CHAPTER 6

PERIODONTAL DISEASE

Although a radiograph cannot show the soft tissue changes that occur in the periodontium, it is of value when used as an adjunct to clinical findings. In spite of the association of a periodontal pocket and bone loss, the radiographic interpretation of bone loss should never be described as pocket formation. Bone loss can occur without pocket formation or may be out of proportion to the depth of the periodontal pocket when measured clinically. Visualization of the depth of a pocket may be aided by inserting a gutta-percha point into the pocket. The gutta-percha point will follow the defect because it is relatively inflexible, and will appear on a radiograph because of its radiopacity. Radiographs are useful in evaluating the location of bone loss, the amount of bone loss, the direction of bone loss, the type of crestal bone irregularities, and the prognosis of the healing process. Radiographs are also useful in determining the causative irritants such as calculus, overhanging restorations, impacted foreign bodies, etc. It must be emphasized that x-ray beam angulation, exposure technics, and developing procedures must be ideal to obtain the correct radiographic results. X-ray beam angulation changes can distort the appearance of the crestal bone; overexposure can produce peripheral burnout of bone giving it an etched appearance; and developing technic errors can produce a film of high contrast which obliterates the fine bone trabeculae. For accurate evaluation of crestal bone height, the paralleling and bite-wing techniques are preferred to the bisecting the angle technique.

In periodontal disease, there may initially be widening of the periodontal ligament space at the crest of the proximal bone. Also, there may be localized erosion of the alveolar bone

crest. Normally, the bone crest runs from the lamina dura of one tooth to that of the adjacent tooth and is flat and parallel to an imaginary line drawn from the cemento-enamel junctions of the two adjacent teeth. This normal interdental alveolar crestal bone has the same radiopacity as that of the lamina dura. In early periodontal disease, this alveolar crestal bone loses its radiopacity and becomes irregular and diffuse with a decreased radiographic density. The proximal crestal bone may, on occasions, show "cupping". When the alveolar bone shows sclerosis between the lamina dura of two adjacent teeth, it must be looked upon favorably as a resistance to an irritant or reaction to occlusal stress.

In advanced periodontal disease one of the changes is the loss of crestal bone. Normally, the crestal bone is usually situated 1 to 2 mm apical to the cemento-enamel junction. When there is bone loss, the crestal bone is more than 2 mm apical to the cemento-enamel junction. Bone loss is considered horizontal when the crest of the proximal bone remains parallel to an imaginary line drawn between the cemento-enamel junctions of adjacent teeth. Horizontal bone loss may be localized or generalized. Generalized bone loss suggests a systemic etiology. Bone loss is considered vertical (angular) when the crest of the proximal bone is not parallel to the imaginary line drawn between the cemento-enamel junctions of adjacent teeth. Vertical bone loss is usually localized and related to such factors as trauma, calculus, subgingival plaque, overhanging restorations, and food impaction. In a multirooted tooth, bone loss involving the bifurcation (or trifurcation) of a root is called furcation involvement.

Fig. 6-1 Calculus is prominently visible on the second premolar, first molar, and second molar. Calculus is visible on a radiograph only when it is sufficiently large in size. It is a contributing local factor to periodontal disease.

Fig. 6-2 Effect of changes in horizonal angulation of the x-ray beam.

Fig. A Overlapping produced by incorrect horizontal angulation gives the illusion of the absence of calculus.

Fig. B Correct horizontal angulation shows the presence of calculus on the first molar and second premolar.

Fig. 6-3 Normally, the crestal lamina dura extends to a point approximately 1 to 2 mm from the cemento-enamel junction. The bone crest running from the mesial of one tooth to the distal of the adjacent tooth normally appears flat and parallel to the imaginary line drawn from the cemento-enamel junctions of the same two teeth. This is clearly shown between the two premolars. The tilted first molar has slanted the mesial crestal bone but has maintained the parallelism. The normal alveolar crest, especially in a healthy condition, has an opacity not unlike that of the lamina dura.

Fig. 6-4 Over-eruption of the mesial molar has not disrupted the parallelism between the crestal bone and an imaginary line joining the cemento-enamel junctions of the two molars.

Fig. 6-5 Widening of the periodontal ligament space at the crest of the proximal bone is observed on the mesial and distal proximals of the right central incisor. This may be indicative of occlusal trauma.

Fig. 6-6 Resorption of alveolar crest is seen in several areas but is most prominent between the second premolar and first molar. Presence of large amount of calculus.

Fig. 6-7 Cupping of alveolar crest inferior to the calculus between the two central incisors.

Fig. 6-8 Crestal irregularities and destruction between the incisors in the presence of heavy calculus.

Fig. 6-9 Overhang of amalgam restoration on distal of mandibular first molar is associated with loss of alveolar bone (arrow).

Fig. 6-10 Effect of changes in vertical angulation (bite-wing and periapical radiographs).

Fig. A Bite-wing radiograph shows normal alveolar bone levels between the two mandibular premolars, and also between the mandibular second premolar and first molar.

Fig. B Periapical radiograph made with excessive negative angulation of x-ray beam gives the illusion of bone growth between the mandibular premolars, and also between the second premolar and first molar.

Fig. 6-11 Horizontal bone loss proximal to the posterior teeth.

Bone loss is considered horizontal when the crest of the proximal bone remains parallel to an imaginary line drawn between the cemento-enamel junctions of adjacent teeth.

Fig. 6-12 Vertical (angular) bone loss mesial to the maxillary molar.

Bone loss is considered vertical when the crest of the proximal bone is <u>not</u> parallel to an imaginary line drawn between the cemento-enamel junctions of adjacent teeth.

Fig. 6-13 Superior arrows (pointing inferiorly) show the buccal bone level. Inferior arrows (pointing superiorly) show the lingual bone level.

The lingual bone level produces a sharp image because of its proximity to the film at the time of x-radiating the teeth. The buccal bone level produces a faint unsharp image because of its distance from the film.

Fig. 6-14 The proximal area between the second premolar and first molar shows vertical bone loss of the lingual bone (L), and horizontal bone loss of the buccal bone (B).

Fig. 6-15 Buccal bone — superior arrows (pointing inferiorly) do not show any bone loss of the buccal plate.

Lingual bone — inferior arrows (pointing superiorly) show bone loss of the lingual plate.

Lingual bone level produces a sharp image because of its proximity to the film. Buccal bone level produces a faint unsharp image because of its distance from the film.

Fig. 6-16 Furcation involvement of molar teeth in advanced periodontal disease.

Fig. 6-17 Bifurcation of the first molar shows sclerosis in the intraradicular bone.

Fig. 6-18 Effect of changes in vertical angulation (bite-wing and periapical radiographs).

Fig. A Bite-wing radiograph shows advanced bone loss between the maxillary teeth.

Fig. B Periapical radiograph made with excessive positive angulation of x-ray beam gives the illusion of bone growth between the maxillary teeth.

Fig. 6-19 Dramatic loss of alveolar bone associated with the mesial root apex of the first molar in conjunction with a periodontal abscess.

Juvenile Periodontitis (Periodontosis) and Papillon-Lefèvre Syndrome

Juvenile periodontitis (periodontosis) is a type of rapidly progressing disease of the periodontium that typically arises in healthy adolescents and young adults. The disease is of obscure etiology and may have a hereditary component. Calculus may be absent since it is not an etiologic factor. Juvenile periodontitis may either be localized or generalized. The localized form involves only the first molars and incisors whereas the generalized form affects most of the dentition. Juvenile periodontitis is characterized by rapid alveolar bone loss in the presence of minimal plaque accumulation and clinical inflammation. The radiographic appearance is typically that of deep vertical (angular) bone loss with a marked predilection for the first molar and central incisor regions with relative sparing of other segments of the dentition. With excessive bone loss, the involved teeth loosen and become mobile. Treatment for juvenile periodontitis consists of scaling, root planing, curettage, and antibiotics. Osseous defects often respond to osseous grafts.

Papillon-Lefèvre Syndrome: This syndrome consists of 1) juvenile periodontitis (periodontosis), 2) palmar-plantar hyperkeratosis (hyperkeratosis of palms and soles), and 3) hyperhidrosis (excessive sweating).

Fig. 6-20A Juvenile periodontitis (periodontosis). Notice the typical angular (vertical) bone loss and its typical location involving the first molars. Calculus is absent and is not an etiologic factor. The disease has a familial distribution.

Fig. 6-20B Generalized juvenile periodontitis (periodontosis) shows typical deep vertical (angular) osseous defects affecting the maxillary and mandibular first molars as well as the premolars. This angular bone defect, especially involving the first molars is characteristic of juvenile periodontitis.

Diabetes Mellitus

Fig. 6-21 Uncontrolled diabetes mellitus (hypoinsulinism). There is marked bone loss and destruction of alveolar bone. Uncontrolled diabetes mellitus in itself does not cause periodontal disease; however, it tends to increase the incidence and severity of periodontal disease.

Scleroderma

Fig. 6-22 Scleroderma. There is widening of the periodontal ligament space around several teeth. The lamina dura around the affected teeth remains intact and uninvolved. Clinically, scleroderma causes sclerosis of the skin and of other tissues.

Histiocytosis X

Fig. 6-23 Histiocytosis X has caused complete destruction of the interdental alveolar bone in the molar region. Described as floating teeth.