

Case Report

Challenge of Aesthetic Rehabilitation in Case of Fractured Anterior Teeth with Diastema and Gummy Smile

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Abstract:

The success of a restorative treatment in anterior teeth for a patient who lost dental aesthetic depends on the esthetic integration between soft tissues and hard tissues with less invasive procedure. (1/2)

The present available case report describes the esthetic management of gummy smile, fractured incisor teeth and midline diastema with a multidisciplinary approach of different specialties from diagnosis to treatment planning. Ceramic veneers and crowns yielded a good aesthetic and functional outcome.

Keywords: Ceramic, veneers, crowns, fractured anterior teeth; multidisciplinary approach; gummy smile; gingivectomy

Introduction:

Nowadays, the esthetics of patients' teeth take a great importance. Since the patient's smile has an obvious impact on facial esthetics, having unpleasant one will certainly be an issue for the patient's social life.

Having fractured anterior teeth presents a massive problem for patients specifically among adolescents and will present a serious challenge for clinicians. Composite resin restorations and porcelain veneers are considered to be the most conservative types of treatment for the fractured incisors. (3)

Other factor that can badly influence the patient's esthetic is the gummy smile. As known, a perfect smile is dictated by a balance among 3 factors: the white (teeth), the pink (gum), and the lips. (sourire gingivale 3). A smile with more than 2 mm of exposed gingiva is called gummy smile, affects the esthetic and the psychology of the patients and decreases their self-confidence which lead them to control or even hide their smile. (4). Several techniques are informed to treat it such as botulinum toxin-A injections, gingivectomy, lip repositioning procedure, and orthognathic surgeries. (5)

Also having a midline diastema which is an interdental space greater than 0.5 mm, in the anterior esthetic zone between the maxillary central incisors can be displeasing and push them to improve their appearance either restoratively with composite resin bonding, veneers, crowns, or orthodontic treatment (6/2)

Having those three issues combined in one patient will be a serious challenge for clinicians and will certainly need a multidisciplinary approach of different specialties from diagnosis to treatment planning. (7)

The purpose of this article, is to highlight the untdisciplinary

approach in aesthetic treatments through a case report in which the diastema closure and the fractured incisors accomplished using prosthodontics such as veneers and crowns

Case Report:

A 22-year-old female patient was referred to the prosthetic department in the dental clinic of Monastir, expressed dissatisfaction with the appearance of her smile. Esthetic disharmonies related to her maxillary anterior teeth are observed with a chief complaint of unsightly smile and fractured teeth.

Intraoral examination showed a fracture of the upper left central incisor (tooth 21) more than 4mm reconstructed with composite resin (fractured tooth due to a fall for 10 years ago), as well as spacing between her maxillary central incisors (diastema), and a gummy smile (Figure 1).

Radiographic examination revealed a completely mature apex without the absence of any periapical lesion or any additional fracture involving the root (figure 2). The treatment started with aesthetic analysis photographs, study models and preliminary shade selection.

Initial photos were taken of the patient's smile and from the previous restored upper central incisor, alginate impressions (Alginate) were taken to obtain a diagnostic cast. A wax up was performed for diastema closure of the two upper central incisors, followed by a diagnostic mock-up placed in the mouth with a self-cured temporary composite material (Structur Premium, VOCO GmbH, Cuxhaven, Germany).

After explaining all treatment modalities, the patient accepted surgical treatment for her gummy smile. A porcelain crown

on the upper left incisor and a porcelain veneer on the right were decided to restore the fractured incisor and close the diastema with E-max® CAD/CAM ceramic.

A gingivectomy procedure was done from canine to canine which increased the cervico-incisal length of the teeth by 2 mm (Figure 3).

After healing, we started by removing the resin, and conservative tooth preparations were done to receive a ceramic crown on the fractured incisor and a porcelain veneer on the right central incisor (tooth 11). (figure 4/5)

A silicone guide matrix ((Hydrorise Putty, ZhermackSpA, BadiaPolesine, Italy)) was made to evaluate incisal and facial reduction. (figure 6/7)

After teeth preparations, the master impression was made using light and heavy-body consistency polyvinylsiloxane (Virtual 380, IvoclarVivadent, Amherst, NY, USA ®). (Figure 8)

The master cast was then scanned and used to fabricate the porcelain veneer and crown.(Figure9)

In laboratory, the ceramist made both restorations with E-max® ceramic, using cad/cam technique. (figure 10 / 11 / 12 / 13). Both the crown and veneer were tried on (figure 14). The patient was satisfied with the shape and shade of the ceramic restorations.

The rubber dam was used to minimize contamination free field before final placement of the pieces (figure15 / 16).

The restorations received hydrofluoric acid surface treatment (Ceramic Etching Gel, IvoclarVivadent ®) for 60 seconds followed by rinsing and drying. (figure 17). Next, silane(Monobond-S, IvoclarVivadent®) was applied for 60 seconds, and then the restoration was dried.(figure 18)

The prepared teeth surfaces were etched with 37% phosphoric acid gel (Condac, FGM®) for 15 seconds (figure 19), followed by rinsing with spray and gentle drying.

The adhesive system (Syntac-ivoclar®) was applied for 30 seconds. The light color cement (VariolinkEsthetic LC, IvoclarVivadent) was applied to both veneer and crown, which were placed onto the teeth, and the excess cement was removed before light curing for 20 seconds.

Finally, a glycerin layer (Liquid Strip, IvoclarVivadent) was applied on the union piece and tooth, and resin cement was light cured for another 20 seconds, aiming to block the oxygen. (figure 20). The patient was satisfied with the good result (Fig 2&, 22)



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9

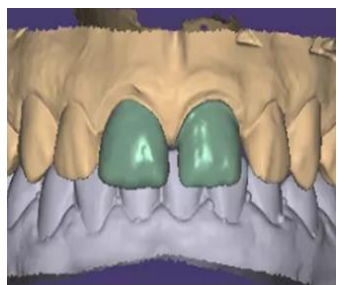


Figure 10



Figure 11



Figure 12



Figure 13



Figure 1



Figure 2



Figure 3

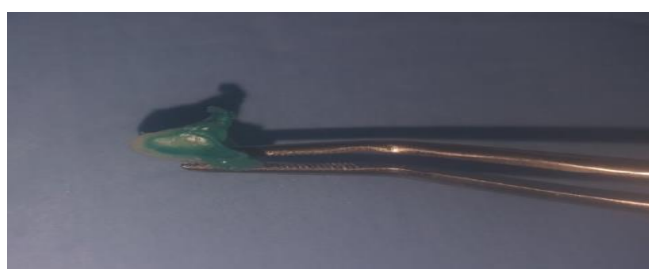


Figure 14



Figure 15



Figure 16



Figure 17



Figure 18



Figure 19



Figure 20



Figure 21



Figure 22

Discussion:

The dentogingival relationship is key to smile harmony. There has been a growing demand from patients looking for esthetic improvement of their smile: a pleasant smile can give supreme confidence and great self-esteem. (8)

Approximately 7% of men and 14% of women are presented with an excessive gingival display when smiling, according to Peck who defined it as an exposure of more than 2 mm of gum when smiling.

The lip defines the esthetic zone. There are three forms of lip lines: high, medium and low. (9)

Three etiological factors have been presented for excessive gingival display: hyperfunction of upper lip elevating muscles; passive dental eruption; skeletal (vertical bone excess). Various treatment options according to etiological factors are noted : the botulinum toxin injections, or surgical treatment (orthognathic surgeries, gingivectomy, lip repositioning procedure).

The botulinul toxin injection is a non-invasive alternative, but temporary. The treatment longevity was presented between 12 and 24 weeks.

Meanwhile, the surgery (gingivectomy) is an irreversible treatment. (5)

Midline diastema is defined as anterior midline spacing greater than 0.5mm between the proximal surfaces of central incisors

The management of dental fracture in the esthetic zone, in case of a traumatism, and maxillary midline diastema are considered to be the greatest challenge to the clinician.

Dantel fracture are considered as an increasing public health problem. Studies conducted on children and adolescents reported that 16–30% of these individuals sustain dental trauma more than once. Reattachment of tooth fragment is a minimal invasive and esthetic method. (14/10)

There are other alternative methods : direct adhesive resin reconstruction, veneers and crowns can be performed in case of failure or a refracture. (12)

The restoration of a broken incisor depends on many factors such as : an incisal fracture > 4-mm, the fracture line's position, the mechanical strength of material, predictable and durable esthetics. (11)

In this case and from a mechanical point of view, 4-mm of fractured tissue is not a favorable situation to use composite resin since the occlusal force is applied directly on the restoration. Thus, the risk of adhesive failure is higher. (13)

However, in this situation, full crown offer the best solutions in terms of esthetic result, durability and protection of residual dental structure. (14)

Concerning diastema closure there is a variety of materials and techniques to achieve esthetic results. Orthodontic treatments are expensive, time-consuming, and not all patients (mostly after adult age), agree to insert brackets. Faster treatments are related to restorative procedures; with the increase in technology and success rate of adhesive dentistry, treatments such as ceramic veneers and composite resins can be successfully performed. (6)

The composite resin is commonly used in minimally invasive restorations due to the fact that it requires minimal tooth preparation and has excellent adhesion to enamel with a reported overall survival rate of over 88% after 10 years (15), especially for young patient

Among the disadvantages of resin materials and the major causes of failure are chipping, color mismatch (6 /16) and instability due to water absorption lead to esthetic degradation of the restoration. (17) This technique also requires knowledge of the field of restorative material, skills to reproduce all characteristic of the tooth.

On another hand, it shows a repetitive loss of restoration, currently the solution was to use indirect restoration with ceramic veneers or crowns

Ceramic veneers also provide an appropriate restorative solution and more conservative than total crowns. (18) The use of porcelain veneers is considered a mini-invasive option to an esthetic concern. (7)

Long-term clinical data for veneers exhibit high survival rates (above 90% in 10 years). (19)

The minimal reduction during the preparation rarely, if ever, leads to pulpal involvement. A major advantage that also

preserves enamel for bonding under the veneer, allowing higher bond strengths and dentin bonding.

The highly glazed surface of the porcelain veneer prevents plaque accumulation, considered important to attain a healthy periodontal response. Additionally, ceramic has better luster maintenance over time than composite with less potential for surface staining. Excellent esthetics can also be achieved due to the lifelike appearance of ceramic (better translucency than composites) and lightscattering effect of the luting cement.

(20)

Milled veneers and crowns fabricated with computer-aided design and computer-aided manufacturing (CAD-CAM) technology have been reported to provide high accuracy and efficiency.

The color parameters were affected by the different types of CAD/CAM ceramic materials, can able to achieve a clinically acceptable color match with the natural tooth. (21)

Conclusion:

This clinical report emphasizes the multidisciplinary approach required for comprehensive treatment planning. Knowledge of the relationship between the periodontal tissue and restorative dentistry is critical for ensuring adequate shape, function, esthetics and health of the dental tissues. Therefore an interdisciplinary approach should be undertaken in the treatment of excessive gingival display to contribute to a better outcome in the improvement of patient's esthetics thereby contributing to their confidence.

Further long-term clinical trials are necessary to study the marginal integrity, marginal staining and the effect on surrounding tissues and evaluate the mechanical performance of each type of ceramic for the fabrication of veneers. A perfect coordination between the dental team and the patient, taking into account the latter's wishes and expectations, is crucial.

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