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Case Report

BONE SCINTIGRAPHY AND CRANIAL SPECT IN THE EARLY DIAGNOSIS OF MALIGNANT (NECROTISING) EXTERNAL OTISIS

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ABSTRACT
Malignant (necrotising) external otisis is an invasive infection which can spread from external auditory canal to skull base fracture. Although it is mostly seen in old patients with diabetes mellitus, immunocompromised people may also be vulnerable to malignant external otisis. 3-phase bone scintigraphy with Tc-99m methylene diphosphonate (MDP) and single photon emission computed tomography (SPECT) can be employed in the early diagnosis of the disease and the evaluation of its prevalence.

Key Words: *Malignant (Necrotising) External Otisis, Bone Scintigraphy, Cranial Spect*

INTRODUCTION
Malignant (necrotising) external otisis is a rare, serious, and invasive infection that could spread from external auditory canal to the adjacent soft tissue and to skull base fracture (Rubin, 2004). It was defined as a separate clinical entity for the first time by Meltzer in 1959 (Meltzer, 1959). Although it is mostly seen in old patients with diabetes mellitus, immunocompromised people (e.g. HIV infection, chemotherapy) may also be vulnerable to malignant external otisis. It is Pseudomonas aeruginosa in critical frequency (Rubin,2004, Karaman, 2012). It is easier to achieve a complete cure in the early diagnosis of malignant external otisis and, therefore, imagining methods are utilised (Karaman, 2012). Technetium 99m methylene diphosphonate bone scintigraphy identifies osteomyelitis earlier than computed tomography (CT). Also, the addition of tomographic scintigraphy and bone scintigraphy brings more specific findings.

CASES
A 78 year-old diabetic man had had increasing dolor and rubor in the right ear for three weeks and was diagnosed with granulation tissue and oedema. Temporal bone CT was applied with the pre-diagnosis of malignant external otisis. The diabetic man was diagnosed with an increase in soft tissue density which constricts the external auditory canal and causes a reduction in the aeration of mastoid cavity (Figure 1). In the nuclear medicine clinic, 3-phase bone scintigraphy and cranial SPECT are obtained. After the injection of 740 MBq (20 mCi) of Tc-99m methylene diphosphonate (MDP) (Mon.MDP, Eczacıbaşı/Monrol) iv perfusion and blood pool scans and at the 3rd hour late phase bone scans were obtained.Images were obtained with dual-head gamma cameras (Symbia S, Siemens Healthcare) on low-energy high-resolution dual-head parallel-hole collimators. In the phases of perfusion and blood pool, in proportion to its symmetry minimal increase in perfusion and relative increase in hyperemia were observed in the petrous region of the right temporal bone. On the other hand, in the late static and SPECT images, past activity involvement that reaches out to the right zygomatic bone was observed in the petrous region of the temporal bone (Figure 2, 3). In light of the described findings, in the petrous region of the temporal bone it was reported as the infection that reaches out to the zygomatic bone. As a result of the prepared culture, Pseudomonas aeruginosa (Auriginosa, P) was produced. The patient had been treated under clinical conditions with the diagnosis of necrotising (malignant) external otisis.

RESULTS AND DISCUSSION

MOE, which was identified for the first time by Meltzer, is a rarely seen invasive infection of the external auditory canal and skull base fracture. It has been reported that the frequency of MOE amongst the diabetic patients is 86-90% (Rubin, 2004). Although the patients mostly apply with serious otalgia and otorrhea, the majority of the time it appears to be *Pseudomonas aeruginosa* (>98% of the cases) (Rubin, 2004, Karaman, 2012). Our case also had diabetes mellitus and applied with the complaints of otalgia and otorrhea. However, P. aeruginosa was produced in the prepared culture. As a result of the spread of the infection in the sub-temporal region, cranial neuropathy and most frequently facial nerve paralysis may be developed. In cases of incurability, death could occur as a result of the wide spread of the infection to the skull base fracture and the development of disseminated septic thromboemboli in the brain (Rubin, 2004, Karaman, 2012). Early diagnosis is important for the prevention of the rapid progress of the disease, the achievement of complete cure, and the utilisation of the imaging modalities (Karaman, 2012). Computed tomography (CT) cannot identify demineralisation in the bone that develops in the early phases of the disease as it identifies bone erosion. This is the biggest limitation of CT. As a result of the application of CT on our patient, an increase in the soft tissue density is observed which causes a reduction in the aeration of mastoid cavity. Compared to CT, MRI is better in terms of soft tissue evaluation but it is not recommended as the first imaging method (Chakraborty, 2012, Sudhoff, 2008).

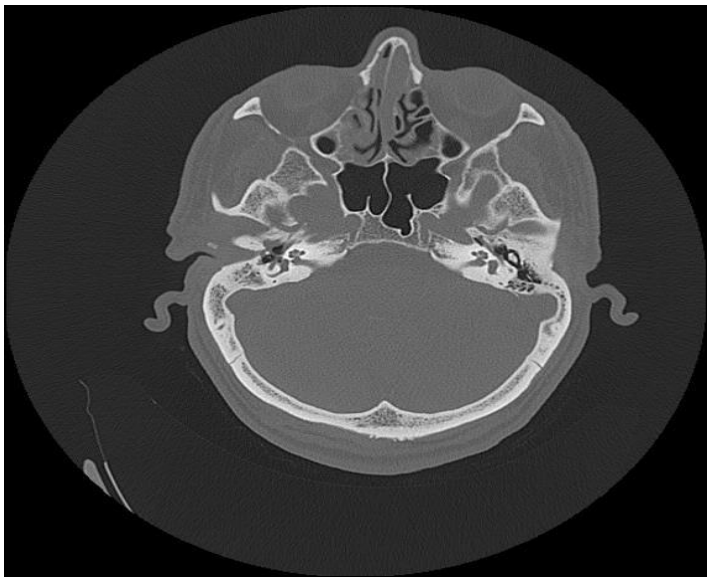

Figure 1*:* Cranial CT: the increase in the soft tissue density which constricts the external auditory canal and causes a reduction in the aeration of mastoid cavity.

Additionally, compared to CT its sensitivity to show bone erosion is lower (Sudhoff, 2008, Grandis, 1995). Indium-111 labeled leukocyte scintigraphy and Ga-67 scanning amongst the methods of infection imaging in nuclear medicine could collaterally be employed; however, bone-soft tissue distinction cannot be achieved with these methods (Benecke, 1989). In the early diagnosis of osteomyelitis, bone scintigraphy is used more frequently as it is superior to the radiographic methods (Hardoff, 1994). Also, periosteal reaction and bone formation are slower in diabetic patients and this reduces the sensitivity of radiographic methods (Seldin, 1985). The application of 3-phase bone scintigraphy allows the evaluation of perfusion and hyperemia of lesion (Hardoff, 1994). The tissues are superimposed in cranial planar imaging. The inclusion of SPECT imaging in the study has increased the sensitivity and specificity as it facilitates the separation of bone structures (Buyukdereli, 2006).

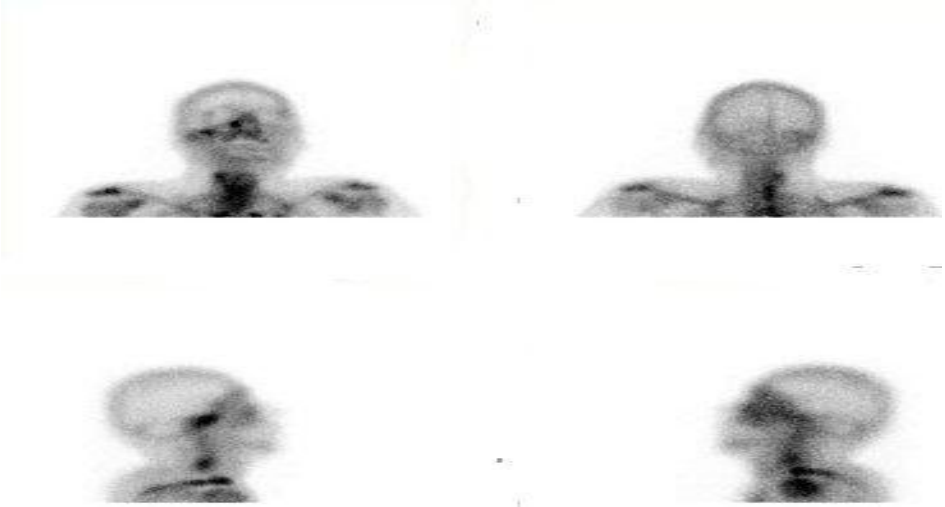

Figure 2*:* Late static anterior-posterior lateral images. Relative increase in activity involvement in the petrous region of the right temporal bone.

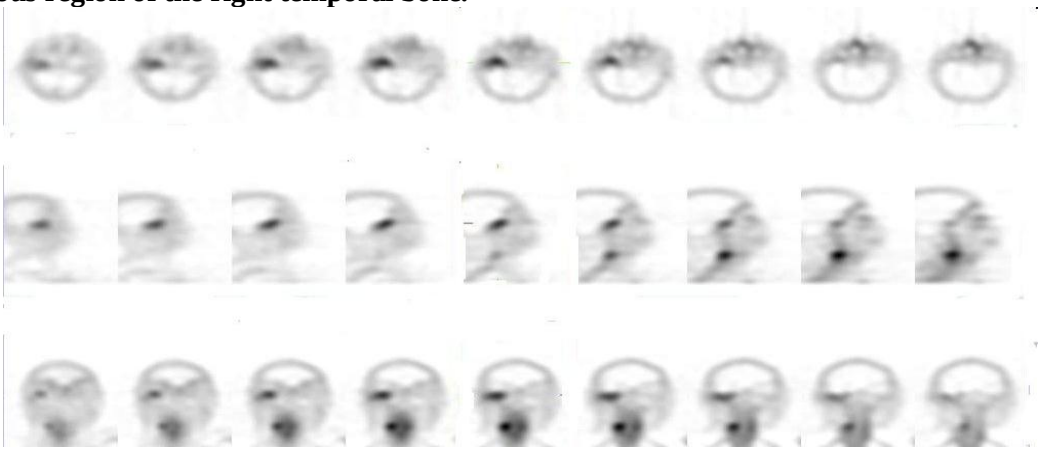

Figure 3*:* Cranial SPECT images. Increase in activity involvement that reaches out to the right zygomatic bone in the petrous region of the temporal bone.

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