SEAL, Korea) (**Fig. 7**).

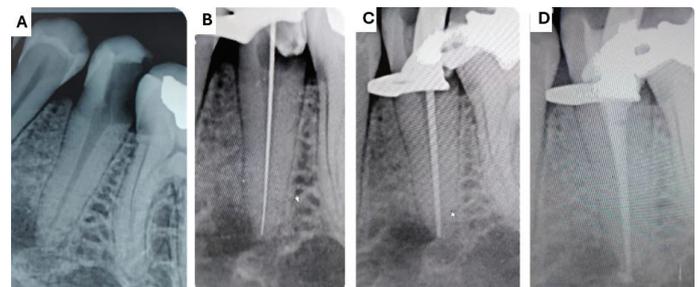


Figure 7 : (A): Preoperative X-ray. (B): working length. (C): Master cone.(D): Obturation.

2.2 Crown Lengthening Surgery

Functional crown lengthening at tooth no. 35 was performed following a rolling test, to confirm an adequate zone of attached gingiva. An internal bevel gingivectomy using a 15C blade was performed followed by a full thickness mucoperiosteal flap. Distal bone removal was carried out with a round surgical bur and copious irrigation. The procedure was completed with simple interrupted sutures. (**Fig.8**).

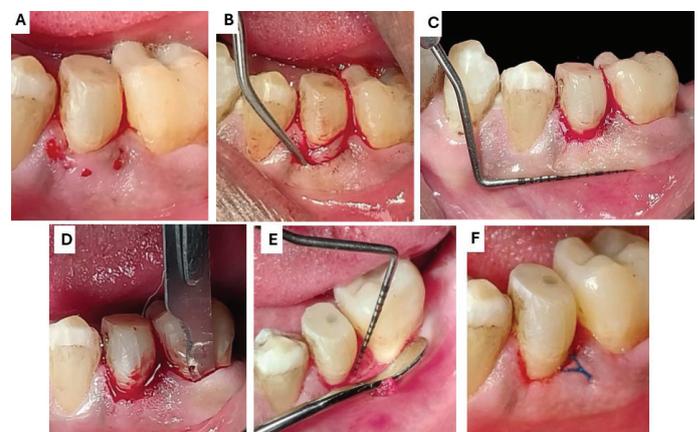


Figure 8 : (A): bleeding points. (B): removal of the gingival collar (C): keratinized tissue width. (D): full-thickness mucoperiosteal flap. (E): flap reflection. (F): simple interrupted sutures.

2.3 Post Placement and Core Build-Up

For tooth #35, a glass fiber post was placed following post space preparation using Gates-Glidden drills and Peeso reamers to select a post matching the final drill size of 25. The bonding technique was employed, and the post was cemented using dual-cure resin cement. Subsequently, the core was built up using a dual-cure core material (Core It Dual Yellow – Automix). (Fig.9)

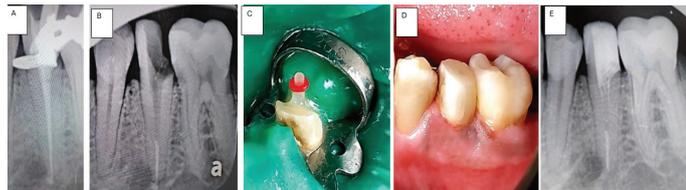


Figure 9: Glass fiber post following endodontically treated tooth #35
(A): Obturation. **(B):** post space preparation **(C):** post cementation
(D): core build up **(E):** x-ray shows post-cementation and core build up

Phase III "Definitive Phase"

Objective: Perform final restorations and esthetic and functional rehabilitation.

3.1 Final Composite Restorations

Completion of Class II, MOD, and Class V cavity preparations with composite restorations was performed under complete rubber dam isolation

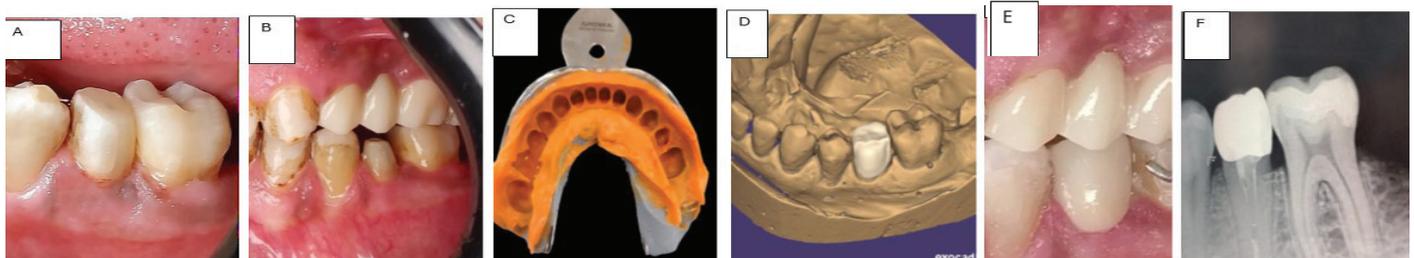


Figure 11: Zirconium Crown on #35.
(A): preoperative view **(B):** Lateral view showing adequate clearance. **(C):** Secondary impression.
(D): Digital design on "Exocad". **(E):** After milling. **(F):** Post-operative radiograph.

(Fig. 10).



Figure 10: Class II, MOD, and class V composite restorations

3.2 Fixed Prosthodontics

Zirconia FPDs and Crowns:

Impressions were obtained using the "putty and wash technique" with condensation silicone material (Zhermack, Italy). A digital workflow (Exocad, Germany) was employed for the design of the restorations, which included a three-unit fixed partial denture to restore teeth #14 and #16 for tooth #15, as well as teeth #24 and #26 for tooth #25. Additionally, teeth #45 and #47 were restored for tooth #46 using the CAD/CAM workflow. The design also incorporated a single crown for tooth #35 following endodontic treatment.

The zirconia crown was milled from VITA YZ-HT (Germany), and a zirconia cleanser (ZirClean, Bisco, USA) was used to enhance bonding strength and remove salivary contamination prior to cementation. The restoration was then cemented using dual-cure resin cement (Fig. 11).

The crown-to-root ratio of the zirconia fixed partial dentures was evaluated through periapical X-rays to examine the abutments' condition and the restoration's long-term stability. Prior to preparation, shade selection was made using the Vita shade guide (Germany). The abutments (#14, #16, #24, and #26) were

then prepared by reducing them to provide sufficient space for the zirconia fixed partial denture, with an occlusal reduction of 2 mm.

The axial reduction was 1.5 mm, with a deep chamfer finish line, ensuring sufficient space at the cervical region. (Fig. 12 & 13).

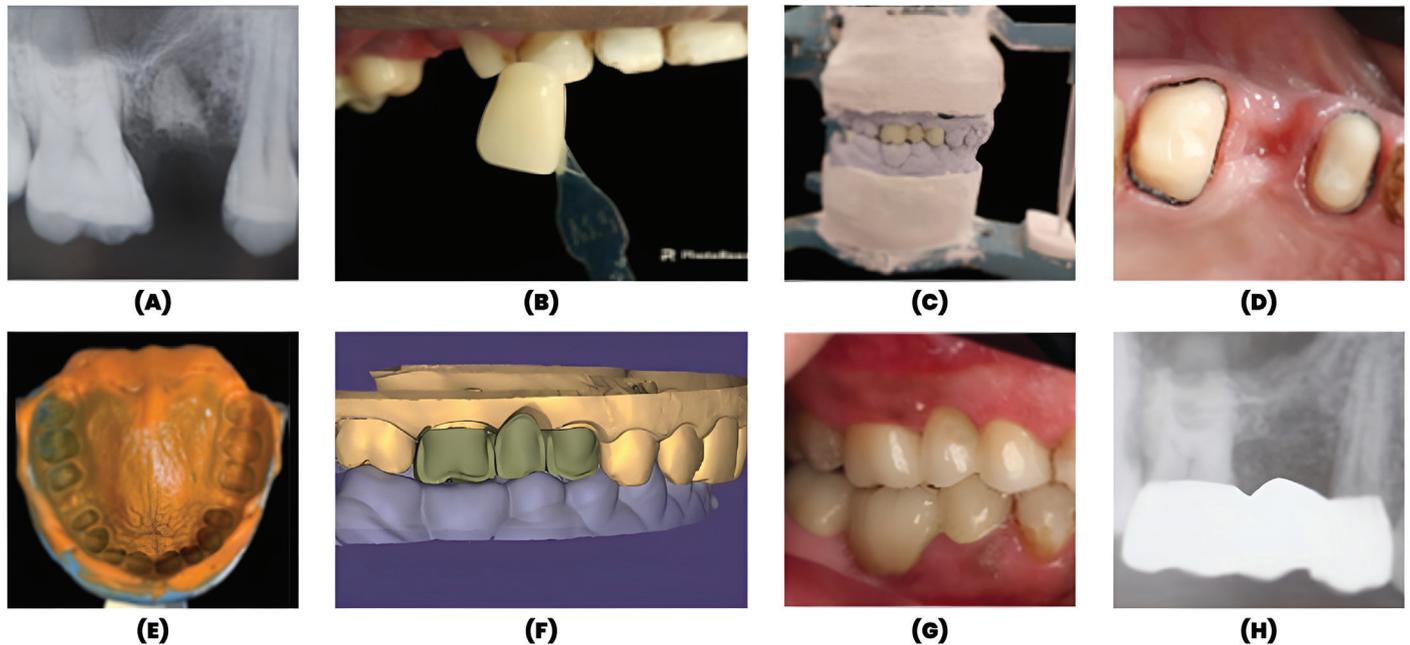


Figure 12: Zirconium Fixed Partial Denture on #14 and #16 to restore #15.

(A): Periapical radiograph. (B): Shade selection.

(C): provisional PMMA FPD. (D): Abutments preparation. (E): Secondary impression. (F): Digital design on "Exocad.

(G): Cementation. (H): Postoperative radiograph.

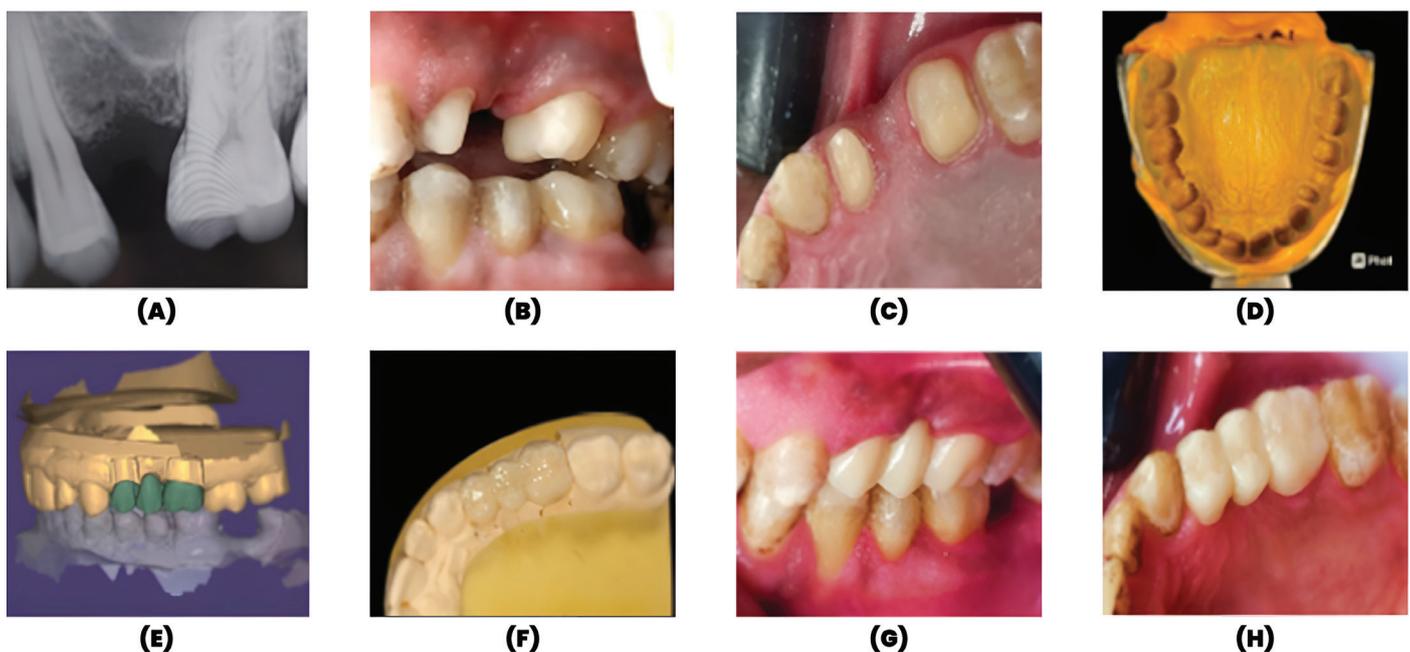


Figure 13: Zirconium Fixed Partial Denture on #24 and #26 to restore #25.

Porcelain-Fused-to-Metal FPDs:

For a porcelain-fused-to-metal (PFM) fixed partial denture, the clinical procedure began with precise occlusal and axial reduction. The occlusal reduction was carefully performed to achieve a uniform clearance of approximately 1.5 mm, ensuring adequate space for the metal and porcelain layers while preserving the structural integrity of the tooth. Following tooth preparation, metal frameworks were fabricated to fit the prepared teeth accurately. These frameworks were then tried intraorally to verify proper fit,

marginal adaptation, and occlusal alignment. Once confirmed, the frameworks were veneered with porcelain to achieve optimal esthetics and functional contours. Subsequent occlusal adjustments were made to ensure proper articulation and minimize any potential occlusal interferences. Finally, detailed post-operative instructions were provided to the patient, emphasizing oral hygiene practices and the importance of regular follow-up appointments to maintain the longevity and functionality of the prosthesis. (Fig. 14).

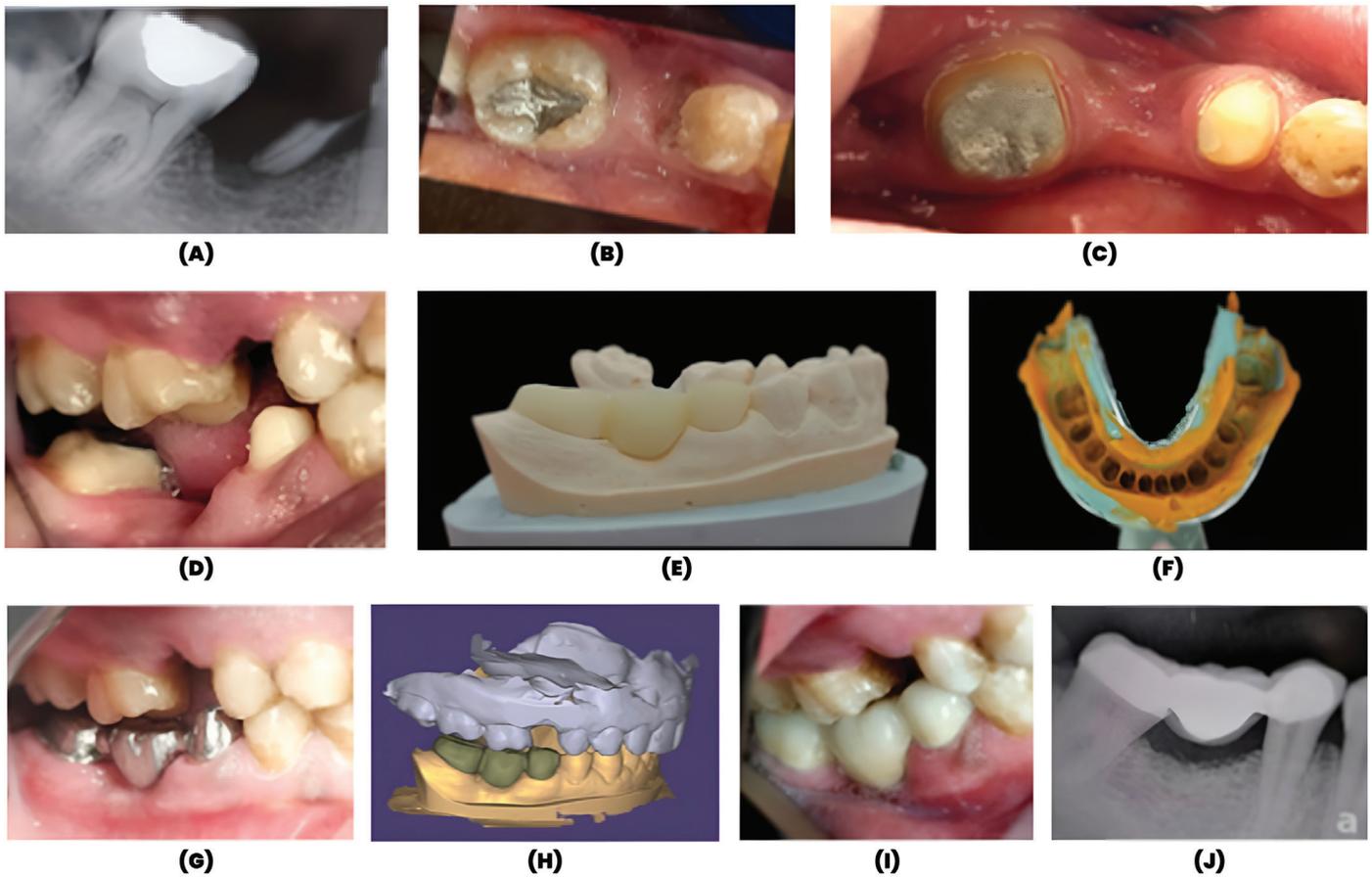


Figure 14: Porcelain Fused to Metal Fixed Partial Denture on teeth #45 and #47 to restore #46.

3.3 Removable Partial Denture (RPD)

Acrylic RPD was fabricated to restore single tooth #37 and to act as space preservation to prevent over eruption of the opposing second molar and further drifting of adjacent teeth. (Fig.15)

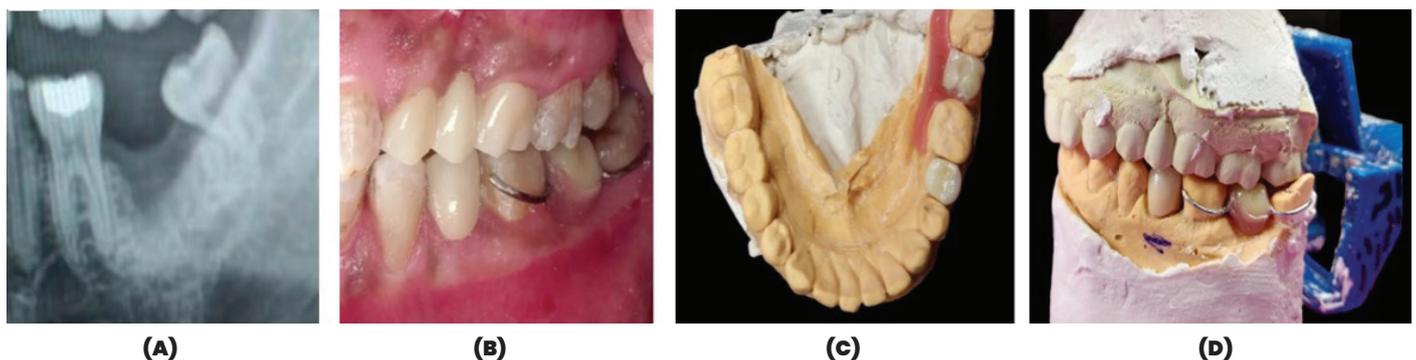


Figure 15: Acrylic RPD for restoring tooth #37

Phase IV “Maintenance Phase”

The patient was advised to use dental floss or alternative interdental aids, such as interdental brushes or water flossers, to improve interproximal cleansing and reduce plaque accumulation (4). They were instructed to rinse twice daily for one minute with a 0.12% chlorhexidine gluconate mouthwash for one week and on the recall visits mouth wash will be re-instructed (11). Additionally, dietary modifications were recommended to lower the consumption of high-carbohydrate foods, aiming to reduce the substrate available for cariogenic bacteria (2).

4. Results

Post-treatment evaluation revealed a significant reduction in the measurements of probing depth; teeth that underwent endodontic therapy and restorations showed no evidence of periapical pathology or mobility. The functional and aesthetic results of the rehabilitation were positive, with proper marginal adaptation. The patient reported improved chewing efficiency, leading to enhanced self-esteem and overall satisfaction. In the patient’s words, he regained his confidence and the ability to smile again. Three weeks postoperatively, regular follow-up appointments were scheduled for clinical and radiographic assessments, which indicated a high success rate. (Fig. 16).

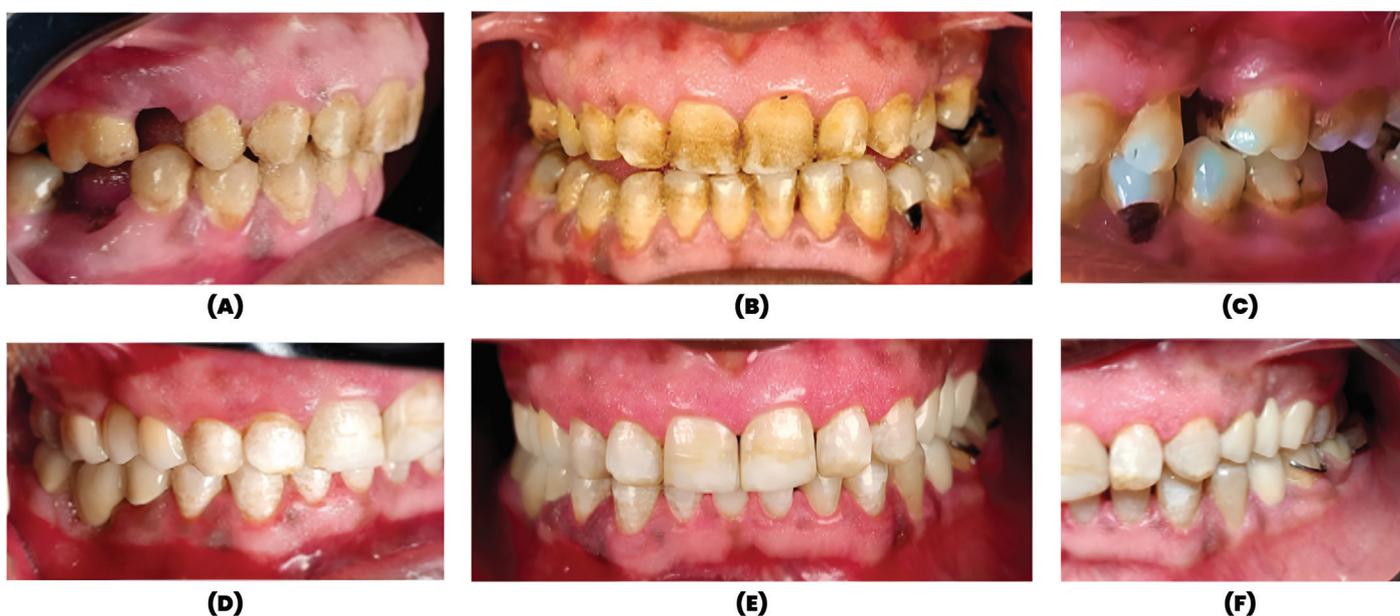


Figure 16 : (A): pre-operative right lateral view (B): pre-operative frontal view (C): pre-operative left lateral view (D): post-operative right lateral view (E): post-operative frontal view (F): post-operative left lateral view

5. Discussion

The successful outcome of this full-mouth rehabilitation emphasizes the importance of a holistic treatment approach. This collaborative effort addressed all aspects of the patient’s oral health, including disease management and functional and aesthetic restoration (5).

The patient’s chronic periodontitis posed a significant challenge. Non-surgical periodontal therapy was essential in stabilizing the condition, particularly with the use of tetracycline irrigation. The primary benefit of irrigating periodontal pockets with tetracycline-HCl lies in its localized concentration at the sites of disease activity.

Tetracycline effectively penetrates gingival crevicular fluid and soft tissues, providing an enhanced antibacterial effect compared to mechanical debridement alone (11).

Dental caries is a multifactorial lifestyle disease, where adherence to medical advice regarding nutrition, lifestyle, and oral hygiene is essential. It can impact overall health through various mechanisms, with tooth loss affecting masticatory function and leading to changes in food selection and nutrition (2). The patient presented with multiple missing teeth (#15, #25, #37, and #46) and extensive cavities in teeth (#14, #16, #17, #18, #24, #26, #27, #28, #35, #36, #38, #45, and #48), which posed significant

restorative challenges. Additionally, the patient's high caries index prompted the recommendation for full-coverage restorations as part of the treatment plan (5).

Endodontic treatments successfully preserved the remaining teeth, enabling them to function as reliable abutments for crowns, particularly tooth #35. The treatment demonstrated a high success rate, with no signs of periapical pathology, indicating initial success, and follow-up visits were scheduled to confirm the 100% success rate. Multi-visit endodontic therapy was performed on tooth #35 to ensure an aseptic condition and absence of symptoms prior to obturation, leading to better healing and fewer postoperative complications (5).

Regarding the final prosthetic restorations, zirconia was selected due to its superior mechanical properties among dental ceramics and its low bacterial adhesion, which is crucial for the longevity of the prosthesis (8). The deep chamfer finish line was chosen to enhance fracture resistance and promote even distribution of occlusal forces along the margin of the restoration (8).

The cementation procedure for zirconia restorations is influenced by the thickness of

the material, as it impacts light curing and the polymerization of dual-cure resin cements used beneath the restorations. A negative correlation exists between the thickness of the zirconia and the degree of polymerization, with thicker zirconia potentially reducing the effectiveness of the light cure and polymerization process (12).

6. Conclusion

Full-mouth rehabilitation is a multifaceted and challenging procedure that necessitates the careful integration of interdisciplinary principles to achieve both functional and aesthetic outcomes.

The treatment led to improved occlusal stability, enhanced masticatory efficiency, and a notable increase in the patient's self-confidence. The use of deep margin elevation, a conservative approach, effectively raised the cervical margin. Ongoing follow-ups and maintenance were emphasized to ensure long-term success. This case demonstrated a high success rate, with advanced restorative techniques leading to substantial improvements in the patient's oral health and quality of life. A well-rounded diagnostic evaluation and treatment plan are crucial for sustained success.

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