

## **$^{99m}\text{Tc(V)}$ -DMSA and $^{99m}\text{Tc}$ -MDP uptake and no $^{67}\text{Ga}$ -citrate uptake in a case of primary pulmonary leiomyosarcoma**

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Tumor scintigraphy with  $^{67}\text{Ga}$ -citrate,  $^{99m}\text{Tc(V)}$ -DMSA and  $^{99m}\text{Tc}$ -MDP were performed on a patient with rare primary pulmonary leiomyosarcoma. While  $^{67}\text{Ga}$ -citrate accumulation to the tumor was not recognized,  $^{99m}\text{Tc(V)}$ -DMSA and  $^{99m}\text{Tc}$ -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,  $^{99m}\text{Tc(V)}$ -DMSA,  $^{99m}\text{Tc}$ -MDP,  $^{67}\text{Ga}$ -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.<sup>1-3</sup> 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 pre-operative (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

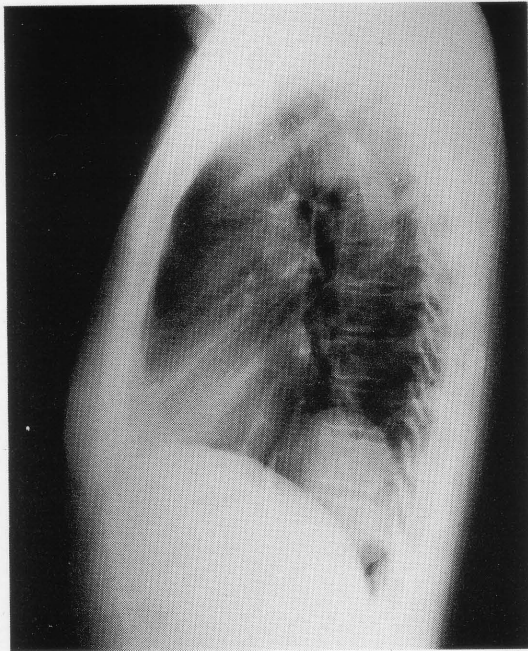
diaphragma (Fig. 1) Laboratory data were normal with the exception of low proteinemia (5.8 g/dl) and anemia (RBC  $396 \times 10^4$ , Hgb 11.0 g/dl, Hct 35.2%). Tumor makers (CEA, SCC, NSE) were normal. MR images ( $T_1$  weighted after gadolinium-DTPA) showed that the tumor behind the heart had heterogeneous intensity almost same as the myocardium (Fig. 2).  $^{67}\text{Ga}$  scintigraphy showed no definite accumulation to the tumor (Fig. 3 left), however  $^{99m}\text{Tc}$ -MDP (Fig. 3 middle) and  $^{99m}\text{Tc(V)}$ -dimercaptosuccinic acid (DMSA) (Fig. 3 right) accumulation to the tumor was recognized.  $^{99m}\text{Tc(V)}$ -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**

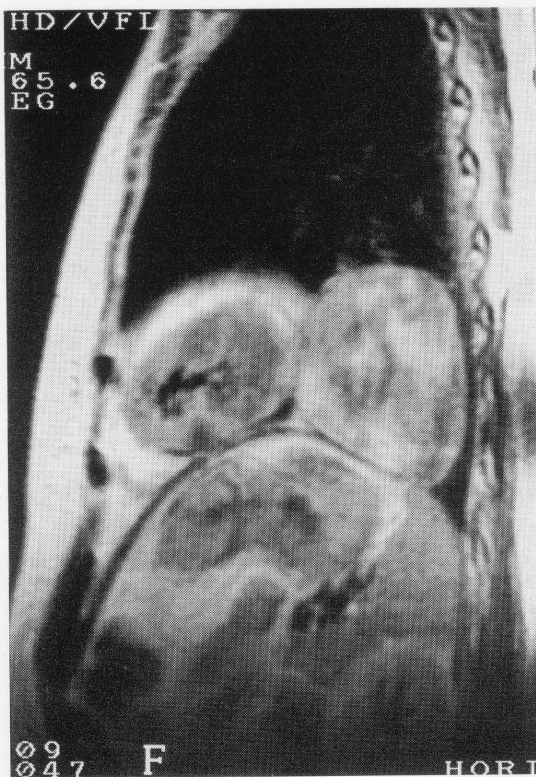
Intraparenchymal leiomyosarcoma presents as a peripheral lung mass.<sup>1</sup> It is difficult to distinguish a leiomyosarcoma from a benign lung tumor or lung cancer in a chest X-ray. To our knowledge, common lung cancer is positive for  $^{67}\text{Ga}$  and negative for  $^{99m}\text{Tc(V)}$ -DMSA, and soft tissue sarcomas including leiomyosarcoma are probably positive for  $^{99m}\text{Tc(V)}$ -

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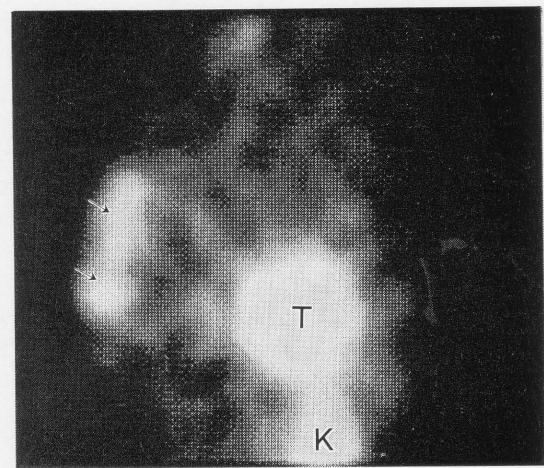
**Fig. 1** Chest X-p film showed a large mass on the left diaphragm.



**Fig. 2** MR images (T<sub>1</sub> weighted after gadolinium-DTPA) showed that the tumor behind the heart has heterogeneous intensity almost same as the myocardium.



**Fig. 3** <sup>67</sup>Ga scintigraphy (left) showed no accumulation to the tumor. <sup>99m</sup>Tc-MDP (middle) and <sup>99m</sup>Tc(V)-DMSA (right) accumulation to the tumor was recognized (P-A view, T: tumor). In <sup>99m</sup>Tc-MDP image, increased renal uptake was recognized, but considered idiopathic. In <sup>99m</sup>Tc(V)-DMSA image, descending aorta was visible as blood pool (▲).



**Fig. 4** <sup>99m</sup>Tc(V)-DMSA sagittal SPECT showed clear accumulation to the tumor (K: kidney, ↑ rib).

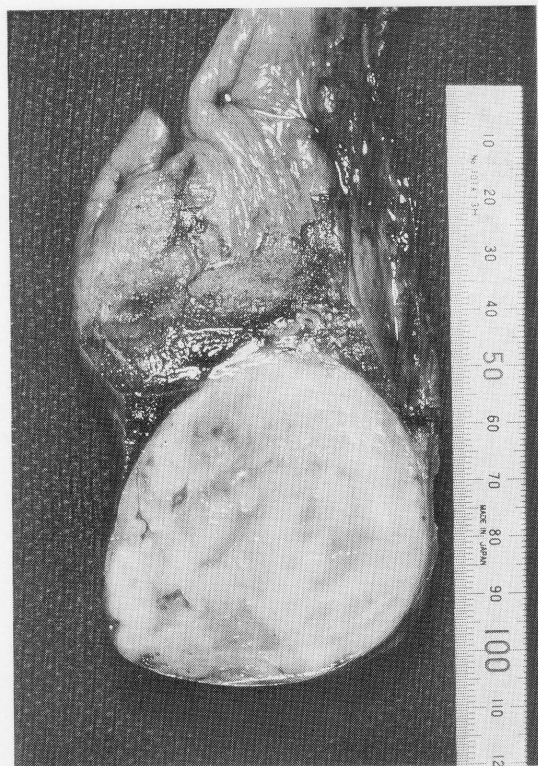


Fig. 5 Surgery revealed the tumor was pulmonary leiomyosarcoma.

DMSA.<sup>4</sup> In this case, the results of  $^{67}\text{Ga}$  and  $^{99\text{m}}\text{Tc(V)}$ -DMSA scintigraphy might suggest the rarity of this lung tumor. High  $^{67}\text{Ga}$ -citrate positive rates are observed in leiomyosarcoma.<sup>5</sup> The absence of  $^{67}\text{Ga}$  accumulation in our case might be caused by histological low grade malignancy.  $^{99\text{m}}\text{Tc}$ -MDP uptake in primary lung tumors is reported,<sup>6</sup> but this finding is not thought to be very common.  $^{99\text{m}}\text{Tc}$ -MDP uptake in a perigastric leiomyomatous tumor is also reported. Suggested mechanisms of increased  $^{99\text{m}}\text{Tc}$ -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.<sup>7</sup> In our case, there was no necrosis or microcalcification.

The mechanism of  $^{99\text{m}}\text{Tc(V)}$ -DMSA accumulation to tumors is considered to be due to a structural similarity between the Tc core in  $^{99\text{m}}\text{Tc(V)}$ -DMSA and the orthophosphate ion<sup>4</sup>, but the exact mechanism is still unknown.

We could find no literature about  $^{99\text{m}}\text{Tc}$ -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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