Int. J. Oral Maxillofac. Surg. 2015; 44: 1268–1274
http://dx.doi.org/10.1016/j.ijom.2015.06.023, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Clinical Paper
TMJ Disorders

Temporomandibular joint osteoarthritis: cone beam computed tomography findings, clinical features, and correlations

S. Cömert Kiliç[1], N. Kiliç[2], M. A. Sümbüllü[3]
[1]Department of Oral and Maxillofacial Surgery, Centre for Oral and Dental Health, Ministry of Health, Erzurum, Turkey; [2]Department of Orthodontics, Faculty of Dentistry, Atatürk University, Erzurum, Turkey; [3]Department of Maxillofacial Radiology, Faculty of Dentistry, Atatürk University, Erzurum, Turkey

S. Cömert Kiliç, N. Kiliç, M.A. Sümbüllü: Temporomandibular joint osteoarthritis: cone beam computed tomography findings, clinical features, and correlations. Int. J. Oral Maxillofac. Surg. 2015; 44: 1268–1274.

Abstract. The aim of this study was to determine the prevalence of and associations between clinical signs and symptoms and cone beam computed tomography (CBCT) findings of temporomandibular joint osteoarthritis (TMJ-OA). Seventy-six patients (total 117 TMJ) with osteoarthritis were included in this study. Clinical signs and symptoms and CBCT findings were reviewed retrospectively. A considerable decrease in mandibular motions and mastication efficiency, and considerable increase in joint sounds and general pain complaints were observed. The most frequent condylar bony changes were erosion (110 joints, 94.0%), followed by flattening (108 joints, 92.3%), osteophytes (93 joints, 79.5%), hypoplasia (22 joints, 18.8%), sclerosis (14 joints, 12.0%), and subchondral cyst (four joints, 3.4%). Flattening of the articular eminence and pneumatization were each observed in five joints. Forty-one patients had bilateral degeneration and 35 had unilateral degeneration. Hypermobility was detected in 47 degenerative joints. Masticatory efficiency was negatively correlated with both condylar flattening and sclerosis, and general pain complaints was positively correlated with condylar flattening. Condylar erosion, flattening, osteophytes, pain, joint sounds, reduced jaw movements, and worsened mastication were common findings in TMJ-OA in the present study. Poor correlations were found between osseous changes and clinical signs and symptoms of TMJ-OA. CBCT is a powerful diagnostic tool for the diagnosis of TMJ-OA.

Key words: CBCT; clinical symptoms; correlation; epidemiology; prevalence; TMJ osteoarthritis.

Accepted for publication 25 June 2015
Available online 17 July 2015

0901-5027/01001268 + 07

Osteoarthritis is a chronic, progressive, and debilitating disease, and is defined as the gradual deterioration (degeneration) of the cartilage in a joint. Temporomandibular joint osteoarthritis (TMJ-OA) is more frequent in females and its prevalence increases in relation to age.[1] Many factors such as overloading, bruxism, unilateral chewing, genetic factors, and internal derangement are held responsible for the development of TMJ-OA.[2,3]

Cone beam computed tomography (CBCT) systems offer many advantages over medical CT for diagnosis and treatment planning in dentistry, including a lower radiation dose for the patient, an affordable alternative to medical CT in terms of cost, a shorter acquisition time for the resolution required in dentistry, better resolution, the ability to acquire three-dimensional (3D) images, and the greater level of detail provided. The morphology of the osseous joint components, cortical bone integrity, and subcortical bone destruction/production can be viewed with higher sensitivity with the use of CBCT.[4,5] However, there are disadvantages associated with CBCT scanners, including increased scatter radiation, beam hardening artefacts, and the inability to display Hounsfield units, which can provide a better quantitative assessment of bone density at the time of diagnosis.[6]

With the gradual progressive destruction of articular tissues and concomitant advanced degeneration, the subchondral cortical layer is lost and erosion and other radiographic signs of osteoarthritis appear. Often, TMJ-OA is at an advanced stage at the time when it is perceived clinically and/or radiographically. The prevalence of clinical signs and symptoms of TMJ-OA have not been evaluated extensively in previous studies and these studies are limited in number. Equivocal results have been reported in previous studies attempting to correlate the intensity of clinical signs and symptoms with the quality of bony changes in TMJ-OA using different imaging modalities.

The aim of this study was to determine the prevalence of and associations between clinical signs and symptoms and CBCT findings of TMJ-OA.

Methods

The study population comprised patients presenting for the evaluation and management of TMJ-OA between January 2012 and June 2014 at the department of oral and maxillofacial surgery of the study institution in Turkey. This study was approved by the ethics board of the university. Patients were informed about the study and written consent was obtained from each subject.

To be included in the study sample, the patient had to meet the following criteria: (1) willingness to participate in the study; (2) TMJ-OA according to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD axis I group IIIb); and (3) adequate existing clinical and CBCT data.

The diagnosis of osteoarthritis was made according to the DC/TMD (DC/TMD axis I group IIIb) published by Schiffman et al., as follows[7]: (1) patient history positive for one of the following: any TMJ noise presented with jaw movement or function in the last 30 days, or patient report of any noise presented during the examination. (2) During the clinical examination, crepitus detected with palpation during at least one of the following: opening, closing, and right or left lateral, or protrusive movement(s). (3) TMJ CBCT positive for at least one of the following: subchondral cyst(s), erosion(s), generalized sclerosis, or osteophytes. Flattening or cortical sclerosis may be a precursor to frank degenerative joint disease, but they may represent normal variation, ageing, and remodelling. Flattening or cortical sclerosis is considered when other the TMJ CT criteria are present (Fig. 1).

Patients were excluded if they had a previous history of TMJ treatment or surgery, a previous history of trauma to the jaws, TMJ pain associated with another joint disorder, a systemic, rheumatic, neurological/neuropathic, endocrine, or immune/autoimmune disease with widespread pain, a previous history of radiation treatment to the head and neck, were pregnant, or if there was inadequate existing clinical and CBCT data.

The main outcome variables included maximum inter-incisal opening (MIO) measurements (both painless opening and maximum mouth opening), visual analogue scale (VAS) evaluations of masticatory efficiency, pain complaints, and joint sounds, and CBCT findings, and correlations between them. All clinical data were assessed by the same oral and maxillofacial surgeon (SCK) and recorded for statistical evaluations.

MIO measurements were made from the incisal border of the central upper incisor to the same point on the lower incisor. MIO with and without pain and lateral–protrusive motions of the mandible were measured with a millimetre rule.

A VAS was used to assess pain complaints, masticatory efficiency, and self-perceived joint noise. The VAS is a continuous scale comprising a horizontal line 10 cm (100 mm) in length, ranging from a score of 0 to a score of 10 (at 100 mm), anchored by two descriptors at the two ends: one for ‘no’ symptoms and the other

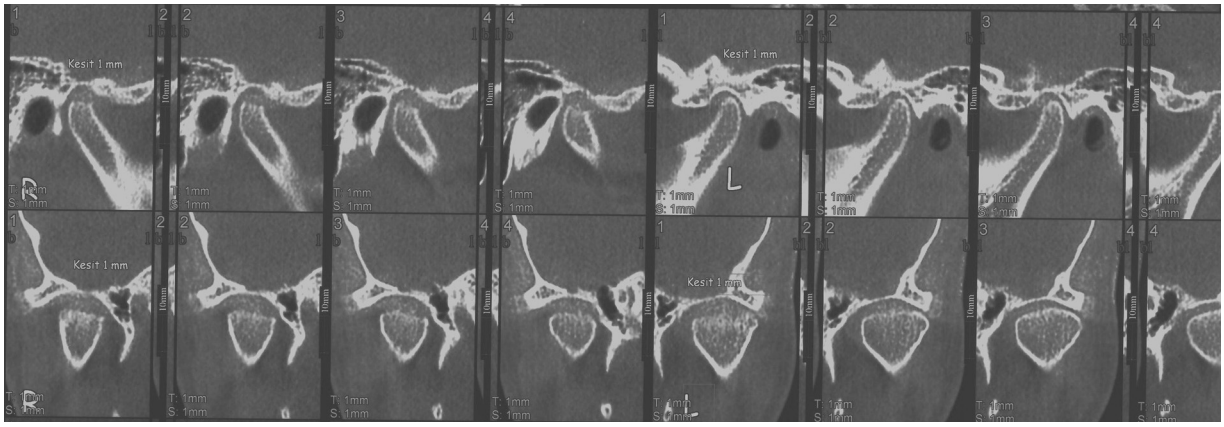

Fig. 1. CBCT images of a case with bilateral TMJ osteoarthritis (coronal and sagittal views).