

Kinematic MRI and TMJ Internal Derangement

MRI evaluation of the TMJ utilizes both static closed and open position sequences, as well as gradient-echo sequences with kinematic (or “dynamic”) imaging. This combination provides an accurate, non-invasive assessment of TMJ pathology and dysfunction.

Kinematic MRI arose from the understanding that it is often necessary to place a joint in a particular position or under load in order to achieve an accurate diagnosis. During the sequence, the joint is manipulated through its range of motion, with or without load, while being kept in the proper imaging plane. The manipulation is provided by a positioning device, which typically contains a surface coil.

In the temporomandibular joint, kinematic images in the sagittal plane allow the radiologist to view the position

of the articular disc during opening and closing of the jaw. This technique uses a series of rapid static images obtained during a stepwise opening of the mouth during the examination.

The examination itself is not straining for the patient and the quality of imaging is comparable with static gradient-echo sequences. The images are viewed as a “video-loop” to accurately depict articular disc dysfunction and motion abnormalities of the mandibular condyle.

The use of kinematic MRI is well suited to the recognition of TMJ dysfunction. Furthermore, evaluation is more sensitive than with static MRI alone.

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Kinematic MRI and TMJ Internal Derangement: A Case Report

Patient History:

A 15-year old female patient presented with right TMJ pain and clicking. Her physician ordered MRI to determine the cause of the condition.

MRI Examination:

The scan was performed on the GE Signa 1.5T high-field short-bore MRI scanner.

Findings:

Normal position of the articular disc of the right TMJ in the closed-mouth position (1). Disc position remains normally interposed between mandibular condyle and the articular eminence in the open position (2). The kinematic sequence revealed lateral translation of the condyle during opening.

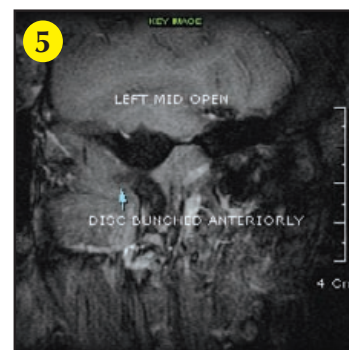
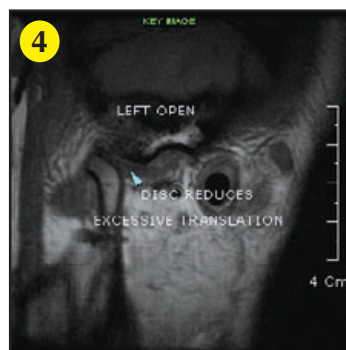
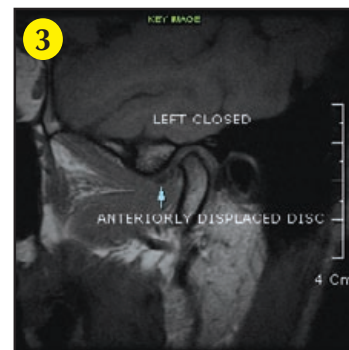
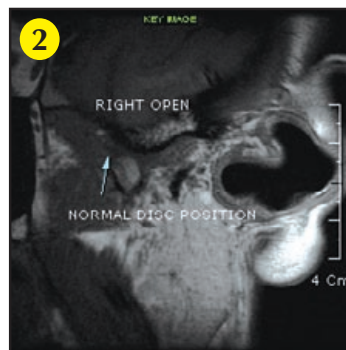
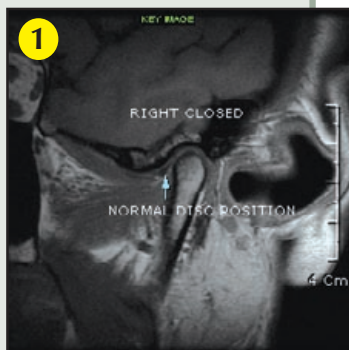
The left TMJ articular disc is displaced anteriorly and folded in the closed position (3). With the mouth open, the disc reduces into normal position (4). Kinematic sequence showed this reduction occurs late, with the disc bunching anteriorly and then rapidly reducing (5).

Discussion:

TMJ dysfunction effects up to 22% of the population. In a normal functioning joint, the articular disc remains between the mandibular condyle and the articular eminence during opening of the joint. TMJ dysfunction (internal derangement) can manifest in many ways, such as headaches, dizziness, vertigo, earache/fullness, tinnitus, joint noises and pain, malocclusions, toothaches, speech disturbances and swallowing difficulty. Internal derangement is graded in order of severity:

- Anterior displacement of the disc, with reduction to normal positioning with mouth opening (late reduction has worse prognosis)
- Anterior displacement of the disc, without reduction to normal position with mouth opening
- Anterior displacement of the disc with a perforation

Both joints are always imaged. In this patient, the right TMJ was more symptomatic, while the left TMJ had internal derangement. Since the joints function together, internal derangement on one side can cause pain in the contralateral joint.



Radiologist Spotlight



Christopher Goeser, D.C., M.D.

Dr. Goeser is a staff radiologist at Diagnostic Imaging of Salem, as well as a member of Diagnostic Imaging Associates (Salem, OR) since 2000. His specialty is musculoskeletal imaging.

A graduate of the University of Illinois College of Medicine and Western States Chiropractic College, Dr. Goeser is both a licensed medical doctor and chiropractor. His interests include spine MRI, women's imaging, musculoskeletal MRI and ultrasound as well as image-guided injections and biopsies. He is on staff at the departments of radiology of Albany General Hospital and Silverton Hospital.

Dr. Goeser is certified by the American Board of Radiology and also the American Chiropractic Board of Radiology.

About Our Center:

Diagnostic Imaging of Salem is a multi-modality imaging center conveniently located near the Capitol in Salem. Our experienced professionals, technologists and radiologists deliver the highest levels of patient care and quality evaluations.

We offer both short-bore and open MRI. Our GE Signa Horizon LX 1.5 T MRI delivers superior image quality and enables a broad assortment of studies, while our Hitachi Elite open MRI delivers exceptional comfort to large, claustrophobic and special needs patients. We have also added a new GE Logiq 9 Ultrasound for faster and more precise ultrasound studies.