

Aesthetic Rehabilitation of the Smile: A Multidisciplinary Approach

Yosra Gassara, Fatma Ben Amor, Imenkalghoum, Zohra Nouira, Dalenda Hadyaoui, Belhssan Harzallah, Mounir Cherif

Department of Fixed Prosthodontics, Faculty of Dental Medicine, Monastir, Tunisia

Abstract

Face and teeth have an essential place in the dominant body aesthetic, which is regularly associated Smiles, good teeth Aligned and quasi-whiteness Blinding. In order to meet the gradually increasing demands; prosthodontist summing up to optimize the aesthetic result of our treatments through the collaboration ticket with other specialties of dentistry. This paper report shows the importance of multidisciplinary approach, illustrated by a case report.

Key Words: Riziform, Invagination, Fixed dental prostheses, Multidisciplinary approach, Smile, Glass cermics, Endodontics, Orthodontics.

Introduction

The search for improved dentofacial aesthetics persists in modern society patients have been sought treatment modalities to improve smile and dento-facial aesthetics [1-4]. In 2000, the study of Albert Yarus showed that while analyzing facial photographs people tend to facial attention mostly on the mouth and eyes. So; smile must always be respected and considered [5,6].

The aesthetic rehabilitation of the smile requires a comprehensive management by a multidisciplinary team involving different specialties like endodontics, orthodontics prosthodontics as well as periodontics [7,8].

The incisivo-canin group, especially maxillary, plays a decisive role in the aesthetics of the smile [9]. The most frequent irregularities in the number and shape of teeth have been differentiated into gemination, fusion, twinning, concrescence agenesis, or riziformity of the incisors, disturb the previous guide and penalize the smile [10]. In front of the riziform teeth several treatment modalities are possible to correct their form and to harmonize them with the rest of the arch.

This article aims to present a clinical case describing a multidisciplinary management in a patient who presents two riziform maxillary lateral incisors, including a pre-prosthetic orthodontic treatment, an endodontic treatment of the 12 who had an invagination and a prosthetic rehabilitation by two ceramics entirely Ceramics Crowns using system E max CAD LD (lithium disilicate) [11].

Case Presentation

A 23 years old female patient with unremarkable medical history, presented to the department of fixed prosthodontics with aesthetic demand. Her chief complaint was to regain her smile, judged unsightly, as the two maxillary lateral incisors present a riziform form (*Figures 1 and 2*).

A comprehensive clinical examination revealed good hygiene, a medium-sized smile line with two maxillary lateral incisors riziform, and 12 with slight dyschromia. The vitality test revealed a necrosis of the 12 while the 22 was vital.

The 12 showed an invagination type III (*Figure 3*) according to the classification of Oehlers, Based on radiological examination [12]:

Type I

A linear radiolucent image of the fissure confined to the crown.



Figure 1. Front view.



Figure 2. The initial smile.

Type II

A radiopaque projection (density similar to enamel) enters the pulp space varying in shape and depth, possibly with a central core of radiolucency. Enamel-cementum junction is a boundary to divide this presentation to CDI Type I or CDI Type II.

A radiolucent pocket with a radiopaque border extends into the root as a blind sac, with variation in depth below enamel-

cementum junction, but not reaching the apical area and without connection to the periodontal ligament.

Type III

The invagination may show a radiolucent area (the invaginated canal) surrounded by a radiopaque border. The relative position of the invagination and the main canal may be different, but there is no communication between the invaginated canal and the main canal.



Figure 3. Peri apical radio on the 12: invagination.

In our case, the tooth is devitalized and has a periapical translucency. This situation is the most common type of invagination, which leads to infections with consecutive pulpal necrosis. Endodontic treatment is necessary, both for invagination and for pulp while taking into account the complexity of the anatomy of the tooth. It is indispensable to use new techniques of preparation and special instruments (e.g. Ultrasonography) as well as a microscope operative [13]. It is judicious to refer the patient to a specialist.

After clinical examination, the prosthetic decision was the realization of two all-ceramics crowns on the 12 and 22 using the IPS e.max CAD system reinforced by lithium disilicate. The axes of the two maxillary lateral incisors were corrected with short-term fixed orthodontic treatment and aesthetic and appropriate tooth position was achieved (Figure 4).



Figure 4. Result after orthodontic treatment.

After orthodontic de-bonding, the presence of white spots was observed especially at the central incisors.

Tooth bleaching was performed with 10% carbamide peroxide, with ambulatory guttering overnight for 15 days. The patient returned for control sessions once a week to evaluate the bleaching effects. She has been given some advice concerning the use of the gel, the cleaning of the gutter, the risks of sensitivity and the control of the diet in order to avoid highly staining foods, such as teas and coffee [14]. But the result of the bleaching was not satisfactory enough, the patient refused to correct the color of the two central incisors by veneers. Then, the patient was referred for restorative treatment, and an endodontic treatment of the 12 using a microscope was made (Figure 5).



Figure 5. Periapical view after endodontic treatment.

Thereafter the two lateral incisors were prepared with respect of guidelines of all- ceramic restorations: 0.8 to 1 mm circumferential chamfer an axial reduction of 1.5 mm with 10 degree taper, and occlusal reduction of 1.5 mm by using diamond rotary cutting instruments. On the buccal aspect of the restorations, the margins were located 0.5 mm subgingivally for esthetic reasons and supragingivally on the lingual aspect. All sharp edges were rounded and smoothed (Figure 6). Two temporary crowns were cemented in order to improve the aesthetic appearance of the patient's smile (Figure 7). After a double gingival cord retractions, a simultaneous double mixed impression was made using light and heavy silicon A (Figure 8).



Figure 6. Teeth preparation.



Figure 7. Temporary prosthesis.

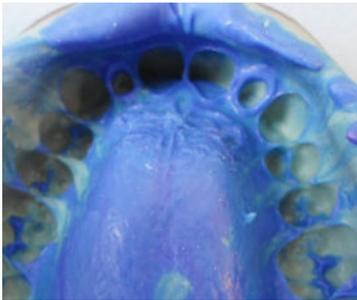


Figure 8. A simultaneous double mixed impression.

For the color of the two crowns, the patient was put before two choices either to reproduce the white spots that appeared in the central incisors after orthodontic treatment or to choose only the base color. During the preparation of the temporary crowns, these spots were reproduced on the 22 and not on the 12 to facilitate the choice between these two options (Figure 9), and finally she chose not to reproduce these white spots.



Figure 9. Reproduction of spots on the temporary crown of the 22.



Figure 10. Working cast.



Figure 11. Realization of two ceramic-ceramic crowns by the system E max CAD.



Figure 12. Intraoral checking of crowns.



Figure 13. Bonding of crowns.



Figure 14. Aesthetic and biological integration of the final restoration.

Then working cast was performed (Figure 10), and scanned, the crown was designed Depending on the color chosen, milled by CAD/CAM (Figure 11), and checked intra-orally to control the gingival margins adaptation, the restoration of contact point areas, gingival embrasure opening, static and dynamic occlusion especially the canine guidance, the occlusal scheme was identified using articulator paper.

Then shade and esthetics are well checked (*Figure 12*). After veneer layering, the two crowns were bonded by a bonding resin (*Figures 13 and 14*).

Discussion

Rehabilitation plan involving anterior teeth requires careful regarding, it is necessary to analyze all the aesthetic parameters and to know the principles of the aesthetics of a natural smile and how to apply them in oral rehabilitation is crucial for a successful therapy.

The major goal of aesthetic rehabilitation is creating a harmony between the shape, color and texture of the teeth with the gums and lips [1]. The rehabilitation of patients requiring an aesthetic smile demands a multidisciplinary approach [7]. The study of Lies C et al., showed that the combination of orthodontic and prosthodontic treatment resulted in a more favorable outcome than prosthodontic treatment alone. Improved tooth position can eliminate potentially pathologic occlusion and create a healthier periodontal environment that is easier to maintain [15].

In addition to that, it creates a direct prosthetic benefit by limiting the tissue reduction of the preparations and improving the biomechanical and functional context of the restoration. Orthodontic treatment that accomplishes these benefits may be limited to a partial fixed appliance localized to one segment of an arch or require a more extensive fixed appliance. Dens invaginatus (DI) is an abnormality of odontogenesis due to the invagination of the crown and/or surface of the root before mineralization. The prevalence of DI varies from 0.3% to 10% [16].

This anomaly mainly affects the maxillary lateral incisors, follow-up of maxillary central incisors, whereas it is rare in canines, premolars and the molars. It may be accompanied by other dental abnormalities such as microdontia or macrodontia. A study by Ridell et al. reported that 11.3% of the teeth affected by the dens invaginatus developed pulpal problems [17].

From a therapeutic point of view, the multiplicity of types and particular forms of invaginated teeth obviously requires the implementation of very diverse techniques. The treatment depends on many factors and it is often difficult. Various treatment modalities have been reported to treat dens invaginatus, like prophylactic treatment, conservative restorative treatment, nonsurgical and surgical root canal treatment and finally extraction.

According to Keles A, the endodontic treatment of type III invaginations can be performed by manual instruments, NiTi rotary and the use of ultrasonic alloy tips which is the most advocated.

On the other hand, the use of rotating instruments in the lesion is not recommended due to the complexity of the ductal anatomy and the presence of an enamel lining to the light of the invagination and the inconsistent form, which can cause instrumental fracture [18]. According to Imburgia M, the rehabilitation of the anterior teeth aims at obtaining optimal aesthetic results while respecting the biological structures involved [19].

Several therapeutic options can be used, such as composite resins, all-ceramic crowns, and ceramic veneers. Due to advances in dental ceramics and adhesive systems, less invasive approaches have been used.

Porcelain veneers are considered as a much more conservative treatment in terms of preparation and they give satisfactory and lasting aesthetic results, it showed a survival rate very important: a prospective clinical study [20] evaluating the clinical performance of 87 ceramic veneers performed by the same operator on 25 patients, 5 and 10 years of clinical service (with all cases controlled at 5 years and 93% to 10 years), shows similar results. At 10 years, all restorations are aesthetically satisfactory and no loss is noted. Clinically acceptable restorations (not requiring intervention) are 92% at 5 years and 64% at 10 years.

Another prospective clinical study, conducted by Layton D and Walton T [21], analyzing 304 ceramic veneers in 100 patients over a period of 16 years, revealed a long-term survival rate of 96% at 5 and 6 years, 93% to 10 and 11 years and 91% to 12 and 13 years.

However, the installation of an all-ceramic crown on the 12 is a more prudent choice seen that it was impaired by endodontic treatment. The decision to make a veneer on the 22 was declined since after preparation for veneer 3/4 the coronary volume was very minimal (*Figure 15*) with a palato version important. An all-ceramic crown was chosen to increase the mechanical strength and preserve the tooth.



Figure 15. Lateral view of the 22.

To preserve the maximum of dental tissue, a monolithic lithium disilicate crown was chosen. According to Harada the recommended thickness for this type of restoration is 1.5 mm [22]. However; according to the CDA quality evaluation system, all of the restorations were classified as satisfactory for marginal integrity, color, and surface, with the exception of monolithic crowns and onlays, which did not show an optimal result in color match in some cases (9.1%) [23].

According to the systematic review of Sailer I; the 12 studies reporting a lithium disilicate reinforced glass ceramics showed an estimated 5- year survival rate of 96, 6 which was similar to the survival rate of metal ceramic crown [24]. According to the study of Van Den Breemer CR et al., aesthetic properties of lithium disilicate restorations were optimal [25].

Conclusion

This article presents a clinical case that highlights the value of a multidisciplinary approach. Optimal integration and long-term stability of oral rehabilitations require correct diagnostic approach, appropriate pre-prosthetic treatments and accurate therapeutic protocols [11].

The treatment, comprising an interaction between restorative dentistry, orthodontics, and endodontics, allowed a favorable functional and esthetic result [14]. Thanks to some prior orthodontic corrections, the position of the maxillary lateral incisors was significantly improved. This results in a direct prosthetic benefit by limiting the tissue reduction of the preparations and improving the biomechanical and aesthetic context of the restoration.

Thus, after a period of orthodontic treatment for a year and a half, with fixed equipment, an endodontic treatment of invagination and a bleaching have been carried out. This enabled us to have at the end of the prosthesis impeccable on the plane aesthetic and functional.

This example should encourage prosthodontists to practice this type of multidisciplinary approach rather than seek solutions of ease that might not provide the desired comfort and satisfaction.

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