The Role of Imaging in the Diagnosis of Temporomandibular Joint Pathology

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KEYWORDS

• Diagnostic imaging • Temporomandibular joint disorders • Temporomandibular joint disc
• Osteoarthritis • Cone-beam computed tomography (CBCT) • Computed tomography • MRI

KEY POINTS

- The reliability of temporomandibular joint imaging increases with optimized image quality, calibrated/experienced observers, and a focus on frank pathologic findings not reported in asymptomatic volunteers.
- The presence of intraarticular disc displacement may not always represent pathology.
- Joint effusion should be considered pathologic only if there is more fluid than reported in asymptomatic volunteers. Coexistence with bone marrow edema indicates a more pronounced inflammatory reaction.
- The diagnosis of osteoarthritis should be based on evident abnormalities, in particular bone destruction, and not on subtle changes that may represent a normal anatomic variation or remodeling.
- Panoramic radiographs are only reliable for imaging gross bony changes in the condyle.

INTRODUCTION

Clinical examination sometimes provides limited information with respect to the joint status in patients with temporomandibular disorder (TMD).[1] Therefore, diagnostic imaging is often necessary to reliably assess the temporomandibular joints (TMJs). However, there is a controversy as to what should be classified as joint pathology. It is also a fact that observer performance may be highly variable and that image quality may vary considerably in routine clinical practice. To assess TMJ pathology it is also mandatory to know the range of normalcy, that is, imaging signs observed in healthy individuals. This review focuses on the accuracy of the diagnostic interpretation of disc displacement, joint effusion, and osteoarthritis in the TMJ and common errors that are made in image interpretation.

DISC DISPLACEMENT

Is Disc Displacement a Normal Condition?

Before the era of diagnostic imaging, displacement of the articular disc relative to the mandibular condyle was diagnosed based on symptoms such

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as clicking sounds and impaired mouth opening.[2] When soft-tissue imaging of the TMJ became possible, displacement of the disc was frequently confirmed in such patients[3] and was considered to be the main cause of the pain.[4] However, when MRI was performed on persons without TMD, some disc displacement was found in as many as one-third of them.[5–7] Thus, there is still a controversy over when disc displacement is a pathologic condition and when it is a normal variant.[5,8]

Are There Differences Between Symptomatic Patients and Asymptomatic Volunteers Regarding Disc Displacement?

In studies of asymptomatic volunteers the anteriorly displaced disc has been found to reduce on open-mouth images in almost all joints examined.[5–7,9–11] Moreover, Larheim and colleagues[7] reported that 90% of the displaced discs in volunteers were only partially displaced, supporting a study of Rammelsberg and colleagues.[11] The same observation was made in a study of schoolchildren without symptoms.[12] All these studies indicate that partial anterior disc displacement most frequently occurs in the lateral portion of the disc. On the other hand, complete disc displacement, that is, a disc that is anteriorly displaced in all sections through the joint, is almost only observed in symptomatic patients.[7] Such findings indicate the need to correlate the clinical symptoms with the imaging findings in determining whether a partially displaced disc is the cause of a patient's problems. **Fig. 1** shows a partially displaced disc in an asymptomatic volunteer and a completely displaced disc in a symptomatic patient.

Is Imaging Diagnosis of Disc Displacement Reliable?

In a systematic review by Limchaichana and colleagues,[13] the sensitivity and specificity, as well as observer performance of diagnosing disc position by imaging, varied considerably and the investigators concluded that the evidence for diagnostic efficacy was insufficient. In a study comparing sagittal MRI sections and cryosections of autopsy TMJ specimens, the sensitivity and

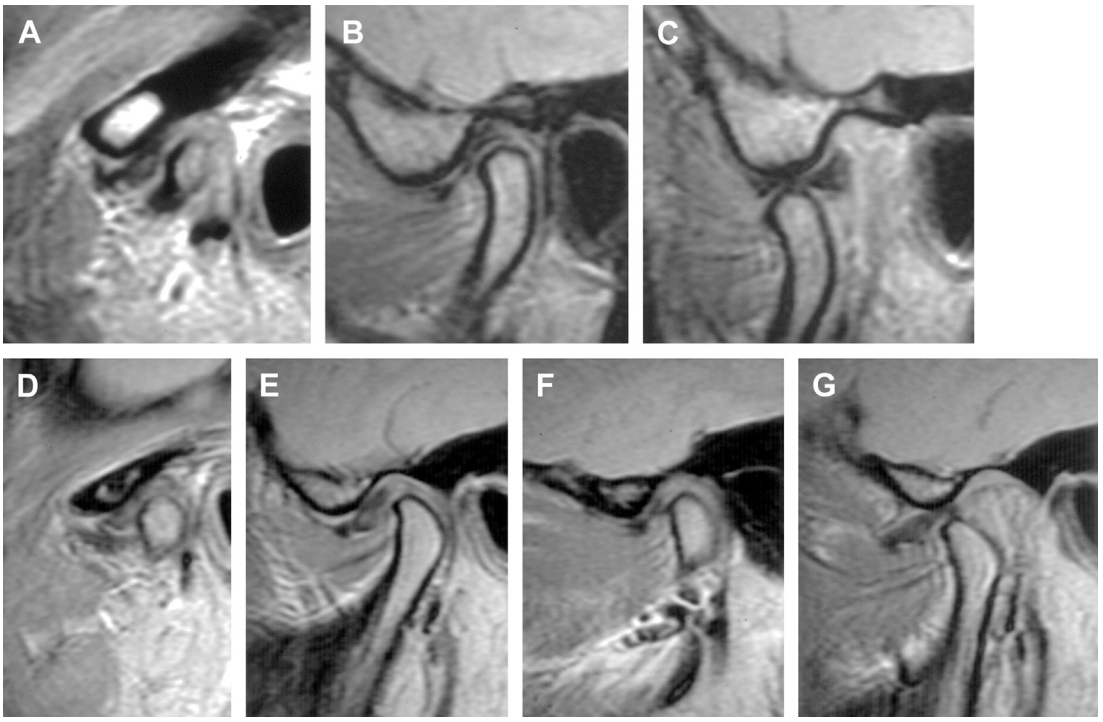

Fig. 1. MRI showing a partially displaced disc with reduction: the disc is displaced anteriorly in the lateral part of the joint (*A*) but normally located in the centromedial part in the closed-mouth position (*B*), and normally located in the open-mouth position (*C*). MRI showing a completely displaced disc without reduction: the disc is anteriorly displaced in all sections throughout the joint in the closed mouth (*D–F*) and open mouth positions (*G*). (*Adapted from* Larheim TA, Westesson P, Sano T. Temporomandibular joint disk displacement: comparison in asymptomatic volunteers and patients. Radiology 2001;218(2):430–1; with permission.)