Chapter 5
Special Techniques

This chapter presents information about:

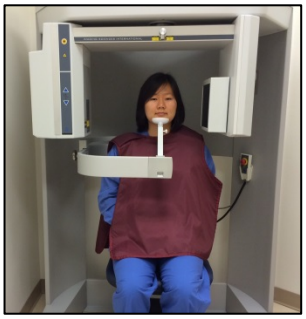
- Panoramic images
- Occlusal images
- Vertical bitewing images
- Portable equipment
- Cone Beam Computed Tomography (CBCT)

Panoramic Images

You are not able to see large areas of the jaw or skull on a single bitewing or periapical image. You can see the entire maxilla and mandible on a single panoramic image.

Panoramic image

Panoramic images are made with X-ray units that are different from those used to take periapical or bitewing images. The X-ray head of the unit rotates around the patient. The X-rays are always directed at the receptor.



Patients with different types of panoramic X-ray units

A thyroid collar is not used with panoramic images because it interferes with the angle of the beam during rotation of the unit. The upward angulation of the X-ray beam reduces direct exposure to the patient's thyroid. Most of the rotation of the X-ray head is around the back of the patient's head. A protective apron that covers both the front and back of the patient can be used.

Patient with protective apron and panoramic X-ray unit

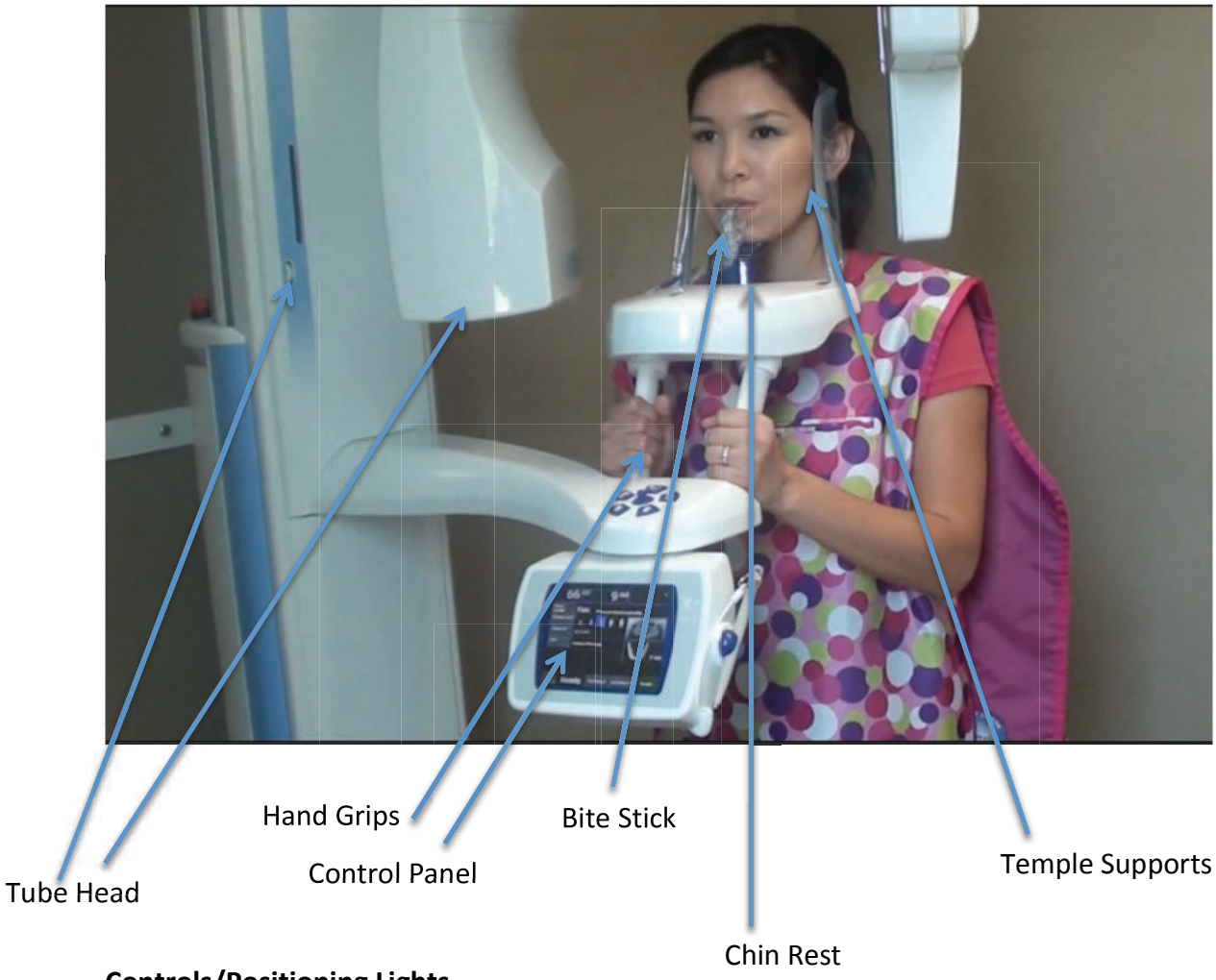
To get better panoramic films, explain to patients what you are doing and why. They will feel more comfortable and be more cooperative.

Can you see the patient's glasses and earrings on this panoramic image?

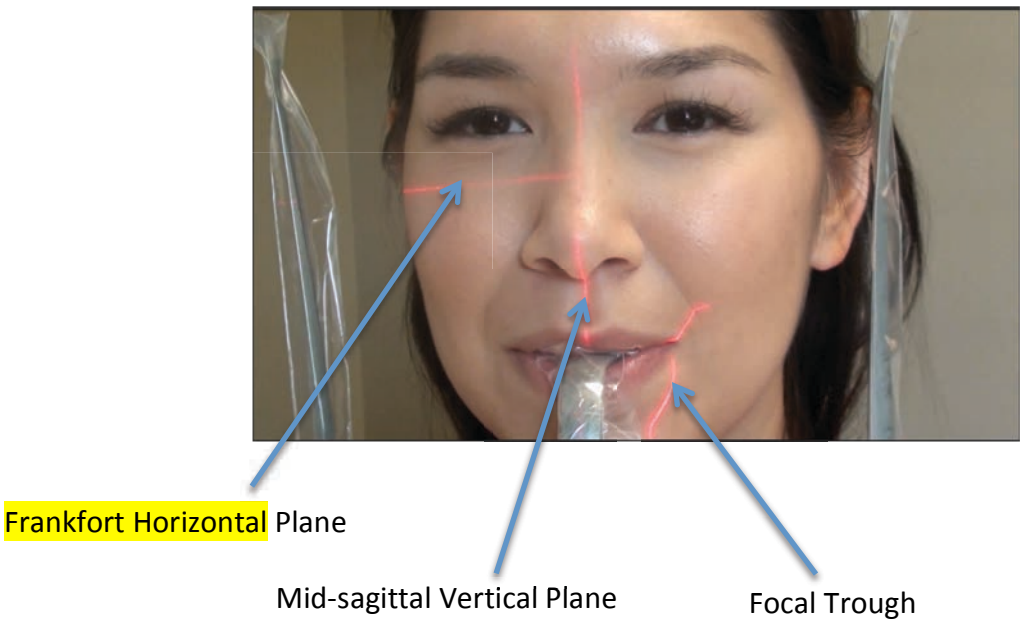
Panoramic image with artifacts

Ask the patient to remove eyeglasses, earrings, hearing aids, neck jewelry, facial and intraoral piercings, partial dentures, retainers, or dentures before taking a panoramic image. These items will block out critical areas in the mouth or cause artifacts. If the patient does not remove these items, the image may have to be retaken. This increases both the patient's and your exposure to radiation.

Parts of a Panoramic Unit



Controls/Positioning Lights



How to Take Panoramic Images

Each panoramic unit will have slight differences in directions for taking images based on the manufacturer recommendations. The following are basic steps that almost all units will require when taking a panoramic image.

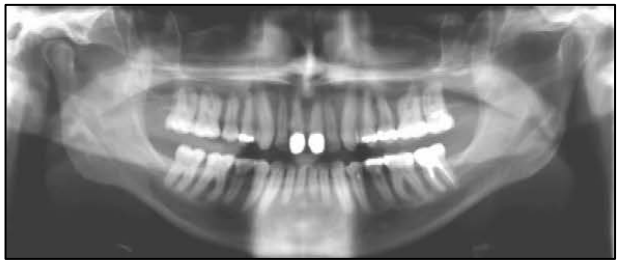
Steps to take a Good Diagnostic Panoramic Image

- Adjust settings on control panel for patient size, type of image, etc.
- Raise or lower the unit so the chin rest is at the appropriate height for the patient
- Have the patient hold the hand grips firmly
- Have the patient bite edge-to-edge on the bite stick
- Have the patient extend their spine and stand tall
- Adjust the controls and/or positioning lights
    - Mid-sagittal vertical plane – this divides the face in half equally
    - Frankfurt horizontal plane – this adjusts the occlusal plane correctly
    - Focal trough (if equipment has this feature)- this focuses the teeth in the anterior region of the image
- Close the temple supports
- Have the patient swallow, placing the tongue on the roof of the mouth and close the lips around the bite stick – this removes shadows on the image
- Double check the control panel settings
- Remind the patient to stand still
- Press the exposure button

How to Take Better Panoramic Images

If a patient has a large upper body, the shoulders could block the rotation of the arm of the unit. Have patients take a couple of steps forward while holding on to the handles. This will lower the shoulders. To further reduce the height of the shoulders, have the patient cross the arms and grasp the handles. Be sure and recheck the positioning lights after having the patient make these adjustments.

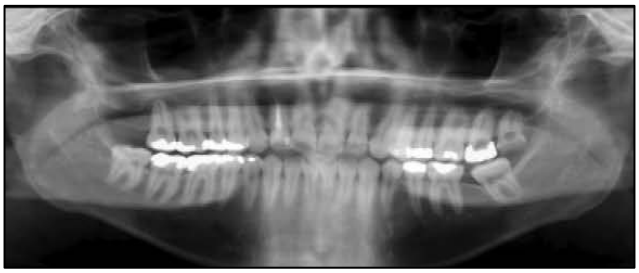
Make sure the patient is standing up straight. This improves the image of the anterior teeth on a panoramic film. If the patient's does not stand up straight, the spine will be superimposed over the anterior region of the panoramic image causing loss of clarity in this area.



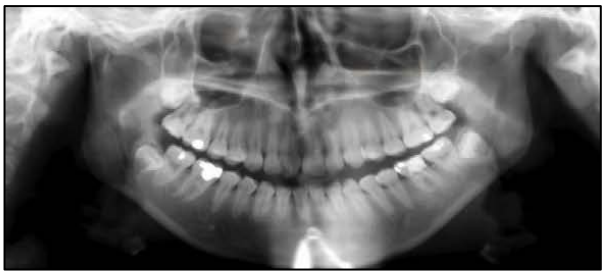
You can help the patient stand tall, by placing a hand at the back of the occipital bone, and gently raising his/her head.

Common Errors When Taking Panoramic Images

If the ***patient's chin is positioned too high***, the occlusal plane will be flat, and cause the image to be stretched, and be distorted.

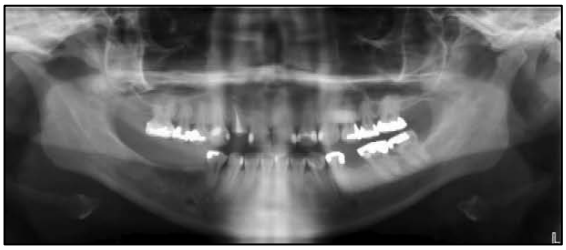


If the ***patient's chin is positioned too low***, it will cause the image to look like a smile. The image will be smaller and distorted especially in the anterior region.

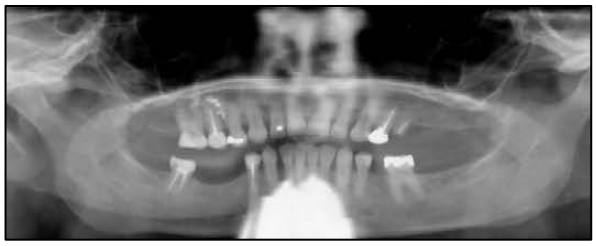


The focal trough is the horseshoe-shaped zone where images appear sharp. Structures outside of the focal trough will be distorted. If the ***focal trough is positioned too far forward***, or the ***patient is biting too forward*** on the bite stick, the anterior teeth will appear narrow and distorted.

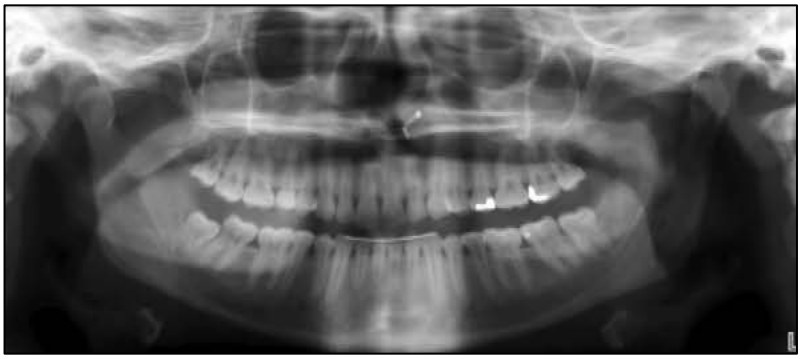
If the ***focal trough is positioned too far back***, or the patient is biting too far back on the bite stick, the anterior teeth will appear wide, and distorted.



If the ***protective apron is too high*** on the patient's neck or shoulders, it will be superimposed on the image as a solid white V, eliminating visibility in the area.



If the patient does not keep the tongue up to the roof of the mouth during the exposure, a dark shadow may appear over the apices of the maxillary teeth. It reduces visibility in this area.



Occlusal Images

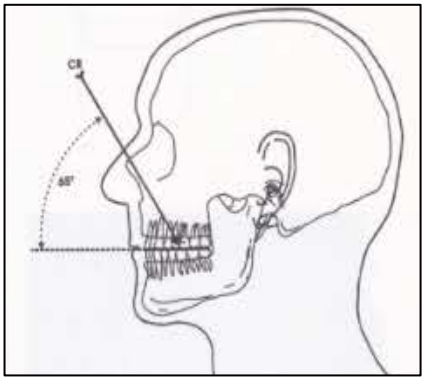
An occlusal image shows large areas of the maxilla, mandible, or floor of the mouth. Occlusal images are used to locate root fragments, supernumerary, unerupted, and impacted teeth. They can also be used to determine the nature and the extent of fractures to the maxilla or the mandible.

Size 4

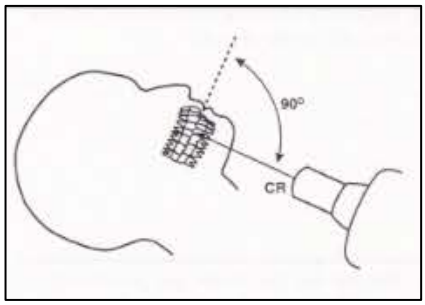
Size 2

Use size 4 receptor for adults; size 2 for children. The receptor is placed in the mouth as if the patient were biting a sandwich. The receptor should be placed as far back in the mouth as possible without gagging the patient. Remember: If you are using a rectangular collimator, remove it to allow a larger exposure area when taking an occlusal image.

For a **maxillary occlusal** image, the patient sits up straight. The receptor is put toward the maxillary occlusal surfaces. The PID is directed just above the bridge of the nose at 60^0 - 65^0 angle.



For a **mandibular occlusal** image, the patient tilts back his/her head. The cone is directed through the chin at a 90^0 angle. The patient may also be laid back in a more supine position with the chin up. The cone is directed at 30-35^0 angle perpendicular to the receptor.



Vertical Bitewing Images

Vertical bitewing images show more of the bone surrounding the teeth. This improves the dentist's ability to evaluate the level of alveolar bone in different areas of the mouth. Vertical bitewings are used to diagnose dental decay and bone loss due to periodontal diseases.

You can use the red XCP or tabs to position a receptor vertically in the patient's mouth.

PSP with BW tab

Placement of vertical anterior BW

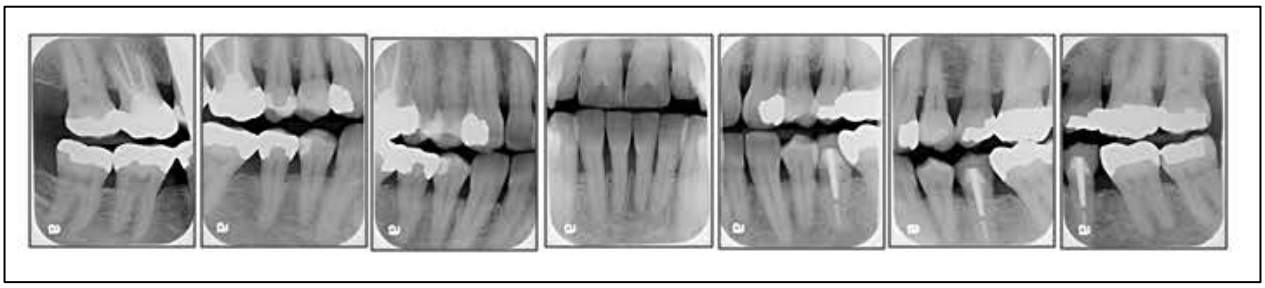
Vertical anterior BW

Size 2 receptor is used to take vertical bitewing images. Usually premolar and molar bitewings are taken on each side. The techniques for opening contacts and cone placement are similar to taking horizontal bitewing images except the receptor is put vertically in the mouth.

Tip: A longer tab is needed for anterior vertical bitewings. You can buy special tabs and positioning devices or you can use two tabs stuck on top of each other. The patient has to bite on the tab so the anterior teeth are touching at the incisal edge.

Vertical Bitewing Series

A total of seven images (three anterior and four posterior) are used to show the anterior, canine, premolar, and molar areas.



Portable Equipment

Hand held radiographic equipment was introduced into dentistry around 2003. The technology is evolving quickly and units are becoming lighter and easier to use.

Dental assistant taking molar bitewing using NOMAD

It is essential to use proper positioning and shielding on the portable X-ray units to prevent operator exposure to unnecessary radiation.

Radiation protection for operator

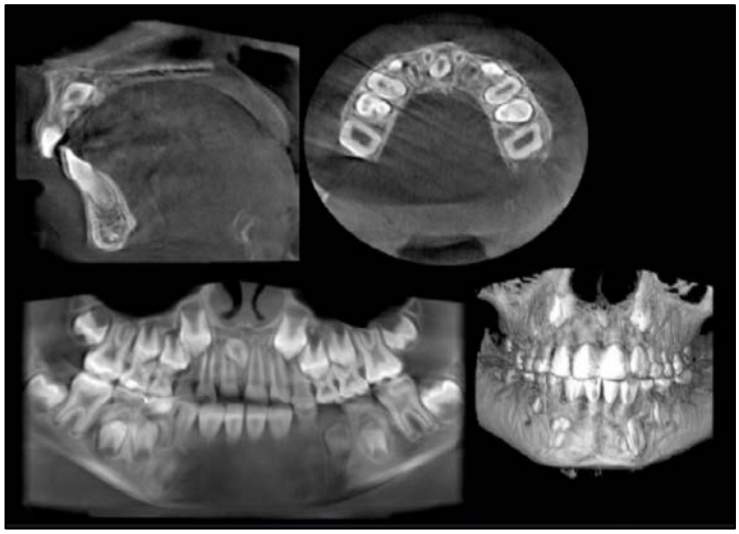
NOMAD screen

Check with the manufacturer's website for more information about using portable X-ray units.

Cone Beam Computed Tomography (CBCT)

Unlike two-dimensional imaging, CBCT produces three-dimensional (3D) views of the mouth, face and jaw. CBCT greatly enhances the diagnostic abilities of the dentist.

CBCT images involve more radiation exposure than a two dimensional image like a panoramic image. You should be well trained on the use of the unit and positioning so the image does not have to be taken more than once. Use of this technology requires a dentist to carefully assess the need and to specifically order the CBCT image prior to a dental assistant taking the exposure.



Different examples of CBCT images

These types of images are vital for the exact placement of implants, for visualizing the buccal/lingual position of impacted teeth that are to be removed, and for determining the exact location of the mandibular nerve before surgery is performed.

Patient with CBCT unit

CBCT machine

This completes Chapter 5: Special Techniques. You are now ready to test your understanding of the information you learned.