

Dental Trauma in Athletes

See also Dental
See also Dental Anesthesia
See also Dental Abscess

Background

1. Definition
   - Dental trauma is disruption to tooth, periodontal ligament, tooth root or alveolar ridge
     - Dental injuries occur during organized athletic events as well as during unorganized recreational activities
     - Most common in high contact sports
     - Tooth fractures
       - Type 1: Tooth Fx of enamel only
       - Type 2: Tooth Fx of enamel and dentin
       - Type 3: Tooth Fx of enamel, dentin, pulp
       - Type 4: Root Fxs
     - Tooth Luxation: displacement of tooth from its normal position
       - Luxations involve supporting structures of tooth, periodontal ligament, alveolar bone
       - Luxations incl
         - Tooth concussion: tooth is neither loose nor displaced
           - Tenderness w/biting d/t inflammation to peridontal ligament
         - Tooth subluxation: tooth is loose, periodontal ligament contused
         - Tooth luxation: tooth is loose and in socket at abnormal angle
           - Peridontal ligament is lacerated, supporting bone damaged
         - Tooth intrusion: tooth is pushed into socket
           - Peridontal ligament is compressed, socket is fractured
         - Tooth extrusion: tooth centrally displaced from socket
           - Peridontal ligament usually lacerated
         - Tooth avulsion: tooth knocked out of socket
           - Peridontal ligament severed
         - Alveolar bone fracture: step off of alveolar ridge

2. General info
   - Tooth fx
     - Enamel is pearly white
     - Dentin has yellow hue
     - Pulp-a pink dot usually bleeding
   - ADA.org: Dental Emergencies and Injuries
   - International Association of Dental Traumatology
     - http://www.iadt-dentaltrauma.org/web/
Pathophysiology

1. Pathology of dz
   - Trauma to dental structures can cause
     - Pulp death
     - Root resorption
     - Developmental defects in permanent tooth
   - Loss of a tooth can lead to
     - Bite abnormalities
     - Long-term pain
   - Trauma to tooth can cause periodontal ligament injury
     - Tooth does not receive nourishment to neurovascular structures

2. Incidence/prevalence
   - CDC in 2001 estimated that 1/3 all dental injuries in US are from sports
   - Injury to teeth and alveolar process represents 84.5% of maxillofacial injuries in sports
   - Boys greater than girls 3:1
   - 25% of 12 yr olds have injuries to permanent teeth
   - Anterior maxillary incisors are most often injured

3. Risk factors
   - High-risk contact sports
     - Soccer
     - Lacrosse
     - Inline skating
     - Basketball
     - Bicycling
     - Boxing
     - Skateboarding
     - Field hockey
     - Skiing
     - Ice hockey
     - Wrestling
     - Baseball
   - Lower risk sports incl
     - Golf
     - Billiards
     - Bowling
   - Use of orthodontic appliance incr risk

4. Morbidity/mortality
   - Primary tooth
     - Cosmetic and functional use of tooth impaired
     - Primary trauma cannot always predict permanent tooth damage
     - Infection to pulp
     - Facial cellulitis
   - Permanent tooth
     - Cosmetic and functional use of tooth impaired
     - Tooth viability
     - Root resorption
     - Infection to periapical and facial area
     - Chronic bite abnormalities that produce pain
Diagnostics
1. History
   o Assess mechanism of injury
     • When, where, how much force
   o Timeline of event greatly affects tx outcome
   o Pain on bite or at rest
   o Are any teeth tender to touch?
   o Is tooth sensitive to cold or hot?
   o Does athlete feel as if their bite is normal?
   o Is tooth primary or permanent
2. Physical exam
   o ABCs
     • Airway
     • Breathing
     • C-spine
     • Concussion
   o Soft tissue swelling, bleeding, hematoma
   o Missing fragments of broken teeth
   o Examine tooth for Fx to enamel, dentin, and pulp
   o Examine tooth for looseness
   o Examine gum line for step off or gingival laceration
   o Can pt open mouth easily?
     • If no, consider:
       • Mandibular fx
       • TMJ dislocation
3. Dx tests
   o Lab eval
     • CBC for excessive bleeding
   o Dx imaging
     • Dental x-ray to assess severity of displacement or Fx
       • Root fx
       • Tooth bud displacement
     • Dental x-ray-baseline record for status of alveolus
     • Facial bone x-ray for step off of alveolar ridge
     • CT of facial bones for associated maxillofacial injuries

Differential Diagnosis
1. Even following a traumatic event, source of oral pain may be unrelated to trauma
   o Aphthous ulcer
   o Dental caries
   o Pericoronitis
   o Dental abscess
   o Food particles stuck between teeth
   o Pulpitis
   o Peridontal disorder
**Therapeutics**

1. Acute treatment
   - Rinse mouth of debris
   - Handle tooth only by enamel surface
   - Avoid cold and hot liquids if pain is present
   - Soft diet
2. Reposition tooth if indicated
   - Gently reposition w/gloved hand
   - If tooth cannot be repositioned, immediately refer to dentist
3. Splinting of tooth once repositioned
   - Mouthguard, sugarless gum, dental wire
4. Tetanus prophylaxis
   - Indicated for dirty wounds
   - Avulsed teeth
   - Deep lacerations
   - Intrusion injuries
5. Antibiotics
   - Unknown benefit in dental trauma
   - Animal models have shown antibiotics to decr extent of root resorption
     - No effect on pulp or periodontal ligament fxn
   - Antibiotic therapy indicated for secondary infections
6. Specific tx guidelines
   - Fractures
     - Enamel Fx: Type 1
       - Dental eval w/in 48 hrs
       - Tooth will be smoothed for cosmetic appearance
       - Irregular enamel Fxs can damage intraoral soft tissue
     - Enamel and dentin Fx: Type 2
       - See dentist w/in 48 hrs
       - Dentin needs covered to prevent infection
       - Tooth will be reconstructed or defect filled
     - Enamel, dentin, and pulp Fx: Type 3
       - See dentist w/in 3 hrs
       - Very painful
       - Dentin needs to be restored to prevent infection
       - Complicated Fxs will require pulpotomy or pulpectomy
     - Root Fx: Type 4
       - Tooth will be loose, very painful or painless
       - Tooth should be splinted w/mouthguard, sugarless gum, or dental wire
       - Refer to dentist w/in 3 hrs
       - Fxs closer to cemental junction are more unstable and have poorer prognosis
   - Luxation injuries involve supporting structures of tooth-peridontal ligament and alveolar bone
     - Tooth concussion: primary or permanent tooth
       - Tooth not loose but peridontal ligament is inflamed
       - Pain on chewing or tenderness
       - See dentist in 1-7 days
- Tooth subluxation: primary tooth
  - Tooth loose w/gingival bleeding
  - Pain on chewing or percussion
  - See dentist 1-7 days
  - X-ray monitoring for 4 wks is done to r/o pulp necrosis
- Tooth subluxation: permanent tooth
  - Tooth loose w/gingival bleeding
  - Pain on chewing or percussion
  - Splint tooth
  - See dentist immediately
- Tooth luxation: primary or permanent tooth
  - Tooth must be repositioned
  - Tooth must be splinted
  - See dentist immediately
- Tooth extrusion: primary or permanent tooth
  - Tooth must be repositioned
  - Tooth must be splinted
  - See dentist immediately
- The longer a tooth has been displaced the more difficult it is to reposition
  - Should reposition w/in 48 hrs or less
  - Tooth intrusion: primary tooth
    - Tooth may need to be repositioned
    - See dentist in 1-7 days
  - Tooth intrusion: permanent tooth
    - Do not attempt to remove tooth
    - Tooth will need to be repositioned
    - Tooth will need to be splinted
    - See dentist immediately
  - Teeth pushed 3mm will likely return to natural position
  - Teeth pushed 3-6mm will need to be repositioned
  - Teeth pushed greater than 6mm will need immediate root canal
  - Tooth avulsion: primary tooth
    - Do not replace tooth
    - See dentist w/in 24 hrs
  - Tooth avulsion: permanent tooth
    - TRUE DENTAL EMERGENCY
    - Find tooth
    - Rinse off any debris w/saline or milk
    - Hold tooth by crown only
    - Do not touch or clean root
    - Re-implant immediately (w/in 5 mins)
    - See dentist immediately
    - If tooth cannot be re-implanted, transport in
      - Cold milk
      - Hanks Balanced Salt Solution
      - Pts saliva
        - Transportation in buccal space may cause more dental injury
- A tooth out of mouth for >5 mins will
  - Lose its ability to regenerate
  - Even replaced it will eventually die
- Alveolar bone fracture
  - Rinse and irrigate mouth
  - Stop bleeding w/pressure
  - Nothing by mouth
  - See oral surgeon w/in 1 hr
  - Reduction is easier before swelling incr

7. Long term care
   - Many dental injuries evolve over time
   - Repeated dental splinting and future root canal surgery is possible
   - Some dental implants are needed over time
   - Many athletes do not have dental insurance
     - Dental care can be expensive

Follow-Up
   1. Highly variable and is determined by dental expert

Prognosis
   1. Prognosis for tooth viability depends upon
      - Integrity of periodontal ligament
      - Maturity level of pulp exposed
      - Extent of dentin exposed
      - Stage of root development at time of injury
      - Damage to neurovascular structure that supports tooth

Prevention
   1. The American Dental Association and Academy for Sports Medicine recommend
      properly fitted mouthguards for sports (SOR:A)
   2. Mouth guards are recommended for
      - Soccer
      - Lacrosse
      - Inline skating
      - Basketball
      - Bicycling
      - Boxing
      - Skateboarding
      - Field hockey
      - Skiing
      - Ice hockey
      - Wrestling
      - Baseball
        - 3 types of mouthguards
          - Stock mouthguards
          - Self-adapted mouthguards
          - Custom-made mouthguards
3. Face cages used for baseball catcher and hockey goalie
4. Helmets w/faceguard
5. Dental Emergency Kit: "Save a Tooth"

Patient Education
1. International Society for Sports Medicine
2. American Dental Association: Dental Emergencies and Injuries
3. Toronto Dental Trauma Research Group
   - http://www.sickkids.ca/dentistry/section.asp?s=Resources&sID=9800&ss=Parents%2FCaregivers+Information:ssID=9801

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