Diagnosis and Management of Dental Trauma in Children
Raleigh Wake County Dental Society
February 19, 2013
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Epidemiology of Permanent Tooth Trauma

- Types of trauma vary from crown fractures to luxation injuries
- The prevalence of permanent tooth trauma before the age 18 ranges from 5-33%
- Males > females with a notable increase in trauma is seen in boys 7-10 years of age
- Etiology: Sports and play, Automobiles, Child abuse, iatrogenic

Location of Trauma

- Anterior > Posterior
- Maxillary > Mandibular
- Maxillary Central

Clinical Examination

- Soft tissue lacerations
- Edemas and hematomas
- Fractured, misplaced or missing teeth
- Pulp exposures
- Arch continuity
- Occlusion
- Deviation on opening

Examination and Diagnosis

- Clinical examination
- Radiographic examination
- Record documentation

Courtesy of Dr. Jens Andreasen
Radiographic Exam

3 Vertical PA’s obtained

Mandibular fracture present including tooth #23-26.

- Verify presence/absence of tooth and tooth parts
- Three vertical views
- Diagnosis of periodontal injury
- Assess for root fracture
- Establish a baseline

Root fracture

Factors affecting prognosis:
1) Location of fracture
2) Extent of fracture
3) Displacement of fragments
4) Splinting (?)

Prognosis

Account for Tooth Fragment

- Look for lacerations
- Take lip radiograph
- ¼ the exposure time

Factors affecting prognosis:

- Welbury et al. Ped Dent 2002

Cervical
Mid-root
Apical
Diagnosis and Management

Diagnosis of Injuries to Crown, Pulp and Root

- Crown Infarction [crazeline]
- Uncomplicated Crown Fracture
- Complicated Crown Fracture
- Uncomplicated Crown/Root Fracture
- Complicated Crown/Root Fracture
- Root Fracture

Crown Infraction

Most cases

- Sensitivity
- Multiple infraction lines that may pick up stains (Andreasen)

No Treatment

Treatment**
- Sealing/ adhesive

** May prevent ingestion of bacteria through cracks in enamel
- Sealant over craze-lines

Crown Fracture

- Uncomplicated (No pulp exposure)
  - Treatment:
    - Rule out root fracture
    - Restore with composites
- Complicated (Pulp exposure present)
  - Treatment:  
    - Rule out root fracture
    - Partial pulpotomy (Cvek)
Vital Root Submergence/Root retention

- FTMPF is raised and the clinical crown and coronal root are removed with a bur to below the CEJ
- The pulp is removed and the intracanal space is allowed to fill in with blood
- Flap is then sutured over the site
- Can use the crown as a splinted pontic to the adjacent teeth

Vital Root Submergence/Root retention

- Preserves the vertical and horizontal volume of the alveolar process until maxillary growth is completed
- These few years may have provided sufficient time needed for valuable 3D alveolar growth or bone maintenance
- This aids in future restorative planning, maximizes esthetics and treatment options
- Extraction, however, contributes to further loss of this essential bone

Vital Root Submergence/Root retention

- ~90% 3 year success rate
- 53 teeth 3 yr follow up 5 were lost
- 3 of 5 teeth had pulpotomies completed
- 2 of the 5 had vital pulp left in the canal

18 month follow-up

Diagnosis of Injuries to Periodontium
- Concussion [bruising]
- Subluxation [loosening]
- Luxation [displacement]
- Avulsion [out of the mouth]

Consequences of Trauma
- PDL
  - Surface resorption (repair-related resorption)
  - Inflammatory resorption (infection-related resorption)
  - Replacement resorption
- Pulp
  - Pulp canal obliteration
  - Pulp necrosis
  - Severed vascular supply
  - Revascularization

Concussion

Subluxation
- Bleeding around sulcus
- No displacement
- Minor or no mobility

Intrusion
**Intrusive Luxation**

- Treatment Options
  - Watch and monitor for re-eruption
  - Surgical reposition with forceps and splint
  - Orthodontic movement

**Extrusive luxation**

- Courtesy of Dr. Jens Andreasen

**Lateral Luxation**

- Courtesy of Dr. Jens Andreasen

**Repositioning**

- Courtesy of Dr. Jens Andreasen

**Splinting**

- Soft splint
- Physiologic movement
- 10-14 days

**Titanium Trauma Splint**

Avulsion

Preserving the PDL

- Immediate replantation = best for PDL
  - Prevents desiccation of the PDL cells
  - PDL should be restored within a few wks if replanted within 5 – 30 minutes

- Tooth transport
  - HBSS = pH-preserving fluid (Save-A-Tooth)
  - Milk
  - Sterile saline

Revascularization

Permanent tooth replantation following avulsion: using a decision tree to achieve the best outcome (McIntyre et al; Ped Dent 2009)
The Condemned PDL: Transitional Therapy

In children/growing patients…

to delay the ankylosic process, the remaining PDL should be removed

- PDL removal prevents the injured/damaged PDL cells from becoming a stimulus for inflammation thereby accelerating infection-related resorption

Decoronation

- FTMPF is raised and the clinical crown and coronal root are removed with a bur to below the CEJ
- The root filling material is removed and the intracanal space is allowed to fill in with blood
- Flap is then sutured over the site
- Can use the crown of the ankylosed tooth as a splinted pontic to the adjacent teeth
**Decoronation**

- The root filling material is removed and the intracanal space is allowed to fill in with blood
- Flap is then sutured over the site

**Decoronation**

- Preserves the vertical and horizontal volume of the alveolar process until maxillary growth is completed
- These few years may have provided sufficient time needed for valuable 3D alveolar growth or bone maintenance
- This aids in future restorative planning, maximizes esthetics and treatment options
  - Extraction, however, contributes to further loss of this essential bone

**Definition of SUCCESS ?**

Growing patients
- Keeping the tooth for several years
  - Especially until after growth is completed: age 18
- Endodontic success: revascularization
- No resorption
  - ORR/ankylosis after growth spurt
  - Minimal loss of bone

Adults
- Keeping the tooth for several years
- Endodontic success
- No resorption
- Minimal loss of bone

**Future Research**

Future potential with
- Doxycycline
- Minocycline
- Alendronate
- ICMs, such as Ledermix
- Emdogain

Time will tell….

**Extraction**

Extraction of an ankylosed tooth may result:
1. Loss of attached bone
2. Loss of the cortical maxillary plate
3. Bony deformation
4. Less than ideal esthetic contours