

# Open surgery assisted with arthroscopy to treat synovial chondromatosis of the temporomandibular joint

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**Abstract.** Open surgery and arthroscopy for the treatment of synovial chondromatosis (SC) of the temporomandibular joint (TMJ) have their advantages and disadvantages. The aim of this study was to report the application and results of the combined use of these two methods in the treatment of SC and the indications for use. A total of 36 patients with magnetic resonance imaging (MRI) confirmation of SC, treated from 2010 to 2015, were included. Patients with tumours in the upper articular cavity and with the extended margin of the medial groove still in-between the medial crest of the condyle and infratemporal space on coronal MRI were selected to undergo open surgery with the assistance of arthroscopy to clear the loose bodies and affected synovium. All 36 patients first went through open surgery. Subsequent arthroscopy examinations indicated the presence of loose bodies in the medial groove in 14 patients (in the anterior or posterior recess), which were removed using a cup-shaped clamp. Thirty-three of the patients were followed up for an average of 33.3 months; there was no recurrence in these patients. This technique has the benefits of the complete elimination of diseased tissues with a minimal osteotomy and a short surgical duration.

Key words: temporomandibular joint; synovial chondromatosis; arthroscopy; open surgery; indication.

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Synovial chondromatosis of the temporomandibular joint (TMJ) is a type of benign tumour that results from the growth of cartilage-like substances on the synovium. These substances may later break off to become free bodies in the articular cavity. Synovial chondromatosis is relatively common in the large joints, but is less

often reported in the TMJ.<sup>1</sup> The diagnosis of synovial chondromatosis of the TMJ is mostly performed through magnetic resonance imaging (MRI) and computed tomography (CT); these imaging modalities provide comparatively accurate information on not only the sizes and positions of the free bodies, but also the condition of

the articular disc, condyle, and glenoid fossa, which can help to guide subsequent treatment.<sup>2</sup>

As conservative treatment for synovial chondromatosis is generally unsuccessful,

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surgical procedures including arthroscopy<sup>3,4</sup> and open surgery<sup>5-7</sup> are used for complete removal of the free bodies and the diseased synovium. However, the elimination of affected tissues located in the deeper layers, such as the medial groove of the joint capsule, remains a challenge. Arthroscopy has the advantages of small incisions and the ability to perform a comprehensive examination of the anatomy including the medial groove. However, this method is restricted in the size of the surgical device and the operating space. Difficulties are sometimes encountered when trying to remove larger-sized loose bodies or parts of the diseased synovium due to the dimensional limitations of the arthroscope. On the other hand, open surgery provides a relatively larger operating field and allows resection of the tumour and the affected synovium under direct view, although dead zones in deeper areas, such as the medial groove of the joint capsule, cannot be reached. As a result, resection of the condyle to allow better examination of the internal structures may be required in certain cases, leading to more extensive wounds.

In this study, a technique of open surgery assisted by arthroscopy was applied to patients with synovial chondromatosis who met the following requirements: the preoperative MRI scan and clinical examination showed that the patient did not meet the criteria for arthroscopic treatment alone, as described by Cai et al.<sup>4</sup>; the preoperative MRI scan indicated that the diseased part was contained within the upper articular cavity; coronal MRI reconstruction showed that the extended margin of the medial groove of the joint capsule was below the medial crest of the condyle and away from the infratemporal fossa. With this novel technique, the tumour and affected synovium were removed and a thorough clean-up of the joint capsule space was guaranteed. The results of the clinical and MRI follow-ups were evaluated. Furthermore, the indications for this procedure and the effects of its application are discussed.

## Patients and methods

### Patient files

Patients presenting from September 2010 to February 2015, who were preliminarily diagnosed with synovial chondromatosis of the TMJ, underwent oblique sagittal MRI scans (Fig. 1A) and CT scans of the skull (Fig. 1B). Taking into account the degree of maximum inter-incisal opening (MIO) and diagnosis from medical

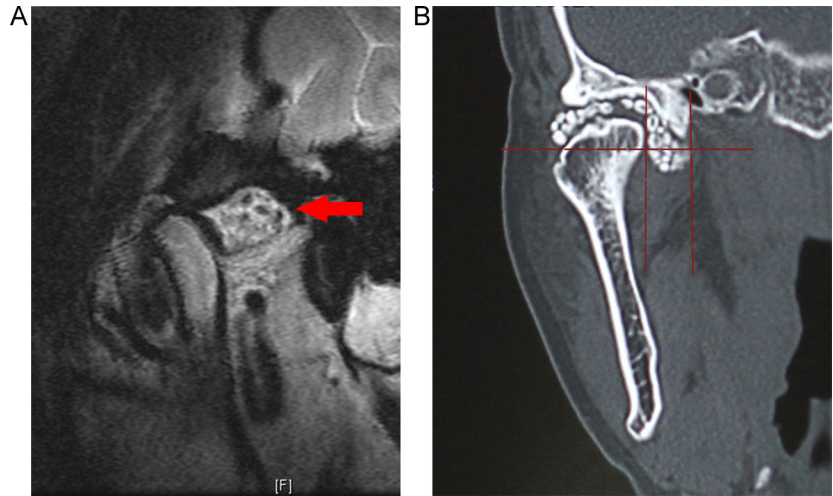


Fig. 1. MRI and CT examinations of a patient. (A) Oblique sagittal MRI scan revealing effusion and loose bodies in the medial groove of the upper articular cavity; the appropriate condyle morphology was maintained and no bone destruction of the glenoid fossa or the articular tubercle was observed. (B) Coronal CT scan showing loose bodies distributed in the upper articular cavity, some of which had aggregated in the medial groove and had caused a bulge on the medial side of the joint capsule.

imaging, patients were included in this study if they fulfilled the following criteria: (1) the diseased regions were in the upper articular cavity, with no articular disc perforation or obvious articular tubercle destruction<sup>8</sup>; (2) the patient complied with the indications for arthroscopic treatment, as suggested by Cai et al.,<sup>4</sup> but could not be treated with arthroscopy alone; (3) the coronal CT and MRI reconstructions showed that the medial groove of the joint capsule extended beyond the bottom of the medial crest of the condyle but did not reach the condylar neck or infratemporal fossa. The following general and clinical information was collected from the patient files: sex, age, clinical history, position of pogonion, any clicking or joint noise, MIO, internal occlusion, and pain on a visual analogue scale (VAS).

A total of 36 patients (11 male and 25 female) with unilateral synovial chondromatosis (22 left-sided and 14 right-sided) were included in this study. All of the basic and medical history information was collected by the same doctor, and all clinical examinations as well as CT and MRI evaluations were done by the same two experienced doctors. The average age of the patients was 48.11 years (range 29–65 years). The average duration of symptoms was 27.19 months (range 1–120 months). Twenty-two of the patients suffered from deviation of the lower jaw upon mouth opening (20 deviated towards the diseased side and 2 towards the healthy side), and one of the 25 also had an anterior open bite. In addition, one patient was observed to

have pogonion deviated towards the affected side. Nine patients experienced TMJ clicking or joint sounds on the affected side, and 12 had an anteriorly displaced articular disc. The subjects had an average MIO of 27.42 mm (range 8–37 mm) and an average pain VAS score of 5.53 (range 0–8) prior to surgery (Table 1).

### Surgical procedure

All patients were treated under general anaesthesia with nasal intubation. The same surgeon performed all surgeries. A modified pre-auricular incision was made to expose the articular eminence, zygomatic arch, and lateral side of the TMJ capsule.<sup>9</sup> Following opening of the TMJ capsule from the lateral side with an arc-shaped incision, loose bodies were removed (Fig. 2A) and the lateral-anterior section of the diseased synovium in the region of the upper articular cavity was resected under direct visualization. In the next step, an arthroscope (1288 HD 3-Chip Endoscopic Camera System; Stryker, Kalamazoo, MI, USA) was used to examine the anterior and posterior recesses of the upper articular cavity, as well as the medial groove (Fig. 2B). Additional loose bodies were detected and removed with cup-shaped and hook-shaped clamps. The diseased synovium in the deeper layer was processed with a curette to eliminate the proliferated synovium and immature cartilage-like substances. Grinding or cutting was performed upon the discovery of severely

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