

## Case Report of a Young Patient with Zirconia Prosthesis to Create Facial Symmetry

Mohammed Saeed Al Dira<sup>1\*</sup>, Hajar Saeed Al Dira<sup>2</sup>

<sup>1</sup>Dental Intern, College of Dentistry, Jazan University, Jazan 45142, Saudi Arabia

<sup>2</sup>General Practitioner, Jazan, Saudi Arabia

DOI: <https://doi.org/10.36348/sjodr.2024.v09i08.003>

| Received: 19.06.2024 | Accepted: 23.07.2024 | Published: 07.08.2024

\*Corresponding author: Mohammed Saeed Al Dira

Dental Intern, College of Dentistry, Jazan University, Jazan 45142, Saudi Arabia

### Abstract

This report aimed to discuss aesthetic rehabilitation utilizing monolithic zirconia restorations to produce a homogeneous and pleasing smile in a patient with facial asymmetry. A patient had a previously failed root canal treatment RCT for maxillary anterior teeth, resulting in midline shift and slightly stained teeth, with many remaining roots causing functional and aesthetic concerns. The treatment plan involved monolithic computer-aided designed/computer-aided manufactured zirconia restorations to enhance his natural teeth appearance. Excellent aesthetic satisfaction was observed during the follow-up visits, resulting in self-happiness, self-esteem, and confidence.

**Keywords:** Zirconia, aesthetic, symmetry, maxilla, anterior teeth.

**Copyright © 2024 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

### INTRODUCTION

Nowadays, cosmetic demands are the first reason to visit a dental clinic [1]. Unrestored edentulous space and alveolar ridges may lead to several significant changes, such as facial asymmetry, impairment of biomechanics in the dentofacial system, and poor aesthetic, and negative effects on the general health and social behavior of the patient [2]. The appearance of gingival tissue around the teeth, which is essential in the aesthetics of the anterior maxillary region of the oral cavity, is a factor determining the beauty of a smile, and symmetry and contour can significantly compromise the appearance of the natural or restored dentition [3].

Fixed prostheses control oral disease while restoring aesthetics and function with durable, biocompatible restorations, such as teeth proportions, crown weight/length ratio, and gingival zenith play an important role in dental aesthetics [4, 5]. They produce an accurate marginal and internal fit, which is essentially required for the success and longevity of fixed dental prostheses [6].

Many options are available to replace missing teeth, and dental implants have become one of the most used biomaterials to replace one or more missing tooth over the last decades [7]. Monolithic zirconia prosthesis

is a material of choice to replace missing teeth due to patient's unwillingness to have a dental implant. The benefits of computer-aided designed/computer-aided manufactured (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 [8, 9].

Sonar *et al.*, 2024 found that using monolithic CAD/CAM zirconia restorations in the maxillary anterior region offers a potential method to accomplish functional and cosmetic goals. They have illustrated the benefits of zirconia such as biocompatibility, durability, and ability to resemble the esthetics of natural teeth [10]. Zirconia crowns have been successfully used to restore patient's smile, demonstrating its potential as an effective option for treating cosmetic issues in the anterior region [9, 11]. Zirconia is a useful material for obtaining the best results in anterior dental restorations, providing patients and dentists with a dependable strategy to improve smile aesthetics and restore function [9].

This case report describes the clinical use of full-coverage crowns and bridges for both arches, fabricated by multi-shade monolithic zirconia

CAD/CAM materials, to restore function and aesthetic for a young adult patient with multiple teeth missing and facial asymmetry.

### CASE REPORT

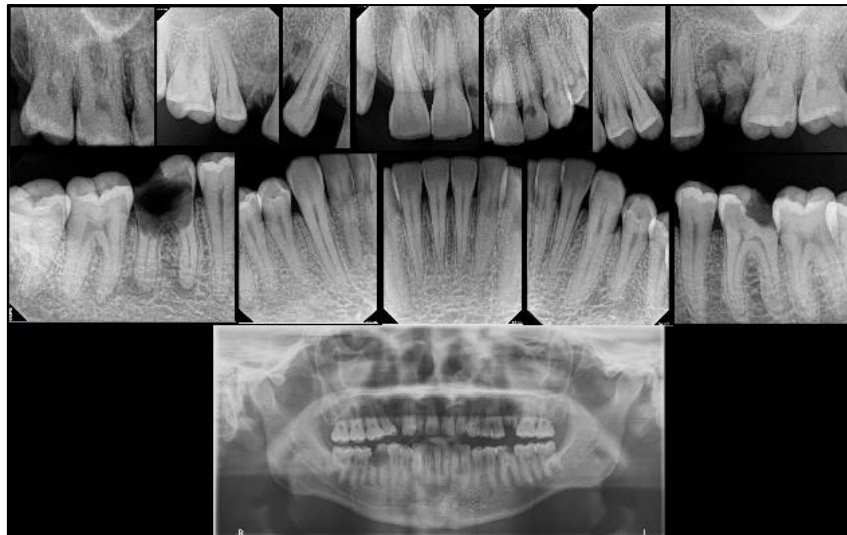
The steps in this case were advised by the supervisors for students in the Comprehensive Clinical Course, College of Dentistry, Jazan University, during the academic year of 2023–2024. This case was referred from the examination and diagnostic department to this course for treatment. The patient was a 29-year-old single male patient. He was medically fit. His periodontal findings showed good oral hygiene and generalized gingival inflammation. He used a toothbrush once a week, and he did not use any type of oral hygiene aids.

His chief complaint was “I want to replace missing teeth, especially the upper frontal teeth and I

want to recover my smile.” His chief complaint started several years ago. He underwent RCT and restorations several months ago, and the procedures failed. Extraoral findings revealed a symmetrical and normal appearance. The intraoral soft tissue color, tongue, tooth relations, and other structures were normal. All teeth were slightly stained, with teeth #s 14, 12, and 26 clean and teeth #s 16, 21, 37, 36, 46, and 47 carious (Figures 1 A and B). Almost all anterior and posterior teeth in both arches had edge-to-edge relation, with slight shifting of the central midline (Figures 1C–E). Full-mouth periapical and panorama radiographs of the teeth confirmed the clinical findings of the remaining roots of teeth #s 14, 25, and 46 and carious tooth #36 extending to the pulp (Figure 2). On the same visit, alginate impressions of both arches were obtained with bite registration and face bow transfer. The treatment plan followed the phases suggested by Rosenstiel *et al.*, 2022, and it was explained to the patients [12].



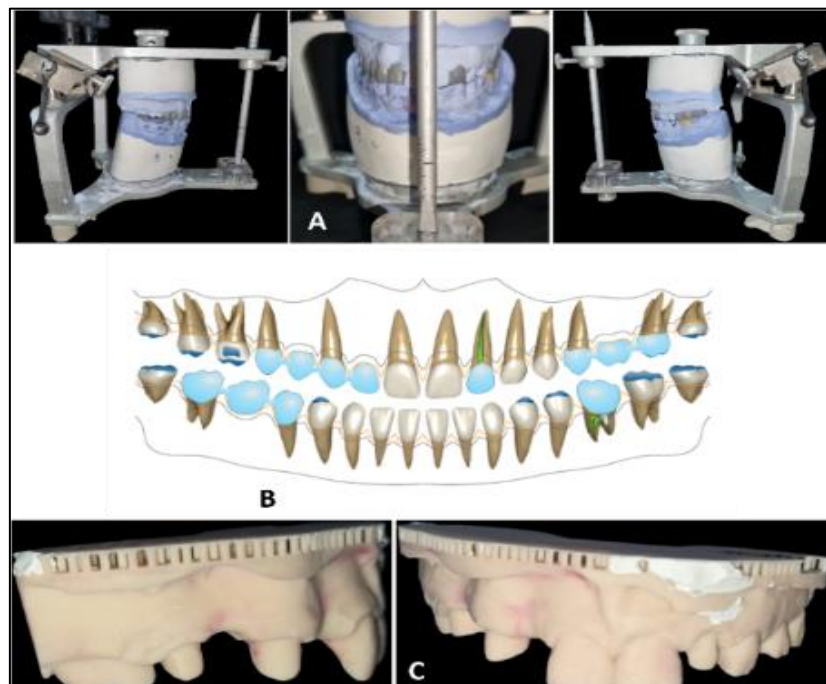
Figure 1: Intraoral preoperative of maxillary (A), mandibular (B) arches, and right, frontal and left views (C-E)



**Figure 2: Preoperative periapical and panoramic views**

During the next appointment, the treatment options were discussed with the patient after data interpretations. He agreed with the proposed treatment, which was in the form of extraction of the remaining teeth, replacement of missing teeth by all-ceramic crowns, and fixed prostheses for maxillary and mandibular teeth, as shown in Figure 3A and B. In 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. In 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 requiring composite restorations were treated.

The patient was appointed 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 and poured cast (Figure 3C). Shade selection was carried out using a 3D-Master shade guide. Full-coverage crowns and bridges for both arches were fabricated using the monolithic zirconia multi-shade CAD/CAM material Ceramill Zolid PS zirconia ECs (Amann Girrbach, North America, Charlotte, USA).

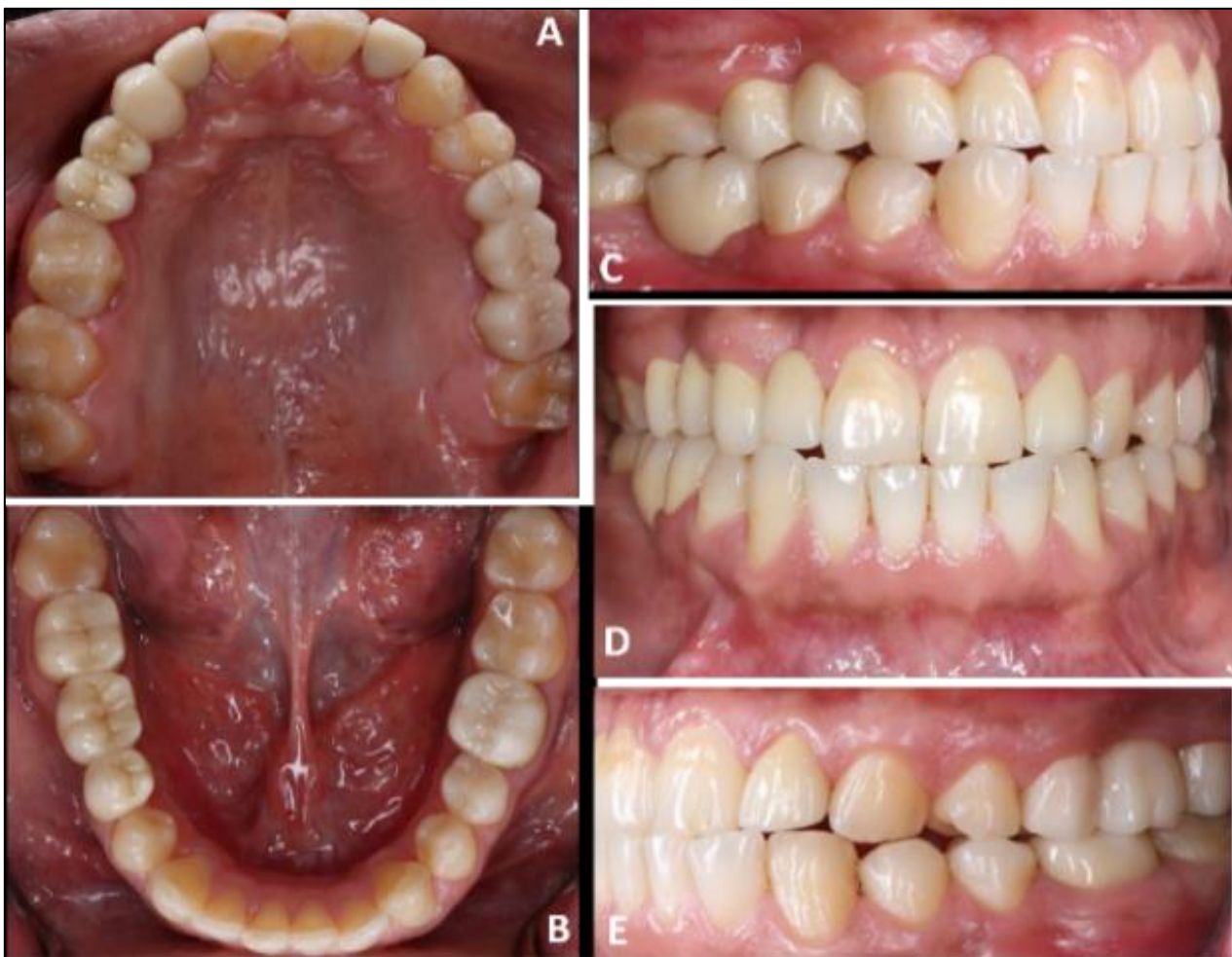


**Figure 3: Mounting of maxillary and mandibular casts with wax-up (A), treatment option (B), cast with prepared maxillary teeth (C)**

The following steps were carried out during the cementation of the crowns: First, the fitting surfaces of the restorations were treated with 9.5% hydrofluoric acid (IPS Ceramic Etching Gel, Ivoclar Vivadent, Germany), rinsed, and dried. Second, a silane coupling agent (Silane, Ultradent, South Jordan, Utah, USA) was applied to the surface for 60 s and air-dried.

The preparations were treated with a total-etch technique using 35% phosphoric acid for 90 s, rinsed, and dried. The 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. The 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 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). Full-mouth postoperative radiographical views were taken by panoramic and preapical X-rays (Figure 5). Different mandibular movements were checked to ensure no occlusal interferences. Figure 6 shows the frontal smile views before (A) and after (B) the treatment. In phase IV, the patient was called after 3 and 6 months for clinical follow-up. The patient functioned well, and he was satisfied with the aesthetics and status of this treatment.



**Figure 4:** Cemented maxillary and mandibular prosthesis (A & B) occlusal, right side (C), frontal (D), and left side (E) views



Figure 5: Postoperative radiographical views



Figure 6: Preoperative (A) and postoperative (B) views

## DISCUSSION

A multidisciplinary approach is essential for an accurate esthetic diagnosis and to attain an adequate treatment plan to achieve satisfactory results and restore symmetry in oral health practically and conservatively [13]. The maxillary anterior is an important aesthetic zone of the oral cavity, and it has a significant impact on patient's appearance, mental health, and social life [14, 15]. So, in this case report, a treatment plan was carried out to restore extracted teeth, extract hopeless teeth, and replace missing teeth to produce an aesthetic smile with facial symmetry, in addition to enhancing the patient's self-confidence and general well-being.

With the innovation in ceramic materials, multi-shade monolithic zirconia that demands minimal preparation with high aesthetic results was used for CAD/CAM as full separated crowns or as a three-unit bridge [1]. So, visually appealing and metal-free alternative materials like dental zirconia, which offers excellent aesthetics and desired mechanical characteristics, have emerged [10].

Monolithic zirconia presents several advantages such as less manufacturing time and less tooth preparation than veneered zirconia [16]. Monolithic zirconia crowns, which are well-known for their entire contour design, are becoming increasingly common and when it comes to maxillary anterior teeth,

and they are preferred for obtaining the best possible aesthetics and functionality [11, 17-19].

Al-Moaleem *et al.*, 2016 found that the performance of the anterior maxillary teeth (in the aesthetic zone) restored with CAD/CAM zirconia crowns has equal or higher survival rate than other ceramic materials tested over the recall period [11]. The prosthesis's capacity to resist staining is a vital clinical requirement for ensuring fracture resistance and other mechanical properties [20, 21]. Over time, insufficient color stability and staining may necessitate a dentist to consider restoring the restoration.

This case report describes the clinical use of a CAD/CAM monolithic zirconia material to restore aesthetics and function for a case with previously failed RCT and restorations and all teeth slightly stained, with many remaining roots and carious teeth. The patient functioned well, and he was satisfied with the aesthetics of this treatment. He was encouraged during appointments to practice good oral hygiene. This report provides evidence of the practicality and acceptability of the use of zirconia crowns and emphasizes the advantages of this approach in achieving functional and esthetic improvements in teeth.

## CONCLUSION

The utilization of monolithic zirconia crowns and bridges proved to be effective in this case, and it is very good from an aesthetic point of view. It represents a suitable solution to replace missing and stained teeth with restored natural color. This work enhances the growing confidence in monolithic zirconia prosthesis as a reliable option for achieving functional and cosmetic success in restorative dentistry, highlighting its role in enhancing patient satisfaction and overall oral health. However, the success of the treatment depends on factors such as developing an accurate treatment plan and the patient's commitment to care and instructions after treatment.

## REFERENCES

- Kanout, C. (2023). Evaluation of the translucency properties for CAD/CAM full ceramic crowns fabricated from glass ceramics (E. max) or high translucency zirconia (Lava Plus): a clinical study. *Cureus*, *15*(2), e34935. doi: 10.7759/cureus.34935.
- Könönen, E., Gursoy, M., & Gursoy, U. K. (2019). Periodontitis: a multifaceted disease of tooth-supporting tissues. *Journal of clinical medicine*, *8*(8), 1135. doi: 10.3390/jcm8081135.
- Huang, D., Luo, L., & Lan, X. (2023). Efficacy of crown lengthening for restoration of maxillary anterior tooth defects. *American Journal of Translational Research*, *15*(7), 4649-4657.
- Rokaya, D., Kitisubkanchana, J., Wonglamsam, A., Santiwong, P., Srithavaj, T., & Humagain, M. (2015). Nepalese esthetic dental (NED) proportion in Nepalese population. *Kathmandu University Medical Journal*, *13*(3), 244-249. doi: 10.3126/kumj.v13i3.16816.
- Humagain, M., Rokaya, D., Srii, R., Dixit, S., & Kafle, D. (2016). Gender based comparison of gingival zenith esthetics. *Kathmandu Univ Med J*, *54*(2), 148-152.
- Heboyan, A. G. (2019). Marginal and internal fit of fixed prosthodontic constructions: A literature review. *International Journal of Dental research and reviews*. doi: 10.28933/ijdr-2019-06-1105.
- Guillaume, B. (2016). Dental implants: A review. *Morphologie*, *100*(331), 189-198. doi: 10.1016/j.morpho.2016.02.002. Epub 2016 Mar 16.
- Choi, J. W., Lee, M. J., Oh, S. H., & Kim, K. M. (2019). Changes in the physical properties and color stability of aesthetic restorative materials caused by various beverages. *Dental materials journal*, *38*(1), 33-40. doi: 10.4012/dmj.2017-247. Epub 2018 Oct 5.
- Alotaibi, F. I., Arishy, L. M., & Al Moaleem, M. M. (2023). Aesthetic management of young patients with adverse social habits. *Medical Science*, *27*, e391ms3275. doi: 10.54905/disssi.v27i142.e391ms3275.
- Sonar, P. R., Panchbhai, A., & Pathak, A. (2024). Anterior Esthetic Rehabilitation with Computer-Aided Design/Computer-Aided Manufacturing Zirconia: A Case Report. *Cureus*, *16*(5), e59936. Doi: 10.7759/cureus.59936.
- Al Moaleem, M. M., Madkhali, H. A., Judayba, M. H., Mobaraky, A. A., & Mobarki, A. H. (2016). Aesthetic management of a patient with different level of fluorosis: Clinical and technical report. *Saudi J Oral Dent*, *1*(1), 2-6.
- Rosenstiel, S. F., Land, M. F., & Fujimoto, J. (2022). *Contemporary fixed prosthodontics*. 6th ed. St. Louis (MO): Mosby Elsevier; 235-251.
- Santi, M. R., Lins, R. B. E., Sahadi, B. O., Martins, L. R. M., & Soto-Montero, J. R. (2022). Evaluation of pretreatments on intra-radicular dentin bond strength of self-adhesive resin cements. *Journal of Esthetic and Restorative Dentistry*, *34*(7), 1051-1059. doi: 10.1111/jerd.12922.
- Huang, D., Luo, L., & Lan, X. (2023). Efficacy of crown lengthening for restoration of maxillary anterior tooth defects. *American Journal of Translational Research*, *15*(7), 4649-4657.
- Wang, Z., Liu, J., Wang, X., Wang, N., & Teng, M. (2022). Effect of CAD/CAM guide plate combined with socket-shield technique in immediate implantation of anterior teeth aesthetic area and its influence on aesthetics. *Frontiers in Surgery*, *8*, 833288. doi: 10.3389/fsurg.2021.833288.
- Pontevedra, P., Lopez-Suarez, C., Pelaez, J., Garcia-Serdio, S., & Suarez, M. J. (2021). Prospective clinical evaluation of posterior monolithic zirconia fixed partial dentures using a complete digital workflow: two-year follow-up. *Journal of*

- Prosthodontics*, 30(4), 298-304. doi: 10.1111/jopr.13251.
17. Ahmed, S. A., Dallak, A. E., Mohammed, A. K., Ahmed, M. S., & Mohammed, M. M. (2021). Maxillary lateral incisor with two separated canals diagnosed with CBCT technology: a six-month follow-up case report and minireview. *Saudi Med J Stud*, 2(1).
18. Al Moaleem, M. M., Alkhayrat, F. M., Madkhali, H. A., Geathy, I. H., Qahhar, M. A. W., Yaqoub, A., & Mattoo, K. A. (2017). Subjective differences between dentists and patients about relative quality of metal ceramic restorations placed in the esthetic zone. *J Contemp Dent Pract*, 18(2), 112-116. doi: 10.5005/jp-journals-10024-2000.
19. Al Moaleem, M. M., AlSanosy, R., Al Ahmari, N. M., Shariff, M., Alshadidi, A. A., Alhazmi, H. A., & Khalid, A. (2020). Effects of khat on surface roughness and color of feldspathic and zirconia porcelain materials under simulated oral cavity conditions. *Medicina*, 56(5), 234. doi: 10.3390/medicina56050234.
20. Acar, O., Yilmaz, B., Altintas, S. H., Chandrasekaran, I., & Johnston, W. M. (2016). Color stainability of CAD/CAM and nanocomposite resin materials. *The Journal of prosthetic dentistry*, 115(1), 71-75. doi: 10.1016/j.prosdent.2015.06.014.
21. Al Moaleem, M. M., Alathwani, A. A., Alamir, A. A., Alshehri, M. I., Alsaeed, M. S., Otudi, A. S., ... & Arishi, M. A. (2021). Effect of thermocycling and khat extract staining on the optical and mechanical properties of ceramic materials. *Medical Science*, 25(118), 3146-3156.