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Case Report

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

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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

Introduction

The rehabilitation of an unaesthetic smile in the anterior maxilla is always a clinical challenge, especially when an improper shape and size, old restorations, and unaesthetic shading are present.

Decision-making is a fundamental aspect of clinical dentistry. Advances in technology and trends towards more conservative technologies have broadened the options available to patients and dentists, increasing the range of choices and opportunities to restore teeth [1].

Porcelain veneers have been considered as a good conservative and aesthetic treatment option. However, they do have limitations, such as important discolorations or extended carious lesions, in similar situations full coverage crowns should be indicated [2].

All-ceramic crowns have been used over the last four decades as an alternative for porcelain fused-to- metal crowns to overcome their aesthetic limitations. These crowns can be made from different types of ceramics and not all ceramic types have the same physical and aesthetic proprieties [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 a: Intra oral view Initial smile.

Periodontal examination verified the presence of short teeth in relation to the gingival margin, the absence of inflammation and growth of the gingiva. In order to evaluate the periodontal condition, probing depth, periodontal attachment loss, gingival bleeding and suppuration examinations were performed. The periodontal examination verified the presence of healthy periodontal tissue. After evaluation of periodontal and esthetic aspects, a diagnosis of altered passive eruption (APE) was established.

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 b).
- **21:** enamel fracture with limited loss of substance

Figure b: 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.

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

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).
- 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, IvoclarVivadent, Amherst, NY, USA®) (Figure). And a temporary prosthesis was bonded.
- 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.
- Prostheses were modified, aesthetic and occlusion relationships were checked and the crown was sealed after ceramic glazing.
- Then, the veneer was cemented.
- Final result showing an improvement of the smile:

Figure c: A and B: intra-oral view after debonding the provisional crown.

Figure 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.

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

Figure f: A: gingival retraction B: master impression.

Figure g: Zirconia crown and veneer try-in.

Figure h: Crown sealing.

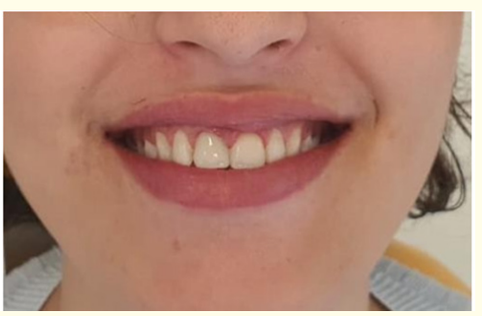

Figure i: Final result.

Discussion

Traumatic injury to the anterior teeth is a frequent occurrence among teenagers. Frequently, when immature teeth are traumatized or fractured and require endodontic treatment, the size of the root canal is enlarged, which leaves a thinner wall of dentin at the dentin-enamel junction (DEJ) after endodontic therapy [4].

If the fracture leaves little of the crown remaining, restoration with a cast-metal post and core is contraindicated because this closely adapting rigid post can lead to undesirable wedging effects that, in turn, can lead to vertical root fracture. Research has shown that thin-walled, endodontically treated teeth can be restored and reinforced using fiber post [5].

Fiber posts offer benefits when restoring the endodontically treated tooth of a younger patient. When a fiber-reinforced post

is bonded within the root canal, it dissipates functional and parafunctional forces and reduces the stress on the root [6]. When catastrophic force is placed on the crown of the tooth, the post or crown will fracture instead of transmitting the energy of force down the root to create a vertical root fracture. Adhesion of the fiber post within the root canal has been shown to be clinically acceptable and root reinforcing [7].

For the case described, an enlarged root canal and a compromised biologic width were evident, because the original root canal treatment was done when the incisor was younger [6]. A fiber post reinforced with Ribbond was used to fill correctly the enlarged canal; both were used with a dual-cure composite resin when cementing the post into the root canal, providing the tooth with root reinforcement [8].

Many other factors can affect the final result, such as the appearance of the gingival tissue around the teeth. Abnormalities in symmetry and contour of gingival tissue affect the harmonization of the teeth's appearance. Short clinical crown of tooth is frequent complaint of patients. There are various factors that can cause it, one of which is altered passive eruption (APE) [9,10].

The procedure that can provide a solution to this aesthetic, periodontal and restorative problem is crown lengthening. This surgical procedure aims to remove periodontal tissue in order to increase the clinical length of the dental crown [11]. Reduction of the alveolar bone was necessary because the distance between the cemento-enamel junction and the bone crest was less than 3 mm. This procedure required flap opening to view the bone as a whole. Suture removal was recommended two weeks after surgery to maintain wound healing maturity [12].

In this case, crown lengthening surgery was an effective treatment to correct functional and aesthetic disturbances associated with altered passive eruption.

One of the biggest challenges in this case, was matching the color between porcelain veneer, zirconia crown, and the natural teeth.

Conclusion

A smile is considered beautiful, attractive and healthy when it has equilibrium between shape and symmetry of teeth, lips and gingiva. Not to mention the relation and harmony in the face.

Through a well-planned approach, a correct diagnosis and technique, it was possible to obtain harmony in the smile and the result was aesthetically acceptable and the patient was satisfied.

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