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International Forum for certified pediatric dentists and general dental practitioners with an interest in treating children.
The Global Voice for Children’s Oral Health
Mission: To promote the best practice of Pediatric Dentistry around the world
The largest international body in Pediatric Dentistry

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Global Summit on Early Childhood Caries

2-4 November, 2018 | Bangkok, Thailand

www.iapdsummit.org
Understanding Root Resorption

Anne O’Connell,
Honorary Editor, IAPD, President IADT
Dental School, Trinity College, Dublin
Susceptible tissues

Mineralised tissue
- Bone
- Cementum
- Dentin

Fibrous connective tissue
- PDL

<table>
<thead>
<tr>
<th>Cells</th>
<th>Apposition</th>
<th>Degradation</th>
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<td>osteoclast</td>
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<tr>
<td>Cementum</td>
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</tr>
<tr>
<td>Dentin</td>
<td>odontoblast</td>
<td>odontoblast</td>
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Tooth and supporting structures
Bone Remodelling at a Glance

Julie C. Crockett, Michael J. Rogers, Fraser P. Coxon, Lynne J. Hocking and Miep H. Helfrich
CASCADE OF MOLECULAR EVENTS INVOLVED IN DENTINOGENESIS

Da Rosa et al. IEJ 2018
Normal development
Resorption
Radiographic appearance

- Physiological
- Pathological
Atypical root resorption (ARR)

- Atypical root resorption is mostly observed in maxillary primary central incisors.
- Previously attributed to digit sucking.
- This study demonstrated the association between ARR and a clear evidence of a history of dental trauma to the primary incisors.
- No correlation was found between ARR and digit sucking;
  - Only 4 of 64 children with ARR were digit suckers and only 4 of 48 digit suckers presented with ARR

2 major types of ARR could be differentiated:

- 1. the follicle of the permanent tooth was enlarged and overlapped the entire part of the resorbed root of the primary incisor.

- 2. the apical resorbed area was not associated with the follicle of the permanent tooth but was surrounded completely by PDL and bone.

Holan et al. Dental Traumatology 2015
Permanent teeth

Pathology

- Infection
- Pressure
- Systemic Disturbances
- Idiopathic
Pathological Resorption
OIRR- orthodontically induced root resorption

Kitaura et al. 2014
Fig. 3 This is an area of excessive pressure where the periodontal ligament has been crushed or "hyalized" and the periodontal ligament has lost its structure. There is a large cell lying in a lacunae behind the frontal edge which is probably an area of undermining resorption.

Fig. 4 Area of root resorption associated with orthodontic tooth movement. The apex of the tooth has a large excavation of the root surface and this is typical of excessive tipping forces that are placed on the apices of the teeth.
Trauma to Permanent teeth

Image from Oral Histology. Ten Cate
Resorption

External (PDL)
- Surface
- Inflammatory
- Replacement
- Cervical

Internal (Pulp)
- Stimulus known
- Stimulus unknown
Resorption

Surface

Inflammatory

External

Internal

Replacement

Cervical

Surface or Repair-related resorption

- Damage to cementum
- Minimal extent at each site
- Healing with deposition of cementum and reattachment of PDL fibres
- No change in mobility
- Independent of pulpal health
- Often not visible on radiograph
Inflammatory or infection-related resorption

2 Essential elements

- Damage to cementum
- Stimulation- necrotic pulp
Inflammatory Resorption

- Necrotic material from the pulp reaches the root surface and an inflammatory response occurs.
- Relatively fast, regardless of age.
- Avoid by timely pulp extirpation
- Treat by removing cause of infection
- Stabilise with CaOH.
- Diagnose early
  - Regular monitoring

- Prevent
  - Timely pulp extirpation

- Treat
  - Remove cause of infection
  - Place CaOH

- Seal
  - Prevent reinfection
Replacement or ankylosis-related resorption

**Essential elements**

- Damage to cementum
- Lack of PDL
Replacement Resorption or Ankylosis

- Damage to PDL, site is remodelled by osteoblasts into bone.
- Cannot be reversed or stopped
- Rate of progression varies but correlates to the pace of bone remodelling
- Tooth cannot be moved orthodontically
- Poor 5 year survival once resorption begins

Humphrey 2003
Varied rate of progression

20 Oct 2011 - 8 yrs post avulsion

13 March 2013 10 yrs post avulsion

Age 15

Age 17
Avulsion in 2004, age 9 yrs

18 years old

Nov 2009

2011

March 2013
Diagnosis
Ankylosis / replacement resorption
Decoronation-Ridge preservation

- Progressive infraocclusion
- >1/8 crown
- Growing patient
- Infection free

Malmgren B
Realignment

- Ongoing eruption of teeth induces bone apposition over the roots
- Thin layer of bone develops over resorbing root
- Interdental fibers realign

Timing of procedure

- Depends on age at diagnosis & growth intensity
- Diagnosis of infraocclusion:
  - <10 years; decoronate within 2-3 years
  - before growth spurt (age 10-12 yrs)
  - during growth spurt - regular monitoring
  - After pubertal growth spurt - may not be necessary

Malmgren 2013
Resorption of Primary Teeth

- Normal
- Delayed
- Abnormal
Summary

- Prevent damage
- Respect cells
- Promote healing
- Preserve pulp
- Preserve bone
International Association of Dental Traumatology

www.iadt-dentaltrauma.org

Dental Traumatology

International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 3. Injuries in the primary dentition
THANK YOU

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