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BONE SCINTIGRAPHY AND POSITRON EMISSION TOMOGRAPHY IN THE EARLY DIAGNOSIS OF MRONJ

SECTION: *5B - Imaging*

AUTHORS (max 8): Contrassegnare SPEAKER con "*"
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Background. Medication-Related OsteoNecrosis of the Jaws (MRONJ) is an adverse drug reaction characterized by the progressive destruction and necrosis of the bone in patients treated with drugs for which an increased risk of MRONJ has been described. These drugs include antiresorptive medications such as bisphosphonates and denosumab (a monoclonal antibody), but also some antiangiogenic drugs and immune modulators. Antiresorptive drugs suppress with different mechanisms the activity of osteoclasts, reducing the risks of skeletal complications in patients with bone loss. For this reason, they are used in patients affected by osteoporosis, bone metastasis from solid tumor, multiple myeloma and other conditions such as Paget's disease of bone or giant cell tumor of the bone. Antiresorptive drugs significantly reduce the risk of fracture or other bone complications for these patients, but their use is associated with the possible development of MRONJ. MRONJ is a relatively rare disease, but in oncologic patients its incidence and prevalence are higher than in the osteoporotic ones. This is due to the higher dose and different route of administrations (usually intravenous) requested for subjects affected by bone metastasis or multiple myeloma. MRONJ can also considerably reduce the quality of life of cancer patients, stressing the importance of a correct and early diagnosis for an optimum treatment. MRONJ is a clinical diagnosis based on the presence of exposed bone in the maxillofacial region of patients with current or previous treatment with ONJ-related drugs. Radiographic features of MRONJ are relatively nonspecific. However, different imaging modalities can be useful as an adjunctive aid in the diagnosis and evaluation of MRONJ patients. Among them, we can include intraoral radiographs, panoramic radiograph, computed tomography (CT), cone beam computed tomography (CBCT), magnetic resonance imaging (MRI), bone scintigraphy (BS) and positron emission tomography (PET). BS and PET are functional imaging modalities able to identify areas of altered bone metabolism through an increased tracer uptake. They can detect minimal and subclinical changes in bones, showing a high sensitivity for detecting early disease. Both techniques are widely used in oncology, especially in the diagnosis of bone metastasis and in the follow up of their treatment with antiresorptive drugs. For these reasons, cancer patients at high risk of developing MRONJ often possess BS and/or PET that may show an alteration of the jaws, thus helping in an early diagnosis of MRONJ. The aim of this study is to evaluate the effective role of bone scintigraphy and positron emission tomography in the early diagnosis of MRONJ and their possible use in the identification of patients at risk for MRONJ development.

Patients and methods. Following research in the database of "Momax" (Oral Medicine and Maxillofacial) project of the Department of Oral Sciences and Maxillofacial Surgery at "Sapienza" University of Rome, patients treated with ONJ-related drugs and who had undergone BS or PET for the evaluation of bone lesions were included in the study. The jaws of each patient were divided into 4 areas. For each area, the presence of pathological tracer uptake was evaluated and related to the eventual MRONJ development. Sensitivity, specificity and predictive values of both techniques were determined. The latency from the finding of pathological tracer uptake in BS or PET to the clinical diagnosis of MRONJ and the odds ratio were also calculated. As regards BS, the statistical significance of the sample was calculated by Yates's chi-squared test, whereas Fisher's exact test was used for PET.

Results. 31 patients with BS and 20 with PET were included in the study. Sensitivity and specificity of BS for MRONJ prediction were respectively 83.3% and 87.5%. Positive and negative predictive values were respectively 73.2% and 92.8%. The odds ratio was 35. Sensitivity of PET was 33.3%, specificity was 94.9% and positive and negative predictive values were 70.0% and 80.0%, respectively. The odds ratio was 9.333. All values were statistically significant ($p < 0.0001$ for BS and $p=0.0025$ for PET). Median time from BS or PET positivity to clinical diagnosis of MRONJ showed a great variability for both techniques.

Conclusions. Despite some limitations, our results show that BS and PET may be accurate techniques for an early prediction of MRONJ.

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