TMJ Radiography (Imaging)

Temporomandibular joint is bounded *laterally* by zygomatic arch and *medially* by petrous ridge of temporal bone.

In TMJ Radiography, we should be able to identify:

- the external auditory meatus of the ear.
- Articular eminence.
- Articular fossa.
- The neck of condyle.
- Mandibular condyle.

The articular disk appears radiolucent so it can be seen by specialized imaging techniques.

Pathological lesions of TMJ which seen by radiographs are:

- Fractures
- Benign and malignant tumor
- Arthritis changes
- Ankylosis
- Disk displacement and perforation
- Fibrous adhesion
- Congenital absence of structures
- Hypertrophy of condyle and osteolytic changes in condyle.

**TMJ projections**

**Transcranial TMJ projection:**

The radiographs are taken of both right and left side in both the open and the closed position.

5 x 7 inch film is used and four views can be taken on an 8x10 by placing appropriate lead shied.

An intensifying screen of 7 to 15 impulses with a fast film and exposure time at 65 kVp and 10 mA is used.

The lateral one third of the joint space can be visualized.

The patient head is positioned parallel to the cassette with the side to be imaged closest to the cassette. The central ray is directed opposite side,
2.5 inches above and 0.5 inches infront of the external auditory meatus, the vertical angulation should be 20-25 degrees.

**Transpharyngeal projection:**

This projection give a sagittal view of the medial pole of condyle. Transpharyngeal projection is effective to view the erosive changes of the condyle.

X-ray beam is directed superiorly at -5 degree through the sigmoid notch of the opposite across the pharynx at the condyle under investigation side and 7 to 8 degree from the anterior. The patient hold the film over the TMJ of interest, the patient's mouth is open and a bite block is insert for stability. This view is taken to visualize both condyles.

**Transorbital projection:**

This projection provide an anterior view of the TMJ, perpendicular to transcranial and transpharyngeal projections.

X-ray beam is directed from the front of the patient through the ipsilateral orbit and TMJ of interest. The cassette is placed behind the patient's head, perpendicular to the x-ray beam. The patient open the mouth maximally to position the condyle at the sum with of the articular eminence and avoiding superimposition of the articular eminence on the condyle. This view is useful for visualize the condyle fractures.

**Panoramic projection:**

This is the most common projection to view both right and left joints in the lateral plane as well as an over all view of mandible and maxilla can be seen. These views are used for screening to detect any TMJ pathological conditions, if this view indicates any pathologic process a more advance projection, e.g. CT scan or MRI, can be used for diagnosis.

CT examinations began in the late 1970s and 1980s and MRI in the late 1980s and 1990s.

**Submentovertex (basaler) projection:**

This view is useful for viewing condyles, zygomatic arch, lateral wall of the orbit, sphenoid and maxillary sinuses and pterygoid plates and the structures of the base of the skull.

This view can be taken with the head position so that the canthomental line is parallel to the film and perpendicular to the central
The central x-ray beam enters the skull in the midline between the mandibular angles.

**Conventional tomography:**

**Computed tomography:**

**MRI:**

Magnetic Resonance imaging (MRI) is a very effective for viewing soft tissues especially the articular disk of the TMJ. The image which is radiolucent on a CT scan will appear radiopaque on an MRI, which indicate high soft tissue density or a strong signal. The image which is radiopaque on a CT scan will appear radiolucent on an MRI indicating low soft tissue density or a weak signal.

**Contrast investigation:**

Contrast media (usually iodine media) containing high atomic number elements absorb radiation well and improve the visualization of cavities.

Contraindication of contrast investigation are sensitivity to medium (iodine sensitivity) and introduction to acutely infected area because in this condition it causes more inflammation.

**TMJ arthrography:**

Contrast media is introduced into the lower joint space. Under fluoroscopic guidance image intensifier the finding are recorded on videotape.

The patient is positioned in supine position with the head turned 8° away from side being examined. The tube above is tilted 5-10° caudalty as for a lateral oblique transcranial TMJ projection. The local anaesthetic solution is injected into the retrocondylar tissues and beneath the articular tubercle. Patient's mouth is closed and an 18 G (1.2 mm x 45 mm) cannula is directed against the posterior surface of the condyle. The patient's mouth is opened and condylar movement is felt with the cannula. The position of the cannula is checked fluoroscopically and the needle withdrawn. The cannula is then advanced medially into posterior part of the joint. The contrast media (water soluble nonionic iohexol 500 or iopamidol 300) of about 0.25 ml containing 300 mg/ml is injected and
joint cavity is visualized. Another cannula is inserted 10 mm anterior to the lower and directed against the posterior slope of the articular tubercle. On bone contact the needle withdraw and the cannula is advanced midially to the upper compartment and 0.3 ml of contrast medium injected.

**Indications of arthrography:**

1. investigation of internal derangement.
2. any perforation or adhesion of the articular disk.
3. disk displacement.