

Temporomandibular joint involvement in patients with multiple myeloma—a retrospective study[☆]

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Abstract. Multiple myeloma (MM) is a common hematological malignancy that has widespread manifestations in multiple organs, including bones and joints. This retrospective study aimed to evaluate the involvement of the temporomandibular joint (TMJ) in patients with MM. Consecutive subjects with a diagnosis of MM who presented to the oral and maxillofacial surgery clinic for routine evaluation between 2008 and 2014 were identified. Patients who had a computed tomography (CT) scan of the TMJs as part of their MM staging were included in the study. Outcome variables were the presence of TMJ myelomatous changes on CT and the presence of TMJ symptoms. Of the 88 patients included in the study, 28 demonstrated TMJ myelomatous lesions on CT scans and 10 patients complained of TMJ pain or dysfunction. The CT scans of seven of the 10 symptomatic patients demonstrated myelomatous involvement of the TMJ area. Myelomatous involvement of the TMJ is common in MM patients and the majority of lesions are asymptomatic. An MM patient complaining of temporomandibular symptoms is relatively highly likely to having a lesion in the TMJ. Diagnosing the myelomatous lesions in the TMJ is important for accurate hemato-oncologic staging and providing treatment without delay.

Key words: temporomandibular joint; TMJ; temporomandibular disorder; multiple myeloma.

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Multiple myeloma (MM) is a plasma cell malignancy that has a multicentric origin within bone. The disease accounts for 10–15% of all hematological malignancies

and is the second most common among them after non-Hodgkin lymphoma.^{1,2} If metastatic diseases were excluded, MM would account for nearly 50% of all malignancies that involve the bone.³

MM is characterized by the proliferation of abnormal plasma cells. The clinical features of the disease are due to this

proliferation and to the subsequent replacement of normal bone marrow cells together with the resulting production of a paraprotein (M protein) and/or its polypeptide subunits (Bence Jones protein).⁴ The manifestations of the disease are characterized by hypercalcemia, renal insufficiency, anemia, bone disease, and

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recurrent infections.^{5,6} Because of this tendency for widespread manifestations in multiple organs, MM is of interest to many medical specialists, including oral and maxillofacial surgeons.⁷

The typical radiographic findings in the skeleton are usually of focal osteolytic lesions with or without areas of diffuse osteoporosis.⁴ The most commonly involved bones are the spine, skull, pelvis, and ribs. The radiolucent areas of the bone contain neoplastic plasma cell proliferations,³ and a high tumor burden is associated with greater numbers of abnormal bony changes on imaging.⁸

There are only four research studies reported in the literature that have evaluated the presence of jaw lesions in MM patients.^{4,7,9,10} All four utilized plain radiography rather than computed tomography (CT) as the imaging modality. No attempt was made to specify the exact location of the lesions; however, they all noted that the majority appeared in the mandibular body. There are no clinical research studies in the literature that have addressed the involvement of the temporomandibular joint (TMJ) in patients with MM. A search of the English language literature yielded only four case reports describing myelomatous involvement of the TMJ.^{11–14} This study was performed to address the topic of TMJ involvement in MM.

The aim of the present study was to evaluate patients with MM both clinically and radiologically for any TMJ involvement, to determine whether there is a correlation between the radiographic findings and the clinical TMJ symptoms, and to examine whether a longer duration of MM disease correlates with a greater number of TMJ lesions and symptoms.

Patients and methods

A retrospective analysis of the medical records and CT scans of patients with MM was performed. They had been evaluated in the outpatient clinic of a department of oral and maxillofacial surgery over a 5.5-year period (December 2008 to May 2014). A total of 115 patients were examined; 88 of them had CT scans that demonstrated the TMJ area and were included in the study. The patients were referred to the clinic from the department of hematology at the same institute. The purpose of the referral was varied and included regular dental check-ups before the initiation of bisphosphonate therapy, dental complaints, osteonecrosis of the jaws, oral mucosa-related complaints, and temporomandibular pain and dysfunction.

CT scans were obtained as routine periodic head and cervical spine studies in MM patients, and were taken at different time points depending on the hematological status of the patient and the decision of the treating hemato-oncologist. The CT scans were not ordered due to TMJ-related disease and were performed in the axial plane. Reformatted coronal and sagittal oblique images were obtained. The imaging of the patients was evaluated by a radiologist who specializes in head and neck radiology. Any alteration of the TMJ area that was considered to be myelomatous in origin was identified and documented.

The differentiation between a small punched-out lesion of myelomatous origin and a large subchondral cyst as a manifestation of degenerative joint disease was given special attention. A lesion was considered to be a subchondral cyst rather than a myelomatous alteration if it was located adjacent to the articular cortex and accompanied by other degenerative changes, such as flattening of the articular surfaces, erosion of the articular cortex, sclerosis of the subchondral bone, presence of osteophytes, narrowing of the joint cavity, or resorption of the articular surfaces.

The data obtained from the medical records included demographic characteristics, co-morbidities, duration of MM at the time the CT scan was performed, and any complaints of pain or dysfunction in the TMJ area as reported by the patient.

The duration of MM was defined as the length of time that had elapsed since the date of MM diagnosis and the first appearance of any TMJ lesions on CT imaging. The duration of disease for the patients with no TMJ lesions was measured from the time of MM diagnosis to the time the last CT scan was performed.

For statistical analysis, differences between sexes for continuous variables were tested using the *t*-test. Differences between involved and non-involved joints for continuous variables were also tested using the *t*-test. Associations between sex, TMJ involvement, and categorical variables were tested by χ^2 test or Fisher's exact test. The statistical software program used was IBM SPSS Statistics version 23.0 (IBM Corp., Armonk, NY, USA).

The study was approved by the institutional ethics review board, which waived informed consent. The study conformed to the guidelines of the Declaration of Helsinki.

Results

The 88 patients who had CT scans that demonstrated the TMJ area were included

in the study. There were 45 males and 43 females, whose mean age was 64.0 ± 8.5 years. The reason for the referral was for a regular dental check-up before the initiation of bisphosphonate therapy in 31 patients, dental complaints in 18 patients, osteonecrosis or suspected osteonecrosis of the jaws in 16 patients, oral mucosa-related complaints in 13 patients, and temporomandibular pain or dysfunction in 10 patients.

The primary outcome variable was the presence or absence of myelomatous alterations in the TMJ area as evidenced on CT scans. The CT scans of 32% of the study population (28 of 88 patients) demonstrated lesions that were compatible with myelomatous changes in one or both TMJs. The CT scans of the remaining 60 patients did not demonstrate any changes in the TMJs that could be attributed to MM. The group of patients with TMJ lesions did not differ from the rest of the study population with regard to sex, age, or duration of MM (Table 1). Myelomatous alterations appeared either as solitary myelomas (focal osteolytic lesions) or in the form of myelomatosis pattern (multiple well-circumscribed lytic bone lesions) (Figs 1 and 2).

The secondary outcome variable was the presence or absence of TMJ symptoms. Ten patients presented with a complaint of pain and/or dysfunction in the TMJ area. The rest of the study population did not report any masticatory dysfunction or temporomandibular pain when presenting to the clinic. The two groups of symptomatic and asymptomatic patients did not differ from the rest of the study population with regard to sex, age, or duration of MM (Table 2).

The clinical signs and symptoms mimicked the most common intra-articular temporomandibular disorders, and the clinical presentation was not suggestive of bone pain secondary to bony lesions. The diagnosis of the MM lesions was made after evaluation of the CT scans. The main complaint reported by the patients was inability or difficulty chewing hard foods. Two patients also reported a subjective feeling of malocclusion. The primary finding on clinical examination was localized tenderness in the pre-auricular area. The tenderness was elicited either by palpation or by passive mouth opening/stretching by the examiner. In addition, three patients suffered from limited mouth opening. The symptoms were on the same side as the lesion (Table 3).

The primary and secondary outcome variables were compared in order to

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