

# Management of a Complex Dentoalveolar Trauma: A Case Report

Moara DE ROSSI<sup>1</sup>  
Andiara DE ROSSI<sup>2</sup>  
Alexandra Mussolino de QUEIROZ<sup>2</sup>  
Paulo NELSON-FILHO<sup>2</sup>

<sup>1</sup>Department of Pediatric Dentistry, Piracicaba Dental School, State University of Campinas, Piracicaba, SP, Brazil

<sup>2</sup>Department of Pediatric Clinics, Preventive and Community Dentistry, Ribeirão Preto Dental School, University of São Paulo, Ribeirão Preto, SP, Brazil

This paper describes the case of a 12-year-old male patient who presented a severe lateral luxation of the maxillary central incisors due to a bicycle fall. Treatment involved suture of the soft tissues lacerations, and repositioning and splinting of the injured teeth, followed by endodontic treatment and periodontal surgery. After a 2-year follow-up, clinical and radiographic evaluation revealed that the incisors presented satisfactory esthetic and functional demands.

Key Words: dentoalveolar trauma, lateral luxation, soft tissue, permanent tooth.

## INTRODUCTION

Traumatic injuries in young children and adolescents are a common problem that usually results from accidents, contact sports, falls, and violence (1,2). In the permanent dentition, the peak age of trauma incidence is between 8 and 10 years (3), and the most commonly affected teeth are the maxillary central incisors (1,4-7). Traumatism in permanent dentition can appear rather severe, particularly when dental tissue injuries are associated with trauma to supporting tissues (8).

The most common types of injuries affecting periodontal tissues are luxations, whose prevalence varies from 15 to 61% (1). Luxation diagnosis depends on clinical and radiographic findings; laterally luxated teeth often have their crowns displaced palatally, which usually results in comminution or fracture of the labial alveolar bone and considerable injury to the periodontal ligaments (1). Although luxation can be clinically diagnosed, a radiographic examination must be done to ensure that it is the only injury (1,3). Because traumatic injuries are difficult to treat, the correct diagnosis must also be associated with prompt treatment and a long

follow-up period so that the treatment is successful (1,9).

This paper describes the treatment of a severe traumatic injury involving the extraoral soft tissues extending from the upper lip to the nose, as well as intraoral structures, namely the upper lip mucosa, the maxillary central incisors and the surrounding periodontal tissues in a 12-year-old boy followed up for a period of 2 years.

## CASE REPORT

A 12-year-old Caucasian male patient was brought by his parents to the Emergency Unit of the Pediatric Dentistry Clinic of Ribeirão Preto Dental School, University of São Paulo (Brazil), about 10 h after a bicycle fall that resulted in dental trauma. The child had already been seen by the medical staff of the emergency unit of a local hospital, where suture of the extraoral tissues was done and no neurological damage or medical complications were detected. Past medical history was reviewed and a signed, written informed consent form was obtained from the parents for treatment and further publication of the case. The patient was in excellent health with no remarkable past medical history.

Clinical examination showed nasal and maxillary lip bruises, as well as laceration of the maxillary labial mucosa and buccal gingiva at the maxillary permanent central incisors, which had a lateral luxation and hypermobility. There was an alveolar bone wall fracture in this area and the roots were visible with no fractures. The right central incisor presented enamel cracking and fracture (Fig. 1). Periapical radiographic examination did not show root fracture or any other injuries involving other teeth. Lateral radiograph revealed fracture of the labial alveolar bone with the roots of the maxillary central incisors displaced buccally and the crowns displaced palatally.

The surgical treatment consisted of repositioning the teeth and bone fragments by finger pressure, with the patient under local anesthesia. A periapical radiograph was taken to ensure that the teeth had been correctly positioned in the socket. The teeth were splinted from canine to canine with composite resin and a 0.7 orthodontic wire, and the lacerated soft tissues were sutured (Fig. 2). Clinical treatment included antibiotic (Amoxil 500 mg; GlaxoSmithKline, Rio de Janeiro, RJ, Brazil) and antiinflammatory (Cataflam 500 mg; Novartis, São Paulo, SP, Brazil) agents. The parents were informed about the importance of maintaining meticulous oral hygiene, regularly returning for clinical and radiographic follow up.

After 15 days, both central incisors were treated endodontically and dressed with a calcium hydroxide-based paste [Calen; S.S. White, Rio de Janeiro, RJ, Brazil; composition: 2.5 g CH, 0.5 g zinc oxide, 0.05 g colophony

and 1.75 mL polyethylene glycol 400 (vehicle)]. The crown fracture of the right central incisor was restored with composite resin. After 30 days, the calcium hydroxide paste was renewed, and the patient was asked to return for follow-up. However, the child failed to return to the Pediatric Dental Clinic for follow up, so the splinting was not removed and the root canals were not obturated.

Six months after the last follow-up visit, the patient returned to the Periodontic Dental Clinic, with loss of labial alveolar bone and gingival recession in the maxillary central incisors area (Fig. 3), where an acellular dermal matrix graft (Alloderm; Lifecell Corporation, Branchburg, NJ, USA) was done for esthetic repair. However, the patient failed again to cope with treatment and came to the Pediatric Dental Clinic only 3 months after the periodontal surgery, at which time the splint was removed and the root canals were obturated with gutta-percha and a calcium hydroxide-based sealer (Sealapex; Kerr Corporation, Orange, CA, USA) (Fig. 4).

The patient was recalled regularly. At 2 years follow-up, clinical and radiographic examination showed healthy tissues and teeth, and both incisors presented satisfactory functional and esthetic demands (Fig. 5).

## DISCUSSION

The 12-year-old boy of this case report had a complex traumatism involving dentoalveolar structures and soft tissues, caused by a bicycle accident. In fact,

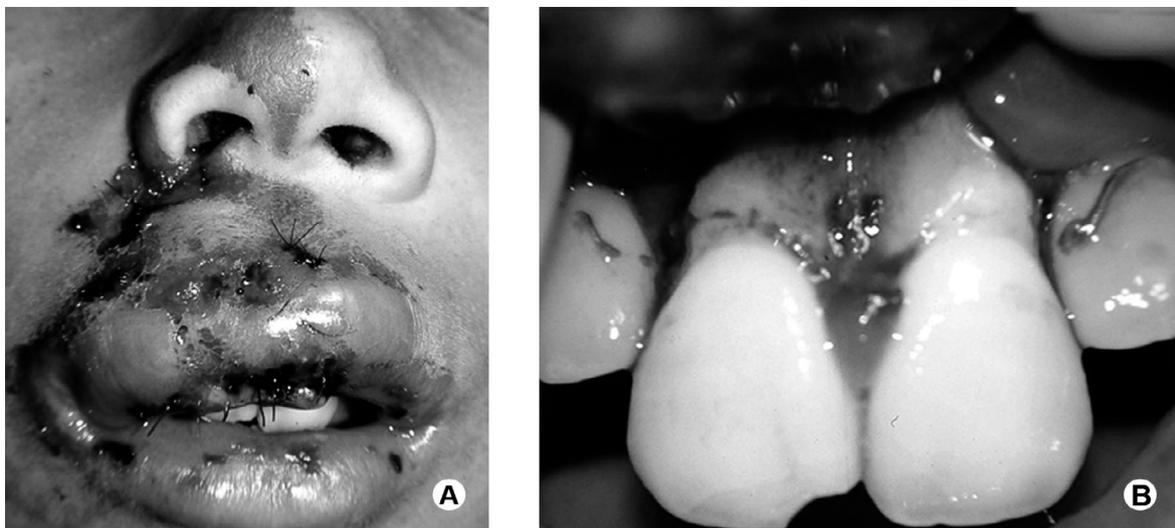


Figure 1. Initial clinical view following traumatic injury. A= Sutured extraoral soft tissue extending from the upper lip to the nose is shown. B= Both maxillary central incisors and the alveolar bone are displaced, and the right central incisor has a crack on the enamel.

male traumatic injuries to permanent dentition appear to be more severe and are among the variety of conditions that can cause trauma. Indeed, accidents involving bicycles or other sports activities account for 30% of the injuries to the facial region (2).

The time interval elapsed since injury is very important because it influences the choice of treatment (1,4). According to Andreasen et al. (1), repositioning of the dislocated teeth is more difficult after 48 h of the injury. In the present case, the repositioning was performed around 10 h after the injury, so treatment was possible and led to satisfactory results.

Pulp necrosis is an important consequence of luxation injuries and its development depends on the type of injury and the stage of root maturation. It is most frequent in mature teeth compared to teeth with open

apices (10). Studies have shown that if loss of vitality or root resorption is present, the pulp must be removed and a dressing of non-setting calcium hydroxide must be placed in the canal, to prevent toxins of the necrotic pulp from triggering an inflammatory resorption (11,12). In the present report, an endodontic treatment including dressing of the root canal with a calcium hydroxide-based paste was performed, which is usually necessary in the case of teeth with mature apices undergoing large



Figure 2. Clinical view showing the repositioned teeth with light-curing resin and orthodontic wire as well as sutured gingival tissue.



Figure 3. Clinical view 6 months after the injury. The splints are still present. Loss of buccal alveolar bone and gingival recession in both maxillary central incisors.



Figure 4. Periapical radiograph taken after root canal treatment.



Figure 5. Clinical view 2 years after the injury. The right central incisor was restored with composite resin. The appearance, gingival contour, and function were normal.

luxations (13).

After lateral luxation, immediate reposition and stabilization of the teeth in their anatomically correct positions are essential to optimize healing of the periodontal ligament and neurovascular supply, while maintaining esthetic and functional integrity (14). The splinting period indicated for periodontal ligament therapy is 2-4 weeks, but in cases of lack of periodontal support or breakdown of marginal bone, as in the present situation, the ideal splinting time must be extended to 8 weeks (4,15). In the present case, removal of the splint occurred only after 9 months because the patient failed to cope with the treatment plan. Splinting with orthodontic wire and composite resin for stabilization of traumatically displaced teeth, as performed in the present case, has been reported to lead to satisfactory results (16), since it allows for physiologic mobility and easy cleansing. These features may have prevented complications like dental ankylosis and dental biofilm accumulation, despite the prolonged splinting period. The meticulous oral hygiene maintained by the patient was also important to prevent any periodontal inflammation that might have been harmful to the treatment.

The loss of marginal bone support is common in cases of alveolar bone wall fracture (1), the use of an acellular dermal matrix has been considered as one of the best treatments for root coverage, reduction of recession, and gain of clinical attachment (17,18). In the present case, the labial alveolar bone was lost and a periodontal surgery with Alloderm resulted in a greater formation of keratinous tissue and an esthetically acceptable gingival contour.

It is impossible to completely prevent accidents that might result in dental injuries (2), but their associated complications can be avoided by ready and adequate treatment and follow-up. In the present case, although the patient missed the follow up for about 6 months, the correct diagnosis and treatment were crucial to the successful management and preservation of the traumatized teeth. Finally, it should be highlighted the importance of a multidisciplinary treatment of traumatic injuries, such as in the present case, in which endodontic, restorative and periodontal procedures were combined to recover the esthetics and function of the traumatized area.

## RESUMO

Este artigo apresenta o caso de um paciente de 12 anos de idade que apresentou uma luxação lateral severa dos incisivos centrais superiores decorrente de uma queda de bicicleta. O tratamento

envolveu a sutura dos tecidos moles dilacerados e reposicionamento e fixação dos dentes traumatizados, seguidos por tratamento endodôntico e cirurgia periodontal. Após um acompanhamento de 2 anos, a avaliação clínica e radiográfica revelou que os incisivos apresentavam exigências estéticas e funcionais satisfatórias.

## REFERENCES

1. Andreasen JO, Andreasen FM, Andersson L. Textbook and color atlas of traumatic injuries to the teeth. 4th ed. Oxford: Blackwell; 2007.
2. Blinkhorn FA. The aetiology of dentoalveolar injuries and factors influencing attendance for emergency care of adolescents in the North West of England. *Endod Dent Traumatol* 2000;16:162-165.
3. Andreasen JO, Ravn JJ. Epidemiology of traumatic dental injuries to primary and permanent teeth in a Danish population sample. *Int J Oral Surg* 1972;1:235-239.
4. Dewhurst SN, Mason C, Roberts GJ. Emergency treatment of oral dental injuries: a review. *British J Maxillofacial Surg* 1998;36:165-175.
5. Schwatz S. A one year statistical analysis of dental emergencies in a pediatric hospital. *Ped Dent* 1994;60:959-964.
6. Ramos-Jorge ML, Peres MA, Traebert J, Ghisi CZ, de Paiva SM, Pordeus IA, et al. Incidence of dental trauma among adolescents: a prospective cohort study. *Dent Traumatol* 2008;24:159-163.
7. Ivancic JN, Bakarcic D, Fugosic V, Majstorovic M, Skrinjaric I. Dental trauma in children and young adults visiting a University Dental Clinic. *Dent Traumatol* 2009;25:84-87.
8. Jacobsen I, Andreasen JO. Traumatic injuries - examination, diagnosis and immediate care. In: Pediatric dentistry - a clinical approach. Koch G, Poulsen S (Editors). Copenhagen : Munksgaard; 2001. p. 351-379.
9. Rusmah M. Traumatized anterior teeth in children. A 24 months follow-up study. *Aust Dent J* 1990;35:430-443.
10. Andreasen FM. Pulpal healing after luxation injuries and root fracture in the permanent dentition. *End Dent Traumatol* 1989;5:111-131.
11. Seddon RP. Concomitant intrusive luxation and root fracture of a central incisor - report of a case. *End Dent Traumatol* 1997;13:99-102.
12. Cvek M. Treatment on non-vital permanent incisors with calcium hydroxide. II. Effect on external root resorption in luxated teeth compared with effect of root filling with guttapercha. *Odont Revy* 1973;24:343-354.
13. Nikoui M, Kenny DJ, Barrett EJ. Clinical outcomes for permanent incisor luxations in a pediatric population. III. Lateral luxations. *Dent Traumatol* 2003;19:280-285.
14. American Academy on Pediatric Dentistry Council on Clinical Affairs. Guideline on management of acute dental trauma. *Pediatr Dent* 2008-2009;30:175-183.
15. Andreasen JO, Borum M. Replantation of 400 avulsed permanent incisors. *Endod Dent Traumatol* 1995;11:51-58.
16. Oikarinen K. Tooth splinting: a review of the literature and consideration of the versatility of a wire-composite splint. *End Dent Traumatol* 1990;6:237-250.
17. de Souza SL, Novaes AB Jr, Grisi DC, Taba M Jr, Grisi MF, de Andrade PF. Comparative clinical study of a subepithelial connective tissue graft and acellular dermal matrix graft for the treatment of gingival recessions: six- to 12-month changes. *J Int Acad Periodontol* 2008;10:87-94.
18. Aichelmann-Reidy ME, Yukna RA, Evans GH, Nasr HF, Mayer ET. Clinical evaluation of acellular allograft dermis for the treatment of human gingival recession. *J Periodontol* 2001;72:998-1005.

Accepted August 11, 2009