Orthodontics and Dental Trauma

Group 3B-3

3B-3 Members

D4 - Kanika Manchanda

D3 - Timothy Knoll

D2 - Mitchell Piacsek

D1 - Sofia Enea

D1 - Mitch Splinter

Specialists:

Dr. Lobb
Dr. Connell
Dr. Ibrahim

Healthy, 26 year-old female

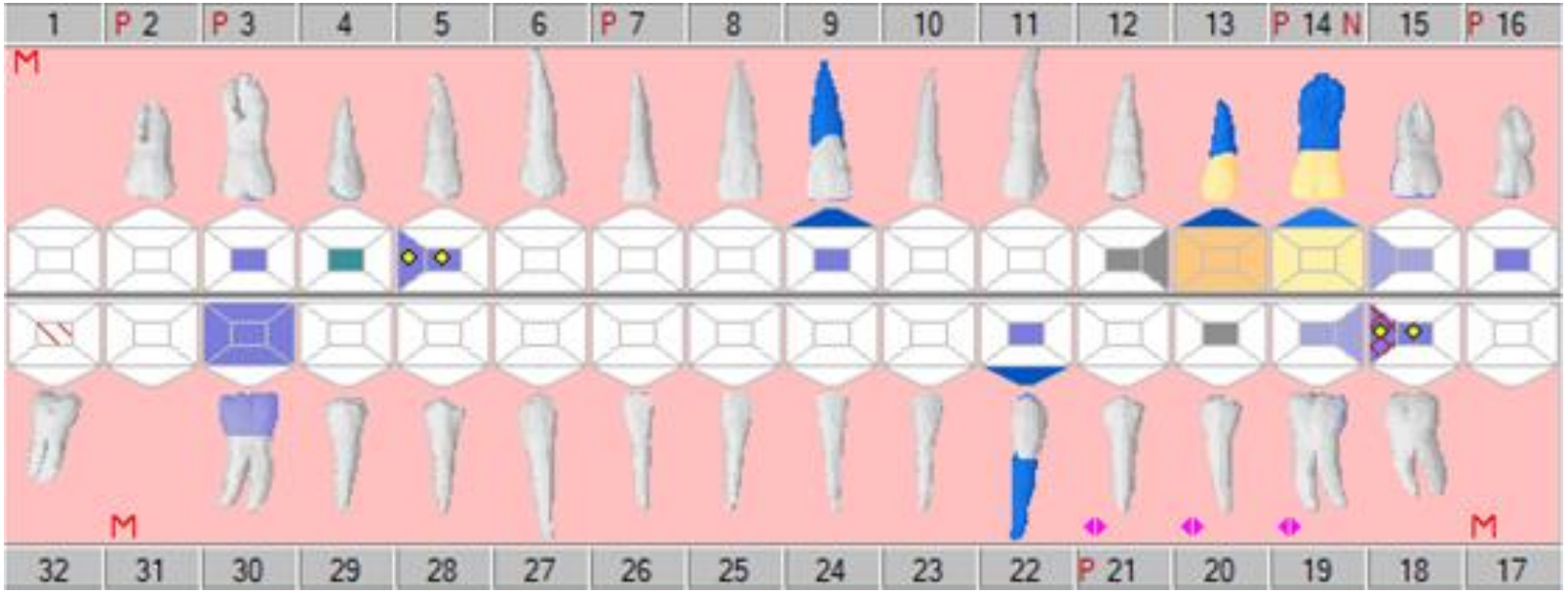
2018

CC: Patient wants braces

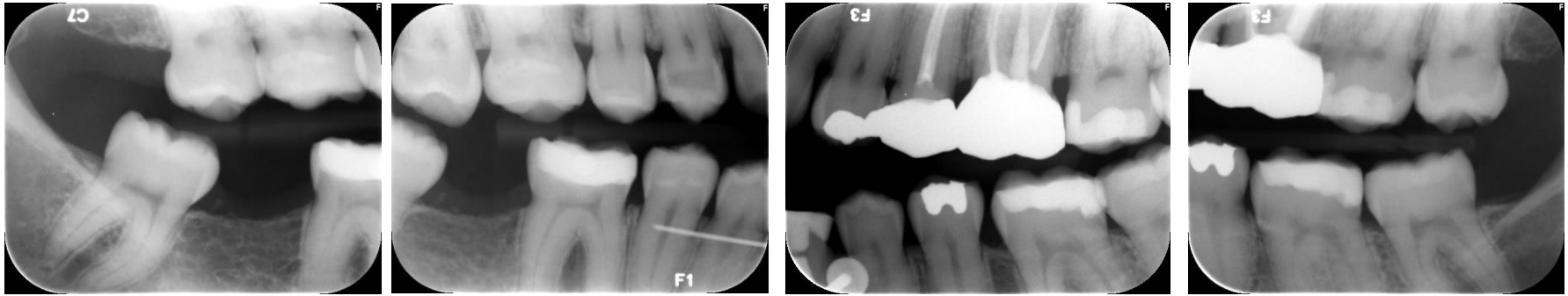
2019

Completed Stage I and Stage II Tx

Odontogram, October 2020



BWs, October 2020



Patient History

June 2020 - Car Accident

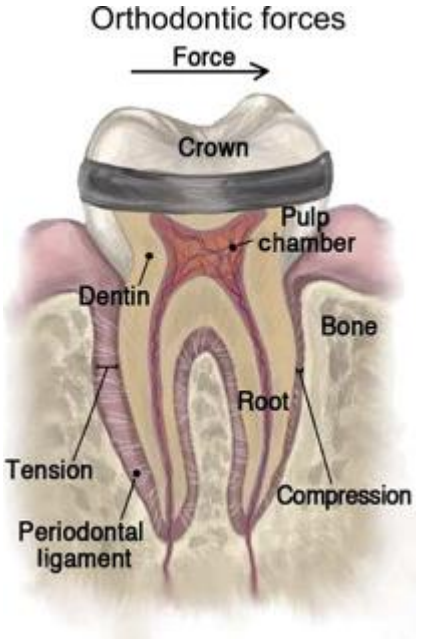
Dental Findings (outside dentist, MuSoD closed due to covid-19):

- Lateral luxation of #9
  - **Treatment: Splint 6 weeks, RCT**
- Subluxation of #22, class I fracture
  - **Treatment: RCT, resin core**

Clinical Photos

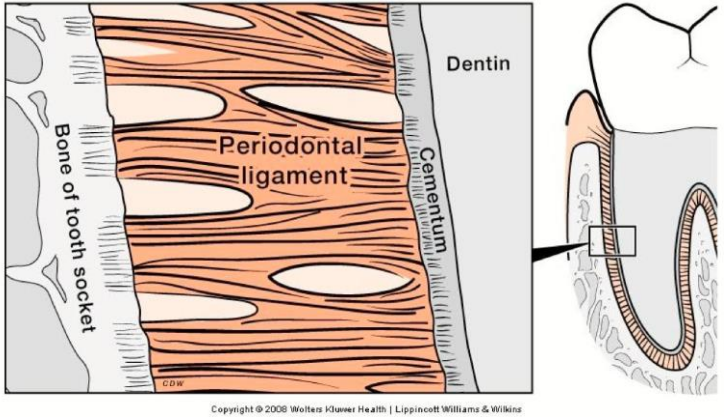
What are the mechanisms of tooth movement?

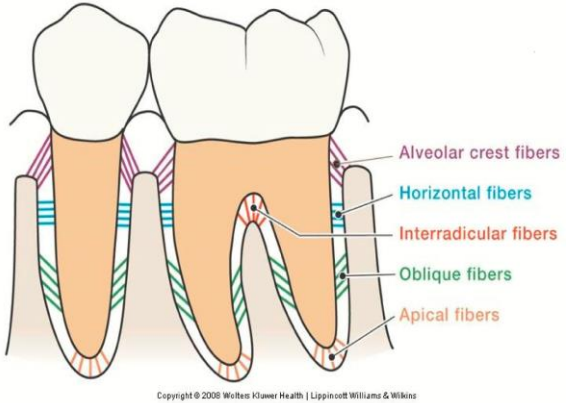
- **Bone Metabolism** - continual cycle of bone growth and resorption
  - Osteoblasts : deposit bone
  - Osteoclasts: resorb bone
- **Direct pressure** - causes bone resorption
- **Tension-** causes bone deposition
- External forces cause tooth movement-> can be either from primary dentition transitioning to permanent or from orthodontic treatment



What is the periodontal ligament?

- Main Function: suspend and maintain tooth in socket
- Components
  - Cells
  - Extracellular matrix
    - CT fiber bundles
  - Blood Vessels
  - Nerve supply
- Fiber Types
  - Unique functions to secure tooth
- Sharpey's Fibers





What is the etiology of anterior open bite?

•Anterior Open Bite: Condition in which there is no vertical overlap between the incisors when posterior teeth are in occlusion.

•Multifactorial etiology:
- •Habits that produce a physical blockage to normal eruption
  - •Thumb/finger-sucking, pacifier use, lip-sucking, tongue thrusting, pipe smoking, pencil chewing
- •Crowding – anterior teeth forced labially
- •Skeletal discrepancy- vertical component of growth exceeds horizontal growth
  - •Respiratory conditions that require mouth breathing can contribute
- •TMJ deformation– i.e. from rheumatoid arthritis

•Determination of the cause of the anterior open bite is crucial for proper treatment.

References:
Dawson, PE. 2007. Chapter 38: Solving Anterior Open Bite Problems. In: Dolan J & Nebel J, editors. Functional Occlusion: From TMJ to Smile Design. St. Louis (MO): Mosby Elsevier. p. 479-492. (Image is Fig. 38-1, p. 481)
Reichert I, Figel P, Winchester L. 2013. Orthodontic treatment of anterior open bite: a review article – is surgery always necessary? Oral Maxillofac Surg. 18: 271-277.
Pisani L, Bonaccorso L, Fastuca R, et al. 2016. Systematic review for orthodontic and orthopedic treatments for anterior open bite in the mixed dentition. Prog Orthod. 17, 28.

D3 PICO

Clinical Question: In patients with dental trauma, what factors influence the timing of orthodontics in adults?

PICO Format

P: Patients in need of orthodontic treatment with a history of dental trauma

I: Early orthodontic movement

C: Orthodontic movement after full healing

O: More favorable orthodontic outcomes

PICO Formatted Question

In adults in need of orthodontic treatment with a history of dental trauma, does earlier orthodontic treatment or later orthodontic treatment after complete PDL healing lead to a better outcome for the patient?

Clinical Bottom Line

Based on the current clinical guidelines, it is recommended that orthodontic movement commence after full healing of the PDL to decrease the risk of ankylosis and root resorption, however, due to the rare nature of these situations and lack of high-quality evidence, more research is in this area is needed.

Search Background

Date(s) of Search: 11/1/20, 11/2/20

Database(s) Used: Pubmed

Search Strategy/Keywords: Orthodontic movement, history of dental trauma, timing

Search Background

MESH terms used: Orthodontics, corrective. Tooth injuries/complications. Incisor/injuries. Tooth movement techniques/methods. Time factors.

Article 1 Citation, Introduction

Citation: Caliskan, MA, Cinsar, A, Turkun, M, Akkemik, O. Delayed endodontic and orthodontic treatment of cross bite occurring after luxation injury in permanent incisor teeth. Endodontics and Dental Traumatology. 1997. 13: 292-296

Study Design: Case Report

Study Need / Purpose: To increase the knowledge of dental traumatology in orthodontics by reporting a case.

Article 1 Synopsis

Method:

A 26 y/o male presented with palatal luxation of 7 and 8 resulting in cross bite and avulsion of 25 and 26 due to a fall one year ago.

Endodontic treatment was carried out on 7 and 8 and calcium hydroxide was left in the canals during movement to reduce the risk of resorption/ankylosis.

Orthodontic treatment was carried out over six months with four CaOH changes.

Radiographs were taken every three months to monitor for signs of resorption. This continued one year after treatment.

Final gutta percha filling occurred after movement with internal bleaching due to crown discoloration.

Article 1 Synopsis (cont.)

Results:

7 and 8 were realigned into a normal arch position with no signs of resorption or ankylosis.

The space for 25 and 26 was closed with remaining dentition due to mandibular crowding.

Conclusions:

CaOH may prevent resorption due to antimicrobial activity and alkaline pH which encourages healing and inhibits osteoclasts.

Long-term monitoring of the teeth is encouraged to look for signs of resorption.

Limitations:

This is only one case and is therefore not very strong evidence.

Article 1 Selection

Reason for selection: The article presents a case that is similar to the patient's situation.

Applicability to your patient: They are closely related as both experienced lateral luxation injuries and had need for orthodontics.

Implications: According to this article, it may be wise to use long-term CaOH treatment during orthodontic movement.

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Article 2 Citation, Introduction

Citation: Kindelan, SA, Day, PF, Kindelan, JD, Spencer, JR, Duggal, MS. Dental trauma: an overview of its influence on the management of orthodontic treatment. Part 1., Journal of Orthodontics, 2008, 35:68-78.

Study Design: Clinical Guideline

Study Need / Purpose: To summarize the best evidence surrounding dental trauma and orthodontics.

Article 2 Synopsis

Method: A literature review was conducted regarding current evidence and recommendations surrounding dental trauma and its influence of orthodontic treatment.

Results:

- Class II Division I patients are at a higher risk of trauma.
- Orthodontic movement leads to cemental damage and risk of resorption is permanently increased in teeth with a history of trauma.
- Blunt or pipette shaped roots are at higher risk.
- CaOH can help arrest resorption but weakens dentin up to 43.9% after 12 weeks.
- Physiological stimulus to teeth increases PDL healing after trauma.

Article 2 Synopsis (cont.)

Conclusions:

- A thorough medical and dental hx is needed prior to treatment.
- Frequent radiographic monitoring (every 6 months) is indicated for teeth with a history of trauma- more frequently if resorption is detected.
- Lateral luxation injuries should wait one year for full healing prior to treatment.
- Gutta percha filling is recommended prior to treatment.
- Semi rigid splints should be used to increase PDL healing after trauma.

Limitations:

- There is limited high quality evidence available to be reviewed due to the rarity of these cases.

Article 2 Selection

Reason for selection: This article directly answers the PICO question and is a high level of evidence.

Applicability to your patient: It directly recommends the healing time for her injury prior to treatment.

Implications: A healing time of one year and thorough radiographic monitoring is recommended.

Article 3 Citation, Introduction

Citation: Owtad, P, Shastry, S, Papademetriou, M, Park, JH. Management Guidelines for Traumatically Injured Teeth During Orthodontic Treatment. The Journal of Clinical Pediatric Dentistry, 2015, 39(3): 292-296.

Study Design: Narrative review/case report

Study Need / Purpose: To review the evidence surrounding dental trauma and orthodontics and present a case in this field.

Article 3 Synopsis

Method:

- A literature review was done regarding current guidelines for orthodontic treatment of teeth with a history of dental trauma.
- A case of a 17 y/o male with palatal luxation of 8 and 9 into crossbite was presented.
- Due to traumatic occlusion with 23-26, immediate orthodontic movement with light forces was performed over six months.

Results:

- The teeth remained vital, but mild resorption occurred at the root tips and a widened PDL remained.
- Class II division I are at higher risk of trauma.
- The type of trauma dictates treatment timing and risk of resorption.
- Lip and tongue dysfunction can lead to sustained trauma on mobile teeth.
- Light orthodontic forces result in less resorption.

Article 3 Synopsis (cont.)

Conclusions:

- Teeth may be moved successfully during the healing phase after trauma.
- Lateral luxation injuries are recommended to wait at least six months for healing prior to treatment.
- Lighter orthodontic forces should be used on traumatized teeth to reduce resorption.

Limitations:

- The case report is only one example and not strong evidence.
- Limited research is available, and this study only included 20 articles in the review portion.

Article 3 Selection

Reason for selection: This article directly answers the PICO question.

Applicability to your patient: It directly recommends the healing time for her injury prior to treatment.

Implications: A healing time of at least six months and light orthodontic forces during treatment are recommended.

Levels of Evidence

- [x] **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
- [x] **5** – Case Series, Case Reports
- [x] **6** – Expert Opinion without explicit critical appraisal, Narrative Review
- [ ] **7** – Animal Research
- [ ] **8** – In Vitro Research

Strength of Recommendation Taxonomy (SORT)

☐	**A** – Consistent, good quality patient oriented evidence
☐	**B** – Inconsistent or limited quality patient oriented evidence
☒	**C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

Conclusions

How does the evidence apply to this patient?

Literature: The recommendation would be to closely monitor the tooth radiographically during healing, wait a year prior to treatment, and use lighter orthodontic forces on the traumatized tooth.

Specialist experience: Dr. Lobb and Dr. Connell commented on the difficulty of treating anterior open bites, specifically when a patient has tongue parafunction. Dr. Ibrahim emphasized that the treatment of the tooth is largely dependent on the timing between injury and repositioning and monitoring is crucial prior to treatment.

Patient circumstances & preferences: The patient wants orthodontic treatment but does have a tongue parafunction.

Based on the above considerations, how will you advise your D4?

I would recommend waiting one year prior to treatment to monitor for resorption and use light orthodontic forces on the traumatized tooth with continued radiographic monitoring.

Discussion Questions