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Jun-ichi Koyama, Jusuke Ito, Takafumi Hayashi and Fukiko  
Kobayashi

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# Synovial Chondromatosis in the Temporomandibular Joint Complicated by Displacement and Calcification of the Articular Disk: Report of Two Cases

Jun-ichi Koyama, Jusuke Ito, Takafumi Hayashi, and Fukiko Kobayashi

**Summary:** Two cases of synovial chondromatosis of the temporomandibular joint (TMJ) are presented, including correlation of CT and MR imaging characteristics with surgical and pathologic findings. The usefulness of CT and MR imaging in the diagnosis of TMJ disorders is discussed.

Synovial chondromatosis is a benign tumorlike disorder of the joint characterized by chondrometaplasia of the synovial membrane, in which cartilaginous nodules form and may become pedunculated and/or detach from the synovial membrane, becoming loose bodies within the joint space. These may also calcify. The chief clinical features of this disorder in the temporomandibular joint (TMJ) are preauricular swelling and pain, and restricted movement. Synovial chondromatosis of the TMJ, first described by Auhausen in 1933, is rare, with only about 40 cases reported in the literature. We present two cases of this disorder with correlation of the imaging and pathologic findings.

## Case Reports

### Case 1

A 47-year-old woman was referred to our institution for deviation of the mandible to the right, pain in the left TMJ on opening the mouth, and left preauricular tenderness. Physical examination revealed an asymmetric face with slight diffuse swelling of the left preauricular region, inability to open the mouth more than 14 mm because of pain, slight deviation of the mandibular midline, and open bite of the bilateral molar regions. The patient had no history of trauma or rheumatoid arthritis. A panoramic radiograph and CT scans revealed a small calcification anterior to the neck of the mandible, bilateral anterior disk displacement, and a partially calcified and protruded disk on the left side (Fig 1A–E). Clinical and radiologic findings prompted a diagnosis of left temporomandibular arthritis due to fracture of the condylar osteophyte.

Exploration of the left TMJ was performed under general anesthesia. When the joint capsule was opened, the articular

disk was seen to be displaced anteriorly to the condylar head, and a comparatively large perforation of the retrodiskal pad was noticed. In one calcified body, verified by radiologic findings, a diskectomy was performed, which revealed white calcification anterior to the condylar neck. The perforated retrodiskal pad was removed. Histologic examination disclosed that the small calcification was a loose body (Fig 1F) and also revealed chondrometaplasia of the synovial membrane and a partially calcified disk (Fig 1G). These histopathologic findings were consistent with a diagnosis of synovial chondromatosis.

### Case 2

A 47-year-old woman was referred to our institution for pain in the left TMJ region on opening the mouth and preauricular tenderness. Her face was symmetrical, with slight trismus. The mouth opening was 31 mm and the midline of the mandible was deviated slightly to the right. The patient had no history of trauma. While the panoramic radiograph (Fig 2A) revealed one small calcification posterosuperior to the mandibular condyle, CT scans (Fig 2B and C) disclosed many small calcifications circling the mandibular condyle anteriorly. MR images (Fig 2D and E) showed a zonal area containing many small calcifications encircling the expanded joint space. A series of clinical and radiologic findings supported a diagnosis of synovial chondromatosis of the left TMJ.

Exploration of the left TMJ was performed under general anesthesia. A preauricular inverted “hockey stick” incision was selected. Immediately after opening the joint capsule, some transparent and viscous fluid issued from the upper joint space. Many calcifications of various size were floating while others were scattered throughout the upper space. All the calcifications were removed, along with the irregularly expanded synovial membrane, and a diskectomy was subsequently performed. Histologic examination revealed chondrometaplasia of the synovial membrane of the TMJ, and the calcifications proved to be a total of 95 loose bodies. The histologic findings confirmed the diagnosis of synovial chondromatosis of the left TMJ.

## Discussion

Synovial chondromatosis usually occurs in large joints, such as the knee or shoulder. It is a benign, chronic, and progressive condition that does not seem to undergo spontaneous resolution. Synovial chondromatosis of other joints has been reported to occur twice as often in males as in females, with a mean age of onset in the fifth decade (1). Within the TMJ, it occurs more often in females by a ratio of 4:1, and is usually located on the right side (right-to-left ratio of 4:1) (2). Synovial chondromatosis is a rare pathologic condition, particularly in the TMJ. Calcification of the surrounding soft

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From the Department of Oral and Maxillofacial Radiology, School of Dentistry, Niigata University, 2-5274 Gakkocho-dori, Niigata 951-8524, Japan. Address reprint requests to Jun-ichi Koyama, MD.

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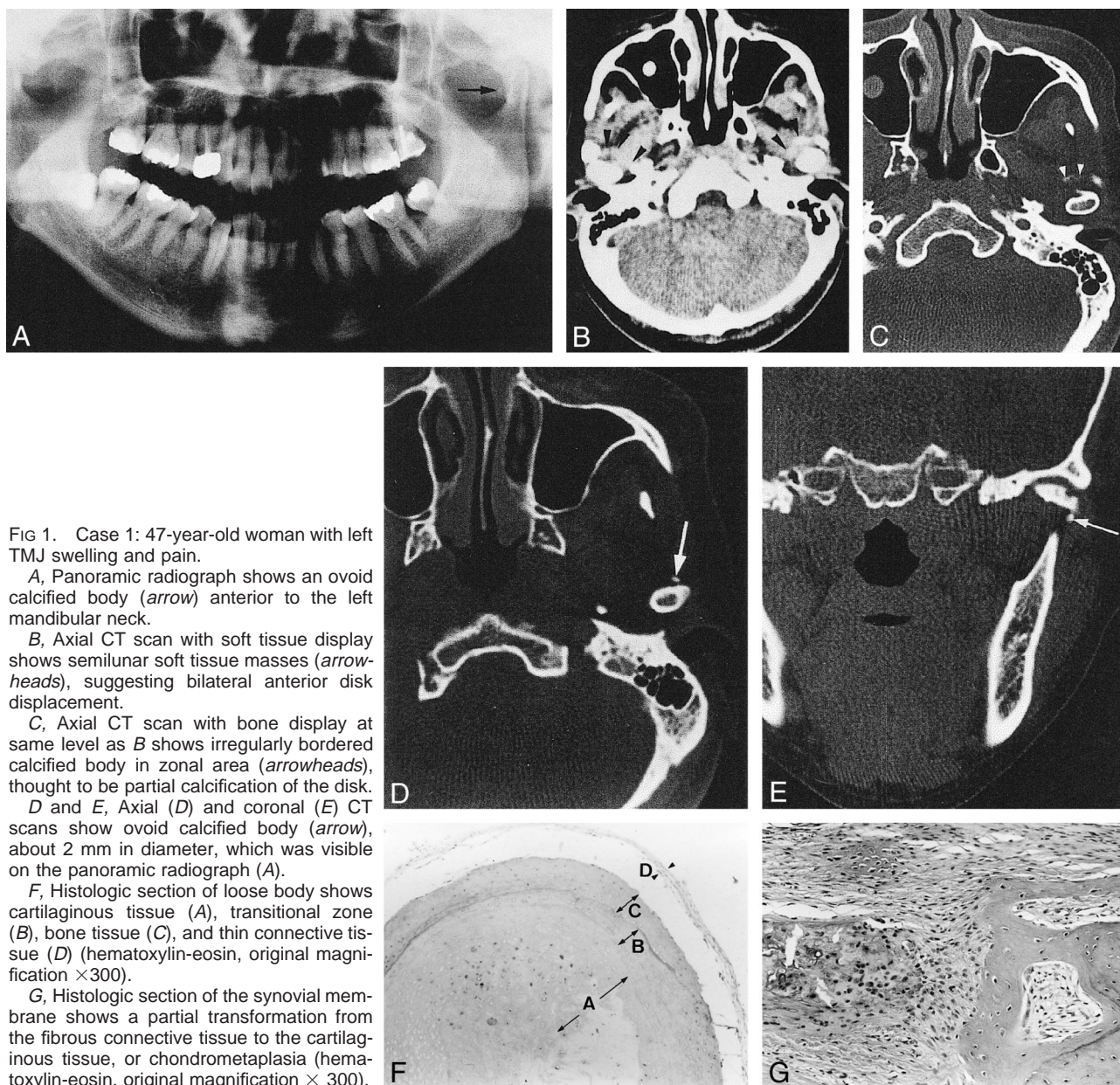


FIG 1. Case 1: 47-year-old woman with left TMJ swelling and pain.

A, Panoramic radiograph shows an ovoid calcified body (arrow) anterior to the left mandibular neck.

B, Axial CT scan with soft tissue display shows semilunar soft tissue masses (arrowheads), suggesting bilateral anterior disk displacement.

C, Axial CT scan with bone display at same level as B shows irregularly bordered calcified body in zonal area (arrowheads), thought to be partial calcification of the disk.

D and E, Axial (D) and coronal (E) CT scans show ovoid calcified body (arrow), about 2 mm in diameter, which was visible on the panoramic radiograph (A).

F, Histologic section of loose body shows cartilaginous tissue (A), transitional zone (B), bone tissue (C), and thin connective tissue (D) (hematoxylin-eosin, original magnification  $\times 300$ ).

G, Histologic section of the synovial membrane shows a partial transformation from the fibrous connective tissue to the cartilaginous tissue, or chondrometaplasia (hematoxylin-eosin, original magnification  $\times 300$ ).

tissue, such as the ligament or tendon, and calcified deposits of the meniscus have been reported in several cases (3). To our knowledge, our case 1 is the first reported example of synovial chondromatosis accompanied by a partially calcified, anteriorly displaced disk of the TMJ. Few cases of synovial chondromatosis have been reported in which there were as many as 95 loose bodies, as seen in our case 2 (4).

Histologically, synovial chondromatosis may be divided into three stages of development: 1) metaplasia found in the synovial membrane without the presence of detached particles, 2) metaplasia found in the synovial membrane with the presence of detached particles, and 3) only detached particles, which may vary in size from less than 1 mm to greater than 10 mm (5). Our cases are representa-

tive of the second developmental stage. A definitive diagnosis may be made after histologic examination of the particles or the synovial membrane.

Noyek and coworkers (1) pointed out radiologic features of synovial chondromatosis in the TMJ, namely 1) widening of the joint space, 2) limitation of motion, 3) irregularity of the joint surface, 4) presence of calcified loose bodies (cartilage), and 5) sclerosis or hyperostosis (overgrowth) of the glenoid fossa and mandibular condyle. These radiologic features, however, are also commonly seen in osteoarthritis involving the TMJ, except for the presence of calcified loose bodies. On the other hand, other causes of loose bodies within a joint include osteochondritis dissecans, intracapsular fracture, avascular necrosis, osteoarthritis, tuberculous or pyogenic arthritis, rheumatoid arthritis,



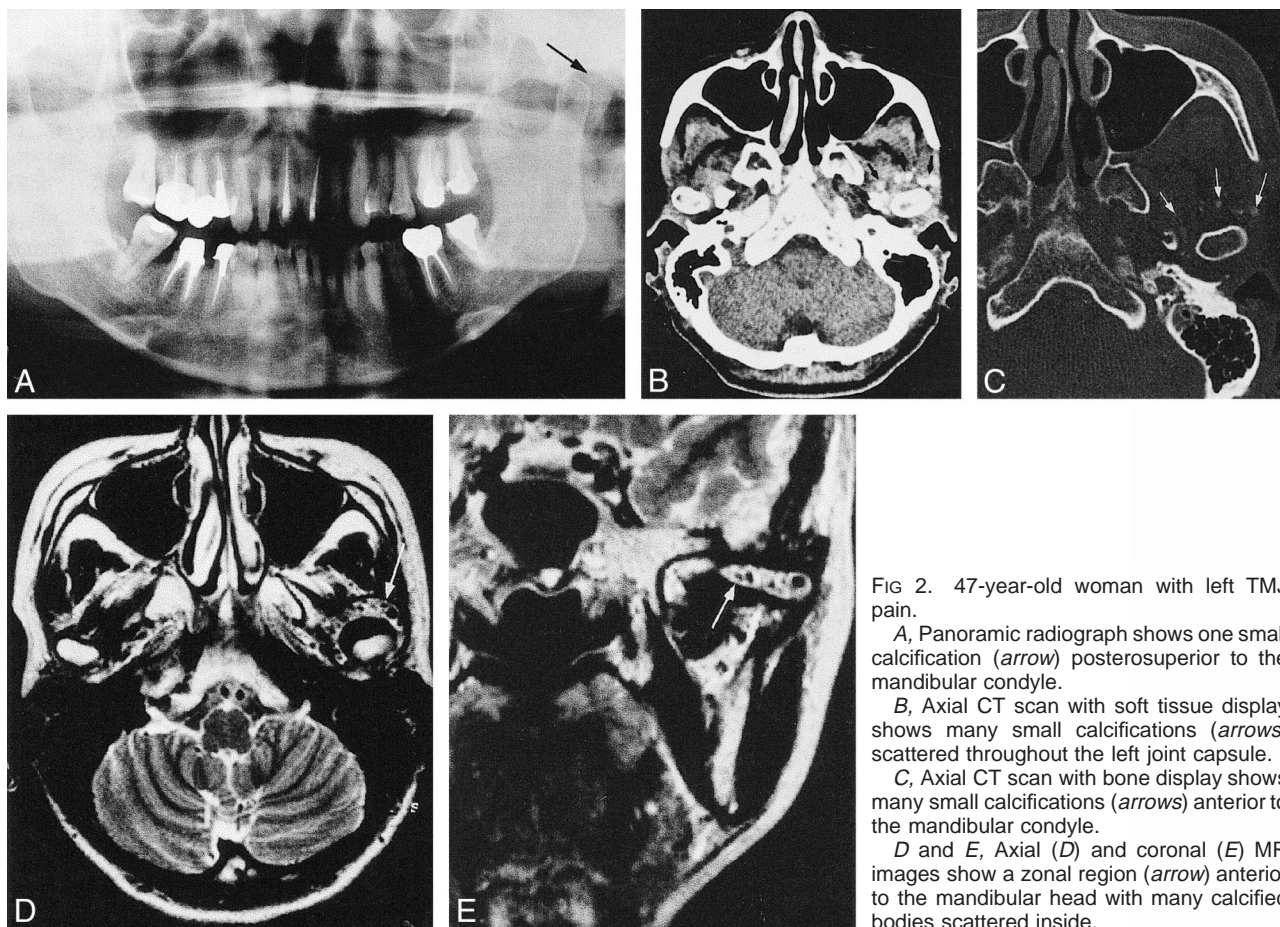


FIG 2. 47-year-old woman with left TMJ pain.

A, Panoramic radiograph shows one small calcification (arrow) posterosuperior to the mandibular condyle.

B, Axial CT scan with soft tissue display shows many small calcifications (arrows) scattered throughout the left joint capsule.

C, Axial CT scan with bone display shows many small calcifications (arrows) anterior to the mandibular condyle.

D and E, Axial (D) and coronal (E) MR images show a zonal region (arrow) anterior to the mandibular head with many calcified bodies scattered inside.

and neurotrophic arthritis (6, 7), with osteochondritis dissecans being the most common cause (7). Therefore, when these radiologic features are not observed in their entirety, there may be some difficulty in establishing an accurate imaging diagnosis of synovial chondromatosis. In both our cases, calcified loose bodies were seen on conventional radiographs, although this technique is not particularly sensitive to the presence of calcified loose bodies, since they have been detected in less than 45% of reported cases.

Recent reports have suggested that CT, MR imaging, and arthroscopy facilitate the clinical diagnosis of synovial chondromatosis (5, 8–12); however, to establish the radiologic diagnosis of this disease it is mandatory to verify pathologically a transitional change from fibrous connective tissue to cartilaginous tissue, or chondrometaplasia (13). Chondrometaplasia was confirmed histologically in both our cases. It is sometimes difficult to differentiate calcified loose bodies from a partially calcified anteriorly displaced disk, but in our case 1, loose bodies were clearly differentiated with bone display on CT scans; and, in case 2, MR images clearly showed calcified loose bodies embedded in a soft tissue mass as small dots of signal void.

Synovial chondromatosis is a local, nonneoplastic, self-limiting process. Removal of the loose bodies and of the involved synovial membrane is

sufficient to control the disease in the majority of cases. Multiple and often short-interval recurrences should alert the physician to the possibility of synovial chondrosarcoma (14).

### Conclusion

We have described two cases of synovial chondromatosis, one with anterior displacement and calcification of the left articular disk and the other with numerous loose bodies in the joint space. CT and MR imaging characteristics were correlated with surgical and histopathologic findings.

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