RADIOLOGY LESSON PLAN AND TEST QUESTIONS

Course: Radiology DH 104

Topic: Interpretation of Periodontal Disease

Audience: Adult Learners (Freshman Level Dental Hygiene Students)

Instructional Objectives:
Upon completion of the lecture, the student should be able to:

1. State the importance of dental image examination to detect periodontal disease.
2. Describe the type of dental images in the detection of periodontal disease.
3. Distinguish between horizontal and vertical bone loss.
4. Evaluate predisposing factors for periodontal disease.
5. Recommend treatment based on the 2017 AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions.

Materials: PowerPoint, computer equipment, Handout

References:

Caton, J. G., Armitage, G., Berglundh, T., Chapple, I. L. C., Jepsen, S., Kornman, K. S., Mealey, B. L., Papapanou, P. N., Sanz, M., & Tonetti, M. S. (2018). A new classification scheme for periodontal and peri-implant diseases and conditions - introduction and key changes from the 1999 classification. Journal of Periodontology, 89. https://doi.org/10.1002/jper.18-0157

Howerton, L. J. (2017). Interpretation of Periodontal Disease. In Dental radiography: Principles and techniques (pp. 413–425). essay, Elsevier/Saunders.

Moran, M., Faria, M., Giraldi, G., Bastos, L., & Conci, A. (2021). Do radiographic assessments of periodontal bone loss improve with deep learning methods for enhanced image resolution? Sensors, 21(6), 2013. https://doi.org/10.3390/s21062013

Pleis, D. (2016, November 9). Do dental X-rays show periodontal issues? Chron.com. Retrieved March 8, 2022, from https://livehealthy.chron.com/dental-xrays-show-periodontal-issues-

10207.html

U.S. National Library of Medicine. (2020, February 27). Gingivitis and periodontitis: Overview. InformedHealth.org [Internet]. Retrieved March 8, 2022, from https://www.ncbi.nlm.nih.gov/books/NBK279593/ References:

Personnel: None needed

Time: 50 minutes

TIME	LESSON CONTENT	NOTES-MEDIA-Q/A
5 minutes	**I. INSTRUCTIONAL SET** A. <u>Introduction</u> Periodontal disease consists of Gingivitis and Periodontitis. Gingivitis cannot be seen on dental x-rays, but Periodontitis destroys the alveolar bone. Therefore, dental x-rays are used as part of the assessment to determine the severity as Dental hygienists should know how to detect bone loss on a dental x-ray. B. <u>Established Mood</u> By attending today's lecture, you are showing a commitment to becoming a knowledgeable Dental Hygienist. Today we will learn how periodontal disease appears on dental x-rays. Learning how to classify Periodontitis while interpreting dental x-rays will help you educate your patients. C. <u>Gain Attention/Motivate</u> If a patient presented with periodontal disease, would you know how to classify them after a clinical examination and dental x-rays? Would you know how to discuss their periodontal health? D. <u>Established Rational</u> By understanding periodontitis signs and systems, dental hygienists will play a vital role in detection and education to help patients become healthy. E. <u>Establish Knowledge Base</u> Has anyone ever noticed bleeding when you have brushed or flossed your teeth? What about the ads we see on TV from companies that sell dental products, do you ever think I have all of the signs they are talking about?	**Slide #1** Interpretation of Periodontal Disease Title **Slide: #2** Picture of patient getting an exam **Note:** Periodontal probing, x-rays, and examination must be completed to assess periodontal disease. **Q:** What do we measure on the x-ray when a patient has bone loss. **A:** The alveolar bone

TIME	LESSON CONTENT	NOTES-MEDIA-Q/A
1 minute	F. Instructional Objective After today's lecture, you should be able to state the importance of dental image examination to detect periodontal disease, describe the type of dental images in the detection of periodontal disease, distinguish between horizontal and vertical bone loss, evaluate predisposing factors for periodontal disease, recommend treatment based on the 2017 AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions.	Slide #3 Objectives Note: Dental images play an important role in assessing periodontal disease. Q: What instrument do you use to measure periodontal pockets? A: A periodontal probe.

TIME	LESSON CONTENT	NOTES-MEDIA-Q/A

3 minutes	**I. Description of the Periodontium**
	    A. Lamina dura
	        1. Dense
	        2. Radiopaque line
		Slide #4 Description of Periodontium Lamina dura
		Note: The periodontium refers to the tissues that invest and support the teeth.
		
		Slide #5 Alveolar crest

	B. Alveolar crest
	        1. 1.5-2 mm apical to the CEJ
	        2. Anterior teeth pointed
	        3. Posterior teeth flat
	        4. Less radiopaque
	    C. Periodontal ligament space
		Slide #6 Periodontal ligament space

2 minutes	**II. Description of Periodontal Disease**
	    A. Definition
	    B. Description of gingiva
	    C. Appearance on x-rays
		Slide #7-8 Description Periodontal Disease
		Q: What does healthy gingiva look like?
		A: Tissue is pink, firm, and stippled with no bleeding.

5 minutes	**III. Detection**
	    A. Clinical examination
	        1. Evaluation of tissue
	        2. Periodontal probing
		Slide #9 Detection Introduction
		Note: Clinical exam includes soft tissue, dental images hard tissue.
		Slide #10 Clinical examination

	B. Radiographic examination
	        1. Purpose
	        2. Periapical image
	        3. Paralleling technique
	        4. Bisecting technique
	        5. Horizontal bitewing
	        6. Vertical bitewing
	        7. Panoramic image
	        8. Examination
		Slide #11 Radiographic examination
		
		Note: Paralleling technique accurately records the relationship of the height of the

TIME	LESSON CONTENT	NOTES-MEDIA-Q/A
		crestal bone to the tooth root. **Slide #12** Picture dental image exam **Slide #13** horizontal bitewing **Slide #14** Reasons for exam

4 minutes	**IV. Interpretation of Periodontal Disease**
	   A. Bone loss
	    1. Purpose of the dental image
	    2. Pattern
	      a. Horizontal
	      b. Vertical
		Slide #15 Interpretation of Periodontal Disease **Note:** The dental radiographer must be familiar with the appearance of periodontal disease. **Slide #16** Bone Loss **Slide #17** picture bone loss **Slide #18** Pattern **Q:** What is another name for vertical bone loss? **A:** Angular bone loss. **Slide #19** picture horizontal bone loss **Slide #20** picture vertical bone loss

5 minutes	**B. Classification**
	    1. Localized
	    2. Generalized
	    3. Severity
	      a. Slight
	      b. Moderate
	      c. Severe
	      d. 2017 AAP/EFP Classification
	         1. Stages
	           a. Gingivitis
	           b. Initial
	           c. Moderate
	           d. Severe potential for tooth loss
	           e. Severe potential for loss of dentition
		Slide #21 Distribution **Slide #22** Severity **Note:** Measured in millimeters
		
		Slide #23 Picture 2017 AAP/EFP Classification **Slide #24** Classification periodontitis **Slide #25** Staging

TIME	LESSON CONTENT	NOTES-MEDIA-Q/A
		Slide #26 Gingivitis **Note:** Only the gingival tissues are affected **Q:** What are the signs of gingivitis? **A:** Bleeding gingival, inflammation, loss of stippling.
1 minute	2. Grades a. Slow b. Moderate c. Rapid	**Slide #27** Initial periodontitis **Note:** Horizontal bone loss is seen more often **Note:** Lamina dura becomes unclear and fuzzy and no longer appears continuous radiopaque line **Slide #28** moderate periodontitis **Slide #29** Severe/Advanced periodontitis
7 minutes	**C. Predisposing Factors** 1. Calculus	**Slide #30** Predisposing Factors Note: Effects of certain medications, tobacco use, and conditions such as diabetes are considered risk factors for periodontal disease. **Slide #31** Calculus **Slide #32** Calculus picture **Slide #33** Calculus picture
	2. Defective Restorations a. Open contacts b. Poor contour c. Uneven marginal ridges d. Overhangs e. Inadequate margins	**Slide #34** Defective Restorations **Q:** What happens if a dental restoration is too large? **A:** Food and bacterial plaque can accumulate along the margins and the area may be

	LESSON CONTENT	NOTES-MEDIA-Q/A

TIME

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<td>difficult to clean.
<mark>Slide</mark> #35 Defective Restorations picture
<mark>Slide</mark> #36 Defective Restorations picture
<mark>Slide</mark> #37 Summary of objectives</td>
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<td>V.   <u>CLOSURE</u></td>
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<td>8 minutes</td>
<td>A. <u>Summary of Major Points-Relate Back to Objectives</u>

I hope that you now have a better understanding of how to detect periodontal disease on an x-ray. Remember, it is important to have x-rays to determine periodontal disease. I recommend you use the correct type of image when detecting periodontal disease. Bone loss can prevent as horizontal or vertical. I hope you understand the predisposing factors that can contribute to periodontal disease. When recommending treatment, you should use the 2017 AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions to classify your patient and make recommendations.

<u>Provide a Sense of Accomplishment</u>
I hope you will be comfortable and able to recognize the horizontal and vertical bone loss when interpreting x-rays. I hope you will be comfortable recognizing and classifying your patients when they present with periodontal disease.

B. <u>Assignment:</u>

For a better understanding of our topic today, you should:</td>
<td><mark>Q:</mark> What is the difference between gingivitis and Periodontitis?
<mark>A:</mark> Gingivitis affects the soft tissues. Periodontitis affects the alveolar bone.
<mark>Note:</mark> Ask students if they have questions.

<mark>Slide</mark> #38 References and Websites to Explore:</td>
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TIME	LESSON CONTENT	NOTES-MEDIA-Q/A
	1. Review the handout provided. 2. Practice interpretation studies on www.dentalcare.com 3. Explore scholarly articles.	**Note:** Also placed in your handout.
9 minutes	**CRITICAL THINKING ACTIVITY** **Case:** Karen McTeeth is a 56-year-old woman who comes into your office for a recall appointment. She complains that she has bleeding around tooth #19, where the dentist placed an OM composite filling. Her last visit to the office was eight years ago. She had healthy gums during her previous visit and no evidence of bone loss, but five caries that the dentist filled. 1. You are the dental hygienist treating Karen McTeeth. Based on what you have learned today, what type of x-rays will be best to look at her periodontal health? **Answer:** The paralleling technique is the preferred periapical exposure method for demonstrating anatomic features of periodontal disease. The vertical bitewing is best to examine bone levels. 2. After a complete examination, you note that the gingival is swollen, red, and bleeds easily, with evidence of 2 mm of vertical bone loss on the mesial of tooth #19. All other areas in the mouth are healthy. How will you classify Karen McTeeth's periodontal health? **Answer:** Karen McTeeth is in the initial stage (stage 1) of periodontal disease. She has localized (less than 30%) bone loss. 3. Based on the x-ray, why do you think she has an issue with her periodontal health on tooth #19? **Answer:** Karen McTeeth has a faulty restoration. She has an overhang of the composite material on the mesial surface. The area may act as a food trap which can lead to the accumulation of food debris and bacteria.	**Slide #39** Critical Thinking Activity: Case **Q:** Why don't we use the horizontal bitewing to detect periodontal disease? **A:** Severe interproximal bone loss can't be seen entirely. **Slide #40** Picture of x-ray. **Slide #41** Q and A

Test Questions

1. **Objective #1:** State the importance of dental image examination to detect periodontal disease.

   Test Item: What are we able to evaluate on dental x-rays when detecting bone loss?

   a. Bone
   b. Inflammation
   c. Soft tissue
   d. Pocket depth

2. **Objective #2:** Describe the type of dental images in the detection of periodontal disease.

   Test Item: X-rays to avoid taking when detecting bone levels include the following **EXCEPT** one. Which is the **EXCEPTION?**

   a. Panoramic
   b. Horizontal bitewing
   c. Bisecting
   d. Paralleling

3. **Objective #3:** Distinguish between horizontal and vertical bone loss.

   Test Item: What is the term for bone loss that does not occur in a plane parallel to the CEJ's or adjacent teeth?
   a. Vertical
   b. Horizontal
   c. Furcation
   d. Buccal

4. **Objective #4:** In 2-3 sentences evaluate predisposing factors for periodontal disease.

   Test Item: Michael Bubba smokes two packs of cigarettes per day and has a medical history of diabetes and high blood pressure. He has not seen a dentist in 2 years but stated that he was told he had gum disease at his last visit. You complete a periodontal examination, but the patient has refused dental x-rays. How will you educate Mr. Bubba on the importance of dental x-rays to detect predisposing factors that influence periodontal disease?

5. **Objective #5:** Recommend treatment based on the 2017 AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions.

   Test Item: In one paragraph (5-7 sentences), discuss how the 2017 AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions aid in classifying dental patients with periodontal disease.

Correct Answers:
1. A
2. D
3. A
4. I will explain to Mr. Bubba that dental images can detect local irritants, including calculus and improper fitting restorations that can contribute to periodontal disease. Other factors contributing to periodontal disease are smoking, medications, and diabetes.
5. Periodontal disease can be classified as gingivitis or Periodontitis. Gingivitis affects the soft tissue but has no association with bone loss. Periodontal disease affects the alveolar bone. According to the 2017 AAP/EFP Classification Periodontitis and Peri-Implant Diseases and Conditions, there are four stages and three grades. Stages are determined by interdental CAL, radiographic bone loss, tooth loss, probing debt, and bone loss, and the Grades are determined by the rate of disease progression.