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Clinical guidelines: Traumatic Dental Injuries in the Primary Dentition

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Clinical Guidelines: Traumatic Dental Injuries in the Developing Dentition

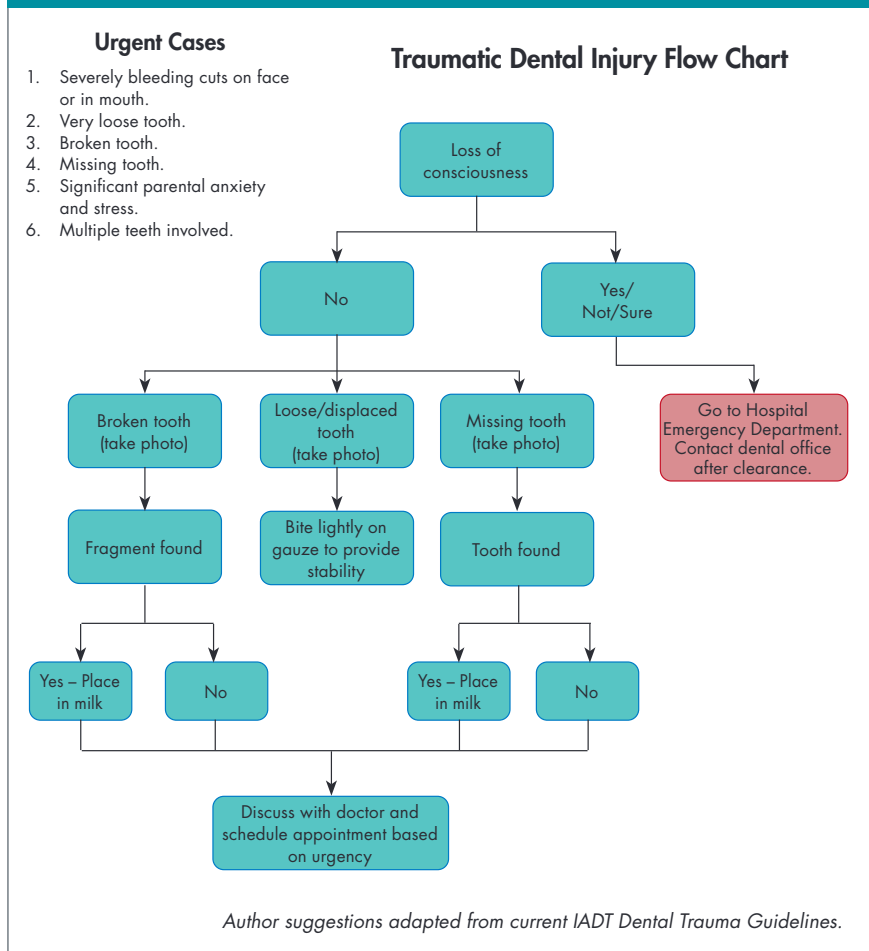
By Rodney J. Vergotine, BChD, MSc(Dent), FAAPD, FIADT, FABPD, FICD, and Richa Bhatia, DDS

The prevalence of traumatic dental injuries (TDI) in the primary dentition is estimated to be around 24% in a recent article by Putnana et al., who also estimated that the presence of any predisposing factors increases the prevalence to above 40%.¹ This meta-analysis also made the following observations: boys are affected slightly more than girls; falls are by far the most common causative agent; enamel fractures are the most common diagnosis; maxillary central incisors are the most frequently involved teeth; and the most common predisposing factor is incompetent lips.

Individuals fielding initial calls regarding TDI should be appropriately trained/informed of managing such calls.² Critical aspects would be the distinction between coming to the office or seeking care in a hospital emergency department. All cases involving loss of consciousness (LOC) should be evaluated in a medical setting before coming to the office.² Other aspects can include guidance as to possible replantation of teeth, acquisition of photos, handling of fragments/teeth, transport media for avulsed teeth, and appropriate first aid. A guidance sheet/form/flowchart for the front desk in this regard will be invaluable (Table 1).

A number of critical factors dictate
(Continued on Page 40)

Table 1 — Front desk flow chart





Traumatic injuries — From 24% to 40% of children are estimated to be affected by traumatic dental injuries. Dental staff should be trained in the management of such injuries to the primary dentition.

the care of young children with TDI (Table 2). Practitioners should take these factors into consideration when contemplating treatment or referral.²

Guidelines

The International Association of Dental Traumatology (IADT) proposed an updated set of guidelines in 2020 regarding TDI management. This includes both permanent and primary teeth, with selected differences in recommendations for treatment and follow-up between the dentitions.³⁻⁵ Most critical is that avulsed primary teeth should not be replanted; factors such as treatment burden and possible further damage to the permanent successor are primary reasons.⁵⁻⁸

A structured approach is critical when assessing and treating any individual who presents with a TDI.² The American Academy of Pediatric Dentistry (AAPD) provides an assessment form that will be helpful for documentation and can serve as an important part of the record of the patient.⁹⁻¹⁰

Photographs taken by caregivers at the scene of the event can provide critical information. Caregiver(s) should also be asked to provide recent photos of the child, preferably smiling, so that comparisons can be made to pre-trauma presentation. Photos taken during the emergency

visit should include both intra-oral (both arches, specific teeth, occlusion) and extra-oral (frontal, right and left sides, mouth open) views.⁵

Classification of TDI

Table 3 outlines the current accepted classification of TDI. This includes four areas, namely, hard dental tissue and pulp; periodontium; soft tissue including gingiva and oral mucosa (laceration, contusion, abrasion); and lastly, supporting bone. This classification is promoted by the IADT and also used by the World Health Organization. Most often, damage involving supporting bone is referred for more-specialized care. The suggested care for each category differs in some instances between primary and permanent teeth, notably regarding intrusion and avulsion of teeth.²⁻⁵

Treatment modalities

Treatment options are varied (Table 4, Table 5, see Pages 42 and 43) and are all reliant on the ability and level of cooperation of the child as well as the expertise/comfort of the provider. Should extraction of the traumatized tooth be considered, it may be best to postpone and to initially provide palliative care, such as pain medication and/or antibiotics.

Splinting in specific circumstances can be an option for traumatized pri-

mary teeth, including alveolar fracture, lateral luxation, and root fracture. Composite/wire splints that are flexible and passive for four weeks are advised. Attach at least one tooth on either side of the affected tooth and consider adding the tooth that requires the stabilization last to the splint. This allows for improved stability and localization of the mobile tooth.^{2,11} Local anesthetic is essential during this process if teeth are to be manipulated to their original position. Home care to keep the area and splint clean is critical, and 0.1% or 0.2% alcohol-free chlorhexidine twice daily for a week is recommended as an adjunct to toothbrushing. A soft diet during this time is also helpful.

Vital pulp therapy including direct pulpcap or coronal pulpotomy (MTA/formocresol) can be options for complicated fractures of the crown.¹⁴ In cases of pulp necrosis, a pulpectomy procedure may be attempted. Often, extraction of the involved tooth may be a more appropriate option. Soft tissue management often requires more advanced expertise. If suturing is required intra-oral, resorbable sutures such as chromic gut or Vicryl may be preferred, as this will negate a visit for suture removal.¹³

Any tooth or soft tissue that is to be manipulated or treated needs to have adequate local anesthetic administered. Current guidelines do not recommend any specific local anesthetic or epinephrine content.^{4,14} Adequate OTC pain medication should also be prescribed. Advanced management modalities such as nitrous oxide, sedation, or general anesthesia should only be considered if the practitioner expertise is appropriate.

Monitoring and follow-up should follow IADT guidelines; however, most data indicates that often parents do not comply (Table 6).^{5,8} Specific outcome measurement criteria, both general and injury-specific, should be documented at follow-up visits to assess progress.^{2,5,15}

Table 2 — Critical factors that may indicate need for referral

1. Practitioner not comfortable providing care.
2. Practitioner does not have the training or skillset to provide care.
3. Practitioner unable to appropriately guide patient behavior.
4. Unable to provide appropriate follow-up care.
5. Significant trauma that affects multiple teeth bone and/or soft tissue.
6. History indicates a possible loss of consciousness.
7. Trauma impacting or compromising respiratory or other vital system.
8. Parental request.

Author suggestions adapted from current IADT Dental Trauma Guidelines.



Table 3 — WHO Classification of Traumatic Dental Injuries (Modified Andreasen)

	Injury	Description
Injuries to hard dental tissues and pulp	Enamel infraction	Incomplete fracture/crack, no loss of tooth.
	Enamel fracture (uncomplicated crown fracture)	Fracture resulting in loss of tooth structure confined to enamel.
	Enamel-dentin fracture (uncomplicated crown fracture)	Fracture resulting in loss of tooth structure confined to enamel and dentin with no pulp exposure.
	Complicated crown fracture	Fracture resulting in loss of tooth structure with pulp exposure.
	Uncomplicated crown-root fracture	Fracture involving enamel, dentin, and cementum with no pulp exposure.
	Complicated crown-root fracture	Fracture involving enamel, dentin, and cementum with pulp exposure.
Injuries to the periodontal tissues	Root fracture	Fracture involving dentin, cementum, and pulp.
	Concussion	Injury to tooth-supporting structures without mobility or tooth displacement, but positive to percussion.
	Subluxation	Injury to tooth-supporting structures with abnormal mobility but no tooth displacement
	Extrusion	Partial displacement of tooth from socket.
	Lateral luxation	Displacement of tooth in any direction other than axially.
	Intrusion	Displacement of tooth into the alveolar bone.
	Avulsion	Complete displacement of tooth from socket.
Injuries to the supporting bone	Comminution of the alveolar socket	Crushing and compression of alveolar socket, concomitant with intrusive and lateral luxation.
	Fracture of the alveolar socket wall	Fracture limited to the facial or oral socket wall.
	Fracture of the alveolar process	Fracture of alveolar process which may involve the alveolar socket.
	Fracture of the maxilla/mandible	Fracture involving the base of the maxilla/mandible and alveolar process. May involve the alveolar socket.
Injuries to the gingiva or oral mucosa	Laceration of gingiva or oral mucosa	Shallow/deep wound of mucosa caused by a tear.
	Contusion of gingiva or oral mucosa	Bruise caused by impact with a blunt object and resulting in submucosal hemorrhage.
	Abrasion of gingiva or oral mucosa	Raw, bleeding surface caused by rubbing/scraping of mucosa.

Current IADT Dental Trauma Guidelines.

Care prioritization

Prioritization of care allows for efficient, appropriate and effective management of TDI. Andreasen et al. proposed a classification of TDI as

well as a prioritization of care that is widely used (Table 7, see Page 44).^{16,17} Though this classification was initially developed for permanent teeth, it can be adapted for use in the primary

dentition following the current guidelines. Immediate management of some TDI, such as permanent tooth avulsion, is critical for improved
(Continued on Page 43)

Table 4 — Hard tissue

Injury	Treatment Modalities				
	Monitor	Extraction	Restorative Care	Splinting	Vital Pulp Therapy
Enamel fracture	✓ May smooth out sharp edges				
Enamel-dentin fracture (uncomplicated crown fracture)	✓		✓ Cover exposed dentin with glass ionomer. May restore lost fragment with composite.		
Enamel-dentin-pulp fracture (complicated crown fracture)	✓	✓ Extraction of entire tooth	✓ After vital pulp therapy (pulp capping/pulpotomy), cover exposed dentin with glass ionomer. May restore lost fragment with composite.		✓ Pulp capping/pulpotomy. See Restorative Care.
Crown-root fracture without pulp involvement	✓	✓ Extraction of entire tooth	✓ Remove fragment. Cover exposed dentin with glass ionomer.		
Crown-root fracture with pulp involvement	✓	✓ Extraction of entire tooth	✓ After vital pulp therapy (pulp capping/pulpotomy), cover exposed dentin with glass ionomer. May restore lost fragment with composite.		✓ Remove fragment. Pulpotomy followed by restorative care.
Root fracture	✓ Allow for spontaneous repositioning	✓ Extract the loose coronal fragment. Allow for resorption of remaining apical fragment.		✓ If displaced, reposition and splint with a flexible splint. 4 weeks.	
Alveolar fracture	✓			✓ Stabilize the segment with a flexible splint. 4 weeks.	

Current IADT Dental Trauma Guidelines.

long-term positive prognosis; fortunately, this occurs infrequently.⁴ This is not applicable in the primary dentition, since avulsed primary teeth should not be replanted.

Acute category classification advises immediate treatment for the best possible outcomes (Table 7). Among these are root fractures. The new IADT guidelines recommend multiple options guided by the ability of the child to cooperate. If there is no displacement, then monitoring at specific intervals is recommended. With displacement of the coronal segment, removal of only the coronal piece or realignment and splinting for four weeks with a passive flexible splint is advised. Practitioner expertise and comfort is critical.⁵

Subacute category classification advises treatment as soon as possible, preferably within 24 hours. This can include the initial assessment visit and then a definitive care visit later (Table 7). A critical category here is intrusion of the primary tooth. New guidelines recommend observation of the injury and allowing spontaneous eruption to occur for a period of time up to 12 months.⁵

Follow-up is critical. Recording of outcomes is essential, and suspected ankylosis should be treated with extraction of the involved tooth. The direction of intrusion and whether the permanent successor is involved are not considered events that will alter treatment.⁵ Infraocclusion and or ankylosis in the developing anterior region of the child can have a critical impact on facial morphology and should be assessed, and the needed interventions implemented in a timely manner.¹⁸

Advising the parent of the possible impact on the permanent successor also is critical. Tewari et al. (2018) categorized these into Mild, Moderate and Severe (Table 8, see Page 45).⁸ Document this discussion with the parent. Most studies are in agree-

(Continued on Page 45)

Table 5 — Periodontium

Injury	Treatment Modalities		
	Monitor	Extraction	Splinting
Concussion	✓		
Subluxation	✓		
Extrusion	✓ Allow for spontaneous repositioning	✓ If extruded >3mm or excessively mobile	
Lateral Luxation	✓ Allow for spontaneous repositioning	✓ If interfering with occlusion or excessively mobile	✓ If repositioned and mobile. 4 weeks
Intrusion	✓ Allow for spontaneous repositioning. 6-12 months		
Avulsion	✓ Do not replant		

Current IADT Dental Trauma Guidelines.

Table 6 — Follow-up guidelines for traumatized primary teeth — IADT

Time period	Type of traumatic injury
1 week	All cases
4 weeks	Only if splinted: root fracture, alveolar fracture, lateral luxation
8 weeks	All cases
6 months	Lateral luxation and intrusion
1 year	Most cases
At 6 years old	Avulsion, intrusion, alveolar fracture

Current IADT Dental Trauma Guidelines.

Table 7 — Prioritization of Care















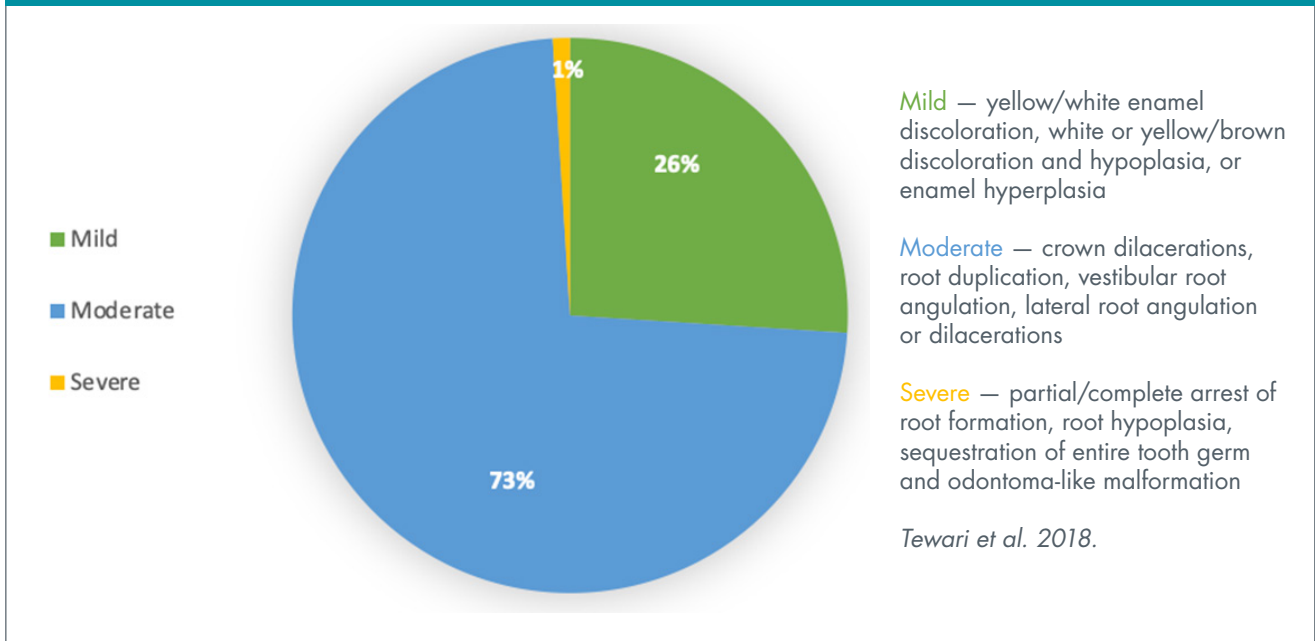
Injury	Clinical/Radiographic Image	ICD-11 Code	Injury	Clinical/Radiographic Image	ICD-11 Code		
ACUTE	Avulsion of permanent tooth Disclaimer: Primary teeth should not be replanted.		NA0D.15	SUBACUTE <i>(Preferably treat within 24 hours)</i>	Intrusion		NA0D.14
	Extrusion		NA0D.12		Subluxation		NA0D.11
	Lateral luxation		NA0D.13		Crown fracture with pulp exposure		NA0D.03
	Root fracture		NA0D.06		Crown/root fracture without pulp exposure		NA0D.04
	Soft tissue injury		NA01.Z		Crown/root fracture with pulp exposure		NA0D.05
	Aveolar fracture		NA02.4Y (maxilla) NA02.75 (mandible)		Crown fracture without pulp exposure		NA0D.02
					DELAYED <i>(Treat within a reasonable time frame or not at all)</i>	Enamel fracture	
			Concussion			NA0D.10	

Table 8 — Long-term Sequelae of Permanent Successors Following TDIs



ment that younger age is the most important age factor. There is some difference on the type of TDI, with some indicating avulsion⁸ and others intrusion⁶ as the most critical factor.

Reattachment of coronal fragments of the primary tooth is not advised. Smoothing of the tooth or restorative procedures such as composite restoration or even a composite crown may be more feasible.

Included in the table on prioritization are specific ICD-11 codes that have just recently been adopted by the World Health Organization.¹⁹ These codes are essential as we continue to document and collate worldwide data on TDI.²⁰ These codes may also be useful in billing for treatment. Often, billing is difficult with current ADA coding, but it may be possible to bill medical insurance coverage. Detailing this type of billing is beyond the scope of this article.

Essential in the diagnosis and effective treatment of TDI is the recognition when referral for more ad-

vanced care is required (Table 2). The abilities of the child and parent as well as practitioner expertise and comfort are most critical.

Often, a TDI is the cause of the first dental visit for the child.⁵ Empathetic management with future growth and

development as critical parameters should be included in our decision-making process. ●

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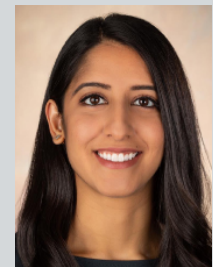
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