ORAL MEDICINE

TEMPOROMANDIBULAR JOINT ARTHROGRAPHY
AN OVERVIEW

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ABSTRACT

Our understanding and interest in the diagnosis and management of patients with various types of temporomandibular disorders had increased as research has identified structural abnormalities and disease mechanisms associated with some of these disorders there has also been remarkable progress in the imaging of the TMJ.

However, with this increasing sophistication there seems to be growing confusion among specialists and general dental practitioners, as to when imaging should be used, if at all, and when each modality can be expected to be most useful. This paper gives an overview to one such imaging modality, arthrography; and its implications in TMJ imaging

Key Words: Temporomandibular joint, imaging, arthrography.

INTRODUCTION

Significant advances in both the diagnosis and understanding of the underlying mechanisms of dysfunction of the temporomandibular joint have been made possible by recent developments in imaging. The clinician should entertain the application of imaging procedures when there is evidence of disease within the joint and when results of such a study will affect the design of the patient’s treatment. The need for imaging should be established on the basis of selection criteria. "Selection criteria" represent those clinical signs and symptoms that suggest that a radiographic examination would contribute to the proper diagnosis and care of the patient. Investigative procedures may be subdivided into examination of the osseous components and soft tissue components of the joint. Soft tissue components of the joint may be assessed using advanced imaging techniques like arthrography and MRI.

ARTHROGRAPHY

Dr Fleming Norgaard was the first to successfully apply positive contrast arthrography to the TMJ in 1947, but it was not until the 1970's that the technique was resurrected in the United States by Wilkes and others. Arthrography involves injection of a radiopaque contrast material into the joint spaces. The space occupied by the disc can then be visualised lying between the layers of contrast material.

TYPES OF ARTHROGRAPHY

1. SINGLE CONTRAST ARTHROGRAPHY
2. DOUBLE CONTRAST RADIOGRAPHY

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Multiple variations of the arthrographic technique have been used successfully. One of the more commonly used approaches involves injection of contrast material into the lower joint spaces, referred to as lower joint space or single — contrast arthrography. Perforations of the disc or posterior attachment are demonstrated by contrast material simultaneously flowing into the upper joint space as the lower space is injected.5

Another variation of the technique involves injecting contrast material into both the spaces and viewing the more central portions of the joint with tomography. Because contrast material is in both the joint spaces, the outline of the disc is profiled, showing its configuration and position. The outline of the disc can often be enhanced by using double-contrast arthrography. This technique involves injecting a small amount of air along with a small amount of contrast material into both joint spaces, producing a thin coat around the periphery of both joint spaces that highlights the disc and the joint spaces.4

**ADVANTAGES**

1. Arthrography provides information regarding the soft tissue components, specifically the shape and position of the articular disc.6 It has been demonstrated that with the addition of tomography, the diagnosis of abnormalities in the position and shape of the disc is accurate.8

2. Fluoroscopic observation of the injection may reveal the presence of adhesions, perforations and discontinuities in the capsule and provides a dynamic study of disc movements, also any abnormal accumulation of joint fluid may be evident.1

3. Synovial fluid sampling (arthrocenesis) and lavage of the joint can accompany the procedure of arthrography.7

4. Arthrography assures a correct pre-operative diagnosis of loose bodies (joint mice)9.

5. An arthrogram can clearly distinguish the synovial changes of an inflammatory arthritis from an internal derangement resulting from meniscal dysfunction.9

**PROCEDURES**

The patient is placed on the fluoroscopic table top in a lateral recumbent position with the head tilted on the table top. This allows the joint to project over the skull above the facial bones in a manner similar to transcranial radiograph. Under fluoroscopic guidance, the posterosuperior aspect of the mandibular condyle is identified with a metal marker. This area is then marked with an indelible pen. Local anesthetic, 1% lidocaine is infiltrated into the superficial skin. A 0.75 or 1 inch scalp vein needle and the attached tubing are filled with contrast material and care taken to eliminate air bubbles. Air bubbles may simulate loose bodies within the joint space. In a direction perpendicular to the skin and X-ray beam, the 23 gauge needle is introduced in a predetermined region of the condyle with the jaw in the closed position. After advancement of the needle, fluoroscopic observation ensures proper positioning. When the condyle is encountered, the patient is instructed to open the jaw very slightly, and the needle is guided by feel of the posterior slope of the bony condylar margin. On fluoroscopic observation the needle will appear to be contiguous with the posterior condylar outline. Approximately 0.4-0.5ml of contrast material is injected into the lower joint compartment under fluoroscopic examination. If the contrast is successfully placed into the lower joint space, the opaque material will be noted to flow freely anterior to the condyle into the anterior recess of the lower joint compartment. The needle is then withdrawn and fluoroscopic videotape images are recorded during opening and closing maneuvers of the jaws. Spot radiographs are obtained during the fluoroscopic procedure.

**LIMITATIONS**

1. Direct medical or lateral displacements are difficult to interpret with arthrography.6

2. Cannot be used when the disc is severely deformed.1

**COMPLICATIONS**

The rare serious complications associated with arthrography include joint sepsis, allergic reaction to the iodinated contrast medium and haemarthrosis. Pain during and after the procedure, extravasation of the contrast medium, disc perforation and transient
facial paralysis are less serious complications of arthrography.\textsuperscript{1}

The radiation exposure to the patient can be significant, depending on the duration of fluoroscopy and the number of tomographic exposures made.\textsuperscript{7}

- The most frequent complications of the technique is contrast medium extravasation into the capsule and soft tissues around the joint, causing pain. Non ionic contrast media will be the agents of choice to minimize this discomfort.\textsuperscript{10}

- Parotitis has been reported following arthrography with large needles and cannulas. A cannula tip can be lost in the region of the joint in this technique.\textsuperscript{9}

- Some patients experience a vagal reaction, as a result of increased anxiety during the procedure, this can be managed by administering 0.6 mg of Atropine intravenously.\textsuperscript{9}

- Intravasation of contrast material infrequently occurs. Epinephrine in a dose of 0.03 ml (1:1000) per 3ml of contrast material is recommended because there is a risk of an acute hypotensive episode with intravasation of higher doses.\textsuperscript{9}

- Transient facial paralysis may result from too vigorous infiltration of lidocaine. Some patients experience a moderate degree of pain as the needle is placed on the periosteum of the condyle and as the joint is distended with contrast material. This discomfort is transient in majority of the cases.\textsuperscript{10} If persistent joint pain occurs following the procedure, aspirin or acetaminophen and cold compress application to the affected side is recommended.\textsuperscript{9}

**SUMMARY**

Temporomandibular joint arthrography has gained acceptance as the "gold standard" for the diagnosis of internal derangements of the temporomandibular joint. This test complements the clinical evaluation. Arthrography is highly accurate in depicting internal derangements of the joint and in aiding differential diagnosis. Temporomandibular joint arthrography is an outpatient procedure performed with local anesthesia and is devoid of any serious complications. Because of its accuracy and the ease with which it can be performed in experienced hands. TMJ arthrography will likely remain a diagnostic procedure inspite of the recent developments with MRI surface coil technology.

The dynamics meniscal derangements especially in the clicking jaw, remains an invaluable aspect of this modality in contrast to the static images obtained with CT and MRI.\textsuperscript{9}

**REFERENCES**