Protecting All Children’s Teeth

Oral Injury
Introduction

Dental injuries are very common, and up to 30% of children injure their primary teeth. These injuries occur most often during the toddler years when children are active but unsteady on their feet.

These injuries become common again in the mid-elementary school years (ages 8 to 10) as children join sports teams and become more independently active outdoors (eg, bicycles, playgrounds, trampolines).

In adolescence, motor-vehicle accidents and assault become increasingly important in the epidemiology of dental injury.

Overall, tooth injury is more common in males (greater than a 2:1 ratio), and almost half of all children will incur some type of tooth damage by the time they reach adolescence.
Learner Objectives

Upon completion of this presentation, participants will be able to:

- Describe the incidence and epidemiology of dental injury in the United States.
- Outline a proper examination following an oral injury.
- List and describe the 7 categories of tooth injury, their basic management, and possible sequelae.
- Discuss in detail the proper management of an avulsed tooth.
- Provide appropriate anticipatory guidance for oral injury prevention.
- Compare and contrast the 3 basic types of mouth guards and summarize the AAPD recommendations on mouth guard use in athletics.

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Patterns and Risk Factors

The most common injury site is the maxillary (upper) central incisors, which account for more than 50% of all dental injuries.

Oral injuries typically result from falls (most common), bike and car accidents, sports-related injuries, and violence.

The mouth is also a common site for non-accidental trauma, and child abuse should always be considered in a child presenting with oral trauma.
Patterns and Risk Factors

Pediatricians should be aware of the following risk factors for oral trauma:

- Children with compromised protective reflexes or poor coordination
- Hyperactivity
- Substance abuse (by the adolescent or within the family)
- Child abuse or neglect
- Malocclusion with protruding front teeth
- Failure to use protective face and mouth gear
Examination Following Oral Injury

History and mechanism of injury are extremely important in predicting the likely type of oral injury.

Airway, breathing, and circulation (ABC’s) are paramount, and life threatening injuries should be addressed immediately.

A complete neurologic examination is necessary, because oral injuries are often accompanied by more generalized head trauma.
Examination Following Oral Injury, continued

1. Irrigate to remove blood and debris and to improve visualization.
2. Examine soft tissues for edema, tenderness, and lacerations.
3. Examine bony structures for pain or malocclusion.
4. Assess patient’s ability to open the mouth and laterally deviate the jaw.
5. Examine the tooth ridge for “step-offs”, which can indicate a fracture of the underlying alveolar bone.
6. Examine the teeth for tenderness and mobility.
7. Account for all teeth and determine if injury has occurred to the primary or permanent dentition.
Missing Teeth

Missing teeth should be accounted for.

Do not assume that missing teeth were lost at the scene of the accident because they may be imbedded in soft tissues, intruded into the alveolar bone or sinus cavity, aspirated, or swallowed.

Radiographs (soft tissue and chest X-rays) should be done to look for missing teeth.
Dental Trauma

It is important that clinicians be familiar with the different types of dental trauma and be able to appropriately triage injured patients.

Dental follow-up is necessary for all tooth trauma because even seemingly minor injuries can result in tooth death.

In general, management of primary tooth injury is dictated by concern for the safety of the permanent dentition.

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Types of Tooth Injury

Tooth injury can be divided into 7 main categories:

1. Concussion
2. Subluxation
3. Lateral Luxation
4. Intrusion
5. Extrusion
6. Avulsion
7. Fracture
Concussion involves injury to supporting structures of the tooth, without loosening or displacement.

Tooth is tender to percussion.

Recommended Treatment:
- Stick to a soft diet for 2 weeks.
- Monitor for changes in tooth color.
- Refer to dentist for non-urgent evaluation.
Subluxation

Subluxation involves injury to supporting structures of the tooth with loosening but no displacement. The tooth is tender to percussion, with bleeding at the gingival margin.

Recommended Treatment:
- Stick to a soft diet for 2 weeks.
- Dental follow-up; may splint permanent teeth.
- Monitor for changes in tooth color that may indicate pulp necrosis.

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Lateral Luxation

Lateral luxation involves injury to the tooth and its supporting structures, resulting in tooth displacement. The injured tooth is at risk for pulpal necrosis and root resorption.

This type of injury requires prompt referral to a dentist for repositioning of the injured tooth/teeth.

Even primary teeth should be examined by a dentist, because the underlying permanent tooth may be injured.
Intrusion

With intrusion injuries, the tooth is pushed into the socket and the alveolar bone. It may appear shortened or barely visible.

Intrusion has a poor prognosis and high risk for complications, including root resorption, *pulp* necrosis, and infection. This type of injury may require a root canal.

Intrusion injuries may also damage underlying permanent dentition, especially if an infection develops.

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Intrusion, continued

With intrusion injuries, teeth may re-erupt. If a primary tooth does not re-erupt, it will require extraction to not interfere with permanent tooth eruption.

Recommended Treatment:
- Do not attempt to remove intruded tooth. Instead, focus on pain control and consider antibiotic prophylaxis.
- For a primary tooth, seek dental evaluation within 1 week (or earlier, for significant symptoms).
- For a permanent tooth, refer to a dentist immediately for repositioning and splinting.
Extrusion

With an extrusion injury, the tooth is partially displaced from its socket.

This type of injury requires re-positioning and stabilization.

Refer to a dentist promptly to evaluate the extent of injury, as well as any associated injury (eg, fracture).
Avulsion

With this type of injury, the tooth is completely out of the socket.

Management of avulsion injuries depends on the tooth type.

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Avulsion of a Primary Tooth

DO NOT re-implant a primary tooth, as this may damage the underlying permanent tooth.

Instead, refer to a dentist within 24 hours.
Avulsion of a Permanent Tooth

This is a dental emergency!

Avulsion should be managed as follows:

1. *Gently* rinse off debris with saline or milk. Hold tooth by crown only.
2. Avoid touching the root. Do not clean or rub it. It is important to preserve the periodontal ligament for tooth survival.
3. Re-implant an avulsed permanent tooth immediately, ensuring correct orientation. The tooth should be re-implanted within 20 minutes, but the best outcome is with teeth replaced within 5 minutes.
4. Instruct patient to bite on gauze or a handkerchief or to hold the tooth in place.
5. Send to a dentist or maxillofacial surgeon immediately for radiographs, splinting, and antibiotic prophylaxis.

6. If the tooth cannot be re-implanted on scene, transport it (ordered by preference) in: a tooth storage solution, warm milk, saline, or saliva.

7. A tooth should not be transported dry or in plain water, as this significantly decreases the chance of ligament survival.

8. Never suggest a child hold the damaged tooth in his or her mouth because of the risk of aspiration or bacterial contamination.
Fracture

There are 5 basic types of tooth fracture:

1. Uncomplicated Fracture of Enamel
2. Uncomplicated Fracture of Enamel and Dentin
3. Dentin, Enamel, and Pulp Death (Complicated Crown Fracture)
4. Dentin, Pulp, and Cementum Fracture
5. Root Fracture
Uncomplicated Fracture of Enamel

This type of fracture is a crack of the enamel that does not involve the dentin or the pulp. It may have a sharp edge.

Recommended Treatment:

- Inspect injured lips, tongue, and gingiva to rule out presence of tooth fragments.
- Refer to a dentist for evaluation ASAP (within 12 to 24 hours).
- Recommend long-term follow-up to evaluate for complications, which are uncommon.
Uncomplicated Fracture of Enamel and Dentin

This enamel-dentin fracture does not involve the pulp and can be recognized by the yellow to pink color of the dentin. Potential complications include pulp death and infection.

Recommended Treatment:

- Inspect injured lips, tongue, and gingiva to rule out presence of tooth fragments.
- Provide a soft diet, avoiding temperature extremes.
- If a primary tooth is injured, refer to a dentist for further treatment.
- If a permanent tooth is injured, refer to a dentist within 12 to 24 hours to cover exposed dentin of permanent incisors.
Dentin, Enamel, and Pulp Death (Complicated Crown Fracture)

The site of a complicated crown fracture has a reddish tinge or will show some bleeding. This type of fracture can cause extreme pain and may lead to pulpal necrosis. It also presents a risk of root resorption and infection in exposed pulp.

Refer to dentist as soon as possible (within 12 to 24 hours) for evaluation.

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Dentin, Pulp, and Cementum Fracture

This type of fracture has pulp exposure. Potential complications include root resorption and pulp necrosis.

Refer to dentist as soon as possible (within 12 to 24 hours) for evaluation, where diagnosis will be made through radiograph.

Treatment consists of reduction and splinting or extraction.
Root Fracture

Excessive mobility of the tooth may indicate a root fracture. This type of fracture includes pulp exposure. Potential complications for a root fracture include resorption and pulp necrosis.

Refer to a dentist ASAP (within 12-24 hours) for evaluation, where diagnosis is made radiographically.

Treatment consists of reduction and splinting for permanent teeth or extraction, depending on the extent of the traumatic lesion.
Complications and Consequences of Tooth Injury

There are many possible consequences of an oral injury:

- Pain, which can be severe.
- Infection, including abscess.
- Ankylosis.
- Inflammatory root resorption.
- Aesthetic consequences.
- Negative impact on self-esteem.
- Impaired oral or phonetic function.
- High cost.

For these reasons, prevention of tooth injury is paramount.
Prevention

Prevention is the most effective intervention.

Pediatricians are in a unique position to help families prevent accidental trauma, including oral trauma, by providing anticipatory guidance at routine visits.

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Accident Prevention

Suggestions for accident prevention specifically related to oral trauma:

1. Advise parents about possible injury to developing permanent teeth from trauma if a primary tooth is injured.
2. Review and anticipate developmental milestones.
3. Counsel about the risks of walkers and trampolines.
4. Discuss childproofing the home.
5. Review safety measures for outdoor activities and sports.
6. Stress the importance of adequate supervision at all times, especially on furniture, stairs, at the playground, and at athletic events or practices.

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Sports and Protective Gear

Sports participation poses a significant risk for trauma

The highest risk sports for oral trauma are baseball, soccer, football, basketball, and hockey.

Skateboarding, rollerblading, and bicycling injuries are also common.
Sports and Protective Gear, continued

Helmet and face masks should be properly fitted and worn during all games and practices for the sports in which they are recommended.

Statistically, children are more often injured in practice than during a game, so all protective gear should be worn during practice as well.
Mouth Guards

Mouth guard use is mandatory for football, ice hockey, lacrosse, field hockey, and boxing.

Several states have also passed regulations to mandate mouth guards for soccer, basketball, and wrestling.
Facts About Mouth Guard Use

1. Mouth guards help to protect the teeth and soft tissues of the mouth from injury.
2. The better the fit, the more protection offered.
3. Mouth guard use may reduce the risk or severity of a concussion.
Types of Mouth Guards

There are 3 types of mouth guards:

1. Stock.
2. Mouth-formed, or “boil-and-bite.”
3. Custom fit.

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Stock Mouth Guards

These pre-formed, over-the-counter, ready-to-wear mouth guards are generally the least comfortable and, therefore, the least likely to be worn.

Because of poor fit, they also offer the least protection and require constant biting down to stay in place.
Boil and Bite Mouth Guards

Made of thermoplastic material that conforms to the shape of the teeth after being placed in hot water, these mouth guards are commercially available and the most common type used by athletes.

They vary in fit, comfort, and protection.
Custom Fit Mouth Guards

This type of mouth guard must be made by a dentist for the individual.

It is the most expensive, but also offers the most protection and comfort.

Custom mouth guards are preferred by dentists and usually preferred by athletes because of their increased comfort, wear-ability, and retention, as well as ease of speaking when worn.

This type of mouth guard is particularly important for adolescents with orthodontic appliances.
Recommendations for Mouth Guards

The American Academy of Pediatric Dentistry (AAPD) recommends properly fitted mouth guards for all children participating in organized and unorganized contact and collision sports.

The AAPD supports mandates for use of athletic mouthguards in any sporting activity containing a risk of orofacial injury.

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Question #1

Which teeth are most commonly affected by oral injury?

A. Central maxillary incisors.
B. Central mandibular incisors.
C. Canines.
D. Molars.
E. There is no common pattern to oral injuries.
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Question #2

Which of the following is not a risk factor for oral trauma?

A. Malocclusion.
B. Child abuse or neglect.
C. Early childhood caries.
D. Hyperactivity.
E. Substance abuse within the family.
Answer

Which of the following is not a risk factor for oral trauma?

A. Malocclusion.
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C. Early childhood caries.
D. Hyperactivity.
E. Substance abuse within the family.
Question #3

Which of the following is most likely following intrusion of a primary tooth?

A. Root resorption.
B. Re-eruption of the primary tooth.
C. Pulpal necrosis with possible root infection.
D. Fracture of the underlying permanent tooth.
E. Damage to the underlying tooth and failure of permanent tooth to erupt.
Answer

Which of the following is most likely following intrusion of a primary tooth?

A. Root resorption.
B. Re-eruption of the primary tooth.
C. Pulpal necrosis with possible root infection.
D. Fracture of the underlying permanent tooth.
E. Damage to the underlying tooth and failure of permanent tooth to erupt.
Question #4

Which of the following is the proper management of an avulsed primary tooth?

A. The tooth should not be re-inserted.
B. The tooth should be transported in milk and the child rushed to a dentist or ER for re-insertion.
C. The tooth should be transported in water and the child rushed to a dentist or ER for re-insertion.
D. It should be re-inserted immediately.
E. None of the above.
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D. It should be re-inserted immediately.
E. None of the above.
Question #5

Which of the following is a consequence of oral injury?

A. High cost.
B. Impaired oral or phonetic function.
C. Pain.
D. Infection, including abscess.
E. All of the above.
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C. Pain.
D. Infection, including abscess.
E. All of the above.
References


