



Tran Thi My Hanh\*, Tong Minh Son,  
Dam Ngoc Tram, Lê Long Nghia, Ha  
Ngoc Chieu, Le Thi Thuy Linh, Luong  
Minh Hang, Nguyen Ha Thu

School of Odonto-Stomatology, Hanoi Medical  
University, Hanoi, Vietnam

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\***Corresponding author:** Tran Thi My Hanh, PhD,  
Department of Pediatric Dentistry, Hanoi Medical  
University, Hanoi, Vietnam, Tel: +84983889232;  
E-mail: hanhbacsy@hotmail.com

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## Research Article

# Clinical features of Tooth Avulsion Injuries in Vietnam

## Abstract

**Objective:** The purpose of this study is to characterize the clinical features of patients with avulsed teeth.

**Material and methods:** This cross-sectional and retrospective study examined 81 patients with avulsion injuries and 150 avulsed teeth at National Hospital of Odonto – Stomatology, Ha Noi, Viet Nam, from January 2010 to December 2016.

**Results:** Dental avulsion was more common in males (61.90%) than in females. The age of 12 to 18 was the most frequent. Many causes including traffic accidents (51.85%) and violence-related factors (37.04%). Avulsed teeth were often maxillary incisors (71.30%). 87.93% of avulsed teeth were intact; 61.73% of dental alveoli were not fractured; common damage to adjacent teeth is subluxation.

**Conclusion:** Although clinical forms of avulsed teeth and local injuries are diverse, most common cases include avulsed maxillary central incisors with intact crown and extra-alveolar period more than 60 minutes without proper storage media.

## Introduction

Dental injury is a common emergency in dental practice. In the world, about a quarter of accidents results in dental injuries, among which, tooth avulsion accounts for 1% to 16% [1-5]. This is one of the most serious traumatic dental injuries, commonly seen in maxillary incisors, especially the two maxillary central incisors (87.1%); especially at the age of 7 to 18 [5,6].

Treatments of dental avulsion may be immediate replantation, removable or fixed partial denture, implants, etc. Among those, immediate replantation is a preferable choice. This simple, inexpensive method ensures both functionality and aesthetics, preserves jawbone volume especially in growing patients, and does not affect adjacent teeth. Time and proper handling of avulsed teeth are critical to the success of replantation after injury. Immediate first aid is immensely important because the length of the extra-alveolar period decides the prognosis after replantation. Many factors are involved, but clinical features of avulsed teeth and local injuries in dental alveoli are (of) most critical [7-12]. In Vietnam, avulsed teeth is very common due to traffic accidents [2], however, appropriate treatments provided by dentists are not always seen. At the same time, there is currently no research towards clinical features of dental avulsion injuries. Therefore, the aim of this research is:

**To characterize the clinical features of dental avulsion injury at National Hospital of Odonto – Stomatology, Ha Noi, Viet Nam.**

## Participants and methodology

This retrospective research examines 81 patients with traumatic dental avulsion injuries and 150 avulsed teeth at National Hospital of Odonto – Stomatology, Ha Noi, Viet Nam from January 2010 to December 2016.

Participants are patients with avulsed permanent teeth, who consented to join in the research.

- **Type of study:** Observational study, a cross-sectional study, got the information from medical record.
- **Sample size:** 81 patients suffered from traumatic injuries with 150 avulsed teeth were included in this study.
- **Sampling:** Convenience sampling method. All the patients presented at National Hospital of Odonto–Stomatology, Hanoi, Vietnam were carefully examined and selected based on the inclusion criteria of this study. The data collection was conducted by dentists using same forms.

**The record for each case includes:**

- **Cause of injury:** Traffic accidents, home and leisure accidents, work accidents, sport injuries, and violence-related factors.
- **Clinical features of avulsed teeth:** Time out of socket, storage media during extra-alveolar period: dry or in physiologic saline, milk, water, saliva, etc.; intact or fractured crown and root; closed or open apex; local injuries such as: damaged soft tissues, fractured alveoli, damaged adjacent teeth, etc.

**Two radiographs are taken:** One apex image to examine the dental alveoli of avulsed teeth, and one panoramic radiograph to examine adjacent and mandibular teeth.

➤ **Data and statistical analyses:** We used the Epi – Info 16.0 and SPSS 20.0 to analyze the data. We used chi-squared and fisher’s exact test to find statistic significant difference.

**Ethics:** The research is conducted under consent from patients and their families or guardians. All personal data are strictly kept confidentially and only used for research purposes.

**Results**

Out of 514 patients with dental injuries, 81 patients suffered from dental avulsion, which accounts for 15.76% (Table 1).

Out of 81 patients with traumatic injuries, 61.90% are males and 32.10% are females. The difference is statistically significant (p = 0.0019). The most common age group is 12 – 18 years (43.21%). Injury in maxillary incisors accounts for 71.30%, half of which are central incisors (Table 2).

Traffic accident is the major cause of dental avulsion (51.85%), followed by violence-related factors, which accounts for 37.04%. The difference is statistically significant when p<0.00011. The most common cause of injury at the age group of 18 years and older is traffic accident while at the age group of 6-12 years is home and leisure accident (Table 3).

Among 116 found teeth, 93.1% had a closed apex; 87.93% remained intact; 82.76% of patients left the teeth dry and unpreserved; 10.34% was put inside the oral cavity with saliva

**Table 1:** Common features of injuries.

Research criteria		Number (%)	Total (%)	
Age	< 12	17 (20,99)	81 (100%)	
	12 – 18	35 (43,21)		
	> 18	29 (35,80)		
Gender	Male	55 (67,90)	81 (100%)	
	Female	26 (32,10)		
Damaged teeth	Maxillary incisor	Central	75 (50,00)	150 (100%)
		Lateral	32 (21,30)	
	Mandibular incisor	27 (18,00)		
	Maxillary posterior teeth	12 (8,00)		
	Mandibular posterior teeth	4 (2,70)		

**Table 2:** Causes of injury.

Research criteria		Number (%)	Total (%)	
Causes of injury	Non-violence related	Traffic	42 (51,85)	51 (62,96)
		Home and leisure	5 (6,17)	
		Work	2 (2,47)	
		Sport	2 (2,47)	
	Violence-related	30 (37,04)	81 (100)	

**Table 3:** Clinical features of avulsed teeth.

Research criteria		Number (%)	Total (n)
Apex condition	Closed	108 (93,10)	116
	Open	8 (6,90)	
Damaged teeth condition	Intact	102 (87,93)	116
		Not Intact	
	Apical fracture	1 (0,86)	
Storage media	Dry	96 (82,76)	116
		Physiologic saline	
	Saliva	12 (10,34)	
	Milk	6 (5,17)	
	Water	2 (1,73)	
Extra-alveolar time	<60 minutes	18 (15,52)	116
	>60 minutes	98 (84,48)	

**Table 4:** Clinical features of damage location.

Research criteria		Number (%)	Total	
Damaged soft tissues	No	10 (12,35)	81	
	Yes	Bruised		29 (35,80)
		Lacerated		42 (51,85)
Fractured alveolar bone	Yes	50 (61,73)	81	
	No	31 (38,27)		
Damaged adjacent teeth	No	7 (8,64)	81	
		Yes		Subluxation
	Intrusion			7 (8,64)
	Extrusion			5 (6,17)
	Damaged hard structures	6 (7,41)		

and only 5.17% was put in milk. Extra-alveolar time of over 60 minutes accounts for 84.48% (Table 4).

Among 81 patients, 51.85 % have avulsed teeth and lacerated soft tissues, 35.80% have bruised soft tissues, only 12.35% are without damages to soft tissues. 61.73% of the dental avulsion cases have intact alveolar bone; 91.36% have damaged adjacent teeth. Subluxation are most common, which account for 69.14%.

**Discussion**

By examining 81 patients with dental avulsion at National Hospital of Odonto – Stomatology, it can be seen that this kind of injury is more common in males than females (61.90% – males compared to 32.10% – females). The difference is statistically significant when p = 0.0019. Compared to a research conducted by Nguyễn Phú Thắng, in which the male/

female ratio was 1.26/1 [2], this result is also consistent with other studies by Andreasen 1966 [6], Grossman and Ship [13]. Injuries are common among males who usually participate in physical activities.

The most common age group is 12 – 18 yrs (43.21%). Andreasen 1966 [4,6], Grossman and Ship [13], also pointed out in their research that the age group under 18 is most common, which can be explained by the anatomy of the area around the tooth: the root is still developing, PDL space is wide, alveolar bone is soft due to more medullary cavities and less trabecular bone. In such condition, a horizontal force with enough power may knock the tooth out of its socket with little damage to the root or alveolar bone [1,3,4].

Injuries in maxillary incisors account for 71.30%, half of which are in two central incisors. Ousama R [1], Nguyễn Phú Thăng [2], Michael [14], and Andreasen [4,6], also noted that avulsion trauma is most common in two central incisors. The vulnerability of the two central incisors is due to their most frontal position. The cases with only one damaged tooth were only seen in central incisors. Damaged lateral incisors only occurred among patients with fractured alveolar bone, causing avulsion of both two central incisors, together with one or two lateral incisors.

#### \* Causes of tooth avulsion

Among 81 patients, traffic accident is the major cause of dental avulsion (51.85%), followed by violence-related factors (37.04%). The difference is statistically significant when  $p < 0.00011$ . The most common cause of injury at the age group of 18 years and older is traffic accidents, while at the age group of 6–12 yrs is home and leisure accidents. According to Grossman and Ship, the most common cause among males is brawling, while among females are bicycle and falling accidents [13]. According to Andreasen, the most common causes among males are brawling and sport accidents [6] (Table 2).

#### \* Clinical features of tooth avulsion

Among 150 avulsed teeth, only 116 were found (Table 3).

Among 116 found teeth, 87.93% have intact crown, because most victims have young permanent teeth, with wide periodontal ligament space, soft alveolar bone due to more medullary cavities and less trabecular bone; therefore, the surrounding areas of teeth are more elastic, and a mild shock may knock a tooth out of its socket without damages to the tooth itself. This result is also consistent with other studies by Andreasen and his partners [4,6].

Most patients come to the emergency room with unpreserved, dry teeth or without the avulsed teeth altogether, and only bring the teeth to the dentist after being explained that the teeth can be replanted. Therefore, the extra-alveolar period often lasts for more than 60 minutes (84.48%). This result reflects a lack of medical knowledge on handling avulsed teeth among Vietnamese population. Comparing to researches in other countries, there is a noticeable difference in the extra-

alveolar time. Rhouma et al., (Australia) has shown the result in their study that 67.6% of avulsed teeth has extra-alveolar period under 60 min; 69.5% was storage in milk and only 15.2% was left dry.

According to many research papers, in dry condition, the vitality of periodontal ligament remains within the first 30 minutes. After that, necrosis occurs and after 60 minutes, most periodontal ligament will have died [4,14]. While ligament vitality is critical to prognosis and treatment of avulsed teeth, only 1 patient with 3 avulsed teeth arrived within the first 30 minutes because the injury occurred within a short distance from hospital; 10 other patients with 15 avulsed teeth sought for medical assistance within 60 minutes with the knock-out teeth as recommended by their relatives who worked in medical fields. 2 patients had their 6 avulsed teeth preserved in milk because their aunts were dentists; 12 were preserved in saliva in the case of 4 patients with multiple avulsed teeth and fractured alveolar bone, the knocked out teeth were still attached to gum tissues, therefore remained in the patients' mouths.

In these cases, the avulsed teeth were handled timely and properly merely by luck or chance, not necessarily due to the patients' knowledge.

According to Andreasen and WHO, Hank is the best medium [3]. However, this medium is not available in every place. In some developing countries including Vietnam, Hank is not available. In this condition, cold sterilized milk is considered to be the best option. This medium can preserve avulsed teeth up to 24 hours [4,10-12].

Local injuries include bruised, lacerated lips at the place of avulsed teeth (87.65%). Lips are often involved in the damage of soft tissues because it covers the outer surfaces of teeth. In some cases, there is no lip injuries. This can be explained in some situations i.e. when patients are speaking, smiling or in patients with protruded teeth. Our findings are quite similar to some other studies. According to Ousama, soft tissues injuries are involved in 76.4% dental avulsed cases [1]. Meanwhile, in a study of Petrovic B. et al., this ratio is 87.1% [5].

The post-traumatic condition of the alveolar bone at the avulsed area is examined under clinical examination and radiographic findings. Table 4 has shown that 61.3% of the alveolar bone is normal. This was explained earlier that the age group under 18 is most common, PDL space is still wide, alveolar bone is soft due to more medullary cavities and less trabecular bone. In such condition, a horizontal force with enough power may knock the tooth out of its socket with little damage to the root or alveolar bone. According to some other studies from other authors i.e. Andreasen et al., Rhouma et al., Petrovic B and Ceallaigh P.O., the alveoli is normal in more than 80% of dental avulsed cases. This result is similar to our result at the age group under 18 [14].

Damages to adjacent teeth occurred to 91.3% cases. This is reasonable because forces are not applied to an individual tooth but a group of teeth. The adjacent teeth, therefore, cannot be

excluded from being affected. The most common sequence is subluxation (69.14%). A reason for that condition is when the force comes from blunt objects and easily spread to adjacent area; meanwhile PDL space has a great resilience. In Petrovic B. study with a sample of more than 400 cases, 85% adjacent teeth were injured. In Ousama study, this ratio is 77.8%.

## Conclusion

Dental avulsion is more common in males than females in the age group of 12-18 years, and usually occurs to incisors.

The most common cause of injury is traffic accident, followed by violence-related factors.

Most avulsed teeth are intact yet improperly preserved. Local damages are diverse.

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