

# International Association for Dental Traumatology guideline updates

Farima Mehrabi\*<sup>1</sup> and Serpil Djemal<sup>2</sup>

## Key points

The trauma guidelines have been recently updated and this article will serve to highlight those updates to dental practitioners in a concise manner.

Serves as a reference for dental practitioners when addressing trauma cases clinically.

Indicates best practice and serves as a reference for clinicians when assessing radiographic and clinical review intervals.

## Abstract

The International Association for Dental Traumatology has recently updated its guidelines following on from a consensus methodology. The update involves increased radiographic review, reduced splinting time for avulsed teeth and the recommendation against extraction of luxated primary teeth when displaced towards the permanent tooth germ. This article will highlight the relevant updates and introduce clinicians to the core outcome sets developed for traumatic dental injuries in both adults and children.

## Introduction

The International Association for Dental Traumatology (IADT) has developed a core outcome set for traumatic dental injuries in children and adults. This development is one of its first in dentistry and is supported by a systematic review of the outcomes used in the trauma literature following from a consensus methodology. The outcomes, which are identified as recurring throughout the different injury types, have been identified as 'generic'. Injury-specific outcomes are determined as those outcomes relating to only one or more individual traumatic dental injury.

This article will set out the key points of the IADT trauma guidelines as well as highlight the updates which have been recommended.

## Permanent teeth

Table 1<sup>1,2,3,4</sup> shows the follow-up, splint duration, and general and injury-specific outcomes for trauma incidents involving fractures in adult patients.

<sup>1</sup>Restorative Clinical Lecturer, Bristol Dental School, UK; <sup>2</sup>Consultant in Restorative Dentistry, King's College NHS Trust, UK.

\*Correspondence to: Farima Mehrabi  
E-mail address: farima.mehrabi@bristol.ac.uk

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Table 2<sup>1,2,3,4</sup> shows the follow-up, splint duration, and general and injury-specific outcomes for trauma incidents involving concussion, luxation, extrusion, intrusion and avulsion in adult patients.

## Primary teeth

Table 3<sup>1,2,3,4</sup> shows the follow-up, splint duration, and general and injury-specific outcomes for trauma incidents involving fractures in paediatric patients.

Table 4<sup>1,2,3,4</sup> shows the follow-up, splint duration, and general and injury-specific outcomes for trauma incidents involving concussion, luxation, extrusion, intrusion and avulsion in paediatric patients.

## Overview of the updated guidance

Table 5 provides an overview of the updated IADT guidelines.

## Radiographic recommendations

A robust clinical evaluation must be undertaken of each case to determine the appropriate radiographic methods required. Justification for taking a radiograph is essential and must provide a clear benefit to the patient.

Initial radiographs are recommended to provide a baseline for follow-up examinations and future comparisons.

A principle to utilise when decision-making regarding exposure to ionising radiation is whether the image is likely to change the management of the injury.<sup>1</sup>

Furthermore, cone beam computerised tomography (CBCT) can provide an enhanced visualisation of traumatic dental injuries including root fractures, crown-root fractures and lateral luxations.<sup>1</sup>

## Photographic consideration

The use of clinical photography is strongly recommended for documentation of traumatic dental injuries, both initially and for follow-up examination.<sup>1</sup> As well as providing a medico-legal document, it can also provide clinical information regarding discolouration, movement and positioning of teeth as well as assessment for post-traumatic complications.<sup>1</sup>

## Vitality and sensibility testing

Testing of neural activity within the tooth is unreliable due to the temporary lack of neural response or undifferentiation of A-delta nerve fibres in young teeth, which occurs during post-traumatic pulp healing.<sup>1</sup> Therefore, it is important to note that a lack of response to pulp sensibility testing should not be conclusive for pulp necrosis.

Despite this, the IADT advise that pulp sensibility testing be performed initially and at each follow-up appointment to first establish

**Table 1 The follow-up, splint duration, and general and injury-specific outcomes for trauma incidents involving fractures in adult patients, adapted with permission from Liran Levin *et al.*, 'International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: general introduction', *Dental Traumatology*, 2020, John Wiley & Sons,<sup>1</sup> originally published under the terms of the Creative Commons Attribution-NC-ND licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)**

| Trauma incident                  | Follow-up   | Splint duration + removal | Generic outcomes   | Injury-specific outcomes                      |
|----------------------------------|---|---------------------------|--|---|
| Infraction                       | No follow up required   | –                         | –  | –   |
| Enamel fracture                  | Clinical review: 6–8 w and 1 yr<br>Radiograph advised: 6–8 w and 1 yr   | –                         | Periodontal healing (including bone loss, gingival recession, mobility and ankylosis/resorption)<br>Pulp healing (including infection)<br>Pain<br>Discolouration<br>Tooth loss<br>Quality of life (days off work, school and sport)<br>Aesthetics (patient perception)<br>Trauma-related dental anxiety<br>Number of clinic visits | Quality of restoration<br>Loss of restoration |
| Enamel-dentin fracture           | Clinical review: 6–8 w and 1 yr<br>Radiograph advised: 6–8 w and 1 yr   | Splint removal: 4 w       |  |   |
| Crown fracture                   | Clinical review: 6–8 w, 3 m, 6 m and 1 yr<br>Radiograph advised: 6–8 w, 3 m, 6 m and 1 yr   | Splint removal: 4 w       |  |   |
| Crown-root fracture              | Clinical review: 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr<br>Radiograph advised: 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr           | –                         |  |   |
| Root fracture (apical-mid-third) | Clinical review: 4 w, 6–8 w, 4 m, 6 m, 1 yr and yearly up to 5 yr<br>Radiograph advised: 4 w, 6–8 w, 4 m, 6 m, 1 yr and yearly up to 5 yr | Splint removal: 4 w       |  |   |
| Root fracture (cervical third)   | Clinical review: 4 w, 6–8 w, 4 m, 6 m, 1 yr and yearly up to 5 yr<br>Radiograph advised: 4 w, 6–8 w, 4 m, 6 m, 1 yr and yearly up to 5 yr | Splint removal: 4 m       |  |   |

**Table 2 The follow-up, splint duration, and general and injury-specific outcomes for trauma incidents involving concussion, luxation, extrusion, intrusion and avulsion in adult patients, adapted with permission from Liran Levin *et al.*, 'International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: general introduction', *Dental Traumatology*, 2020, John Wiley & Sons,<sup>1</sup> originally published under the terms of the Creative Commons Attribution-NC-ND licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)**

| Trauma incident          | Follow-up   | Splint duration + removal | Generic outcomes   | Injury-specific outcomes  |
|--------------------------|---|---------------------------|--|---|
| Concussion               | Clinical review: 4 w and 1 yr<br>Radiograph advised: 4 w and 1 yr   | –                         | Periodontal healing (including bone loss, gingival recession, mobility and ankylosis/resorption)<br>Pulp healing (including infection)<br>Pain<br>Discolouration<br>Tooth loss<br><br>Quality of life (days off work, school and sport)<br>Aesthetics (patient perception)<br>Trauma-related dental anxiety<br>Number of clinic visits | –   |
| Subluxation              | Clinical review: 2 w, 3 m, 6 m and 1 yr<br>Radiograph advised: 2 w, 3 m, 6 m and 1 yr   | Splint removal: 2 w       |  | –   |
| Extrusion                | Clinical review: 2 w, 4 w, 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr<br>Radiograph advised: 2 w, 4 w, 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr | Splint removal: 2 w       |  | Infra-occlusion   |
| Lateral luxation         | Clinical review: 2 w, 4 w, 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr<br>Radiograph advised: 2 w, 4 w, 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr | Splint removal: 4 w       |  | –   |
| Intrusion                | Clinical review: 2 w, 4 w, 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr<br>Radiograph advised: 2 w, 4 w, 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr | Splint removal: 4 w       |  | Infra-occlusion<br>Re-alignment – where spontaneous repositioning is undertaken |
| Avulsion (mature root)   | Clinical review: 2 w, 4 w, 3 m, 6 m, 1 yr and yearly up to 5 yr<br>Radiograph advised: 2 w, 4 w, 3 m, 6 m, 1 yr and yearly up to 5 yr               | Splint removal: 2 w       |  | Infra-occlusion   |
| Avulsion (immature root) | Clinical review: 2 w, 4 w, 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr<br>Radiograph advised: 2 w, 4 w, 6–8 w, 3 m, 6 m, 1 yr and yearly up to 5 yr | Splint removal: 2 w       |  |   |

Key:  
w = week(s); m = month(s); yr = year(s).

**Table 3** The follow-up, splint duration, and general and injury-specific outcomes for trauma incidents involving fractures in paediatric patients, adapted with permission from Liran Levin *et al.*, 'International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: general introduction', *Dental Traumatology*, 2020, John Wiley & Sons,<sup>1</sup> originally published under the terms of the Creative Commons Attribution-NC-ND licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

| Trauma incident        | Follow-up   | Splint duration + removal | Generic outcomes   | Injury-specific outcomes   |
|------------------------|---|---------------------------|--|--|
| Enamel fracture        | No follow-up or splinting required  |                           | Periodontal healing (including bone loss, gingival recession, mobility and ankylosis/resorption)<br>Pulp healing (including infection)<br>Pain<br>Discolouration<br>Tooth loss<br>Quality of life (days off work, school and sport)<br>Aesthetics (patient perception)<br>Trauma-related dental anxiety<br>Number of clinic visits<br>Impact on development of permanent successor | –  |
| Enamel-dentin fracture | Clinical review: 8 w<br>Radiograph advised: not advised   | No splint advised         |  | Quality of restoration<br>Loss of restoration                          |
| Crown fracture         | Clinical review: 1 w, 8 w and 1 yr<br>Radiograph advised: only if endodontic treatment is carried out | No splint advised         |  | If crown is restored:<br>Quality of restoration<br>Loss of restoration |
| Crown-root fracture    | Clinical review: 1 w, 8 w and 1 yr<br>Radiograph advised: only if endodontic treatment is carried out | No splint advised         |  | Re-alignment – where spontaneous repositioning has been undertaken     |
| Root fracture          | Clinical review: 1 w, 4 w, 8 w and 1 yr<br>Radiograph advised: not advised                            | Splint removal: 4 w       |  |  |
| Alveolar fracture      | Clinical review: 1 w, 4 w, 8 w, 1 yr and at 6 years old<br>Radiograph advised: 4 w and 1 yr           | Splint removal: 4 w       |  |  |

Key:  
w = week(s); m = month(s); yr = year(s).

**Table 4** The follow-up, splint duration, and general and injury-specific outcomes for trauma incidents involving concussion, luxation, extrusion, intrusion and avulsion in paediatric patients, adapted with permission from Liran Levin *et al.*, 'International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: general introduction', *Dental Traumatology*, 2020, John Wiley & Sons,<sup>1</sup> originally published under the terms of the Creative Commons Attribution-NC-ND licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

| Trauma incident  | Follow-up  | Splint duration + removal | Generic outcomes   | Injury-specific outcomes  |
|------------------|--|---------------------------|--|---|
| Concussion       | Clinical review: 1 w and 8 w<br>Radiograph advised: not advised                            | No splint advised         | Periodontal healing (including bone loss, gingival recession, mobility and ankylosis/resorption)<br>Pulp healing (including infection)<br>Pain<br>Discolouration<br>Tooth loss<br>Quality of life (days off work, school and sport)<br>Aesthetics (patient perception)<br>Trauma-related dental anxiety<br>Number of clinic visits | –   |
| Subluxation      | Clinical review: 1 w and 8 w<br>Radiograph advised: not advised                            | No splint advised         |  | Re-alignment – where spontaneous repositioning is undertaken                    |
| Extrusion        | Clinical review: 1 w, 8 w and 1 yr<br>Radiograph advised: not advised                      | No splint advised         |  |   |
| Lateral luxation | Clinical review: 1 w, 8 w, 6 m and 1 yr<br>Radiograph advised: not advised                 | Splint removal: 4 w       |  |   |
| Intrusion        | Clinical review: 1 w, 8 w, 6 m, 1 yr and at 6 years old<br>Radiograph advised: not advised | No splint advised         |  | Re-alignment – where spontaneous repositioning is undertaken<br>Infra-occlusion |
| Avulsion         | Clinical review: 1 w, 8 w and at 6 years old<br>Radiograph advised: not advised            | No splint advised         | Pain<br>Tooth loss<br>Aesthetics<br>Quality of life<br>Trauma-related dental anxiety<br>Number of clinic visits<br>Impact on development of permanent successor  | –   |

Key:  
w = week(s); m = month(s); yr = year(s).

**Table 5 An overview of the updated IADT guidelines**

| Area of treatment                       | Updated guidelines  |
|---|---|
| Radiographic assessment                 | The new guidance recommends a return to radiographic assessment at every review appointment. This allows for the early identification of any significant injuries, which may occur to the tooth root and supporting periodontal tissues over time <sup>1</sup> CBCT scans can be undertaken to help aid diagnosis where justifiable and necessary   |
| Follow-up                               | When undertaking review and follow-up for episodes of dental trauma, it is recommended yearly for at least five years   |
| Documentation                           | Dental photography is encouraged and advised as a form of documentation   |
| Sensibility testing                     | Sensibility testing should not be relied upon and a negative sensibility test should not be the sole driver for irreversible treatment  |
| Root canal treatment                    | Pulpotomy has now become the treatment of choice over root canal treatment in mature traumatised teeth and extraoral root canal treatment is no longer recommended  |
| Splinting                               | A flexible splint is now defined as a passive and flexible splint<br>Splinting in primary teeth should only be undertaken in cases where dentoalveolar fractures have occurred for a duration of 30 days. In all other circumstances of traumatic injury in the primary dentition, splinting is not recommended should the teeth be stable<br>The splinting duration for an avulsed permanent tooth has now also been reduced from (previously) four weeks to (now) two weeks <sup>2</sup>  |
| Avulsion injuries                       | Splinting time is now two weeks irrespective of the extraoral dry time<br>Fluoride application on the root surface of avulsed teeth is no longer advised  |
| Intrusive and lateral luxation injuries | For intrusive and lateral luxation injuries in deciduous teeth, new guidelines recommend that extraction should not be recommended when the direction of displacement of the traumatised primary tooth is towards the permanent tooth germ. <sup>3</sup> The evidence to support this includes: <sup>3</sup> <ul style="list-style-type: none"> <li>• Evidence of spontaneous re-eruption of intruded primary teeth</li> <li>• The concern that further damage may be inflicted on the tooth germ should extraction be undertaken</li> <li>• The lack of evidence that immediate extraction minimises further damage to the permanent tooth germ</li> <li>• For secondary teeth, which have been intruded as a result of traumatic injury, passive eruption should be allowed to take place before considering intervention.</li> </ul> |

a baseline and further determine if changes occur over time.<sup>1</sup> Initial testing has been shown to be a good predictor for long-term prognosis of the pulp.

Pulse oximetry, used to measure actual blood flow, has been shown to demonstrate a reliable and non-invasive method as well as being an accurate way of determining vitality (presence of a blood supply) in the pulp.<sup>1</sup>

### Antibiotic use

Currently, there is limited evidence to support the use of systemic antibiotics during the emergency management of traumatic dental injuries for permanent or primary teeth, with the exception of those patients whose medical status warrants antibiotic, coverage for example in immunocompromised patients.

It does, however, remain at the discretion of the clinician if through clinical judgement they believe, due to soft tissue injury or the requirements of significant surgical intervention, antibiotics are necessitated. In those instances, the child's paediatrician should be contacted and advice sought.

For injuries involving avulsion, bacteria from the environment, the oral cavity or the storage medium may contaminate the periodontal ligament of said teeth.<sup>1</sup> Therefore, for the instances in which avulsion has occurred,

systemic antibiotics are recommended in order to prevent infection-related reactions and to reduce the risk of inflammatory root resorption.<sup>1</sup>

Amoxicillin or penicillin are the first-choice medications, taking into consideration the patient's age and weight for correct and safe dosage.<sup>1</sup> However, a suitable alternative should be provided in those with medical allergies.

Although doxycycline has antimicrobial, anti-inflammatory and antiresorptive properties, its use is contraindicated for patients under the age of 12 years, and patients and/or guardians should be informed that it does carry the risk of discolouration of permanent teeth.<sup>1</sup>

Currently, there is limited evidence in support of the use of topical antibiotics placed on the root surface of avulsed teeth before replantation and therefore these cannot be recommended.<sup>1</sup>

### Endodontic considerations

Early endodontic treatment is strongly advised in fully developed teeth.<sup>1</sup> Calcium hydroxide is the recommended intracanal medicament to be placed 1–2 weeks after trauma and ideally left for up to one month before completing root canal treatment.<sup>1</sup>

Incompletely developed teeth should be left to continue root development, and every effort should be made to preserve and/or heal the pulp and pulpotomies given precedence over root canal treatment in mature teeth where possible. However, if there is any evidence of inflammatory (infection-related) external root resorption, then root canal treatment should be immediately initiated.<sup>1</sup> This would initially involve placing calcium hydroxide for three weeks and replacing it every three months until all radiolucencies of resorptive lesions have disappeared.<sup>1</sup> When bone repair is visible radiographically, root canal treatment can be commenced.<sup>1</sup>

### Stabilisation and splinting

The most up-to-date evidence recommends the use of passive and flexible splints for short-term duration for splinting teeth which have been either avulsed, luxated or root-fractured.<sup>1</sup> The splint should be a stainless steel wire up to 0.4 mm in diameter.<sup>1</sup> This will help to maintain a repositioned tooth as well as support its healing and improve function, and is considered best practice.<sup>1</sup>

Both composite and bonding agents should be kept away from gingival margins and proximal areas, in order to prevent plaque trapping and/or secondary caries or infection.<sup>1</sup>

### Combined injuries

Studies have shown that teeth which sustain a combination of injuries are likely to experience a greater frequency of pulp necrosis and infection.<sup>1</sup>

### Pulp canal obliteration

Teeth that have open apices, which are subject to extrusion, intrusion and lateral luxation, are at highest risk for pulp canal obliteration occurring. It may also commonly occur following root fractures.<sup>4</sup>

### Final considerations

Traumatic dental injuries are not only distressing for the child and parent but also challenging for the dental team managing them. The final considerations are as follows:

- A structured approach should be undertaken, including robust documentation and intraoral/extraoral clinical photographs of patients recorded where possible. The literature shows that the use of a structured approach can significantly improve the quality of trauma records
- A careful and systematic approach to diagnosis should be undertaken
- The clinician should be alert to concomitant injuries involving the head and neck region and seek medical assistance if necessary
- For children, appropriate advice should be provided to parents on the best ways to manage acute symptoms and education on the potential long-term outcomes as a consequence of the dental injuries. Such advice should also be provided to adults who have sustained dental trauma
- Consideration should be given to a child's maturity, compliance and level of dental

anxiety when discussing potential treatment visitation to prevent the potential of post-traumatic stress disorder and anxiety.

#### Conflict of interest

The authors declare no conflicts of interest.

#### References

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## Correction to: Book review: Odell's clinical problem solving in dentistry

The original article can be found online at <https://doi.org/10.1038/s41415-021-2961-8>

Correction note:

Book review article *Br Dent J* 2021; **230**: 506.

When this article was initially published the editor's name was listed incorrectly as Edward Odell.

The editors were: 'Avijit Banerjee & Selvam Thavaraj'.

The journal apologises for any inconvenience caused.