


Are We Evaluating Everything
We Should With
Our Pediatric Patients ?


Pediatric Periodontal Challenges
April 29, 2020
~ IAPD ~

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Storytelling

*Tell me the facts and I'll learn
Tell me the truth and I'll believe
But tell me a story
And I will keep it in my heart forever*

~ Native American Proverb ~

3

*Have you ever had to work
up a child with
periodontal pathology ?*

4

Good Overviews


- ❖ Delaney JE & Keels MA: Oral Pathology-Soft Tissue and Periodontal Conditions. Pediatric Clinics of North America 47(5): 1125-1147, 2000.
- ❖ Oh TJ et al. Periodontal Diseases in the Child and Adolescent. J Clin Periodontol 29(5):400-410, 2002.

5

Good Overviews


- ❖ Song, HJ. Periodontal Considerations for Children. Dental Clinics of North America. Pediatric Dentistry 17-38, 2013.
- ❖ Keels MA & Tatakis, DN: Periodontal disease in children: Associated systemic conditions. UpToDate 2019.

6



AAPD endorses the American Academy of Periodontology's Guidelines on a yearly basis

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The Gingival / Perio Landscape

- A. Healthy Gingival and Periodontal Appearance
- B. Simple Gingival Pathology
- C. Complex / Isolated Gingival Pathology
- D. Periodontal Involvement
 - (alveolar bone loss, tooth mobility, tooth loss)

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Describe Healthy Gingiva



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Compare Gingiva

Children

- more vascular
- redder
- rounded margins
- less stippling

Adults

- pink
- knife-edge margins
- stippled

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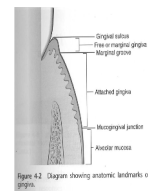
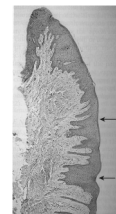


Figure 4-2 Diagram showing anatomic landmarks of the gingiva

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LOADS
of
BLOOD
VESSELS

Figure 4-22 Diagram of chronic inflammation showing the vascular response. The gingiva is inflamed, and a large number of leukocytes are present in the gingival sulcus, causing gingivitis (the surrounding tissue is healthy).



Figure 4-23 Blood vessels and inflammatory infiltrate of the gingiva. The gingiva is inflamed, and a large number of leukocytes are present in the gingival sulcus, causing gingivitis (the surrounding tissue is healthy).

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The Gingival / Perio Landscape

- A. Healthy Gingival and Periodontal Appearance
- B. ISOLATED Gingival Pathology
- C. Generalized Gingival Pathology
- D. Periodontal Involvement
 - (alveolar bone loss, tooth mobility, tooth loss)

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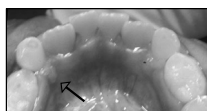
Common Gingival Conditions

- Retrocanine papillae
- Melanin pigmentation
- Isolated gingivitis from poor OH
- Generalized gingivitis poor OH
- Aberrant frenulum attachment
- Eruption gingivitis
- Mouth breathing Gingivitis

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Retrocanine papillae



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Describe what you see?



Normal Melanin Pigmentation

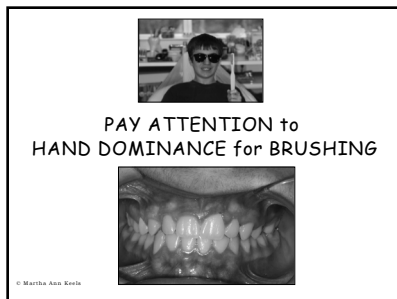
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Isolated Gingivitis
related to TB technique

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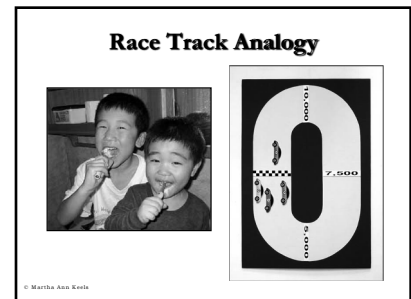
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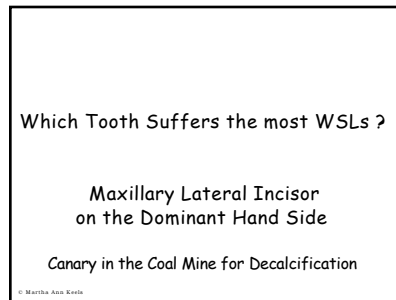
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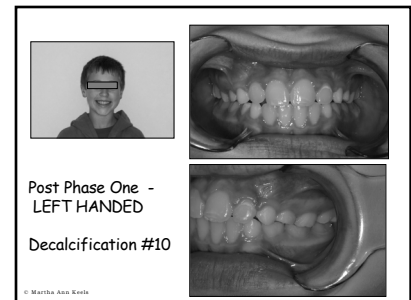
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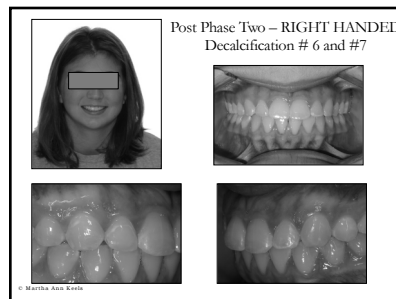
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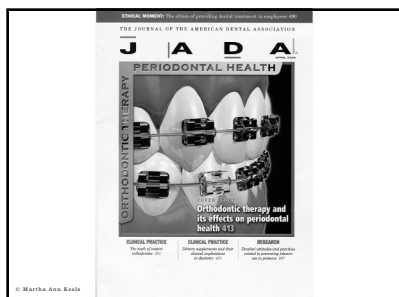
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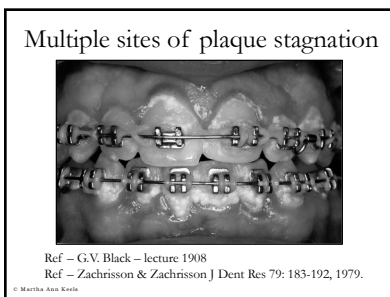
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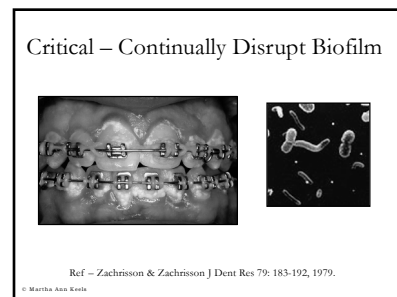
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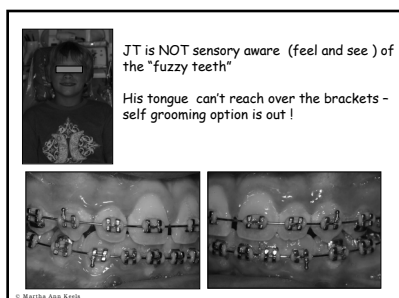
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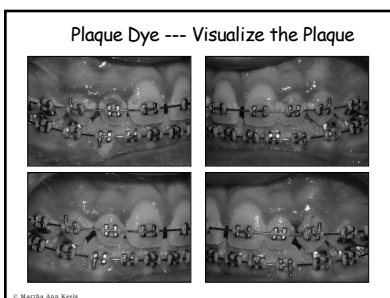
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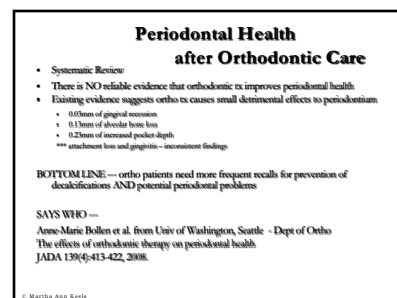
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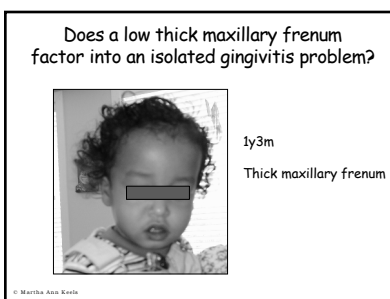
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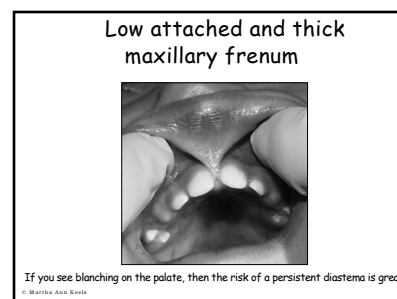
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Maxillary Frenum ...constricted



Is there tethering of the facial gingiva?
If so, consider releasing to maintain optimal gingival health.

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Wide and Thick Maxillary Frenum



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Diastemas Galore...



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Final Phase II Ortho

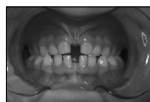


Maxillary frenectomies were completed
prior to
orthodontic care



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Lower Lingual Frenum ...constricted



What are the indications to clip
the lower lingual frenum?

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Ask 4 questions?



- 1) Can he latch on to breastfeed?
- 2) Will his speech be affected?
- 3) Can he self-clean all of his teeth?
- 4) Will there be gingival tethering

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The Lower Lingual Frenum ...



1. Latching
2. Speech
3. Self cleansing
4. Tethering
(rare to see)

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The Lower Lingual Frenum ...



Tx ~ released his lower lingual frenum



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Mom is worried about Jack's Gums

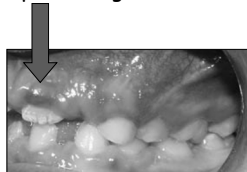


What do you tell mom and Jack?

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Eruption Gingivitis



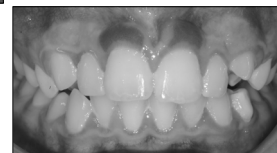
* See vascular immature gingiva

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Age 12
Isolated Inflamed Gingiva –
First Appeared after Eruption

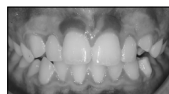


Is this remnant of immature gingiva and slow to keratinize?
Is this an inflammatory response to a specific bacteria?

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- **Previously biopsied at UNC at age 7 –**
Dx – inflammation due to
eating red apples
- **Stopped red apples and NO change**
- **Not Puberty Gingivitis**
- **No other tx rendered**



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LJSGH - Localized Juvenile Spongiotic
Gingival Hyperplasia

- ❖ distinct inflammatory hyperplasia
- ❖ affects anterior gingiva
- ❖ 2.3 : 1 female to male
- ❖ average age 12
- ❖ painless
- ❖ may bleed easily

Ref – Solomon et al. Pediatric Dent 2013;35:360-363.

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LJSGH - Localized Juvenile Spongiotic
Gingival Hyperplasia

- ❖ Ped Dent Jul/Aug 2013 – Report of 3 cases
- ❖ Biopsy ? --- still need therapy
- ❖ Duke Dermatology – try Clobetasol ointment – high potency corticosteroid

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LJSGH - Localized Juvenile Spongiotic
Gingival Hyperplasia

- ❖ Duke Pharmacy – Clobetasol ointment (0.05%) – high potency corticosteroid – mixed with Orajel to reduce % to 0.025%
- ❖ Other institutions ~ try laser therapy ~ concern is residual esthetic defect

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One Month Progress



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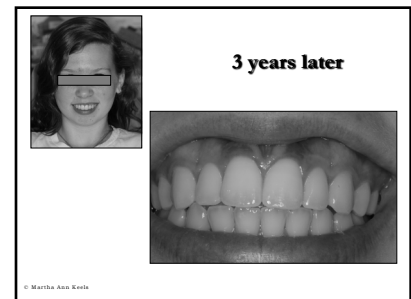
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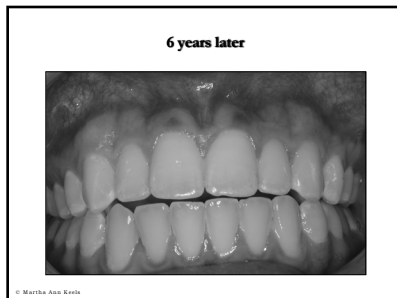
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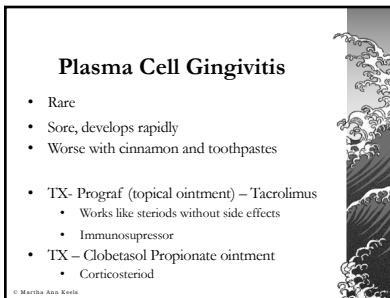
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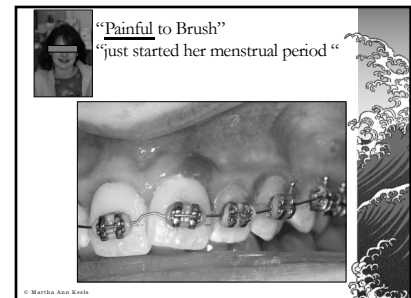
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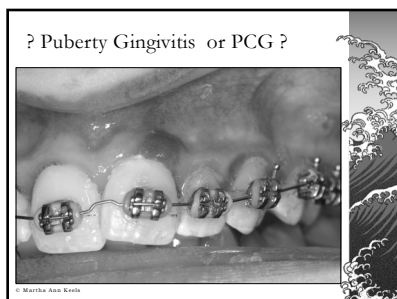
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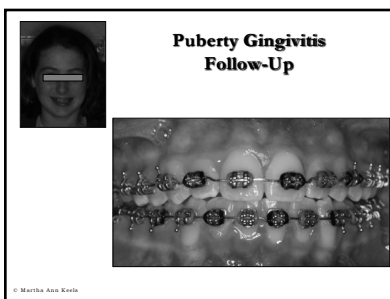
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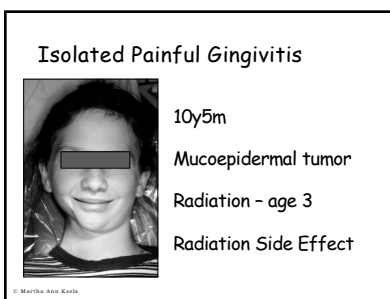
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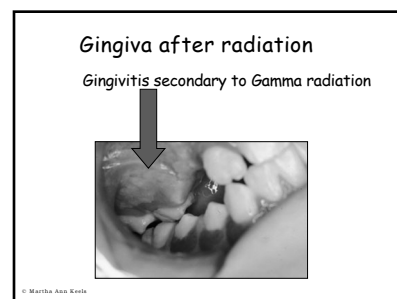
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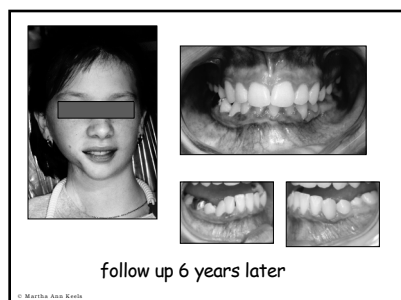
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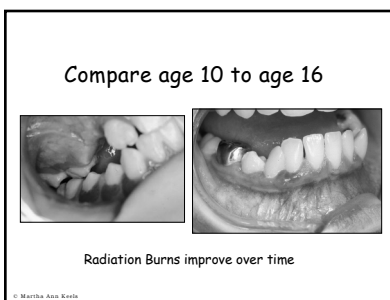
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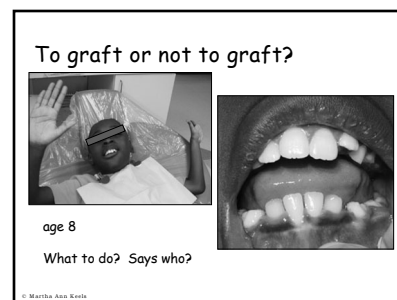
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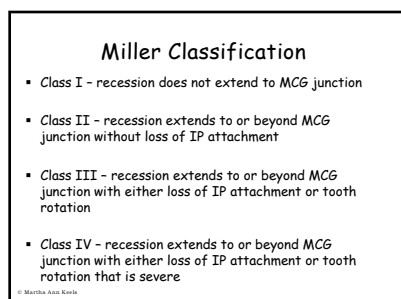
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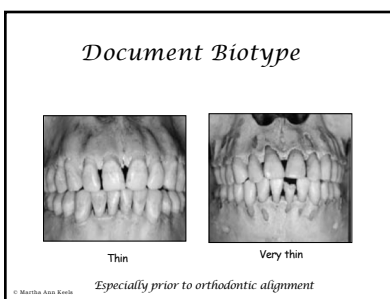
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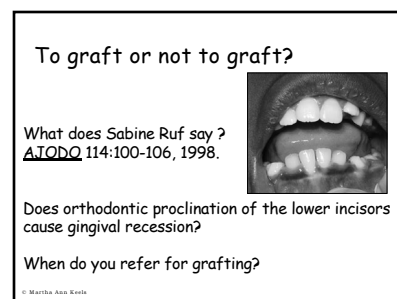
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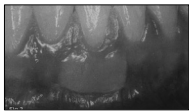


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To graft or not to graft?



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Answer

- ❖ If you are planning to move the incisor FACIALLY during orthodontic treatment
- ❖ GRAFT FIRST
- ❖ If you are planning to move the incisor LINGUALLY during orthodontic treatment
- ❖ DELAY grafting

Song, H.J. Periodontal Considerations for Children. Dental Clinics of North America, Pediatric Dentistry 17-38, 2013.

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Factitious Injury



Age 8
Significant for Autism



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Factitious Injury



In this case, no gingival grafting was recommended due to persistent habit and parents resisting arm splits

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Isolated Gingival Pathology due to Enamel Notch or Divot



Enamel notch at CEJ #8

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The Enamel Notch



Note: gingiva settles into notch



What are our treatment options ?

- 1) Keep clean
- 2) Restore defect

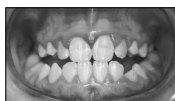
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Mouth Breathing Gingivitis



Age 10
Asthmatic
Chronic Mouthbreathing
Maxillary Gingivitis



TX = hydrate
Keep gingiva moist !

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Seasonal Allergies

--- Increased Inflamed Gingival Risk

TIPS to REDUCE RISK

- drinks lots of water !!!!
- moisturize gums - windshield wiper
- brush BID
- power toothbrush - b/c tenacious plaque
- fluoride 5000ppm paste
- alcohol free mouthwash
- more frequent recall interval q3months

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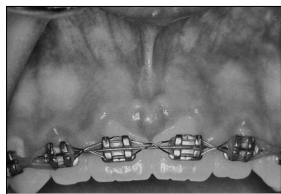
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High Smile LINE → Air exposed gingiva
→ Fibrotic Gingivitis → Hard to reach
Cervical Third → Plaque Stagnation Sites



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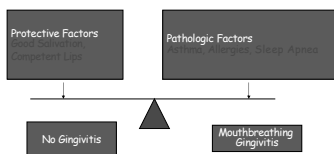


Consider Gingivoplasty
for the very fibrotic gingival overgrowth

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Mouthbreathing Gingivitis Risk Assessment



Ref - JDB Featherstone, J Dent Res 83 (Spec Iss C): C39-C42, 2004.

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Etiology of Gingival Hyperplasia

1. Dilantin (seizure med)
2. Nifedipine (calcium channel blocker)
3. Cyclosporin A (transplant pts)
4. Chronic Mouthbreathers & G-tube fed
5. Familial gingival overgrowth

Ref - Doufexi et al: Gingival overgrowth in children. A literature. J Periodontol 76: 3-10, 2005.

Ref - Dongari et al: Drug-induced gingival overgrowth. Oral Path Oral Med and Oral Pathol 76: 543-548, 1993.

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Solid Organ Transplants (kidney, liver, lung, heart)

Culprit for gingival enlargement = cyclosporin

Cyclosporin alone 26% increase

Cyclosporin with CCB 60% increase
SYNERGY

Tacrolimus alone 13%

Children on cyclosporins are at 5x greater
risk for GE than children on other meds

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Solid Organ Transplants (kidney, liver, lung, heart)

Culprit for gingival enlargement = cyclosporin

Also 4x greater in boys than girls

SAYS WHO ?

Caroline Shiboski et al. UCSF
Pediatr Dent 31:38-46, 2009

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Example of Severe Gingival Hyperplasia



Cyclosporin A - induced gingival hyperplasia

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8yo s/p Liver Transplant

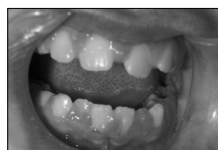


What do you expect to see intraorally ?

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Gingival hyperplasia

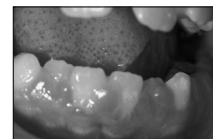


Gingival hyperplasia due to Cyclosporin A treatment

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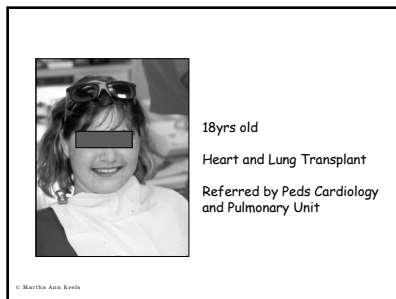
Gingival Hyperplasia Hers is more vascular



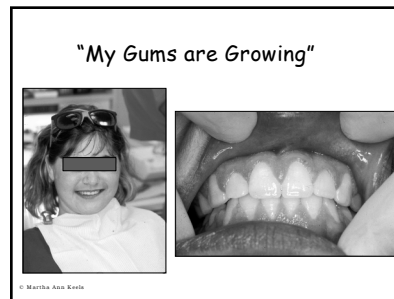
More vascular = focus on OHI
More fibrotic = focus on gingivectomy

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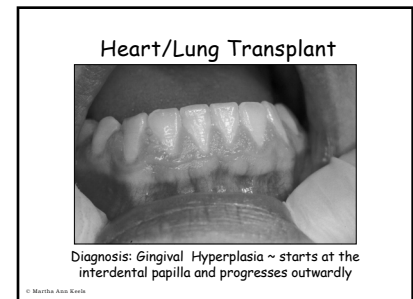
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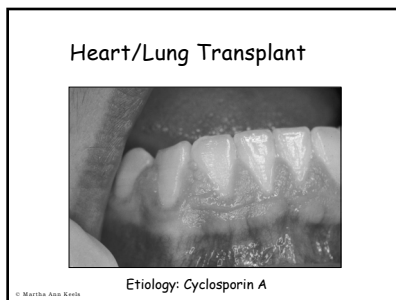
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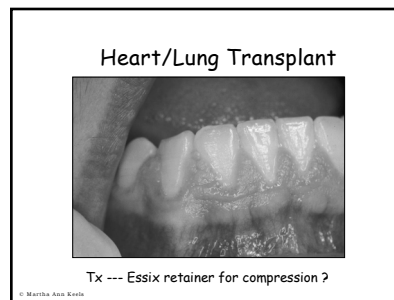
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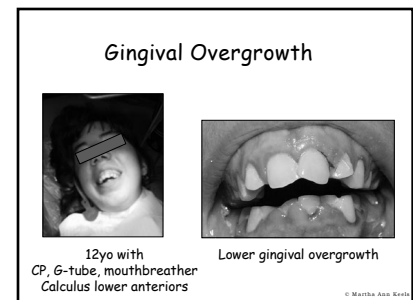
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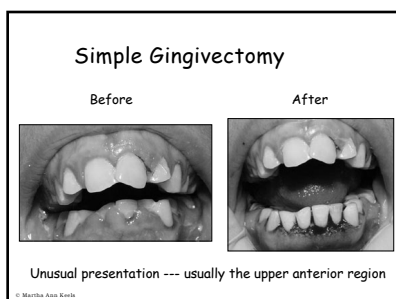
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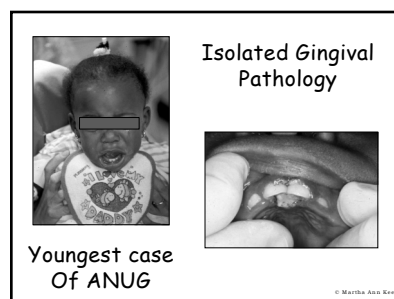
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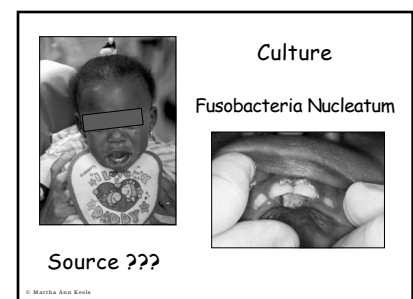
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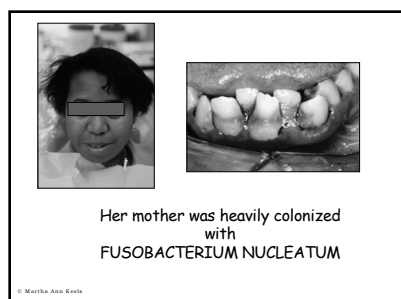
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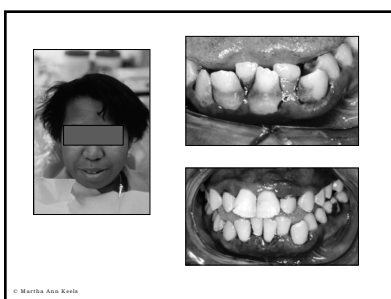
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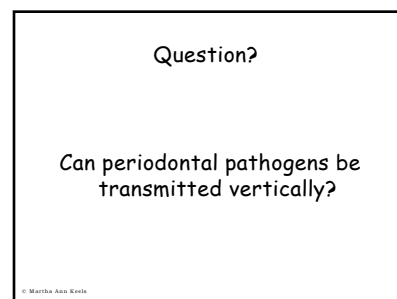
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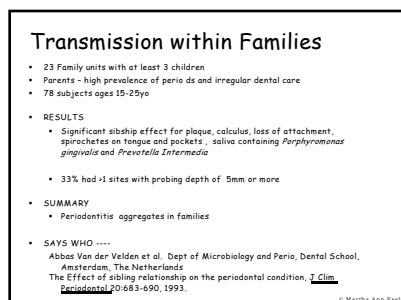
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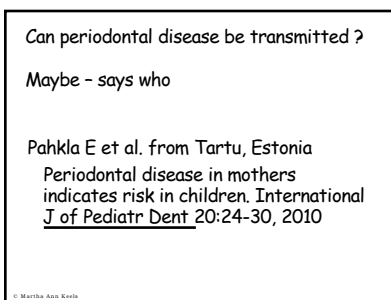
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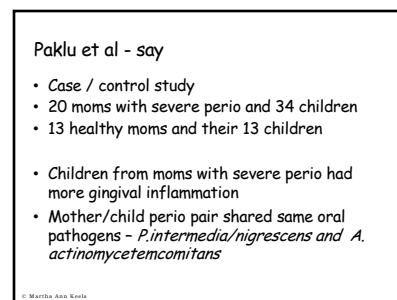
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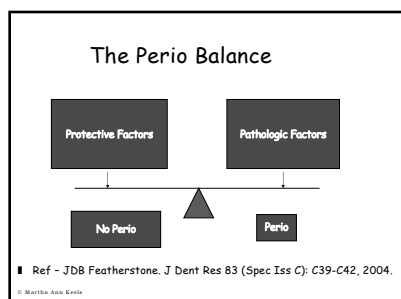
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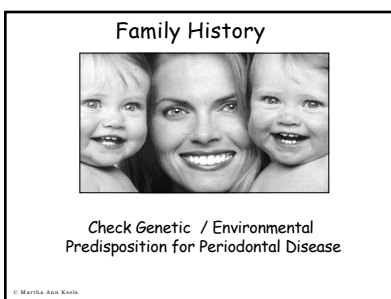
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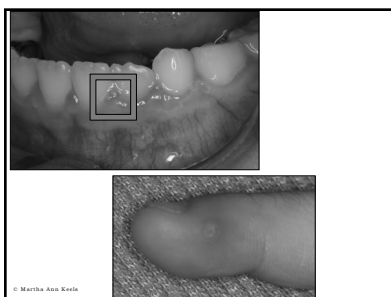
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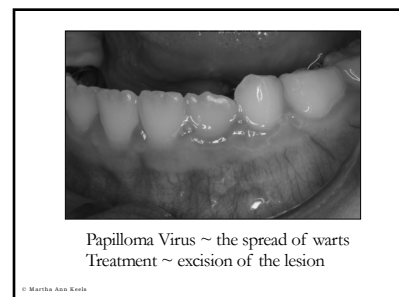
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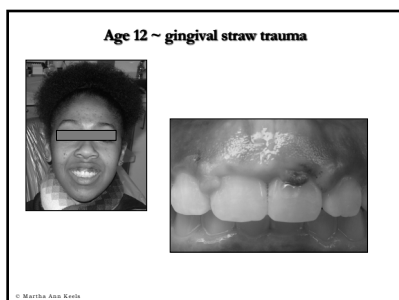
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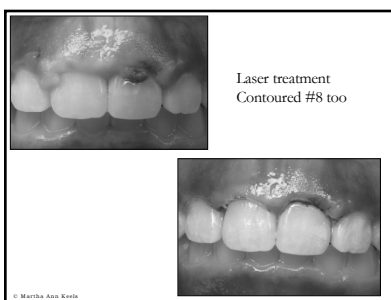
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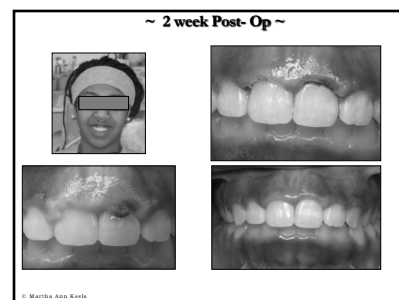
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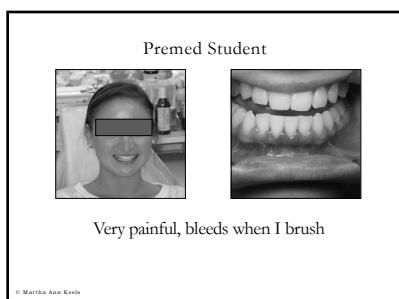
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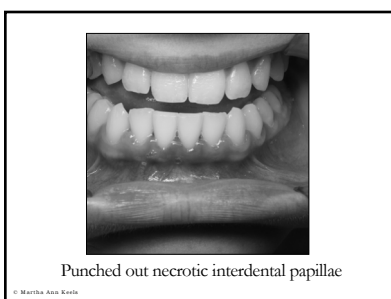
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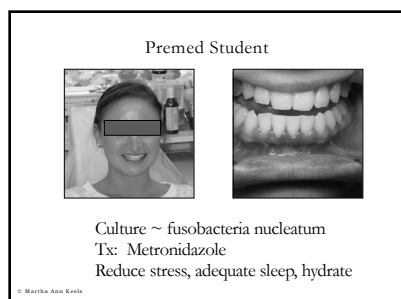
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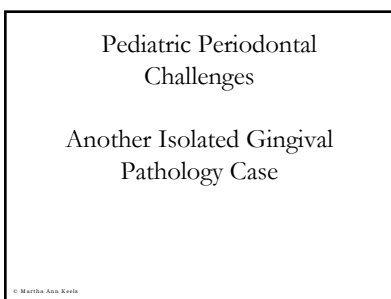
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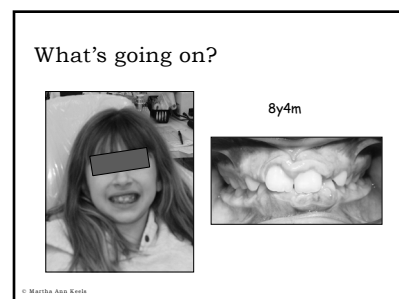
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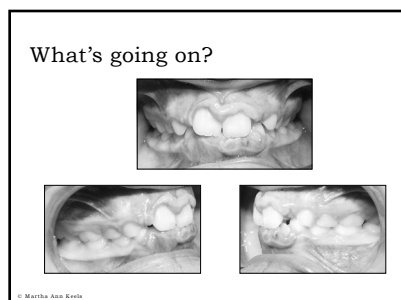
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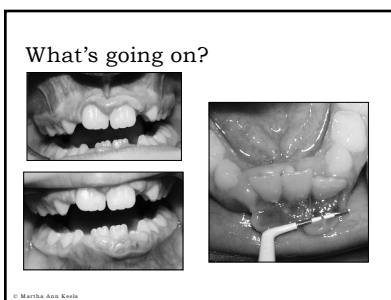
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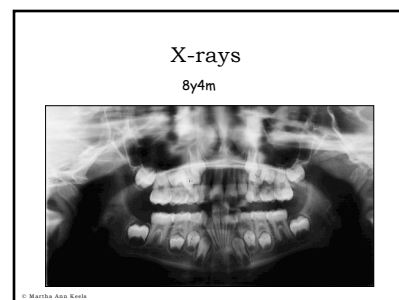
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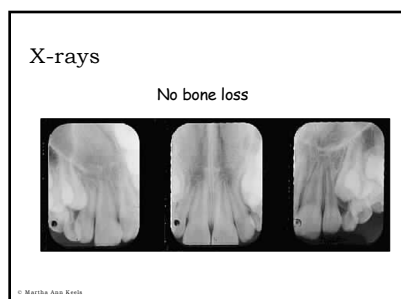
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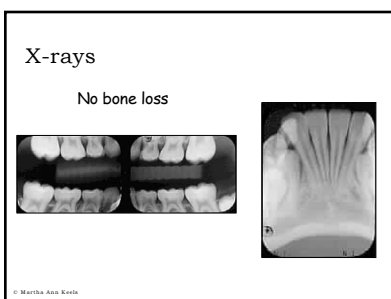
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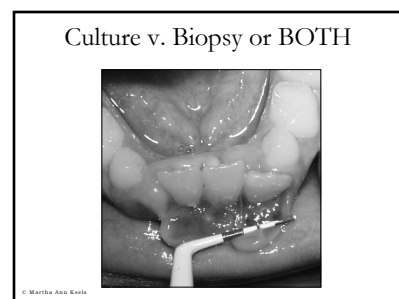
123



124



125



126

Initial Culture Results

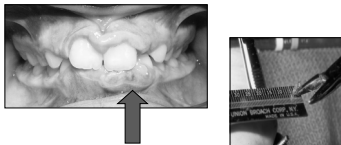
- *Fusobacterium nucleatum* HEAVY
- *Capnocytophaga* LIGHT
- *Bacteriodes ureolyticus* MEDIUM
- *Prevotella intermedia* MEDIUM

*** all sensitive to Amoxicillin

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Gingival Biopsy



Biopsy site
Principle ~ biopsy the most affected site

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Gingival Biopsy

Diagnosis: Peripheral ossifying fibroma



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Treatment

Complete excision of lesions is required
Referral to Periodontist



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What's going on...9 months later?



9y1m

New area on #10



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Compare and Contrast

9y1m

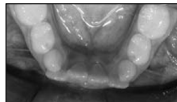
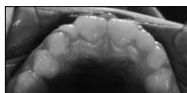


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Compare and Contrast

9y1m



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Follow-up Culture Results

- *Fusobacterium nucleatum* HEAVY
- *Capnocytophaga* NONE
- *Bacteriodes ureolyticus* NONE
- *Prevotella intermedia* NONE
- New: *Eikenella corrodens* LIGHT

*** all sensitive to Amoxicillin

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Summary

- Referred for additional excision of new lesions
 - Plan: full-thickness flaps
 - Excise to bone to remove lesions
 - Laser
- Without pseudo-pockets, she doesn't harbor any anaerobes

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Summary

- Starting to use Azithromycin instead of Amoxicillin
 - Concentrated in white blood cells better

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The Gingival / Perio Landscape

- A. Healthy Gingival & Periodontium
- B. Simple Gingival Pathology
- C. Localized Gingival Pathology
 - Progress to Perio Involvement
 - Alveolar bone loss, mobility, tooth loss
- D. Generalized Gingival Pathology
 - Progress to Perio Involvement
 - Alveolar bone loss, mobility, tooth loss

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Pediatric Perio Ds Matrix

BOX 1	BOX 2
Good gums Good bones	Good gums Bad bones
BOX 3	BOX 4
Bad gums Good bones	Bad gums Bad bones

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Pediatric Perio Ds Matrix

BOX 1	BOX 2
HEALTHY	Hypophosphatasia
BOX 3	BOX 4
VIRAL – self-limiting Leukemias	Losing bone ! See disease list on the next slide

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0.2% ~ 0.5% Prevalence Rate

- Possible Diseases BOX 4
 - White blood cell problems
 - Cyclic Neutropenia, Chronic Idiopathic Neutropenia, Agranulocytosis
 - Leukocyte Adhesion Deficiency Disorder
 - Langerhan Cell Histiocytosis X
 - Tuberculosis, CGD
 - Down Syndrome
 - Chediak-Higashi
 - Papillon-Lefevre Syndrome
 - Localized Juvenile Periodontal Disease

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Pediatric Perio Ds Matrix

BOX 1	BOX 2
Good gums Good bones	Good gums Bad bones
BOX 3	BOX 4
Bad gums Good bones	Bad gums Bad bones

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Presents at age 3 Problem – teeth falling out early



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Patient History

- Infant GERD
- Astigmatism
- 4 months of age – Hydrocephalus
- 7 months of age – VP shunt placed
- 4-7 months – delays in development noted
 - sitting and balance issues
- Growth Hormone Delay – taking Genotropin

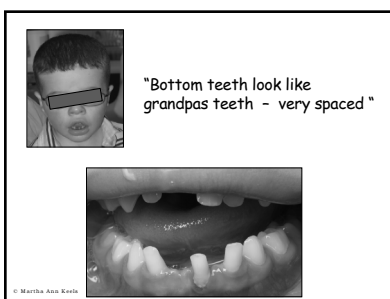


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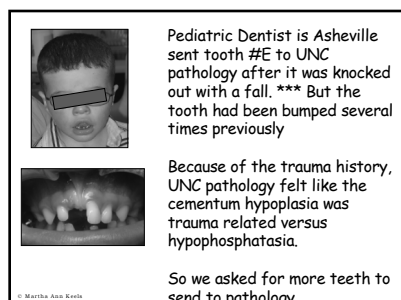
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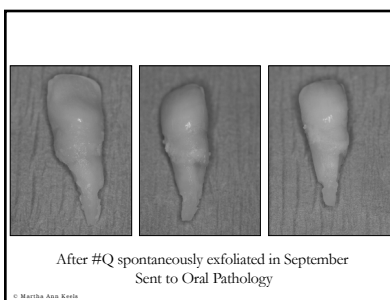
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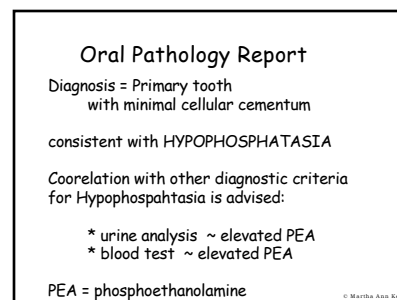
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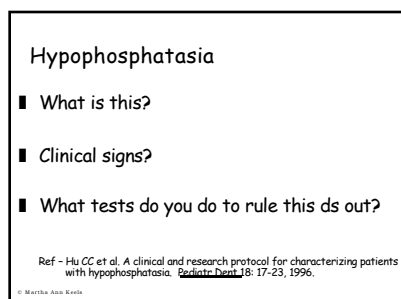
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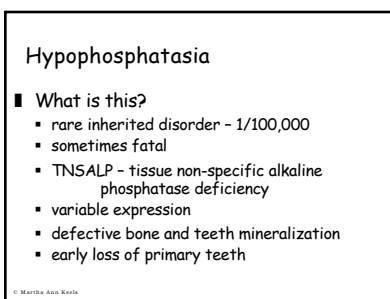
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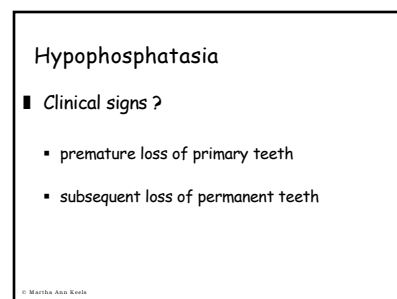
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151



152



153

Hypophosphatasia

- What test can you do to rule this ds out?
 - ask the family to save a tooth - send to ORAL PATHOLOGY
 - cementum aplasia or cementum hypoplasia

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Hypophosphatasia

- Enzyme Replacement Therapy for HPP
 - Asfotase alfa (Strensiq) ~ company Alexion
 - ! 2mg/kg three times a day
 - ! Subcutaneous injection
 - ! Goal ~ reverse mineralization defects
 - ! Approved in USA for perinatal/infantile and juvenile onset HPP

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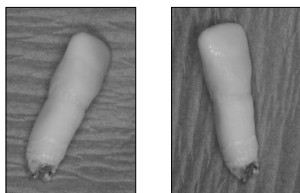
155

Case #2 ~ age 18 months
#O and #P fell out last month, no history of dental trauma
Mom saved the teeth ~ Sent to oral pathology



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Oral Pathology ~ Cementum Aplasia
Another example of Hypophosphatasia

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Hayden ~ age 18 months
Referral to Medical Genetics for
Enzyme Replacement Therapy



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Pediatric Perio Ds Matrix

BOX 1	BOX 2
Good gums Good bones	Good gums Bad bones
BOX 3	BOX 4
Bad gums Good bones	Bad gums Bad bones

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Pediatric Perio Ds Matrix

BOX 1	BOX 2
HEALTHY	Hypophosphatasia
BOX 3	BOX 4
Viral Leukemias	Losing bone

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Pediatric Perio Ds Matrix

BOX 1	BOX 2
Good gums Good bones	Good gums Bad bones
BOX 3	BOX 4
Bad gums* Good bones	Bad gums Bad bones

* Consider viral etiology for first two weeks, if generalized gingivitis persists
then look for systemic etiology involving the stem cells ~ leukemias, neutropenias

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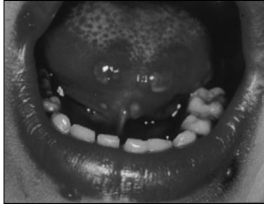
161

3 yo ~ presents with bleeding gums



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- Describe what you see
- What are your differential diagnoses ?
- What are your next steps ?

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Pediatric Periodontal Challenges Infectious Diseases causes of gingival pathology

■ Viral Gingivitis

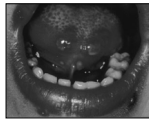
- HSV
- EBV, etc.....

■ HIV - special case - LGE

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Primary Herpetic Acute Gingivostomatitis



- TX =
- 1) hydration
 - 2) 7-10days healed
 - 3) don't touch
 - 4) rare antiviral therapy

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HIV & Periodontal Disease



3y6m with hx of HIV+

Referred for
"severe caries"

1 week post full mouth
rehabilitation

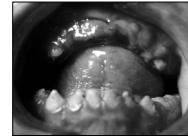
Ref - Coogan MM et al. Oral lesions in infections with human immunodeficiency virus. *Bull World Health Organ* 83(9): 700-706, 2005.

Ref - Fine DH et al. Clinical implications of the oral manifestations of HIV infection in children. *Dent Clin of North America* 47(1): 159-174, 2003.

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Poor OH associated Generalized Gingivitis



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almost a year later



Swollen parotid glands



Clubbing of fingers

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Immunodeficiency associated Gingival Inflammation



11yo --- Linear gingival erythematosis (LGE)

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11 years old

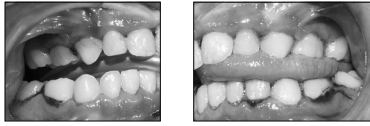


Linear gingival erythematosis (LGE)

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What if Alexis – 3yo is your next patient ?



Chief Concern – her gums bleed a lot when we brush

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Plan of Action

- Chief Concern – her gums bleed a lot when we brush
- Unable to obtain Radiographs – ? Bone loss
- Assume Viral Etiology – reassess in 2 weeks
- If still bleeding after 2 weeks – Refer to Peds Hematology – Oncology for evaluation

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It has already been several weeks of bleeding – unlikely viral etiology – need MD consult



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Plan of Action

- Chief Concern – her gums bleed a lot when we brush
- Unable to obtain Radiographs – ? Bone loss
- Assume Viral Etiology – reassess in 2 weeks
- If still bleeding after 2 weeks – Refer to Peds Hematology – Oncology for evaluation

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With MD in OR – get Bone Marrow Biopsy and Blood Samples



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Diagnosis – Chronic Idiopathic Neutropenia



Chief Concern – her gums bleed a lot when we brush

Tx – G-CSF and possible Stem Cell Transplant

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Your Next Patient Monday Morning



~ dad, a physician, brings her in for you to assess her mouth injury from falling and hitting her mouth on a toy over the weekend

~ dad wants you to make sure everything looks okay

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~ 18 months old ~



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See Generalized Gingivitis
beyond the torn frenum

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How do you proceed ?



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Pediatric Perio Ds Matrix

BOX 1

BOX 2

Good gums
Good bones

Good gums
Bad bones

BOX 3

BOX 4

Bad gums
Good bones

Bad gums
Bad bones

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Pediatric Perio Ds Matrix

BOX 1

BOX 2

HEALTHY

Hypophosphatasia

BOX 3

BOX 4

viral- self-limiting
Leukemias

Bone involvement

Acute onset of WBC
defects

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- What are your differential diagnoses ?
- What are your next steps ?

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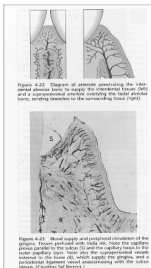
Differential Diagnoses

- 1 ~ Trauma (more generalized)
- 2 ~ ANUG (no high fever)
- 3 ~ AML (plump papillae)



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Next Steps

1. Elected Photos only
2. No sulcular cultures and No probing
3. 2 week post-op rule out viral cause
4. Referral to MD for Hem/Onc
* Dad had a sense of urgency

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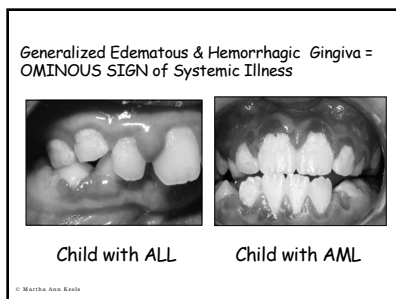
Diagnosis?



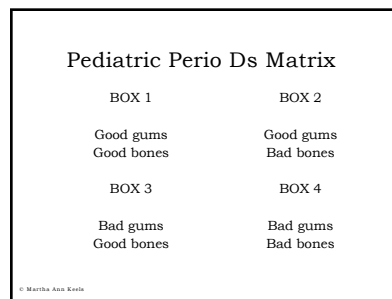
Acute myelogenous leukemia

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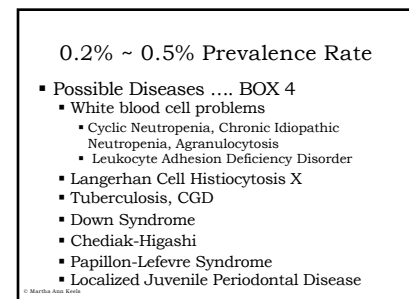
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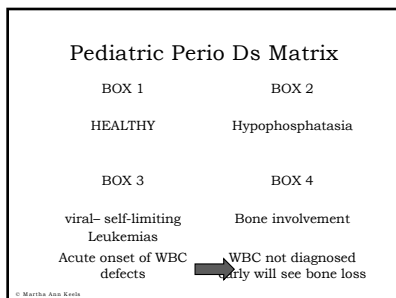
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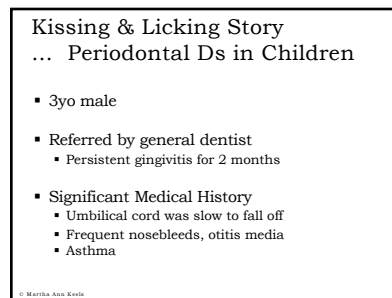
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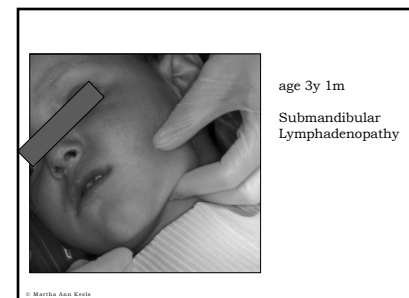
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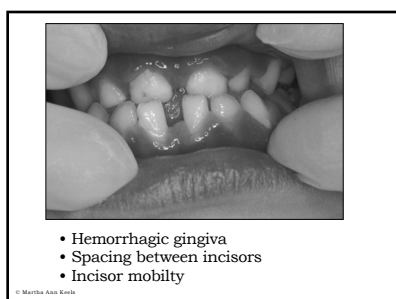
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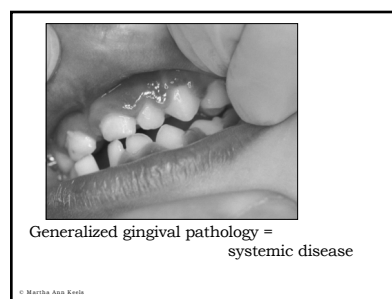
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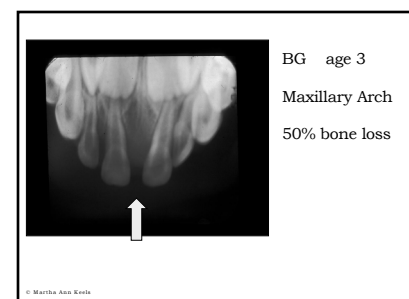
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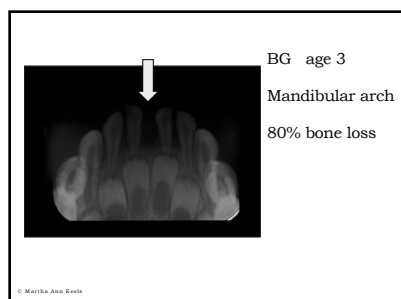
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199

Why is the disease worse in the mandible vs. maxilla ?

- *THE AGING GUM GUTTER THEORY*
- The older the gingival sulcus, the more time for bacteria to do its damage
- Mandibular incisors erupt before maxillary incisors

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Pediatric Periodontal Work-Up

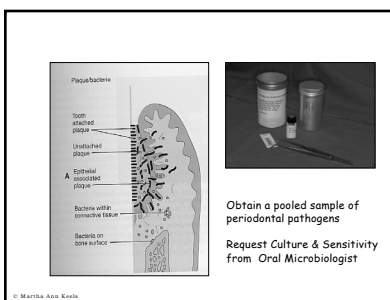
- Photograph gingival condition
- Document tooth mobility - diastemas
- Check alveolar health - radiographs
- Culture & Sensitivity Testing for Bacteria
- Medical Referrals - blood work

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202



203

Kissing & Licking Story

- While the culture of the periopathogens is being evaluated in the oral microbiology lab ...
- Obtain a physical & blood work-up

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Medical Referral - why?

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Medical Referral - why?

- Possible Diseases BOX 4
 - White blood cell problems
 - Cyclic Neutropenia, Chronic Idiopathic Neutropenia, Agranulocytosis
 - Leukocyte Adhesion Deficiency Disorder
 - Tuberculosis, CGD
 - Papillon-Lefevre Syndrome
 - Langerhan cell Histiocytosis X
 - Chediak-Higashi

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WBC Defect
Quantitative or Qualitative ?

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Critical White Blood Cell

■ QUANTITATIVE TESTS

- --- evaluate the number of immune cells
- Neutropenias
 - Cyclic Neutropenia
 - Chronic Idiopathic Neutropenia
 - Agranulocytosis

■ QUALITATIVE TESTS

- --- evaluate the function of the immune cells
- Leukocyte adhesion deficiency disorder (LAD)
- Diabetes *
- Papillon-Lefevre Syndrome *

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Initial Immunologic Workup

- WBC Function Tests were normal
 - CD 18, 11b, 16 normal
 - IgA, IgG, etc normal
 - Oxidative bursts & killing assays normal
- Chest Xray – interstitial findings
- + PPD test
- WORKING DIAGNOSIS = TB or Atypical Mycobacteria

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Blood work up 10/14 ---11/04

Blood drawn every few days for several weeks

- | | |
|-----------------|-----------------------|
| ■ 10/14 WBC 6.3 | ABS neutrophil 1.6 |
| ■ 10/17 WBC 5.5 | ABS neutrophil 1.3 |
| ■ 10/21 WBC 4.6 | ABS neutrophil 0.8 |
| ■ 10/23 WBC 4.3 | ABS neutrophil 0.7*** |
| ■ 10/29 WBC 4.7 | ABS neutrophil 0.7 |
| ■ 11/04 WBC 4.5 | ABS neutrophil 1.0 |

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DIAGNOSIS

❖ CYCLIC NEUTROPENIA

❖ TX = GCSF

- ❖ – Granulocyte Colony Stimulating Factor

■ 11/04 started on GCSF 2cc qod

- | | |
|------------------|---------------------|
| ■ 10/23 WBC 4.3 | ABS neutrophil 0.7* |
| ■ 11/19 WBC 22.2 | ABS neutrophil 14.9 |
| ■ 12/07 WBC 23.8 | ABS neutrophil 16.3 |

Ref - Long LM et al. Cyclic Neutropenia: Case report of two siblings.
Pediatric Dentist 5: 142-144, 1983.

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What about the gum gutter?

- No different than the lungs
- Vulnerable to colonization during the WBC nadir

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Curing the gingival inflammation INSIDE and OUTSIDE

- INSIDE --- GCSF increases the WBC numbers to fight infection
- OUTSIDE --- What kind of bacteria were growing in the periodontal pockets ???

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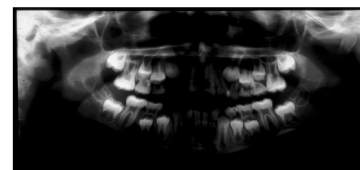
Assessing the FAMILY

- ❖ Panorex of each family member
- ❖ Periodontal culturing of each family member

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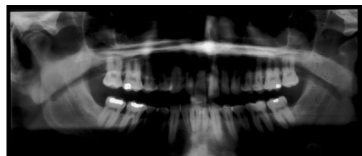
BG's older sister's Panorex



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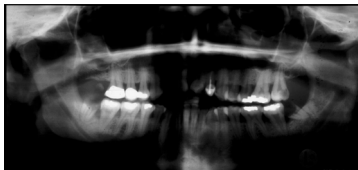
BG's Dad's panorex



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BG's Mom's panorex



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Kissing & Licking Story

All family members were colonized with a similar anaerobic pattern:

- *Fusobacterium nucleatum* HEAVY
- *Capnocytophaga* HEAVY
- *Eikenella corrodens* MEDIUM
- *Prevotella intermedia* MEDIUM

*** all sensitive to Amoxicillin

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BG's perio therapy

- Meticulous OHI --- including flossing
- Monojet syringe / water pik --- irrigate with Chlorohexidine Rinse
- Amoxicillin for 6 weeks - reculture

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BG age 3y5m

3 month followup



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← Before

3 months after



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← Before

3 months after



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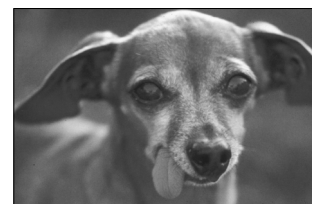
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BG's perio therapy

- ❖ Ensure parents and sister establish and maintain oral health
- ❖ Avoid sharing licking the spoon
- ❖ Frequent recalls
- ❖ Did we forget anything ???

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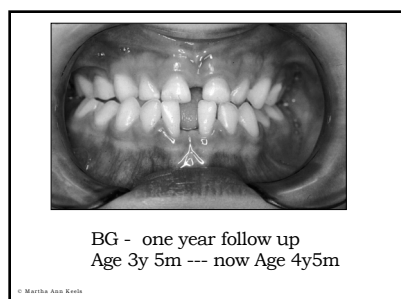
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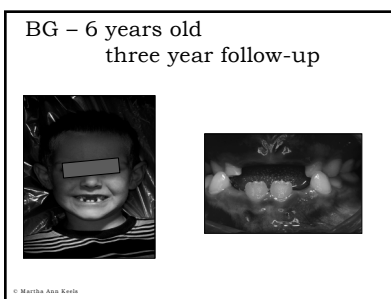
The pet dog cultured the same anaerobic bacteria

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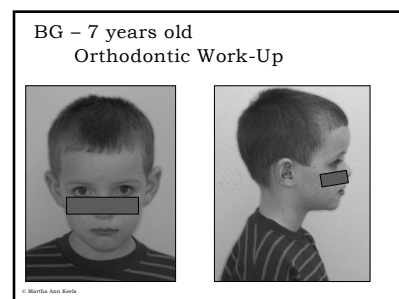
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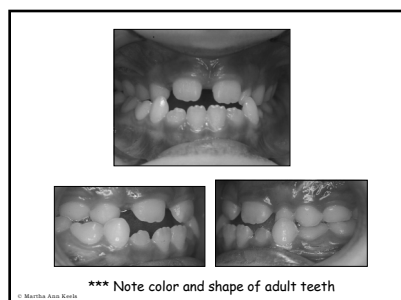
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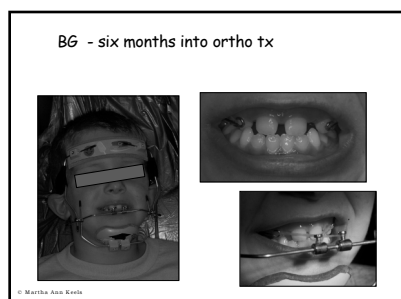
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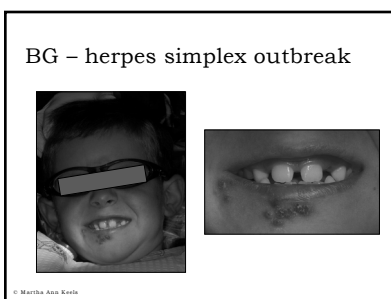
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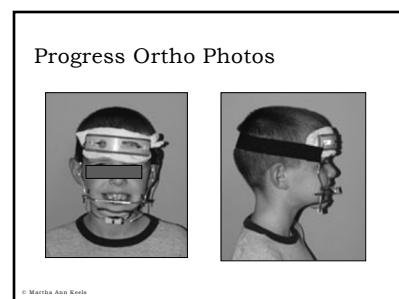
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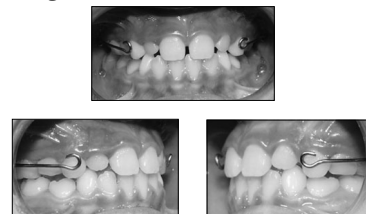


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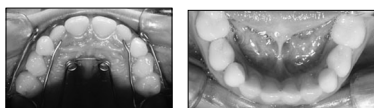
Progress Ortho Photos



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Progress Ortho Photos



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Final Ortho Photos



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237

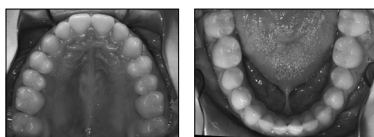
Final Ortho Photos



© Martha Ann Keels

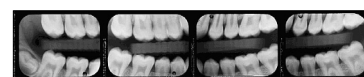
238

Final Ortho Photos



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BWx at 11y5m

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Success – positive overjet!
Periodontal Disease is Stable



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- 4yo referred by Pediatrician
- concern: persistent bleeding gums

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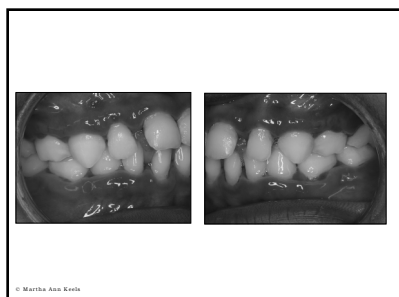
242



Tip ~ if you see recession and exposed roots of primary teeth not related to dental caries, then you most likely have an illness in Box 2 or 4

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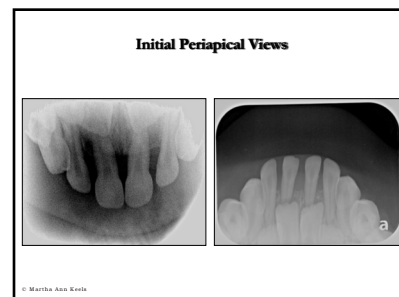
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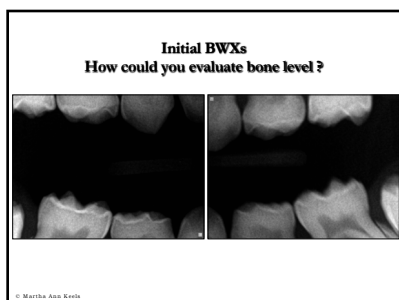
244

- Describe what you see
 - What are your differential diagnoses ?
 - What are your next steps ?
 - Document ~ Document
- © Martha Ann Keels

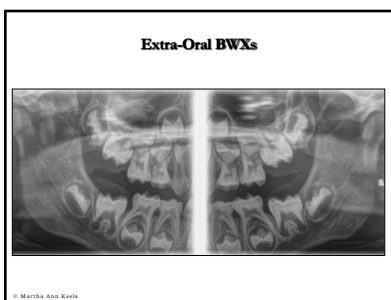
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246



247



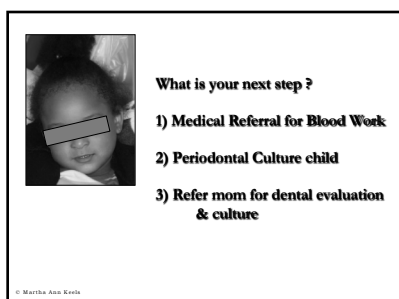
248

Pediatric Perio Ds Matrix

BOX 1	BOX 2
Good gums	Good gums
Good bones	Bad bones
BOX 3	BOX 4
Bad gums	Bad gums
Good bones	Bad bones

© Martha Ann Keels

249



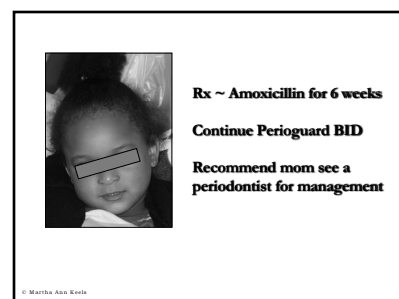
250

Perio Culture Results ~ Child / Mom

■ Aerobic organisms		
■ Candida non-albicans	HIGH	HIGH
■ Enterococcus	HIGH	HIGH
■ Anaerobic organisms		
• Prevotella intermedia	LOW	
• Fusobacterium nucleatum	MEDIUM	
• Eikenella corrodens	HIGH	MEDIUM
*** all sensitive to Ampicillin or Tetracycline or Metronidazole		

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251



252

Hematology ~ Oncology Workup

- WBC ~ <100
- Multiple draws ~ consistently low
 - Ruled out Cyclic Neutropenia
 - Dx ~ Chronic Idiopathic Neutropenia
- No need to look at functional diseases
 - Since we do not have any WBC

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Two Month Progress



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255

Hematology ~ Oncology Workup

- Bone Marrow Biopsy
 - Confirmed minimal production of WBC
- Therapy
 - Started GCSF
 - (Granulocyte Colony Stimulating Factor)
 - GOAL ~ Try to jump start Bone Marrow Factory ~ to produce WBC

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3 Month Progress



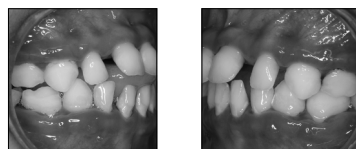
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3 months Perio Culture Results

- Aerobic organisms
 - B Streptococcus non group A HIGH
- Anaerobic organisms

• Prevotella intermedia	MEDIUM
• Fusobacterium nucleatum	HIGH
• Eikenella corrodens	LOW

*** all sensitive to Ampicillin or Tetracycline
or Metronidazole

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6 months Perio Culture Results

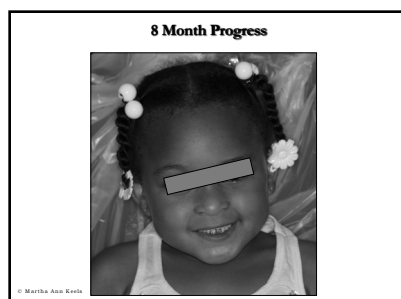
- Aerobic organisms ~ none isolated
- Anaerobic organisms

• Prevotella intermedia	HIGH
• Fusobacterium nucleatum	HIGH
• Eikenella corrodens	LOW
• Bacteroides forsythus	LOW

*** all sensitive to Ampicillin or Tetracycline
or Metronidazole

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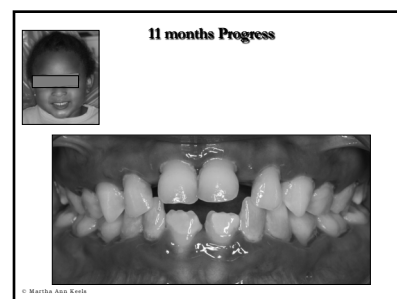
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262



263



264



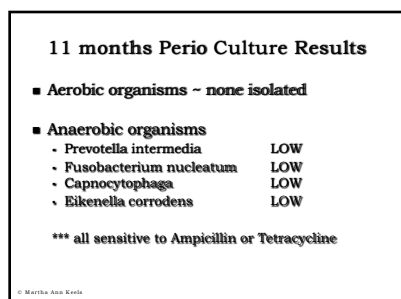
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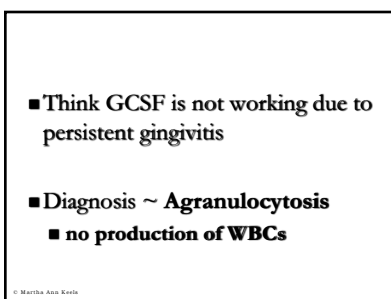
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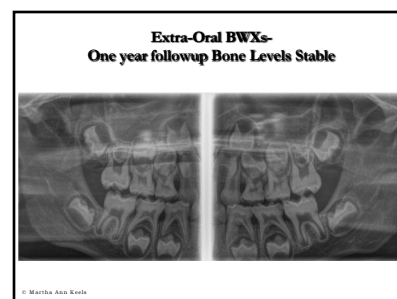
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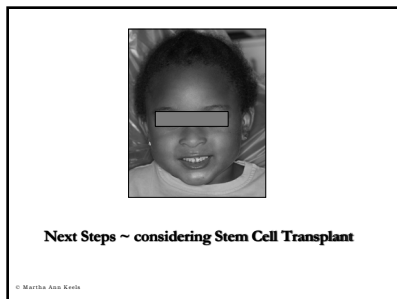
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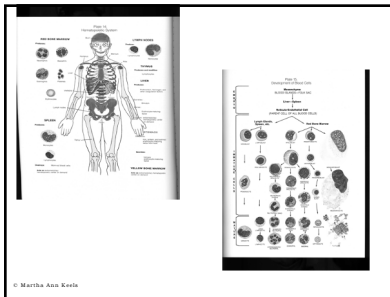
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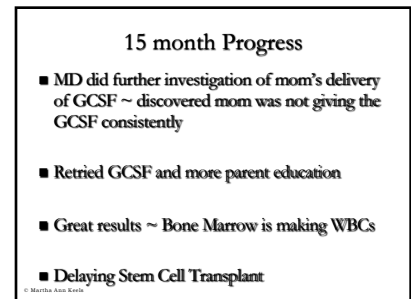
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271



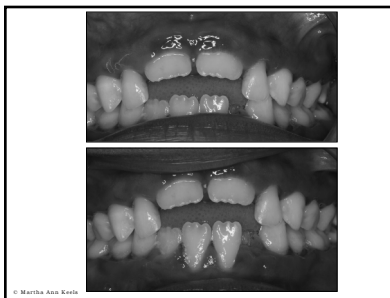
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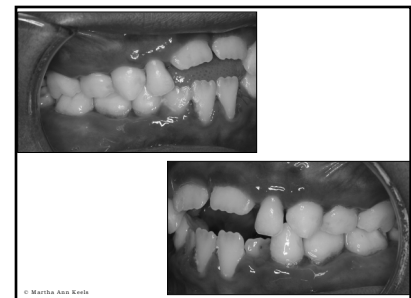
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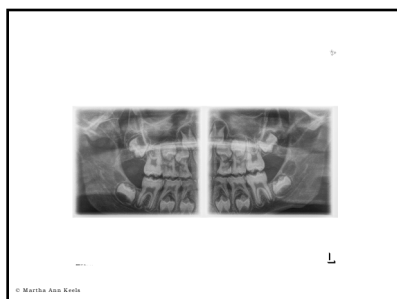
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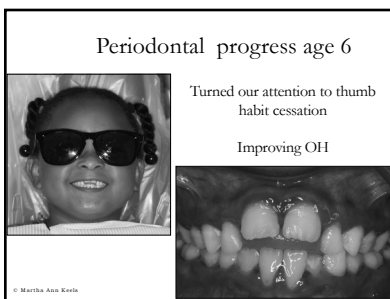
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276



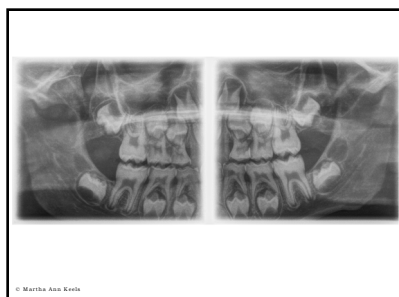
277



278



279



280

Periodontal Culture age 6

- Recultured around permanent first molars
- Results
 - *Fusobacterium nucleatum*
 - *Campylobacter* / *Wolinella*
- Treatment
 - Metronidazole 100mg TID for ten days

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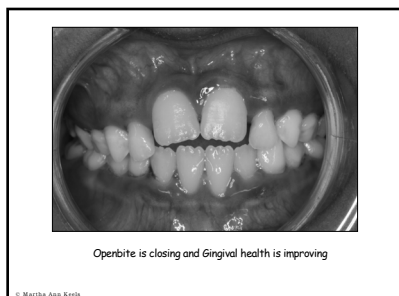
Perio Follow-up age 7



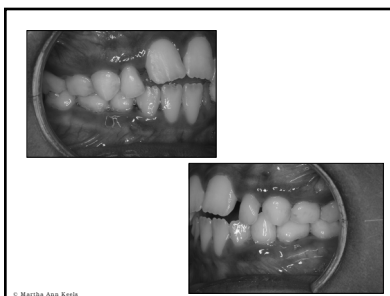
- GCSF injection qod
- Blood work once a month
- Neutrophils ~ average 1800
- Septra on weekends
- Fluconazole during the week
- Mavala for thumbsucking

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- We have discussed Immune cell NUMBER problems
 - Neutrophils that cycle
 - Neutrophils ~ with a Very Low count
 - Not having any Neutrophils
- Now let's look at Immune cell FUNCTION problems
 - Leukocytes that Do NOT adhere to pathogens to start phagocytosis
 - Leukocytes that Do NOT recognize specific bacteria
 - Lymphocytes that Get LAZY over time

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Leukocyte Adhesion Deficiency

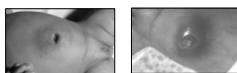
- What is this? Function problem – neutrophils do NOT recognize certain bacteria
- Clinical signs? Gingival bleeding and alveolar bone loss / abscess without pus formation
- Treatment? BMT or SCT

Ref - Roberts MW & Atkinson JC. Oral manifestation associated with LAD: a Five year case study. *Pediatr Dent* 12: 107-111, 1990.

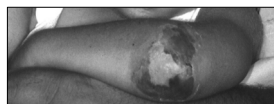
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Leukocyte Adhesion Deficiency



Omphalitis ~ infection of umbilical cord



Infection without pus formation

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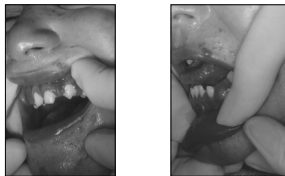


2yo boy
Dx - Chronic Granulomatous Disease
Sick since 2 months of age

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Generalized Gingivitis and Mobility (Bad Gums and Bad Bone = BOX 4)



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Pediatric Perio Ds Matrix

BOX 1

Good gums
Good bones

BOX 3

Bad gums
Good bones

BOX 2

Good gums
Bad bones

BOX 4

Bad gums
Bad bones

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Box 4

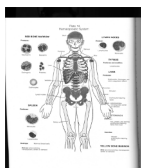


- Severe hemorrhagic gingivitis
- Congenitally missing laterals

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- Tx - HLA - identical sibling BMT
- Dental check-up 6 months post- BMT



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6 months Post-BMT



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BOTTOM LINE – you need to be able to keep the oral flora in check with an intact immune system in order to have healthy gums.

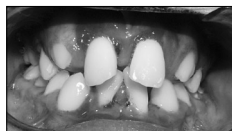
AFTER HIS BMT – his immune system began to keep the oral flora in check.

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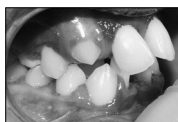


10y6m



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Pediatric Perio Ds Matrix

BOX 1	BOX 2
Good gums Good bones	Good gums Bad bones
BOX 3	BOX 4
Bad gums Good bones	Bad gums Bad bones

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- What are your differential diagnoses ?
- What are your next steps ?

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What does he have ?



Hyperkeratotic hands and feet



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Papillon ~ Lefevre Syndrome



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Papillon-Lefevre Syndrome

- What is this ?
- What are the Clinical signs?

Ref - Lundgren T et al. Periodontal treatment of patients with Papillon-Lefevre Syndrome - a 3-year follow-up. J Clin Periodontol 31(1): 933-938, 2004.

Ref - Ullbro C et al. Preventive periodontal regimen in Papillon-Lefevre Syndrome. Pediatr Dent 27:226-232, 2005

Ref - Tinanoff N et al. Dental treatment of Papillon-Lefevre Syndrome: 15-year follow-up. J Clin Periodontol 22: 609-614, 1995.

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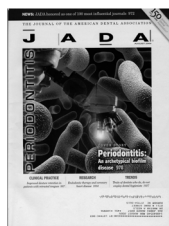
How can someone so young lose teeth to severe periodontal ds ?



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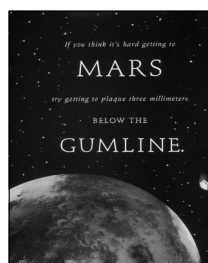
303

Bacteria vs Immune System



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Dental Treatment Plan

- Culture ~ find out what organisms are colonizing the sulcus
- Extract compromised teeth
- Replace missing teeth

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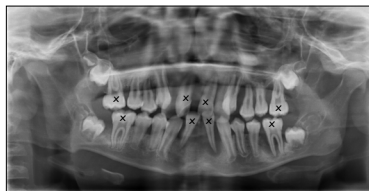
Papillon-Lefevre Syndrome

Culture Results Anaerobic Organisms

- | | |
|---|-------|
| ▪ <i>Prevotella intermedia</i> | Heavy |
| ▪ <i>Fusobacterium nucleatum</i> | Heavy |
| ▪ <i>Bacteriodes fragilis</i> | Light |
| ▪ <i>Bacteriodes ureolyticus</i> groups | Light |

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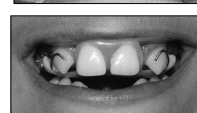
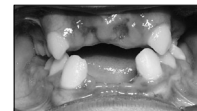
307



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Loves his new teeth



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309

Follow-up

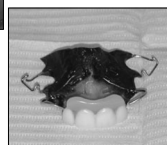


10y11m

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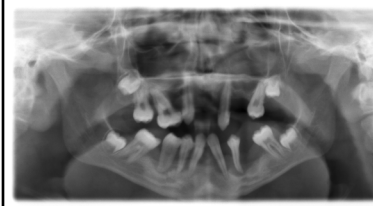
Follow-up



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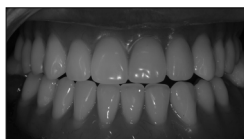
PANOREX ~ progress age 16



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Dentures 18 years old



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Why isn't she smiling ?

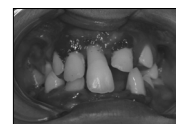


10y6m

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Clinical Pearl



If more than one tooth has root exposed with inflammation (ie not a factitial injury) - the child probably has a systemic illness causing periodontal disease

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Papillon-Lefevre Syndrome

Clinical Manifestations

- Severe periodontal disease
- Severe gingivitis above #7, 8, 10
- Loss of #3, 9, 14, 23-26, 30
- #8 almost exfoliated
- 90% bone loss
- #19 severe mobility
- severe bone loss



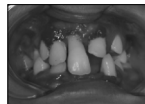
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Papillon-Lefevre Syndrome

Other Clinical Manifestations

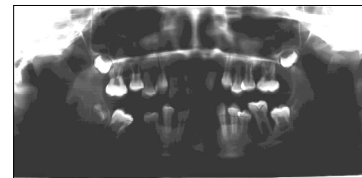
- Keratotic hands and feet since 7 mos of age
- Currently treated by pediatric dermatologist at Duke with Carmol 40 lotion



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Papillon-Lefevre Syndrome



See all permanent teeth except #3,9,14,23-26,30

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Papillon-Lefevre Syndrome

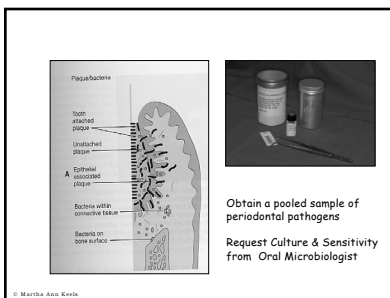
Phagocytosis problem

Tx = sterilize the oral cavity



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Papillon-Lefevre Syndrome

Culture Results Anaerobic Organisms

- | | |
|---------------------------|-------|
| Prevotella intermedia | Light |
| Fusobacterium nucleatum | Light |
| Capnocytophaga spp. | Heavy |
| Campylobacter / Wolinella | Heavy |

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Follow-up 1 month later

Treatment Plan

- Extract #7, 10, 19 - most severe
- Biopsy of granular tissue around #19
- Full mouth curettage and scaling
- Irrigate with perioguard
- Rx: Doxycycline BID for 6 weeks
 - Doxycycline is okay as she is almost 11yo

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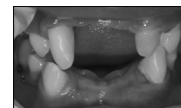
Oral Pathology Report

- Fragments of connective tissue support an "intense mixed inflammatory cell infiltrate and small caliber vascular channels"
- No evidence of malignancy
- Dx: intense inflammation consistent with periodontal disease
- NOTE: Peds Allergy & Immunology confirmed no immunodeficiency

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Now she is smiling !



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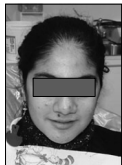
Follow-up Care

- 3 month recalls
 - Showed less mobility
 - Gingivitis improved
 - Switched meds to amoxicillin due to stomach sensitivity over time to doxycycline
- Fit for maxillary partial to replace #7,8,9
- OH regime:
 - Amoxicillin BID
 - Perioguard
 - Cleaning 2-3 x per day

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Follow-up at 16y1m



Removable bridge -
attached onto #2,15

Teeth present: #2,15,18

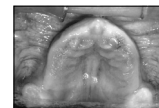
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Follow-up at 16y1m



Removable bridge -
attached onto #2,15



Maxillary arch -
no appliance

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Follow-up at 16y1m



#2, #15 are stable / #18 is loose

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Treatment Plan

- Exam: OH is great
- Previously referred to prosthodontist for consult for dentures

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Now she is smiling !



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Pedo Pearl

Parents don't care how much you know

until

They know how much you care about their child .

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Genetic Conditions associated with Periodontal Involvement

- Papillon-Lefevre Syndrome
- Down Syndrome
- Chediak-Higashi Syndrome

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Down Syndrome

Is there a risk for periodontal disease ?



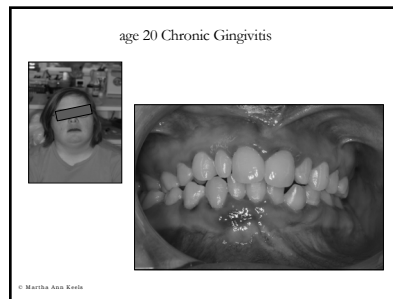
Ref - Izumi Y et al. Defective neutrophil chemotaxis in Down Syndrome patients and its relationship to periodontal destruction. Periodontol. 60: 238-242, 1989.

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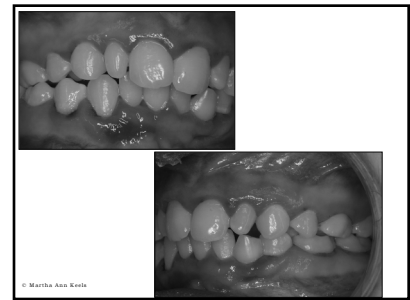
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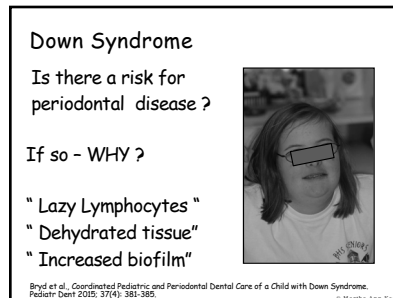
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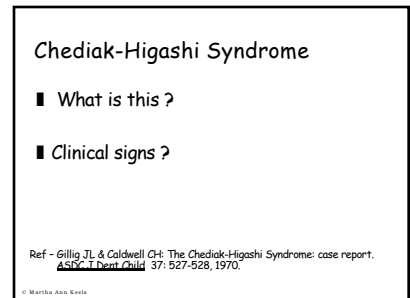
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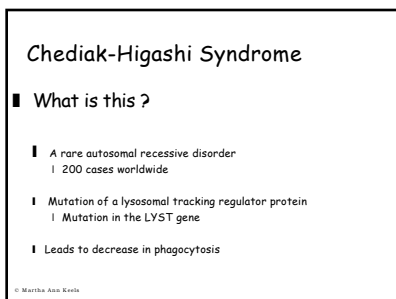
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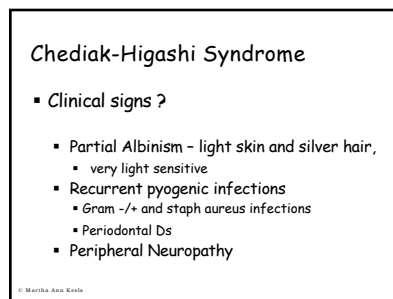
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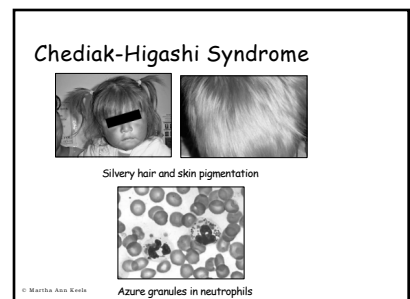
339



340



341



342

Chediak-Higashi Syndrome

■ Treatment

- Improve immune function
- Antibiotics and Antivirals and Vitamin C
- Stem Marrow Transplant

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Endocrine Conditions and Perio Ds

Diabetes Mellitus type 1

What is the best way to measure a patient's control of his/her diabetes?

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Endocrine Conditions

Diabetes Mellitus type 1

What is the best way to measure a patient's control of his/her diabetes?

- The A1C (glycosylated hemoglobin < 7%) or now eAG (estimated Average Glucose < 154 - tells you the average blood glucose over past 2-3 months

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345

Endocrine Conditions

Diabetes Mellitus type 1

How is this measurement related to the risk of periodontal disease?

Ref - Aren G et al. Periodontal health, salivary status, and metabolic control in children with Type I diabetes mellitus. *J Periodontol* 74(12): 1789-1795, 2003.

Ref - Lalla E et al. Diabetes-related parameters and periodontal conditions in children. *J Periodontol Res* 2007;42: 345-350.

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Endocrine Conditions

Diabetes Mellitus type 1

How is this measurement related to the risk of periodontal disease?

Longterm poor control - associated with advancing periodontal disease in adults (not seen in pediatric pts)

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First tooth -> Neonatal Molar



one day old

Maxillary arch
Premature eruption #I



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First tooth -> Neonatal Molar



one day old

Mandibular arch



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Pediatric Perio Ds Matrix

BOX 1

Good gums
Good bones

BOX 3

Bad gums
Good bones

BOX 2

Good gums
Bad bones

BOX 4

Bad gums
Bad bones

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350

• What are your differential diagnoses ?

• What are your next steps ?

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Puzzler - Neonatal Molar



one day old

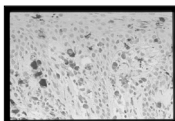


Gingival biopsy

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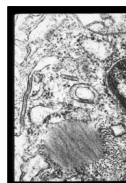
Puzzler - Neonatal Molar



SMA 100 stain

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EM study



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Puzzler - Neonatal Molar

Diagnosis - Langerhan Cell
Histiocytosis X

Treatment - Chemotherapy

Vincristine
PrednisoneRef - Henry RJ and Sweeney EA: Langerhan's cell histiocytosis: case reports
and literature review. *Pediatr Dent* 18: 11-16, 1996.

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Puzzler - Neonatal Molar



newborn

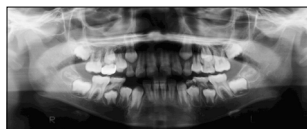


Age 8

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Puzzler - Neonatal Molar



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Puzzler - First tooth is a Molar



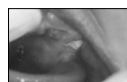
9 month old

Presenting signs and symptoms:
• Swollen right temporal
region
• Persistent diaper rash
• Candidiasis (?)

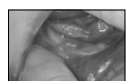
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Puzzler - First Tooth is a Molar



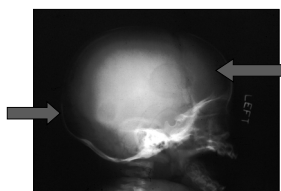
#1 erupting



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Puzzler - First Tooth is a Molar



Max's ceph at 7 months

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Langerhans Histiocytosis X



Treatment

Vinblastine and
Prednisone

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Prepubertal Periodontitis ???
Juvenile Periodontitis ???
Aggressive Periodontitis ???

■ What is this?

- Suspect undiagnosed immune response problem
- Possible cementum hypoplasia on centrals and molars permitting anaerobic infiltration

Ref - Bimstein et al. Clinical and microbial considerations for the treatment of an extended kindred with seven cases of prepubertal periodontitis: 2-year follow-up. Pediatr Dent 19:396-403, 1997.

Ref - Donly KJ & Ashkenazi M. Juvenile periodontitis: A review of pathogenesis, diagnosis and treatment. J Clin Pediatr Dent 16: 73-78, 1992.

Ref - Sjodin B et al. Marginal bone loss in the primary dentition of patients with juvenile periodontitis. J Clin Periodontol 20: 32-36, 1993.

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Keels & Quinonez
Pediatric Perio Ds Matrix

BOX 1

Good gums
Good bones

BOX 3

Bad gums
Good bones

BOX 2

Good gums
Bad bones

BOX 4

Bad gums
Bad bones

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Keels & Quinonez
Pediatric Perio Ds Matrix

BOX 1

HEALTHY

BOX 3

Viral illnesses
Leukemias

BOX 2

Hypophosphatasia

BOX 4

Neutropenias
Neutrophil function problems

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* KEY *

PROLONGED
GENERALIZED (not isolated)
BLEEDING =

SYSTEMIC MEDICAL
CONDITION

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*In the field of observation,
chance favors only those
minds which are prepared*

~ Louis Pasteur

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*Thank You for Listening
Stay safe and Be well !*

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