CLINICAL RADIOGRAPHY

BARBARA E DIXON
Therapist, Hygienist or Certified nurses role

- Place film in appropriate place in mouth
- Position x-ray tube
- Select appropriate setting on x-ray unit
- Expose radiograph
The clinical image
Radiographic Image

- Produced by x-rays passing through an object and interacting with film
- Two dimensional
- Black, white and grey image
- Superimposed shadows
Equipment

• X-ray unit (operating at approx. 70kV)
• Radiographic Film
• Beam aiming device
• Processing equipment
• (Dark room)
• Log book
How do the “shadows” form

• X-ray beam hits an object
• Beam is stopped or slowed or altered (attenuated) by the object
• The varying amount of x-rays passing through the object have varying effects on the film.
X-ray Interaction with Matter

- Total Absorption
- Absorption and scatter
- Pure scatter
- Transmitted unchanged
Technique

• Film parallel to object being imaged
• Beam aimed at right angles to film
• Correct exposure
• Patient co-operation
Alignment

Film supported by film holder and beam aiming device

Direction of x-ray beam
Production of x-rays

- Requires energy source
- Specialist equipment
- Photographic (x-ray) film
- Processing equipment
- Image viewer
In short

- Electricity in
- X-rays out
- Pass through tissues
- Hit photographic film (or receptor)
- Film Processed (computer programmed)
- Image viewed
Dental X-ray Generating Equipment

- A tube head
- Positioning arms
- A control panel and circuitry
Ideal Requirements

• Safe and accurate
• Capable of producing required x-rays
• Small
• Easy to manoeuvre and position
• Stable, balanced and steady
• Easily folded and stored
• Simple to operate
• Robust.
Tube head

- Glass x-ray tube
- Transformers
- Lead shield
- Oil
- Aluminium Filters
- Collimator
X-ray Units

• Inside a typical x-ray unit
The Target

• Usually Tungsten
Modern x-ray tube head, armature and control panel
Modern x-ray tube head and armature
Control panel
Photographic Film
Main Components

• Photographic Film
• Black paper to reduce light leakage
• Metal foil to reduce scatter
• Plastic cover for water and light tightness
Standard Radiographic film

White outer protective, light tight and waterproof cover
Intra-oral film

- Photographic film
- Black paper
- Waterproof outer plastic sleeve
- Lead foil
Types of Radiographs

Two main types

• Intra – oral

• Extra - oral
Intra-oral Radiographs

- Bitewings
- Periapicals
- Most Occlusal views
Intra-oral radiography

• Use film holder and beam aiming device for Bitewings and Periapicals

• Appropriate film size
  1. Small- children
  2. Medium-adults
  3. Large- occlusal views
Film sizes

occlusal

Standard i.o.

Small i.o.
Reverse of films
Posterior periapical film holder and beam aiming device
Anterior periapical film holder and beam aiming device
Types and reasons for use

**Periapical**
Shows anatomy of whole tooth including apex, pulp, crown and supporting bone.

**Used for**
detection of apical pathology, endodontics, periodontal assessment, recurrent caries.
Periapical radiograph of lower left.

- Grossly carious tooth
- Apical pathology
Bitewing Radiograph

Shows crowns of upper and lower teeth

Reasons for use.

• Periodontal bone levels
• Detection of interproximal caries
• Detection of secondary caries
• Detection of early caries.
BITEWING RADIOGRAPHY

Film holder and beam aiming device

Film

X-ray beam
Bitewing Radiograph

Caries under existing filing

Secondary caries
Occlusal Radiographs

Larger than bitewing or periapical
Shows “plan “ view of teeth and bone in mandible or maxilla.

Used to detect

• Unerupted teeth
• Supernumerary teeth
• Cysts
Upper Occlusal view

Radicular Dental Cyst
Lower Occlusal Radiograph
Extra-oral radiographs

- Used for detecting trauma
- As adjunct to intra-oral views
- Used in orthodontics
- Used as general scan
- Used where patient compliance is poor.
Projections

- O.P.G.
- Lateral Oblique
- Occipitomental
- 30 degree O.M.
- PA. skull
- PA. Jaws
- Rotated PA.
- True Lateral
- Lateral Cephalograph
- Submento-vertex
- Transpharyngeal.
O.P.G. or D.P.T.
Lateral Oblique
True Lateral
Lateral Ceph.
P.A. view
Submentovertex
Digital Radiography
Digital Radiography

- Basic set up as for routine
- Needs x-ray generating equipment
- Requires digital sensors
- Requires computer plus software
Film Faults

- Blurred
- Too dark
- Too Pale
- Poor contrast
- Marked
- Obscurred
## Faults

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bright Image</td>
<td>Under exposure</td>
<td>Adjust exposure</td>
</tr>
<tr>
<td></td>
<td>Exhausted developer</td>
<td>Change developer</td>
</tr>
<tr>
<td>Dark Image</td>
<td>Over exposed</td>
<td>Adjust exposure</td>
</tr>
<tr>
<td></td>
<td>Over developed</td>
<td>Reduce time/temperature</td>
</tr>
</tbody>
</table>
## Faults.cont

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partly blank image</td>
<td>Incorrect angulation</td>
<td>Direct beam to middle of film</td>
</tr>
<tr>
<td>Blurred image</td>
<td>Patient or machine moved</td>
<td>Ensure patient is fully informed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use fastest possible film</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ensure tube head stable</td>
</tr>
</tbody>
</table>
### Faults….cont.

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<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black lines</td>
<td>Finger nail marks</td>
<td>Handle film gently</td>
</tr>
<tr>
<td></td>
<td>Over bending of film in or out of mouth</td>
<td>Ensure patient does not bite film</td>
</tr>
<tr>
<td>Herring bone pattern over film</td>
<td>Film positioned back to front in patients mouth</td>
<td>Ensure correct orientation of Film</td>
</tr>
</tbody>
</table>
## Faults ....cont.

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<tr>
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<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bright spots on film</td>
<td>Fixer splashes</td>
<td>Keep darkroom areas clean and dry</td>
</tr>
<tr>
<td></td>
<td>Inadequate washing</td>
<td>Wash thoroughly after fixing.</td>
</tr>
<tr>
<td></td>
<td>Grease / oil on hands</td>
<td>Ensure clean hands before processing films.</td>
</tr>
</tbody>
</table>
### Faults....cont.

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<th>Cause</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark/black areas</td>
<td>Over lap of films</td>
<td>Ensure adequate times between processing films, agitate films in processor</td>
</tr>
<tr>
<td>Bright Patches</td>
<td>Temperature of solutions too high</td>
<td>Check temperature and reduce</td>
</tr>
</tbody>
</table>
Log Book

• Record date
• Patients name
• No and type of radiographs
• Assessment of radiograph
• Reject Analysis
• Use for Audit
Local Rules

- Name of RPS
- Name and contact details of RPA
- Identification and description of “controlled area”
- Summary of working instructions
- Contingency arrangements
- Dose investigation level
- Name of “Legal Person”
- Arrangements for personal dosimetry
- Arrangements for pregnant staff
Quality Assurance

• Aims are to produce radiographs of consistently high quality
• Reduce the number of repeat radiographs.
• Determine sources of error and correct them
• Increase efficiency,
• Reduce risks to patients and staff
• Reducing costs.
Quality Assurance cont.

- All exposures justified
- A.L.A.R.A.
- High Speed Film
- Beam aiming Devices.
- Correct maintenance of equipment.
- Correct instructions to patient
Quality Assurance cont.

• Radiographic evaluation as suitable for purpose (A. B .or C or 1.2.3 )

• Correctly orientated, mounted and dated.

• Correctly processed.

• Log book
Q.A. Processor Maintenance and Processing

- Written protocol for maintenance.
- Record of fluid changes
- Record of cleaning
- Record of profession maintenance.
- P.A.T. test record
- Processing record
  (wedge or coin re standard)
Q.A. - Training

• All Personnel suitably trained in core subjects as appropriate.
• All attended appropriate I.R.M.E. course every 5 years (5 hrs)
• Record updated courses.
• All staff who process radiographs to have suitable training.
Report

- All radiographs must have a written report made on them
- Report should be in the notes
Information

- H.S.E.
- N.R.P.B.
- F.G.D.P.
- D.B.G.
- Text books
In Short

• X-rays can be fatal!
• There are strict rules governing their use
• There are guidelines for exposure
• There is legislation about recording activity
• Ensure you comply- even 1 cancer in 1,000,000 is a lot on the conscience!
• Ignorance is no excuse.