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RESEARCH ARTICLE

PREDICTABILITY AND SUCCESS IN THE FUNCTIONAL RECOVERY AND THE AESTHETICS OF LATE POSTOPERATIVE DENTAL REIMPLANTATION SMILE IN A PATIENT WITH CEREBRAL PALSY - CASE REPORT

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ABSTRACT

Dental avulsion is a dento-alveolar lesion consisting of the total displacement of the tooth from its alveolus. It causes many functional, aesthetic and psychological damages and constitutes a dental emergency. It presents a dubious prognosis, and is still considered a challenge for dental surgeons. Treatment depends on several factors, however, dental reimplantation should be the first-choice therapeutic possibility when possible. This paper reports the case of a patient with moderate cerebral palsy, who in a skateboard accident had his right upper central incisor fully avulsed. Late dental reimplantation was performed, with therapeutic protocol including high- and low-power laser application, drug endodontic therapy and 4-year proservation. It was concluded that late dental reimplantation is a therapeutic possibility that facilitates, is effective and is recommended for avulsed teeth, rescuing the aesthetics, and psychologically replacing the patient in his social life, mainly because he is a patient with special needs, promoting improvements in his quality of life.

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INTRODUCTION

Cerebral palsy (CP) is a static brain injury that can be defined as a non-progressive movement disorder and posture. It is commonly associated with epilepsy and speech, hearing, vision and mental retardation abnormalities. These patients require special and intensive care not only of the disease, but also in the prevention of associated factors such as oral problems. The oral diseases that affect CP patients are the same in the general population (caries, periodontal disease, malocclusion, bruxism, enamel hypoplasia), but they usually occur more frequently in the cerebral paralyzed due to a series of associated factors such as poor oral hygiene, type and consistency of feeding, medication use, facial musculature, lack of information and access to dental services. (Grant *et al.,* 1989, Colver *et al.,* 2014, Braun *et al.,* 2016). In patients with special needs, and among those with a diagnosis of cerebral palsy, episodes of dental avulsion are relatively common. This is due to spasticity, difficulty in locomotion and balance. The constant falls that they suffer can lead to a trauma, and the complete separation of a tooth from its alveolus is common.

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The prevalence between 0.5 and 16% of dental traumatisms occur in permanent teeth and 7 to 13% in deciduous teeth. The highest incidence is for the upper incisors of children between 8 and 12 years old, at a ratio of 2: 1 for boys. (Stigger *et al.,* 2013, Maenner *et al* 2016, Stavsky *et al.,* 2017). Andreasen *et al* 1995; Barrett *et al.,* 1997; Campos *et al* 2006; Ishida *et al.,* 2013; Kostka *et al.,* 2014; Deep *et al.,* 2013; Carrol *et al.,* 2014) reported that the dental reimplantation consists of the repositioning of the tooth to its normal anatomical position, aiming at restoring the aesthetic and functional function. Several factors may influence the prognosis of reimplantation, such as length of stay outside the tooth socket, means of preservation, the timing of endodontic treatment, type of medication used, conditions of oral hygiene of the patient, general health, among others. The immediate reimplantation is the one that happens with the extra alveolar time of up to 1 hour and that the dental element has been kept in physiological medium, as saline, milk or saliva. The mediate reimplantation is one whose extra alveolar time is greater than 1 hour. In this case, the prognosis may be better considered if the dental element was stored in physiological medium, except for saliva. Saliva is mildly hypotonic and the bacteria present can impair healing by stimulating an inflammatory response. (Rodrigues *et al* 2010, Rebouças *et al.,* 2013, Inês *et al.,* 2016, Khinda *et al.,* 2017).

In the immediate reimplantation, whose tooth was kept outside the socket for long periods, it is recommended to remove the necrotic periodontal ligament, so as not to stimulate the resorptive process, and immediate onset of endodontic therapy. With this, attempts are made to minimize the processes of reabsorption and ankylosis, to maintain the dental element for longer in the mouth. (Sani *et al*., 2009; Poi *et al*., 2013, Silva Jr *et al*., 2015, and Navit *et al* 2017). For cases of immediate reimplantation, it is recommended to begin endodontic therapy after 7 to 14 days to avoid traumas to the cells of the periodontal ligament that are in the process of resting. The most severe sequelae of dental reimplantation are external root resorptions, especially inflammatory and substitutive ones. Inflammatory reabsorption occurs due to the necrotic remains and contaminations of the dentinal tubules, whose control depends on the good cleaning and disinfection of the root canal. Replacement resorption occurs due to damage to the periodontal ligament, leading to replacement of dental tissue by bone tissue, evolving to loss of the element in a short time. (Sousa *et al*., 2005; Uchoa *et al*., 2009, Zanarotti *et al*., 2009, Simşek *et al.,* 2012, Vitorino *et al.,* 2013, Tuna *et al.,* 2014).

CLINICAL CASE REPORT

Patient MGL, male, melanoderma, 16 years old, with systemic medical diagnosis of moderate cerebral palsy and advanced cognitive deficit, took a skateboarding crash and hit his mouth on the floor, element 11 had avulsion.

Fig. 1. Loss of element 11, alveolus in view

At this moment, the mother found him crying a lot and complaining that he had lost his tooth and that he was now ugly. The mother searched for the tooth and found it on the floor, took it with her hands and without washing it, stored it in milk in the refrigerator. After 6 days, he sought the Emergency Clinic of the School of Dentistry of UNIP for evaluation and conduct. In this urgent consultation, the boy cried a lot and wanted his tooth in place. In the intra-oral clinical evaluation, an empty cell was observed, without fracture and with aspect of being free of contamination. Periapical and panoramic radiographic examination can verify the alveolar integrity and absence of fracture of the adjacent teeth. The conditioned tooth also looked healthy and well hydrated. It was decided to attempt a late dental reimplantation, even knowing that this tooth could remain in the buccal cavity for a doubtful period of time, but that it would be the time necessary for the patient to accept his condition for later treatment more adequate and definitive with implant dental or fixed partial denture.

Fig. 2. Periapical Rx confirming the loss of element 11

Fig. 3. Avulsed dental element

Next, the preparation of the avulsed dental element was carried out. It was initiated by manual scraping of the root for removal of necrotic remains of the periodontal ligament.

Fig. 4. Endodontic preparation stage of opening and contour of access to the pulp chamber

Next, the pulp chamber access surgery was performed for endodontic treatment and disinfectant penetration followed by surgical chemical preparation.

Fig. 5. Stage of root canal emptying and intraradicular sanitization by disinfectant penetration

For irrigation and disinfection of the canal 2.5% sodium hypochlorite was used. After this, the pulsed Nd: YAG laser was applied with 1.5W power, 100mJ power and 15Hz frequency. A 300µm optical fiber was used for application inside the root canal and on the outer surface of the entire root portion, to complement the disinfection, promote the dentin fusion and resolidification, creating a crystalline structure and obliterating the dentinal tubules.

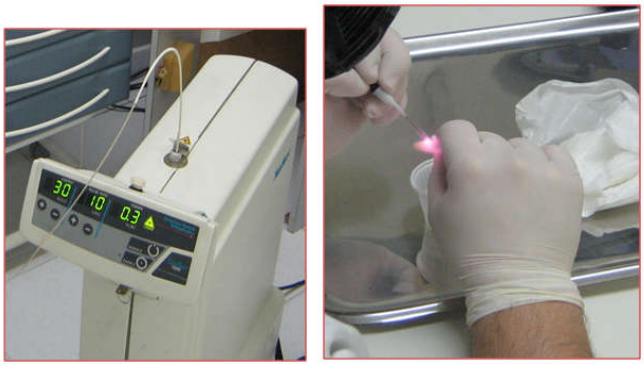

Fig. 5. and 6. Irradiation with high intensity laser (Nd: YAG)

Next, calcium hydroxide and coronary cavity sealing with modified resin-ionomer cement were placed as intracanal medication.

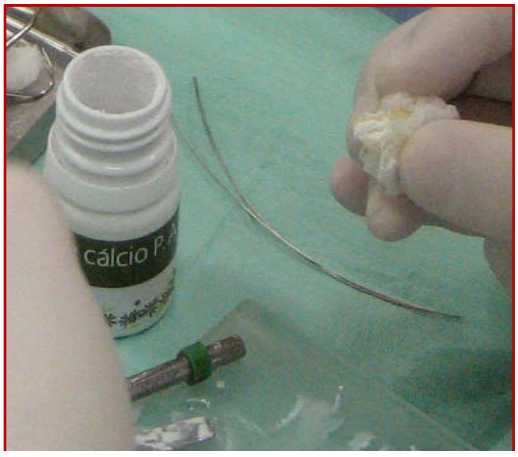

Fig. 7. Temporary sealing of the conduit with calcium hydroxide PA and Sealing with resino-modified CIV

The element was then placed in sterile physiological solution to wait the opportune moment for the reimplantation. Preparation of the alveolus was begun to perform the reimplantation. For this, an infiltrative anesthesia was injected from the alveolar region and complemented with anesthesia by palatine. Curettage of the alveolus was performed with surgical curettes to induce new bleeding and alveolar filling.

Fig. 8 and 9. Infiltrative anesthesia and curettage of the alveolus with induction of new bleeding

Next, the dental element was inserted into the newly opened socket.

Fig. 10 and 11. Replantation of the 11 and the positioned element

Acid etching with hydrofluoric acid was performed on the buccal enamel surface of elements 12, 11 and 21, followed by abundant air / water wash under relative insulation and salivary control by means of a high power suction pump, due to the impossibility of performing absolute isolation. The relative insulation was changed and the dental adhesive was applied, followed by photopolymerization.

Fig. 12 and 13. Preparation of the Rigid Containment and the installed containment

Orthodontic yarn was adapted with the curvature of the teeth mentioned above and the yarn was fixed with photoactivated composite resin, thus finalizing the containment of the element 11. The bite test was performed with carbon paper and the element was slightly worn dental implant so that it did not remain in occlusion and did not suffer the masticatory forces.

This was followed by the application of the low power laser of J. Morita, 660mW of power for 2 minutes and 20 seconds, totaling 4J / cm2 per point, 3 points per vestibular and 3 points per palatal, following the orientation of the alveolus.

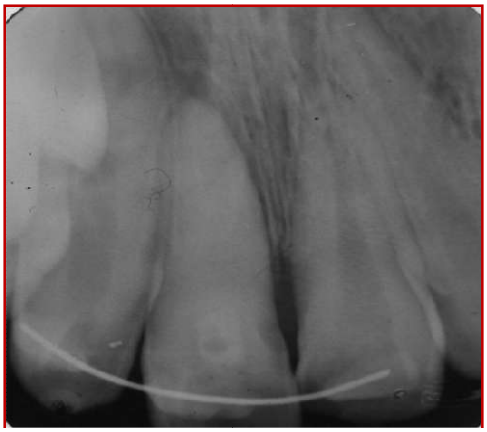

Fig. 14 and 15. Application of the low power intensity laser and periapical x-ray confirming the positioning and splinting of the dental element

A periapical radiograph was then performed for the first proservation. It was prescribed antibiotic therapy with amoxicillin 500mg of 8/8 hours for 7 days, anti-inflammatory nimesulide 100mg of 12/12 hours for 4 days and analgesic paracetamol 500mg if it was necessary, of 4/4 hours. The next day, the first postoperative evaluation was performed. The oral conditions looked normal. A low-power laser was applied with the same intensity, one per vestibular and one palatino. The second postoperative evaluation was performed on the tenth day of surgery. A new periapical radiograph was performed in which tissues with normal aspects, both radiographically and clinically, were observed.

Fig. 16 and 17. Control on the 10th day post reimplantation

Fig. 18 - 10 days after

Fig. 19 - 30 days after

Fig. 20 - 3 months after

Fig. 21 - Periapical Rx

Fig. 22 - Replanted tooth

Fig. 23 - Root canal filling with 90 days of reimplantation

Ample irrigation with 2.5% sodium hypochlorite was then performed and new intracanal medication was introduced with calcium hydroxide. We performed the 30-day control with radiography, analysis of root containment and new exchange of intracanal medication. A new exchange of intracanal medication was repeated at 50 daysand at 90 days, irrigation of the root canal and final filling were performed, followed by cleaning the pulp chamber with 70% alcohol to remove cement residues, thus avoiding the darkening of the dental element. The root entrance sealing was performed with glass ionomer cement, acid conditioning of the dentinal walls of the interior of the pulp chamber, followed by air / water spray washing, plus drying of the cavity.

The dental adhesive and photo polymerization were then applied. Then, the final restoration was performed with light-cured composite resin, which was inserted by the incremental method until complete restoration of the dental element. In the same session, the containment of the dental elements was removed. The occlusion was again verified where once again the element was left in infra occlusion. A further radiograph was performed to check the canal filling and the surrounding tissues. At the 13-month evaluation, small root resorption was observed in the apical region, which appeared to be stable during the other months of proservation. The patient was very collaborative throughout the procedure, even at the surgical moment. He remains very happy and encouraged to better maintain his oral conditions with mechanical control of bacterial plaque by means of brushing technique and through periodic preventive consultations to perform prophylaxis and topical application of fluoride. The patient is in proservation until the present day.

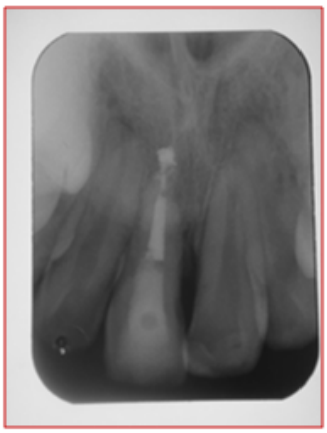

Fig. 24 and 25 - discrete root resorption and reimplanted element after 13 months

Fig. 26 and 27 - Periapical Rx and clinical picture of the patient after 4 years

DISCUSSION

Dental reimplantation is still a challenge for dentistry and its success depends on several factors ranging from the storage of the dental element to technical and therapeutic conduct. Pulpal necrosis and periodontal ligament damage are the main complications in the dental reimplantation. The maintenance of the aseptic chain achieved during treatment related to dental reimplantation is fundamental, since microorganisms and their products play an important role in the etiopathogenesis of diseases related to this type of intervention. (Barrett *et al.,* 1997, Campos *et al* 2006, Ishida *et al.,* 2013, Kostka *et al.,* 2014, Deep *et al.,* 2013, Carrol *et al.,* 2014). Research by Stigger *et al.,* 2013; Maenner *et al* 2016; Stavsky *et al*., 2017, reported that even if care has been taken in the clinical phases of the reimplantation process, and that all means have been exhausted for repair, failure may occur. In these cases, microorganisms located in cementation resorption gaps, in the cement itself, in possible lateral channels, in dentinal tubules, may be responsible for external root resorption, mainly inflammatory and substitutive. The negative effects of pulpal infection and periodontal ligament damage during avulsion should be attenuated by immediate reimplantation or, in the absence of such conduct, adequate storage media (reimplantation mediated) followed by endodontic treatment.

When the cells of the periodontal ligament are not viable, the treatment is aimed at minimizing the effects of necrotic periodontal ligament remnants, in order to delay the onset of root resorption, increasing the expectation of reimplanted tooth survival reported by Sanabe *et al*. al, 2009; Poi *et al.,* 2013; Silva Jr *et al* 2015; Navit *et al* 2017. Sousa *et al*., 2005; Uchoa *et al*., 2009; Zanarotti *et al.,* 2009; Simşek *et al.,* 2012; Vitorino *et al.,* 2013; Tuna *et al*., 2014, advocated the complete removal of the devitalized periodontal ligament by mechanical means. Others suggest the treatment of the remnants of the periodontal ligament with acidic substances (hydrochloric, citric, phosphoric and ascorbic acid) without the need for total removal of the necrotic tissue. However, the biocompatibility of the necrotic periodontal ligament treated with acids still needs studies with a longer period of post-clinical evaluation. In order to reduce the problems related to tissue necrosis, such as root resorption, we opted for the medial dental reimplantation, with endodontic therapy associated with the application of Nd: YAG and GaAlAS lasers. The Nd: YAG laser was used as an auxiliary tool in the operative procedure, reducing to levels close to zero the number of bacteria in both the root canal and the external root surface.

The control of pain, edema and inflammation was achieved through the low power laser, GaAlAs, applied during the therapeutic process with the purpose of tissue biomodulation, evidenced positively by Deep *et al.,* 2013; Carrol *et al*., 2014. The use of the lasers in the case reported occurred considering their properties as to vaporize the mineralized fabric resulting in melting or crystallization, antimicrobial effect and cleaning ability. The use of high power lasers in endodontic treatment has become possible with the introduction of optical fibers capable of conducting the energy emitted into the root canals. With this, soft tissue evaporation, dentin melting and melting and antimicrobial action were achieved. The fusion and resolidification of the enamel, dentin and cement matrix when exposed to laser radiation is recognized by creating a new crystalline structure obliterating dentinal tubules described by Simşek *et al.,* 2012; Deep *et al.,* 2013; Carrol *et al*., 2014. During the endodontic treatment of this dental element, the calcium hydroxide paste was used as therapeutic complementation.

This medication, because it is a highly alkaline material (pH12.5), has antimicrobial properties, promoting acceleration in the tissue repair process, inhibiting osteoclastic activity, preventing the entry of granulation and exudate tissue, and promoting the formation of hard tissue near the root apex. There was a negative aggravation in this treatment due to the extra-oral time of the dental element, however, the conducts performed assured us much confidence and expectation of success, as to the length of time this dental element remains in the oral cavity. In this way, getting the time to work the psychological aspect of this patient with cerebral palsy was an important issue that was considered. The patient wanted his tooth to be replaced and he had no understanding of possibilities and failures. His mother followed the whole process and was responsible for the proposed treatment, signed the free and informed consent.

This case has been proserved for 4 years. There was a small root resorption in the apical portion of the element, which is being controlled by periodic radiographs. Replacing this element with a dental implant is a long-term possibility. Today, the patient is 20 years old and now, this option can be taken into account, since the growth and development phase has already been completed. Interpersonal relationships are fundamental for establishing a better understanding between patient and professional. This has to think of the individual as a "being" and not just worry about its symptomatology. People wait for technically competent professionals, but they want it to have the most humanistic aspect in dental practice, because the more the dentist understands and creates bonds with the people who seek him, the more positive the treatment can become.

Conclusion

The late dental reimplantation is a therapeutic possibility in cases of dental avulsion, with great possibility of success, being, therefore, the best conduct when it comes from patient in growth phase until complete maturation of the skeletal system. The replacement of this element by dental implant, if failure occurs in the treatment of reimplantation, is the most appropriate therapeutic possibility for future rehabilitation. The satisfaction demonstrated by the patient in special needs conditions should lead to reflections, that the attempts for a rehabilitation is of great magnitude in the satisfaction of the patient improving his quality of life and his personal satisfaction.

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