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內文：

Introduction

Synovial chondromatosis (SC) is a rare benign arthropathy characterized by cartilage formed in the synovial membrane, as well as secondary calcification and ossification.

- usually affects large synovial joints, elbow and knee.
- uncommon in the TMJ, more than 200 cases of SC in the TMJ have been presented in the literature.
- Widespread finding is possibly attributable to improved imaging techniques, such as plain radiography, CT, MRI.

Most reports suggest that SC of the TMJ has a predilection for occurrence in the superior compartment.

- Only 6 cases were originated in the inferior compartment of the SC literature in the TMJ.
- 1 case was found in both the superior and inferior compartments without perforation.
- 9 cases were found in both the superior and inferior compartments with perforation.

From January 2008 to May 2011, we found 5 cases of SC in the inferior compartment (including a previously reported case).

- Each case had different clinical and radiologic aspects and was treated with different surgical therapies.
- The stages and the treatment principles of SC in the inferior compartment are discussed.

Patients and Methods

According to the different structures involved, we classified SC in the inferior compartment of the TMJ into 3 stages.

- Stage 1 involves multiple loose bodies that are noted with expansion of the inferior compartment; bony erosion is not found.
- Stage 2 involves multiple calcified nodules that are conglutinated to the condyle, the condyle is enlarged by pressure erosions, and the disc is intact.
- Stage 3 involves multiple calcified nodules conglutinated to the condyle, the condyle is destroyed as a result of pressure erosion or by direct bony invasion of the mass, the inferior surface of the disc is involved, and the lesion can not be detached from the disc.

The classification was simply defined as follows:

- stage 1, synovium is involved
- stage 2, synovium and condyle are involved
- stage 3, synovium, condyle, and disc are involved.

A retrospective review of our patient files showed that there were 81 patients with SC

of the TMJ treated at the TMJ clinic of the Ninth People’s Hospital, Shanghai Jiao Tong University, Shanghai, China, from January 2000 to May 2011.

- 70(86.4%) had origins from the superior compartment, including 1 patient who had both SC and pigmented villonodular synovitis simultaneously
- 5 (6.2%) had origins from both the superior and inferior compartments with perforation
- 1 (1.2%) had origins from both the superior and inferior compartments without perforation
- 5 (6.2%) were diagnosed with SC originating from the inferior compartment.

Demographics, location, duration of symptoms before hospitalization, clinical manifestations, and follow-up are given in Table 1.

Table 1. SUMMARY OF DATA FOR 5 PATIENTS WITH SC IN INFERIOR COMPARTMENT OF TMJ

Case	Age (yr)/ Gender	Location	Symptoms					Duration of Symptoms (mo)	Follow-Up (mo)
			PAS	Pain	Crepitus	LMO (mm)	Malocclusion		
1 ¹⁷	50/M	L	++	++	+	28	Left posterior open bite	10	18
2	29/M	R	+	+	+	20	Right posterior open bite	12	30
3	30/M	L	-	-	-	20	Mandibular midline shift of 7 mm to left	12	23
4	41/F	R	+++	+++	-	28	No	24	19
5	35/M	L	-	+	-	10	Mandibular midline shift of 5 mm to left	24	2

Abbreviations: PAS, preauricular swelling; LMO, limitation of mouth opening.

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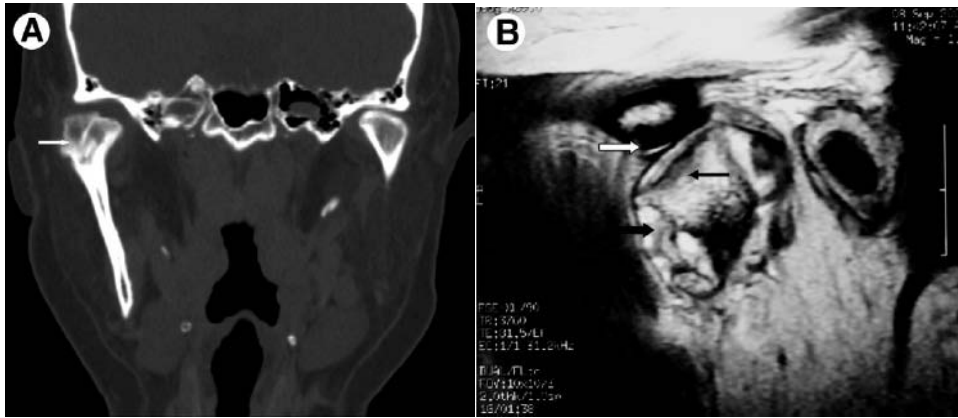
Results

There were 3 types of manifestation modes from radiologic findings.

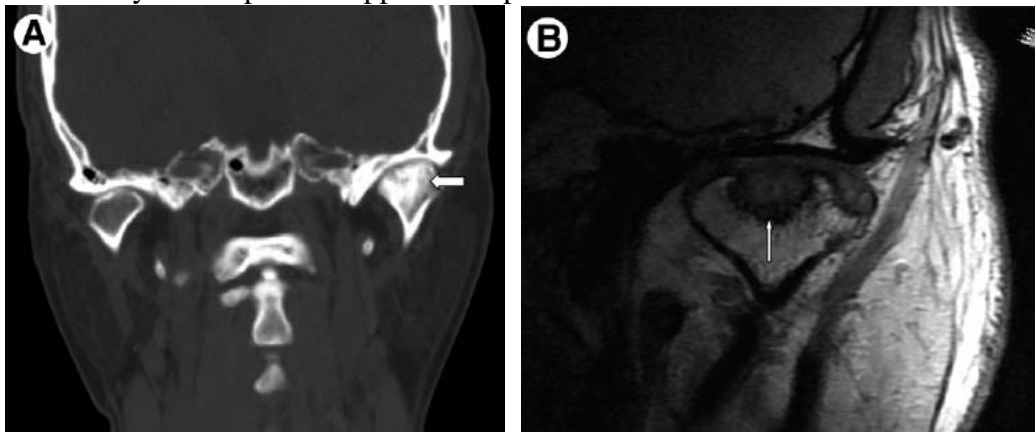
- The first mode was found case 1: CT scans did not show calcifying lesions, and sagittal magnetic resonance images showed distinct nodules within an extremely expanded inferior joint compartment and an articular disc in the normal position.
- The second mode was found in case 2, case 3, and case 4: the bony window on CT scans showed ossification lesions around the condyle, and the bone cortex was destroyed, MRI showed some calcification around the head of the condyle, hypertrophy of the condyle, and normal position of the disc.



- Clinical and radiologic findings of case 1. A, Preoperative sagittal MRI showed the normal position of the disc, the normal contour of the condyle, and multiple loose bodies in the expanded inferior compartment



- Preoperative radiologic examination of case 2 and case 3. A, Coronal CT scan showed several calcified bodies (arrow) at the lateral part of the right condyle. B, MRI showed the normal position of the disc (white arrow), severe osteoarthritis of the condyle (thin black arrow), and some calcification (thick black arrow) in the expanded inferior compartment.
- The third mode was found in case 5: CT scans and MRI showed sclerosis of the condyle with partial cupped absorption



- FIGURE 3. Preoperative radiologic examination of case 4. A, CT scan showed sclerosis of the left condyle (arrow). B, MRI showed partial sunk absorption (arrow) on the surface of the condyle.

During the operation, we found that all superior compartments were intact and the position of the discs was normal without perforation

- In case 1 many cartilaginous nodules of various sizes were floating in the inferior joint compartment. All loose bodies and grossly abnormal synovium were removed.



B, Loose bodies and synovium

- In case 2 condylectomy with the mass was performed. There was no invasion into the surrounding soft tissues including the attachment of the disc and the

external pterygoid muscle. A costochondral graft (CCG) from the seventh contralateral rib was harvested and then fixed by use of an endoscope.¹⁹ Numerous loose bodies with diameters ranging from 2 to 7 mm were conglutinated to the neck of the condyle. The cartilage surface of the condyle was destroyed.



FIGURE 4. Gross appearance of mass in case 2. Numerous loose bodies, ranging in diameter from 2 to 7 mm, were conglutinated to the neck of the condyle.

- In case 3 and case 4, after the inferior joint space was opened, multiple calcified, small nodules were found between the disc and the condyle. Small nodules could not be detached from the inferior surface of the disc and the condyle. There was bony erosion in the condylar head.

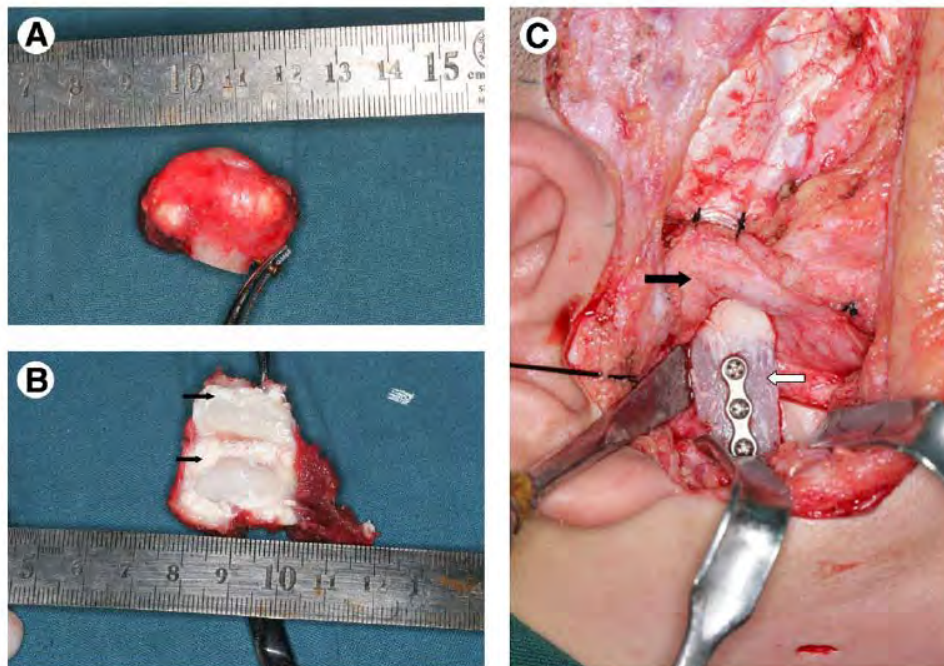


FIGURE 5. Gross appearance of mass and operative view in case 3. A, Condylectomy together with meniscectomy was performed. B, Small nodules could not be detached from the inferior surface of the disc and the condyle (black arrows). C, Pedicled DTF (black arrow) was transferred to reconstruct the disc, and CCG (white arrow) was fixed to reconstruct the condyle.

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- In case 5 a perforation was found at the superficial condyle. There were no loose bodies, but an irregular, semitransparent, jelly-like substance filled the inferior compartment and the cupped bony defect



FIGURE 6. Gross appearance of mass in case 4. A perforation was found at the superficial condyle. No loose bodies were found, but an irregular, semitransparent, jelly-like substance filled the inferior compartment and the cupped bony defect.

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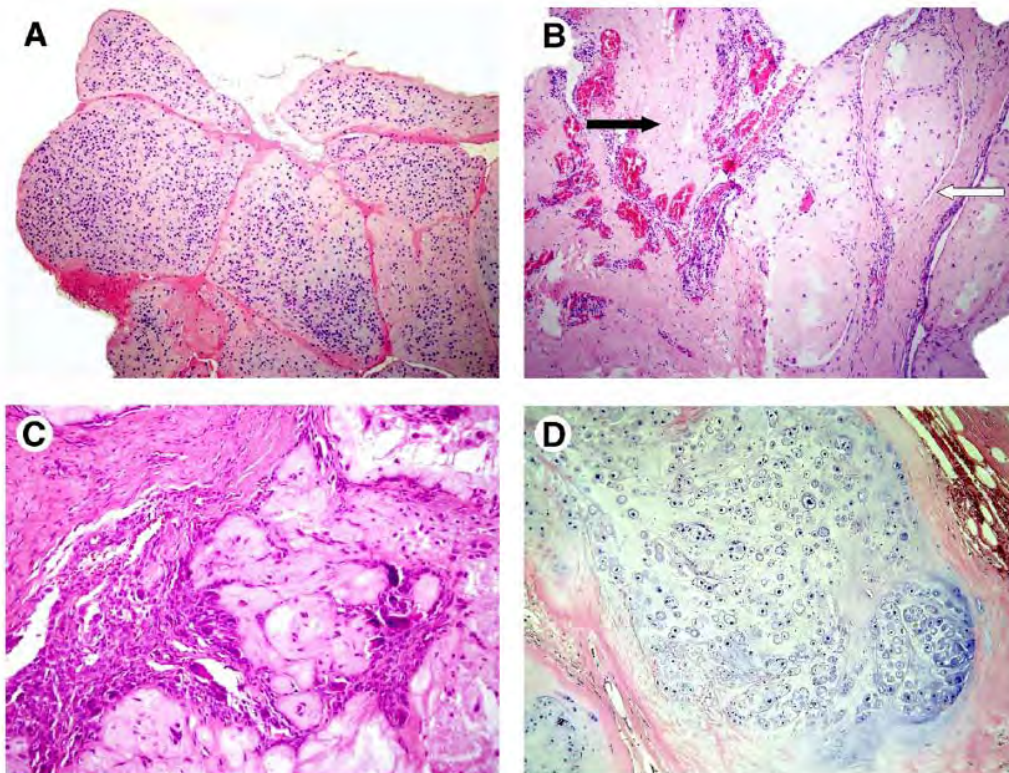


FIGURE 7. Histologic views of cases 1, 2, 4, and 5 (hematoxylin-eosin staining). A, Case 1 showed many cartilaginous immature nodules with a lining of synovium-like connective tissue (original magnification $\times 100$).¹⁷ B, Case 2 showed exophytic nodular growth of mature (white arrow) and immature (black arrow) hyaline cartilage (original magnification $\times 100$). C, Case 4 showed a core of hyaline cartilage surrounded by a fibrous capsule with a synovial internal lining (original magnification $\times 200$). D, Case 5 showed mature hyaline cartilage surrounded by a fibrous capsule (original magnification $\times 200$).

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According to the radiologic and surgical findings, case 1 was in stage 1, case 2 was in stage 2, and case 3, case 4, and case 5 were all in stage 3.

With 3 months of physical therapy, good outcomes occurred with respect to mandibular maximum interincisal opening (mean, 35.6 mm) without pain. CT and MRI scans were re-examined. Good positioning of the CCG and/or pedicled DTFFF was found. The disease had not recurred during the follow-up period.

Discussion

- In these cases the signs and symptoms were pain, swelling, decreased mandibular range of motion, crepitus, and malocclusion, which were nonspecific.
- From radiographic findings, only 1 case displayed multiple loose bodies with expansion of the inferior compartment, and 5 cases that were easily misdiagnosed as malignant bony tumor displayed condylar erosion or extension.
- It is generally accepted that the recurrence of SC is likely if cartilaginous foci or hyperplastic synovium is left behind.
- There are 2 histopathologic classifications of SC in the literature.
- One is the classification of Milgram, which is based on the relationship between the cartilage foci and the synovium. He classified the disease into 3 developmental stages.
 - Stage 1 shows active chondrogenic metaplasia with the foci of cartilage embedded within or protruding from the synovium, but without any detached particles.
 - Stage 2 shows loose bodies containing active chondrocytes that maintain their growth potential.
 - Stage 3 shows that only detached particles exist in the joint space; no intrasynovial disease is present.
- The other classification is that of Gerard et al, which is based on the synovial activity of the disease without considering the loose bodies in the joint cavity.
 - Stage 1 is characterized by the presence of cartilaginous or fibrocartilaginous nodules with plenty of ground substance in the synovium.
 - Stage 2 is the most active stage of synovial metaplasia, in which a very thick synovium with numerous small calcification or ossification cartilaginous nodules is present.
 - In stage 3 active metaplasia is finished; the nodules are large and mostly ossified. In stage 4 the synovium is nearly normal or atrophic without any signs of metaplasia.
- We classified SC in the inferior compartment of the TMJ into 3 stages based on the extension of the lesion.
 - Stage 1 means that the synovium is involved
 - Stage 2 means that the synovium and condyle are involved
 - Stage 3 means that the synovium, condyle, and disc are involved.
- Case 1 was in stage 1, case 2 was in stage 2, and case 3, case 4, and case 5 were in stage 3.
- Compared with the traditional classification, which is based on histopathologic examination, our classification is more useful to guide the treatment during the operation.
- Different stages indicate that different structures are involved. Thus, we would also expect that different stages have different treatment principles.
 - In stage 1 only the synovium is involved. So, removal of loose bodies and affected synovium is generally enough.
 - In stage 2 the synovium and condyle are involved, and thus condylectomy should be performed and CCG harvested to reconstruct the condyle.
 - In stage 3 the synovium, condyle, and disc are all involved. As a result,

condylectomy together with discectomy should be performed. The pedicled DTFFF and CCG are harvested to reconstruct the joint. Compared with condylar recontouring or high condylectomy, CCG reconstruction could maintain the height of the ramus.

題號	題目
1	對 TMJ 軟組織最有效的影像診斷技術為： (A) 核子影像(nuclear image) (B) 核磁共振影像(MRI) (C) 電腦斷層攝影(CT) (D) 環口放射線攝影術(panoramic radiography)
答案(B)	出處：Manual of Temporomandibular Disorders,2005(Edward F.Wright)
題號	題目
2	顳顎關節異常(temporomandibular disorders)的最常見問題是： (A) Muscular disorders (B) Internal derangement (C) Ankylosis (D) Osteoarthritis
答案(A)	出處：Contemporary oral and maxillofacial surgery P.633