

Rounds Team

- ▶ **Group Leader: Dr Grady.**
- ▶ **Specialty Leader: Dr Poe.**
- ▶ **Project Team Leader: Tia Rinzel**
- ▶ **Project Team Participants: D1:Aman Goyal; D2: Chloe Philip; D3: Matthew Mueller**

Patient Background

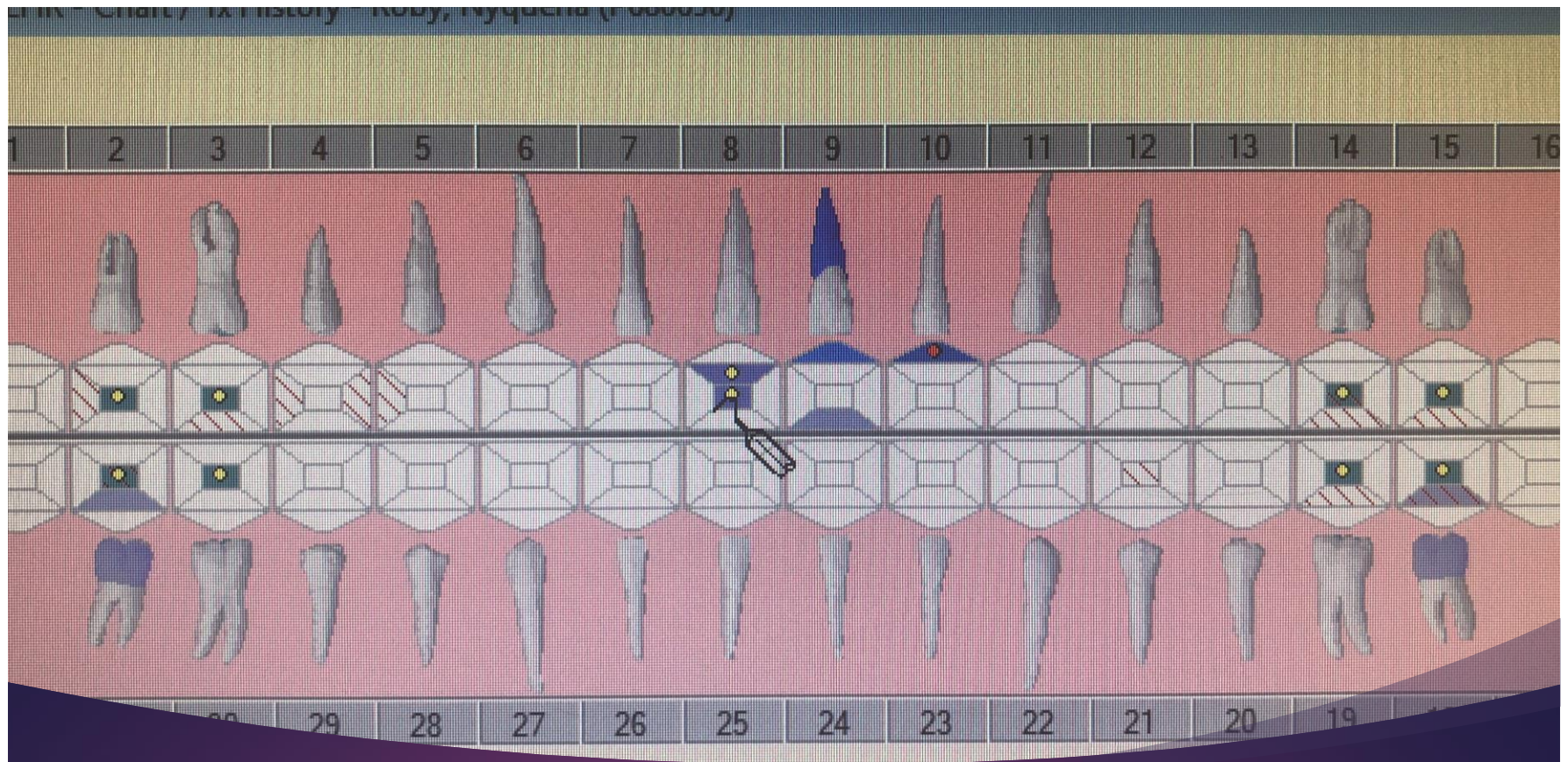
- ▶ 14 y/o
- ▶ African American
- ▶ Female

Medical History

- ▶ Patient has behavioral issues
- ▶ Resides at a Milwaukee Behavioral Center
- ▶ Mom states no medications or allergies
- ▶ No health conditions

Dental History

- ▶ Watches on D #2, L #3, M/D #4, D#5, L #14, L #15, B #18 , and B #19
- ▶ Resin restoration on B #18 and #31
- ▶ Chip on Facial #8 that patient would like restored
- ▶ Sealants planned on #2, 3, 14, 15, 18, 19, 30 , 31



Odontogram



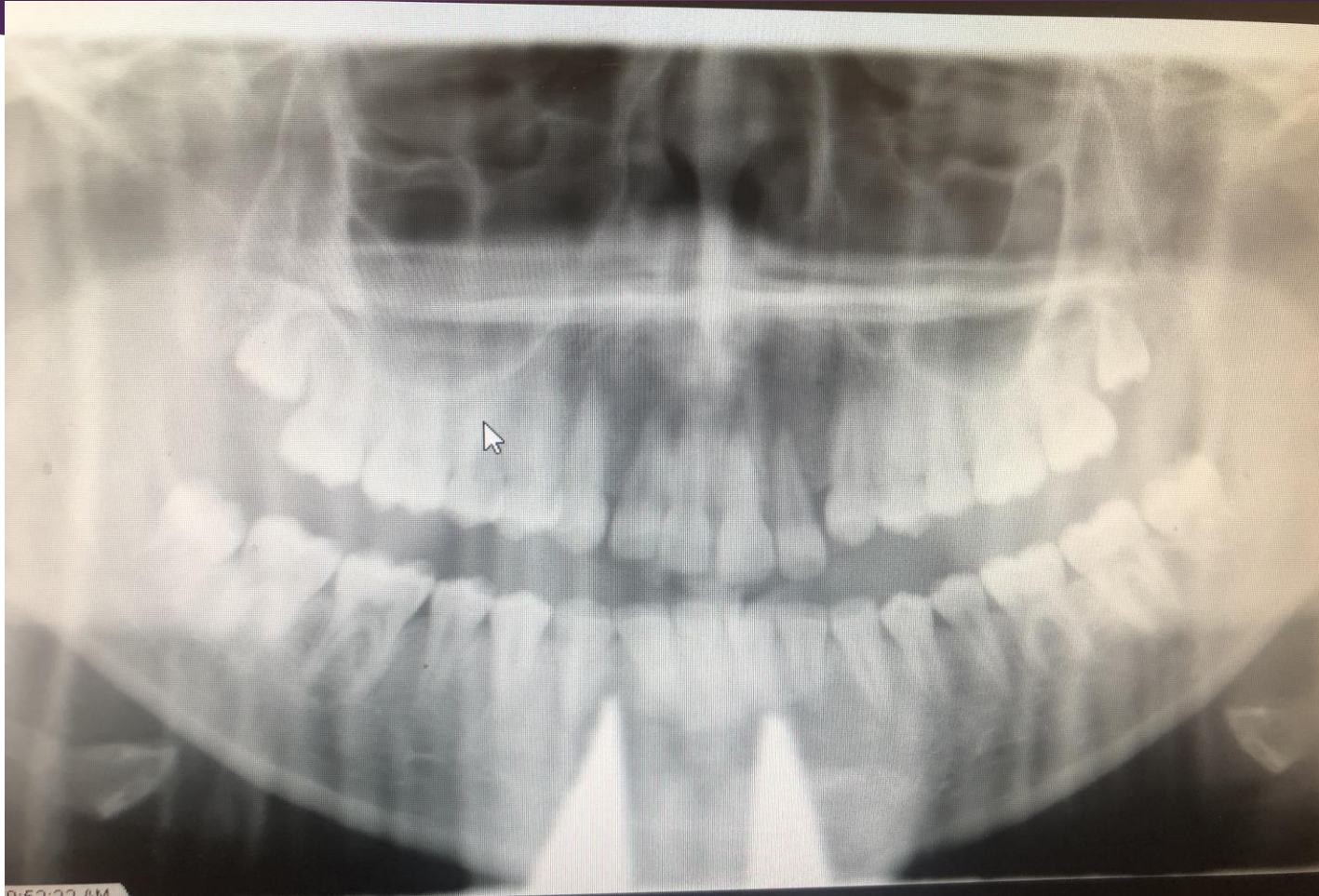
Bitewings

Specific Findings

- ▶ October 2019 avulsed #9, and #10
 - ▶ Fight with cousin , hit with shovel in the face



Panoramic





PA's after
replanted



PA after we
created new
splint in Pado

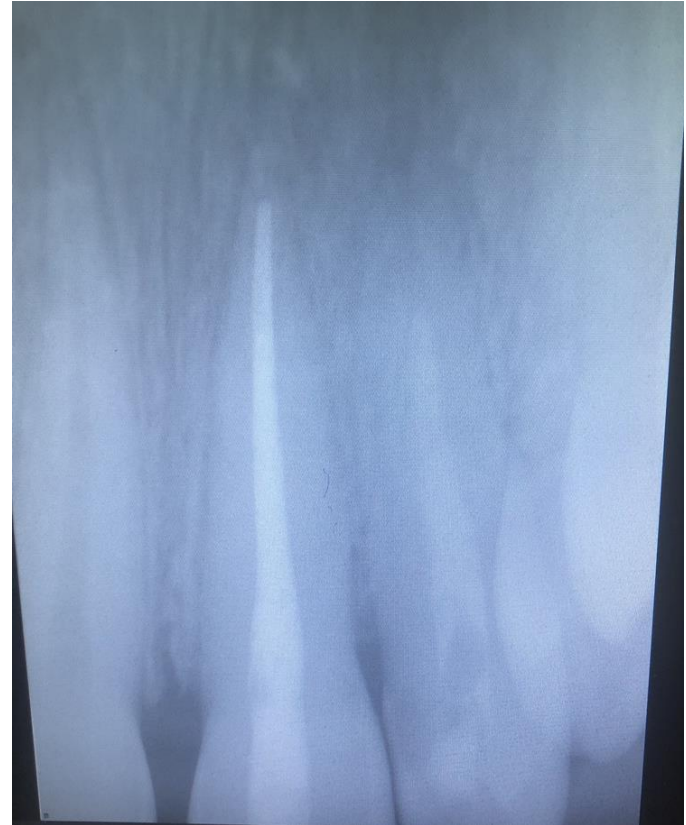
- Calcium Hydroxide Treatment #9
November 2019

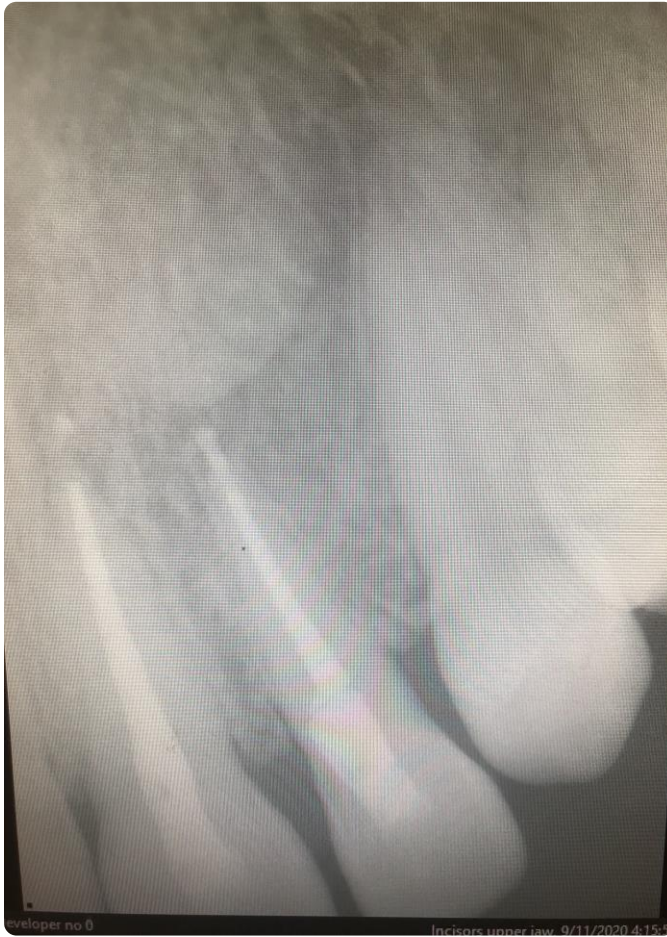


Calcium Hydroxide treatment #10 December 2019



Final Obturation PA #9 February 2020





Final
obturation
PA of #10
Sept 2020

Radiographic Findings after replantation

- ▶ 10 percent root resorption on #9
- ▶ 20 percent root resorption on #10
- ▶ Detected as of Sept 2020

Clinical Findings

► Oct 2019:

Pulp Sensibility Testing:

Caries...	Cold....	Percussion...	Palpation...
#8.....	(-)	(3s)	(-)	(-)
#9.....	(-)	(NR)	(-)	(-)
#10.....	(-)	(NR)	(-)	(-)
#11.....	(-)	(3s)	(-)	(-)

► Sept 2020:

- Grade 1 mobility on #9, #10
- No swelling or pain on percussion
- No caries



- ▶ Patient has not had perio charting in the Pediatric Clinic. She will be coming to main clinic for next apt.
- ▶ #10 charting
 - ▶ 3mm, 1mm, 3mm Facial
 - ▶ 3mm, 1mm, 2mm, palatal

Diagnosis

- ▶ Diagnosis of teeth after pulpal sensibility testing
 - ▶ pulpal necrosis with asymptomatic apical periodontitis subsequent to trauma.

Problem List



Root resorption
and being able
to keep #9,#10



Mobility



Misalignment of
teeth

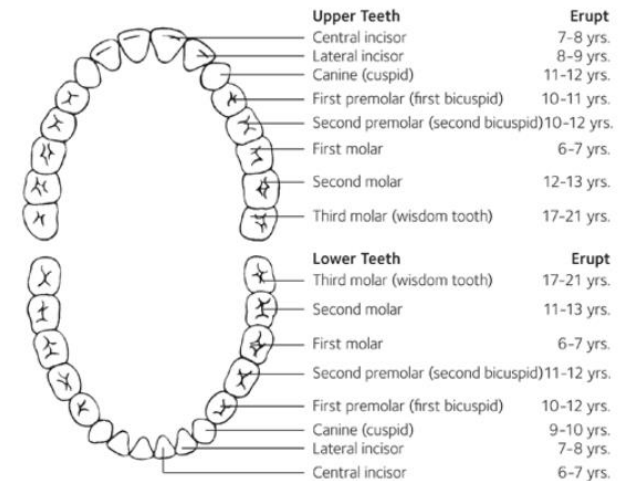
D1 Basic Science

- “What is the eruption sequence of the anterior teeth, including root formation?”

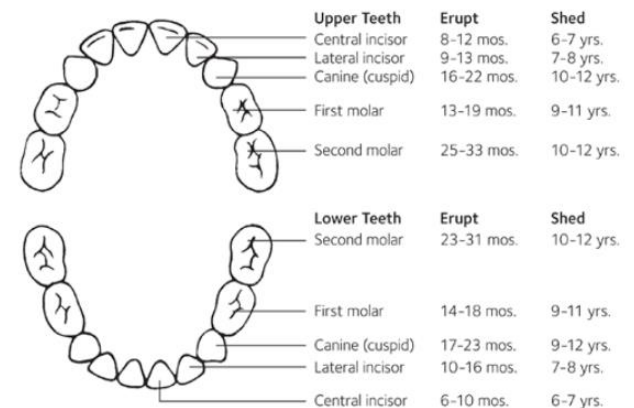
Eruption Sequence

- ▶ Comes from Latin word “erumpere” which means to break out
- ▶ Primary (baby) teeth erupt through gums during first 2 ½ years and stay in oral cavity till age 6-7
- ▶ Will be replaced by permanent teeth
- ▶ After age 13 only permanent teeth remain

Permanent Teeth Eruption Chart

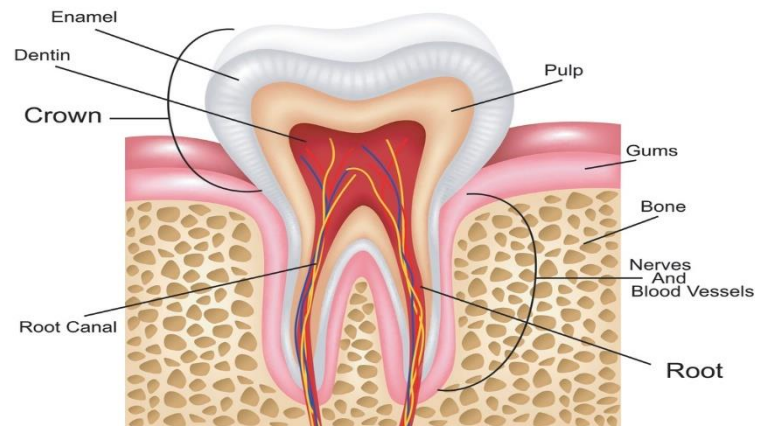


Baby Teeth Eruption Chart



Root Formation

- ▶ Main tissue contributing to root formation are Hertwig's epithelial cells (HERS), dental papilla, and dental follicle
- ▶ HERS important for cementum and PDL formation
- ▶ Dental papilla get induced to form odontoblasts and later form root dentin
- ▶ Dental follicle differentiate into cementoblasts to form cementum
- ▶ Collagen fibers fix root in jawbone



Citations

- ▶ All About Primary Teeth." Triangle Pediatric Dentistry, www.trianglepediatricdentistry.com/all-about-primary-teeth/.
- ▶ Chaitanya, Penmatsa, et al. "Time and Eruption Sequence of Permanent Teeth in Hyderabad Children: A Descriptive Cross-Sectional Study." International Journal of Clinical Pediatric Dentistry, Jaypee Brothers Medical Publishers, 2018, www.ncbi.nlm.nih.gov/pmc/articles/PMC6212657/.
- ▶ "Eruption Charts." Mouth Healthy TM, www.mouthhealthy.org/en/az-topics/e/eruption-charts.
- ▶ Huang, Xiao-Feng, and Yang Chai. "Molecular Regulatory Mechanism of Tooth Root Development." International Journal of Oral Science, Nature Publishing Group, Dec. 2012, www.ncbi.nlm.nih.gov/pmc/articles/PMC3633063/.
- ▶ "Teeth Eruption Timetable." Cleveland Clinic, my.clevelandclinic.org/health/articles/11179-teeth-eruption-timetable.

D2 Pathology Question

- ▶ *What are the factors that contribute to success of an avulsed tooth?*

Avulsed Tooth



- ▶ Complete displacement of tooth its socket and alveolus^{1,2}
- ▶ Tooth higher risk for long-term complications³

Kracher, C.M & Knowlton R.K. (2010) *Figure 6: Images of Avulsion* [Online Image]. Retrieved from <https://www.dentalcare.com>

Avulsed Tooth – Successful Reimplantation

- Relies on timing of reimplantation^{1,2,3,4}
 - Ideally within 20 minutes because PDL cells still attached to its roots remain viable
 - If not possible - put tooth in storage medium
- Proper oral hygiene and care when splint is put on^{1,2}
- Consistent clinical and radiographic monitoring^{1,2,3}



Beverly, L. (2016) *Tooth in Mlik*[Online Image].
Retrieved from
<https://www.westmetrokidsdental.com>

Citations

1. Muhamad, A., Nezar, W., Azzaldeen, A. (2014). Reimplantation of Avulsed Permanent Anterior Teeth: A Case Report. *Research and Reviews: Journal of Dental Sciences*, 2(4), 43-52.
2. Ram, D. & Cohenca, N. (2004). Therapeutic protocols for avulsed permanent teeth: review and clinical update *Pediatric Dentistry* 26(3), 251- 255.
3. Trope, M. (2011). Avulsion of permanent teeth: theory to practice. *Dental Traumatology* 27(4), 281-94.
4. Söder PO, Otteskog P, Andreasen JO, Modéer T, (1977). Effect of drying on viability of periodontal membrane. *Scandinavian Journal of Dental Research* 85(3), 164 -8

D3 PICO

Clinical Question:

What is the effectiveness of early vs delayed RCT treatment in avulsed teeth?

PICO Format

P: Patients with avulsed (knocked out) teeth

I: Early RCT

C: Delayed RCT

O: Successful replantation and clinical outcome

PICO Formatted Question

- ▶ In a patient with an avulsed tooth, does early RCT treatment after replantation vs. delayed RCT render a more successful long term prognosis?

Clinical Bottom Line

There is no real consensus
on this in the literature

Search Background

- ▶ Date(s) of Search: Sept 26th, 2020
- ▶ Database(s) Used: PubMed
- ▶ Search Strategy/Keywords: “Avulsed tooth”, “Root Canal Therapy” , “timing”
“early, delayed”

Search Background

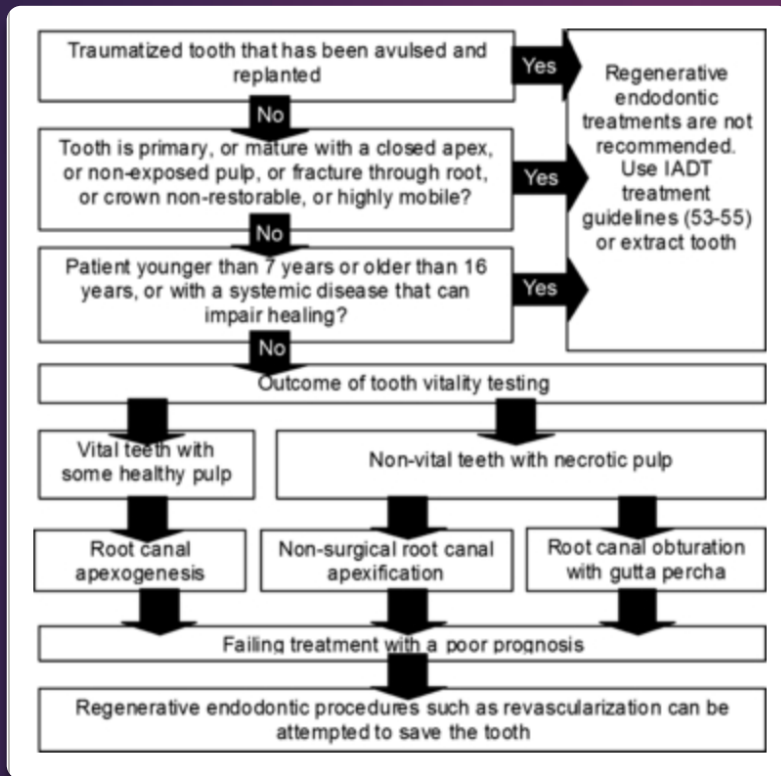
- ▶ MESH terms used:
 - Apexification / methods
 - Dental pulp therapy
 - Avulsion
 - Regeneration
 - Tooth injuries

Article 1

- ▶ Citation: Garcia-Godoy, F. and Murray, P.E. (2012), Recommendations for using regenerative endodontic procedures in permanent immature traumatized teeth. *Dental Traumatology*, 28: 33-41.
doi:[10.1111/j.1600-9657.2011.01044.x](https://doi.org/10.1111/j.1600-9657.2011.01044.x)
- ▶ Study Design: Invited Review
- ▶ Study Need / Purpose: To review literature and suggest guidelines for avulsed teeth treatment

Article 1 Synopsis

- ▶ Method: Review of literature
- ▶ Results :
 - “Because of the lack of long-term evidence to support the use of regenerative endodontic procedures in traumatized teeth with open apices, revascularization regeneration procedures should only be attempted if the tooth is not suitable for root canal obturation.”
- ▶ Conclusions: Successful periodontal healing can be improved if the pulp is extirpated within 14 days
- ▶ Limitations: Lack of evidence in regards to case reports



To Regenerate or not to Regenerate?

Article 1 Selection



Article gave information on pulp treatment for avulsed teeth



Patient has avulsed tooth that may or may not require pulp treatment



This article could direct treatment towards regenerative procedures or full obturation

Article 2: Clinical Evidence and literature to compare two different therapeutic protocols in tooth avulsion

Giannetti L, Murri A. Clinical evidence and literature to compare two different therapeutic protocols in tooth avulsion. Eur J Paediatr Dent. 2006 Sep;7(3):122-30. PMID



Method:

- 2 groups
- Group 1: immediate replantation with aim to regenerate, delayed RCT by 2 weeks
- Group 2: Extraoral RCT, then replantation



Results:

Greater initial mobility in group A, but the mobility evens out after 2 weeks

Group A went through more resorption



Conclusions:

Group B treatment is preferred.

Increased time out of socket leads to pulpal necrosis, so RCT is necessary anyway. Do it sooner, better extraorally



Limitations: Not enough time for observation

Article 2 Selection

- ▶ Article answered the question we were asking, regarding the best method for RCT on avulsed tooth.
- ▶ Our patient no longer has the option to do extra-oral endodontic therapy
- ▶ If response is quick enough, more teeth can be saved from avulsion.

Levels of Evidence

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- ☐ **1b** – Individual RCT ←
- ☐ **2a** – Systematic Review of Cohort Studies
- ☐ **2b** – Individual Cohort Study
- ☐ **3** – Cross-sectional Studies, Ecologic Studies, “Outcomes” Research
- ☐ **4a** – Systematic Review of Case Control Studies ←
- ☐ **4b** – Individual Case Control Study
- ☐ **5** – Case Series, Case Reports ←
- ☐ **6** – Expert Opinion without explicit critical appraisal, Narrative Review ←
- ☐ **7** – Animal Research
- ☐ **8** – In Vitro Research

Double click table to activate check-boxes

Strength of Recommendation Taxonomy (SORT)

<input type="checkbox"/>	A – Consistent, good quality patient oriented evidence
<input type="checkbox"/>	B – Inconsistent or limited quality patient oriented evidence
<input type="checkbox"/>	C – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

Double click table to activate check-boxes

Conclusions

- ▶ D3: Patient's injury occurred over a year ago, so most of the data found doesn't directly relate. Most research applies to cases shortly following avulsion.
- ▶ D4: how will you advise the patient?
 - ▶ It would have been better to have the RCT's done earlier to reduce root resorption, but due to COVID, treatment was delayed.

Discussion Questions

- ▶ What are the indications for replanting an avulsed tooth?
- ▶ Is it ever indicated to perform RCT on an avulsed tooth while it is still outside of the mouth?
- ▶ Is it ever indicated to perform RCT on an avulsed primary tooth?
- ▶ How does the management of an avulsed primary tooth differ from that of a permanent tooth? If a patient calls in an emergency and his or her tooth has avulsed, what is the most common storage medium you see patients use before coming into the office?

Discussion Questions

- ▶ What is the longterm prognosis of a RCT done on an avulsed tooth?
- ▶ Are the financial costs of doing RCT on an avulsed tooth different?
- ▶ Are there aspects of the trauma itself that might lead to the successful replantation of the avulsed tooth?
- ▶ What signs indicate that a RCT should have been done earlier?