Extra oral Radiography

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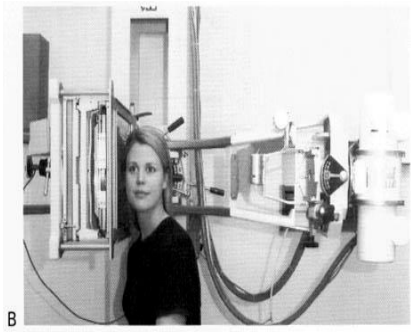
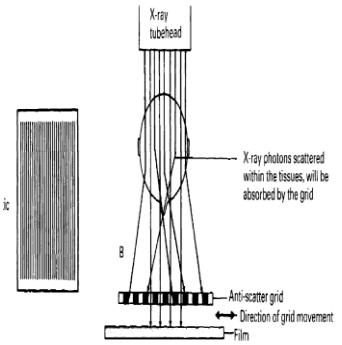
Examination made of the head and facial region using films located outside the mouth. They allow the dentist to view large areas of the jaws and skull on a single radiograph not covered by intraoral films. Most of the views are named according to the direction the X-ray beam is travelling to exit side.

Extraoral film is used in combination with intensifying screen. X-ray is absorbed in intensifying screen. Phosphors layer emits visible light which exposes the x-ray film. Screen film's emulsion has dyes which increases the absorption of the wavelength of light emitted by the phosphors.

Anti-scatter grid to stop photons scattered within the patient from reaching the film. These scattered photons would degrade the overall image quality by fogging the film and reducing the contrast. X-ray generating apparatus capable of producing a high-intensity (about 200 mA), and highly penetrating X-ray beam (80-100 kV).



X-ray generating apparatus

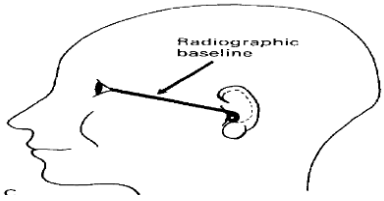


Anti-scatter grid

The main anatomic landmark used in patient positioning during extraoral radiography is the canthomeatal line, which joins the central point of the external auditory canal to the outer canthus of the eye. Frankfort plane

the line that connects the superior border of the external auditory

canal with the infraorbital rim .



Main maxillofacial/skull projections:

A-Standard occipitomental (0° OM): Also known as sinus (water's) projection.

Main indications:

1-Investigation of the maxillary antra

2-Detecting the following middle third facial fractures:

— Le Fort I

— Le Fort II

— Le Fort III

— Zygomatic complex

— Naso-ethmoidal complex

— Orbital blow-out

3-Coronoid process fractures .4- Investigation of the frontal and ethmoidal sinuses

5- Investigation of the sphenoidal sinus (projection needs to be taken with the patient's mouth open).

Technique and positioning: the patient is in the nose-chin position and the X-ray beam is horizontal. The radiographic baseline is at 45° to the film, and the X-ray beam is horizontal centered through the occiput.

B-30° occipitomental (30° OM): This projection also shows the facial skeleton, but from a different angle from the 0° OM, enabling certain bony displacements to be detected.

Main indications:

1-Detecting the following middle third facial fractures:

— Le Fort I

— Le Fort II

— Le Fort III

2- Coronoid process fractures.

Note: Ideally for fracture diagnosis two views at right angles are required but the 0 ° OM and 30 ° OM provide two views of the facial bones at two different angles — therefore in cases of suspected facial fracture both views are needed. Enabling certain bony displacements to be detected.

Technique and positioning:

The patient is in the nose-chin position and the X-ray beam is aimed downwards at 30°. The radiographic baseline is at 45° to the film, and the X-ray beam is aimed downwards at 30° centered through the lower border of the orbit.

C- Postero-anterior of the skull (PA skull):

Main indications:

1- Fractures of the skull vault

2- Investigation of the frontal sinuses

3- Conditions affecting the cranium, particularly:

— Paget's disease

— Multiple myeloma

— Hyperparathyroidism

4- Intracranial calcification.

Technique and positioning:

The patient is in the forehead-nose position and the X-ray beam is horizontal. . The radiographic baseline is horizontal and perpendicular to the film, and the X-ray beam is also horizontal.

D- Postero-anterior of the jaws (PA jaws/PA mandible:

The main clinical indications include:

1- Fractures of the mandible involving the

following sites:

— Posterior third of the body

— Angles

— Rami

— Low condylar necks.

2- Lesions such as cysts or tumors in the posterior third of the body or rami to note any medio-lateral expansion

3- Mandibular hypoplasia or hyperplasia

4- Maxillofacial deformities.

Technique and positioning: the patient is in the forehead-nose position and the X-ray beam is horizontal centered through the rami. the radiographic baseline is horizontal and perpendicular to the film, and the X-ray beam is also horizontal centered through the cervical spine at the level of the rami of the mandible.

E- Reverse Towne's:

The main clinical indications include:

1- High fractures of the condylar necks

2- Intracapsular fractures of the TMJ

3- Investigation of the quality of the articular surfaces of the condylar heads in TMJ disorders.

4- Condylar hypoplasia or hyperplasia.

Technique and positioning: **the patient is in the forehead-nose position with the mouth open and the X-ray beam is aimed upwards at 30°. B Diagram of the positioning — the radiographic baseline is horizontal and perpendicular to the film, the mouth is open and the X-ray beam is aimed upwards at 30° centered through the condyles.**

F- Rotated postero-anterior (Rotated PA):

The main clinical indications include:

1- Stones/calculi in the parotid glands

2- Lesions such as cysts or tumors in the ramus to note any medio-lateral expansion.

3- Submasseteric infection — to note new bone formation.

Technique and positioning:

patient is in the normal head position and rotated to the side of interest and the X-ray beam is horizontal. from the side, normal head position and the X-ray beam horizontal, from above, 10° rotation of the head to the side of interest and the X-ray beam aimed along the side of the face.

G- Submento-vertex (SMV):

The main clinical indications include:

1- Destructive/expansive lesions affecting the palate, pterygoid region or base of skull

2- Investigation of the sphenoidal sinus

3- Assessment of the thickness (medio-lateral) of the posterior part of the mandible before osteotomy

4- Fracture of the zygomatic arches — to show these thin bones the SMV is taken with reduced exposure factors.

Technique and positioning: **the patient's head is tipped backwards . The radiographic baseline is vertical and parallel to the film and the X-ray beam is aimed upwards at 5° to the horizontal centered on an imaginary line joining the lower first molars.**

H- Lateral skull (cephalometric)projection:

It shows the entire skull from the side and the X-ray passes from the lateral side

Main indications:

1-Orthodontic purposes

-.Pre and post treatment records.

-.Evaluate the growth and development

-.Facial soft tissue profile of the face by placing a wedge filter is placed over the anterior side of the beam at the tube head so that filter will absorbs some of the x-rays in the anterior region.

2-Surgeons also use it for pre and post treatment records. (Orthognathic surgery).

3-Trauma (Middle third facial fractures, Fractures of the cranium and the cranial base)

4-- Conditions affecting the skull vault, particularly:

— Paget's disease

— Multiple myeloma

— Hyperparathyroidism

5- Conditions affecting the sella turcica, such as:

— Tumor of the pituitary gland in acromegaly.

6-- Investigation of the frontal, sphenoidal and maxillary sinuses.

Technique and positioning:

X-ray tube head and cephalostat are in fixed positions (approximately 2 m apart) and the patient's head is stabilized within the cephalostat ,left side of the face next to the cassette, with the Frankfort plane horizontal. The sagittal plane of the head is parallel to the film, and the X-ray beam is horizontal and perpendicular to the sagittal plane and the film. The x-rays is directed towards the acoustic meatus perpendicular to the film.

I:- Oblique lateral jaw technique:

Main indications: 1-Assessment of the presence and/or position of unerupted teeth

2- Detection of fractures of the mandible

3- Evaluation of lesions or conditions affecting the jaws including cysts, tumors, giant cell Lesions and osteodystrophies

4- As an alternative when intraoral views are unobtainable because of severe gagging or if the patient is unable to open the mouth or is unconscious.

5- As specific views of the salivary glands.

Technique and positioning:

1. **Rotate the head to the side of interest.**
2. **Raise the chin. To increase the triangular space between the back of the ramus and the cervical spine (the so-called radiographic keyhole). Through which the X-ray beam will pass.**
3. **The X-ray tube head is positioned on the opposite side of the patient's head to the cassette aiming slightly upwards. There are two basic positions:**

a- **Behind the ramus aiming through the radiographic keyhole .Maxillary and mandibular teeth under investigation and the body of the mandible.**

b- **Beneath the lower border of the mandible. A clear image of the third molar – retromolar area, angle of the mandible, ramus, and condyle head should be obtained.**

J:- Bimolar technique:

Oblique lateral views of the right and left sides of the jaws on the different halves of the same radiograph.

1. The patient is positioned with one side of the face in the middle of one half of the cassette, with the nose towards the midline. The precise positioning depends on which teeth or area of the jaws is being examined (like any other oblique lateral).

2. The other half of the cassette is covered by a lead shield to prevent exposure of this side of the film.

Specialized Purposes Projection:

Hard tissues of tempromandibuar joint

A: Transcranial projection:

Main indications: **1-TMJ pain dysfunction syndrome and internal derangements of the joint producing pain clicking and limitation in opening.**

2- To investigate the range of movement in the joints.

Technique and positioning:

The patient's head has been turned through90°, TMJ is against the film and the X-ray beam is aimed downwards, at 25° to the horizontal, across the cranium with the mouth open and closed.

B- Transpharyngeal projection:

Main indications:

1-TMJ pain dysfunction syndrome

2-To investigate the presence of joint disease, particularly osteoarthritis and rheumatoid arthritis.

3-To investigate pathological conditions affecting the condylar head, including cysts or tumors

4-Fractures of the neck and head of the condyle.

Technique and positioning:

The patient is holding the film against the TMJ, the mouth is open and the X-ray beam is aimed across the pharynx.

TABLE 12-1
Technical Aspects of Extraoral Radiographic Projections and Resultant Images

	Lateral Ceph	SMV	Waters	PA Ceph	Reverse Towne	Oblique Lateral Body	Oblique Lateral Ramus
Patient placement	Film parallel to midsagittal plane	Canthomeatal line parallel to film	Canthomeatal line at 37° with film	Canthomeatal line at 10° with film	Canthomeatal line at −30° with film	Film in contact with cheek at molar area	Film in contact with cheek at ramus area
Central beam	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam aims at the molar-premolar area	Beam aims at the ramus area
Diagram of patient placement							
Illustration of patient placement							
Skull view							
Resultant image