Visualization of Pulmonary Arteriovenous Malformation by Three Dimensional Computed Tomography: A Case Report

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Summary: Pulmonary arteriovenous malformation (PAVM) is an anomaly condition characterized by abnormal vascular communications between arteries and veins in the lungs. Hereby we describe a 60-year-old female with PAVM. Although the patient was asymptomatic, an abnormal round opacity was found on a chest X-ray film. Computed tomography (CT) of the lung disclosed nodules connected with enlarged vessels. Because PAVM was suspected, the patient was further evaluated by spiral CT coupled with three dimensional reconstruction of the images (3D-CT). As a result, PAVM was clearly visualized and invasive procedures such as angiography was not performed. The present case illustrates that 3D-CT is a diagnostic procedure of choice when PAVM is suspected.

Key words pulmonary arteriovenous malformation, computed tomography, three dimensional

INTRODUCTION

Pulmonary arteriovenous malformation (PAVM) is a relatively rare anomaly, leading occasionally to chronic hypoxia and vascular emboli [1]. For the diagnosis of the condition, pulmonary angiography has been a mainstay to confirm, however, invasiveness of the procedure limits its clinical application. In addition, if PAVM may exist bilaterally, angiography can be applicable to screen one lung at a time. In contrast, spiral computed tomography (CT) can scan both lungs without invasiveness and 3-dimensional reconstruction of the obtained images is able to visualize vascular communications in PAVM [2].

CASE REPORT

A 60-year-old woman was referred to Kurume University Hospital because of an abnormality on a chest X-ray film. The patient was asymptomatic. Medical histories revealed that she had recurrent epistaxis. Physical examination showed normal vital signs, no finger clubbing, no hepatosplenomegaly. Skin and oral mucosa were normal. Heart and breath sounds were normal. Laboratory tests demonstrated normal range of complete blood count, arterial blood gas, pulmonary functions, and electrocardiogram. A chest radiograph disclosed a round opacity on the right middle lung layer (Fig. 1). Conventional CT of the chest showed small nodular opacities on right 54 (Fig. 2) and S8. The film disclosed feeding and drainage vessels communicating with the lesion in S4. Since PAVM was suspected by these findings the patient was further evaluated by spiral CT. Three dimensional reconstruction of the obtained images permitted assessment of the architecture of the lesion, and visualized abnormal communications between an artery (A4) and a vein (V5), establishing the diagnosis of PAVM (Fig. 3). Because she had a history of recurrent epistaxis, hereditary hemorrhagic telangiectasia (Rendu-Osler-Weber syndrome) was implicated, so that nasal cavities were scrutinized by
DISCUSSION

Pulmonary arteriovenous fistula is a malformation characterized by abnormal vascular communications between arteries and veins. They are pathologically classified into following categories: 1) shunting between pulmonary arteries and pulmonary veins, 2) shunting between systemic circulation and pulmonary arteries, 3) shunting between vena cava and pulmonary arteries, with 1) the most common. PAVM is usually a congenital anomaly, however, can be formed secondarily to diseases such as schistosomiasis, cirrhosis of the liver, cancer, amyloidosis. Osler-Redue-Weber syndrome is known to accompany PAVM. It is estimated that twenty to thirty percent of patients with PAVM have Osler-Redue-Weber syndrome [3]. Clinical findings and human leukocyte antigens typing did not suggest the presence of Osler-Rendu-Weber syndrome in the present case [4].

PAVM often produces few symptoms as in the present case. Common clinical manifestations include cyanosis (50-70%), compensation hypercythemia (55%), clubbed fingers (35-75%), dyspnea on effort (25%), hemoptysis (12%) [1,5,6]. Hypoxemia is common, however, may be absent in some patients. Thus, for the diagnosis of the condition, chest radiograph appears to give a primary clue in clinical practice. The characteristic appearance of PAVM in a plain chest radiograph is a round or oval mass, lobulated in contour but sharply circumscribed, in the medial third of the lung. A feeding artery and drainage vein can often be identified. Classically, the mass appears expanded on deep inhalation, whereas smaller on exhalation. However, these findings do not always present, nor do confirm the diagnosis per se. Further evaluations are necessarily to confirm the diagnosis and to search for the presence of other lesions that can not be identified initially. Pulmonary angiography used to be a mainstay in the diagnosis of PAVM, however, the procedure is invasive and accompanies several critical complications, such as arrhythmia, thrombosis, and bleeding. Instead, a variety of imaging modalities can currently be available, including CT, radionuclide scanning, echocardiography. The characteristic CT finding of PAVM consists of a homogeneous, circumscribed

endoscopy, revealing no teleangiectasis. She discharged from the hospital without treatment since PAVM caused no physiological derangements in this patient.
nodule or mass connected with blood vessels. CT demonstrates an association between the peripheral nodule and an enlarged vessel in the present case [2]. However, optimal investigation of PAVM by CT requires the use of spiral CT, which allows scan of the entire lung, thus minimizing the risk of overlooking small lesions. Three dimensional reconstruction of the images enables assessment of the architecture of the lesion [7]. We applied this technique to the present case, which successfully visualized the abnormal vascular communications between an artery and a vein, and thus confirming the diagnosis of PAVM. Treatment is required if the patients are symptomatic, such as dyspnea, or complicated with hypoxemia or embolisms. In this context, the present case did not undergo any therapeutic interventions. Therapeutic modalities for PAVM are surgical removal, partial resection or lobectomy, or percutaneous transcatheter embolization of the feeding artery [9-13]. Surgical removal may be indicated for a sizable lesion, whereas embolization is advantageous for preserving lung function and may be applicable to multiple lesions. Screening entire lung with 3D-CT, therefore, can be of help to choose optimal therapeutic modalities.

REFERENCES