

## Osteoarthritis of the temporomandibular joint

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### Abstract:

Osteoarthritis (OA) is a degenerative joint disease marked by progressive loss of articular cartilage and damage of bony components. The clinical features include joint pain, crepitus and limitation of movement. The exact cause of OA is unknown; however some authors consider it as a multifactorial disease. The age and over usage are the most common factors, in addition to race and sex. In case of temporomandibular joint(TMJ), traumatic occlusion, and over load caused by parafunctions are additional factors. The purpose of this investigation was to study the (TMJ) arthropathy among a group of Iraqi patients previously diagnosed as having OA.

One hundred patients with OA are used in this study. They were examined clinically and radiographically for effects of systemic OA on TMJ.

Results of the study revealed that 39% of patients with OA have TMJ lesions of different degrees ranged between osteophytes, diminution of joint space and bone destruction of glenoid fossa and head of condyle.

Dental management of temporomandibular joints affected with OA usually aim to suppress the active disease, preserve functions, prevent deformity and relieve pain. Early detection of the disease and early commencement of management greatly reduce joint destruction and improve prognosis. Results of this study indicated that 11% of patients had only TMJ lesions, with no other joints lesions. Because of difficulty of interpretation of TMJ radiographs we suggest criteria for radiographic diagnosis of osteoarthritis of the TMJ.

### Keywords:

Osteoarthritis, TMJ arthropathy, TMJ disorders.

### Introduction:

Osteoarthritis (OA) is a degenerative joint disease marked by progressive loss of articular cartilage, and damage of bony components<sup>(1-3)</sup>. The clinical features include joint pain, joint stiffness, Limitation of movement, and joint crepitus. Although its prevalence increases with age, it has been shown by radiographical survey that twenty percent of OA was found in individuals

15 to 24 years old. When all ages are considered the prevalence of OA in men is comparable to that in women in people less than 45 years old, while above the age of 45 years it is more common in women probably due to menapausal changes<sup>(3-5)</sup>, some authors believe that OA is more common in certain races such as Indian Americans while less common in others such as Chinese, which indicates genetic factor. Joint usage is another factor that

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contributes to early appearance of OA in some hyperactive joints such as the (TMJ) <sup>(6-8)</sup>. The exact cause of OA is unknown, although some authors consider it as multifactorial disorder, the age and over usage are being most common factors, in addition to race and sex. A high incidence of OA is noted in joints subjected to heavy usage (e.g. elbow and knees in miners, and ankles in dancers). Trauma may be implicated as a predisposing factor but the true cause of degenerative changes in the articular tissues of the joints due to this disease remain obscure <sup>(8,9)</sup>.

Osteoarthritis is the most common arthritic disease encountered in the TMJ, and as in other joints of the body it may remain clinically silent with progressive bone damage. The early lesions may pass unnoticed unless the disease becomes advanced. It is believed that the first osteoarthritic site of involvement is strongly influenced by excessive usage of the joint <sup>(10)</sup>, it has been shown histopathologically that erosion of the TMJ condyles starts at the posterior aspect, probably because of the anatomical relationship posteriorly, compared to the anterior free movement due to availability of space. Other factors blamed for initiation of OA are pre-existing structural joint abnormalities, intrinsic aging, metabolic factors, genetic predisposition, obesity leading to over loaded joints, and macro-trauma or micro-trauma, they are all considered as contributory factors in the origin of the disease <sup>(11,12)</sup>. In case of TMJ traumatic occlusion and over load caused by parafunctions are additional factors. Oral habits such as bruxism, clenching, and cheek or lip biting put extra load on the TMJ, in addition to the fact that TMJ is an actively functioning joint during normal function and mandibular movements <sup>(13,14)</sup>.

The most reliable way of assessing the true incidence of osteoarthritis of the TMJ is the morbid anatomical examination which was possible in a small number of studies. Blackwood <sup>(3)</sup> have done a detailed examination of 40 mandibular joints removed from cadavers. Osteoarthritic changes were present in about 40 percent. The author indicated that in osteoarthritis the earliest changes occur in articular covering of the condyle. Histopathologically the normal arrangement of cells is interrupted, the cells tend to clump together and become unevenly distributed throughout the fibrous matrix and many of these cell aggregates show an increased affinity for basophilic dyes. At this stage osteoclastic resorption of bone takes place. Eventually vertical splitting of the articular layer take place and this is followed by fragmentation and loss of the articular surface with exposure of the underlying bone. Attempted repair by proliferation of the overlying articular tissue downwards into the resorbing areas of subarticular bone is some times seen and this leads to uneven thickening of the articular surface, from here the lesion may spread to involve larger area of the articular surface and exposure of underlying bone causes disruption and resulting perforation of the articular disc. When the perforation of the disc occurs secondary osteoarthritic changes can then be seen in the articular tissues of the glenoid fossa and articular eminence <sup>(15,16,17)</sup>.

Toller and Wilcox <sup>(18)</sup> studied the ultrastructure of surface of normal human condyles and compared it with specimens from condyles affected with OA, taken during surgical treatment of those joints. Specimens were examined by transmission electron microscopy. The normal specimen revealed a dense network of

bundles of collagen fibers, interspersed with a population of fibroblasts. In TMJ with OA electron microscopy revealed deviation from normal, alteration of ground substance with denaturation of collagen fibers of the extreme surface layer. These changes are reflected at the clinical level as impairment of free sliding, low friction qualities of the normal joint components, and appear in osteoarthritic TMJ as limitation of movement and joint sounds<sup>(18,19,20)</sup>. The purpose of this investigation is to study the temporomandibular joint arthropathy among a group of Iraqi patients with osteoarthritis.

### Materials and methods:

Clinical and Radiographical examination of the temporomandibular joints of one hundred patients were done. The patients used in this study were previously diagnosed as having osteoarthritis, and were usually visiting the out patient clinic of rheumatology at Kathmyia teaching hospital.

Clinical examination included palpation of TMJ in rest position and during opening and closing movement, to detect pain, tenderness, crepitus, limitation of movement, deviation on opening and any abnormality.

Patient's age, sex and the date of onset of the disease were recorded. Patients were asked about their concern regarding TMJ health status. They were also asked if they have the habits of bruxism and clenching. Dentition of those who have bruxism or clenching was examined for presence of attrition of teeth. Radiographic examination included transpharyngeal view in open and closed positions.

### Results:

The age range of participating patients varied between 24 years and

81 years with an average of 53 years. The sample consisted of 66 women and 34 men. Around 26% of patients showed some degrees of physical disability which was demonstrated by their gait.

Tenderness of the TMJ area on palpation was found in 43% of patients and crepitus was found in 22%. Some degree of pain with or without crepitation during chewing was experienced by 27%. In response to the question about concern of the patient regarding the health status of their TMJ compared to other joints 90% of patients were concerned. Patients who considered TMJ health states less important than other joints were 13%.

Duration of the systemic disease in the studied sample varied between 1 year and 35 years, limitation of mandibular movement was found in 15% of patients especially when they open wide. Morning stiffness was experienced by 35% of patients, and stiffness following rest and relaxation was experienced by 12%. Habits of clenching and bruxisms were experienced by 25% of patients.

On radiographic examination, 39% of cases revealed some degree of joint involvement. Osteophytes were seen in 9% of cases (Fig.1). Reduction of joint space was seen in 12% of cases (Fig.2). while erosion of head of condyle or glenoid fossa and articular eminence was seen in 18% of radiographs, five of them showed flattened condyles (Fig.3and4). Eleven percent of radiographs revealed TMJ involvement as the only lesion without involvement major joints. In correlating this finding with clinical findings it has been found that all these 11 cases were included in the group of patients that have the habits of clenching and or bruxism. Clinical examination of these patients revealed mild to sever attrition, age range of this group was between 31 years and 43

years clinical and radiographical findings are explained table (1).

Table (1) Clinical and Radiographical Findings

Finding	Percentage
Pain on palpation	43%
Pain and crepitus	27%
Crepitus alone	22%
Limitation of movement	15%
Morning stiffness	35%
Stiffness after rest	10%
Osteophytes	9%
Diminution of joint space	12%
Erosion of condyle and fossa	18%
Flattened condyle	5%

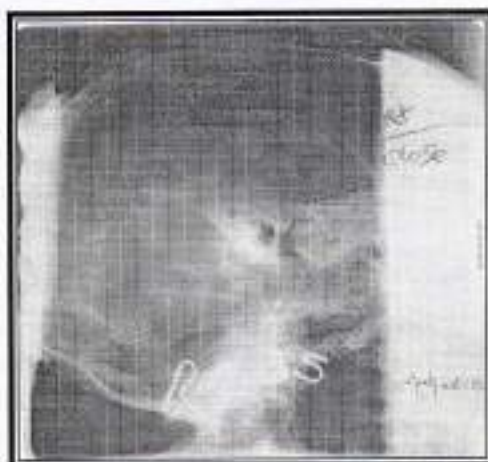


Fig.(1): Osteophytes



Fig. (2): Reduction of joint space

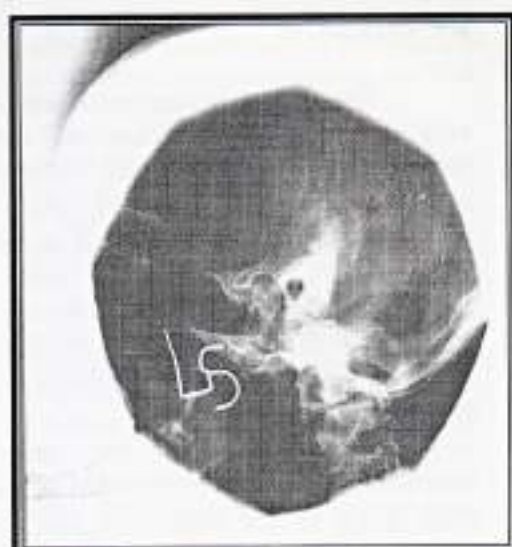


Fig. (3): Erosion of condyle or fossa

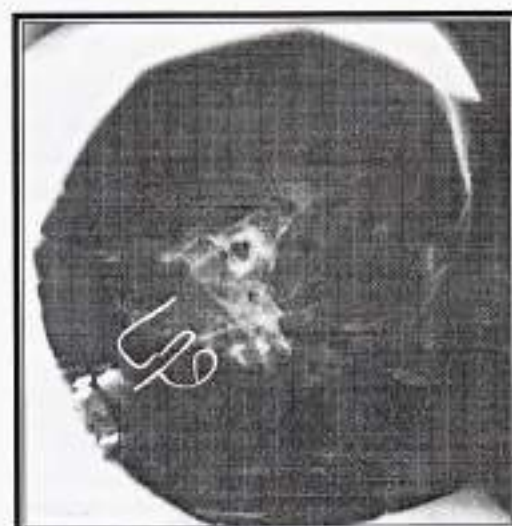


Fig. (4): Flattened condyle

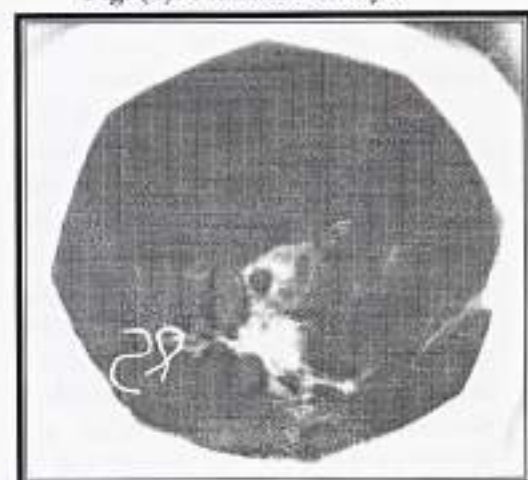


Fig.(5): Normal condyle

## Discussion:

The temporomandibular joints may be affected by many of the pathological processes which involve other articulations of the body. However the manifestations of these processes in the mandibular joint, although similar to those in other joint, may be modified by the particular structural and physiologic character of the region.

Osteoarthritis is the most common arthropathy of the TMJ as in other joints of the body. The fibrous tissue covering of the head of condyle compared to the cartilaginous covering of other joints makes it easier to be broken and destroyed especially when overload applied by parafunctions such as bruxism, clenching and other oral habits and the tendency of joint tissues to resist those forces and achieve repair and remodeling. Bone damage to the head of condyle may irritate to articular disc resulting in its perforation.

Early detection of the disease and early commencement of management greatly reduce joint destruction and improve prognosis. Treatment measures usually aim to suppress the active disease process preserve function, prevent deformity and relieve pain, reduction of joint loading and stopping parafunction support these treatment measures.

The dental management of TMJ affected with OA is directed towards decreased jaw functions, soft diet, moist heat, analgesic medications. For patients with more severe symptoms treatment may include non steroidal anti-inflammatory drugs, but some times in cases of severe pain intra-articular injection of corticosteroids is needed. It provides pain relief and improves function but should not be repeated more than once every 6 months. Occlusal bite plates may be used to decrease joint loading. Surgery

is considered only in severe cases of pain and destruction.

The greatest number of the studied patients were concerned about their TMJ health status and the importance of its involvement in the generalized disease process of OA, but they didn't know if it was related to their generalized chronic and disabling condition namely osteoarthritis. These patients indicated that they were trying to withstand pain and learn how to live with it, putting more effort on the problems involving other weight bearing joints affected by the disease

## Conclusions:

The results of this study revealed that 11% of cases with bone damage in TMJ did not have other joints damage, this indicates the importance of radiographic examination of the TMJ for all patients who have osteoarthritic complains. There was also the observation that TMJ symptoms were not always comparable to the degree of bone damage. The large number of patients with TMJ lesions among osteoarthritic patients revealed in this study demonstrate the need for early detection of these lesions by using more sophisticated radiography such as magnetic resonance imaging, which is also valuable in exposing the degree of damage of disc and soft tissue components of the TMJ. Because of the difficulty of interpretation of TMJ radiographs, especially for some general practitioners we suggest the following criteria for radiographic diagnosis of osteoarthritis affecting the temporomandibular joints as compared to normal TMJ (fig .5).

I-Osteophytes indicate mild osteoarthritis of TMJ or Grade I (fig.1).

II-Diminution of joint space indicates moderate osteoarthritis of TMJ or Grade II (fig .2)

III-Erosion of bone surfaces of the head of condyle, glenoid fossa and articular eminence, (fig .3) or flattening of head of condyle (fig .4) indicates severe osteoarthritis or Grade III.

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