Bone scintigraphy in the diagnosis of chronic osteomyelitis in the maxilla

Figen C. Senel, *DDS,* ***Onur Icten,*** *DDS,*
Serpil Duran, *DDS,* ***Nahide Gokcora,*** *MD.*

Chronic osteomyelitis is a disabling disease with a substantial impact on the quality of life.[1] Several methods are used in the treatment of chronic osteomyelitis. Hyperbaric oxygen has also been used to improve revascularization of bone and soft tissues, and in speeding up the healing process. Accurate assessment of the severity and extent of the disease is essential to facilitate and optimize surgical or antibiotic treatment. For this purpose, different diagnostic modalities are available, including conventional radiography, computerized tomography, magnetic resonance imaging, and scintigraphic techniques.[2,3] The 99mTc-methylene diphosphonate (MDP) bone scan is a reliable method to diagnose chronic osteomyelitis, except for vertebral osteomyelitis.[4,5] In 2 cases, we aimed to evaluate the significance of bone scan with Tc-99 in diagnosing jaw osteomyelitis and in evaluating the osteoblastic activity prior to and following hyperbaric oxygen therapy.

A 38-year-old woman was referred to the Oral and Maxillofacial Surgery, Department of the Dental Faculty of Ankara University, Ankara, Turkey. She was suffering from pain, and a bad odor in her right maxilla. In clinical and radiographic examinations, a large portion of denuded bone was observed in the posterior region of her right maxilla where first molar extraction was performed several months ago. A 43-year-old man also referred to the same department with severe pain in his right maxillary sinus region. He gave a history of oroantral fistula formation following a tooth extraction from the associated region. The oroantral fistula was treated in a series of operations. Both cases were clinically and radiographically diagnosed as chronic osteomyelitis. To approve the diagnosis of both patients Tc-99 MDP bone scan was used. The same technique was also used after treatment with hyperbaric oxygen at 2-3 ATA for 2.5 hours a day for 20 sessions. Pretreatment and posttreatment bone scans were obtained on a dual-detector gamma camera with acquisition of simultaneous anterior and posterior images. There was a period of 4 months between the 2 scans of each patient. A dose of 20 mCi 99mTc-MDP was injected intravenously, and simultaneous dynamic acquisition was performed in all studies. Early blood pool and delayed static and whole-body images were obtained. Visual interpretation of the pretreatment and posttreatment images was performed. In addition, by drawing irregular regions of interest over the pathological and normal controlateral areas, mean counts per pixel values and their pathological-to normal ratios was obtained and a semiquantitative evaluation was made. In the blood pool images of both patients, hyperemia over the right maxillary region was observed. The pretreatment delayed images showed intense radioactivity accumulation in the pathological regions over the right maxilla. In the posttreatment delayed images for both patients, the activity accumulations were visually observed to be reduced in the pathological regions relative to their pretreatment images. The semiquantitative indices calculated, supported the visual evaluation. For the

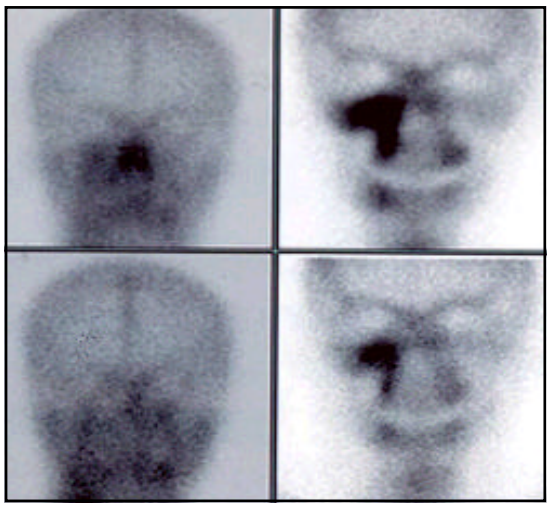

Figure 1 - Pretreatment and posttreatment of blood pool images of patient 1.

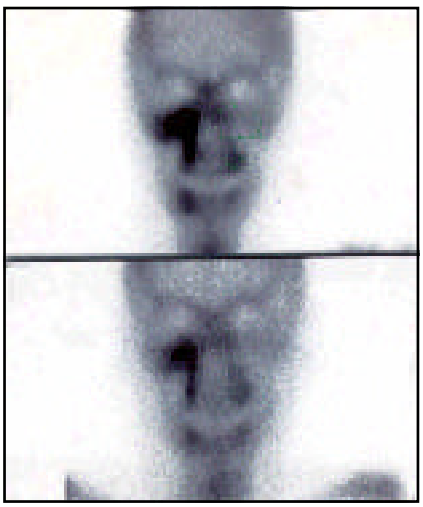

Figure 2 - Delayed bone phase images of patient 1.

first patient **(Figures 1 & 2)**, pretreatment pathological-to-normal mean ratios was found to be 2:75 and posttreatment pathological-to-normal was 1:96. For the second patient these values were 1.57 and 1.48.

The 99mTc has been reported to be used successfully in diagnosing chronic bone osteomyelitis in several studies.[4,5] In our cases, it has also showed excellent performance in diagnosis and treatment follow-up of jaw osteomyelitis with hyperbaric oxygen. The 99mTc have the major advantage of providing a high proton flux at early time points after injection in combination with a low radiation dose, low costs, continuous availability, and good image quality. The exact mechanism by which 99mTc-MDP localizes in bone is unknown, but it is thought to adsorb to hydroxyapatite crystals during new bone formation, as occurs in bone that is undergoing remodeling.[6]

In conclusion, our preliminary results show that 99mTc-MDP enables noninvasive detection and demonstration of the extent of chronic osteomyelitis with a high degree of accuracy and detection of treatment results with hyperbaric oxygen. The results also reveal that hyperbaric oxygen therapy is of great value in speeding up and improving the healing process in chronic osteomyelitis as reported in several studies with hyperbaric oxygen.[7]

Received 8th February 2005. Accepted for publication in final form 11th May 2005.

From the Department of Oral and Maxillofacial Surgery (Senel, Icten, Duran), Dental Faculty of Ankara University, and the Department of Nuclear Medicine, (Gokcora), Medical Faculty of Gazi University, Ankara, Turkey. Address correspondence and reprint requests to Dr. Figen C. Senel, KTU Dis Hekimligi Fakultesi, Trabzon, Turkey. Tel. +90 (462) 3775710. Fax. +90 (462) 3253016. E-mail: fcsenel@hotmail.com

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