

X - RAY DEPARTMENT

Lecture 10

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Extra oral radiographic techniques

Introduction

There is a variety of ways to image large regions of the oral and maxillofacial complex. In most cases, the clinician must take enough radiographs to adequately assess the problem that he is investigating. Clinician's knowledge of anatomy and of diseases that affect the oromaxillofacial region should guide the selection of the most appropriate film techniques to image the region of interest.

Lateral jaw projections:

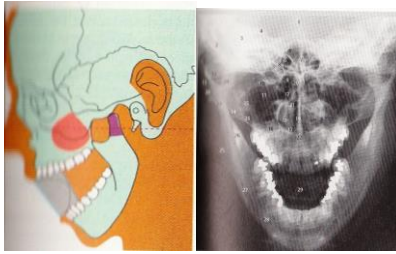
These are made to visualize either the body or the ramus of the mandible. A lateral jaw radiograph is an appropriate alternative when a panoramic machine is not accessible. The mandibular body view demonstrates the teeth, alveolar bone, and inferior border of the mandible in the premolar-molar region. The mandible should contact the cassette, the head is angled about 15° toward the side of interest. The patient holds the cassette against the headrest. The central ray is directed upward about -15° -20° . The central ray enters perpendicular to the cassette in the areas of the bicuspid. The ramus view is especially useful for assessment of the third molar region. This projection shows the entire ramus by providing coverage up to and including the second mandibular molar, extending to below the mandibular angle, and superiorly to include the condyle. The head is tilted toward the side of interest approximately (15°) with the cassette resting against the head to prevent superimposition of the cervical spine onto the ramus. The patient holds the cassette against the head rest. The central ray should be angled approximately -15° upward (vertical angulation) and inter perpendicular to the cassette just distal to the third molar area



PA mandible projection

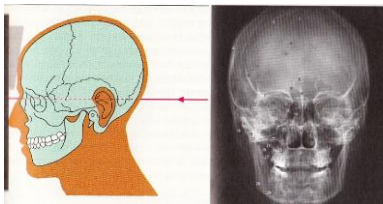
Posterior mandible projection. The film is positioned at right angles to the sagittal plane of the skull. The patient rests the forehead on the cassette. The central ray is directed perpendicular to the film horizontally and vertically through the sagittal plane at the level of the angle of the mandible. The chin is retracted away from the cassette until the central ray bisects the angle of the mandible. As in the posteroanterior skull projection, the cassette can be wall supported by the patient if a cassette holder is not available. The posteroanterior mandible projection is valuable in showing the mandible position of the various parts of the mandible. Lesions affecting the width of the mandible, fractures of the mandible and radiopaque objects encroaching on the mandible are well portrayed. The head of the condyle is observed more clearly in this projection if the patient opens the mouth, causing the condylar head to move downward and forward out

of the glenoid fossa. Films exposed using a slight rotation of the patient's head (approximately 5°) often are helpful as supplementary views.



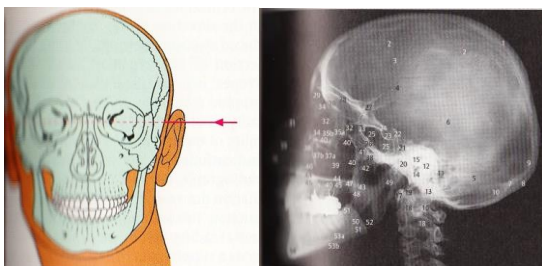
PA Skull projection

Posterior skull projection. The film is positioned at right angles to the sagittal plane of the skull. The patient rests the forehead on the cassette with the orbitomeatal (canthomeatal) plane (a line or plane drawn from the corner of the eye to the external auditory meatus) perpendicular to the film vertically and horizontally. The central ray is directed through the sagittal plane and parallel with the orbitomeatal plane at the level of the bridge of the nose. The cassette can be supported against a wall by the patient's thumb and forefinger of each hand (the thumb is placed under the lower border of the cassette, and the forefinger supports the cassette against the wall by pressing on the front of the cassette). The superior, inferior, medial, and lateral borders of skull parts are shown in this projection. The mediolateral and superoinferior positions of objects or lesions can be identified. The mandibular symphysis is superimposed on the vertical column.



Lateral skull projection

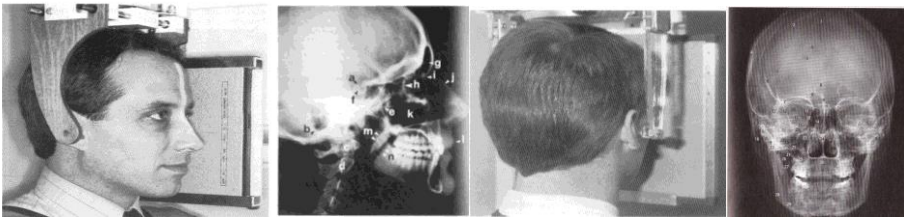
Lateral skull projection. The film is positioned planoparallel with the sagittal plane of the skull. The central ray is directed perpendicular to the film horizontal and vertically. The central ray enters approximately 1 inch above the external auditory meatus. The patient supports the cassette on the shoulder and holds the top of the cassette against the side of the head, it shows the enteroposterior and superoinferior borders of the various anatomic entities. In addition, it demonstrates the anterior, posterior, superior, and inferior, relationships of the one part of another. Profile views of the soft tissues can be obtained by a 50% reduction in exposure time.



Cephalometric examinations:

These are made to demonstrate a side or a front view of the skull. Production of a cephalometric radiograph requires standardization of the way a patient is positioned in the cephalometric x-ray machine or apparatus. Lateral and P.A. cephalometric radiograph are made using a device called a cephalostat. This device helps position a patient in the machine the same way each time a new radiograph is made. The cephalostat provides a means to standardize, and thus to replicate, patient positioning from exposure to exposure. The principle application of cephalometric radiography is in orthodontics, in which repetition of patient positioning is necessary to allow measurements of skeletal changes or growth and development over time. The lateral and P.A. skull views are also useful to assess.

1. The sinuses.
2. The bones of the skull for signs of systemic disease or involvement by odontogenic or nonodontogenic lesions
3. Potential implant sites

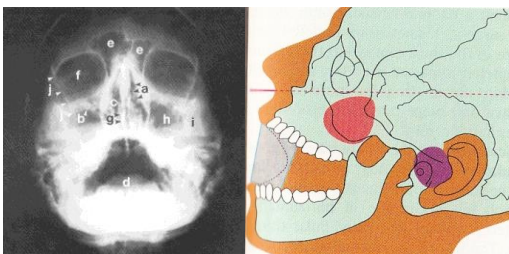


Paranasal sinus examinations:

A typical sinus series might include panoramic, waters, posteroanterior (PA), submentovertex (SMV) and lateral skull radiographs. It is not uncommon for computed tomography (CT) or magnetic resonance imaging (MRI).

1. Waters (occipitomenal) projection:

This projection is considered to be the classic view for this application (elevation of maxillary sinus). Also this view demonstrates the frontal and ethmoid sinuses, the orbit, the zygomaticofrontal suture, and the nasal cavity. The patient faces the cassette with the chin placed on it. The head extended backward so that the tip of the nose is approximately (0.5 to 1) inch off the cassette. The central ray enters the occiput of the patient perpendicular to the cassette. The angle formed by the tragocentital line and the central ray is approximately 37° .



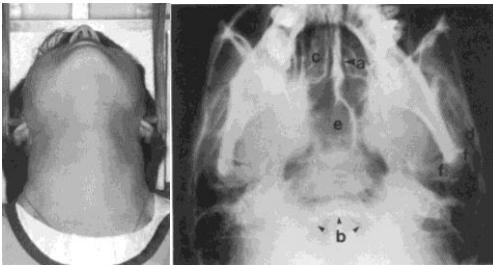
2. Posteroanterior (PA) projection :

This view demonstrates the frontal and ethmoid sinuses, nasal fossae, and orbits. This view is useful to assess the skull for local or systemic disease involvement and to monitor growth and development. Serial measurements of growth and development should be assessed only from P.A. radiographs made using a cephalostat or other standardized criteria to assist in the replication of patient positioning from exposure to exposure. The patient nose and chin are placed on the cassette. The tragocanthal line or the Frankfort horizontal line (Frankfort plane) is parallel to the floor. The central ray enters the patient's occiput and is coincident with the Frankfort horizontal line.



3. Submentovertex projection:

Also known as the basilar view. This projection demonstrates the base of the skull; the location, general shape, and orientation of the condyles, the sphenoid sinuses, the curvature of the dental arches and portions of the mandible, the lateral wall of the maxillary sinuses, and the zygomatic arches. The patient's head is positioned so that the tragocanthal line parallel the cassette. The central ray enters 1.5 inches below the mentum.



Temporomandibular joint examinations:

The standard panoramic radiograph can provide a non corrected tomographic view of both condyles on one film. The condylar image is designated as non corrected because the x-ray beam does not pass through the long axis of the condyle. The long axis of the average condyle is oriented at approximately 20 to the coronal plane, with the medial pole angled posteriorly. This orientation results in distortion of the condylar image in panoramic projections. Panoramic images should be reserved for assessment of gross osseous changes of the condyle. Open and closed views can be made of each condyle. These projections require that the patient's normal panoramic head position be altered: the head is moved slightly forward turned toward, the site of interest. This maneuver positions the long axis of the condyle of interest approximately parallel to the path of the x-ray beam.

1- Transcranial projection:

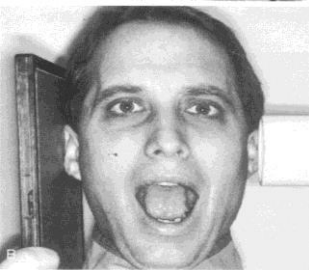
Clinicians often differ in their opinion of the utility of this view for assessing the T.M.J. the transcranial view can be used to evaluate the cortical out line of the superior surface of the condyle and the cortical out line of the eminence, to visualize the degree of translation of the condyle, and to make a general statement about the joint space. Plain film lateral tomography is rapidly replacing transcranial radiography. The cassette is placed parallel to the patient's midsagittal plane, centering the condyle of interest the central ray enters ½ inch posterior to the external auditory meatus and 2 inches above EAM at a vertical angulation of +25°. The horizontal angulation is chosen from long axis of the condylar head, as determined by (SMV) view.



2- Transpharyngeal projection:

It's principal use is to visualize the cortical outline of the condyle from it's lateral aspect.

The patient holds the cassette against the head and turns 7° to 10° away from the side of interest. The cassette still parallels the midsagittal plane. The central ray is directed through the coronoid notch on the opposite side from 0° to -5° perpendicular to the cassette. The patient is instructed to open wide (two or more) fingers and the exposure is made.



The cassette rotated away from the patient midsagittal

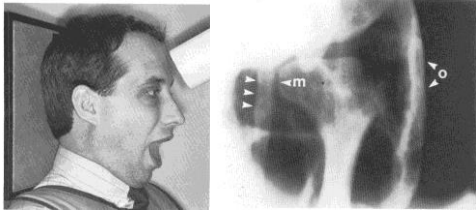


Patient's head rotated

3- Transorbital projection :

When frontal tomography is not available, the transorbital radiograph is the frontal projection of choice to visualize the structures comprising the condylar complex. This projection is made with the mouth open and closed. An open mouth transorbital projection allows visualization of the condyle from its medial to lateral pole. A closed mouth view results in these structures being at least partially superimposed on each other. The condylar neck can be evaluated on either an open or closed mouth transorbital view.

The open mouth technique demonstrates the most anatomy and is the view of choice. The cassette placed behind the patient's head, the central ray is directed downward at $+35^{\circ}$ through the patient's medial canthus, thus centering the condyle within the orbit. The patient's head is rotated approximately 20° toward the side of interest to avoid superimposition of the mastoid process over the structures of interest.



Tangential projection:

The occlusal film is very useful in obtaining a tangential projection of an anterior tooth or area. The film is placed in a groove or slot in a wood or plastic stick. The stick is held between the teeth with the film positioned beyond the area of interest. The central ray is directed in such a manner as to be perpendicular to the film in both horizontal and vertical planes and to form a tangent with the curve of the jaw at the area under examination. It's useful in localizing objects in the anterior areas of the mandible and maxilla.