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ORIGINAL ARTICLE

Prevalence of permanent teeth avulsion in a brazilian trauma center: a 12 years retrospective study

Prevalência de avulsão de dentes permanentes em um centro de trauma brasileiro: estudo retrospectivo de 12 anos

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ABSTRACT

Objectives: The aim of this study is to perform a retrospective study of cases of avulsion of permanent teeth in patients from 12 years of the Oraldental Trauma Center (CENTRAU) of the School of Dentistry of Faculty of Pharmacy, Dentistry and Nursing in Federal University of Ceara. **Material and Methods:** A retrospective transversal study characterized by direct observation of dental records was performed of a spontaneous demand sample of dental trauma victims who presented to the Oraldental Trauma Center of UFC (CENTRAU) during the period from May 2001 to May 2013. **Results:** The analysis was done on 1,104 records, in which 66 patients reported having been victims of avulsion with 88 avulsed permanent teeth with ages ranging between 6 and 30 years. Among the 88 avulsed teeth, 59 (67.04%) were replanted. Only in 9 (15.5%) cases replantation was immediate. The storage medium that was the most widely used was the oral cavity by 8 (30.7%) patients. In 26 (39.4 %) cases, the cause of avulsion was falling to the ground. **Conclusion:** In this study, it was clear that cases of avulsion in CENTRAU corresponded to a low occurrence of all cases seen in the center.

KEYWORDS

Tooth avulsion; Tooth replantation; Prevalence.

RESUMO

Objetivo: O objetivo deste estudo é realizar um estudo retrospectivo dos casos de avulsão de dentes permanentes em pacientes de 12 anos do Centro de Trauma Bucodentário (CENTRAU) da da Faculdade de Odontologia da Faculdade de Farmácia, Odontologia e Enfermagem da Universidade Federal do Ceará. **Material e Métodos:** Foi realizado um estudo retrospectivo transversal caracterizado pela observação direta de arquivos de exames dentários de uma demanda espontânea de vítimas de traumas dentários que se apresentaram ao Centro de Trauma Bucodentário (CENTRAU) durante o período entre Maio de 2001 a Maio de 2013. **Resultados:** A análise foi realizada em 1.104 arquivos, dentre os quais 66 pacientes reportaram ter sido vítima de avulsão dentária com 88 dentes tendo sido avulsionados, com idades variando entre 6 e 30 anos. Dentro os 88 dentes avulsionados, 59 (67,04%) foram reimplantados. Apenas 9 (15,5%) casos o reimplante foi imediato. O meio de armazenamento mais utilizado foi a cavidade oral, por 8 (30,7%) pacientes. Em 26 (39,4%) casos, a causa de avulsão foi queda. **Conclusão:** Nesse estudo, ficou claro que os casos de avulsão do CENTRAU corresponderam a uma baixa ocorrência dentre os casos atendidos neste centro.

PALAVRAS-CHAVE

Avulsão dentária; Reimplante dentário; Prevalência.

INTRODUCTION

Traumatic injuries are quite common in young people, especially among children between 8-11 years [1-4]. Trauma in the facial region occurs frequently and represents about 5% of cases of people seeking treatment, increasing to 18% in preschool children [1,5]. Among the facial injuries, dental are the most prevalent [5], but there are no agreements between epidemiological studies, where the prevalence may vary from study to study and between different regions. Among the dental injuries, avulsion is about 0.5 -18.3 % of all dental injuries [6], which is considerated a public health problem, although showing low prevalence.

Avulsion is a traumatic injuries which can cause serious complications [4] and is defined as the complete separation of tooth from its socket, occurring disruption of the periodontal ligament fibers, a part of them remain adhered to the cement tooth and the other part to the alveolar bone, thus compromising dental pulp, periodontal ligament and alveolar bone [7].

The treatment of choice for dental avulsion is replantation [1], a procedure that consists on the rehabilitation of a tooth of its socket, avulsed intentionally or accidentally [6]. Most cases of avulsion occur at a time when the patient is still in facial growth process, so it is extremely important to maintain the tooth and the adjacent alveolar bone [8], in addition to care for child psychosocial development [2]. The prognosis of these cases depends on the care taken at the scene, as the action of dental replantation [3], the choice of storage medium of the avulsed element and dental treatment performed after avulsion, and is also important to care for no contamination of the tooth [9,10]. The root development and the presence of alveolar fracture will also influence the prognosis [11].

The aim of this study was to perform a study of cases of avulsion of permanent teeth in patients from 12 years of the Oraldental Trauma Center (CENTRAU) of the School of Dentistry of Faculty of Pharmacy, Dentistry and Nursing in Federal University of Ceará (UFC), investigating the characteristics of the avulsed dental elements and patients.

MATERIAL AND METHODS

A retrospective transversal study characterized by direct observation of dental records was performed of a spontaneous demand sample of dental trauma victims who presented to the Oraldental Trauma Center of UFC (CENTRAU) during the period from May 2001 to May 2013. This project was approved in protocol #185/03 of UFC research ethics committee.

Information of patient's age and gender, causes of tooth avulsion, number of avulsed and replanted permanent teeth, transport media used and period of delayed replantation was taken from CENTRAU specific dental records. The collection of data from the medical records was done since they were properly completed and possess at least a radiograph of the case.

The data collected were subjected to descriptive statistical analysis and carried out using personal computer and the Microsoft office Excel 2013. Differences between genders, age groups, causes and other comparisons done were analyzed using chi-squared test or Fisher's exact test. BioEstat statistical package version 5.3 was used to analyze the data with significance level of $\alpha < 0.05$.

RESULTS

Gender and Age

Among the 1104 records that were evaluated, 66 patients (5.9%) experienced dental avulsion, and of these 50 males (77%) and 16 females (23%) ($p < 0.0001$), with a male/female ratio of 3.125:1. Trauma with tooth avulsion occurred in patients with age between 6 and 30 years, in which 45 patients (68%) were aged 6-12 years, 11 patients (17%) between 13-17 years and 10 patients (15%) between 18 and 30 years. The male and female average ages were, respectively, 12.4 and 13.2 years ($p = 0.5751$) as showed in Table 1.

Table 1 - Distribution of avulsed teeth according to the gender and age

Gender	Number of patients (%)*	Age Mean (SD)**
Female	16 (23)	13.2 (7.05)
6 - 12 years	12 (75)	
13 - 17 years	0	
18 - 30 years	4 (25)	
Male	50 (77)	12.4 (4.65)
6 - 12 years	33 (66)	
13 - 17 years	11 (22)	
18 - 30 years	6 (12)	

*p < 0.0001 **p = 0.5751

Type and number of avulsed and replanted teeth

A total of 88 teeth were avulsed: 76 (86.3%) of them were in the maxilla and 12 in the mandible (13.7%) (Table 2).

Dental elements most frequently affected were the maxillary central incisors (Figure 1).

Table 2 - Number of tooth replanted or not according to the jaw

Number of teeth	Yes	No
Maxilla	53 a	23 b
Mandible	6 c	6 c

Different letters show statistically significant diferences.

In 52 (79%) cases, only one tooth was avulsed, while in 10 (15%) cases two teeth were avulsed and the remaining 4 (6%) patients three or more avulsed teeth were at the same time.

Among the 88 elements avulsed, 59 (67.04%) were replanted and 29 (32.95%) were not. The maxillary central incisors was the elements that had its replantation performed the most times, 44 times, showing a statistically significance (p = 0.003) when compared with the amount of the others replanted teeth (Table 3).

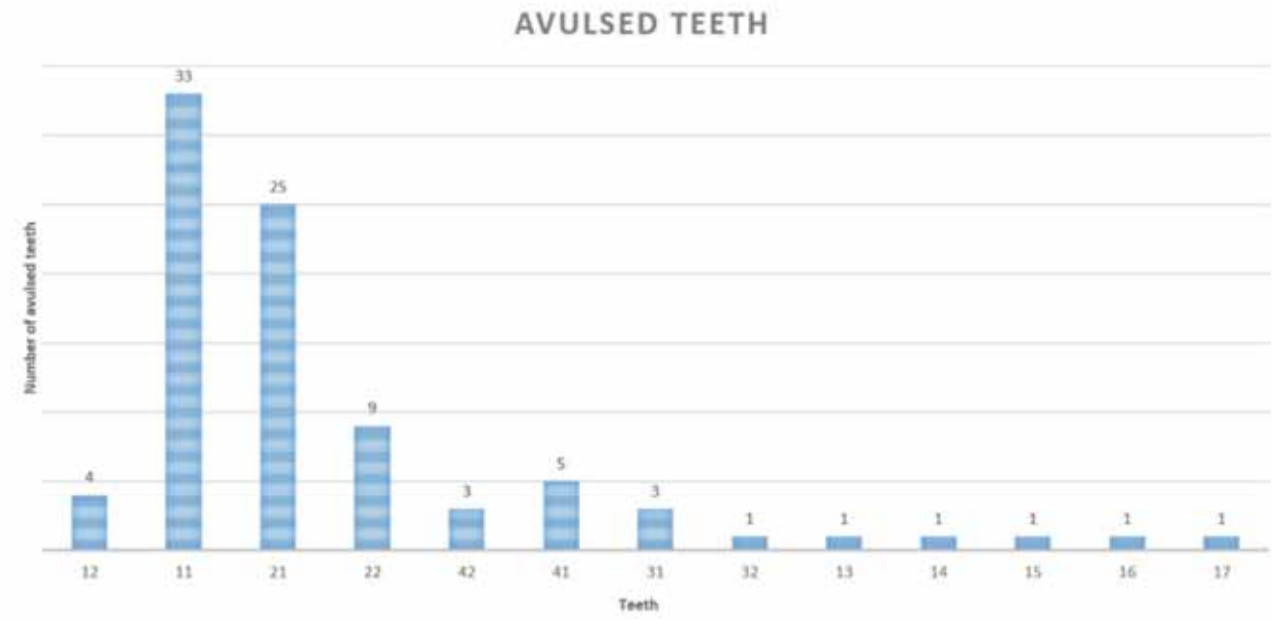

Figure 1 - Number of avulsed teeth according to tooth type.

Table 3 - Distribution of replanted teeth according to the tooth type

	Number of replanted teeth
Maxilla	53
Maxillary Central Incisors	44
Right	25
Left	19
Maxillary Lateral Incisors	9
Right	2
Left	7
Mandible	6
Mandibular Central Incisors	3
Right	2
Left	1
Mandibular Lateral Incisors	3
Right	2
Left	1

Storage medium and Extra-oral time

Among the 66 patients who had their dental elements avulsed and replanted later, 24 have not informed the medium tooth had been stored. Physiological media such as oral cavity (saliva), milk and saline were used by 17 (28,8%) patients (Figure 2). The most frequently used medium was the oral cavity environment of patient, which had been used by 8 (14%) patients. Only 2 (03%) patients reported that they did not remember the medium in which the element was stored, although being stored anyway. One of the patients initially stored its right incisor in alcohol for 2 days and then passed it to the physiological saline for 4 days. Another patient stored his tooth into the fridge, outside any medium, for 1 day.

As for the extra-oral time, only 9 (15.5%) had their replantation immediately. 30 (50.84%) teeth were replanted with over 1 hour of extra-oral time (Figure 3).

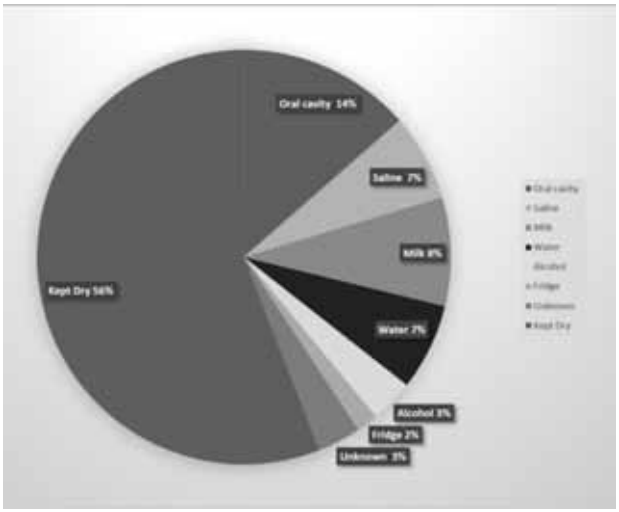

Figure 2 - Number of teeth according to the storage medium used until replantation.

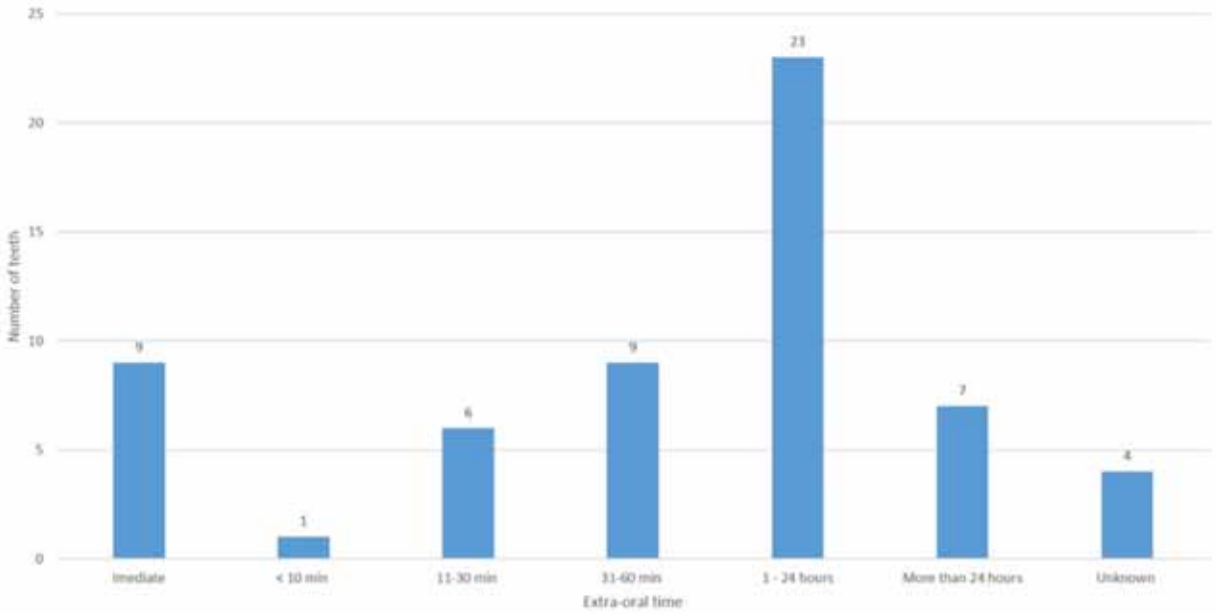

Figure 3 - Number of teeth according to the extra-oral time until replantation.

Causes of avulsion

Of the 66 patients, 26 (39.4%) had as a cause of avulsion falling against floor, stairs or an object during walking or running, while 9 (13.7%) fell from bicycles and 8 (12.1%) were hit by cars or motorcycles. In 6 (9.1%) cases, the cause was a violent act, which may be associated with assault, contact sports or at household. In 2 (3.0%) cases the cause was not informed (Figure 4).

DISCUSSION

This study examined the medical records of patients who presented to a dental reference center located in Fortaleza, in northeastern Brazil, after 12 years of its existence. The details of injuries depends on the information collected from the patients and/or their caregivers about the events in which, consequently, the accuracy will depend on factors such as the severity of the condition, the time from injury to treatment. Despite these limitations, this study aims to depict the profile of patients who presented to treatment as victims of dental trauma in CENTRAU.

In the present study, there was a higher prevalence of trauma in men than in women, which is consistent with other epidemiological studies [2,3,10]. The highest incidence were in patients aged 6-12 years, followed by the age group between 13-17 years, what is also supported by other studies [3,13,14] because in that age a greater number of males are practicing sports, besides it is the age at which there is the eruption of permanent incisors and periodontal ligament appears more fragile the action of extrusive forces [15,16] . Several studies claim that a greater number of men than women generally practice more aggressive sports, which is configured as a predisposing factor to dental trauma [17].

Storage medium may be defined as saline solution that reproduces the oral cavity environment in order to preserve the viability of the cells after periodontal ligament avulsion dental element. Therefore, it is important that storage medium of the avulsed element is in adequate osmolarity and pH [1]. Natural solutions can easily protect more effectively the dental element to be replanted, beyond what they

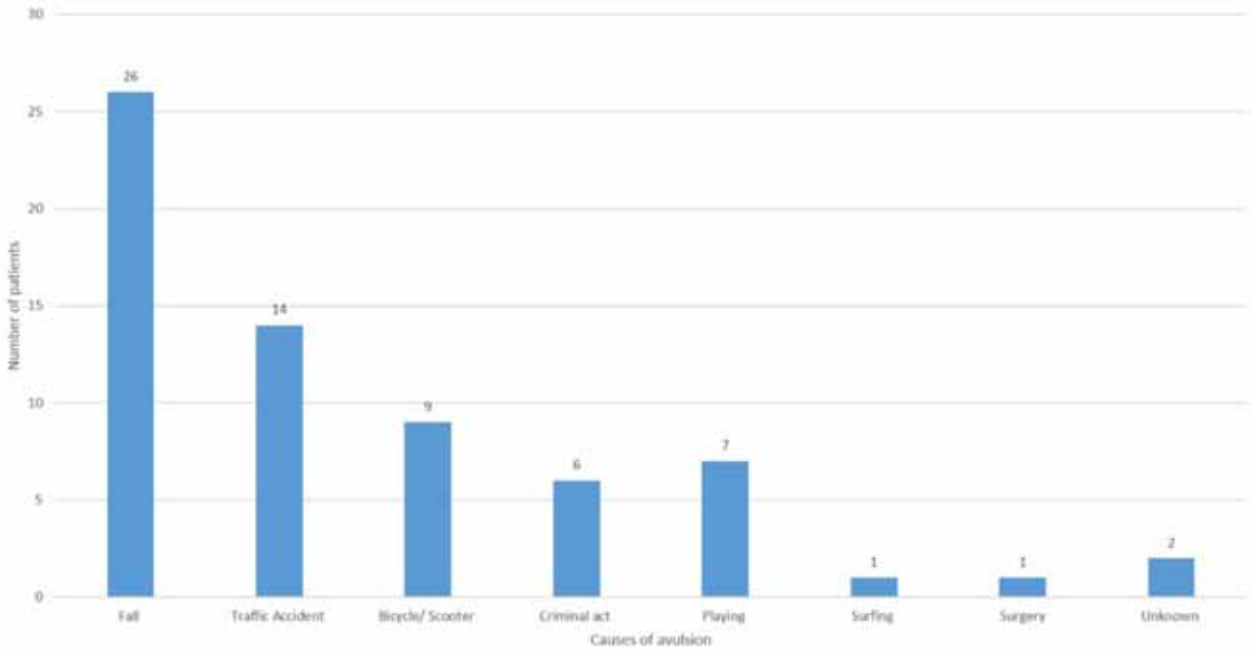

Figure 4 - Causes of avulsion.

should be prioritized for not cause homeostatic disorders and lead to endogenous infections or to increase susceptibility to exogenous infections [2]. As for the storage medium, each has its own peculiarities as to preserve the viability of the cells of the periodontal ligament.

The most important factor about the prognosis of the dental element is tooth extraoral time [9]. Replanting teeth immediately after tooth avulsion or keeping tooth dry for short periods of time (less than 15 min) before the procedure shows excellent healing and excellent prognosis [11]. Research shows that the immediate replantation has a direct positive impact on the viability of PDL and over 85% of cases show great results in the healing of the periodontal ligament of teeth with complete root formation [9].

The most frequent causes of avulsion found are falling to the floor/stairs/object, fall from bicycles, pedestrians and traffic accidents, violence and sports. That is consensus in the literature [3,13]. There is no standard for the causes of dental avulsion, which can generate subjectivity and variations between studies rating because the reports depend on how the avulsion victims or their caregivers tells the story of trauma and these descriptions can be interchangeable between different professionals. Unusual or uncommon causes are often grouped as 'other' to simplify the results. Regarding the type of avulsed tooth element, the results showed a high percentage (65.9%) of the avulsion of maxillary central incisors, a result that shows the similarity of our sample with of other studies in other countries [3,18].

Replantation is the treatment of choice for dental avulsion, but it is not always possible to have it done right away [4,23]. In most situations, dental replantation is indicated, even with doubtful prognosis [1]. In our study, replantation was performed in 59 (67.04%) of 88 avulsed elements, a result similar to the study by Zhang & Gong (2011), in which 85/120 dental elements were replanted. A low rate of replantation was reported by Kinoshita et al. [24] (14/32), Tzigkounakis et al. [17] (27 /90) and Petrovic et al. [2] (32 /62), and it may be explained by the differences between evaluated population and knowledge level about dental avulsion and its immediate treatment. The central incisors were the teeth, which were most replanted, and it may be related with its avulsion rate, the highest compared to other teeth.

Teeth that were replanted immediately after its avulsion, or kept dry for short periods of time until the replantation procedure show excellent healing and excellent prognosis [21]. Researches show that the immediate replantation has direct positive impact on the viability of the periodontal ligament and over 85 % of cases show excellent results in healing of the periodontal ligament of teeth with complete root formation [10].

The avulsed tooth should be replanted as soon as possible, but, in cases which the replantation can not be executed immediately, the tooth should be stored in a medium that plays similar condition of the oral cavity to preserve the viability of the periodontal ligament, such as saliva, milk or saline. Each storage medium has peculiarities that can alter the prognosis of treatment. The balanced Hank's solution, or HBBS and the ViaSpan are the storage medium that can maintain the viability of the cells of the periodontal for a longer period of time up to 24 hours ligament [22]. The Save- A- Tooth kit (Phoenix Lazerus Inc., Pottstown, PA, USA) is a special kit with HBBS which can be found in some countries for general population to be used in emergencies involving avulsed teeth, and it is not necessary to keep it cooled. The ViaSpan has shown superiority of preservation of cell viability over long periods of time, but no differences in short periods. Unlike HBBS, it should be kept under refrigeration [23]. Both ViaSpan e HBBS are storage media with high cost and, although these solutions are the best option for storage avulsed teeth, it is hard to have in hand and use them at trauma moment, reasons why these solutions are not used.

Success of the dental replantation is associated with the absence of root resorption of the periodontal ligament repair and reestablishment of epithelial adhesion [9].

CONCLUSION

In the present study, it was clear that cases of avulsion in CENTRAU corresponded to a low occurrence of all cases seen in the center. It was observed that the dental avulsion occurred more frequently at the age between 6-12 years of age, with falls as the main etiological factor. In both jaws, maxillary central incisors were the most affected teeth.

The knowledge about the factors that will influence the success of replantation and the responsibility of the dentist who will perform the treatment of the traumatized patient is crucial and will greatly influence the prognosis of dental element replanted.

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