EVIDENCE BASED DENTISTRY ROUNDS

ORTHODONTICS

6B-2

ROSHAN, AKSHAT, ELLIOT, EVAN

10/13/2020

2 ROUNDS TEAM

- **Group Leader: Dr. Cimrmancic**
- **Specialty Leader: Dr. Liu**
- **Project Team Leader: D4 Roshan Patel**
- **Project Team Participants: D1; Evan Hoffins D2; Elliot Shambeau D3; Akshat Desai**

3 PATIENT

- Age – 16 years old
- Gender - Female
- Ethnicity – Puerto Rican
- Chief Complaint – I don't like that I have a baby tooth and my teeth are crooked
- Additional pertinent information: Patient is in high school, concerned about looks.

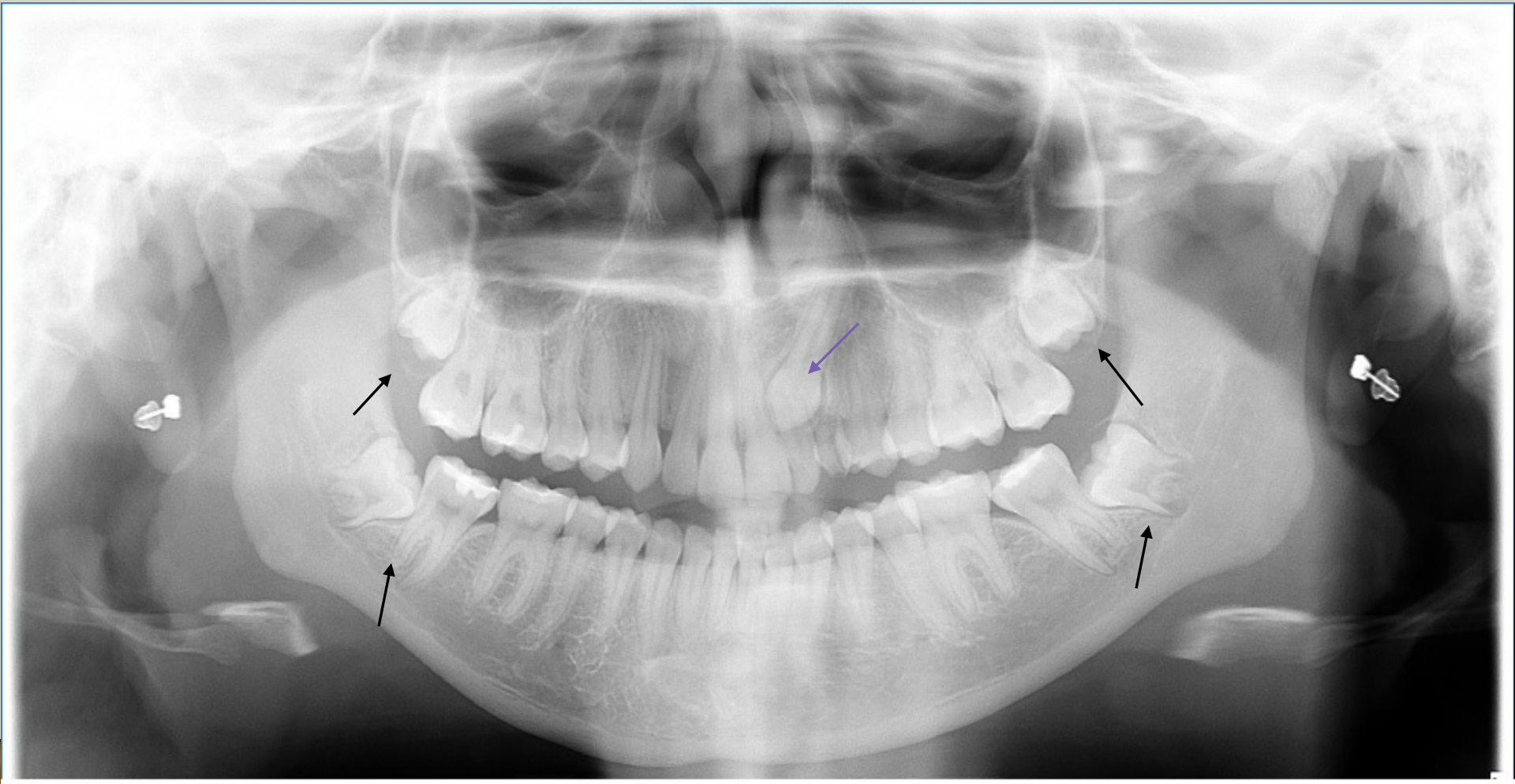
4 MEDICAL HISTORY

- Current & past: Non- contributory
  - Diagnoses: None
  - Conditions: None
  - Medications: None
  - Medical Consults, if any: Orthodontic referral for general health. Patient is in good health.
  - Treatment considerations: None

5 DENTAL HISTORY

- Patient has been seen in the pediatric department since she was 3 years old.
- Patient had been receiving routine preventative care which included prophy treatment, Fluoride treatment, and sealants of permanent molars.
- First caries activity was at age 9, MO on tooth A.
- Delay in school treatment from 2015 to 2019.
- Now receives routine care in clinic E.

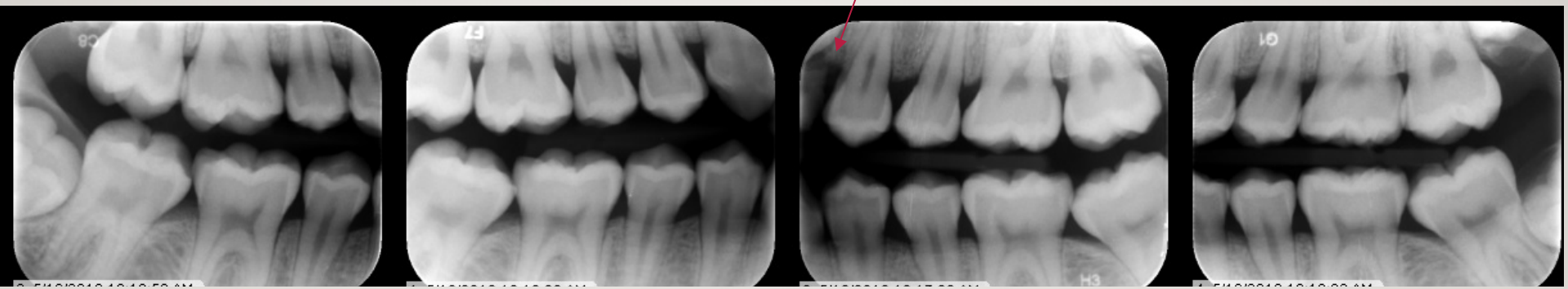
6 RADIOGRAPHS



7 RADIOGRAPHS

Bite Wing view:

Distal of H caries



8 RADIOGRAPHIC FINDINGS

- Impacted #11
- H is present
- All 4 third molars are developing roots
- #17 and #32 are impacted
- #4 mesial incipient decay
- Healthy bone levels less than 2mm from CEJ
- Patient will likely need a CBCT to determine location of #11. In addition, determination of any other odontogenic pathology

9 CLINICAL FINDINGS

- H primary caries Distal surface
- #2 Primary caries OL
- #3 Primary caries OL
- #4 Incipient/watch check Mesial
- #8 Small chip Incisal
- #15 Primary caries L
- #18 Primary caries O
- #19 Sealant
- #21 Incipient/ watch check Mesial
- #30 Primary caries O
- #31 Primary caries OB
- Deep pockets distal to mandibular 2nd molars associated with 3rd molars

10 CLINICAL FINDINGS CONTINUED

- Functional Examination:
  - Bilateral Class I both skeletal and in occlusion
  - CR=CO
  - Bilateral group function
  - Overbite: 37%, 3mm. Overjet: 5mm
  - Space loss: Maxillary and mandibular crowding in the anterior. #10 distal rotation, #18 mesial tip, #25 mesially tipped, #24 lingual tip.
  - Max open: 46mm; Left Lateral: 9mm; Right lateral: 10mm.

11 SPECIFIC FINDINGS

- Impacted Left Maxillary Canine/ #11
- H primary caries on the distal
- Space loss: Anterior crowding in both arches . #10 distal rotation, #18 mesial tip, #25 mesially tipped, #24 lingual tip.

PERIODONTAL CHARTING

																MOBILITY
																FURCA
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																FURCA
																MOBILITY

13 DIAGNOSIS

- Impacted Maxillary #11 w/ retained primary H

14 PROBLEM LIST

- Primary Caries on permanent molars with incipient watches on #4 and #21
- Poor oral hygiene
- Gingival hyperplasia distal to third molars making cleaning difficult.
- Anterior crowding in both arches
- Retained primary H
- Impacted #11
- Slight issue with "s" sound pronunciation.
- Distal rotation of #10, #25 mesial tip

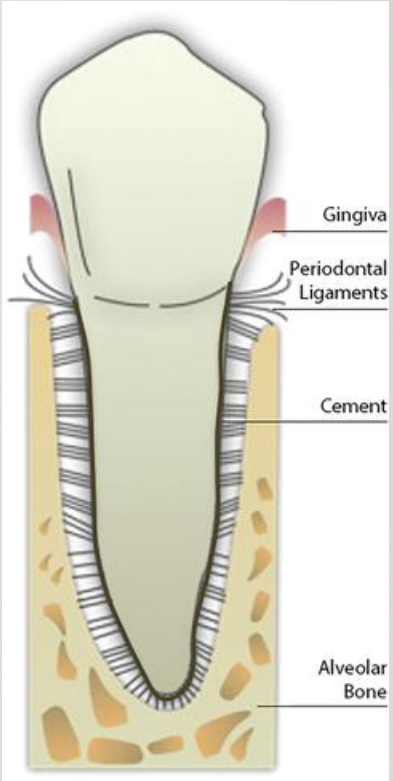
HOW DO ORTHODONTIC FORCES INFLUENCE BONE FORMATION AND RESORPTION?

Orthodontic Forces:

- Generated by appliances acting upon tooth, absorbed by surrounding periodontal tissues
- Cause local tooth **displacement** and **activate bone remodeling** processes via the periodontal ligament

Periodontal Ligament (PDL):

- Connects *cementum* to *alveolar bone*
  - Provides vascular supply & nutrients
  - Absorbs mechanical stress & anchors tooth
  - ***Regulates bone formation and resorption***
    - *Allows for tooth movement*



Jiang N, Guo W, Chen M, et al. Periodontal Ligament and Alveolar Bone in Health and Adaptation: Tooth Movement. *Front Oral Biol*. 2016;18:1-8. doi:10.1159/000351894

d'Apuzzo F, Nucci L, Jamilian A, Perillo L (2017) Biomarkers of Periodontal Tissue Remodeling during Orthodontic Tooth Movement in Mice and Men: Overview and Clinical Relevance, Periodontitis, *IntechOpen*, doi: 10.5772/intechopen.69648.

HOW DO ORTHODONTIC FORCES INFLUENCE BONE FORMATION AND RESORPTION?

"Pressure-Tension Theory":

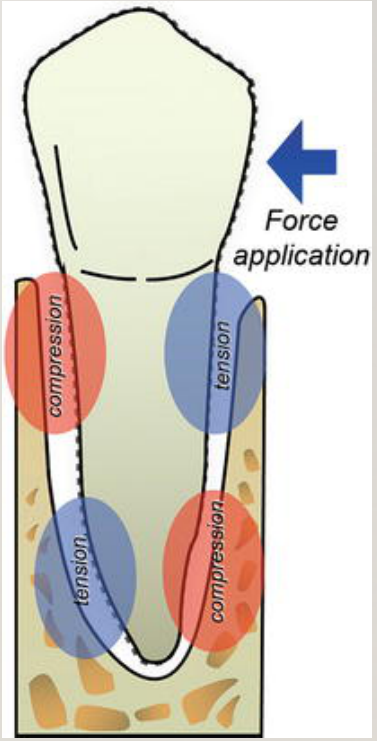
- Tooth *displacement* causes PDL to be *constricted* or *stretched* on opposite sides of the tooth

"Compression Side":

- Disruption of blood flow causes cell/tissue death
- **Resorption** of dead tissue/bone by macrophages/osteoclasts
  - Creates space for tooth movement

"Tension Side":

- **Bone formation** by osteoblasts fills gaps left behind by tooth movement



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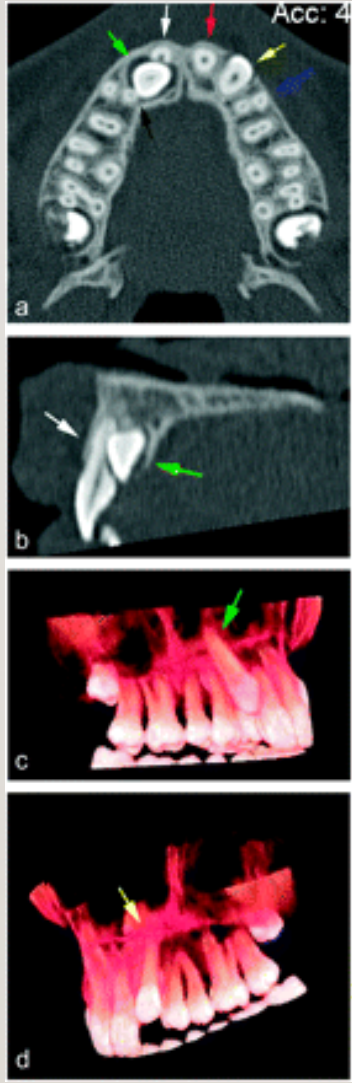
WHAT ARE THE CONSEQUENCES OF ECTOPIC ERUPTION?

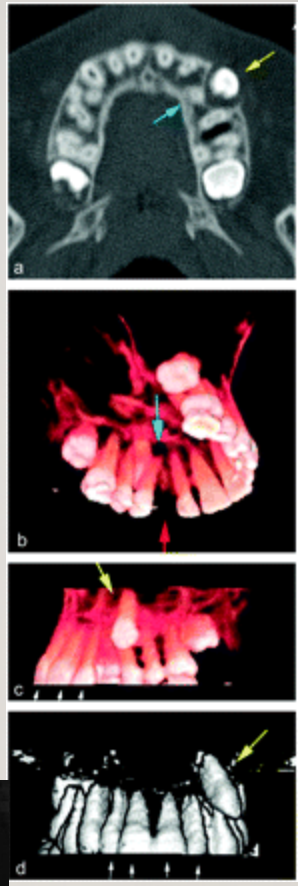
- "Tooth does not follow its predetermined course"
- Females > Males (3:1)
- Multifactorial etiology
- Early diagnosis and treatment are preventative of malocclusion
- Process is rapid and asymptomatic
- Goal is to reposition the ectopic tooth
- Surgical exposure of the crown and orthodontic traction
- Some cases correct spontaneously

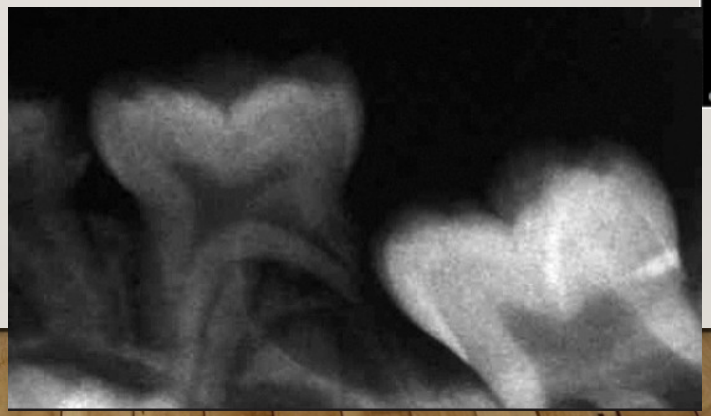


Cernochova, P., Krupa, P., Isakovicova-Holla, L., Root resorption associated with ectopically erupting maxillary permanent canines: a computed tomography study, European Journal of Orthodontics, Vol 33, Issue 5, October 2011, pages 4
https://doi.org/10.1093/ejo/cjq085
DeligaSchroder, A. DDS, MS, PhD. To What Extent are Impacted Canines Associated with Root Resorption of the Adjacent Tooth? The Journal of the American Dental Association, Vol 149, issue 9, September 2018, pages 765-767,
https://doi.org/10.1016/j.adaj.2018.05.012

CONSEQUENCES OF ECTOPIC ERUPTION

- Internal and external root resorption
- Food and plaque trap
- Loss of arch length and crowding
- Inadequate space and displacement regarding other developing teeth
- Malocclusion
- Neuralgic pain
- Formation of follicular cysts
- Ankylosis of the ectopic tooth
- Decrease crown root ratio
- Tooth loss





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Yaseen, S. M., Naik, S., & Uloopi, K. S. (2011). Ectopic eruption – a review and case report. Contemporary clinical dentistry, 2(1), 3-7. https://doi.org/10.4103/0976-237X.79289

19 D3 PICO

- **Clinical Question:** Is there a better prognosis for impacted maxillary canines and the dentition when the canine is treated versus leaving it untreated?

20 PICO FORMAT

P: Patients with impacted canines

I: Surgically assisted orthodontic treatment

C: No treatment

O: Better prognosis

21 PICO FORMATTED QUESTION

- Do patients that have surgically assisted orthodontic treatment of impacted maxillary canines have better prognosis than patients who do not treat their impacted maxillary canines?

22 CLINICAL BOTTOM LINE

- **Surgical extrusion of impacted canines is recommended as it prevents further root resorption in the adjacent teeth and has the best prognosis for the canine.**

23 SEARCH BACKGROUND

- **Date(s) of Search: 10/1/2020 10/4/2020**
- **Database(s) Used: PubMed**
- **Search Strategy/Keywords: Canine, orthodontic surgery, retention, Maxillary retention, esthetic**

24 SEARCH BACKGROUND

- **MESH terms used:**
- **Maxilla, canines, root resorption, tooth eruption, Humans, impacted**

ARTICLE 1 CITATION, INTRODUCTION

- Citation: D'Amico, Rozmary Mak, et al. "Long-term results of orthodontic treatment of impacted maxillary canines." *The Angle Orthodontist* 73.3 (2003): 231-238
- Study Design: Individual cohort study
- Study Need / Purpose: studies long term results of orthodontic treatment on maxillary canines

ARTICLE 1 SYNOPSIS

Method

61 patients we selected to for the study of which 52 patients underwent surgery to expose the canines. A silver chain was used with fixed appliances to extrude the teeth

Five orthodontists evaluated the results in terms of the esthetic outcome of the procedure, Periodontal condition of the incisors, canine and the 1st premolar was examined by probing the six surfaces of the teeth, level of attached gingiva was also noted, a percussion test and a vitality test was also performed

- Results- Only 4 patients expressed concerns about the esthetic outcome of the procedure, periodontal conditions reveled no difference between the normally erupted teeth and the extruded teeth. However the disto-lingual surfaces on the lateral incisors had deeper pocket depths that were statistically significant. 4 canines were found to be ankylosed. On the follow ups over a period of 3.5 years. 35 children had a resorbed lateral incisor that tad to be root canal treated

- Conclusions- The study indicates that the subjects were given a good esthetic result, while keeping the periodontal health relatively healthy, however the impaction of the canine itself did lead to root resorption in 35 patients which requires additional endodontic treatment.
- Limitations- Even though the study focuses on the periodontal health an the long term health. The major focus of the study is on esthetics

29 ARTICLE 1 SELECTION

- Reason for selection-- addresses the PICO question by looking at the long term dental prognosis.
- Applicability to your patient- Surgical extrusion is an effective way to extrude the canine.

30 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

31 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

Double click table to activate check-boxes

32 ARTICLE 2 CITATION, INTRODUCTION

- Citation:Becker, Adrian, Gavriel Chaushu, and Stella Chaushu. "Analysis of failure in the treatment of impacted maxillary canines." *American Journal of Orthodontics and Dentofacial Orthopedics* 137.6 (2010): 743-754.
- Study Design: Individual cohort study
- Study Need / Purpose: Evaluate the reasons for failure of orthodontic treatment of maxillary canines

33 ARTICLE 2 SYNOPSIS

- Method- 28 patients were used I the study from 3 practices, with 26 palatal impactions, 9 buccal and 2 midalvelous. Patients had been treated elsewhere but did not respond to treatment. The details of the 1st treatment included the types of radiographs taken, how traction was applied, type of anchor base used and time elapsed between start of treatment and realization of failure. The 2nd treatment included additional radiographs and revised reasons for 1st treatment failure and corrective measures adopted.

- Results- Tre 2nd treatment and evaluation yielded a success rate of 71.4%. And the reason for failure for the 1st treatment was poor anchorage(48.6%), mistaken potential tractional direction(40.5%) and ankylosis(32.4) and filed eruption because of soft tissue eruption(8.1%). The 2nd treatment included redirection of ligature wires (3 pts), cleating of soft tissue(4 pts), In 2 pts exposure was performed for the 1st time.

- Conclusions- There are many aspects involved in treatment of maxillary canines and these can impact the treatment by themselves of in a combined manner. Failure can occur because of mistaken diagnosis of location of the tooth and its relation to adjacent tooth, not fulfilling the correct anchorage requirements, ankylosis,

- Limitations- The study did not have a routine follow up on patients to look at the long-term prognosis in terms of alveolar bone height or root resorption.

37 ARTICLE 2 SELECTION

- Reason for selection- Addresses the PICO question by looking at methods used to extrude the impacted canine.
- Applicability to your patient- surgical extraction is an effective way to extrude the impacted canine and use a fixed appliance to orthodontically move tooth

38 LEVELS OF EVIDENCE

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
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40 ARTICLE 3 CITATION

- Oz, A. Z., and S. Ciger. "Health of periodontal tissues and resorption status after orthodontic treatment of impacted maxillary canines." *Nigerian journal of clinical practice* 21.3 (2018): 301.
- Study Design: Individual cohort study
- Study Need / Purpose: studies long term results on periodontal health of teeth after treatment

41 ARTICLE 3 SYNOPSIS

- Methods- study included 20 patients with unilaterally impacted maxillary canines, minute crowding and good oral hygiene. CBCT was performed and reason for incisor resorption was assessed and graded into three criteria no resorption, slight resorption and resorption midway to the pulp. Pocket depth measurements on all six surfaces were taken and alveolar bone loss was measured on all four surfaces oof the previously impacted canines all measurements were made twice and the mean was recorded.

42

- **Results-** In total ten incisors had resorption four laterals had slight resorption and four laterals had moderate resorption and two centrals had slight resorption. There was no severe root resorption with the impacted maxillary canines. A direct correlation was found between contact and root resorption before the treatment. Most of the resorbed incisors were near the impacted canines. After treatment the buccal bone thickness of the impacted tooth was greater than the contralateral canine that was normally erupted, however the mean pocket depths were deeper in the impacted canines(2.13mm) vs the contralateral canine(1.64mm). The impacted canines also had

- Conclusions- Incisor root resorption resulting from impacted maxillary canine heals when impacted tooth is moved.
- Periodontal tissues of the impacted teeth are affected by surgical orthodontic procedure and and followup visits are recommended

- Limitations- The study did nor conduct follow-ups on the patients to see if the alveolar bone loss and the pocket depths increased over a period of time.

- Reason for selection- Addresses the PICO question by looking at the success of methods used to extrude the impacted canine looking at showing the implications if nothing is done.
- Applicability to your patient- Surgical extrusion is an effective way to treat the impacted canine.

46 LEVELS OF EVIDENCE

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
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48 CONCLUSIONS: D3

How does the evidence apply to this patient?

- The evidence states that, the most effective treatment for the patient would be surgical extrusion of the canine and using a fixed appliance to orthodontically move the tooth

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

I would advise my D4 to surgically expose the canine and use gold chain to guide the tooth in place.

49 CONCLUSIONS: D4

Based on your D3's bottom line recommendations, how will you ***advise*** your patient?

-We will complete orthodontic treatment and attempt to surgically expose and guide #11 into occlusion.

How will you ***help*** your patient?

-Monitor progress by taking periapical radiographs throughout orthodontic treatment to assess health of adjacent teeth.

- Routine preventative care and OHI to ensure patient's #11 has best periodontal prognosis

50 DISCUSSION QUESTIONS

- 1-2 slides
- List posted discussion questions
- Questions may also be from Group Leader or Specialist

51 DISCUSSION QUESTIONS

THANK YOU