Radiology

Panoramic Radiography

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Panoramic imaging (also called pantomography) is a technique for producing a single tomographic image of the facial structures that includes both the maxillary and mandibular dental arches and their supporting structures.

**Paatero and Numata were the first to describe the principles of panoramic radiography. x-ray source rotates around the patient’s head and in opposite direction to the rotation of image receptor and collimator. Lead collimators in the shape of a slit, located at the x-ray source and at the image receptor, limit the central ray to a narrow vertical beam. Another collimator between the objects and the receptor reduces scattered radiation.

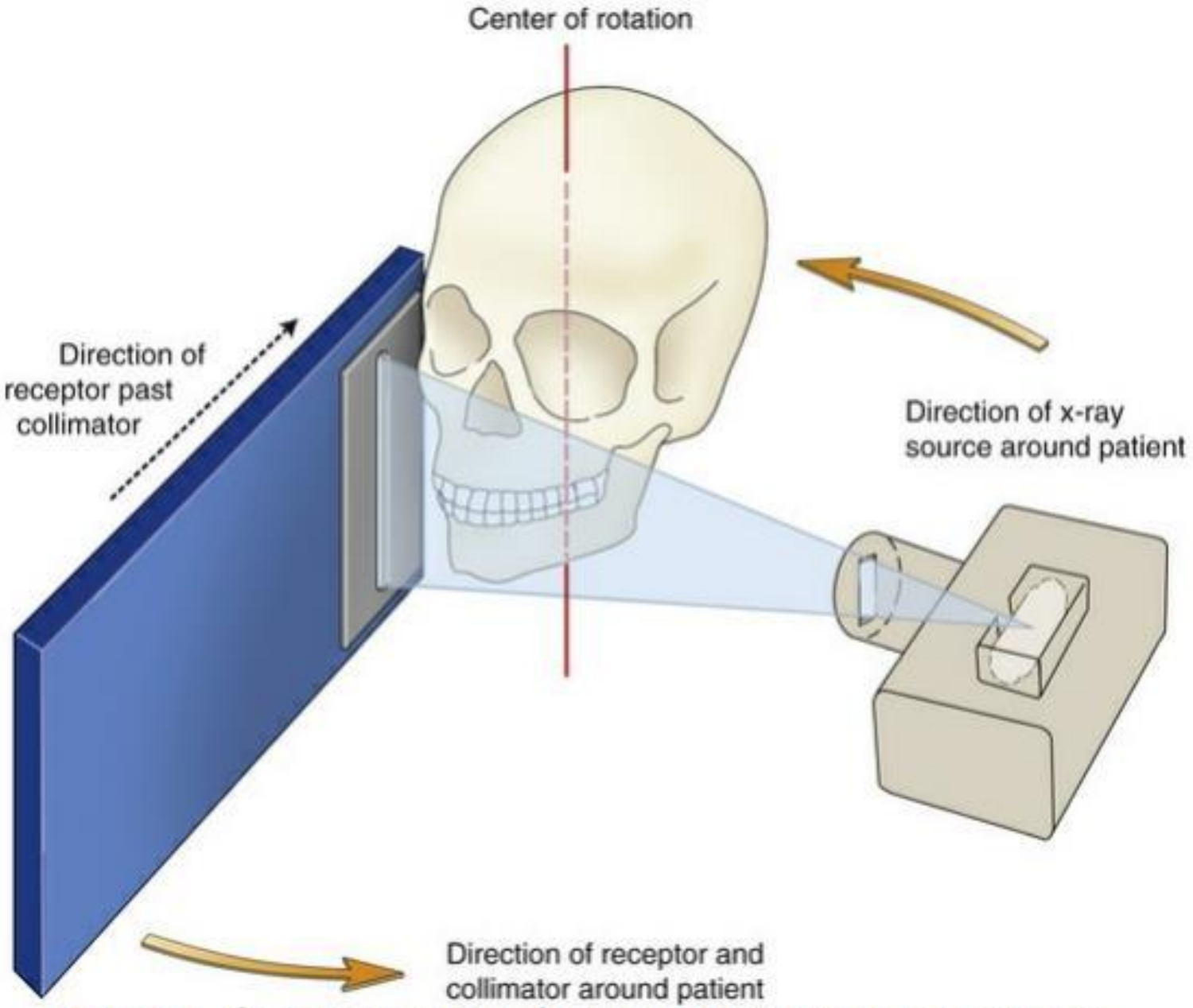
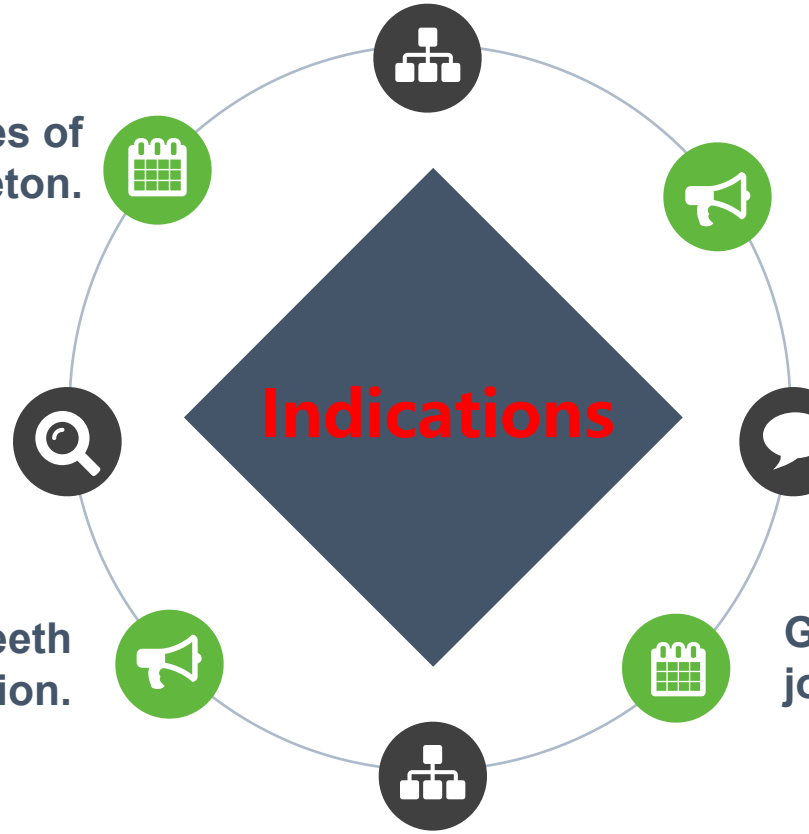


FIG. 9.2 Schematic view of relationships between the x-ray source, the patient, the secondary collimator, and image receptor.

Indications



Developmental disturbances of maxillofacial skeleton.

Overall evaluation of dentition

Dentomaxillofacial trauma such as fracture.

Evaluation of intraosseous pathology such as cysts, tumors and infections.

Evaluation of permanent teeth eruption and mixed dentition.

Gross evaluation of tempromandiular joints

Evaluation of impacted teeth, dental implant, and orthodontic treatment

Advantages


1. Broad coverage of facial bones and teeth
2. Low radiation dose
3. Ease of panoramic radiographic technique
4. Can be used in patients with trismus or in patients who cannot tolerate intraoral radiography
5. Quick and convenient radiographic technique
6. Useful visual aid in patient education and case presentation

Disdvantages

Lower-resolution images that do not provide the fine details provided byintraoral radiographs

Magnification across image is unequal, making linear measurements unreliable

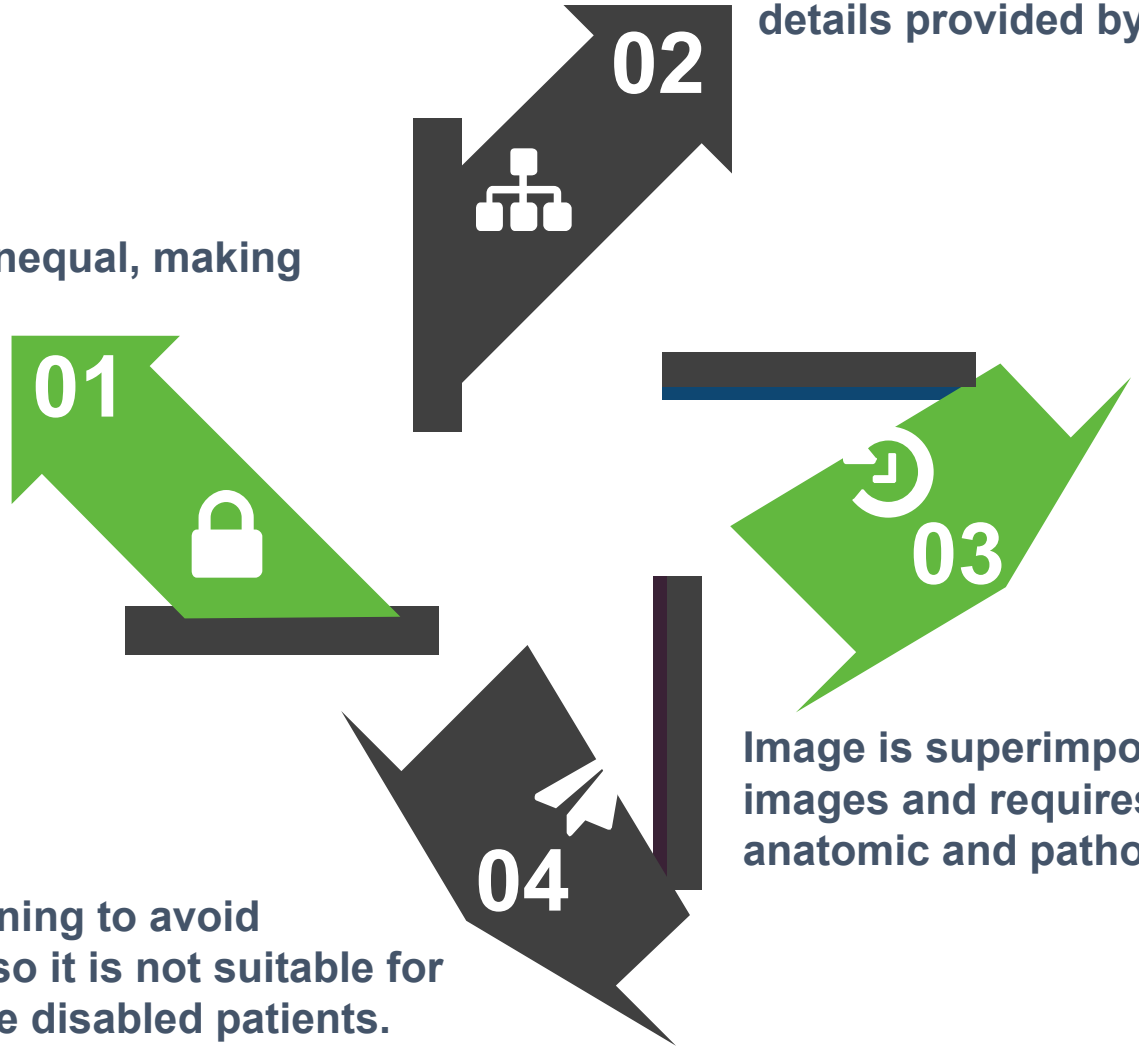


Image is superimposition of real, double, and ghost images and requires careful visualization to decipher anatomic and pathologic details

Requires accurate patient positioning to avoid positioning errors and artifacts, so it is not suitable for children under 5 years or on some disabled patients.

Technique, Patient Positioning and Head Alignment

This technique utilises a narrow vertical negatively angled beam. The angle can be (−4 to −7°), so the beam exposes the patient just below the occipital bone. The beam is shaped by a lead collimator which is long, narrow slit located at the X-ray source and the image receptor (film or digital plate).
Proper patient preparation and positioning within the focal trough are essential to obtaining diagnostic panoramic radiographs.

1. Dental appliances, earrings, necklaces, hairpins, and any other metallic objects in the head and neck region should be removed.

2. Demonstrate the machine to the patient by cycling it while explaining the need to remain still during the procedure. This is particularly true for children, who may be anxious. Children should be instructed to look forward and to not follow the tube head with their eyes

3. The anteroposterior position of the patient head is achieved typically by place the incisal edges of their maxillary and mandibular incisors into a notched positioning device (the biteblock).
4. The midsagittal plane must be centered within the focal trough without any lateral shift in the mandible
5. The patient's chin and occlusal plane must be properly positioned to avoid distortion. The occlusal plane is aligned so that it is lower anteriorly.
6. Patients are positioned with their backs and spines as erect as possible and their necks extended.
7. Ask the patient to swallow and hold the tongue on the roof of the mouth. This raises the dorsum of the tongue to the hard palate, eliminating the air space and providing optimal visualization of the apices of the maxillary teeth

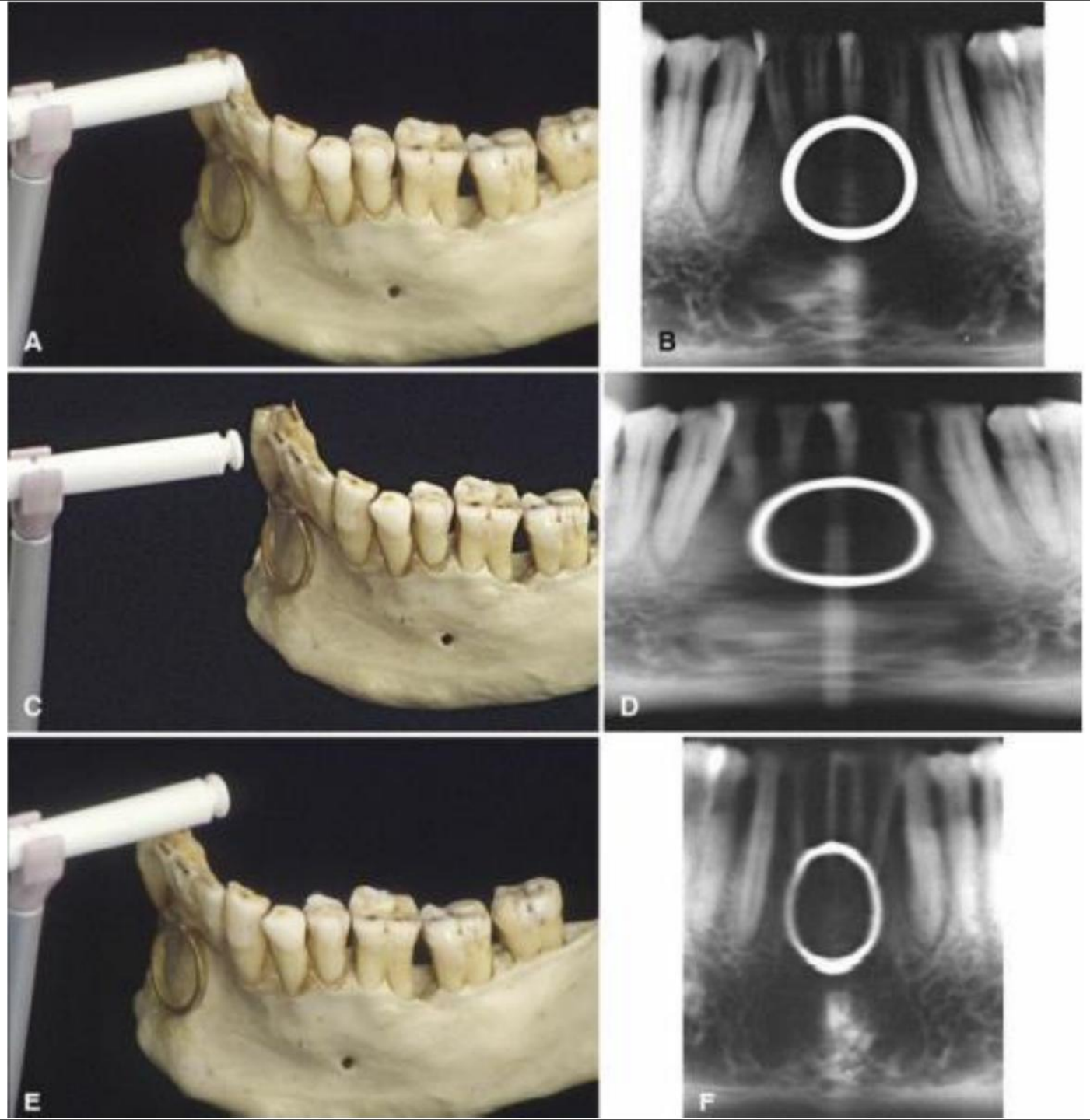

PANORAMIC
X-RAYS
EXPLAINED

Placement of the patient either too far anterior or too far posterior relative to the focal trough results in significant dimensional **errors** in the images for example:

- Too far posterior results in magnified mesiodistal dimensions through the anterior sextants and resulting “**fat**” teeth (D).

Too far anterior results in reduced mesiodistal dimensions through the anterior sextants and resulting

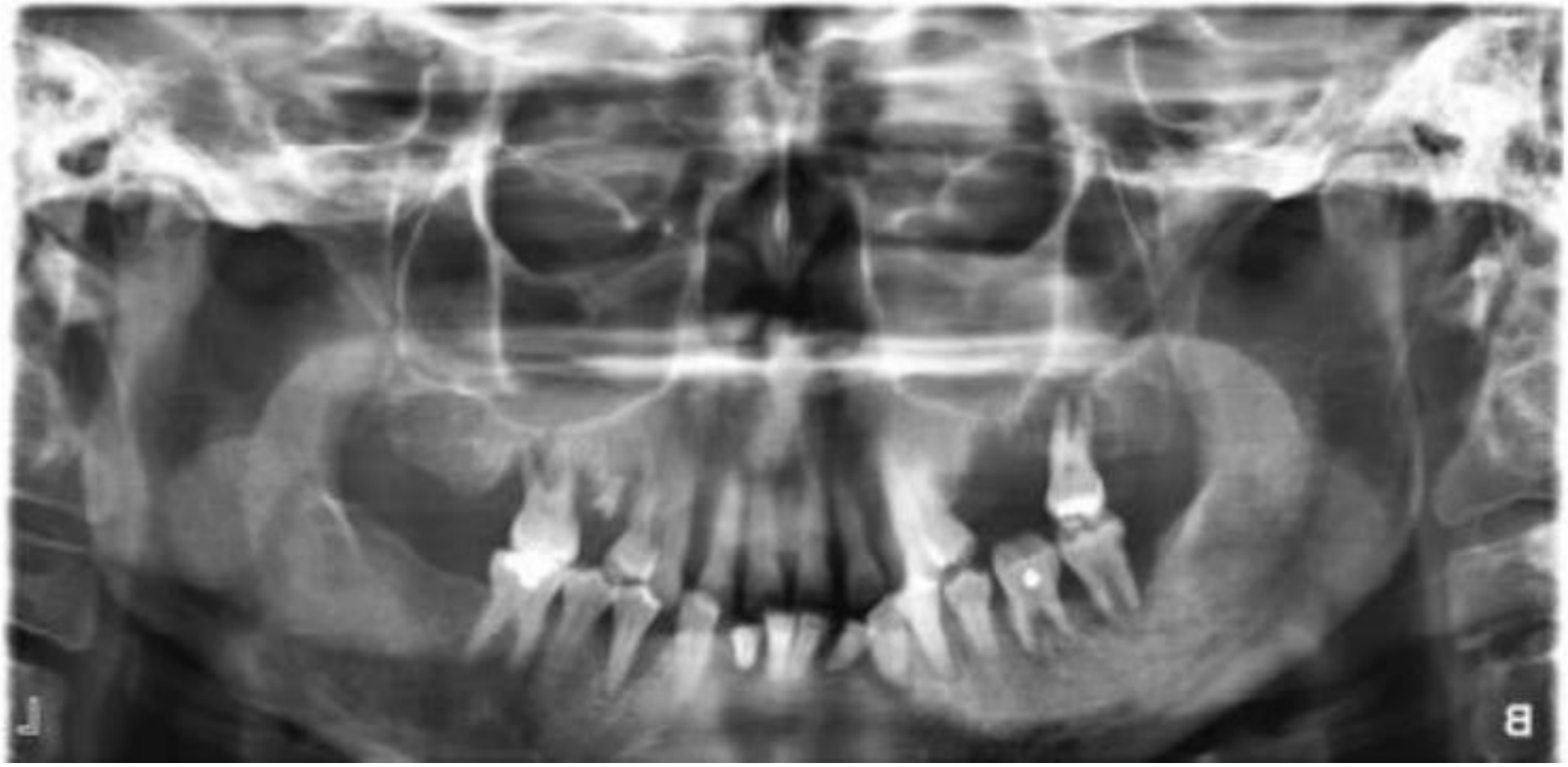
“ thin ” teeth (F).


A
B
C
D
E
F

Failure to position the midsagittal plane lead to rotational midline results in a radiograph showing right and left sides that are unequally magnified in the horizontal dimension . Poor midline positioning is a common error, causing horizontal distortion in the posterior regions, excessive tooth overlap in the premolar regions and, on occasion, nondiagnostic, clinically unacceptable images.

If the chin is tipped too high, the occlusal plane on the radiograph appears flat or inverted, and the image of the mandible is distorted (A). In addition, a radiopaque shadow of the hard palate is superimposed on the roots of the maxillary teeth.

While If the chin is tipped too low, the teeth become severely overlapped, the symphyseal region of the mandible may be cut off the film, and both mandibular condyles may be projected off the superior edge of the film (B).



improperly positioned patient. Patients don't sit straight and align or don't stretch their back leading to large radiopaque region in the middle (vertebral shadow)

Interpretation of Panoramic Images

Interpretation of normal anatomical structures, ghost image and pathological conditions on a panoramic image can be complex. As a general rule, images should be viewed in dim light room using a viewer box or a computer monitor. An operator should always analyses a panoramic image for any possible technique or processing errors.

it is important to know a good panoramic radiograph the mandible is "U" shaped, the condyles are positioned about an inch inside the edge of the film and 1\3 of the way down from the top edge of the film. The occlusal plane exhibits a slight curve or "smile line", upwards. The roots of the maxillary & mandibular anterior teeth are readily visible.


THANK
YOU