

International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: General introduction

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Abstract

Traumatic dental injuries (TDIs) occur most frequently in children and young adults. Older adults also suffer TDIs but at significantly lower rates than individuals in the younger cohorts. Luxation injuries are the most common TDIs in the primary dentition, whereas crown fractures are more commonly reported for the permanent teeth. Proper diagnosis, treatment planning and follow up are very important to assure a favorable outcome. These updates of the International Association of Dental Traumatology's (IADT) Guidelines include a comprehensive review of the current dental literature using EMBASE, MEDLINE, PUBMED, Scopus, and Cochrane Databases for Systematic Reviews searches from 1996 to 2019 and a search of the journal *Dental Traumatology* from 2000 to 2019. The goal of these guidelines is to provide information for the immediate or urgent care of TDIs. It is understood that some follow-up treatment may require secondary and tertiary interventions involving dental and medical specialists with experience in dental trauma. As with previous guidelines, the current working group included experienced investigators and clinicians from various dental specialties and general practice. The current revision represents the best evidence based on the available literature and expert opinions. In cases where the published data were not conclusive, recommendations were based on the consensus opinions of the working group. They were then reviewed and approved by the members of the IADT Board of Directors. It is understood that guidelines are to be applied using careful evaluation of the specific clinical circumstances, the clinician's judgment, and the patient's characteristics, including the probability of compliance, finances and a clear understanding of the immediate and long-term outcomes of the various treatment options vs non-treatment. The IADT does not, and cannot, guarantee favorable outcomes from adherence to the Guidelines. However, the IADT believes that their application can maximize the probability of favorable outcomes.

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KEYWORDS

avulsion, luxation, prevention, tooth fracture, trauma

1 | INTRODUCTION

Traumatic dental injuries (TDIs) occur frequently in children and young adults, comprising 5% of all injuries. Twenty-five percent of all school children experience dental trauma and 33% of adults have experienced trauma to the permanent dentition, with the majority of the injuries occurring before age 19. Luxation injuries are the most common TDIs in the primary dentition, whereas crown fractures are more commonly reported for the permanent teeth. Proper diagnosis, treatment planning and follow up are important to assure a favorable outcome.

These updates of the International Association of Dental Traumatology's (IADT) Guidelines include a review of the current dental literature using EMBASE, MEDLINE, PUBMED, and Scopus searches from 1996 to 2019 and a search of the journal *Dental Traumatology* from 2000 to 2019.

The goal of these guidelines is to provide information for the immediate and urgent care of TDIs. It is understood that some of the subsequent treatment may require secondary and tertiary interventions involving specialists with experience in dental trauma.

The IADT published its first set of guidelines in 2001 and updated them in 2007. A further update was published in *Dental Traumatology* in 2012. As with previous guidelines, the current working group included experienced investigators and clinicians from various dental specialties and general practice. The current revision represents the best evidence based on the available literature and expert professional judgment. In cases where the data were not conclusive, recommendations were based on the consensus opinion of the working group, then reviewed and approved by the members of the IADT Board of Directors.

It is understood that guidelines are to be applied with evaluation of the specific clinical circumstances, clinicians' judgment and patients' characteristics, including but not limited to the probability of compliance, finances and an understanding of the immediate and long-term outcomes of treatment options vs non-treatment. The IADT does not, and cannot, guarantee favorable outcomes from adherence to the Guidelines, but the IADT believes that their application can maximize the chances of a favorable outcome.

These Guidelines offer recommendations for the diagnosis and treatment of specific TDIs. However, they provide neither the comprehensive nor the detailed information found in textbooks, the scientific literature, or the Dental Trauma Guide (DTG). The DTG can be accessed at <http://www.dentaltraumaguide.org>. In addition, the IADT website <http://www.iadt-dentaltrauma.org> provides connection to the journal *Dental Traumatology* and other dental trauma information.

2 | GENERAL RECOMMENDATIONS

2.1 | Special considerations for trauma to primary teeth

A young child is often difficult to examine and treat due to lack of cooperation and because of fear. This situation is distressing for both the child and the parents. It is important to keep in mind that there is a close relationship between the root apex of the injured primary tooth and the underlying permanent tooth germ. Tooth malformation, impacted teeth and eruption disturbances in the developing permanent dentition are some of the consequences that can occur following severe injuries to primary teeth and/or alveolar bone. A child's maturity and ability to cope with the emergency situation, the time for shedding of the injured tooth, and the occlusion are all important factors that influence treatment. Multiple traumatic episodes are also common in children and this may affect the outcomes following trauma to a tooth.

2.2 | Immature vs mature permanent teeth

Every effort should be made to preserve the pulp in the immature permanent tooth to ensure continued root development. A large majority of TDIs occur in children and teenagers where loss of a tooth has lifetime consequences. The immature permanent tooth has considerable capacity for healing after traumatic pulp exposure, luxation injury, or root fracture.

2.3 | Avulsion of permanent teeth

The prognosis for avulsed permanent teeth is heavily dependent on the actions taken at the place of accident. Promotion of public awareness of first-aid treatment for the avulsed tooth is strongly encouraged. Treatment choices and prognosis for the avulsed tooth are largely dependent on the viability of the periodontal ligament (PDL), and the maturity of the root. See the IADT's specific Guidelines for managing avulsed teeth.¹

2.4 | Patient/parent instructions

Patient compliance with follow-up visits and home care contributes to better healing following a TDI. Both the patient and the parents of a young patient should be advised regarding care of the injured tooth or teeth for optimal healing, preventing further injury, employing meticulous oral hygiene, and rinsing with an antibacterial agent

TABLE 1 Primary dentition follow-up regimes

	1 W	4 W	8 W	3 M	6 M	1 Y	At 6 Y old	Generic outcomes to consider collecting as identified by the Core Outcome Set	Injury-specific outcomes to consider collecting as identified by the Core Outcome Set
Enamel fracture	No follow up								
Enamel/dentin fracture	*		*					Periodontal healing (including bone loss, gingival recession, mobility, and ankylosis/ resorption)	Quality of restoration Loss of restoration
Crown fracture	*		*			*		Pulp healing (including infection) Pain Discoloration Tooth loss Quality of life (days off work, school, and sport)	Quality of restoration Loss of restoration
Crown/root fracture	*		*			*		(Radiograph only if endodontic treatment carried out)	If crown restored: Quality of restoration Loss of restoration
Root fracture	*	*S	*			*		(Radiograph only if endodontic treatment carried out)	Realignment—where spontaneous repositioning undertaken
Alveolar fracture	*	*SR	*			*R	*	Aesthetics (patient perception) Trauma-related dental anxiety Number of clinic visits Impact on development of permanent successor	
Concussion	*		*					Periodontal healing (including bone loss, gingival recession, mobility, and ankylosis/ resorption)	Realignment—where spontaneous repositioning undertaken
Subluxation	*		*					Pulp healing (including infection) Pain	Realignment—where spontaneous repositioning undertaken
Extrusion	*		*			*		Discoloration Tooth loss Quality of life (days off work, school, and sport)	Realignment—where spontaneous repositioning undertaken
Lateral luxation	*	*S	*		*	*	*	Aesthetics (patient perception) Trauma-related dental anxiety Number of clinic visits Impact on development of permanent successor	Realignment—where spontaneous repositioning undertaken
Intrusion	*		*		*	*			Infra-occlusion
Avulsion	*		*				*	Pain Tooth loss Aesthetics Quality of life Trauma-related dental anxiety Number of clinic visits Impact on development of permanent successor	

Note: At these follow-up visits consider collecting the generic and injury-specific outcomes as identified by the Core Outcome Set—Kenny et al Dent Traumatol 2018.

* = clinical review appointment.

S = splint removal.

R = radiograph advised even if no clinical signs or symptoms.

TABLE 2 Permanent dentition follow-up regimes

	Yearly up to at least 5 Y							Generic outcomes to consider collecting as identified by the Core Outcome Set	Injury-specific outcomes to consider collecting as identified by the Core Outcome Set
	2 W	4 W	6-8 W	3 M	4 M	6 M	1 Y		
Infraction	No follow up								
Enamel fracture			*R				*R	Periodontal healing (including bone loss, gingival recession, mobility, and ankylosis/resorption)	Quality of restoration Loss of restoration
Enamel/dentin fracture			*R				*R	Pulp healing (including infection)#	
Crown fracture			*R	*R		*R	*R	Pain	Quality of restoration Loss of restoration
Crown/root fracture			*R	*R		*R	*R	Discoloration	
Root fracture (apical third, mid-third)		*S*R	*R		*R	*R	*R	Tooth loss	Root fracture repair
Root fracture (cervical third)		*R	*R		*S*R	*R	*R	Quality of life (days off work, school, and sport)	
Alveolar fracture		*S*R	*R		*R	*R	*R	Aesthetics (patient perception) Trauma-related dental anxiety Number of clinic visits	Infra-occlusion
Concussion		*R					*R	Periodontal healing (including bone loss, gingival recession, mobility, and ankylosis/resorption)	
Subluxation	(*) *R			*R		*R	*R	Pain	Infra-occlusion
Extrusion	*S*R	*R	*R	*R		*R	*R	Pulp healing (including infection)#	
Lateral luxation	*R	*S*R	*R	*R		*R	*R	Discoloration	
Intrusion	*R	(*) *R	*R	*R		*R	*R	Tooth loss	Infra-occlusion
Avulsion (mature tooth)	*S*R	*R		*R		*R	*R	Quality of life (days off work, school, and sport)	Infra-occlusion Realignment—where spontaneous repositioning undertaken
Avulsion (immature tooth)	*S*R	*R	*R	*R		*R	*R	Aesthetics (patient perception) Trauma-related dental anxiety Number of clinic visits	Infra-occlusion

Note: At these follow-up visits consider collecting the generic and injury-specific outcomes as identified by the Core Outcome Set—Kenny et al Dent Traumatol 2018².

* = clinical review appointment.

S = splint removal.

R = radiograph advised even if no clinical signs or symptoms.

= for immature permanent teeth with necrotic and infected pulps, consider the following additional outcomes: root length, root width, and late stage crown fracture.

TABLE 3 Splinting durations for the permanent and primary dentitions

	2 W	4 W	4 M
Permanent dentition			
Subluxation	*(if splinted)		
Extrusion	*		
Lateral luxation		*	
Intrusion		*	
Avulsion	*		
Root fracture (apical third, mid-third)		*	
Root fracture (cervical third)			*
Alveolar fracture		*	
Primary dentition			
Root fracture		*(if splinting required)	
Lateral luxation		*(if splinting required)	
Alveolar fracture		*	

such as alcohol-free chlorhexidine gluconate 0.12% for 1-2 weeks. Alternatively, with a young child, it is desirable to apply the chlorhexidine to the affected area with a cotton swab.

2.5 | Summary tables for follow up, splinting duration and core outcomes

To help summarise activities for the follow-up appointment and splinting regimes, Tables 1-3 are presented for different injuries in the primary and permanent dentitions. The core outcome variables, explained in the next paragraph, are also included.

2.6 | Core outcome set

When the worldwide trauma literature is reviewed, it is dominated by one center in Copenhagen. The lifetime work of Dr Andreasen and his research group is remarkable in both its longevity and the prolific publication of their results. One of the key fundamentals of scientific research is replication, where the results found in one center with one group of patients are also consistently seen across other patient groups. It is essential that the results from other centers are published even when they confirm the findings from earlier

studies. By increasing the number of studies available for clinicians and researchers to analyze, the ability to compare, contrast and combine studies as appropriate is enhanced.

The IADT recently developed a core outcome set (COS) for traumatic dental injuries (TDI) in children and adults.² This is one of the first COS developed in dentistry and follows a robust consensus methodology and is underpinned by a systematic review of the outcomes used in the trauma literature.³ A number of outcomes were identified as recurring throughout the different injury types. These outcomes were then included as "generic"—that is relevant to all TDI. Injury-specific outcomes were also determined as those outcomes related only to one or more particular TDI. Additionally, the study established what, how, when and by whom these outcomes should be measured. Tables 1 and 2 show the generic and injury-specific outcomes to be recorded at the follow-up review appointments for the different traumatic injuries. Further information for each outcome is described in the original paper.²

CONFLICT OF INTEREST

The authors confirm that they have no conflict of interest.

ETHICAL APPROVAL

No ethic approval was required for this paper.

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REFERENCES

1. Fouad AF, Abbott PV, Tsilingaridis G, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth [published online ahead of print, 2020 May 27]. *Dent Traumatol*. 2020. <https://doi.org/10.1111/edt.12573>
2. Kenny KP, Day PF, Sharif MO, Parashos P, Lauridsen E, Feldens CA, et al. What are the important outcomes in traumatic dental injuries? An international approach to the development of a core outcome set. *Dent Traumatol*. 2018;34:4-11.
3. Sharif MO, Tejjani-Sharif A, Kenny K, Day PF. A systematic review of outcome measures used in clinical trials of treatment interventions following traumatic dental injuries. *Dent Traumatol*. 2015;31:422-8.

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