Tips and Hints on how to make Radiographic Technique easier for the Operator and the Patient

Barbara Lamb

Paralleling technique

- To allow you to see the position of your film is parallel to the tooth in question the head should be upper occlusal plane parallel to the floor (ala-tragus) for upper teeth
- Lower occlusal plane parallel to the floor (corner of the mouth-tragus) for lower teeth
- Films - size 0 vertical for anterior teeth
  - size 2 horizontal for posterior teeth
  - size 0 and 2 for bitewings children and adults
  - occlusal films

Operator Position

To position your films as accurately as possible, you will pretend your eye is the x-ray beam. This means that your body position must be as close as possible to the tube as it will be positioned before exposure of the film i.e. for tooth 11 stand on right side of patient; for 21 stand on left side. Stand as close as possible to the chair, close one eye, allowing you to look through the ring at the correct angle down the rod! All will become clear – read on!

Cotton Wool

Cotton wool will be used for taking all paralleling technique films, apart from bitewings. It will be placed in the mouth on the opposing occlusal surface to the one being radiographed. It is best to place the cotton wool:

- **before** the film is placed for **upper teeth** and
- **after** the film is placed for **lower teeth**.

Therefore, **first** for uppers, **second** for lowers.

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Anteriors:
Cotton wool should be placed across the arch for anteriors, like a cigarette.

Posteriors:
Along the arch for upper posteriors and obliquely across the arch for lower posteriors.

Locator Rings
The ring must be brought close to the skin, approximately one centimetre away, before exposure to give the correct anode/film distance. If the ring is too far from the patient’s face the exposure will be reduced quite markedly.

Bite block Position (approximate position only – every patient is different)

Patient bites:
- Upper Anterior: on the outer aspect of the block i.e. furthest from the film
- Lower Anterior: halfway across the block
- Upper Posterior: on the outer aspect only of the block
- Lower Posterior: approximately one third across the block i.e. close to the film

Technically Challenging Patients

Patients with a Strong Gag Reflex

It has become clear to me that most dentists ask patients to breathe through the nose when taking radiographs to stop gagging. Possibly from the time when, as students, they were taught nose-breathing when taking impressions. After many years as a radiographer in dental work, I believe the only way to control a strong gag reflex is to mouth breathe. As the patient’s teeth come together on the block, loud breathing should commence through the teeth – quite shallow breaths with the patient being aware of trying to hold the soft palate high. You can only gag if you stop breathing, and it usually happens on an out breath, so suggest to the patient that he/she breathe loudly through the teeth so that you can hear them – in breath and out breath joined together – **no gaps between the two.**

Remove films, cotton wool, bite block etc, with patient breathing one long breath in. Try it – it works (happy breathing).
Cotton Wool

Cotton wool is usually used on the opposing occlusal surface to the one you are x-raying.

There are some exceptions:

Short crowns/ Shallow palates/ Cleft palate patients

- It may be necessary to lengthen the crown slightly in these patients to allow access into the palate. The cotton wool can be placed against the tooth in question and bitten hard so that the crown is only slightly lengthened and the film still shows the apex of the tooth.

Partially edentulous patients

- It may be advisable to fill the spaces with “pretend crowns” (cotton wool) to allow the patient to bite the block with the film along the line of occlusion and not falling into an edentulous area.

Totally edentulous patients

- These patients should have cotton wool along both the occlusion of interest “pretend crowns” and the opposing occlusion to allow the patient to bite in comfort and to give the operator control of the film angle. The edentulous patient should not wear any dentures as a) their bite is not strong enough and b) they can dislodge the appliance. The patient should hold a grimace during the bite as this will help them bite strongly with their gums and not their lips. SMILE!

PERIAPICAL FILMS

Parallelizing Technique – Upper Teeth

Maxillary Incisors

Head Position

Upper occlusal plane parallel to the floor (straight head) allowing the operator to check the position of the film by looking through the ring down the rod at the bite.
block and tooth position before aligning the spacer cone, with the rectangular columator aligned to the notches.

Locator Ring

At distance from block, to allow access into the mouth, brought close to skin for exposure.

Cotton Wool

The cotton wool is placed in the mouth before positioning the film.

Used for all films taken with paralleling technique – cotton wool is placed on the corresponding tooth on the lower arch. Cotton wool is placed across the arch like a cigarette and is held in position with the operator’s non-dominant hand. This hand holds the cotton wool until the correct bite is achieved. The cotton wool will allow the operator to achieve positioning of the film parallel with the long axis of the root. The cotton wool may need to be moved many times to achieve the correct film position.

Positioning film

Hold rod and tilt film at an angle (flat) to insert into mouth. Raise film into upright position into the palatal vault at its highest point. Sit bite block onto the lower occlusion on top of the cotton wool (dominant hand holding rod; non-dominant hand holding cotton wool). The patient bites on to the block, probably at the furthest area of the block from the film. The palatal vault should be able to accommodate the film height without too much compromising of parallellility. When checking position is correct, move the locator ring close to the teeth (not touching) and look through the ring (exactly the centre of the ring). You will see where the centre of the beam is passing (best done with one eye closed). Is the tooth or teeth biting centrally on the block? Will the beam pass through the spaces on either side of the teeth and show bone levels and possible caries? If not, change position of cotton wool and bite block independently, until your eye sees the result you want. Bring the spacer cone into position, parallel to the rod, and adjust the rectangular columator to line up with the notches, close but not touching. The vertical position will have notches to match size 0 film. As the patient bites their teeth gently on to the block, they should breathe through their teeth loudly, so that you can hear the breathing. To align the tube the operator’s hands should be on top of the X-ray tube, and on top of the spacer cone, to stop the rod being displaced by the operator. After exposure, the film and cotton wool should be removed, with the patient taking a long in breath.
Maxillary Canines

Head Position

The Ala- tragus line is parallel to the floor – i.e. a straight head.

Locator ring

Is placed at a distance from the block to allow access into the mouth and brought to the skin before exposure.

Cotton wool

The cotton wool is placed in the mouth before positioning the film.

Is placed across the lower arch on the occlusal surface of the lower canine.

Film position

The film is placed into the palatal vault at its highest point behind the canine. The patient bites with the maxillary canine central on the block. The cotton wool determines that the film position is parallel to the long axis of the root. As before, for maxillary incisors, complete the positioning using the breathing technique.

Problems with taking Maxillary Canine Films

Very frequently there is an overlap with the maxillary canine and the first premolar. Distomesial angulation of tube of about 8 degrees can sometimes throw the teeth apart by off-centring the beam. Usually, if a bone level is required or caries is to be detected, two films will need to be done.

- First film size 0 vertical anterior paralleling technique as above.
- Second film size 2 horizontal premolar film should be taken as explained below but the bite block film and rod should be placed more mesially in the mouth to include the canine. This angle will throw the canine and first molar apart.

Maxillary Pre-Molars

Head Position

Upper occlusal plane, Ala- tragus parallel to the floor.

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Locator Ring

At distance from block. Brought to skin for exposure.

Cotton Wool

The cotton wool is placed in the mouth before positioning the film.

Held with non-dominant hand, along the line of the arch, on top of the occlusal surfaces. The cotton wool will extend just far enough out of the mouth to allow the operator to hold the end of the cotton wool roll until after the patient has bitten onto the block. If not held, the roll will fall off the occlusal surface before the block is bitten. The cotton wool will be very effective in holding the film up into the mid-line of the mouth; without it, the film will want to tip forward, possibly “cutting off” the distal roots of the teeth you wish to see on the radiograph.

Positioning of Film

The film will be laid flat for access into the mouth and brought into the mid-line at the highest point, around the position of the first molar. The rod is then rotated mesially towards the front of the mouth, until it lines up the block with the pre-molars. This allows the film to be positioned without bending on the hard palate. The patient bites and the operator looks down the rod with one eye and checks that the pre-molars are biting clearly on the block. The eye will see that the beam will pass between the teeth and show bone levels and caries etc. and the height of the film in the mid-line and position of cotton wool will ensure that all roots are showing on the resultant radiograph. The patient will be biting halfway - to the outer aspect of the block.

Bring the ring close to the skin. Position the spacer cone parallel to the rod and with the rectangular columator matching horizontal notches. Breathing as before.

Maxillary Molars

Head Position

Ala-tragus parallel to the floor.

Locator Ring

At distance for access. Brought to skin for exposure.

Cotton Wool

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The cotton wool is placed in the mouth before positioning the film.

Placed along the line of the arch being held into position by the non-dominant hand, as for pre-molar.

**Position of Film**

Lay film flat for access into the mouth, brought upright into the mid-line of the mouth. Staying in the mid-line should be a good position for the first and second molars. To access the third molar, ask your patient to open their mouth slightly and move the film further back. As the patient closes their teeth together, he/she must start mouth-breathing. The patient should be biting on the outer aspect of the block. Any closer and the roots will be foreshortened due to the steep non-parallel angulation. Bring the ring close to the skin and position the spacer cone parallel to the rod and rectangular columator to the notches.

**Paralleling Technique – Lower teeth**

Common problems when dealing with lower paralleling technique are:

- Patient complaining of pain in the floor of the mouth due to film pressure
- Inability to achieve teeth/bite block position
- Pressure of film on lingual aspect of the mandible

**Mandibular Anteriors**

**Head Position**

Chin up, corner of the mouth-tragus of ear, parallel to the floor i.e. lower occlusal plane.

**Locator Ring**

At distance for access and brought to the skin for exposure.

**Cotton Wool**

The cotton wool is placed in the mouth after positioning the film across the arch like a cigarette.

Feel the floor of the mouth and place the film down into the softest area until the block is on the occlusion of the tooth or teeth to be radiographed. Place the

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cotton wool across the block and ask the patient to bite and hold the block with their teeth. The operator hands will push the tube upwards so as not to dislodge the rod. Bring the ring close to the skin and check through the ring (one eye only) and see where the beam will travel. The patient should be biting at least halfway across the block. Bring the ring close to the skin, line up the spacer cone parallel to the rod and with the columator against the notches.

**Mandibular Pre-Molars**

**Head Position**

Corner of mouth - tragus of the ear parallel to the floor.

**Locator Ring**

At distance for access, brought to skin for exposure.

**Cotton Wool**

The cotton wool is placed in the mouth after positioning the film obliquely along the line of the arch.

Check the floor of the mouth, place the film parallel down the side of the first molar. Rotate the rod mesially until the pre-molars are parallel to the film. Push the film down until the block is on the pre-molar occlusal surfaces. Place the cotton wool along the line of the arch and with the patient biting on the bite block bring the ring to the skin for exposure. Check beam position by looking through the ring (one eye only). The patient should be biting halfway/outer aspect of block. Bring the spacer cone into position parallel with the rod and columator against the notches.

**Mandibular Molars**

**Head Position**

Corner the mouth- tragus of the ear, parallel to the floor.

**Locator Ring**

At distance for access. Brought to the skin for exposure.
Cotton Wool

The cotton wool is placed in the mouth after positioning the film obliquely along the line of the arch.

This area of the mouth is the closest the film and teeth will be in paralleling technique. The teeth should be biting approximately one third onto the block - no closer as this can be very painful. Check the floor of the mouth, flatten the film to enter the mouth, and gently push the tongue out of the way as you place the film into the sulcus next to the molar area. If you place the film down into the sulcus and the block onto the occlusion, the floor of mouth should not tighten as the patient has put no pressure on it. To place the film further back, ask the patient to breathe through his/her teeth and to open the mouth slightly. Slide the film further back until the third molar area will be shown. The floor of the mouth should remain relaxed and the gag reflex controlled by the breathing. Place the cotton wool obliquely along the line of the arch and with the patient biting gently on the block bring the spacer cone parallel to the rod and adjust columator to the notches.

BITEWING FILMS

4 Holders: 2 horizontal – size 0 used in children
size 2 used in adults
predominantly used for the detection of caries

2 vertical – size 0 and size 2 used to show bone levels but will not show apices of teeth.

Exposure for bitewings is lower in Kv than for periapicals if the machine allows a variable Kv. This will reduce cervical burnout and show more shades of grey, therefore more caries will be shown if present. If Kv is not variable, reduce exposure time instead. A test film exposure (Quality Assurance) is often a goodbitewing exposure as it shows many levels of grey. Bitewings have the only mandatory head positions for paralleling technique. The head must have the upper occlusal plane parallel to the floor.

Check if the patient has any eights.

If so and also a full complement of other posterior teeth, take 2 films per side.
The first for pre-molars, second for molars.

If no eights do one film per side, showing mesial four to distal seven unless it is specified that the mesial five to distal eight is wanted.

Check the patient’s arch formation.

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• Are the proximal spaces lying at the same angle as each other?
• Are there any teeth out of the arch?
• Is the arch pointed, square or a gentle curve?

Ascertain the most anterior canine/premolar proximal space on either side in turn. Is it the upper or lower that is most anterior when the teeth are in occlusion? If it is the lower, place the film with the block on the occlusion and the film 2 or 3 millimetres anterior to mesial four. If it is the upper, place the film anteriorly by the number of millimetres the upper is anterior to the lower canine/premolar space.

Place the film parallel to the line of the arch, to allow the beam to pass through the spaces with the teeth in occlusion and no cotton wool. If the patient smiles when checking position through the ring, you will be able to ascertain what will show on the film before lining up the spacer cone. Bring the ring close to the skin and position the spacer cone parallel to the rod and adjust rectangular columator to the notches – close but not touching.

When taking bitewings on children with deciduous teeth, the small bitewing holder is used with a size 0 film. For a few minutes before placing the film in the mouth, have the child practise big smiles with soft tissues pulled back, almost in a grimace. This will allow them to clench their teeth together when the film is placed in the mouth. If the child is much younger, have the child practise by growling like a bear. Sounds silly but it works!

**Vertical Bitewings**

Vertical bitewings can be used with the same technique as above. Two films must be taken on either side – first for pre-molars and second for molars. They show excellent bone levels as the operator will automatically use their bitewing technique which is excellent for proximal spaces. Therefore this will also show excellent bone levels. The only drawback is that apical attachment is not shown and, if this is needed, periapical films must be done.

**Soft Tissue Lip**

Place size 2 film behind the lip and draw on a piece of paper where the dot is. A flash exposure on the film can be used, which is at least half the exposure of an anterior periapical film. The film can then be mounted in the same position as is drawn on the paper and will show tooth fragments etc.
Bisecting Angle Technique

For some patients paralleling technique cannot be used. Bisecting angle occlusals can be the film of choice for these patients. Occlusal films will give much more information than bisecting angle periapicals and there is only a 5 degree difference between bisecting angle periapical and bisecting angle occlusals of the same area.

Occlusal films are often the film of choice when a large area is required, showing excellent detail radiographs, for example areas of infection, uneruption or tumour. Occlusals are also taken for parallax to locate unerupted teeth and mesiodens.

All oblique occlusals will show a large periapical area with excellent film quality.

Head Positions

Oblique occlusals upper:

Upper occlusal plane parallel to the floor.

Central beam passes through the roots of interest, one centimetre above the ala tragus line. The angle of the tube is 60 degrees to the floor for anteriors, flattening to 45 degrees for posteriors

i.e. 60 degrees for central incisors
   55 degrees for canines
   50 degrees for pre-molars
   45 degrees for molars

When centring for an upper standard central oblique occlusal, first align your tube with the operator standing at the side of the patient. The top of the rectangular columnator should be touching the lowest eyebrow hair with the tube in the mid-line. The operator then stands at the bottom of the chair and checks the alignment of the tube. When oblique occlusals are necessary for other areas of the mouth, first position centrally and then rotate the tube to point at the roots of interest.
Oblique occlusals lower:

Lower occlusal plane parallel to the floor.

Central beam passes through the roots of interest. Align the tube along the lower border of the mandible. The angle of the tube is 35/40 degrees to the head for anteriors, flattening to 20/25 degrees for posteriors.

i.e. 35/40 degrees for lower central incisors
30/35 degrees for lower canines
25/30 degrees for lower pre-molars
20/25 degrees for lower molars.

For all oblique occlusals, the colimator is rotated to allow as much information as possible on the film.

True Occlusals (only lower)

Used for bucco-lingual expansion or submandibular calculi.

Head is positioned as far back as comfortably possible, chin high and beam centred to the film over area of interest at 90 degrees.

PANORAMICS

All panoramic machines differ from one another but a few points seem to be universal.

- The patient removes all artefacts (Kirby grips, earrings, chains, high zips, dentures, braces).
- The patient removes bulky clothes around the shoulders (jackets etc)
- The patient sits or stands “tall” with their back as straight as possible
- The Frankfort plane (lower border of orbit-tragus of the ear) is parallel to the floor
- The focal trough is ascertained and the teeth bite edge to edge in the trough. The trough is narrow and it is very important to be as particular as possible on this point.
- The mid sagittal light is positioned down the centre of the face and the head is supported in the correct position.
- The tongue is placed against the roof of the mouth behind the front teeth to minimise the amount of air in the mouth as this will show as a dark area on the resultant radiograph, and the mouth is closed.
- The eyes are closed during the exposure so that the patient does not move their head by watching the rotating cassette.

See diagram handout for common positioning faults

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