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
        - http://www.ada.org/public/manage/emergencies.asp
    - 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
    - Assess mechanism of injury
        - When, where, how much force
    - Timeline of event greatly affects tx outcome
    - Pain on bite or at rest
    - Are any teeth tender to touch?
    - Is tooth sensitive to cold or hot?
    - Does athlete feel as if their bite is normal?
    - Is tooth primary or permanent
2. Physical exam
    - ABCs
        - Airway
        - Breathing
        - C-spine
        - Concussion
    - Soft tissue swelling, bleeding, hematoma
    - Missing fragments of broken teeth
    - Examine tooth for Fx to enamel, dentin, and pulp
    - Examine tooth for looseness
    - Examine gum line for step off or gingival laceration
    - Can pt open mouth easily?
        - If no, consider:
            - Mandibular fx
            - TMJ dislocation
3. Dx tests
    - Lab eval
        - CBC for excessive bleeding
    - 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
    - Aphthous ulcer
    - Dental caries
    - Pericoronitis
    - Dental abscess
    - Food particles stuck between teeth
    - Pulpitis
    - 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
    - http://www.iadt-dentaltrauma.org/web/index.php?option=com_content&;task=section&id=5&Itemid=28
2. American Dental Association: Dental Emergencies and Injuries
    - http://www.ada.org/public/manage/emergencies.asp
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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Author: Brenda Baumann, MD, *University of Alabama*

Editor: Carol Scott, MD, *University of Nevada Reno FPRP*