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# Synovial Chondromatosis of the TMJ: MR and CT Findings

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Synovial chondromatosis is a rare, benign joint disorder characterized by metaplasia of the synovium with the formation of numerous foci of cellular hyaline cartilage. These foci may detach from the synovium and become loose bodies within the joint space, and also may calcify. The disease is usually monoarticular, of unknown origin, and occurs most often in larger joints, such as the knee, shoulder, and hip [1, 2]. Synovial chondromatosis of the temporomandibular joint (TMJ), first described by Axhausen in 1933 [3], is truly rare, with only 41 cases reported in the literature [3–7]. This article presents another case, and emphasizes MR and CT findings.

## Materials and Methods

CT and MR imaging were performed in a patient with symptoms referable to the left temporomandibular joint. CT was performed on a GE 9800 scanner. The direct sagittal images were obtained according to methodology previously described [8]. MR was performed with a 1.5-T superconductive magnet (GE Signa, Milwaukee, WI) using a single 5-in. circular receiver surface coil. Technical parameters included 3-mm-thick sections with 1-mm gaps; 256 × 128 matrix; 12–16-cm field of view; and 800/25/4 (TR/TE/excitations) for T1-weighted sagittal closed- and open-mouth projections. Coronal proton-weighted (2000/20) and T2-weighted (2000/80) spin-echo pulse sequences were also obtained using a standard head coil. The study also included gradient-echo images using the GRASS (gradient-recalled acquisition in the steady state) technique with 27/14/10, a 60° flip angle, and a 16-cm field of view.

## Case Report

A 53-year-old woman presented with a chief symptom of progressively increasing pain in the left TMJ, which was exacerbated by function. There was a questionable history of trauma to the area. Her medical history was positive only for cholecystectomy and for hysterectomy for endometrial carcinoma 20 years previously. Physical examination revealed point tenderness over the lateral pole of the left mandibular condyle, with no apparent preauricular swelling, and soft crepitus of the joint to auscultation. The mouth opening was normal, as was the remainder of the physical examination.

An orthopantomographic radiograph was reported as being grossly normal. A presumptive diagnosis of left TMJ pain/dysfunction caused by internal derangement was made. A nonsteroidal antiinflammatory

agent was prescribed, as well as a soft diet and moist heat applications. The patient returned 1 month later with worsening pain and slight preauricular swelling. Further work-up was deemed necessary.

Rheumatoid factor, antinuclear antibody, and erythrocyte sedimentation rate were normal. Aspiration of the left TMJ revealed no evidence of malignant cells, and was otherwise unremarkable.

CT of the TMJs, including direct sagittal views (Fig. 1), revealed an irregular cortical outline of the mandibular condyle, irregular calcifications adjacent to the articular eminence, calcifications within the joint space, and an apparent soft-tissue mass eroding the fossa posterosuperiorly and displacing the condyle in an inferior direction. The right TMJ appeared normal. MR of the TMJs was subsequently performed. Coronal T1-weighted images (Fig. 2) revealed marked concentric expansion of the left joint capsule with areas of hypointensity in the superior joint space consistent with loose bodies. There was an apparent fluid accumulation in the left joint (Figs. 3A and 3B), with two loose bodies evident in the joint space. Gradient-echo images confirmed the presence of hyperintense fluid within the joint, with the same hypointense areas suggestive of loose bodies. Sagittal T1-weighted images in the open and closed position (Fig. 4) showed the disk to be in a relatively normal position with respect to the condyle, with thickening and irregularity posteriorly. Also evident was a decrease in the signal intensity of the retrodiskal tissue and an increase in the size of the joint space.

A presumptive diagnosis of synovial chondromatosis was made. The patient underwent exploration of the left TMJ, which revealed multiple cartilaginous bodies within the superior joint space and severe synovitis. Approximately 75 ovoid loose bodies, ranging in size from 0.25 to 7 mm, were removed, along with the articular disk and all visible synovium. Histopathologic evaluation of tissue confirmed the diagnosis of synovial chondromatosis. Four months after surgery the patient was completely free of symptoms and the preauricular swelling had resolved.

## Discussion

Synovial chondromatosis of the TMJ has been reported to occur in individuals from ages 18 to 75, with a mean age of 46, and with a predilection for women. The disease is invariably monoarticular, and of unknown origin [4–7]. Synovial chondromatosis is a benign condition, and although chondrosarcoma has been reported to develop following synovial chondromatosis [9], such cases probably represent primary

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Fig. 1.—Direct sagittal CT scans of left TMJ.

A, Closed-mouth view shows irregular cortical outline of mandibular condyle, irregular calcifications along inferior margin of articular eminence (*curved arrow*), and calcifications within joint space (*arrowhead*). There is erosion of the posterosuperior aspect of the glenoid fossa (*straight arrow*) and inferior displacement of the condyle, apparently by a soft-tissue mass.

B, Open-mouth view shows anterior translation of condyle. Calcifications on anterior slope of articular eminence (*curved arrow*), calcification within joint space (*arrowhead*), and erosive changes of fossa (*straight arrows*) are evident.

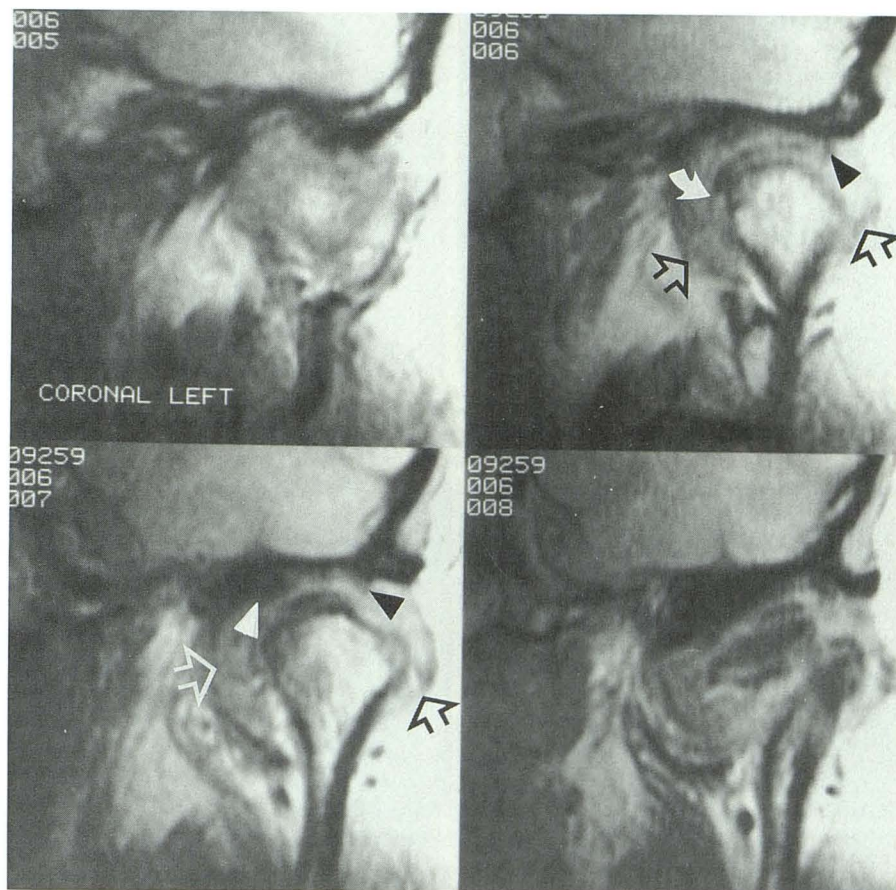
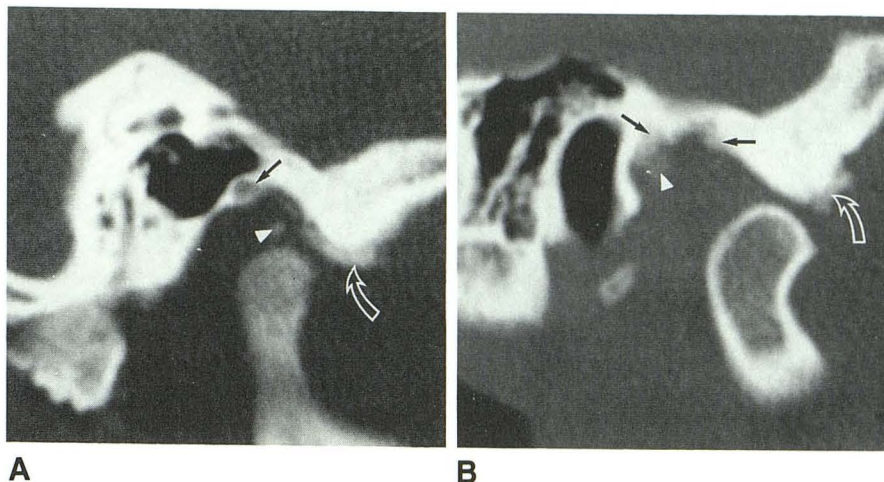


Fig. 2.—Coronal T1-weighted MR images of left TMJ. Note marked concentric expansion of joint capsule (*open arrows*) and several areas of hypointensity in superior joint space consistent with loose bodies (*arrowheads*). The articular disk is seen as a hypointense curvilinear band (*curved arrow* in top right view).

malignancy. None of these cases involved the temporomandibular joint.

Clinical findings include pain, restriction of mandibular movement, deviation of the jaw to the affected side on opening, and joint sounds [4–7], all of which are findings consistent with internal derangement of the TMJ, a common disorder. Although preauricular swelling is usually present, it may be absent, as initially was the case with the patient presented in

this report. The presence of preauricular swelling has led to the erroneous diagnosis of pleomorphic adenoma (benign mixed tumor) of the parotid gland and unnecessary parotid exploration [10].

Conventional radiography has not yielded consistent findings in cases of synovial chondromatosis. The most common findings have been calcified loose bodies, widening of the joint space, limitation of movement, and sclerotic and lytic



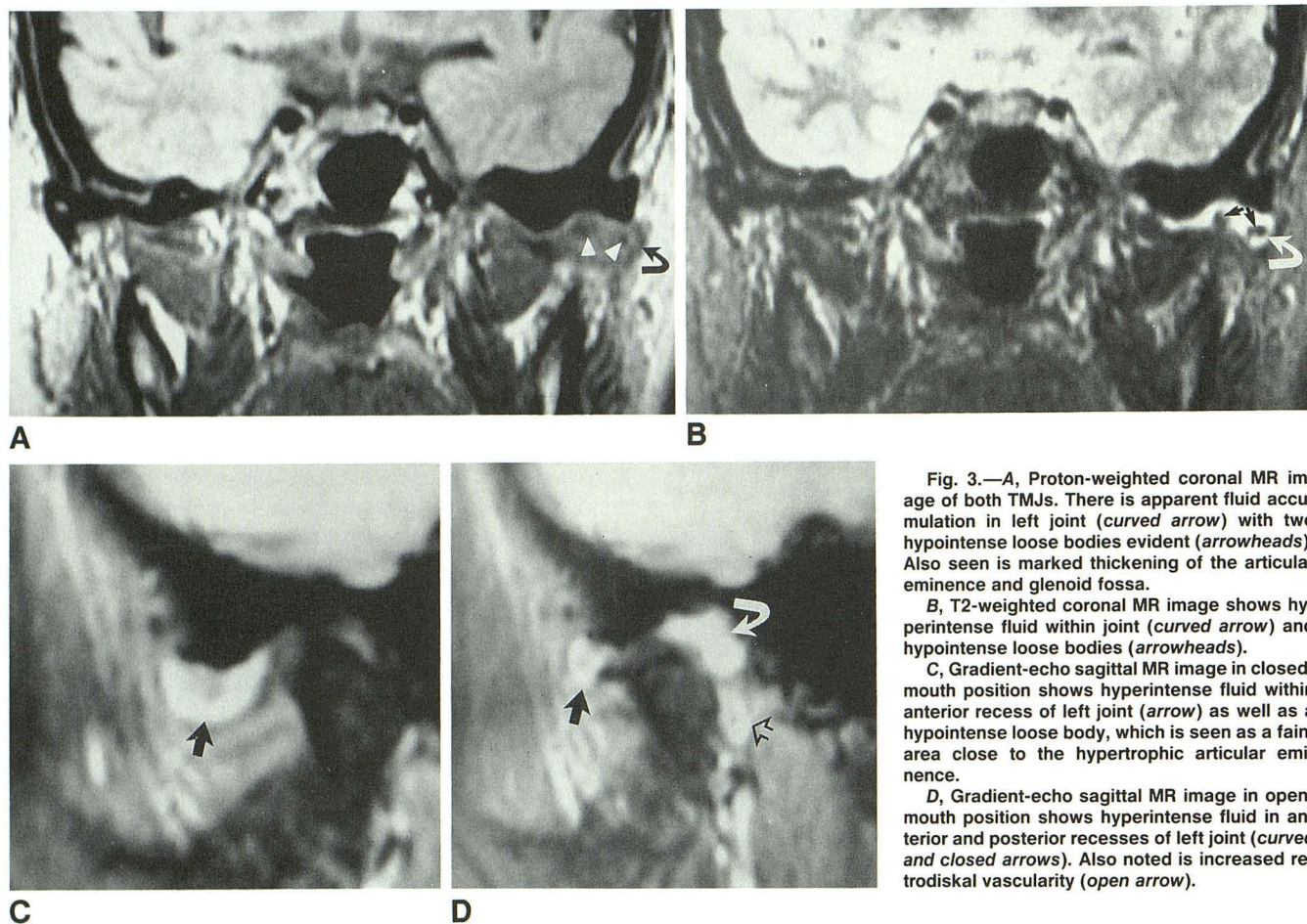


Fig. 3.—A, Proton-weighted coronal MR image of both TMJs. There is apparent fluid accumulation in left joint (curved arrow) with two hypointense loose bodies evident (arrowheads). Also seen is marked thickening of the articular eminence and glenoid fossa.

B, T2-weighted coronal MR image shows hyperintense fluid within joint (curved arrow) and hypointense loose bodies (arrowheads).

C, Gradient-echo sagittal MR image in closed-mouth position shows hyperintense fluid within anterior recess of left joint (arrow) as well as a hypointense loose body, which is seen as a faint area close to the hypertrophic articular eminence.

D, Gradient-echo sagittal MR image in open-mouth position shows hyperintense fluid in anterior and posterior recesses of left joint (curved and closed arrows). Also noted is increased retrodiskal vascularity (open arrow).

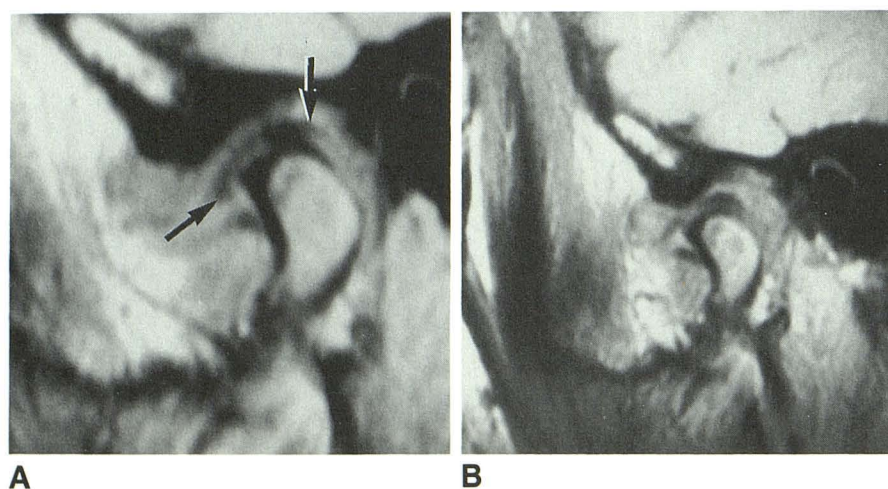


Fig. 4.—Sagittal T1-weighted MR images of left TMJ.

A, Closed-mouth view. The articular disk is thickened (arrows) and is irregular anteriorly. The retrodiskal tissue shows increased signal intensity, most likely due to the presence of exudate within the joint.

B, Open-mouth view. Translation of the condyle is evident, with no change in the disk-condyle relationship. The superior joint space is markedly enlarged.

changes in the condyle and fossa [5]. These findings are not specific for synovial chondromatosis, as all may be seen in degenerative joint disease. Conventional radiographs have revealed no findings in 24–57% of cases [4, 5]. Radiopaque bodies in the TMJ are not pathognomonic for synovial chondromatosis, and can be found in other disorders, including

osteoarthritis, osteochondritis dissecans, condylar fracture, tuberculous arthritis, rheumatoid arthritis, and neurotrophic arthritis [11].

CT has been helpful in the diagnosis of synovial chondromatosis [12, 13], and double-contrast arthrography has detected the presence of loose joint bodies in the TMJ that were



not apparent on conventional radiographs [14]. Radionuclide scanning with technetium-99m has shown increased uptake in two cases [4, 15], but this is not specific for synovial chondromatosis. Additionally, one of these cases had condylar hyperplasia of the affected side [15].

MR imaging has been of great benefit in the diagnosis of internal derangement of the TMJ [16]. There has been only one previous report on MR findings in synovial chondromatosis, involving intracranial extension of the disease [17]. In that case, CT was helpful in identifying calcifications not seen with conventional radiography, but the MR study was found to be superior in delineating the boundaries of the lesion, especially the boundary approximating the temporal lobe. In our case, CT demonstrated calcifications within the joint and along the inferior margin of the articular eminence, features suggestive of synovial chondromatosis but not specific for it. MR revealed the striking expansion of the joint capsule, which is known to be a common finding at surgery. The loose cartilaginous bodies consistently presented as small areas of low signal intensity, and the articular disk was shown to be in good position but irregular. The presence of a large volume of fluid within the joint cavity, a common finding in synovial chondromatosis, was confirmed by the gradient-echo images. Delineation of the boundaries of the lesion is important owing to the proximity of vital structures and the possibility of extraarticular extension, of which five cases have been reported [10, 17–20]. The use of MR also eliminates the possibility of confusing synovial chondromatosis with pleomorphic adenoma of the parotid gland.

Sophisticated imaging studies such as CT and MR should be considered when a painful temporomandibular joint fails to respond to therapy or is associated with preauricular swelling.

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