Case Report

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Radiological study of three cases of loose bodies in the temporomandibular joint

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Abstract

According to the literature, loose bodies in the temporomandibular joint (TMJ) primarily prompt to synovial chondromatosis (SC). SC is a cartilaginous metaplasia of the mesenchymal remnants of the synovial tissue of the joints. Its main characteristic is the formation of cartilaginous nodules in the synovium and inside the articular space, described as loose bodies. The main symptoms are pain, limitation of jaw movement, crepitation and inflammation. Diagnosis is made by panoramic radiograph, computed tomography scan and mainly magnetic resonance imaging. SC is usually monoarticular. We report two cases of bilateral loose bodies in TMJ and one monoarticular evaluated through plain radiograph and cone beam volumetric tomography (CBVT). Clinical and radiologic findings are reviewed and discussed. References for diagnosis of SC affecting TMJ are supported. Patients presenting preauricular swelling, pain and restriction of TMJ movements should be evaluated with plain radiography, CBVT and if necessary, magnetic resonance imaging. If loose bodies are found, synovial chondromatosis must be the first suspicion. The definitive diagnosis depends on histology. A differential diagnosis of chondrosarcoma should be considered because of the life-threatening features of chondrosarcoma.

Keywords: synovial chondromatosis, temporomandibular joint, temporomandibular joint disorders.

Introduction

According to the literature, loose bodies in the temporomandibular joint (TMJ) primarily prompt to synovial chondromatosis[1]. Synovial chondromatosis (SC) is a cartilaginous metaplasia of the mesenchymal remnants of the synovial tissue of the joints. Its main characteristic is the formation of cartilaginous nodules in the synovium and inside the articular space, the loose bodies[2]. Other clinical signs and symptoms of SC are preauricular swelling, pain, crepitus and limitation of mandibular movement[1-2]. SC commonly involves large joints such as the knee, hip and elbow, but its presence in smaller joints has also been reported[3]. The incidence of SC is more common in the second and third decades of life. However, when it affects the TMJ, it is more common in women (1,5:1) during their fourth and fifth decades of life and rare in children[4-5].

Diagnosis is made by panoramic radiograph, computed tomography (CT)

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scan and mainly, magnetic resonance imaging[2]. SC is usually monoarticular. Reports of bilateral SC of the TMJ is scarce in literature[6-7]. This paper presents 3 cases of loose bodies in TMJ, being two bilateral cases, evaluated by plain radiograph and cone beam volumetric tomography (CBVT). Clinical and radiologic findings are reviewed and discussed. References for diagnosis of SC affecting TMJ are supported.

Case 1

A 17-year-old white woman was referred to our radiological center due to pain in the TMJs on opening the mouth, and bilateral preauricular tenderness. Physical examination revealed slight diffuse swelling of the preauricular region, normal open the mouth (40mm) without mandibular deviation. The patient had no history of trauma or rheumatoid arthrosis. An orthopantomograph of TMJs (Instrumentarium Imaging, Tuusula, Finland) (Figures 1 and 2) revealed bilateral calcifications posterosuperior the mandible condyle (loose bodies). In positions of maximum intercuspation (MI) and open mouth, the loose bodies did not appear to accompany the condyle movement. The cortical bone of condyles and glenoid fossa were intact. Clinical and radiologic findings prompted a diagnosis of bilateral SC of the TMJ. No follow-up information was received from the referring clinician.

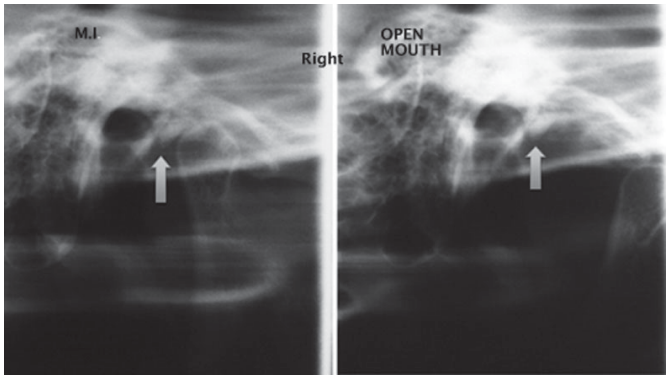

Fig. 1. Case 1. Orthopantomograph of right TMJ: Maximum intercuspation (MI) and open mouth. Arrows point to the loose bodies.

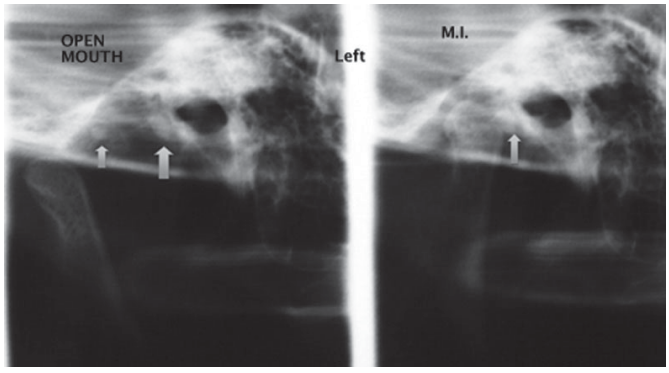

Fig. 2. Case 1. Orthopantomograph of left TMJ: Maximum intercuspation (MI) and open mouth. Arrows point to the loose bodies.

Case 2

A 68 year-old white female was referred to an imaging service for CBVT (i-CAT, Imaging Sciences International, Hatfield, PA, USA) evaluation of the TMJ regions due to intermittent pain and "locking" problems. Radiographic evaluation of the data volume revealed the bilateral presence of loose bodies consistent with SC as well as subchondral cyst formation and subchondral sclerosis (Figures 3 and 4). Diagnoses of osteoarthritis and SC were included in the "Clinical Findings" and "Clinical Impressions and Recommendations" sections of the radiographic report. In addition, both stylohyoid ligaments were calcified and elongated, but did not relate to any of her symptomatology (Figure 4). No follow-up information was received from the laboratory service or referring clinician.

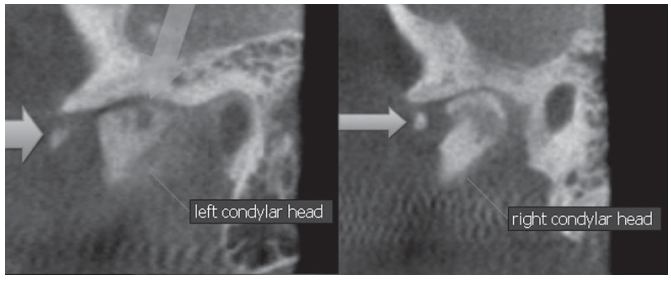

Fig. 3. Case 2. Sagittal view (CBVT) of left and right condylar head. Arrows point he loose bodies.

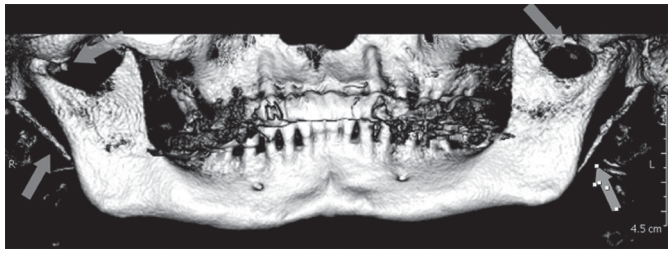

Fig. 4. Case 2. Panoramic view of CBVT. Arrows point to the bilateral loose bodies and both stylohyoid ligaments calcified and elongated.

Case 3

A 78 year-old white female was referred to an imaging facility for the CBVT (i-CAT, Imaging Sciences International) evaluation of potential implant sites in the maxilla and mandible. Radiographic interpretation of the data set revealed multiple discrete calcifications in and around the "joint space" of the right TMJ. In addition, there was a large lobular radiopaque mass located medially to the condylar head, originating from the temporal bone (Figures 5 and 6). Osteoarthritic changes were also seen. A clinical impression of SC as well as osteoarthritic changes was given in the radiology report. No follow-up information was received from the laboratory service or referring clinician.

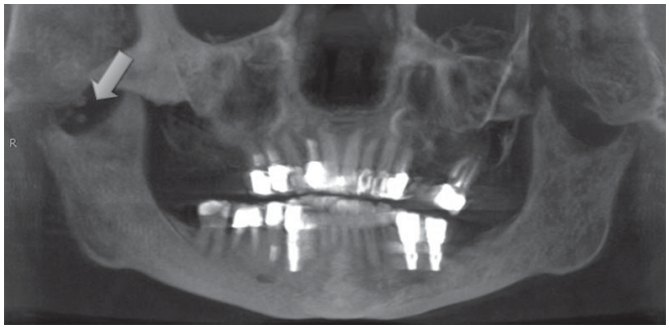

Fig. 5. Case 3. Panoramic view of CBVT. Arrow points to the loose bodies and a mass originating from the temporal bone.

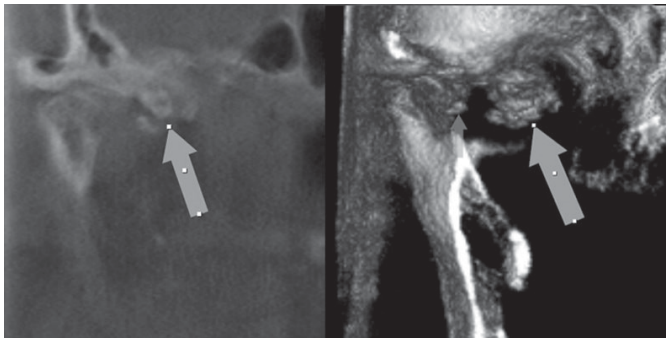

Fig. 6. Case 3. Coronal image and 3-D reconstruction (CBVT) of right TMJ. Arrows point the loose bodies and a mass medially to the condylar head originating from the temporal bone.

Discussion

The etiology of SC is still unknown. However, most researchers believe it to be associated with embryologic disorders, a cartilaginous metaplasia of synovial tissue remains. It can be associated with trauma or microtrauma, infection or articular disease, such as inflammatory and non-inflammatory osteochondritis and arthroplasty[4,8]. Conventional radiography is not particularly sensitive to the presence of calcified loose bodies, since they have been detected in less than 45% of reported cases[9]. Oftentimes, loose bodies do not show bone formation, thus plain radiographs are not always suitable if SC is suspected[5]. An interesting finding is that loose bodies can be seen bilaterally in a plain radiograph (Case 1).

CT and magnetic resonance imaging (MRI) had greatly improved radiological diagnosis of this condition[1,10]. Conventional CT scan reformats series of parallel helical slices, which incorporate small errors in final scan. Two important advantages of CBVT over conventional tomography are more accurate images and less radiation. CBVT captures volumes of data taken in one 194 to 360-degee rotation about patient's head. Each volume "touches" adjacent volume to avoid distortion and error in reformatted studies[11]. The radiation exposure to a patient from a conventional CT is approximately 100-300 microsieverts (ìSv) for the maxilla and 200-500 ìSv for the mandible[12]. The radiation exposure from CBVT is between 34-102 microsieverts (ìSv) depending on the time and resolution of the scan, the same magnitude of conventional dental radiographs[13]. According Holmlund et al.[5], MRI is useful in demonstrating internal derangement of the TMJ. Intra-articular loose bodies, expansion of joint capsule and fluid accumulation within the joint space can be directly depicted by MRI[14]. An advantage of MRI over CT is in the detection of parotid tumor, which may clinically mimic SC[15-16].

A recent systematic review was carried out and reported that the prevalence of SC in the TMJ is very low with less than 300 cases reported in the literature[17]. From January 1998 to July 2009, only 80 cases were retrieved. Females are affected almost three times more than males. The right and left TMJs seem to be affected equally. Only a single new case of bilateral involvement was reported[17]. Because of the nonspecific symptom and signs, SC in TMJ should be differentially diagnosed first with TMJ disorder. Leveling, erosion, destruction of articular bone surface (degenerative osteoarthritis), osteophyte formation and reduction of the joint space must be investigated. About 0.3% of the patients complaining of TMJ pain and dysfunction were found with SC[18]. In addition, SC has been found to coexist with degenerative osteoarthritis as we can see in this study (Cases 2 and 3), and sometimes with condylar hyperplasia[19]. In agreement with the gender predilection found in the literature, our patients were women.

Highlights of the cases presented hereby are the wide age difference among the patients (age range from 17 to 78 years) and the reporting of two cases of bilateral loose bodies, which is rare in literature. Almost all cases of SC of the TMJ that have been reported showed monoarticular occurrence. Although our cases prompt to SC, differential diagnosis from other pathologies of the joint, such as osteoarthrosis, osteochondritis dissecans, intracapsular fractures and inflammatory arthritis must be considered and histopathologic study can be required[20-21]. Rheumatologic conditions, dysfunction of the facial nerve and hearing disturbances also must be investigated. A differential diagnosis of chondrosarcoma should be considered because of the life-threatening features of chondrosarcoma, which is a rare primary malignancy of the TMJ[17]. Owing to the aggressive nature of SC cases for which a known etiology cannot be identified, it was suggested that primary cases may be neoplastic in origin and secondary cases metaplastic in origin, thus representing mild and benign tumoral variants. Malignant transformation of SC is very rare, but some histopathological signs of SC, such as cellular atypia, may easily be misinterpreted as signs of malignancy[17]. Histologically, SC often has atypical and multinucleated chondrocytes, so is essential to differentiate also from a chondrosarcoma[21].

Perry et al.[22] have reported malignant transformation of the cartilage with development of chondrosarcoma. Yokota et al.[16] presented a case of SC in the TMJ with extension into the middle cranial fossa manifesting as swelling and exacerbation of pain. The preoperative diagnosis was chondrosarcoma or osteosarcoma, however the histological diagnosis was SC.

Treatment for SC is surgical, removing all the loose bodies through surgical exploration or arthroscopical

removal[5,23-24]. Adachi et al.[24] believe that when loose bodies alone are present, arthrocentesis could be an efficient method of treatment. The authors report completely resolution of the symptoms after arthrocentesis and no recurrence of the lesion after 18 months of follow up. Monitoring is important in the light of possible malignant transformation of the cartilage with development of chondrosarcoma or recurrence[25-26]. Surgery has always been recommended as the therapy of choice but some authors advocate less invasive techniques, such as arthroscopy and two-needle arthrocentesis, to remove the loose bodies from the joint space[1].

Data from a systematic review do not support the hypothesis that minor surgery may be sufficient to treat SC[17]. The reported success rate for arthroscopy was no better than 55%, since in almost half the cases complete removal of loose bodies from the joint cavity was not achieved by arthroscopy and needle aspiration alone, an open surgery was needed to clear the synovia thoroughly. TMJ arthroscopy has no advantage over arthrocentesis in terms of efficacy and none over open surgery in terms of post-surgical course.

Diagnosis of SC in TMJ can be made by panoramic radiography, CT and mainly, MRI. In particular, the utility of a CBVT in diagnosing a lesion involving the TMJ is emphasized in this study. Dentists must be aware of the availability of this imaging technology to diagnose TMJ anomalies. Patients presenting preauricular swelling, pain and restriction of TMJ movements should be evaluated with plain radiography, CBVT and if necessary, MRI. If loose bodies were found, synovial chondromatosis must be the first suspicion. The definitive diagnosis depends on the histological analysis.

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