Usefulness of $^{201}$Tl and $^{99m}$Tc MIBI scintigraphy in a case of oncogenic osteomalacia

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A 45-year-old male was admitted with difficulty in walking due to leg pain. At the time of the first visit, a reduced serum phosphorus concentration and an increased serum alkaline phosphatase concentration of unknown etiology were observed. Either a whole body bone scintigraphy or CT of the neck, chest and abdominal region did not reveal any underlying disease. However both the whole body $^{201}$Tl scintigraphy and $^{99m}$Tc MIBI SPECT showed accumulation in the right knee region, and a small tumor was detected by MRI examination. After a diagnosis of oncogenic osteomalacia due to this tumor was determined the tumor was surgically removed, and turned out to be a hemangiopericytoma. By removal of the tumor, either the symptoms or the laboratory data were improved significantly. In this case, both $^{201}$Tl scintigraphy and $^{99m}$Tc scintigraphy MIBI were useful in identifying the location of the tumor which caused oncogenic osteomalacia.

Key words: oncogenic osteomalacia, $^{201}$Tl scintigraphy, $^{99m}$Tc MIBI scintigraphy

INTRODUCTION

ONCOGENIC OSTEOMALACIA is a relatively rare disease accompanied with hypophosphatemic vitamin D-resistant osteomalacia (or rickets in the case of children) due to some kind of humoral factor produced by a tumor, and it can be completely cured by removal of the tumor. Based on the characteristics of the disease, rapid identification of the location of tumor and its removal is important. However, the tumor is sometimes very small and its location varies widely, making identification of the location highly difficult in some cases. In this report, we describe a case effectively identified its location with thallium-201 ($^{201}$Tl) and technetium-99m-hexakis-2-methoxy-isobutyl-isonitrile ($^{99m}$Tc MIBI) scintigraphy.

CASE REPORT

A 45-year-old male was admitted to our hospital with a main complaint of gait difficulty due to leg pain in September 2000. He had also attended another clinic for left chest pain and lower back pain since around July 1999, but the cause had not been identified and symptomatic treatment had been given. Laboratory evaluation revealed white blood cell count $5.0 \times 10^3/\mu l$ (normal range $4.0 \times 10^3-8.0 \times 10^3/\mu l$), red blood cell count $4.08 \times 10^{12}/\mu l$ (normal range $4.10-5.30 \times 10^{12}/\mu l$), hemoglobin 12.9 g/dl (normal range 14.0-18.0 g/dl), platelet count $215 \times 10^4/\mu l$ (normal range 150-400 $\times 10^4/\mu l$), total protein 6.9 g/dl (normal range 6.5-8.5 g/dl), albumin 4.6 g/dl (normal range 3.5-5.3 g/dl), creatinine 0.7 mg/dl (normal range 0.6-1.1 mg/dl), sodium 143 mM/l (normal range 135-145 mM/l), chlorine 106 mM/l (normal range 99-110 mM/l), potassium 4.2 mM/l (normal range 3.5-5.0 mM/l), calcium 8.2 mM/l (normal range 7.9-9.8 mM/l), phosphorus 1.4 mg/l (normal range 2.0-4.5 mg/l), alkaline phosphatase 1033 IU/l (normal range 115-359 IU/l) and CRP 0.3 or less (normal range 0.3 or less). These results show abnormal low value of serum phosphorus and abnormal high value of ALP. Whole body bone scintigraphy (obtained three hours after intravenous administration of 740 MBq technetium-99m-hydroxy-methylenediphosphonate, $^{99m}$Tc HMDP) showed abnormal accumulations in the both ribs, knees, and ankles and left hip joint (Fig. 1). The possibility of systemic bone...
metastasis or hyperparathyroidism could not be excluded, but computed tomography (CT) of the neck, chest or abdomen revealed neither suspicious tumors nor parathyroidoma. Then, whole body $^{201}$Tl scintigraphy (obtained fifteen minutes after intravenous administra-

tion of 111 MBq $^{201}$Tl chloride) showed a slight accumulation in the right patella and proximal terminal of right tibia (Fig. 2). Close examination of the right knee with $^{99m}$Tc MIBI single photon emission computed tomography (SPECT, these images were obtained fifteen minutes for early phase and three hours for late phase after intravenous administration of 600 MBq $^{99m}$Tc MIBI) showed intensive accumulations around the patella of right knee and proximal terminal of right tibia both in early and late phases (Fig. 3a, 3b).

A small tumor was found on the dorsal side of right patella by magnetic resonance imaging (MRI) examination (Fig. 4). Oncogenic osteomalacia due to this tumor was suspected and tumorectomy was carried out. The tumor with about two centimeters size located in the articular capsule at dorsal side of patella was an elastic and soft burned amber soft tissue tumor. No infiltration in the surrounding tissue was observed. The tumor was spindle or cylindrical shape medium size and covered with thin filamentous capsule filled with proliferated nearly ho-

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Fig. 1 Whole body bone scintigraphy. Abnormal accumulation can be observed in ribs, knee joints, ankle joints bilaterally, and in left hip joint.

Fig. 2 Whole body $^{201}$Tl scintigraphy. Increased accumulation is observed in the right patella and proximal terminal of right tibia.

Fig. 3 $^{99m}$Tc MIBI SPECT, sagittal sectional image. Clear accumulation can be seen on the dorsal side of the patella in the right knee joint both in (a) early phase and (b) late phase. Increased accumulation is also observed around proximal terminal of right tibia as well as scintigram with $^{201}$Tl.

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