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FOURTH EDITION

Intraoral Bitewing Radiographic Technique

Educational Objectives

Following this unit of instruction, the practitioner should be able to:

1. Describe the characteristics of a quality bitewing radiograph.
2. Recognize the guidelines for proper receptor placement and beam orientation.
3. Recognize the common errors found in bitewing projections and their cause.
4. Describe the ways in which common errors can be avoided.

Introduction

Bitewing radiographs are the most common intraoral radiographic tool used for diagnosis in dentistry. It is estimated that bitewings, either individually or as part of a full mouth series, account for nearly 60% of all dental radiographic surveys taken. When combined with thorough clinical examinations, bitewings are a valuable diagnostic tool. They are excellent aids for the identification of certain types of pathology, defective restorations, dental caries, and periodontal disease. However, like most radiographic procedures, bitewings are technique-sensitive. In an attempt to prevent or reduce the frequency of technique-related problems, this module will describe the characteristics of good diagnostic bitewings, present three common technique errors, and describe methods for solving technique errors.

Bitewing Devices

There are primarily two common devices used to expose bitewing projections, bitewing tabs and XCP® bitewing holders. The technique and strengths/weaknesses are discussed.

Bitewing Tabs

The bitewing tab is attached to the active side of the receptor cover and the circular collimator aligned to completely irradiate the receptor. The collimator is preset at a positive 10 degrees angulation. The disadvantages of this technique are: the inability to use rectangular collimation and the freehand alignment of the beam to the receptor.

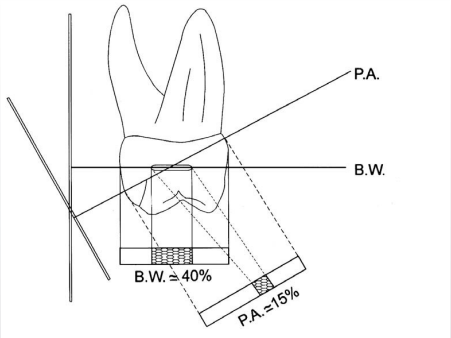
Beam-alignment Device (XCP®)

Use of a beam-alignment receptor holder allows for the use of a rectangular collimator which decreases the radiation dose to the patient. The receptor is placed in the holder with the active side facing the collimator. Once the receptor is placed orally, as described in this module, the rectangular collimator is aligned to the positioning collimator. The positioning collimator automatically aligns the beam at 90 degrees to the receptor.

Characteristics of a Good Bitewing Projection

The radiographic projection best suited for the interpretation of dental caries and periodontal disease is the bitewing radiograph. This is primarily

FIGURE 1



The beam positioning for the bitewing (B.W.) allows more of the contact area to be imaged compared to the periapical (P.A.).

Author Acknowledgements

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Drs. Mauriello and Shugars have no relevant financial relationships to disclose.

The following commentary highlights fundamental and commonly accepted practices on the subject matter. The information is intended as a general overview and is for educational purposes only. This information does not constitute legal advice, which can only be provided by an attorney.

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due to the vertical angulation used in exposing the projection. In contrast, in a periapical projection the vertical angulation can distort the carious lesion or superimpose other structures to mask or hide a lesion or distort bone topography. Figure 1 depicts the projection geometry principles for bitewing and periapical radiographs. With the angulation of a bitewing projection, approximately 40% of the proximal surface is imaged compared to only 15% in a periapical projection.

Because radiographs can detect proximal caries lesions and alveolar bone not easily seen in a clinical examination, it is essential that the radiograph clearly display interproximal surfaces of the teeth and the crestal ridge of the adjacent alveolar bone. For a caries lesion to be detected radiographically, the mineral content of the tissue must change or demineralize 30-50%. As a result, a lesion will often tend to be larger clinically than that displayed by the radiographic image. Thus, an image with adjacent interproximal surfaces not overlapped will enhance the ability to detect lesions early, which in turn impacts management considerations.

FIGURE 2

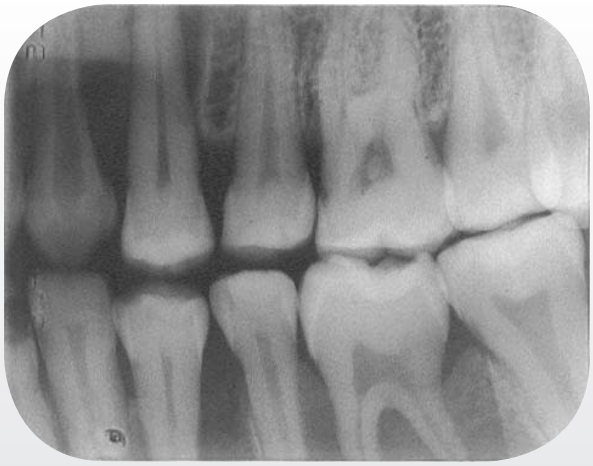
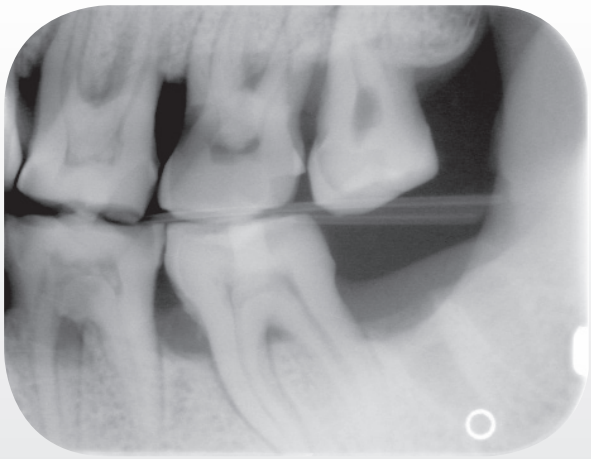


FIGURE 3



Problem-Solving Techniques

Receptor Placement

Packet placement is one of the most critical elements in exposing a diagnostic radiograph. It is also one of the most common sources of error. Because of the contour of the dental arch, it is often difficult to place the packet and angle the beam to create an open proximal contact between those teeth. There are two easy steps that ensure proper placement of the receptor. First, place the receptor as far forward as possible. Second, angle the receptor so it is positioned behind the mandibular lateral on the opposite side of the mouth.

Beam Orientation

Proper orientation of the central beam is essential to obtaining diagnostic projections. Misalignment of the x-ray beam through the interproximal spaces can cause overlap of the proximal areas. When this occurs, the SLOB rule (Same Lingual Opposite Buccal) can be used to determine the angulation that caused the error and thus correct the error on the retake projection. To identify the cause of the horizontal overlap, the clinician can use the following rule. First, identify the lingual cusp on either maxillary premolar on the receptor. This would be the shorter cusp. Then, determine whether the lingual cusp is mesial or distal to the facial cusp. Using the SLOB Rule when viewing a radiograph, the tubehead would be positioned too mesial if the lingual cusp is mesial to the facial cusp and too distal if the lingual cusp is distal to the facial cusp. Thus, the horizontal overlap error can be corrected by moving or repositioning the tubehead in the opposite direction.

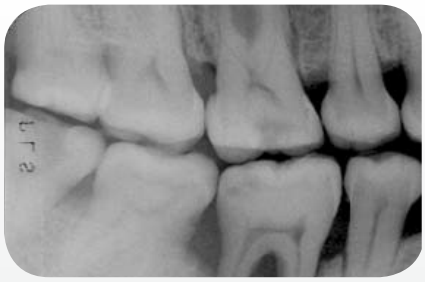
Notice that the radiographs shown in Figures 2 and 3 meet the four criteria of diagnostic premolar and molar bitewings. These criteria are:

- For the premolar projection, the distal of the canine (figure 2), and in the molar projection no more than the distal of the mandibular second premolar should be imaged (figure 3).
- The interproximal spaces should be open with no horizontal overlap between the maxillary premolars on the premolar projection. For the molar projection, there should be no horizontal overlap between the maxillary 1st and 2nd molars
- The alveolar crestal bone should be imaged with about the same amount of bone in both arches displayed on the receptor.
- For the molar projection, all of the terminal molar should be displayed with the retromolar area imaged.

Common Errors

This section presents examples of bitewings with poor technical quality. The error and possible solutions are discussed.

FIGURE 4



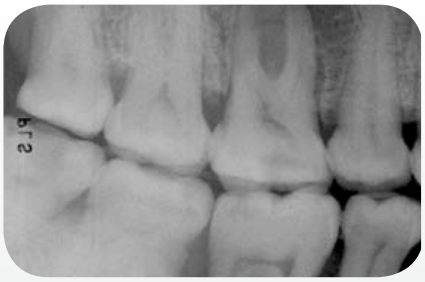
Problem:

This projection did not image the mesial of the first premolars onto the receptor due to improper packet placement in the mouth (Figure 4).

Solution:

This error can be corrected by placing the anterior edge of the receptor behind the mandibular lateral on the opposite side of the arch.

FIGURE 5



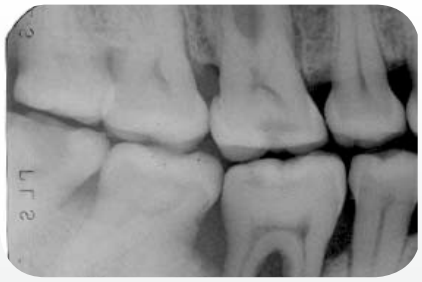
Problem:

The mesial of the premolars is missing on this projection due to improper horizontal angulation. The tubehead was too distal, thus projecting the mesial of the premolars off of the receptor (Figure 5).

Solution:

This error can be corrected by moving the tubehead towards the mesial.

FIGURE 6



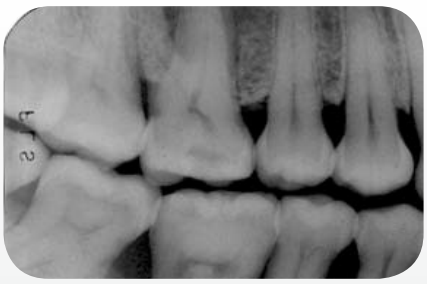
Problem:

The third molar is not imaged on the receptor due to improper receptor placement (Figure 6).

Solution:

Align the front edge of the receptor so that it is no further forward than the mesial of the mandibular first molar. If the tooth is still not imaged on the receptor, then a third molar disto-oblique projection should be exposed.

FIGURE 7



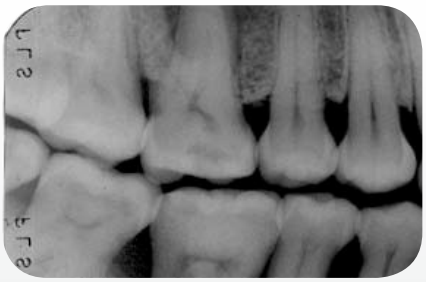
Problem:

The interproximal areas are overlapped, thus obscuring any carious lesions. In this example, the tubehead is directed too mesial, (Figure 7) determined by the lingual cusp positioned mesial to the buccal cusp.

Solution:

Rotate the tubehead toward the distal.

FIGURE 8



Problem:

The level of alveolar bone imaged in the projection is unequal in the maxillary and mandibular arches. This error could be due to the receptor-holding device not centered on the receptor, or incorrect vertical angulation (Figure 8).

Solution:

Reposition the receptor so that it is centered in the holder. The vertical angulation should be positioned at a +10 degrees (beam is angled down). If the patient exhibits periodontal pocketing of 5 mm or more, then a vertical bitewing should be exposed to ensure that the crestal bone is imaged on the projection.

Summary

Bitewing projections play an important role in aiding the identification and treatment of dental disease. Therefore, it is imperative that good diagnostic bitewing radiographs be exposed. This guide describes the desired characteristics of posterior bitewings, problem-solving techniques and common problems with associated solutions.

Suggested Reading

Oral Radiology: Principles and Interpretation, Chap. 7, 14 and 16 by White and Pharoah, 6th Ed. Mosby, 2009

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1. The correct vertical angulation to use with a bitewing is:

a. +10 degrees
b. +20 degrees
c. -10 degrees
d. -20 degrees

2. Vertical bitewings are indicated when there is _____ mm of periodontal pocketing.

a. 3
b. 4
c. 5
d. all of the above

3. A premolar bitewing should image the distal of the canine.

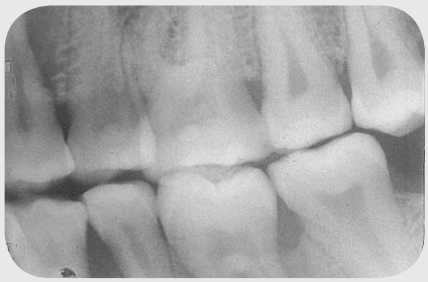
a. True
b. False

4. A molar bitewing should image no more than the distal of the mandibular second premolar.

a. True
b. False

5. Using the SLOB rule, determine the cause of the horizontal overlap in the maxillary premolar area in this radiograph.

a. the tubehead is too mesial
b. the tubehead is too distal
c. the tubehead is positioned correctly, the receptor is turned
d. none of the above



6. Bitewings are used to aid in the identification of:

a. defective restorations
b. caries
c. periodontal disease
d. all of the above
e. none of the above

7. In a bitewing, the alveolar crestal bone for both arches should be imaged.

a. True
b. False

8. If the mesial of the first premolar is not imaged on the projection and there is no horizontal overlap, then the most likely cause for the missing mesial of the premolar is:

a. incorrect vertical angulation
b. incorrect horizontal angulation
c. incorrect packet placement
d. none of the above

9. A bitewing radiograph that exhibits unequal amounts of alveolar bone in each of the arches is most likely a result of:

a. incorrect vertical angulation
b. incorrect horizontal angulation
c. both a and b
d. none of the above

10. A molar bitewing radiograph that displays a partial third molar, most likely is a result of:

a. incorrect vertical angulation
b. incorrect horizontal angulation
c. incorrect packet placement
d. none of the above

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