



Aesthetic Rehabilitation of Maxillary Central Incisors: Zirconia Crown and Porcelain Veneers

BY

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Abstract

This article describes a case of a central incisor with an old provisional crown. In addition, the other maxillary central incisor was filled with old composite resin which was compromising aesthetics.

A 21 year old female patient presented to the Department of Fixed Prosthodontics, seeking a treatment to improve her smile and the impaired aesthetic appearance caused by affected teeth. She gave a history of an early childhood trauma to the central incisors, an old provisional crown on the left central incisor.

A comprehensive examination revealed that the right central incisor had sufficient endodontic treatment, the left central incisor was vital and had an old discolored defective reconstruction with composite resin.

The objective of this case report is to highlight the steps of dental rehabilitation using ceramic veneers reinforced by lithium disilicate and zirconia crown.

CLINICAL SIGNIFICANCE: *This case demonstrates how a conservative multidisciplinary approach yields excellent results in an aesthetically demanding area. Atraumatic surgical techniques can maintain the natural soft tissue architecture, while a detailed approach to provisional and final restorations allows for a highly aesthetic smile.*

The treatment plan included:

11: *fiber core reconstruction with Zirconia based crown restoring the altered properties of the incisor, both aesthetic and mechanical*

21: *ceramic veneer reinforced by lithium disilicate providing aesthetic results and solving problems related to the size, shape, and color of the teeth.*

Keywords: *porcelain veneers, lithium disilicate, full coverage crown, aesthetic restoration, Central incisors, Zirconia based crown, Devitalized teeth*

Article History

Received: 01/01/2024

Accepted: 15/01/2024

Published: 17/01/2024

Vol – 1 Issue – 1

PP: -25-29

Introduction.

The rehabilitation of an unattractive smile in the anterior maxilla poses a constant clinical challenge, particularly when dealing with issues such as inappropriate shape and size, outdated restorations, and unappealing shading.

Effective decision-making is a pivotal component of clinical dentistry. Technological advancements and the shift toward more conservative approaches have expanded the array of

choices for both patients and dentists, offering a broader spectrum of opportunities to restore teeth. (1)

Porcelain veneers are often regarded as a conservative and aesthetically pleasing treatment choice. Nonetheless, they do come with limitations, particularly in cases of significant discolorations or extensive carious lesions. In such scenarios, the more appropriate recommendation would be full coverage crowns. (2)



Over the past four decades, all-ceramic crowns have served as a substitute for porcelain fused-to-metal crowns to address their aesthetic constraints. It's important to note that these crowns can be crafted from various types of ceramics, and each ceramic type possesses distinct physical and aesthetic properties. (3)

Case presentation:

A 21-year-old healthy female patient with a past history of trauma of the maxillary central incisors since 10 years ago, presented to restore her central maxillary incisors in the Department of Fixed prosthodontics at the Dental Clinic of Monastir, expressed discontent with her smile. She complained about old discolored provisional crown on the right central incisor and sought smile improvement.

Intraoral examination showed a fracture of more than 3mm on the upper left central incisor (21) reconstructed with composite resin.



Figure: Intra oral view Initial smile

Periodontal examination

Confirmed the existence of short teeth in relation to the gingival margin, with no signs of inflammation or gingival overgrowth. To assess the periodontal condition, examinations were conducted to measure probing depth, periodontal attachment loss, as well as examine gingival bleeding and suppuration. The results of the periodontal examination indicated the presence of healthy periodontal tissue. Following an evaluation of both periodontal and aesthetic factors, a diagnosis of altered passive eruption (APE) was determined

Radiographic examination revealed:

11: An immature tooth with open apex and thin dentinal walls due to an old trauma, the endodontic treatment was completed with the absence of any periapical lesion or any additional fractures involving the root (figure 2).

21: enamel fracture with limited loss of substance



Figure: The initial periapical X-ray shows maxillary central incisors, radiographic confirmation of MTA placement, note the thin dentinal walls and large root canal space

Treatment:

After informing the patient of all available treatment modalities, we decided to restore the fractured incisors using a zirconia crown on the upper right incisor and a porcelain veneer on the upper left incisor.

The treatment started with aesthetic analysis photographs, studying models and preliminary shade selection. Initial photos of the patient's smile and alginate impressions were taken. A wax up was performed.

- After debonding the provisional crown, we evaluated the remaining walls and a **fiber post** reconstruction was indicated. Due to big width of the root canal, we indicated the technique of customized fiber post with the use of Ribbond.



Figs A and B: intra-oral view after debonding the provisional crown

After root canal preparation, a periapical radiograph was employed to check the preparation quality and to select the fiber post size



Figs A, B, C and D:
 A: checking the fit and adaptation of the customized fiber post;
 B: Tooth isolation by rubber dam;
 C: Fiber post cementation and core build-up; D: tooth preparation

After preparing, a provisional crown was installed.

- For the passive eruption, a **crown lengthening** procedure was done from canine to canine which increased the cervico-incisal length of the teeth by 2 mm to fix the passive eruption (Figure).



Figs A and B: (A) after crown lengthening and (B) suture removal (10 days), the harmony of mucogingival tissue is re-established

- After healing, a conservative tooth preparation was done to receive a porcelain veneer on the left central incisor (21).
- The master impression was made using light and heavy-body consistency polyvinylsiloxane (Virtual 380, Ivoclar Vivadent, Amherst, NY, USA ®)(Figure). And a temporary prosthesis was



Figs A and B:
 A: gingival retraction B: master impression

- Prostheses were fabricated using indirect CAD/CAM technique. Zirconia crown and the veneer were tried. We noticed the need of modifications concerning the crown's final shade and shape.



Figure: Zirconia crown and veneer try-in

- Prostheses were modified, aesthetic and occlusion relationships were checked and the crown was sealed after ceramic glazing (Figure).



Figure: crown sealing

- Then, the veneer was cemented.
- Final result showing an improvement of the smile:



Figure: Final result

Discussion:

Traumatic injuries to the front teeth commonly occur among teenagers. When immature teeth experience trauma or fractures that necessitate endodontic treatment, the root canal is often enlarged, resulting in a thinner dentin wall at the dentin-enamel junction (DEJ) post-endodontic therapy. (4)

If the fracture leaves little of the crown remaining, using a cast-metal post and core for restoration is not recommended. This tightly fitting, inflexible post can induce unfavorable wedging effects, potentially resulting in vertical root fracture. Studies indicate that thin-walled, endodontically treated teeth can be effectively restored and reinforced using a fiber post. (5)

Utilizing fiber posts for the restoration of endodontically treated teeth in younger patients comes with advantages. When a fiber-reinforced post is bonded inside the root canal, it effectively disperses functional and parafunctional forces, thereby minimizing stress on the root. (6) If an intense force impacts the tooth's crown, the post or crown is designed to break rather than transferring the force energy down the root, preventing the occurrence of a vertical root fracture. Clinical evidence has demonstrated that the adhesion of the fiber post within the root canal is both acceptable and effective in reinforcing the root. (7)

In the mentioned case, it was apparent that the root canal had been enlarged, and the biologic width was compromised due to the initial treatment when the incisor was younger (6). To appropriately address this, a fiber post, reinforced with Ribbond, was employed to properly fill the enlarged canal. Both the fiber post and Ribbond were utilized in conjunction with a dual-cure composite resin during the post's placement in the root canal, ensuring effective root reinforcement for the tooth. (8)

Several factors can influence the ultimate outcome, including the visual aspect of the gingival tissue surrounding the teeth. Irregularities in the symmetry and contour of the gingival tissue can impact the overall aesthetic harmony of the teeth. A common concern raised by patients is the short clinical crown of a tooth. Multiple factors can contribute to this issue, and one of them is altered passive eruption (APE). (9,10)

A potential resolution to address the aesthetic, periodontal, and restorative challenges is the crown lengthening procedure. This surgical intervention is designed to eliminate periodontal tissue with the goal of increasing the clinical length of the dental crown. (11). Alveolar bone reduction became necessary due to the distance between the cemento-enamel junction and

the bone crest being less than 3 mm. The procedure involved opening a flap to visualize the entire bone. It is advised to remove sutures two weeks post-surgery to promote the maturity of wound healing. (12)

In this instance, crown lengthening surgery proved to be an effective intervention for addressing both functional and aesthetic issues linked to altered passive eruption.

A significant challenge in this case was achieving a color match between the porcelain veneer, zirconia crown, and the natural teeth.

Conclusion:

A beautiful, attractive, and healthy smile is characterized by a harmonious balance in the shape and symmetry of teeth, lips, and gingiva, along with a cohesive relation and harmony with the overall facial features.

Employing a meticulously planned approach, accurate diagnosis, and precise technique allowed for the achievement of this smile harmony. The aesthetic outcome was satisfactory, and the patient expressed contentment with the result.

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