Radiology

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Not all dental radiographic techniques can be successfully performed on all patients. Radiographic examination techniques must often be modified to accommodate patients with special needs.

The dental radiographer must be competent in altering radiographic techniques to meet the specific diagnostic needs of individual patients. We discuss how to manage patients with a Gag reflex, patients with physical or developmental disabilities, pediatric, endodontic, and edentulous patients.

1. Gagging Reflex
Intra oral films are placed in oral areas specifically related to the initiation of this reflex. Some patients may unconsciously activate this reflex as a defense against anticipated unpleasantness.

Gagging (retching): Refer to strong involuntary effort to vomit.

Gag reflex (pharyngeal reflex): retching that is elicited by stimulation of the sensitive tissues of the soft palate region.

A gag reflex is a protective mechanism of the body that serves to clear the airway of obstruction. In the dental radiography a hypersensitive gag reflex is a common problem.

The areas that are most likely to elicit the gag reflex are the soft palate and the lateral posterior third of the tongue.

Prior to gag reflex, two reactions occur:
1. Cessation of respiration.
2. Contraction of the muscles of the throat and abdomen.

The precipitating factors that are responsible for initiating the gag reflex include (psychogenic stimuli) and (tactile stimuli)

Patient management:
   a. Operator attitude:
      — Most gagging can be controlled through the creation of the patient confidence or by-diverting the patient's concentration away from gagging reflex like asking the patient to breathe deeply through the nose or moving his/her arm.
b. Patient and equipment preparations:
— In a patient with hypersensitive gag reflex, every effort should be made to limit the amount of time that a film remains in the mouth. The longer a film stays in the mouth, the more likely the patient to gag.

c. Exposure sequencing:
— It play an important role in preventing gag reflex. The dental radiographer should always start with anterior exposure; with posterior exposure the dental radiographer should always expose the premolar before molar.

d. Film placement and technique:
Each film must be placed and exposed as quickly as possible. Placement and technique modification include the following:
- Avoid the palate: position the film lingual to the teeth and then firmly bring the film in to palatal tissue using one decisive motion.
- Demonstrate film placement: in the areas that are most likely to elicit the gag reflex, rub a finger along the tissues near the intended area of film placement, while telling the patient, “This is where the film will be positioned.” Then quickly place the film.

e. Use of extraoral radiograph:
occasionally the dental radiographer encounters a patient with a gag reflex that is uncontrollable. In such a patient, intra oral radiograph is impossible to obtain, so the dental radiographer must use extra oral films such as panoramic or lateral jaw radiographs.

f. Using topical anesthetic agent:
when the cause of gag reflex is tactile, in such cases with gag reflex we can use local anesthesia. Salt application on the palate said to be useful.

2. Neuromuscular problems
Refer to patient inability to remain immobile
a. Speed is essential in radiographic procedure.
b. Minimization of the exposure interval through:
* The use of fast films.
* Decrease the source-object distance.
* Maximally high kilo voltage.
* Highest milli amperage
c. Using of films holders that can be stabilized by another person but not by dental office staff.
d. Extraoral films may be useful supplemented by intraoral films.
e. Sedation sometimes is essential.
f. Radiograph can be performed under anesthesia.

3. Physical Disabilities
— Patients with disabilities physical impairment that substantially limits one or more of an individual’s life activities.

a. Vision impairment: if a patient is blind or visually impaired, the dental radiographer must communicate using clear verbal explanations. The dental radiographer must keep the patient informed of what is being done and explain each procedure before performing it.
b. Hearing impairment: if a person is deaf or hearing impaired, the dental radiographer may ask the caretaker to act as interpreter, or use written instructions. When the patient can read lips, the dental radiographer must face the patient and speak clearly and slowly.
c. Mobility impairment: if a person is in a wheelchair and does not have use of the lower limbs, the dental radiographer may offer to assist the patient in transferring to the dental chair. If a transfer is not possible, the dental radiographer may attempt to perform the procedure with the patient seated in the wheelchair. If a person does not have use the upper limbs and a holder cannot to stabilize the film placement, the dental radiographer may ask the caretaker to assist with film holding, the caretaker must wear a lead apron and thyroid collar. The dental radiographer must never hold a film during exposure.

4. Developmental Disabilities
— Is a substantial impairment of mental functioning that occurs before the age of 22 and is of indefinite duration. (Autism, cerebral palsy, epilepsy and other neuropathies and mental retardation).
— A person with a developmental disability may have problems with coordination or comprehension of instruction. As a result the dental radiographer may experience difficulties in obtaining intraoral films. If coordination is a problem, mild sedation may be useful. If comprehension is a problem and the patient cannot hold a film, the caretaker may be asked to assist with film holding.
It's important that the dental radiographer recognize situations in which the patient cannot tolerate intraoral exposure. In such cases no intraoral films must be used and change to extraoral films.

5. Child patient
   a. Use conveniently small intraoral films
   b. lead apron, the growing organs of the child are particularly susceptible to the effects of ionizing radiation and must be protected, so lead apron and thyroid collar must be placed on the child prior to the x-ray exposure.
   c. Exposure factors (mA, kVp, time) must be reduced.
   d. Extraoral films can be used instead of intraoral.
   e. Radiographic procedures should not be hurried nor should the child be apprised of any negative possibility like you might hurt a bit or you may gag.
   f. Do not expose the young child to two or more circumstances simultaneously.
   g. Show him a radiograph of another child's teeth and let him see the radiographic procedure on another member of the family.
   h. A mirror enabling the child to observe the procedure, maybe helpful.

6. Edentulous patient
   Edentulous patient require dental radiograph for the following reasons:
   - Detect the presence of root tips, impacted teeth and lesions.
   - To establish the position of normal anatomic landmarks relative to the crest of alveolar ridge
   - To observe the quantity and quality of bone that is present.

   The radiographic examination of edentulous patient may include;
   a. Panoramic radiograph: is the most common way, its quick and easy. If the panoramic technique reveals any root tips, impacted teeth, foreign bodies or lesions in the jaw, a periapical film of that specific area must be used.
   b. Periapical radiograph: it has more definition and permits the area in question to be examined in greater detail. When using parallel technique, cotton roles must be placed on both sides of biting block to take the place of missing teeth. If the alveolar ridge is severely absorbed, bisecting angle technique is used.
   c. Occlusal radiograph: to examine the tooth bearing area and detection of bone lesions not recognized by OPG.
Localization techniques
Is a method used to locate the position of a tooth or object in the jaws.

Localization technique may be used to locate the followings:
  1) foreign bodies
  2) impacted teeth
  3) unerupted teeth
  4) retained roots
  5) salivary stones
  6) root positions
  7) jaw fractures
  8) broken needles & instruments
  9) filling materials

The radiograph presents as two dimensional image of a three-dimensional object. There is often a need for determining special relationship. So techniques for doing this are discussed as follows:

A. Right angle technique.
B. Tube shift technique.
C. Stereo radiography (It is not widely used because it is time consuming and need a special viewing device).
D. Use of radio-opaque media.

Right angle procedure
It involves the use of at least 2 films taken at right angles to each others. For example: lateral skull projection demonstrates the anteroposterior areas and posteroanterior projection demonstrates the mediolateral areas so an object could be located.
**Tube shift technique:**
It employs the concepts called Clark's rule. The area in question is anesthetized, a small hypodermic needle is inserted in vertical position in mucobuccal fold near the object in question, a radiograph is taken, then insert another film and second radiograph is taken with mesial shifted tube. The 2 films are processed and compared.

If the object in the second radiograph appears more mesialy, that means the object is located far lingualy or palately, while if it is more distally (in relation to the needle) it means it is buccaly positioned, and if it is not move it means that it is close to the needle.

![Image](image.png)

When the object in question is close to a tooth or surface of a crown so that there is no need for insertion of a needle.

*note: to remember the tube shift technique. Keep in your mind the word (SLOB) Same = Lingual , , Opposite = Buccal
Use of radio-opaque media:

Barium sulfate, lipiodol and dionosil can be used to demonstrate cavernous areas with hard and soft structures. After the injection of the radio-opaque media (mostly lipiodol) in cyst for example, film exposed, processed and viewed to see the extension of the cyst. Radio-opaque media also used in sialogram to demonstrate the salivary glands and their duct.

Radiographic survey

An examination of a part or an area designed to determine whether any abnormal changes exist within the part or area. It is either routine scanning procedure, or specific purpose survey for example cephalometric films designed to study growth pattern.

A new complete survey is not necessary for a period of at least 5 years, but new bite-wing films are often necessary every 6 months. Any single film in the complete mouth survey should have the following criteria of excellence:

1. Should show no film fog other than that inherent in the film base itself.
2. Should have no stain or discoloration resulting from inadequate darkroom procedure.
3. Film density varies with personal performance but excessively dark or light films are unacceptable.
4. The position of the identifying dot must be toward the occlusal plane, such positioning will avoid superimposing important structures on the dot.
5. The film should be placed so that the incisal edges or cups of the teeth are approximately 1/8 inch (2mm) from film margin.
6. Each single film should show a suitable reproduction of the area being examined.
7. Each tooth's image should be neither elongated nor foreshortened.
8. Interproximal surfaces of teeth should not overlapped.
9. Each film should show the interproximal bone crest without superimposition of the adjacent teeth. It is necessary that approximately 1/8 of an inch of alveolar be observable beyond the apex of the tooth (for periapical view).
10. In the excessively long tooth we use 2 films to cover the whole area.

** Criteria of excellence for extraoral films are largely similar to those for intraoral films.
**Radiographic survey methods**

Routine: for children, adult and edentulous 14-17 periapical films with 2-4 posterior bite-wing films are necessary for adequate interpretation of oral conditions.

Alternate: lateral jaw projections, anterior periapical mandibular and maxillary views with bitewing for posterior teeth. For edentulous patients topographic occlusal films could be used instead of periapical films as alternative survey method.

![Adult complete mouth periapical survey.](image)