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Original Article

A study of temporomandibular joint osteoarthritis using computed tomographic imaging

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ABSTRACT

Background: This study aimed to determine the various bony changes in osteoarthritis (OA) of elderly patients who are suffering from temporomandibular joint dysfunction (TMD) and to find if all the changes manifesting in generalized OA were presented in temporomandibular joint (TMJ).

Methods: Thirty TMJs of fifteen elderly patients who were diagnosed with TMD were selected for the study. Patient with TMD were subjected to computerized tomographic (CT) imaging, and the various bony changes in the TMJ were recorded.

Results: CT study of TMJ showed that there is a positive evidence of joint involvement in 80% of the cases. In this study, female patients were more commonly affected by OA than the males. The condylar changes (69.93%) are more common than the changes in the articular eminence (6.6%) and condylar fossa (10%). About 56.6% of TMJ in the study was affected by the early manifestations of the OA.

Conclusion: CT study showed that there is a positive evidence of TMJ involvement in the elderly patients with TMD. The results show that condylar changes are more common than the changes in the articular eminence and condylar fossa. The study also shows that most of the patients are affected by early TMJ OA; hence, initiating treatment at early stages may prevent the disease progression.

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At a glance commentary

Scientific background on the subject

Osteoarthritis is a degenerative disease affecting the temporomandibular joint. It was observed in the study that more than 80% of the elderly patients with temporomandibular joint dysfunction were more commonly affected by early stage of osteoarthritis.

What this study adds to the field

Advocating early treatment such as topical NSAIDS, occlusal adjustments, jaw self-care, physiotherapy, oral appliance therapy, and intraarticular injection of corticosteroids may help to prevent the disease progression.

Osteoarthritis (OA) is defined as a degenerative condition of the joint characterized by deterioration of articular tissue and concomitant remodeling of underlying subchondral bone [1]. OA is an age-related disease, and the WHO estimates that globally 25% of adults aged over 65 years suffer from pain and disability associated with this disease [2]. The percentage of temporomandibular joint (TMJ) OA in age group 9–90 years range from 28% to 38% and incidence increases with advancing age. The incidence of TMJ OA has received a little attention in past literature and studies are only a few.

OA is caused primarily by the degeneration of collagens and proteoglycans in cartilage leading to fibrillation, erosion, and cracking in the superficial cartilage layer [2]. This process spreads to a deeper layer of cartilage and eventually enlarges to form erosions. The articular surface of TMJ has the remarkable adaptive capacity. Hyaline cartilage of the load-bearing joints of the body are more resistant to compressive loading, but the fibrocartilage of TMJ better withstands shear force [3]. When functional demand exceeds the adaptive capacity of the TMJ or if the affected individual is susceptible to maladaptive response, then the disease state will ensue [3].

The cardinal features of TMJ OA are both clinical and radiographic [4]. The clinical features are tenderness in the joint region, pain on movement of the joint during mouth opening and lateral excursion, and hard grating or crepitus [4,5]. Radiographic signs of the disease are cortical bone erosion, flattening of joint compartments with productive bone changes such as sclerosis and osteophyte [6]. These signs of TMJ OA represent different stages of the disease process. Erosive lesions and joint space narrowing indicate acute or early change, whereas sclerosis, flattening, subchondral cyst, and osteophyte may indicate late changes in TMJ [7]. This study was done to determine the various bony changes in OA of elderly patients who are suffering from temporomandibular joint dysfunction (TMD) using computed tomography (CT) and to find if all the changes manifesting in generalized OA were present in TMJ.

Materials and methods

The study group selected consisted of 15 patients out of whom 10 were female and 5 were male from Outpatient Department of Oral Medicine and Radiology. The age range was within 50–80 years with the mean average age of 63.06 years. These patients were examined for TMD. The clinical criteria for TMD were formulated using the standard TMJ questionnaire by Okeson, which includes: (1) tenderness present in the preauricular region, (2) tenderness in the muscles of mastication, (3) limitation or deviation in the mandibular range of motion, and (4) clicking, or popping, or crepitus [8].

The inclusion criteria include patients with age >50 years, generalized OA, TMD at least on one side. The exclusion criteria include the patients who had various problems in the TMJ such as TMJ surgery, direct trauma, fracture of TMJ, myalgia, and congenital craniofacial anomalies. Other than joint problems, patients with pain in the TMJ region due to tooth pain, impacted teeth, ENT surgeries, ear infections, and neuralgias were excluded from the study.

The TMJ pain during mandibular function was evaluated by bilateral manual palpation of the preauricular region and intraauricular region by means of firm pressure. TMJ pain was identified during palpation, mandibular range of motion, or assisted mandibular opening. Tenderness in the muscles of mastication was checked by palpation of each muscle. The mandibular range of motion was evaluated by maximum mouth opening, which was measured from incisal edge of upper central incisor to lower central incisor with a Digital Vernier Caliper or millimeter ruler [9]. The lateral movements were measured relative to the maxillary midline with teeth slightly separated.

On palpation, bilaterally on the lateral side of both TMJ near preauricular region, clicking was elicited [9]. Auscultation was carried out with the diaphragm side of the stethoscope at the preauricular region, with the subject performing three opening and three lateral and protrusive movements [9]. Joint sounds like single or reciprocal click [9] and hard grating or crepitus were evaluated.

The patients satisfying these criteria were subjected to CT scan using multi-slice helical CT. The patient is explained about the entire procedure of the scan and requested to sign the consent form and was advised to remove metal objects such as hair pins and hair clips before the procedure. The patient was taken to the CT scanner (SEIMENS, 125 kV, 500 mA) and placed in supine position on the scanning table with the head placed on the headrest. A small sponge is placed on either side of the head to limit the lateral movements.

The scan was performed with the patient's mouth closed and that the rays were directed parallel to the Frankfort's horizontal plane over a distance of 5 cm at 120 kV and 333 mA, with the scanning table advancing with an increment of 1 mm per rotation [1]. In bone display mode, the scan data were reformed into 0.625 mm interaxial image. The scanning procedure was carried out for 2 min. The axial CT images were taken and reconstructed into sagittal or coronal images, which were obtained by orientation to the long axis of the condyle.