Interpretation of Periodontal Disease

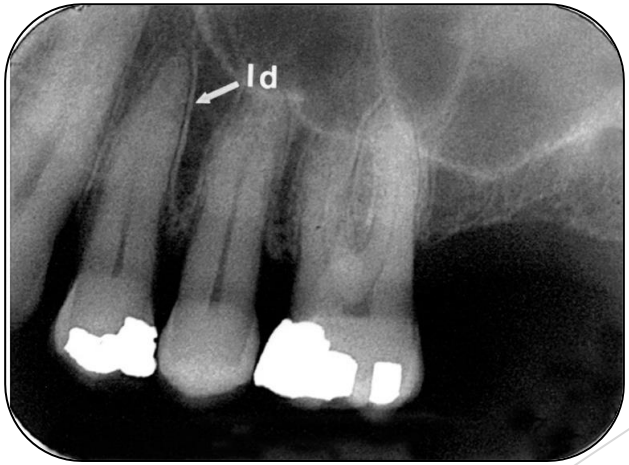
Chapter 34

Objectives

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 AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions.

Description of the Periodontium

- **Lamina dura**
  - Lamina dura appears as a dense radiopaque line in healthy teeth.



Description of the Periodontium

- **Alveolar crest**
  - About 1.5 to 2 mm apical to the CEJ of adjacent healthy teeth.
  - In anterior teeth, the alveolar crest is pointed.
  - In posterior teeth, the alveolar crest appears flat and smooth, and parallel to a line between adjacent cementoenamel junctions.

Description of the Periodontium

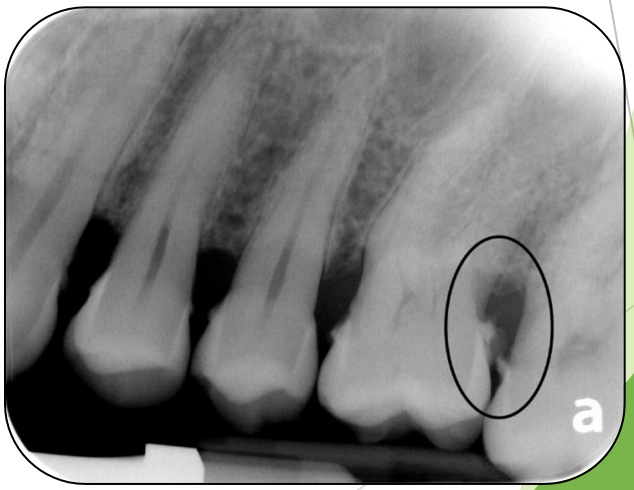
- **Periodontal ligament space**
  - This appears as a thin radiolucent line between the root and the lamina dura.
  - It is continuous around the root structure and of uniform thickness in healthy teeth.

Description of Periodontal Disease

- **Periodontal disease** is a group of diseases that affect the tissue around teeth.
  - May range from superficial inflammation of gingiva to destruction of supporting bone and periodontal ligament.
  - The gingiva appears swollen, red, and bleeding, with soft tissue pocket formation.

Description of Periodontal Disease

- Periodontal disease changes the radiographic appearance of the alveolar process.
- The alveolar crest appears indistinct.
- Bone loss is seen.



Detection of Periodontal Disease

- Clinical examination.
  - The clinical examination provides information about soft tissue.
- Radiographic examination
  - The image examination provides information about bone.

Dental images *must* be used in conjunction with a clinical examination

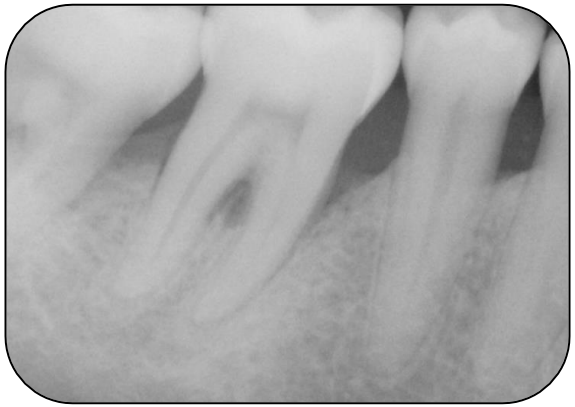
Clinical Examination

- Clinical examination must be performed by the dentist and dental hygienist.
  - Should include **evaluation of soft tissue** for signs of inflammation such as redness, bleeding, swelling, pus.
  - A thorough clinical assessment must include **periodontal probing**.
  - If there is clinical evidence of periodontal disease, images must be obtained to get maximum diagnostic information.

Radiographic Examination

- This provides an overview of the amount of bone present.
  - Indicates the **pattern**, **distribution**, and **severity of bone loss.**
  - Provides documentation of periodontal disease at a *specific point in time.*
  - The **periapical image** is the image of choice for the evaluation of periodontal disease.
  - The **paralleling technique** is the preferred periapical exposure method for demonstrating anatomic features of periodontal disease.
  - Bisected periapical images have a tendency to show less bone loss than is actually present.

Dental Image Examination



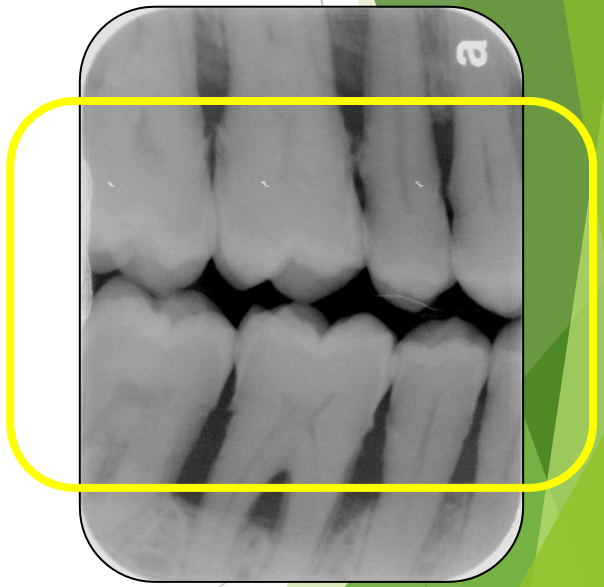
The height of crestal bone is accurately represented by the periapical image exposed with the paralleling technique.

Bisecting technique distorting the level of bone present seen on an image because of the vertical angulation used.

Paralleling technique used to examine the same area seen above. Note the difference in bone level. With the paralleling technique, the height of crestal bone is accurately recorded in relation to the tooth root.

Dental Image Examination

- The horizontal bite-wing has limited value in the detection of moderate to severe periodontal disease.
  - Severe interproximal bone loss cannot be adequately visualized on horizontal bite-wing images.
  - The vertical bite-wing image can be used to examine bone levels in the mouth.
  - **The panoramic image has little diagnostic value in the detection of periodontal disease**.



Dental Image Examination

- Images alone cannot be used to diagnose periodontal disease.
  - They do not provide information about the condition of soft tissue or early bone changes.
- *They are two-dimensional representations of three-dimensional objects.*
- Buccal and lingual areas may be difficult to evaluate.
- Bone loss may be difficult to detect in furcation areas.

Interpretation of Periodontal Disease on Dental Images

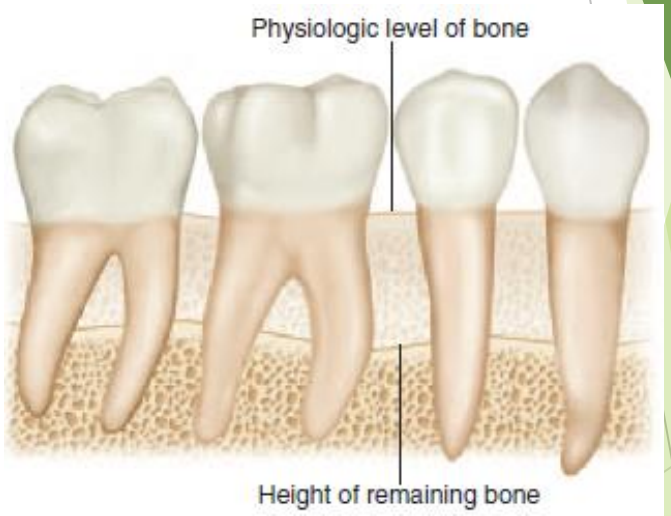
- Bone loss
- Classification of periodontal disease
- Predisposing factors

All images should be evaluated for bone loss and examined for other predisposing factors that may contribute to periodontal disease.

Bone Loss

- A dental image allows the evaluator to view ***the amount of bone remaining rather than the amount of bone lost*.**
  - **However, when documenting bone levels, we record the amount of bone lost.**
- The amount of bone loss can be estimated as the **difference between the physiologic bone level and the height of remaining bone**
- Can be described in terms of the **pattern**, **distribution**, and **severity of loss**

Bone Loss

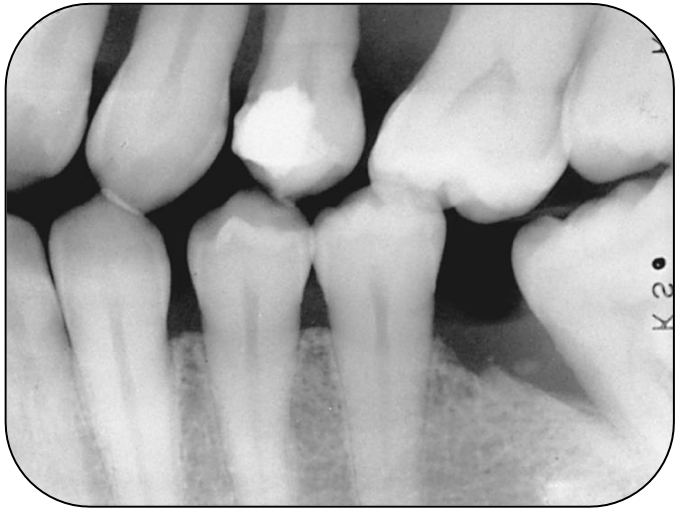


Pattern

- Described as either **horizontal** or **vertical**
  - **Horizontal bone loss**
    - The loss occurs in a plane parallel to the CEJs of adjacent teeth.
  - **Vertical bone loss**
    - The loss does not occur in a plane parallel to the CEJs of adjacent teeth.

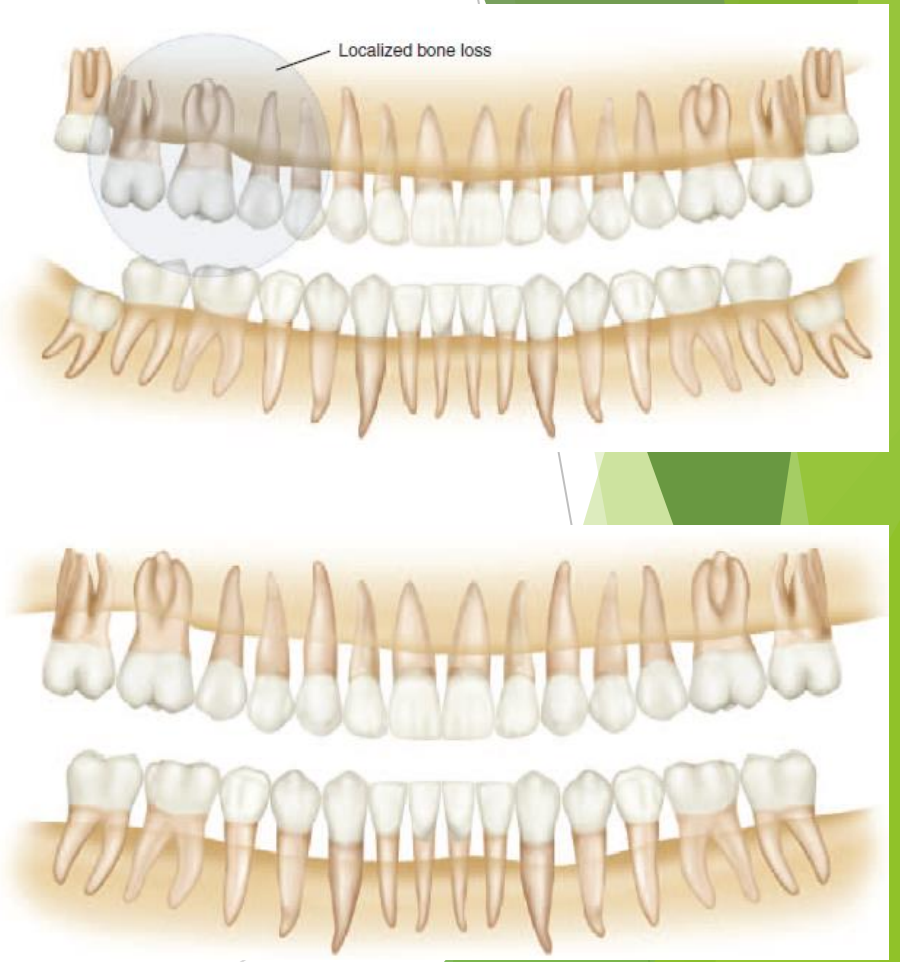
Horizontal Pattern

Vertical Pattern



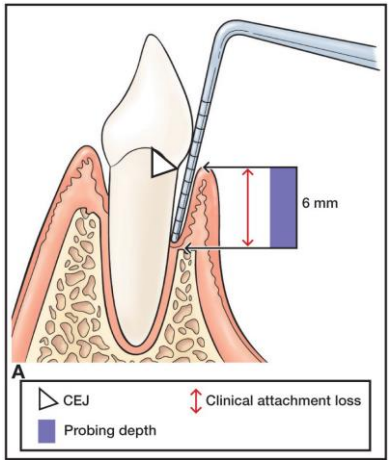
Distribution

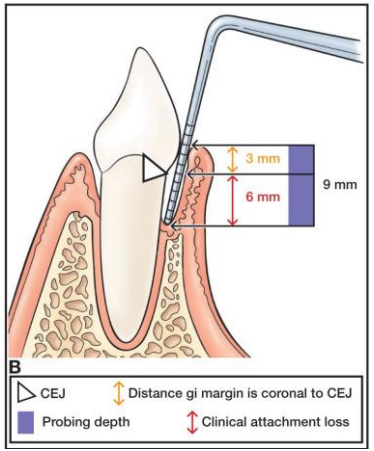
- Described as **localized** or **generalized.**
  - Localized
    - Occurs in isolated areas (<30%)
  - Generalized
    - Occurs evenly throughout the dental arches (>30%)

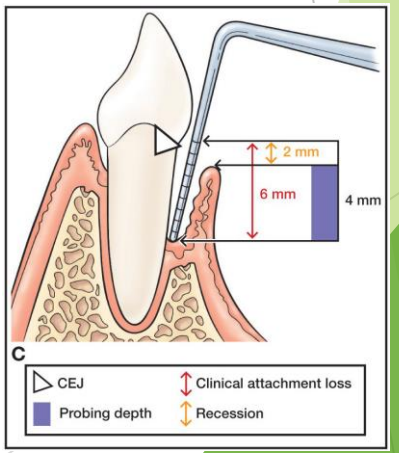


Severity

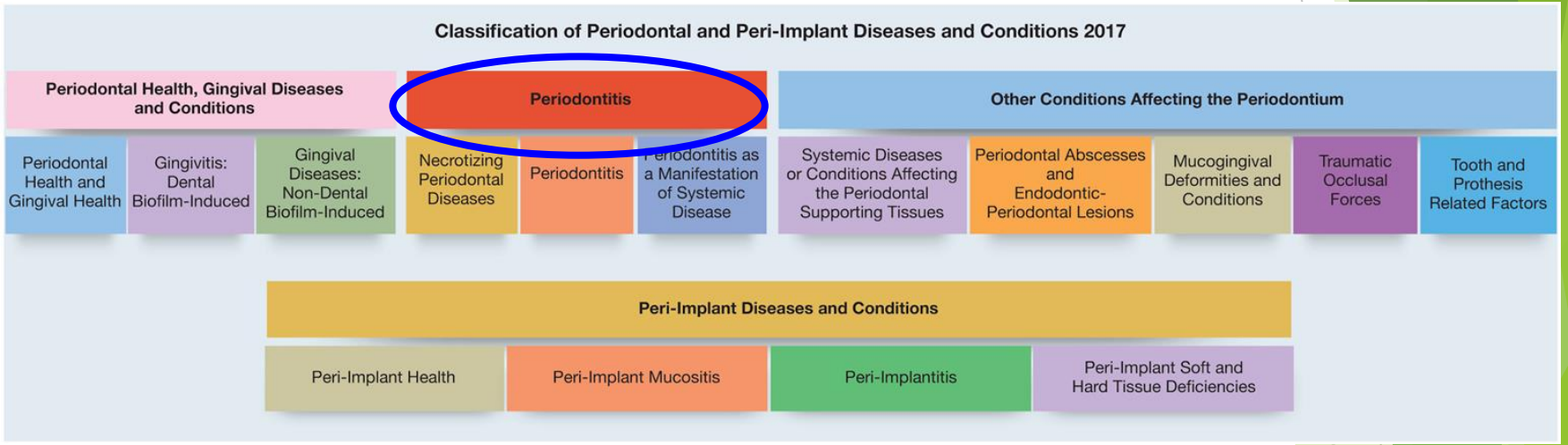
- Can be classified as **slight**, **moderate**, or **severe.**
  - Slight (Initial) bone loss: 1 to 2 mm.
  - Moderate (Established) bone loss: 3 to 4 mm.
  - Severe (Severe/Advanced) bone loss: 5 mm or greater.
- Measured by the clinical attachment loss (CAL).





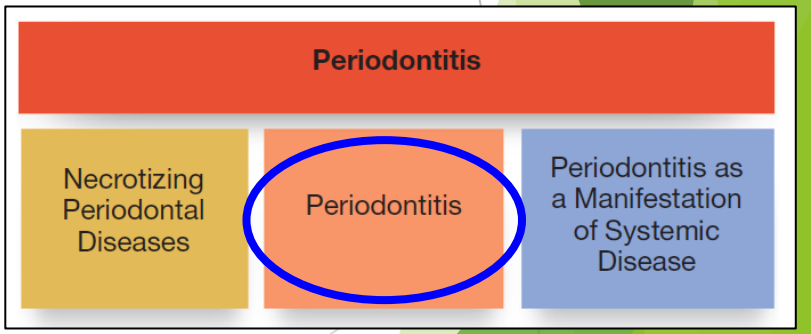


The 2017 AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions



Classification of Periodontitis

- Four stages based on severity and complexity of management:
  - Stage I: Initial periodontitis
  - Stage II: Moderate periodontitis
  - Stage III: Severe periodontitis with potential for additional tooth loss
  - Stage IV: Severe periodontitis with potential for loss of the dentition
- Extent and distribution
- Grades:
  - Grade A: Slow rate of disease progression
  - Grade B: Moderate rate of disease progression
  - Grade C: Rapid rate of disease progression



Periodontitis Staging

TABLE 7-1 PERIODONTITIS STAGE

	Interdental CAL[a]	Radiographic Bone Loss	Tooth Loss	Probing Depth	Bone Loss	Other
Stage I	1 to 2 mm	Coronal third (>15% loss)	No tooth loss due to periodontitis	4 mm or less	Mostly horizontal bone loss	
Stage II	3 to 4 mm	Coronal third (15–33% loss)	No tooth loss due to periodontitis	5 mm or less	Mostly horizontal bone loss	
Stage III	5 mm or more	Extending to the mid-third of root or beyond	4 or less teeth lost due to periodontitis	6 mm or more	Vertical bone loss 3 mm or greater	
Stage IV	5 mm or more	Extending to the mid-third of root and beyond	5 or more teeth lost due to periodontitis	6 mm or more	Vertical bone loss 3 mm or greater	Need for complex rehabilitation

[a]Interdental clinical loss of attachment at the site of greatest loss.

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Gingivitis

- **Gingivitis**
  - No associated bone loss
  - No change is seen in bone when viewed on a dental image

Stage I: Initial Periodontitis

- Associated with mild crestal changes.
- Lamina dura may become fuzzy or non-continuous.
- Alveolar bone level approx. 3-4 mm apical to CEJ radiographically (within the coronal one-third of the root).
- Mostly horizontal bone loss

Stage II: Established Periodontitis

- Bone level is approx. 4-6 mm apical to CEJ radiographically, but still within the coronal 3rd of root.
- Furcation involvement may be seen.
- Mostly horizontal bone loss.

Stage III: Severe & Stage IV: Advanced Periodontitis

- Bone level is ≥6 mm apical to CEJ radiographically.
- Bone loss extending to the mid-third of the root and beyond.
- Probable radiographic evidence of vertical bone loss.
- Evidence of tooth loss (due to periodontitis).

Predisposing Factors

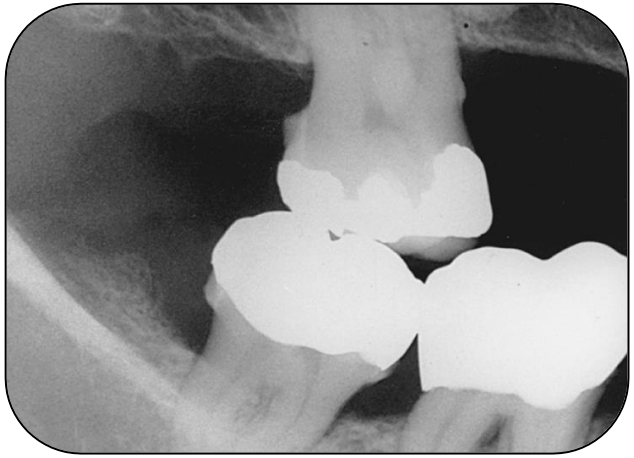
- Predisposing factors and local irritants may contribute to periodontal disease.
  - Elimination is important in the management and treatment of periodontal disease.
  - Dental images aid in detection of irritants such as:
    - **Calculus**
    - **Defective restorations**

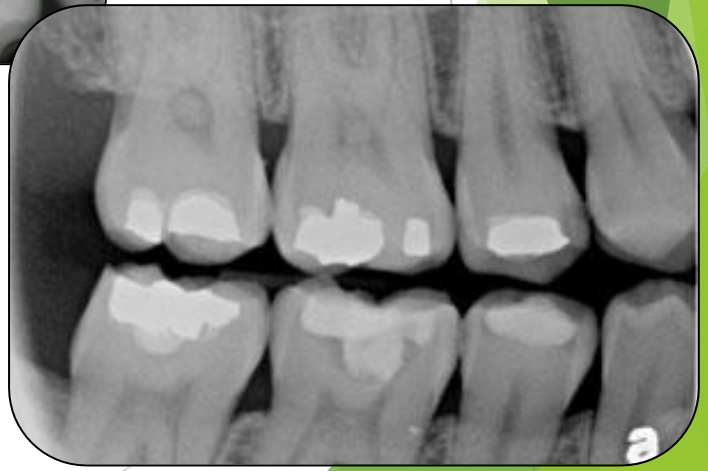
Calculus

- Results from the mineralization of plaque.
  - Appears white or light on a dental image.
- Most often appears as a pointed or irregular radiopaque projection extending from proximal root surfaces.
  - May also appear as a:
    - Ringlike opacity.
    - Nodular image projection.
    - Smooth opacity on a root surface.

Calculus

Calculus

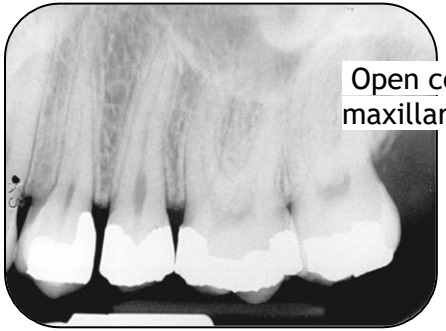




Defective Restorations

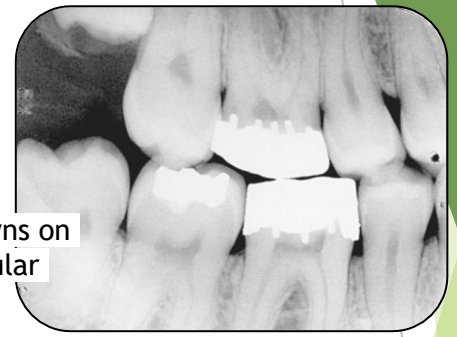
- Faulty restorations may act as food traps and lead to the accumulation of food debris and bacteria.
  - They may be detected both clinically and on dental images.
- Dental images may allow identification of restorations with:
  - **Open contacts.**
  - **Poor contour.**
  - **Uneven marginal ridges.**
  - **Overhangs.**
  - **Inadequate margins.**

Defective Restorations



Open contact between maxillary premolars.

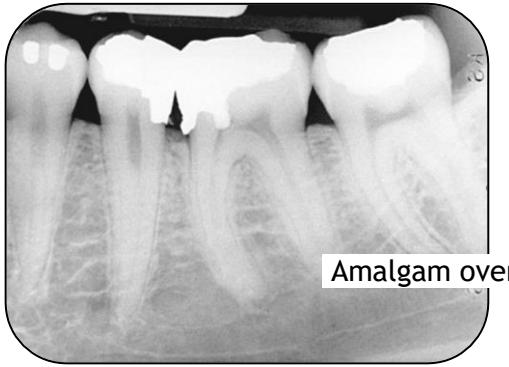
Poorly contoured crowns on maxillary and mandibular first molars



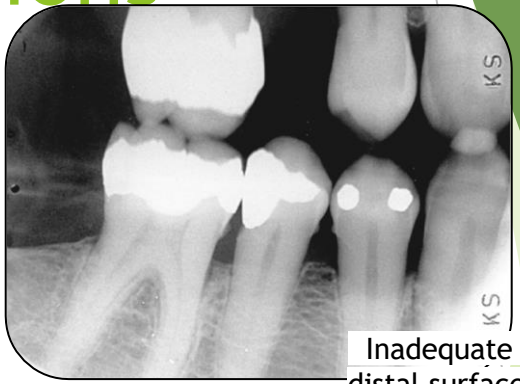
Uneven marginal ridges, open contacts, overhangs, and poorly contoured restorations

A poorly contoured stainless steel crown causing bone loss on a mandibular first molar.

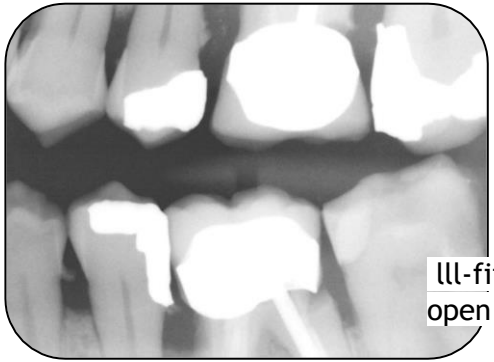
Defective Restorations



Amalgam overhang



Inadequate margin on the distal surface of a mandibular second premolar.



lll-fitting restorations and open contacts

Summary

- 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 AAP/EFP Classification of Periodontal and Peri-Implant Diseases and Conditions to classify your patient and make recommendations.

For a better understanding of our topic today you should:

- Review the handout provided.
- Practice interpretation studies on www.dentalcare.com
- Explore scholarly articles.

Case Study

- **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 #30 where the dentist placed an OM composite filling. Her last visit to the office was 8 years ago. During her last visit, she had healthy gums, no evidence of bone loss, but 5 caries that were filled by the dentist.

Interpret tooth #18 & 19

Questions?