**CASE REPORT**

**99mTc(V)-DMSA and 99mTc-MDP uptake and no 67Ga-citrate uptake in a case of primary pulmonary leiomyosarcoma**

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Tumor scintigraphy with 67Ga-citrate, 99mTc(V)-DMSA and 99mTc-MDP were performed on a patient with rare primary pulmonary leiomyosarcoma. While 67Ga-citrate accumulation to the tumor was not recognized, 99mTc(V)-DMSA and 99mTc-MDP scintigraphy showed relatively intense localization of the tracers in the lesion, and were very useful in suggesting the characteristics of the tumor.

**Key words:** pulmonary leiomyosarcoma, MRI, 99mTc(V)-DMSA, 99mTc-MDP, 67Ga-citrate

**INTRODUCTION**

**Primary pulmonary sarcomas** are rare tumors. The frequency of primary pulmonary sarcomas is about 1%. Among sarcomas, in Japan leiomyosarcomas occur most frequently (30%), but in Europe and America lymphosarcomas occur most frequently. Primary pulmonary leiomyosarcoma can occur in the lung parenchyma (70%), endobronchially (20%) or in the pulmonary artery (10%). It has a peak incidence in the fourth decade of life and no gender predilection is known.1–3 We examined the tumor by scintigraphy and MRI and reported the images.

**CASE REPORT**

A 55-year-old female was referred to our surgical department due to an abnormal mass in the chest. The mass was picked up three years before in a preoperative (pituitary adenoma) chest film. The mass was smooth and round measuring 5×5 cm and was thought to be benign. However, the mass slightly increased in size. On admission, a chest X-ray showed a large mass measuring 7×6 cm on the left diaphragma (Fig. 1). Laboratory data were normal with the exception of low proteinemia (5.8 g/dl) and anemia (RBC 396×104, Hgb 11.0 g/dl, Hct 35.2%). Tumor makers (CEA, SCC, NSE) were normal. MR images (T1 weighted after gadolinium-DTPA) showed that the tumor behind the heart had heterogeneous intensity almost same as the myocardium (Fig. 2). 67Ga scintigraphy showed no definite accumulation to the tumor (Fig. 3 left), however 99mTc-MDP (Fig. 3 middle) and 99mTc(V)-dimercapto-succinic acid (DMSA) (Fig. 3 right) accumulation to the tumor was recognized. 99mTc(V)-DMSA sagittal SPECT performed 64 different views over 360° and 10 seconds, each view for a 5.6° rotation also showed clear accumulation to the tumor (Fig. 4). Surgical resection was performed and histology revealed that the tumor was a pulmonary leiomyosarcoma (low grade malignancy) with no microcalcification (Fig. 4). Gastrointestine and uterine examination results were normal.

**DISCUSSION**

Intraparenchymal leiomyosarcoma presents as a peripheral lung mass.1 It is difficult to distinguish a leiomyosarcoma from a benign lung tumor or lung cancer in a chest X-ray. To our knowledge, common lung cancer is positive for 67Ga and negative for 99mTc(V)-DMSA, and soft tissue sarcomas including leiomyosarcoma are probably positive for 99mTc(V)-
Fig. 1 Chest X-p film showed a large mass on the left diaphragma.

Fig. 2 MR images (T₁ weighted after gadolinium-DTPA) showed that the tumor behind the heart has heterogeneous intensity almost same as the myocardium.

Fig. 3 ¹⁷⁷Ga scintigraphy (left) showed no accumulation to the tumor, ⁹⁹mTc-MDP (middle) and ⁹⁹mTc(V)-DMSA (right) accumulation to the tumor was recognized (P-A view, T: tumor). In ⁹⁹mTc-MDP image, increased renal uptake was recognized, but considered idiopathic. In ⁹⁹mTc(V)-DMSA image, descending aorta was visible as blood pool (▲).

Fig. 4 ⁹⁹mTc(V)-DMSA sagittal SPECT showed clear accumulation to the tumor (K: kidney, ▲ rib).
The mechanism of $^{99m}$Tc(V)-DMSA accumulation to tumors is considered to be due to a structural similarity between the Tc core in $^{99m}$Tc(V)-DMSA and the orthophosphate ion, but the exact mechanism is still unknown.

We could find no literature about $^{99m}$Tc-MDP accumulation to primary pulmonary leiomyosarcoma. In this case scintigraphic evaluation was useful in suggesting the rare nature of the tumor.

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Fig. 5 Surgery revealed the tumor was pulmonary leiomyosarcoma.

DMSA. In this case, the results of $^{67}$Ga and $^{99m}$Tc(V)-DMSA scintigraphy might suggest the rarity of this lung tumor. High $^{67}$Ga-citrate positive rates are observed in leiomyosarcoma. The absence of $^{67}$Ga accumulation in our case might be caused by histological low grade malignancy. $^{99m}$Tc-MDP uptake in primary lung tumors is reported, but this finding is not thought to be very common. $^{99m}$Tc-MDP uptake in a perigastric leiomyomatous tumor is also reported. Suggested mechanisms of increased $^{99m}$Tc-MDP in a tumor include increased binding to hydroxyapatite crystals found in areas of necrosis, regional differences in blood flow, and differences in pH related to increased anaerobic glycolysis. In our case, there was no necrosis or microcalcification.