



IMAGING MODALITIES FOR TMJ: A review

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Abstract

TMJ Imaging is of utmost importance in diagnosing a TMD. There are different classifications for TMDs & also imaging techniques. The various options available for imaging should be used wisely. A particular imaging technique is indicated for confirming a particular clinical diagnosis. With this knowledge, the Clinician should be confirming the final diagnosis.

INTRODUCTION

Clinical and Radiological Imaging examinations of the Temporomandibular joint (TMJ) are necessary for proper diagnosis and management of temporomandibular disorders (TMD). With technological advancement, the understanding of the spatial arrangement of the condyle in the fossa has become better. To image the TMJ there are multiple modalities available. Conventional radiographs are 2D display of the 3-Dimensional TMJ. It is not possible to have better view with 2D display. Choosing the proper imaging technique is essential. [1]

The AAOP classifies the TMD in two groups: muscular and articular. The most common clinical signs of TMD are represented by pain, limited mouth opening and joint sounds (clicking, crepitation).[2]

The important step in the diagnosis of TMJ pathology is done clinically, yet special imaging techniques are indicated due to the complex anatomy and pathology of the TMJ.

TMJ IMAGING

At the earliest signs of the TMD, it is very common to take an image of the joint. Various options are:

1. Plain radiography

It is done at Different angulations. It consists of transcranial projection of Temporomandibular Joint.

Different angulations are:

- a) Lateral oblique transcranial projections
- b) Anterior-posterior projections
- c) Submental-vertex projection
- d) Trans pharyngeal view



Fig: Plain Radiography

It is to avoid the superposition of the temporal bone and the opposite TMJ. ^[3] Plain radiography is useful in advanced stages of degenerative joint disease [3]. The condyle position can also be assessed with plain radiographs. The condyle position in the glenoid fossa were found to be present in large variation even in asymptomatic population.^[4] The position of the head during the examination could influence the joint space, which could influence the interpretation of the radiography ^[5].

. CT is indicated in identifying TMJ changes than conventional radiography.

1. Panoramic Radiography

Panoramic radiography is not in the list of imaging techniques provided by RDC/TMD. The jaws and the associated structures are checked for identifying any periodontal or odontogenic causes for orofacial pain. The lateral part of the condyle can be assessed. ^[6]

Panoramic radiography can help evaluate the following:

- Degenerative bone changes;
- Asymmetries of the condyles
- Hyperplasia
- Hypoplasia
- Trauma
- Tumor

Epstein et al consider the clinical findings of greater relevance than panoramic images for patients with TMD.^[7]



Fig: Panoramic radiograph

2. Computed Tomography (CT)

CT is considered to be the best method for assessing osseous pathologic conditions of TMJ. IT WAS First used for TMJ evaluation in 1980. obtaining 3D images in closed and opened-mouth positions ARE possible with CT. The image is obtained in: sagittal plane, axial plane & coronal plane.

A review published by Silvia Caruso et al [8] pointed out the main contributions of cone beam CT in the field of TMJ:

- allows the calculation of volume and surface of the condyle;
- improves qualitative analyses of condylar surface and allows detecting the mandibular condyle shape;
- improves the accuracy of linear measurements of mandibular condyle;
- clarifies that, in case of facial asymmetry, the condyles are often symmetric, while joint space can change between the two sides;
- clarifies the position of the condyle in the fossa.

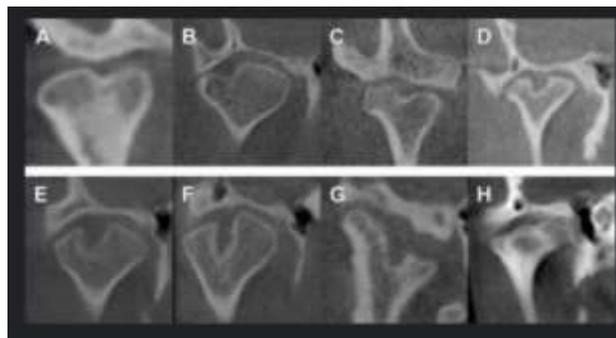


Fig: Computed Tomography

Although CT provides important information regarding the osseous components of TMJ, it has several limitations, like the artefact which can appear due to the patient's accidental movement during

examination (especially in children). Also, a decrease in radiation dose (for cone beam CT) can affect the image quality. [9]

3. Magnetic Resonance Imaging (MRI)

In most scanning sequences, the images obtained are

1. T1 weighted
2. T2 weighted
3. proton-density (PD).

The PD helps to assess the disc-condyle relationship, while T2-weighted images diagnose the inflammation in the joint [10].

Disc displacement is diagnosed when the posterior band sits in an anterior, posterior, medial or lateral position with regard to the condylar surface [11].

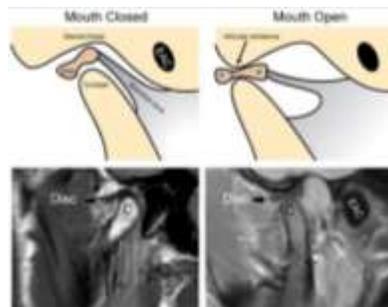


Fig: MRI

MRI is used mainly for imaging:

- articular disc
- synovial membrane
- lateral pterygoid muscle.

It has been pointed out as the best imaging modality in diagnosing disc displacements. [3]

4. High-Resolution Ultrasonography

It was first used for TMJ exploration in 1991, by Nabeih et al, using a 3.5 MHz transducer. [12] It is a non-invasive, dynamic, inexpensive procedure, but it is not commonly used in TMJ exploration. If the disc returns to its normal position during opening, the diagnosis is disc displacement with reduction. If not, the diagnosis is disc displacement without reduction [13]

CONCLUSION

The most important part of the diagnosis of TMD is to differentiate the common diseases from those clinically significant, but unusual conditions, as well as conditions that are more serious which urgent attention is needed.

The purpose of the chosen radiological investigation must improve the diagnosis and the treatment outcome according to each imaging examination's specific indications and varying degrees of sensitivity and specificity. CT and MRI are, nowadays, the most used imaging techniques. CT is the most efficient examination in detecting the osseous changes are detected efficiently by CT. Although the gold standard for the articular disc examination is MRI.

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