A to Z
ORTHODONTICS

Volume: 07

RADIOGRAPHS

Dr. Mohammad Khursheed Alam
BDS, PGT, PhD (Japan)

ISBN 978-967-5547-96-6
1. Dental Xray.........................................................3-5
2. Types of radiographs........................................5-7
3. Hand wrist radiographs.....................................7-8
4. Panoramic radiographs......................................9-10
5. Intra oral occlusal radiographs............................11
6. Bite wing radiographs.......................................12
7. Periapical radiographs......................................13-15
Orthodontic treatment for malocclusion moves faster during growth spurts. In general, children have a pattern of fast growth, followed by slow growth in late childhood, and then another growth spurt in the teen years. Because children start this pattern at different ages.

**WHAT IS A DENTAL X-RAY?**

The term x-ray is actually referring to the radiation that is used to make the image on the film. A radiograph is an extremely important diagnostic tool. Without the proper use of it, an inferior examination and inferior treatment will result.

**WHY THE NEED?**

**Dental X-rays help the dentist to:**

- Determine presence of unusually shaped roots
- Determine the existence of an abscess
- Study root involvement and location in relationship with your sinuses
- Find hidden decay
- Locate the presence of cysts
- Locate hidden calculus
Determine the presence of tumors
Examine area being considered for a bridge
Study primary teeth
Locate a fistula
Determine if all permanent teeth are present
Determine presence and location of foreign objects
Determine condition of root canal filled teeth
Determine presence of a fracture
Determine condition of deep restorations
Determine reasons for pressure sensitivity
Determine if decay is located in abnormal areas
Determine presence of ill-fitting restorations and overhangs
Determine condition of supporting bone
Determine amount of bone destruction in gum disease
Study impacted teeth
Determine health of teeth being considered to support a fixed
Determine if extra teeth are present
Determine sinus condition
<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparent</td>
<td>These are objects through which X-ray passes freely. They appear black in a radiographic film.</td>
</tr>
<tr>
<td>Radiolucent</td>
<td>These are objects through which X-rays pass without much resistance. They appear different shades of gray in a radiographic film.</td>
</tr>
<tr>
<td>Radio-opaque</td>
<td>These are objects through which X-rays do not pass. They appear white in a radiographic film.</td>
</tr>
</tbody>
</table>

**Types of Radiographs**

**Intraoral radiograph**

1. Intraoral periapical radiograph
2. Bite wing radiograph
3. Occlusal radiograph
**Extraoral radiographs**

1. Panoramic radiographs

2. Others-
   - Cephalometric radiographs
   - Lateral cephalogram
   - Postero-anterior cephalogram
   - Lateral oblique cephalogram
   - Method of parallax
   - Hand-wrist radiograph
   - Cervical vertebrae radiograph

**Intra Oral Periapical Radiograph**

There are done to view single or small number of teeth and their supporting structures.

There are two techniques-

**Paralelling or Right angle or Long cone technique**

In this technique, the X-ray film is placed parallel to the long axis of the teeth and the central ray of the X-ray beam is directed at right angles to the teeth and film. This technique reduces geometric distortions.
Bisecting Angle Technique

In this technique, the central ray is directed at right angles to a plane bisecting the angle between the long axis of the teeth and the film. This technique produces a clear image of the teeth and periapical tissues.

The hand-wrist radiograph

The hand-wrist radiograph, or X-ray image of the wrist bones, can help pinpoint a child's skeletal age. Wrist bones develop to adult size in a clear pattern. This has allowed experts to make a picture atlas of wrist bones in various development stages. Orthodontists can compare a hand-wrist radiograph with the atlas and find out a child’s skeletal age.

Importance:

- Carpal bones, epiphysis, phalanges and metacarpals provide a clue to bone growth of the body.
- Ossification in these bones occurs after birth and before maturity.
- The growth can be evaluated by:
  - Shape of the carpal bones
  - Degree of ossification
  - Time and order of appearance of carpal bones.
Position of the patient:

- Patient is sitted with the forearm on a table on the line parallel to the shoulder.
- X-ray film is placed below the hand on the table.
- The ray is directed perpendicular to the line passing between the hands.

If one hand then ray is directed at the center of the carpals.

Interference:

1. The beginning of ossification of sesamoid bone is a reliable indicator of onset of puberty.

2. Absence of sesamoid bone at the absence of puberty in a female means, there is retardation of pubertal growth.

3. Initial ossification of pisiform is and hook of hamate indicates peak growth in most boys and girls.

4. Initial ossification of thumb and advanced ossification of hook of hamate indicates peak growth in most boys and it is true for only half of the girls.
**Panaromic radiograph**

Panaromic radiograph enable viewing of both maxillary and mandibular arches with their supporting structures. Thus a single image covers a major part of the facial region.

**Use of Panoramic radiograph includes:**

1. They are useful in assessing the dental development by studying deciduous root resorption and root development of permanent teeth.
2. They can be used to view ankylosed and impacted teeth.
3. To study the path of eruption of teeth.
4. To diagnose the presence and extent of pathology fractures of the jaw.
5. To diagnose the presence or absence of multiple supernumerary teeth.
6. They are useful in the mixed dentition period to study the status of erupting teeth.
7. They are useful in the mixed dentition period to study the status of unerupted teeth.
The advantages of Panoramic radiograph includes:

1. The patient radiation exposure is low.
2. A broad anatomic area can be visualized.
3. It can be used in patients who are unable to tolerate intra-oral films or unable to open the mouth.

The following are the disadvantages of panoramic radiograph includes:

1. Distortions; magnifications and overlapping of the structures occur.
2. The teeth and the supporting periodontal structures are not as clear as in periapical films.
3. Inclination of anterior teeth cannot be visualized.
4. Requires equipments that are expensive.
5. Whenever details of a particular area needed they have to be supplemented by other radiographs.
Intraoral occlusal radiograph

Intraoral occlusal radiographs enable viewing of a relatively large segment of the dental arch, including the palate or floor of the mouth.

**Uses:**

1. To locate impacted or unerupted teeth.
2. To locate supernumerary teeth.
3. To locate foreign bodies in the jaws and stones in salivary ducts.
4. To study buccolingual expansions of cortical plate due to pathology of the jaw.
5. To diagnose the presence and extent of fractures.
6. They are useful in orthodontics to study the effects of arch expansion procedures.
**Bite wing radiographs**

Bite wing radiographs record the coronal part of the upper and lower dentition along with their supporting structures.

**BITEWING** X-rays highlight the crowns of the teeth. On each radiograph, the upper and lower teeth in one portion of the mouth are shown, from the crown to about the level of the jaw. These require patients to hold or bite down on a piece of plastic with X-ray film in the center.

**Uses:**

1. To detect proximal caries.
2. To study the height and contour of inter-dental alveolar bone.
3. To detect secondary caries below restorations.
4. To detect overhanging proximal restorations.
5. To detect periodontal changes.
6. To detect interproximal calculus.

Bitewing X-rays typically determine the presence of decay in between teeth, while periapical X-rays show root structure, bone levels, cysts and abscesses. They are also used to help diagnose cavities between the teeth, as these areas are not visible when looking directly in the mouth.
Intraoral Periapical radiographs

They are radiographs that are used to view the teeth and their supporting structures.

**Uses**

1. To confirm the presence or absence of teeth.
2. To establish the presence or absence of supernumerary teeth.
3. To assess the extent of calcification and root formation of teeth.
4. To confirm the presence and study the extent of periapical pathology and root fractures.
5. To study the alveolar bone periodontal ligament space.
6. To study the height and contour of alveolar bone crest.
7. To assess the axial inclination of roots.
8. To detect retained root fragments and roots stumps.
9. To determine the size and shape of unerupted teeth.
Advantages

1. Low radiation dose
2. Possible to obtain localized views of the area of interest
3. They offer excellent clarity of teeth and their supporting structures

Disadvantages:

1. Assessment of the entire dentition requires too many radiographs.
2. Children may not allow placement of intra-oral films
3. They cannot be used in patients having high gag reflex and trismas

Determining tipper or Lower from a Radiograph

- The dot of film should be downwards during exposing, so that it will be placed epically for lower teeth and occlusally for upper teeth.
- If the dot is not placed accurately upper or lower may be detected from other landmarks like number, shape and size of teeth, carious, filled or missing teeth, outline of sinuses, inferior dental canal, mental, incisive and mandibular foramen, nasal cavity outline, maxillary tuberosity, etc.
Determining Front and Back from a Radiograph

- Elevated side of dot is front and depressed side is back for the operator

Determining Right and left from a Radiograph

- If the film is exposed and viewed accurately the dot will be on the right when the long axis of the film is horizontal and on the left when the long axis of the film is vertical.

If the dot is not properly placed right or left side can be determined by comparing the patient face after determining the front and upside of the film.
Bibliography:

4. Iida J. Lecture/class notes. Professor and chairman, Dept. of Orthodontics, School of dental science, Hokkaido University, Japan.
5. Lamiya C. Lecture/class notes. Ex Associate Professor and chairman, Dept. of Orthodontics, Sapporo Dental College.
17. Yoshiaki S. Lecture/class notes. Associate Professor and chairman, Dept. of Orthodontics, School of dental science, Hokkaido University, Japan.
Dedicated To

My Mom, Zubaida Shaheen
My Dad, Md. Islam
&
My Only Son
Mohammad Sharjil
Acknowledgments

I wish to acknowledge the expertise and efforts of the various teachers for their help and inspiration:

1. Prof. Iida Junichiro – Chairman, Dept. of Orthodontics, Hokkaido University, Japan.
3. Asst. Prof. Kajii Takashi – Dept. of Orthodontics, Hokkaido University, Japan.
8. Prof. Amirul Islam – Principal, Bangladesh Dental college
9. Prof. Emadul Haq – Principal City Dental college
11. Asso. Prof. Lamiya Chowdhury – Chairman, Dept. of Orthodontics, Sapporo Dental College, Dhaka.
13. Asso. Prof. MA Sikder – Chairman, Dept. of Orthodontics, University Dental College, Dhaka.
Dr. Mohammad Khursheed Alam has obtained his PhD degree in Orthodontics from Japan in 2008. He worked as Asst. Professor and Head, Orthodontics department, Bangladesh Dental College for 3 years. At the same time he worked as consultant Orthodontist in the Dental office named “Sapporo Dental square”. Since then he has worked in several international projects in the field of Orthodontics. He is the author of more than 50 articles published in reputed journals. He is now working as Senior lecturer in Orthodontic unit, School of Dental Science, Universiti Sains Malaysia.

Volume of this Book has been reviewed by:

Dr. Kathiravan Purmal
BDS (Malaya), DGDP (UK), MFDSRCS (London), MOOrth (Malaya), MOOrth RCS( Edin), FRACPS.
School of Dental Science, Universiti Sains Malaysia.

Dr Kathiravan Purmal graduated from University Malaya 1993. He has been in private practice for almost 20 years. He is the first locally trained orthodontist in Malaysia with international qualification. He has undergone extensive training in the field of oral and maxillofacial surgery and general dentistry.