

Diagnosis of Temporomandibular Joint Arthrosis

1. Arthrographic Differentiation

Natsuki SEGAMI*, Kazuma FUJIMURA, Hideki HANAFUSA
and Michio FUKUDA

**Department of Oral and Maxillofacial Surgery, Faculty of Medicine,
Kyoto University, Kyoto 606, Japan*

*Department of Oral Surgery, Kawasaki Medical School,
Kurashiki 701-01, Japan*

Accepted for publication on January 17, 1989

ABSTRACT. Arthrotomography of the temporomandibular joint was performed on 207 joints of 148 patients by puncturing inferior and superior joint compartments and injecting water-soluble contrast medium under fluoroscopy. Symptoms of these subjects were arthralgia, noise and hypomobility of the temporomandibular joint. In the results, 16 joints (7.7%) were normal, 31 joints (15.0%) with reducible anterior disk displacement (click), 143 joints (69.1%) with non-reducible anterior disk displacement (closed-lock), and 17 joints (8.2%) with stenosis or adhesion of the joint compartment. Among the all joints, 13 joints (6.3%) associated with discal perforation.

These findings indicated several intra-capsular organic changes, moreover has a significance in differential diagnosis and treatment for the patients with temporomandibular joint arthrosis.

Key words : temporomandibular joint — TMJ arthrosis — arthrography

The disease showing such symptoms as pain, noise and hypomobility of the temporomandibular joint (TMJ) is known as TMJ arthrosis. Because of the inherent anatomical background of the TMJ, i.e. its control of chewing and biting due to the presence of the upper and lower jaw teeth anterior to the joints and its important effects on jaw movement, almost all patients with TMJ arthrosis are diagnosed and treated by dentists or oral surgeons.¹⁾

1. Anatomy of the TMJ

The TMJ consists of the following anatomical components; bony components are the mandibular condyle, articular fossa and tubercle of the temporal bone; and soft tissues are the articular disk which is inserted between the superior, inferior articular compartments and capsule surrounding the joint, and the attached ligament of the disk. The TMJ differs from other joints because the bilateral ends of the mandible are positioned so that they control rotation and anterior translation harmonically owing to actions of the masticatory muscles, moreover the articular disk is formed by fibrocartilage²⁾ (Fig. 1).

2. Pathology of TMJ arthrosis

TMJ arthrosis is the general name of a disease with various TMJ symptoms, but its pathology is diverse and it can be classified into five types: 1) cases

瀬上夏樹, 藤村和磨, 華房英樹, 福田道男

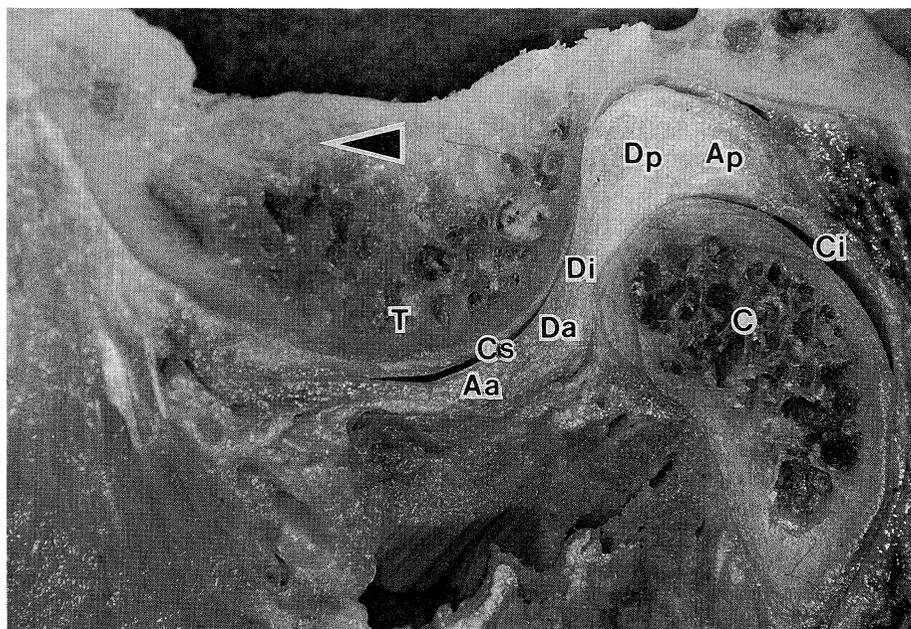


Fig. 1. Sagittal section with the normal left TMJ of a cadaver.

T : tubercle of the temporal bone	Ap : posterior disk attachment
C : condylar head of the mandible	Aa : anterior disk attachment
Dp : posterior band of the articular disk	Cs : superior joint compartment
Di : intermediate zone of the disk	Ci : inferior joint compartment
Da : anterior band of the disk	arrow head indicate to the front

(Courtesy of Drs. K. Murakami and K. Hoshino in the Departments of Oral and Maxillofacial Surgery, and Anatomy at Kyoto University)

complaining mainly of myalgia due to hypertonia and spasms of the masticatory muscles, 2) cases of damage to the articular capsule or ligament due to chronic irritation such as malocclusion, 3) cases of clicking or painful locking, i.e., internal derangements of the TMJ, caused by antero-medial displacement of the articular disk, 4) cases of painful locking associated with destruction or application of the bony or cartilaginous components of the TMJ, i.e., osteoarthritis, and 5) the psychosomatic type with undetermined symptoms.³⁾ These types are not often present alone but most cases involve a mixture of two or three types of pathology.

3. Arthrography of the TMJ

TMJ arthrography was first reported by Zimmer⁴⁾ in 1941 and has been further developed by Nørgaard,⁵⁾ Toller,⁶⁾ *et al.* The initial significance of this method was not anatomical examination of the configuration of the articular soft tissue, but stressed the determination of perforations in the articular disks. However, in the latter half of the 1970s, Farrar and McCarty⁷⁾ proposed the general concept of internal derangements of the TMJ caused by anterior displacement of the articular disk, and arthrography of the TMJ became widely used since a high percentage of cases of TMJ arthrosis was of this type and this method was indispensable in the diagnosis of internal derangements of the TMJ. Double-contrast arthrography of the TMJ was established by

Westesson⁸⁾ in 1982, and detailed morphological examinations of the soft tissue of the TMJ including the disk, disk attachment and articular compartments became possible. Reports on arthrography of the TMJ in Japan have been published by Segami *et al.*⁹⁾ and Yonetsu *et al.*¹⁰⁾

4. Materials

The subjects in the present study were a total of 207 joints in 148 patients suspected of organic abnormalities of the soft tissue of the TMJ and subjected to arthrography of the TMJ among cases of TMJ arthrosis examined at the Department of Oral Surgery, Kawasaki Medical School Hospital. These subjects consisted of 26 males and 122 females, ranging in age from 13 to 71 years old (average age: 30.3 years). Their symptoms included TMJ clicking, arthralgia and hypomobility.

5. Technique

The patients were placed in side position on an fluoroscopic X-ray table. After disinfection and covering with a drape, infiltration anesthesia was applied



Fig. 2. Puncture and detainment of catheters to the both joint compartments under fluoroscopy.

by injecting about 5 ml of 2% lidocaine subcutaneously in the preauricular region. Then, the needle was inserted in the skin about 1 cm in front of the tragus, the position of the needle tip was checked on fluoroscopic monitor and the inferior compartment was punctured. After the puncture, water-soluble contrast medium was injected, the presence of discal perforation and the position of the articular disk were confirmed, and movement of the disk with the mouth opening and closing was carefully examined on the monitor. Thereafter, the superior compartment was punctured in the same way, contrast medium was injected, and lateral tomography in two positions, with the mouth closed and with maximum mouth opening, was performed. In some patients (43 joints), double-contrast arthrography was performed by injection of small amounts of contrast medium and air to the both compartments (Fig. 2).

6. Results

1) Normal cases

In 16 joints (7.7%), there were no deformations of the articular disks, the posterior band of the disk was located on the condylar head with the mouth both opened and closed (Fig. 3), and there were no abnormal configuration or perforations of the disks. These patients complained of clicking or arthralgia with no trismus. The etiology of these symptoms could not be clarified using arthrography.

2) Reducible anterior disk displacement (click)

In 31 joints (15.0%), there was anterior disk displacement with the mouth closed (Fig. 4 left), and the posterior band of the disk was reducible on the condyle and in the postero-superior direction of the condylar head with the

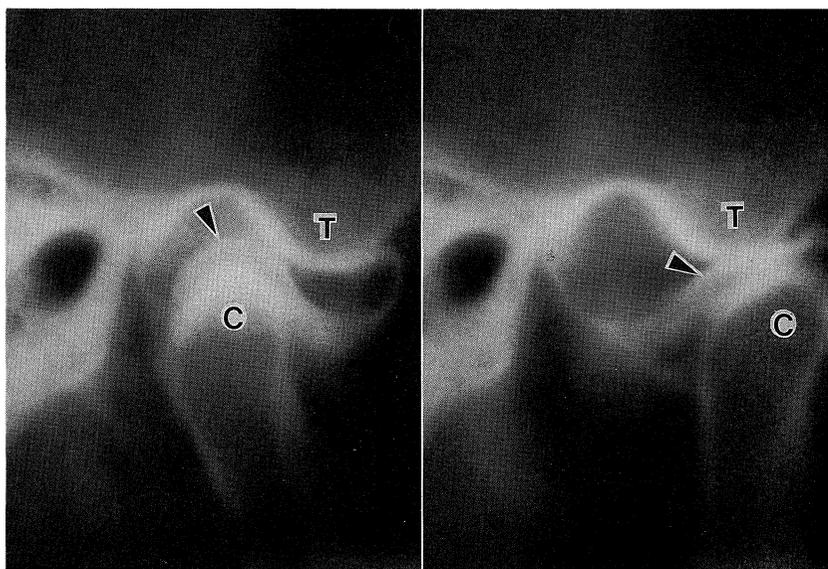


Fig. 3. Double-contrast arthrotomographic view of the normal right TMJ. In closed mouth position (left), and maximum opening mouth position (right), the disk situates on the condylar head.
T : tubercle of the temporal bone, C : condylar head of the mandible, arrow head : posterior band of the disk.

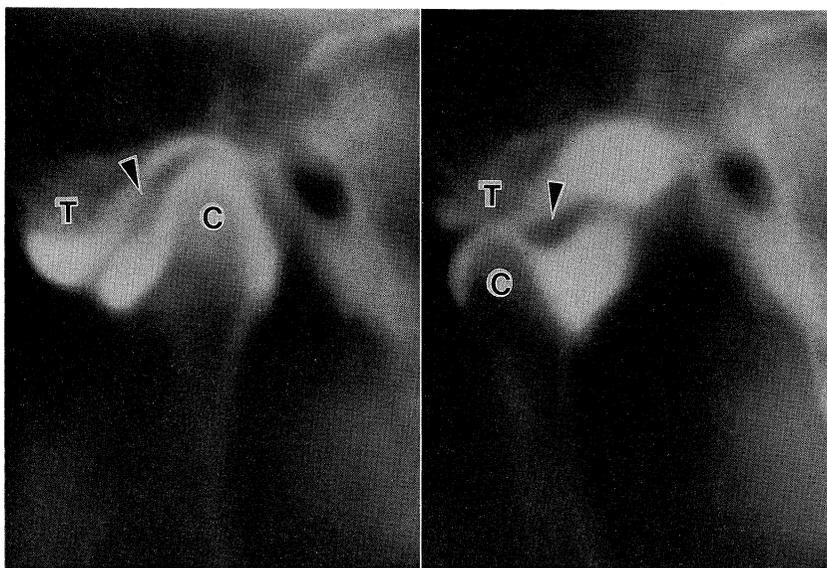


Fig. 4. Arthrotomographic view of the left TMJ with a clicking patient. In closed mouth position (left), the disk displaces anteriorly. In maximum opening position (right), the disk reduces to normal position.

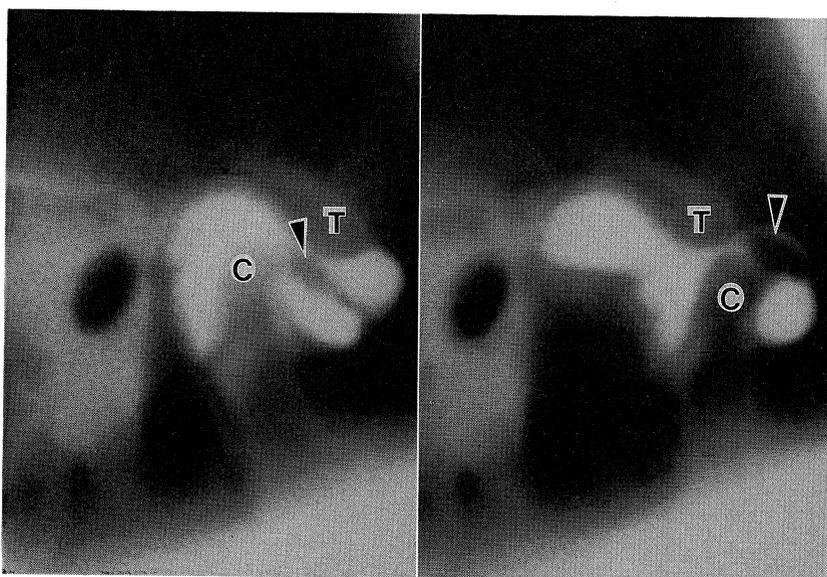


Fig. 5. Arthrotomographic view of the right TMJ with a closed-lock patient. Both in closed mouth (left) and maximum opening mouth position (right), the disk is displacing anteriorly to the condylar head.

mouth open (Fig. 4 right). Most of the patients experienced opening or reciprocal clicking, all of this clicking was found to be due to positional abnormalities of the disks.

3) Non-reducible anterior disk displacement (closed-lock)

In 143 joints (69.1%), there was anterior displacement of the articular disk with the mouth closed (Fig. 5 left) and with the mouth open, the disk

was pushed outward in front of the condylar head (Fig. 5 right). These patients experienced pain when opening their mouths and had trismus.

4) Stenosis or adhesion of the joint compartments

In 17 joints (8.2%), the disks were in the normal position when the mouth was opened and closed, but there was stenosis in either the superior or inferior articular compartment, and movement of the condylar head was greatly restricted. These patients were diagnosed as osteoarthritis and almost all of them had painful locking, as well as morphological abnormalities of bony components of the TMJ in conventional X-P.

5) Disk perforations

In 13 joints (6.3%), there was leakage to the superior compartment simultaneously with injection of contrast medium into the inferior compartment, and it was suggested that there was a perforation of the disk or the discal attachment. In 12 of these joints, closed-lock or osteoarthritis combined with discal perforation.

These results indicate that arthrography of the TMJ revealed various types of organic changes in the articular soft tissue in many patients with TMJ arthrosis, and that clarification of the pathology was highly significant in the treatment following diagnosis. Closed-lock internal derangement is present in almost 90% of patients with painful locking (hypomobility) of the TMJ, and a more definite diagnosis was possible by means of arthrography. However, in the future it will be necessary to perform a more detailed pathological examination of the discal deformation, fibrous adhesion, etc. by means of extensive use of double-contrast arthrography. Fig. 6 shows a case of closed-

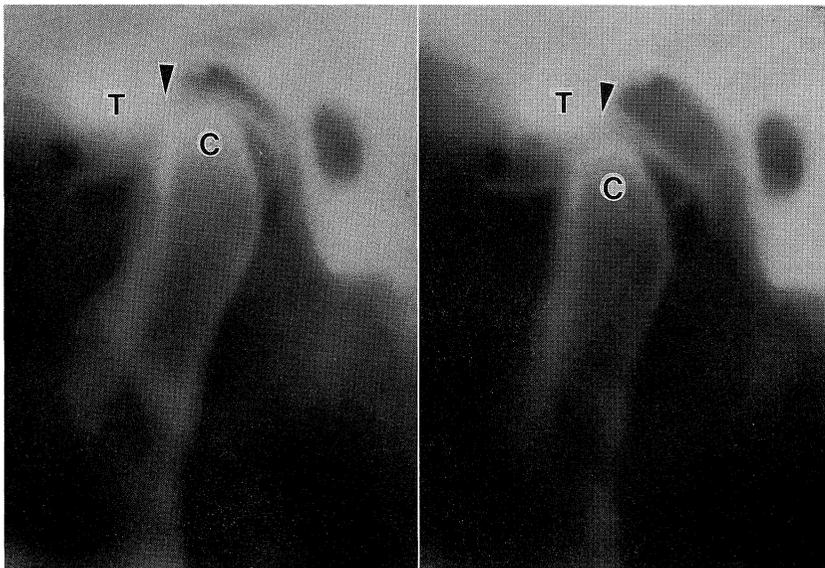


Fig. 6. Double-contrast arthrotomographic view of the left TMJ with a closed-lock patient. Anteriorly displaced disk that adhering to the eminence is determined obviously. left : closed mouth position, right : maximum opening mouth position.

lock subjected to double-contrast arthrotomography. The findings revealed that the articular disk, which showed anterior displacement, had thickened and adhered to the tubercle (Fig. 6).

REFERENCES

- 1) Bell, W.B.: Temporomandibular disorders, classification, diagnosis, and management, 2nd ed. Chicago, Year Book Medical Publishers Inc. 1986, pp. 1-15
- 2) Murakami, K.: Arthroscopy of the temporomandibular joint. *In* Arthroscopy of small joint, ed. by Watanabe, M. Tokyo, Igaku-Shoin. 1985, pp. 128-139
- 3) Gakkansetsusho no bunruian. Gakkansetsu Kenkyukai Zassi 7 : 136, 1986
- 4) Zimmer, E.A.: Die Röntgenologie des Kiefergelenkes. *Schweiz. Mschr. Zahnkeilk.* 51 : 949-983, 1941
- 5) Nørgaard, F.: Arthrography of the mandibular joint. *Acta Radiol.* 25 : 679-685, 1944
- 6) Toller, P.A.: Opaque arthrography of the temporomandibular joint. *Int. J. Oral Surg.* 3 : 17-28, 1974
- 7) Farrar, W.B. and McCarty, W.L.: Inferior joint space arthrography and characteristics of condylar paths in internal derangement of the TMJ. *J. Prosthet. Dent.* 41 : 548-556, 1979
- 8) Westesson, P-L.: Double-contrast arthrography and internal derangement of the temporomandibular joint. *Swed. Dent. J. Suppl.* 13 : 1-57, 1982
- 9) Segami, N., Fukuda, M., Hanafusa, H., Hayashi, Y., Fujimura, K., Sato, Y., Hata, T., Kowaka, S., Hosoda, M. and Nakagawa, H.: Arthrographic study of patients with temporomandibular joint arthrosis. *J. Jpn. Stomatol. Soc.* 36 : 551-557, 1987 (in Japanese)
- 10) Yonetsu, H.: Video-fluoroarthrographic study on abnormal disc movements in patients with internal derangements of the temporomandibular joint. *Shikwa Gakuho* 87 : 1613-1639, 1987 (in Japanese)