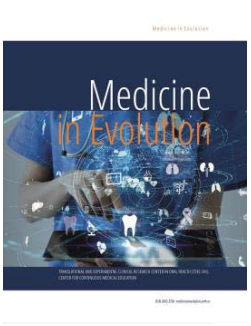
Enameloplasty in interdisciplinary treatment of dental injuries – case report



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Abstract

Case presentation: Traumatic lesions of the upper incisor group can target only one of the dental topographical areas, being represented by crown fractures with or without affecting the pulp chamber, crown-root or root fractures or they can also involve the alveolar process. Another category of dental trauma can be represented by complete or incomplete dental dislocations, as well as traumatic tooth avulsion.

Material and method: In this study we presented the case of the 12-year-old patient with traumatic avulsion of the two upper central incisors. The interdisciplinary treatment performed was orthodontic and direct restorative. We used Herculite dental composites system from Kerr, Germany.

Discussions/Conclusions: The direct restorative composites are able to perform as an intermediate solution during the complex treatment when morphological dental transformations are required and to facilitate the objectives of the orthodontic treatment in frontal traumatic injuries.

Keywords: traumatic avulsion, orthodontic, restorative, composite, incisors

INTRODUCTION

In the last period, there is an increased frequency of dental-facial traumatic accidents in children and young people, by increasing the number of traffic accidents, sports accidents, and especially playgrounds accidents. It seems that this pathology is directly related to the intensification of road traffic, congestion and daily agitation, both in urban and rural environments.

It was found that the traumas of the frontal teeth represent, second to untreated dental caries, the major cause of the occurrence of large crown destructions in child and adolescent patients. According to Andersson [1, 2], the prevalence of traumatic dental injuries (TDIs) in children and adolescents is approximately 20% and varies little. Petti et al [3] found that traumatic dental injuries occur in both primary and permanent dentitions, although the prevalence in primary dentition is higher. So traumatic accidents in children and young people can affect temporary teeth, but also permanent teeth. According to some authors, the period of maximum frequency would be between 1-10 years, and according to others between 7-18 years, with the higher incidence in males [4, 5].

From the dental trauma classification system provided by Andreasen [6], the pathologies that can be treated by ameloplasty/ enameloplasty (associated with orthodontic treatment) are: enamel cracks and crown fractures without complications. But enameloplasty also finds its application in the treatment of dental avulsions, when the limiting teeth of the traumatically edentulous space are orthodontically moved in order to redistribute the space. As a result they require a "disguise" to be as close as possible to the shape, size and color of traumatic lost teeth.

The mechanism of producing dental-periodontal lesions can be directly (the traumatic forces acting on the dental structures) or indirectly, usually in forced occlusions, in the case of falls or hits on the chin, leading in some situations to the avulsion of the involved teeth [7-10].

Aim and objectives

The aim of this case report was to emphasize the use of direct composite restorative adhesive materials in a situation of traumatic injury of frontal upper incisors, with following partial avulsion. First the edentulous traumatic space was the subject of orthodontic treatment to re-distribute the remaining teeth for an improved occlusion and to prepare proper dental abutment axis for the future definitive prosthetic work. During the orthodontic treatment, due to aesthetic considerations, and to facilitate the orthodontic occlusal achievement, we „transformed" an upper lateral incisor into upper central incisor or an upper canine into an upper central incisor using direct adhesive composites placed into a conforming crown.

CASE REPORT

I. Anamnesis

This is the case of PM, 12-year-old female patient. She presented to the dental office after a fall in the street, with open mouth. The patient was clinically sound.

II. Clinical examination data

At clinical examination we discovered the following:

- the traumatic avulsion of the both upper central incisors
- the avulsed 2.1 remained gingivally embedded in a horizontal position
- the absence of the upper right lateral incisor (1.2)
- a treated carious lesion on 7.5

III. Paraclinical investigations

The initial OPT confirmed the absence of the bud of 1.2, and especially the 2.1 enclaved in gingival mucosa (Figure 1, arrow).

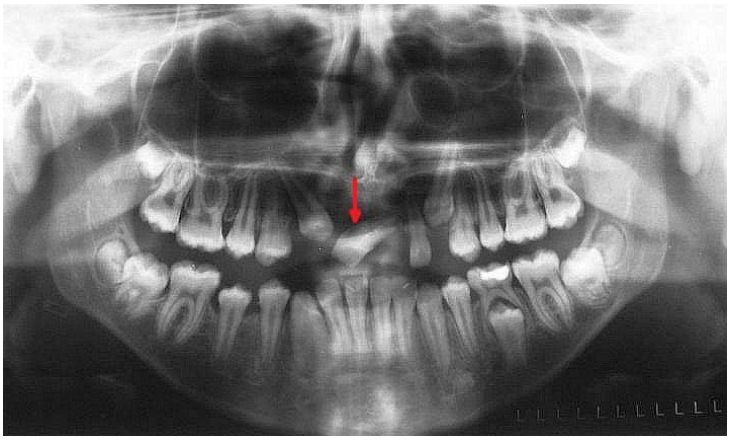

Figure 1. Patient PM, female, 12 years old, with traumatic avulsion of 1.1, 2.1 and anodontia of 1.2 (initial radiological appearance)

In a first stage, for the dental trauma with avulsion, the indication was for an emergency extraction of 2.1, the patient remaining under observation until the wound in the upper frontal area was completely healed.

Three months after the accident, the oral examination revealed the superposition of the lower frontal group through egression with the inversion of the incisal line, due to the lack of antagonists (Figure 2a) and an atypical swallowing by interposing the tip of the tongue in the edentulous space.

The complex diagnosis was:

- anodontia of the upper right lateral incisor (asymmetry),
- frontal open occlusion,
- occlusal-articular dysfunction,
- atypical swallowing, of traumatic etiology;

alteration of masticatory, physiognomic and self-maintenance functions.

a b

Figure 2. Intraoral appearance of patient PM, female, 12 years old, 3 months after the avulsion of 1.1 and 2.1 (a – occlusal, b – upper arch)

IV. Treatment and evolution

In this situation, the orthodontist followed the objectives of judicious redistribution of the existing spaces. This was performed in order to establish a final fixed prosthetic solution,

with the favorable placement of the future abutment teeth. So the orthodontic and restorative treatment were pre-prosthetic treatments.

After two years of orthodontic treatment, the mesial displacement of the lateral groups was obtained. In order to maintain the results, the orthodontist chose a palatal plate, with an artificial tooth next to 1.1 for physiognomic reasons, also acting as a temporary prosthesis. An important role in reaching this stage was played by the upper wisdom molars, which in their eruption process generated true mesialization impulses of the lateral teeth.

For the insertion of the lower frontal group, the orthodontist used a fixed appliance on the lower arch.

As far as we are concerned, after applying the device, we transformed 1.3 and 2.2 on their initial positions into approximate central incisors. This step was dictated by their morphology (Figure 3 and 4) and performed to obtain a minimum frontal overlap:

- 1.3 with a very high gingival margin and a large vertical dimension, and
- 2.2 with a smaller vertical dimension, the gingival border being approximately next to the lower portion of the cervical third of the vestibular face of 1.3 (Figure 3).

Figure 3. Patient PM, female, 14 years old, occlusal aspect with ameloplasty of 1.3 and 2.2 with composite materials placed in the celluloid cap/transparent crown

We used the method of direct enameloplasty with composite materials applied to the tooth surface by means of celluloid caps, with an increased interest in building the incisal angles and less in covering the vestibular face.

The work phases were:

- teeth isolation,
- demineralization of the working area with ortho-phosphoric acid 34% (UltraEtch, Ultradent, USA), for 20 s, washing with water and drying,
- application of the adhesive (OptiBond, Kerr, Germany) according to the manufacturer's instructions, then photopolymerized for 20 seconds.
- the choice from the celluloid caps kit (Frasaco, Italy) of two incisor-shaped caps that we adapted up to half of the gingivo-incisal distance, so that they cover only the incisal half of the crowns of the targeted teeth. We practiced at the incisal level 3 holes for the evacuation of the surplus material. Then we filled the caps with composite (A2, Herculite XRV, Kerr, Germany) taking care not to retain air voids, and applying them with pressure on the two teeth. After removing the excess composite, it was photopolymerized for 40 s (20 s on the vestibular side and 20 s on the palatal side). When the hardening of the composite resin was obtained, we removed the caps with one dental probe. [11, 12]

- occlusion adaptation (static and dynamic) of the obtained surfaces and finishing with finishing discs (OptiDisc, Kerr, Germany), points, cups and brushes with polishing paste.

We left most of the vestibular faces intact in order to place brackets to move the reshaped teeth towards the midline. One of the reasons for adopting this solution was to fix the bracket directly on the tooth enamel and not on a composite construction, in order to have an intimate control over the dental movements.

Until that prosthetic phase was reached, we found with satisfaction that after another two years of orthodontic treatment (fixed and mobile) the two modified teeth reached the frontal median area, with a point of contact, and the composite restorations by enameloplasty in the celluloid cap behaved honorably throughout this interval (Figure 4).

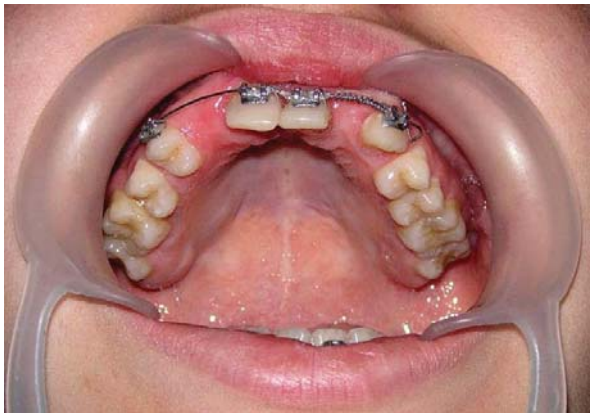

Figure 4. Patient PM, female, 16 years old, stage of orthodontic treatment, with placement of 1.3 and 2.2 on the space of the upper central incisors and their crowns remodeled by enameloplasty

DISCUSSIONS

In these "traumatizing" situations enameloplasty finds its usefulness, managing to bring simple, fast, relatively rapid solutions through the use of adhesive composite materials. These solutions can be temporary, but sometimes also "definitive". In support of what has been stated [13-15], we believe that the presented case can be an argument.

Insertion of the composite material with the help of a transparent celluloid cap/ crown matrix as a conformer, adapted to the dental structure (in the case of restoration of the entire dental morphology) or of a half adapted to the dental structure and proximal to the prepared surface (in the case of restoration of only a portion of the dental morphology) applied to the tooth that is to be restored can lead to favorable and quick solutions.

As general indications for manipulation, the literature and manufacturers propose that on the preparation for adhesion, a quantity of composite is applied with the help of a spatula moistened in adhesive, after which the crown matrix is filled with composite material and placed on tooth in the correct position and with pressure [12]. It will be photopolymerized for a longer time (60 s) vestibular and oral, and the excess will be removed. In the case of using an integral celluloid cap, small holes can be made in the incisal portion to facilitate the evacuation of excess material. Surface finishing is done with sharpened diamond cutters, and marginal finishing with flexible discs. The restoration must be checked in the centric relation position, in propulsion and laterality.

CONCLUSIONS

A particularization of the techniques of applying direct composite materials by layering are the veneers.

Most likely, the final prosthetic solution in our case will be through esthetic bridges or prosthetics on implants for the morpho-functional restoration of the traumatized area.

Although this time the enameloplasty was a temporary, intermediate solution during the complex treatment, the mechanical qualities of the micro-hybrid composite resin - Herculite XRV, Kerr, Germany – such as high resistance to compression / bending or wear resistance, as well as the color adaptation made this type of material to be chosen by us as a ultimate solution for crown remodeling of the incisal portion of the front teeth, we hope successfully.

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