Pediatric Dental Trauma: The Old and The New

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A little review of dental trauma

- Tooth displacements (luxations)
  - Primary teeth
  - Permanent teeth
- Tooth fractures
  - Primary teeth
  - Permanent teeth
- Alveolar bone fractures
- Soft tissues lacerations
- Complex dental and maxillo-facial trauma
Tooth displacements (luxations)

- Reduce the luxation and splint mobile teeth for ~7 to 10 days
Tooth displacements (luxations)

• Exception: intruded tooth = let the tooth re-erupt on its own (within 4-6 weeks)
Tooth fractures

- Repair the fracture with esthetic dental materials
- Protect the pulp/“nerve” if exposed
Alveolar bone fractures

- Reduce bone fracture and splint the teeth for ~4 weeks
Soft tissue lacerations

- Clean-up the lacerations
- Remove all foreign bodies
- Sutures
Complex dental and maxillo-facial trauma

- Team work approach (with OMFS and/or plastic and/or ENT)
- Extractions of any teeth in the line of fractures of the jaws
Consequences of dental trauma

- Pulp becomes necrotic = “tooth dies”
- Treatment: root canal treatment
Typical root canal treatment
In the past, we do root canal treatment but in a young patient the long term results are somewhat disastrous...
The “old”...
So what is new?

- If the traumatized tooth is vital, we try to keep the teeth as vital as long as possible to avoid early root canal treatment in young growing pediatric patients.
- The sooner we take care of that tooth, the better the prognosis.
- Root canal treatment is still the gold standard to treat “dead tooth” in older adults!
Pulp treatment traumatized immature teeth

- “The special concern for maintaining pulpal health during tooth development becomes an important goal in managing traumatic injuries in the immature dentition”
- Risk of fracture of the weak underdeveloped root
- Potential orthodontic/esthetic complications
- GROWTH and DEVELOPMENT
MTA

- “Mineral trioxide aggregate”...
- vs CaOH:
  - Higher level of biocompatibility
  - Does not deteriorate/disintegrate with time
  - Not an irritant to the pulp
  - Does not cause pulpal calcification
Pulp treatment traumatized immature teeth
What else is new from the past 5 years…

- Avulsion protocol
- Splints
- Temporary fillings
- Fragment re-attachment
- Pulp treatment:
  - Calcium hydroxide
  - MTA
  - Revascularization
- De-coronation (for ankylosis)
Avulsion protocol
Avulsion protocol

• Primary teeth:
  - No scientific evidence for replantation

• Permanent teeth:
  - On-site replantation ASAP for maximum prognosis
  - Keep in Hank’s physiologic solution or cold milk and visit to dentist immediately for replantation… DO NOT DELAY
Avulsion protocol

- **Replantation and splint (for 7-10 days)**
- **Closed apex:**
  - Calcium hydroxide is recommended for intra-canal medication for up to one month (ideal time to begin treatment is 7-10 days post-replantation)
  - Root canal treatment
- **Open apex:**
  - Pulp revascularization is possible
  - Root canal treatment should be avoided unless there is clinical and radiographic evidence of pulp necrosis
  - In case of pulp necrosis:
    - Calcium hydroxide is recommended for intra-canal medication for up to one month
    - MTA for apical seal + root canal treatment
    - ... Revascularization...
- **Clinical control:**
  - Replanted teeth should be **monitored by frequent controls** (like any other trauma) during the first year (one week, 1, 3, 6, and 12 months) and then yearly thereafter
  - What we are afraid of is resorption (inflammatory and ankylosis)
Splints

• The “old”...
Splints now...

- Semi-rigid/flexible
  - “twisto” orthodontic wire (0.15 or 0.175)
  - “home-made” with orthodontic ligatures
  - Tofflemire matrix
  - Interproximal composite
  → to permit physiologic tooth movement

- All splints have to be passive

- Most splints should be kept for 7-10 days, except for root and/or alveolar bone fractures and/or severe lateral luxations – up to 4 weeks

- To avoid:
  - Ni-ti wires, paper clips
from Andreasen
Tooth fractures treatment

- The “old”
Tooth fractures treatment

• The “new”
  - Temporary filling
  - Re-attachment of fragments
Temporary fillings for tooth fractures

• To relieve pain in the fastest way possible
• Fast to apply and to set
• Easily removable for the dentist but not for the patient
• Ideal material = light cure glass ionomer
Tooth fragment re-attachment
Fractured tooth with fragment
But what if a young tooth is dead no matter what?

- The “old”: root canal treatment with its known problems
The “new”: Revascularizationization
Revascularization

- Documented since 2004
- The ideal treatment for an immature necrosed tooth is to regenerate a healthy pulp-dentin complex that would allow the continued maturation of the root
- Resolution of the periapical lesion, significant lengthening of the root, thickening of the dentinal walls, and closure of the apex
Revascularization technique

- Access cavity
- Pulpectomy (necrotic pulp) – length determination
- Copious irrigation with hypochlorite sodium
- Rinse with normal saline
- Insertion of tri-antibiotic paste (home-made) in the canal
- Temporary seal for ~2 to 6 weeks
- Then verify for resolution of infection (signs/symptoms, radiographs)
- Re-open canal, re-irrigation with hypochlorite sodium and saline
- Dry coronal half of canal with sterile paper points
- Induce a blood clot in the canal by creating a bleeding from apex with sterile file in the canal
- Wait ~15 minutes, blood clot at the enamel-cementum junction
- Seal with 3mm of MTA, coton pellet, temporary filling (48 hours to set)
- GI, composite
- F/U (1, 2, 4, 6 months post-op; then every 6 months)
Revascularization technique

- Original tri-antibiotic paste:
  - 100 mg of minocycline powder
  - 500 mg of ciprofloxacin powder
  - 500 mg of metronidazole powder
  - mixed with a base of propylene glycol and macrogol
  - The powder and base were mixed at the time of the appointment to prevent moisture contamination
Problems encountered...

- Bluish discoloration of the crown
- Caused by the presence of minocycline above the cemento-enamel junction
- For this protocol, minocycline was replaced by cefaclor 500 mg, a second generation cephalosporine
- This change resolved the staining for the cases that followed
Problems encountered...

- Fail to produce a blood clot that would reach the cemento-enamel junction
- It was formed, but remained under the CEJ...
Problems encountered...

- Technically difficult to control the placement of the MTA
- Once placed over the blood clot, the MTA material would collapse in the canal
Problems encountered...

• Visible root elongation was not noticed at the one month follow-ups.
• Most of the cases demonstrated significant lengthening of the root but only after a six months period.
Revascularization, also...

- New evidences show that it might not be dentine forming in the canal...
- We are still very far from “regeneration”...
Importance of a nice smile

- Nothing equals a nice smile
- « a smile is the shortest distance between two persons » (Victor Borge)
Lost of a permanent young tooth

- Alveolar bone exists only when there is a tooth present
- Supporting bone resobs when a tooth is lost
- The younger the patient, the faster and the more severe the bone loss process will be
“it doesn’t matter, we can always place an implant...” - ?!? 

• There might be not enough bone to place an implant  
• Bone and gingival grafts are expensive and not enjoyable experiences  
• Success is never guarantied...
“it doesn’t matter, we can always place an implant...” - ?!?
Ankylosis
De-coronation (cases of ankylosis)

• “In children below the age of 15, if ankylosis occurs, and when the infraposition of the tooth crown is more than 1mm, it is recommended to perform decoronation to preserve the contour of the alveolar ridge.”
But let’s not forget the old but proven basics

- The importance of follow-up... Even for minor trauma!!!
In resume:

• Try to keep any/all teeth and/or teeth fragments (exception for avulsed primary teeth)
• Try to keep to traumatized teeth vital as long as possible
• Time is a major factor, the sooner the treatment, the better the prognosis!!!
• Our mission of the MCH: best care for life
Thank you!