

# Guidelines for Prescribing Radiographs

Radiographs can only be prescribed by a dentist and only after a clinical examination has been performed to determine which projections are required to give the maximum diagnostic information. Patient imaging needs are determined by findings from the dental history and clinical examination and modified by patient age and general health.

It's very important to avoid taking radiographs that will not contribute diagnostic information (according to ALARA). If a patient is complaining of sensitivity to cold, taking a radiograph to examine the periapical area for pathosis is not required because no pathological periapical lucency will be seen in a vital tooth.

As a general principle, radiographs are indicated when a high probability of providing information about a disease that cannot be seen clinically exists; i.e. the probable benefit to the patient outweighs any possible disadvantage.

The cost of the examination and the radiation dose should be considered when selecting views. Conventional tomography, CBCT, CT or MRI will often be required to best see the lesions. However, do not request a CT where you feel a panoramic radiograph will be adequate. If one wishes to visualize the disc [or position of the disc] in the TMJ or soft tissue then MRI is required.




## **Radiographic examination**

After concluding that a patient requires a radiograph, the dentist should consider which radiographic examination is most appropriate to meet the patient's diagnostic and treatment planning needs. Some patients need simple periapical or panoramic imaging only while other more complicated cases require CBCT or CT or MRI.

The design of the type and scope of the imaging examination should be guided by:

1. The perceived nature or severity of an abnormality (including its size and accessibility)
2. The ability of the imaging technique to accurately reveal the characteristic diagnostic features of the abnormality (sensitivity and specificity)
3. The amount of image detail required (resolution)
4. The radiation dose to the patient

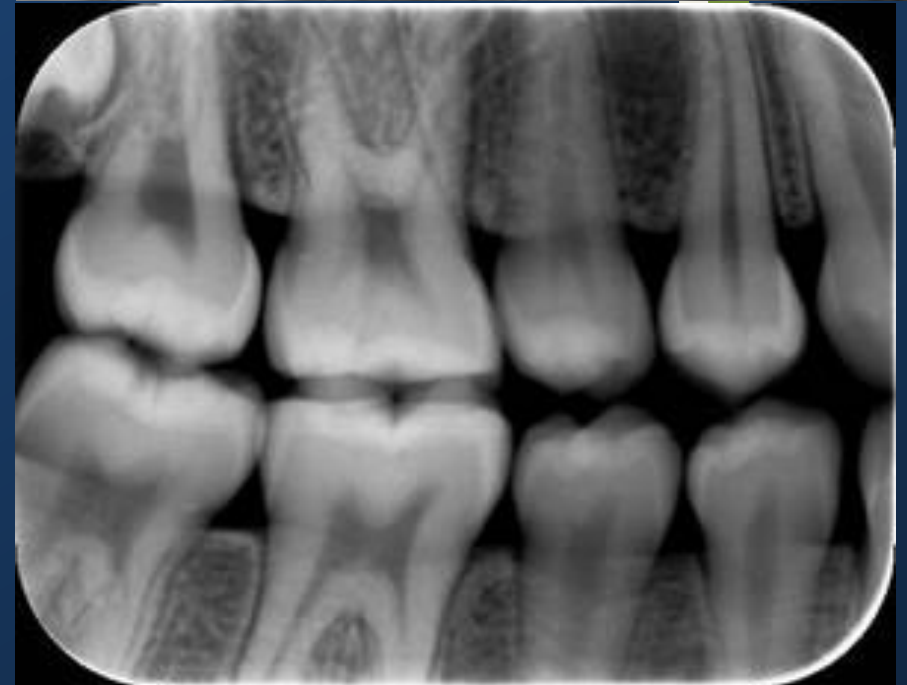
## **Guidelines for Ordering Radiographs**

- Make radiographs only after a clinical examination.
  - Order only those radiographs that directly benefit the patient's diagnosis or treatment plan.
  - Use the least amount of radiation exposure necessary to generate an acceptable view of the imaged area - ALARA Principle
- 

# CARIES

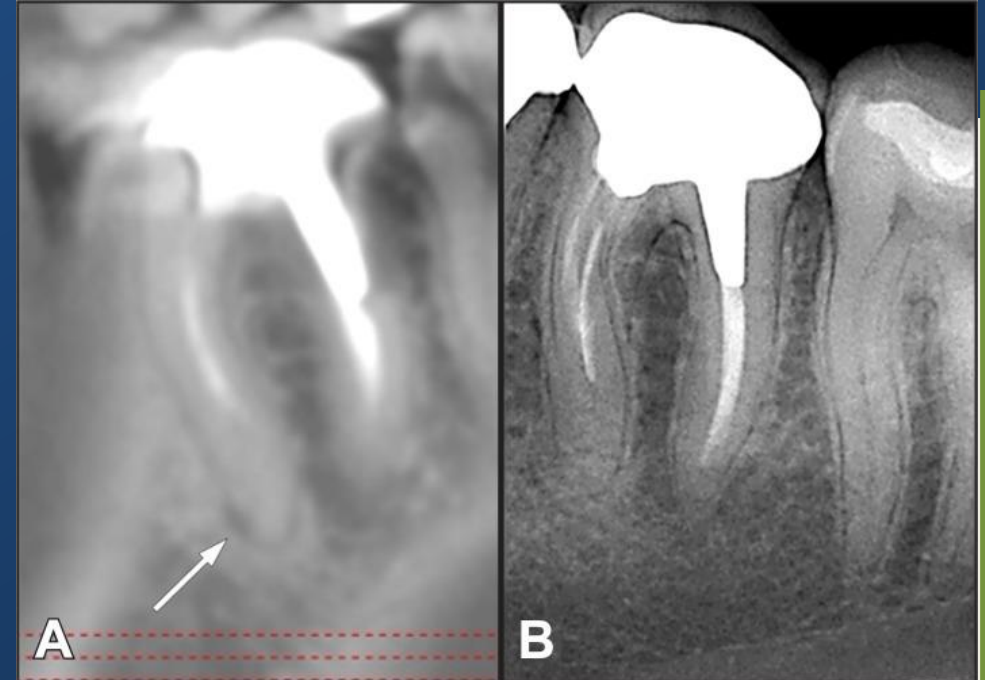
Buccal, lingual and occlusal caries can be seen clinically. Early interproximal caries can only be seen radiographically. The rate of caries varies from person to person. The rate of caries progression is more rapid in deciduous teeth. In carious prone patients radiograph should be taken every 6 - 12 months; in non-caries prone patients every 18 - 24 months is adequate.

The best radiographic view for visualizing both interproximal caries and periodontal bone height is bite-wing radiographs.



# PERIAPICAL INFLAMMATORY DISEASE

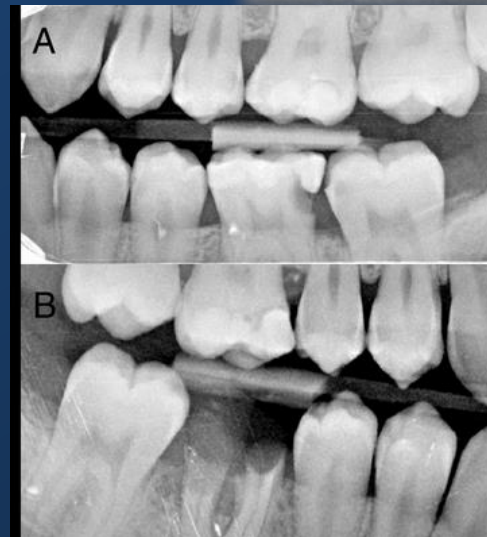
When patient presents with a toothache, deep caries, or large or deep restoration, the likelihood of an inflammatory lesion of pulpal origin occurring at the tooth apex increased. Clinical examination combined with **periapical radiograph** is sufficient to make diagnosis and treatment planning. In some cases with complex root canal anatomy, failed endodontic treatment, intra or postoperative complications, or when periapical radiograph doesn't provide adequate information; therefore high resolution, limited volume **CBCT** may be required.



**A = CBCT image in a sagittal view showing the presence of periapical radiolucency on the apical aspect of the mesial root of a mandibular first molar. B = digital periapical radiography of the same tooth showing a normal aspect of the bone in the periapical area.**

# PERIODONTAL DISEASES

The radiograph is important in determining the amount of periodontal involvement. The radiographic examination shows the amount and type of bone loss and also whether it is localized or generalized. After treatment, follow-up radiographs are important to monitor the progression of the condition. A combination of **periapical and bitewing** images is required





# Dental Anomalies

Abnormalities occur less frequently in deciduous teeth. The impact of anomalies on the permanent dentition is more serious. The most common finding is additional or missing teeth. Mesiodens is the most common additional tooth. The most common tooth missing is the last one in the series; incisors – the maxillary lateral; premolars - mandibular second; molars - all third molars. The same teeth are also most commonly peg shaped.

A panoramic radiograph is the best view for anatomic anomalies but there is no need for this before the age of about 10 years. Should there be a missing tooth, a periapical or an occlusal view of that area may be required.





**Treatment of Class II division 1 malocclusion  
treatment with mandibular advancement features**

## **Growth, Development and Malocclusion**

---

A radiographic examination for growth, development and dental malocclusion can involve several different views, depending on what is being examined. These can vary from periapical, an occlusal, CBCT, a panoramic view to a cephalometric and a lateral skull for orthodontics. Sinus involvement could require an Occipito-mental; non symmetrical growth of the mandible could require a PA [postero-anterior]. For impacted teeth, a panoramic radiograph is required at the age of about 17 - 20 years of age for general examination, while CBCT required for evaluation of roots relation with inferior alveolar nerve.



# OCCULT DISEASE

Occult disease refers to a disease process presenting NO signs or symptoms; they can be dental or osseous. Dental findings vary from interproximal caries to root resorption, dilaceration, concrescence or hypercementosis. Intra-osseous findings can be impacted teeth, sclerosing / condensing osteitis, idiopathic osteosclerosis, tumors [ benign or malignant] and cysts.

In edentulous patients who require dentures, there are often dental or general problems, and this requires a radiographic examination to exclude occult disease. A clinical exam will determine whether a periapical, an occlusal or a panoramic radiograph is required.



# JAW PATHOLOGY

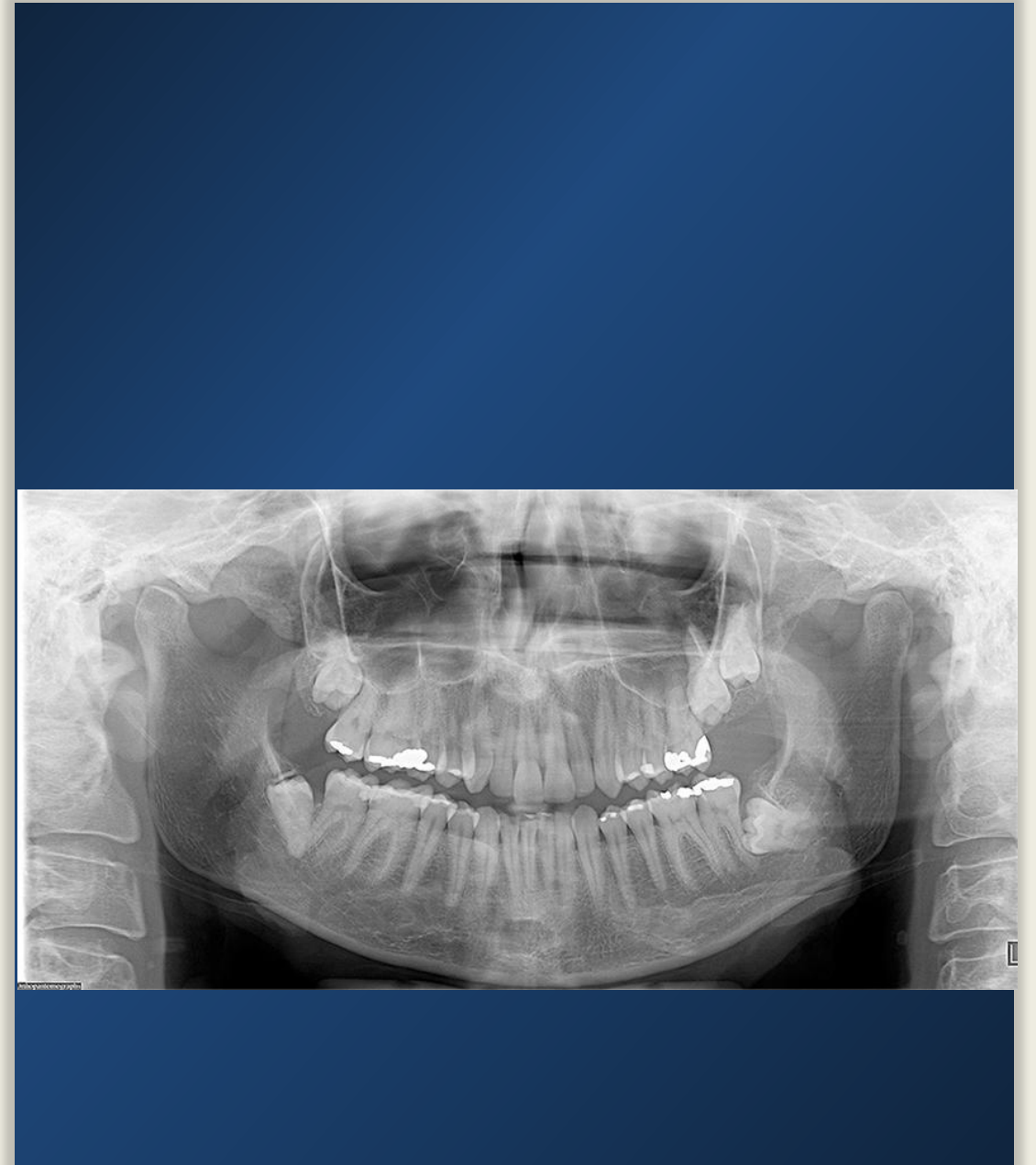
Imaging of known jaw lesions, such as fibro-osseous diseases or neoplastic diseases, before biopsy and definitive treatment is also important for appropriate management of the patient. For small lesions of the jaws, periapical or panoramic radiographs may be enough as long as the lesion can be seen in its entirety. If clinical evidence exists of swelling, some type of radiograph at 90 degrees to the original plane (often occlusal image) should be made to detect evidence of expansion of the jaw and perforation of the buccal or lingual cortical bone. If lesions are too large to fit on standard dental films, extend into the maxillary sinus or other portions of the head outside the jaws, or are suspected of malignancy, additional imaging such as CBCT or computed tomography (CT) is appropriate. These types of imaging can define the extent of the lesion, provide excellent bone details and provide information about the nature of the lesion.



# Temporomandibular Joint

A wide variety of diseases affect the TMJ, including congenital and developmental malformations of the mandible and cranial bones; acquired disorders such as disc displacement, neoplasms, fractures, and dislocations; inflammatory diseases including rheumatoid and osteoarthritis. The goal of TMJ imaging should be to obtain new information that will influence patient care. Radiologic examination may not be needed for all patients with signs and symptoms referable to the TMJ regions, particularly if no treatment is contemplated.

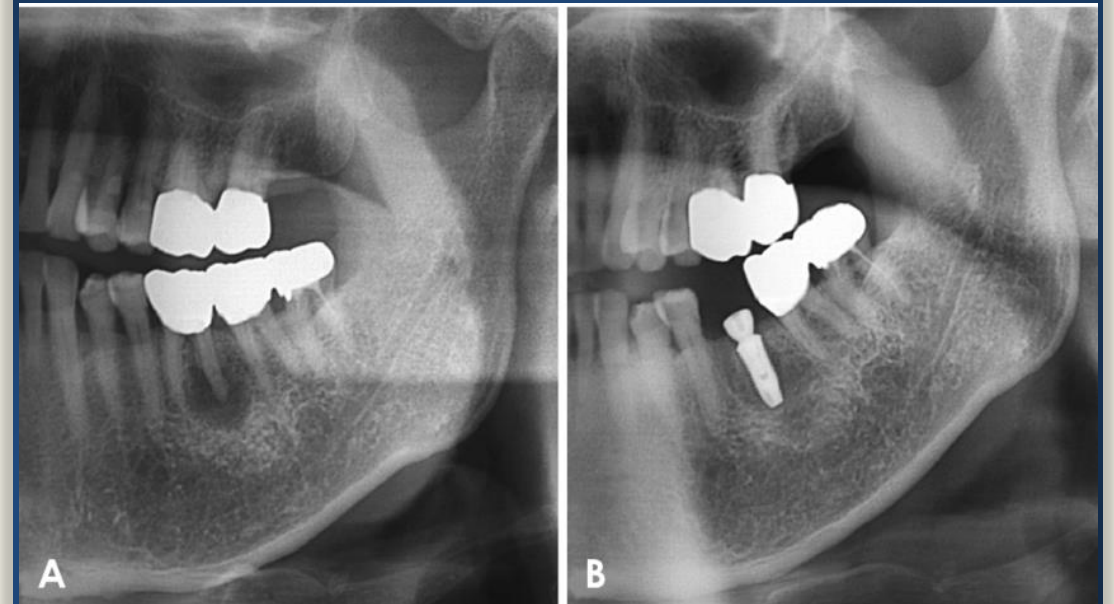
The decision of whether and how to image the joints should depend on the results of the history and clinical findings, the clinical diagnosis, and results of prior examinations, as well as the tentative treatment plan and expected outcome. The cost of the examination and the radiation dose should also influence the decision if more than one type of examination can provide the desired information. For example, information about the status of the osseous tissues can be obtained from **panoramic radiographs, CBCT, CT**. while investigation of soft tissue component (disc), magnetic resonance imaging (**MRI**) is used.



# Implants

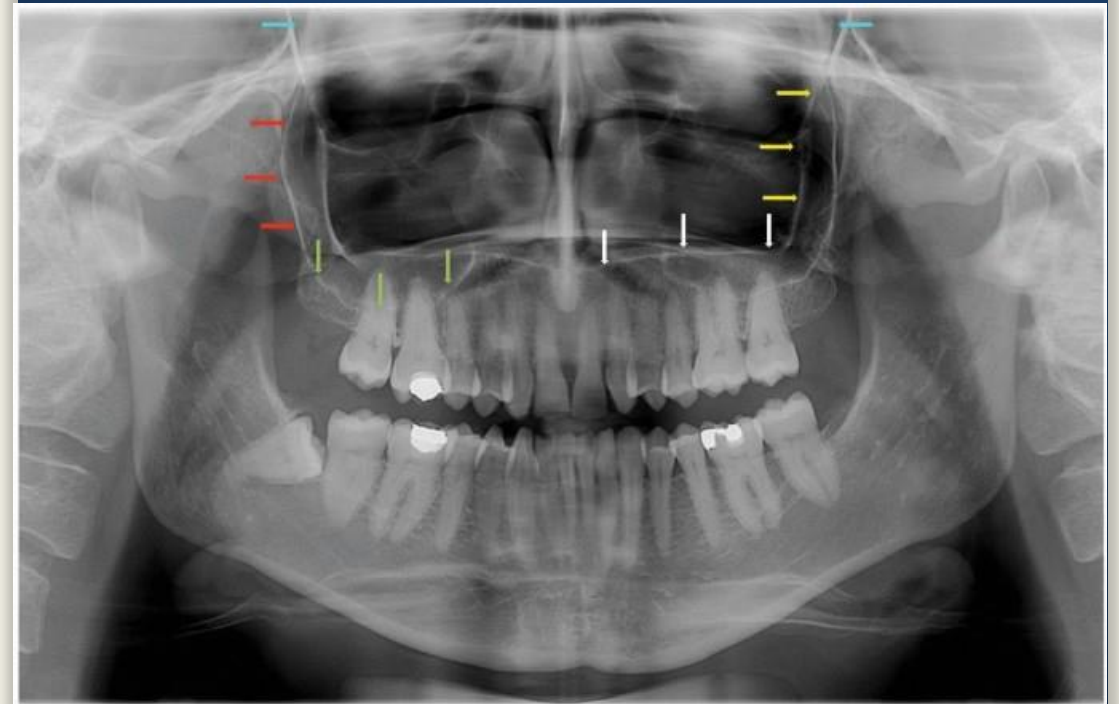
Preoperative planning is crucial to ensure success of the implants. The dentist must evaluate the adequacy of the height and thickness of bone for the desired implant; the quality of the bone, the location of anatomic structures such as the mandibular canal or maxillary sinus; and the presence of structural abnormalities such as undercuts that may affect placement or angulation of the implant.

Standard **periapical and panoramic** radiographs can supply information regarding the vertical dimensions of the bone. However, some type of cross-sectional imaging, like **CBCT** is recommended before implant placement for visualization of important anatomic landmarks, determination of size and path of insertion of implant, and evaluation of the adequacy of the bone for anchorage of the implant. Also evaluation of implants may be needed at later times to judge healing, complete seating of fixtures, and continued health of the surrounding bone.



## Paranasal Sinuses

Because sinus disease can present as pain in the maxillary teeth and because periapical inflammation of maxillary molars and premolars can also lead to changes in the mucosa of the maxillary sinus, the dentist needs to obtain an image of the maxillary sinus. Sometimes sinus imaging is required to assess the need for bone augmentation or sinus lift before implant placement in posterior maxilla. Periapical and panoramic radiographs demonstrate the floor of the maxillary sinus well, but visualization of other walls requires additional imaging techniques such as occipitomenal (Waters') view, CBT or CT.





# TRAUMA

For patients who experience trauma to the oral region periapical and/or panoramic radiographs are helpful for evaluation of fractures of the teeth. If a suspected root fracture is not visible on a periapical radiograph, a second radiograph made with a different angulation may be helpful. A fracture that is not perpendicular to the beam may not be detectable. CBCT may be useful (if taken without artifact). Otherwise a tooth with a history of trauma but no associated clinical finding should be monitored and evaluated radiographically on a periodic basis.

Fractures of the mandible can frequently be detected with panoramic radiographs, supplemented by images at 90 degrees such as a posteroanterior or reverse Towne's view. Trauma to the maxilla and midface may require CBCT or CT for a thorough evaluation.





Summary of the more common types of radiographic examinations for general dental patients and factors to consider in choosing the most appropriate one ( note: the table is required)

TABLE 15-1

*Dental Radiographic Examinations and Their Properties*

TYPE OF EXAMINATION	COVERAGE	RESOLUTION	RELATIVE EXPOSURE*	DETECTABLE DISEASE
<b><i>Intraoral Radiographs</i></b>				
Periapical	Limited	High	1	Caries, periodontal disease, occult disease
Bitewings	Limited	High	10	Caries, periodontal bone level
Full-mouth periapical	Limited	High	14-17	Caries, periodontal disease, dental anomalies, occult disease
Occlusal	Moderate	High	2.5	Dental anomalies, occult disease, salivary stones, expansion of jaw
<b><i>Extraoral Radiographs</i></b>				
Panoramic	Broad	Moderate	1-2	Dental anomalies, occult disease, extensive caries, periodontal disease, periapical disease, TMJ
Conventional tomography/slice	Moderate	Moderate	0.2-0.6	TMJ, implant site assessment
CBCT	Broad	Moderate to high	4-42	Implant, TMJ, craniofacial relationships, dental anomalies, extent of disease, fracture
CT/head	Broad	High	25-800	Extent of craniofacial disease, fracture, implants
MRI	Broad	Moderate	—	Soft tissue disease, TMJ
Skull	Broad	Moderate	30	Fracture, anatomic relation, jaw disease

Thank You

