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DISCOVERY
SCIENTIFIC SOCIETY

Aesthetic management of young patients with adverse social habits

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ABSTRACT

Khat chewing and excessive soft drink user habits are destructive habits for hard tissue, especially the enamel and dentine layers. This case report showed a patient with destructive social habits. The first was a khat chewer, and the second one was a soft drink user. Both of them had been practicing these habits for more than 7 years. They were both treated with multi-layer CAD/CAM zircon restorations. Both cases showed excellent aesthetic satisfaction during the follow-up visits, which resulted in self-happiness, self-esteem, and confidence.

Keywords: Aesthetic, zirconia, khat, soft drinks, social habits

1. INTRODUCTION

Facial attractiveness is one of the components that determine the overall attractiveness of an individual. Among the components of the face, the eyes and the mouth have been found to be the major determinants of attraction. In the mouth, the teeth (their color, shape, size, and arrangement) play a major role in defining the attractiveness of a smile. A beautiful smile is said to be determined by the overall attractiveness of an individual's teeth (Ren et al., 2021; Qualtrough and Burke, 1994). Many factors contribute to teeth discoloration such as khat chewing, Shamma use, and intake of beverages and sugar tablets can lead to cervical discoloration and staining in both enamel and dentine, resulting in attrition and cervical caries at the chewing side (El-Wajeh and Thornhill, 2009). Khat (also qat; *Catha edulis*) chewing is a popular habit in many regions, especially in Jazan Province, Saudi Arabia. People often chew khat for more than 5 h daily because of its amphetamine-like effects. Khat chewing is associated with discoloration of the teeth (Al-Alimi et al., 2018; Masoud et al., 2016).

Another factor determining the beauty of a smile is the appearance of gingival tissue around the teeth, which is essential in the aesthetics of the anterior maxillary region of the oral cavity. Abnormalities in symmetry and contour can significantly compromise the appearance of the natural or restored dentition (Huang et al., 2023). Therefore, crown lengthening

procedure (CLP) is commonly used to maintain the dentogingival complex in optimal conditions, correct aesthetic defects through a smile design and increase retention of the restoration (Rosenstiel et al., 2022). Utilizing digital workflows eases the advancement of ceramics such as zirconia, which is one of the highly promising oxide ceramics for full crowns due to its high resistance to cohesive fractures (Ramos et al., 2015). Different studies demonstrated the ability of all-ceramic and zirconia crowns to maintain and minimize the discoloration of the prostheses over a period of time in the presence of social habits such as chewing khat and using smokeless tobacco (Al-Moaleem et al., 2020; Al-Moaleem et al., 2021; Al-Moaleem et al., 2022).

Excessive tooth discoloration due to social habits, defect of clinical crowns, or an overly prominent display of the gingiva can be significant aesthetic issues that can be emotionally distressing for many individuals. Dentists need to comprehend the diverse causes, accurately diagnose the issue, and develop an aesthetic treatment plan with clinically predictable outcomes to ensure the success of both CLP and aesthetic restoration. This case reports describes the clinical use of CAD/CAM multilayer zirconia prostheses to restore aesthetics and function for two young adult patients with multiple teeth discoloration associated with poor social habits such as smoking, chewing khat, and drinking soda.

2. CASE DESCRIPTIONS

The technique demonstrated in these cases was advised by the supervisors for students in the Comprehensive Clinical Course, College of Dentistry, Jazan University, during the academic year of 2022–2023. Both cases were referred to this course for treatment. They were medically fit. Their periodontal findings showed poor oral hygiene and generalized gingival inflammation, and they never brushed their teeth nor used any type of oral hygiene aids. Patients had a Class I canine and molar relationship, as well as anterior guidance with contact in excursive movements. The treatment plan followed the phases suggested by Rosenstiel et al., (2022), and it was explained to the patients.

Case # 1

A single 25-year-old male patient was referred and presented to clinics. He has been chewing khat chewing while smoking for more than 10 years, as well as using Shamma for 5 years. His chief complaint was "I want to fix my broken teeth and I want to improve my smile". The history of his chief complaint started several months ago. He underwent a previous RCT and composite restorations 12 months ago. His extraoral findings revealed a symmetrical and normal appearance. The intraoral soft tissue color, tongue, teeth relations, and other structures were normal. All teeth were discolored, with many remaining roots and carious teeth (Figure 1). Almost all posterior teeth in both arches were badly destructed, and caries extended to the bifurcation area. The full-mouth periapical radiographs of teeth confirmed the clinical findings as carious teeth extended to the CEJ, and several composite fillings and RCT in relation to tooth #44 (Figure 2). On the same visit, alginate impressions of both arches were obtained with bite registration and face bow transfer.

During the next appointment, and after data interpretations, the treatment options were discussed with the patient. He agreed with the proposed treatment in the form of extraction of the remaining teeth and replacement of missing teeth by all-ceramic crowns, fixed prostheses for maxillary teeth, and transitional denture for the mandibular arch or implant replacement of missing teeth #37, #46, and #47. At Phase I, the treatments started with scaling and root planning, local anesthesia, and extraction of all the remaining roots and hapless teeth at different appointments. At Phase II, isolation with a rubber dam was conducted for the teeth that needed RCT, followed by GFP and cores for the needed teeth. Finally, all teeth needing composite restorations were treated (Figure 3).

The patient was appointed after 3 weeks to carry out Phase III for the prosthetic treatments. The teeth preparations were accomplished following the guidelines and principles for tooth preparation of full ceramic restoration, followed by two-step maxillary and mandibular final impression with additional silicon (Virtual, Ivoclar Vivadent, Lichtenstein) via a retraction cord technique. Shade selection was carried out using a 3D-Master shade guide. Full coverage crowns and bridges for both arches were fabricated by monolithic zirconia multi-shade CAD/CAM materials Ceramill Zolid PS zirconia ECs (Amann Girrbach, North America, Charlotte, USA). The following steps were followed during the cementation of the crowns. The fitting surfaces of the restorations were treated with 9.5% hydrofluoric acid (IPS Ceramic Etching Gel, Ivoclar Vivadent, Germany), rinsed, and dried. Subsequently, a silane coupling agent (Silane, Ultradent, South Jordan, Utah, USA) was applied to this surface for 60 s and air-dried.

Figure 1 Different preoperative views

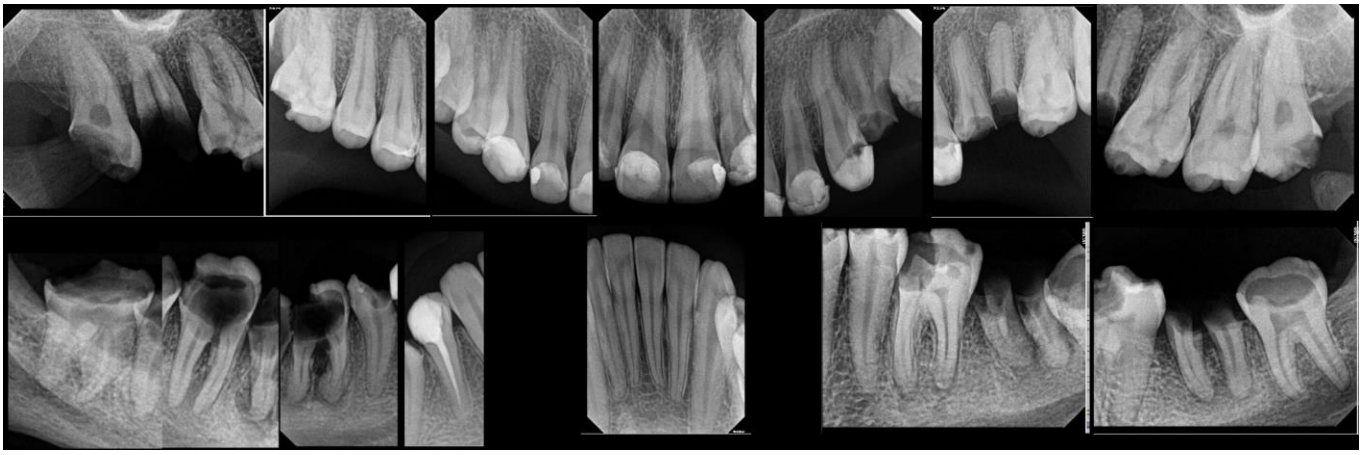

Figure 2 preoperative periapical radiographical views

The preparations were treated with a total-etch technique using 35% phosphoric acid for 90 s, rinsed, and dried. A bonding agent system Adper Prompt L-Pop (3M ESPE, St. Paul, MN, USA) in the form of a self-etching adhesive system was applied to the preparations for 20 s and air-thinned. A dual-cure resin cement, Unicem ApliCap Resin Cement (3M ESPE, Germany), was then applied to the intaglio surface of each restoration. Excess resin cement was separated and removed, and the restorations were entirely light-cured on each accessible side. All steps of zirconia restorations were carried out following the manufacturer's instructions (Figure 4). A mandibular transitional denture was constructed and inserted into the patient's mouth to prevent drifting and overeruption and ensure occlusal stability, and it will be replaced by a dental implant later on. At Phase IV, the patient was recalled after 3 and 6 months for clinical follow-up. The patient functioned well and was satisfied with the aesthetics and well-being of this treatment.

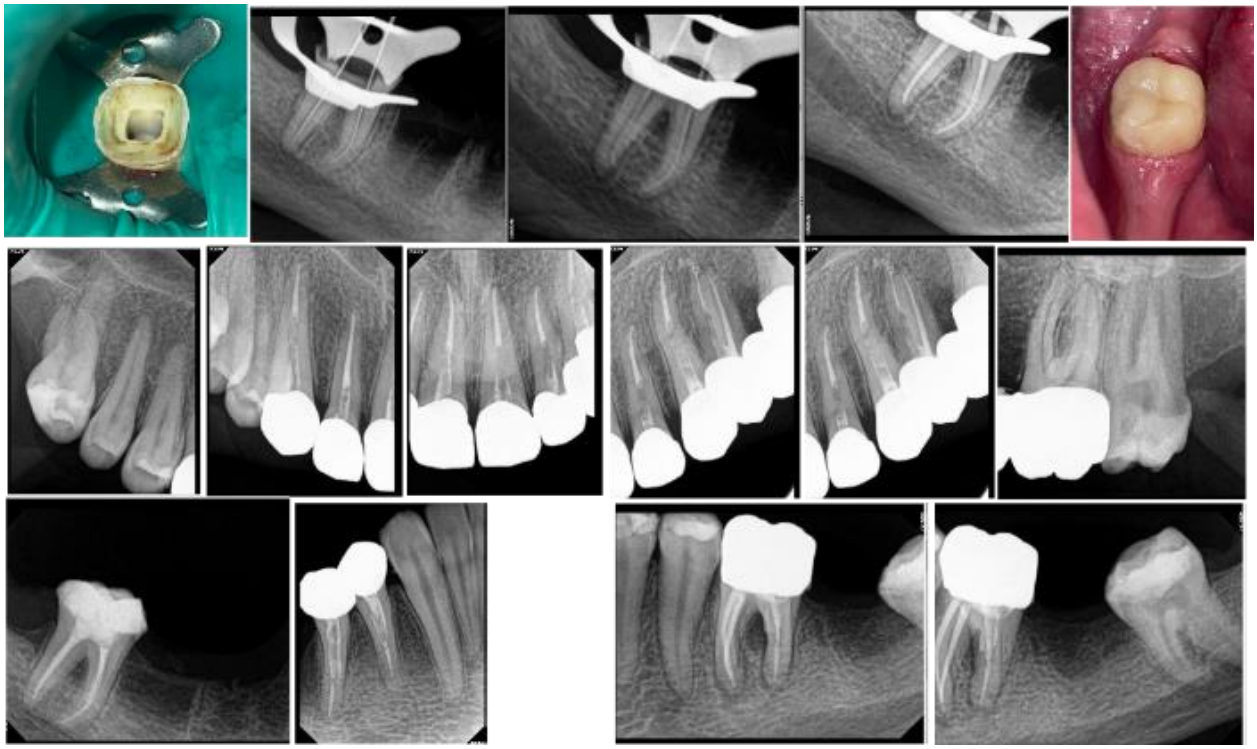

Figure 3 During RCT, composite and after cementation of zirconia restorations

Figure 4 different postoperative views

Case # 2

A 29-year-old Saudi male patient was referred to comprehensive care clinics for a prosthodontic assessment and treatment. His adverse social habit was that he was a heavy soft drink user. His chief complaint was "I have small upper frontal teeth with space between them and I want to correct them". He had undergone dental extractions before at different time periods, as well as a single composite restoration in the maxillary arch. The patient did not use any type of oral hygiene aids. The extra- and intraoral examinations showed healthy tissues and facial symmetry. In addition, generalized erosion was detected in both arches in the

incisal and occlusal surfaces of both arches. Teeth #22 and #24 were missing, and tooth #14 had caries (Figure 5). The panoramic view showed carious teeth of all third molars and carious teeth #14, #12, #11, and #22 with a preapical pathosis and remaining root in relation to tooth #24 (Figure 6). At this appointment, alginate impressions and face bow with bite registration were obtained and then mounted using a semi-adjustable articulator.

Figure 5 Different preoperative views

The treatment objectives were developed using information obtained from a review of dental histories and radiographic, diagnostic, and clinical findings. These treatment options were proposed and discussed with the patient. Following a review of all treatment options, objectives, and limitations, a maxillary prosthesis in the form of crowns or bridges was approved by the patient after CLP of the teeth at the anterior region extended between the right and left first premolars. At Phase I, the treatments started with scaling and root planning, and extraction of all the remaining roots and hopeless teeth at separate appointments was performed.

At Phase II, after the extraction sites healed, we conducted RCT of tooth #14 and composite restoration to the carious teeth. Surgical crown lengthening was carried out after waxing of maxillary anterior teeth and designing the needed bone removal and future finishing line (2 mm shorter than the pre-surgery crowns). Duplication of the cast was conducted and waxed up. This new wax-up duplicated cast was used for surgical guide construction. Finally, CLP was carried out under local anesthesia (Figure 7). After surgery, a periodontal pack was used over the surgical site, and post-surgical instructions were given to the patient.

Figure 6 preoperative panoramic view

Figure 7 during crown lengthening

After 6 weeks from surgery, Phase III began. The teeth preparation, provisional restorations, final impression, zirconia core try-in, shade selection, and cementation steps were conducted as in the previous case. Figures 8 and 9 show the postoperative view of the patient. The patient received a soft, thin night guard for the maxillary arch, and it was to be used at night for 3 months. At Phase IV, the patient was recalled after 3 and 6 months for clinical follow-up. The patient functioned well and was satisfied with the aesthetics and well-being of this treatment. In addition, he reduced the number of soft drinks that he drank daily.

Figure 8 different postoperative views after cementation of zirconia restorations

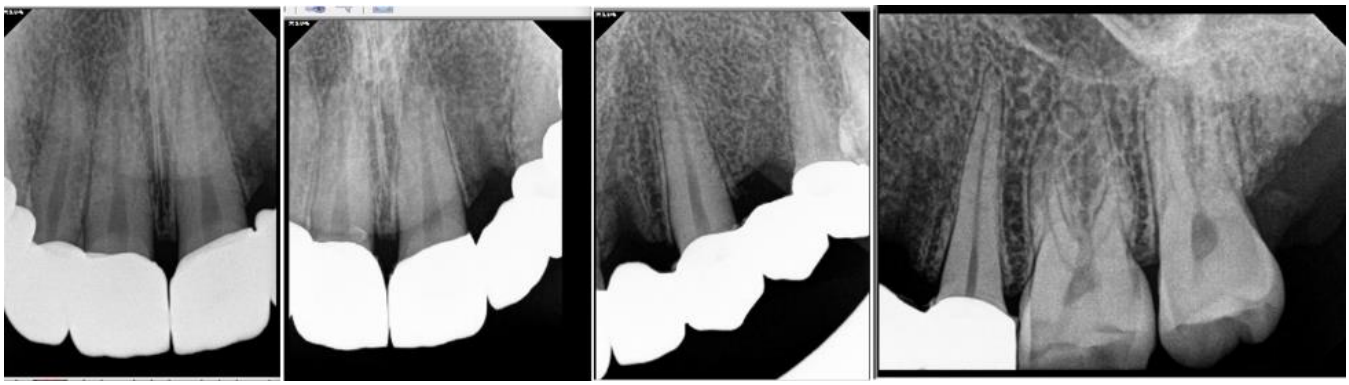

Figure 9 different postoperative periapical x-rays after cementation of zirconia restorations

3. DISCUSSION

The maxillary anterior is an important aesthetic zone of the oral cavity and has a significant impact on the patient's appearance, mental health, and social life (Huang et al., 2023; Wang et al., 2022). The benefits of CAD/CAM zirconia ceramic prostheses include a natural, tooth-like translucency, excellent biological compatibility when in direct contact with oral tissues and the periodontium, and a wear pattern that closely resembles tooth enamel (Choi et al., 2019). This case report describes the clinical use of a CAD/CAM zirconia material to restore aesthetics and function for two young adult patients with multiple teeth discoloration associated with bad social habits, such as smoking with khat chewing and consuming soft drink beverages.

As a result of their outstanding mechanical characteristics, including superior flexural strength and fracture toughness, when compared with other all-ceramic materials, zirconia-based restorations are a viable restorative option for anterior and posterior teeth (Hakami et al., 2021). In their clinical study, Al-Moaleem et al., (2016) found that the performance of anterior maxillary teeth (in the aesthetic zone) restored with CAD/CAM zirconia crowns is equal or higher in survival rate compared with other ceramic materials tested over the recall period. The prosthesis's capacity to resist staining is a vital clinical requirement for ensuring fracture resistance and other mechanical properties (Acar et al., 2016; Al-Moaleem et al., 2021). Over time, insufficient color stability and staining may necessitate a dentist to consider restoring the restoration.

The color stability of any prosthesis is influenced by intrinsic factors associated with aging, as well as extrinsic factors such as surface staining from dietary habits, plaque accumulation, surface staining absorption, and effects of degradation agents (Al-Moaleem et al., 2020; Al-Moaleem et al., 2021). The two patients reported bad oral hygiene associated with frequent consumption of beverage, khat chewing, and Shammah use. Al-Moaleem et al., (2020) noted that khat chewing has a notable effect on the bacterial diversity within oral biofilms, leading to an increase in discoloration and staining (Al-Moaleem et al., 2020). In another study on dental restorations, he also observed that multilayer zirconia has the lowest mean color change among either khat chewers or smokeless tobacco users (Al-Moaleem et al., 2020). For these reasons, multilayer zirconia prostheses are a suitable substitution for patients with teeth discoloration associated with khat chewing and smoking, as well as smokeless tobacco chewing.

The ultimate goal of CLP is to provide adequate crown dimensions for a stable dentogingival complex and for placement of restorative margins, thereby achieving the best marginal seal and an aesthetically pleasing final restoration (Cabunac et al., 2023; De-Oliveira et al., 2015). Surgical guides are often utilized to achieve adequate aesthetic results; on the basis of diagnostic waxing, they are made with acrylic resin or vacuum transparent shells or 3D prints (Alhumaidan et al., 2020; Amato et al., 2013). Surgical guides with diagnostic wax-up are commonly created as a point of reference for CLPs, particularly in cases involving anterior teeth. Diagnostic waxing is necessary for anticipating the future crown length and serves as a guide for soft tissue incision and the freehand osteotomy process (Cabunac et al., 2023). In the second case, crown lengthening with bone reduction was the treatment of choice to maintain the periodontal health and postoperative aesthetics of the patient.

Full completion of wound healing must be ensured following CLP, as any interference in this process may result in unfavorable outcomes (Dawadi et al., 2021). In this study, we waited 6 weeks after the surgery to facilitate full healing of the wound prior to the final crown preparation and insertion. The results demonstrated favorable treatment efficiency. In relation to case #1, during recall, some difficulties in performance of the posts of teeth #24, #25, and #36 were reported due to the anatomy of the roots and presence of curvature at the middle of roots. However, during follow-up, no further complications were raised or noticed either radiographically or clinically. Moreover, the patient started practicing daily oral care using different oral hygiene aids. For case #2, the patient reported a reduction in the intake of number of soft drinks.

This practice demonstrated the importance of motivation of patients during appointments toward practicing good oral hygiene and avoiding harmful social habits. The clinical significance of the treatment of these cases is masking teeth discoloration with biocompatible zirconia crowns, resulting in a boosted self-esteem and improved social communication. Moreover, the smile line and the degree of arrangements during smiling and speaking were in union with each other. The treatment of the patients with adverse social habits that caused teeth discoloration with zirconia crowns resulted in good aesthetic and functional outcomes.

4. CONCLUSION

The utilization of multilayer zirconia crowns in the presented cases proved to be a highly effective and aesthetically pleasing solution for the management of teeth discoloration due to certain adverse social habits. The positive outcome not only restored the natural color of the teeth but also illustrated the durability and cosmetic benefits of zirconia crowns. This work reinforces the growing confidence in the multilayer zirconia crowns as a reliable option for achieving functional and cosmetic success in restorative dentistry, highlighting their role in enhancing patient satisfaction and overall oral health.

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Author Contributions

All authors were contributed by treating the patient, data collection and writing the full manuscript.

Informed consent

Written and Oral informed consent was obtained from the patients.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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