

Aesthetic rehabilitation of maxillary anterior teeth with high caries risk and poor oral hygiene: A case report

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Abstract

Introduction: Anterior teeth are key to smile aesthetics, requiring careful restorative planning. Success depends on dentist-patient-lab collaboration and precise case selection. Smile harmony involves tooth color, shape, texture, gingival contour, and facial alignment. Caries, caused by bacterial acid demineralization, often prompts esthetic treatment. Tools like Digital Smile Design (DSD) enhance predictability and teamwork, addressing high-caries-risk cases with poor oral hygiene.

Description of Case: A 28-year-old female patient presented with multiple carious lesions and esthetic concerns in the maxillary anterior region. She reported poor oral hygiene habits, a high-frequency snacking routine, and an upcoming wedding as motivation for treatment. Clinical and radiographic evaluations revealed extensive caries, a non-vital tooth and esthetic discrepancies including discoloration, misalignment, and gingival asymmetry. A comprehensive treatment plan was implemented, involving periodontal therapy, root canal treatment, and full-coverage lithium disilicate crowns guided by digital smile design.

Discussion: Managing complex anterior esthetic cases with high caries risk and poor hygiene requires a multidisciplinary approach. Behavioral factors worsened the condition, necessitating restorative, endodontic, and periodontal treatment. The use of digital smile design helped in planning and achieving optimal esthetic outcomes. Lithium disilicate crowns were selected for their superior esthetics and strength, providing long-term functional and cosmetic benefits.

Conclusion: This case highlights that successful esthetic rehabilitation depends on accurate diagnosis, motivated patient involvement, and coordinated multidisciplinary treatment. The approach effectively restored both dental function and appearance, greatly improving the patient's smile and self-confidence.

Keywords: Aesthetic Rehabilitation; Digital Smile Design; Multidisciplinary Dentistry; Complex Dental Restoration

1. Introduction

Dental caries is one of the most prevalent global health problems, particularly affecting individuals with poor oral hygiene and unhealthy dietary patterns. It is a progressive condition marked by the localized destruction of tooth structure due to organic acids produced by cariogenic bacteria [1,2]. In this case, the patient's frequent consumption of sugary snacks, along with irregular oral hygiene practices, contributed to the progression of carious lesions and gingival inflammation.

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Poor oral hygiene and frequent consumption of sugary foods are major causes of tooth decay and gum disease. Without proper cleaning, plaque and tartar build up, allowing bacteria to grow. These bacteria produce acids that damage the tooth enamel and cause gum inflammation, which can lead to more serious problems if not treated. Other factors, like low motivation to care for teeth, changes in saliva, and constant plaque buildup, can make the condition worse. Regular and proper oral hygiene is essential to reduce bacteria, protect teeth, and maintain good oral health over time [3,4].

The diagnostic process begins with collecting patient information through inquiry, examination, observation, and diagnostic testing. These methods provide a comprehensive view of the patient's condition, forming the foundation for an accurate diagnosis. Clinical findings are generally categorized into signs identified through examination and symptoms, which are patient-reported issues such as pain, swelling, bleeding gums, or aesthetic concerns [5].

In aesthetic rehabilitation, treatment must balance preserving tooth structure with restoring natural form, function, and appearance. Caries management involves examination, diagnosis, risk assessment, and a personalized plan. When anterior teeth are involved, aesthetics is as important as disease control. Restorative decisions depend on prognosis, caries activity, and tissue loss. Success relies on selecting materials and techniques that ensure durability and a natural look through proper shade, translucency, texture, and contour [6,7].

2. Description of Case

A 28-year-old female patient presented to the Airlangga Dental Hospital with a chief complaint of poor aesthetic appearance of the upper anterior teeth, including multiple cavities, misalignment, and discoloration. The patient expressed a desire for aesthetic rehabilitation in preparation for her upcoming wedding. Her dental history revealed previous composite restorations and an unfinished root canal treatment on tooth 11. She reported no history of spontaneous pain but admitted to long-term poor oral hygiene habits, frequent snacking, and a prolonged bottle-feeding habit during childhood.

Clinical examination showed carious lesions of varying depths on teeth 13, 12, 11, 21, 22, and 23, with white spot lesions, discoloration, and a rotated tooth 13. Tooth 11 was diagnosed as non-vital with asymptomatic apical periodontitis, while the remaining anterior teeth responded positively to vitality tests. Radiographic examination supported clinical findings, revealing caries penetrating to dentin or pulp space in multiple teeth, with evidence of previous restorations and periapical involvement in tooth 11.

Extraoral and smile analyses demonstrated a symmetrical facial midline and average smile line. However, micro-aesthetic analysis identified discrepancies in tooth proportions, gingival zenith asymmetry, inappropriate interproximal contact areas, and old restorations with discoloration. The gingival condition showed signs of inflammation, and the patient was classified as high risk for caries based on salivary pH and oral hygiene index.



Figure 1 Clinical photo before treatment

Radiographic examination showed no abnormalities in teeth 13 and 23, though tooth 13 appeared misaligned. Tooth 12 exhibited deep Class III mesial caries without periapical involvement. Tooth 11 showed a temporary restoration reaching the pulp and apical periodontal space widening, suggesting profound Class IV caries with possible perforation. Tooth 21 had a mesial restoration with radiolucent margins, indicating secondary caries of moderate depth. Tooth 22 showed moderate to deep Class III mesial caries without periapical changes.

Facial analysis revealed balanced vertical proportions with equal distribution among the trichion–glabella, glabella–subnasal, and subnasal–menton thirds. The patient presented with a round facial shape, and the facial midline aligned with the dental midline. A facial profile angle of 183° indicated a concave profile. Upon smiling, the maxillary incisal plane followed the contour of the lower lip, and the patient exhibited an average smile line.

Dental analysis showed a central incisor width-to-height ratio of 85% for tooth 21, with unfavorable axial inclinations—teeth 12, 11, and 21 inclined distally, 22 upright, and 23 slightly mesially. Discoloration due to caries and white spot lesions was present on teeth 13 to 23, and an old composite restoration on tooth 12 showed discoloration. Contact points and incisal embrasures were suboptimal.

Gingival analysis revealed erythematous margins, enlarged interdental papillae, and asymmetric gingival zeniths and margin heights, particularly between teeth 11 and 21, 12 and 22, and 13 and 23.

Space analysis showed a symmetrical intercanine width of 42 mm, with no midline shift and proportional distribution of mesiodistal tooth widths. Based on facial references, the ideal width and height for central incisors were calculated at 8.5 mm and 10.5 mm, respectively, consistent with the patient's actual tooth dimensions. Tooth size design followed the golden proportion (C: Lateral: Central = 0.617: 1: 1.618), with frontal widths of 3.7 mm (13/23), 5.6 mm (12/22), and 8.5 mm (11/21). The height-to-width ratio of 75–80% confirmed esthetic suitability without altering the intercanine arch width.



Figure 2 Digital smile design according to ideal sizes

The proposed treatment included scaling and root planing, followed by gingivectomy and gingivoplasty for soft tissue management. Root canal treatment was performed on tooth 11 and intentionally on tooth 13, using a crown-down pressureless preparation and single cone obturation with bioceramic sealer. Tooth 11 received a fiber post, core build-up, and crown, while lithium disilicate crowns were placed on teeth 13, 12, 21, 22, and 23. The prognosis was good, supported by adequate tissue resistance, no harmful habits, and a highly motivated, cooperative patient.

The initial visit included comprehensive anamnesis, clinical and radiographic examinations, diagnosis formulation, oral hygiene instruction, informed consent, photographic documentation, and impression-taking using irreversible hydrocolloid for study model fabrication. Digital smile design was conducted to aid esthetic planning. On the second visit, scaling and root planing were performed to reduce inflammation, followed by caries risk assessment and shade selection (VITA 3D Master, 2M2).

At the third appointment, composite restorations were placed on teeth 12, 11, and 22 using a layering technique, after caries excavation, dentin lining ($\text{Ca}(\text{OH})_2$), etching, bonding, and rubber dam isolation.

By the fourth visit, periodontal evaluation revealed altered gingival contours; probing and bone sounding confirmed the need for periodontal crown lengthening. Gingivectomy and gingivoplasty were performed by a periodontist.



Figure 3 Condition of gingiva after crown lengthening

The fifth visit involved endodontic treatment on teeth 11 and 13. Root canals were prepared using the ProTaper Gold system with a crown-down pressureless technique and obturated using a single cone method with bioceramic sealer. A fiber post was placed in tooth 11 during the sixth visit, followed by core build-up with dual-cure composite.

On the seventh visit, composite restoration of the access cavity was completed, and lithium disilicate crown preparation was carried out on teeth 13-23 based on a 3D digital wax-up. Immediate dentin sealing was also performed, and impressions were taken with polyvinyl siloxane.



Figure 4 Preparation result

During the eighth visit, try-in of the non-glazed crowns was conducted to assess fit, occlusion, and esthetics. The ninth visit included the final try-in with shade confirmation and surface pretreatment of both the crowns (hydrofluoric acid and silane) and abutment teeth (pumice, self-etch adhesive). Crowns were adhesively cemented using dual-cure resin cement under rubber dam isolation. In the final appointment, intraoral evaluation confirmed the integrity of all restorations, healthy gingival margins, and patient satisfaction with esthetic outcomes. The patient was asymptomatic throughout all visits and exhibited high compliance and oral hygiene motivation.

One week after the previous appointment, the patient returned for follow-up. The patient reported no complaints. Extraoral examination revealed no abnormalities, and intraoral examination showed that the lithium disilicate crowns on teeth 13, 12, 11, 21, 22, and 23 were in good condition. The surrounding gingival tissue appeared healthy, and percussion tests were negative.



Figure 5 Clinical photo after treatment

3. Discussion

The aesthetic and functional rehabilitation of the anterior maxilla presents both technical and psychological challenges, especially in patients with caries, discolored restorations, and altered gingival architecture. In the present case, a comprehensive, multidisciplinary approach was adopted that included periodontal management, endodontic therapy, and definitive restoration using lithium disilicate crowns. This aligns with established clinical protocols that emphasize diagnostic precision, minimally invasive techniques, and high esthetic demands.

A critical tool in this process was Digital Smile Design (DSD), which played an essential role in treatment planning and communication. By utilizing photographs and digital analysis software, the DSD process allowed for a detailed assessment of facial proportions, tooth display, gingival levels, and smile symmetry. This method not only enhanced clinician confidence in achieving predictable outcomes but also significantly improved patient understanding and acceptance of the proposed treatment. Incorporating smile design in anterior esthetic cases enables a conservative, functionally sound plan that respects facial harmony and mimics natural tooth morphology. In this case, DSD guided mock-up fabrication, margin placement, and crown design, ensuring the final result matched both functional and esthetic expectations [8].

The decision to use lithium disilicate ceramic for the definitive restorations was driven by its superior mechanical strength, translucency, and biocompatibility. Its proven performance in the anterior zone, especially when bonded adhesively, has been well-documented and supports long-term esthetic stability [9]. Moreover, the use of fiber posts and dual-cure core build-ups provided a reliable foundation for crown retention and load distribution in endodontically treated teeth.

As highlighted in the study by Singh and Jain (2024), dental caries and poor anterior aesthetics have a direct, statistically significant impact on adolescents' psychosocial well-being, self-esteem, and daily function. In our case, the patient demonstrated high motivation to undergo complete rehabilitation and expressed satisfaction with the post-treatment esthetic result, illustrating the strong correlation between smile enhancement and improved quality of life [10].

In summary, this case demonstrates the value of integrating DSD, minimally invasive techniques, and high-performance ceramic materials in achieving a successful aesthetic and functional outcome. A multidisciplinary and patient-centered approach, supported by digital planning tools, ensures precise execution and enhances both clinical results and patient satisfaction.

4. Conclusion

This case highlights that successful esthetic rehabilitation depends on accurate diagnosis, motivated patient involvement, and coordinated multidisciplinary treatment. The use of Digital Smile Design and lithium disilicate crowns enabled a conservative and predictable approach that restored both function and esthetics. The treatment significantly improved the patient's smile and self-confidence, demonstrating the impact of a well-planned and patient-centered approach to anterior dental rehabilitation.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this document.

Statement of informed consent

Informed consent was obtained from patient included in the study.

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