

# Radiographs and the periodontal patient

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*Radiographs are a valuable adjunct in the diagnosis and treatment planning of the periodontal patient. The dentist should be aware of when radiographs are indicated, what types to take, how to achieve good quality, and as well be aware of the benefits and limitations of radiographs.*

No matter the dental discipline, a history should be taken, and a clinical examination of the patient should be completed *before* deciding if radiographs should be made. Once it has been decided that radiographs are needed, the dentist must decide which type of views are to be taken. Guidelines for the periodontal patient vary. However, it is generally accepted by most dentists that individualized periapical and/or bitewing radiographs are more accurate than a panoramic radiograph. As reported in the Journal of the American Dental Association, the *Technology Assessment Forum In Dental Radiology* concluded that "periapical with bitewing radiographs (Fig. 1a, 1b, 1c), using long-cone paralleling projections at high beam energy" are the preferred type of radiographs. "Panoramic radiographs have very limited value in the diagnosis of periodontal disease."

For areas where periodontal disease (other than non-specific gingivitis) can be demonstrated clinically, radiographs are indicated. This applies to the child, adolescent and adult dental patient.<sup>1</sup>

Situations related to the diagnosis and treatment of periodontal disease where radiographs may be indicated are summarized in Tables I & II.

In many offices and universities, the standard has been that a 'new patient' would undergo a Full Mouth Series of periapicals. In light of more recent guidelines perhaps one should re-think this standard and apply a philosophy of *individualized patient prescription radiography*.<sup>2</sup>

## Quality

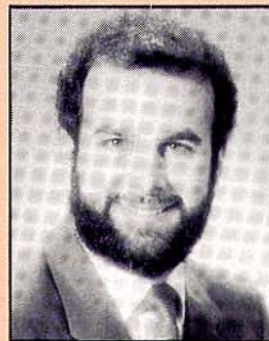
It is not within the scope of this article to describe the techniques for taking and processing dental radiographs. Having said that, I would state that it has been my experience that the 'paralleling technique' is far

**Table I**  
**Positive historical findings**

1. previous periodontal or endodontic therapy
2. history of pain or trauma
3. familial history of dental anomalies
4. post-operative evaluation of healing
5. presence of implants

**Table II**  
**Positive clinical signs/symptoms**

1. presence of periodontal disease
2. deep restorations or carious lesions
3. malposed or impacted teeth
4. swelling and/or a fistulous tract is present
5. evidence of foreign objects, root tips, etc.
6. potential abutments for a fixed or removable prosthesis
7. unexplained bleeding or sensitivity
8. unusual tooth migration
9. unusual tooth morphology or color
10. missing teeth with unknown reason



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superior to the 'bisecting angle technique'. (It is preferred that duplicate radiographs be made available.) It is indeed a problematic situation for example, when the patient presents with recent radiographs (eg. from a referring dentist) that are inadequate for diagnostic purposes. This might necessitate subjecting the patient to additional radiographs and cost. As well it might be difficult or embarrassing for the dentist, when trying to explain to the patient why the additional radiographs are needed. Some of the criteria of accuracy of radiographs are listed in Table III.

<b>Table III</b> <b>The criteria of accuracy of dental radiographs</b>
<ol style="list-style-type: none"> <li>1. molar cusp tips are recorded with little or none of the occlusal surface showing</li> <li>2. proximal anatomy is accurately reproduced ie. no overlap unless teeth are crowded</li> <li>3. distinct enamel caps and pulp chambers</li> </ol>

**Benefits and limitations**

Tables IV, V and VI and the accompanying illustrations will describe some of the benefits and limitations of dental radiographs.

<b>Table IV</b> <b>Benefits of radiographs</b>
<ol style="list-style-type: none"> <li>1. an adjunct to the clinical exam</li> <li>2. the alveolar bone on mesial, distal and apical aspects is recorded (see Figs. 2a, 2b, 2c)</li> <li>3. crown to root ratio is documented</li> <li>4. dense subgingival calculus deposits are identified (see Figs. 3a, 3b, 3c)</li> <li>5. ill-fitting restorations are discovered (see Figs. 3a, 3b, 3c)</li> <li>6. furcation defects are identified (see Figs. 6a, 6b, 6c)</li> </ol>

<b>Table V</b> <b>Information that can be obtained only from radiographs</b>
<ol style="list-style-type: none"> <li>1. root length and morphology</li> <li>2. approximate bone destruction (see Fig. 2, a, b, c)</li> <li>*3. most coronal position of bone in interseptal area</li> <li>4. condition of bone in mesial, distal and apical areas around the root</li> <li>5. position of anatomic structures (eg. sinus) in relation to the periodontal defect</li> <li>6. approximate percentage of attachment apparatus (ie. % bone loss)</li> <li>7. discovery of unexpected findings (eg. endodontic lesion, supernumary tooth — illustration 1b.)</li> </ol> <p>*Note: It is considered "normal" for the crestal lamina dura to follow a plane that would parallel an imaginary line joining the two cemento-enamel junctions of the adjacent teeth.</p>

<b>Table VI</b> <b>Limitations of radiographs</b>
<ol style="list-style-type: none"> <li>1. do not show the periodontal gingival pocket</li> <li>2. cannot differentiate between successfully treated and untreated periodontal patient (ie. cannot demonstrate disease activity; presence or absence of the lamina dura is not a reliable indicator<sup>3</sup>)</li> <li>3. do not accurately record the morphology of bone deformities especially on the radicular aspects (ie. buccal, lingual) of teeth. See Fig. 4a, 4b, 4c, 5a, 5b, 5c.</li> <li>4. do not accurately show the soft to hard tissue relationship</li> <li>5. do not record tooth mobility</li> <li>6. does not accurately record bone loss in furcation areas. See Fig. 6 a, b, c.</li> <li>7. may not record interproximal bony craters where heavy cortical plates of bone are present</li> <li>8. are not accurate early indicators of attachment loss. (Goodson et al<sup>4</sup> demonstrated approximately 4 mm of attachment loss occurred several months before radiographic changes were detected)</li> </ol>



**Fig. 1A** Bitewing radiograph misses apical aspects of the teeth and the periodontium, demonstrating one of the limitations of the bitewing.



**Fig. 1B** Same site as in 1A. Note full view of the osseous defect and the unexpected finding of a supernumerary bicuspid.



**Fig. 1C** Same site as in 1A. Note full view of the osseous defect as compared to the bitewing in 1A.



**Fig. 2A** Periapical radiograph. Note how bone loss is recorded in the interproximal areas as related to the clinical views in 2B & 2C.



**Fig. 2B** Palatal view. Note the pattern of bone loss as related to the radiograph in 2A.



**Fig. 2C** Buccal view. Note pattern of bone loss as related to the radiograph in 2A.



**Fig. 3A** Lingual view demonstrating very heavy plaque and calculus deposits.



**Fig. 3B** Pre-treatment bitewing of the patient in 3A. The bitewing should be taken after the completion of the initial therapy.



**Fig. 3C** Post-scaling bitewing of the patient in 3A & 3B. Calculus that is not evident radiographically assures a minimum standard of care but does not assure complete calculus removal.



**Fig. 4A** Periapical radiograph indicates moderate mesial distal and buccal bone loss.



**Fig. 4B** Clinical view from buccal correlates with radiograph in 4A suggesting moderate bone loss.



**Fig. 4C** The extensive recession on the palatal aspect is not anticipated if one only evaluates the periapical radiograph.



**Fig. 5A** In the periapical film it appears that there is good bone support on the mesial, distal and apical aspects of the cuspid.



**Fig. 5B** Clinical view corresponding to the periapical in 5A. As expected, lack of significant probing depth correlates with good interproximal bone levels seen in the periapical in 5A.



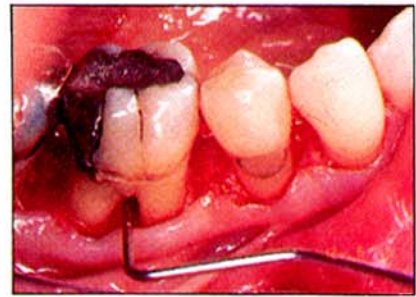
**Fig. 5C** Clinical view corresponding to the periapical in 5A. On the mid-labial, the 11 mm pocket is not anticipated if one only evaluates the periapical in 5A.



**Fig. 6A** Periapical radiograph indicated furcation involvement of the first molar. Several views from different angles are sometimes indicated.



**Fig. 6B** Changing the mesio-distal angulation of the radiograph as compared to 6A gives a different perspective of the degree of furcation involvement.



**Fig. 6C** Clinical view corresponding to 6A & 6B (Note the enamel projection on the first molar). Radiographs alone are inadequate to diagnose furcation involvement accurately.

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