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## Lung granuloma mimicking pulmonary arteriovenous malformation: Report of a case



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### ABSTRACT

**INTRODUCTION:** While hypervascular lesions in the lung are known to mimic pulmonary arteriovenous malformation (PAVM), here we report a rare case of lung granuloma mimicking PAVM, on which video-assisted thoracic surgery (VATS) was performed.

**PRESENTATION OF CASE:** A 76-year-old woman without any symptom was admitted to our hospital because of abnormal shadow in the left lung field on chest X-ray. A 20 mm × 14 mm nodule with well-defined margins and smooth contours in the left upper segment was detected in her chest computed tomography (CT). Contrast-enhanced three-dimensional CT (3D-CT) revealed an enhanced solitary lung nodule, which was connected with linear structures suggestive of feeding artery and drainage vein. Thus, we made a preoperative diagnosis of PAVM by performing partial pulmonary resection by VATS. Intraoperatively, elastic hard nodule was palpable in the left upper segment and bruit was not convincing. Histopathological findings revealed multiple foci of coagulative necrosis surrounded by epithelioid cell granuloma containing Langhans-type multinucleated giant cells, involving the medium-sized blood vessels in the pulmonary parenchyma. Abnormal vascular structures, such as PAVM were not convincing. Based on these findings, a diagnosis of left lung granuloma was made.

**DISCUSSION:** Preoperatively, it was difficult to distinguish the left lung granuloma from PAVM, because hypervascular lesion, such as inflammatory changes can present as strongly enhanced nodules after injection of contrast material.

**CONCLUSION:** Surgical approach seems appropriate, not only for the purpose of diagnosis, but also for the safety in treatment of a PAVM.

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## 1. Introduction

Pulmonary arteriovenous malformation (PAVM), first described in 1897 by Churton,<sup>1</sup> is characterized by abnormal communications between pulmonary veins and arteries, and is known to disturb the filtering action of pulmonary capillaries, causing thromboembolic event in systemic circulation.<sup>2</sup> Most of the PAVMs have no symptoms, and are detected as abnormal shadow in the chest. Conclusive

diagnosis is generally made by means of pulmonary arteriography or three-dimensional computed tomography (3D-CT) angiography. While hypervascular lesions can mimic PAVM, we observed a rare case of a lung granuloma mimicking PAVM, and performed video-assisted thoracic surgery (VATS).

## 2. Case report

A 76-year-old woman, who was otherwise symptom-free, was admitted to our hospital because an abnormal shadow was detected in the left lung field on her chest X-ray. Her saturation of pulse oximetry oxygen (SpO<sub>2</sub>) was 95% at room air. No significant murmur was audible in the left mammary area. Chest computed tomography (CT) revealed a 20 mm × 14 mm nodule with well-defined margins and smooth contours in the left upper segment (Fig. 1). An enhanced solitary lung nodule, connected with linear structures suggestive of feeding artery and drainage vein, was

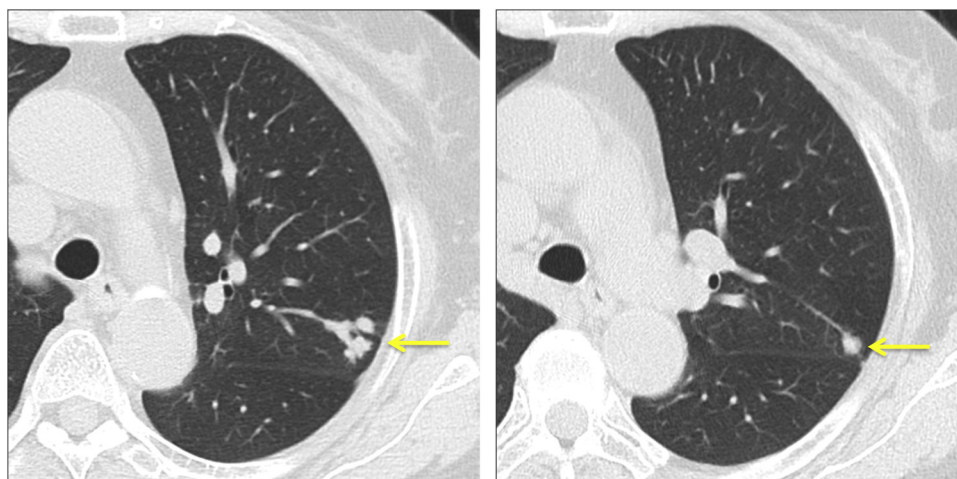
**Abbreviations:** 3D-CT, three-dimensional computed tomography; PAVM, pulmonary arteriovenous malformation; VATS, video-assisted thoracoscopic surgery; CT, computed tomography.

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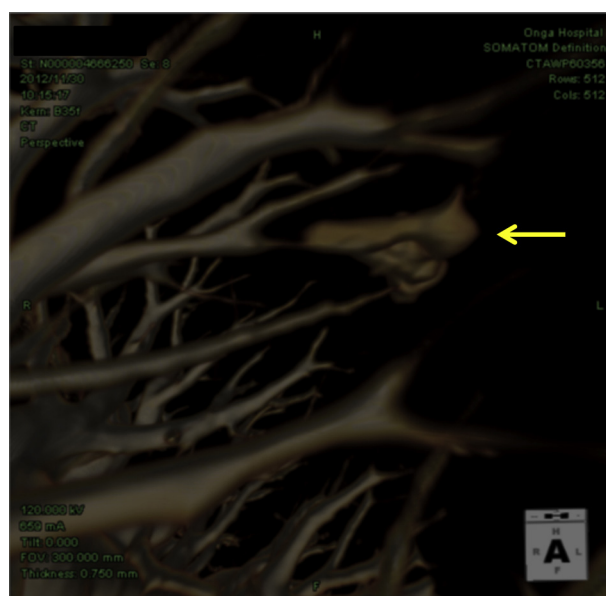


**Fig. 1.** Chest computed tomography (CT) revealed a 20 mm × 14 mm nodule with well-defined margins and smooth contours in the left upper segment.

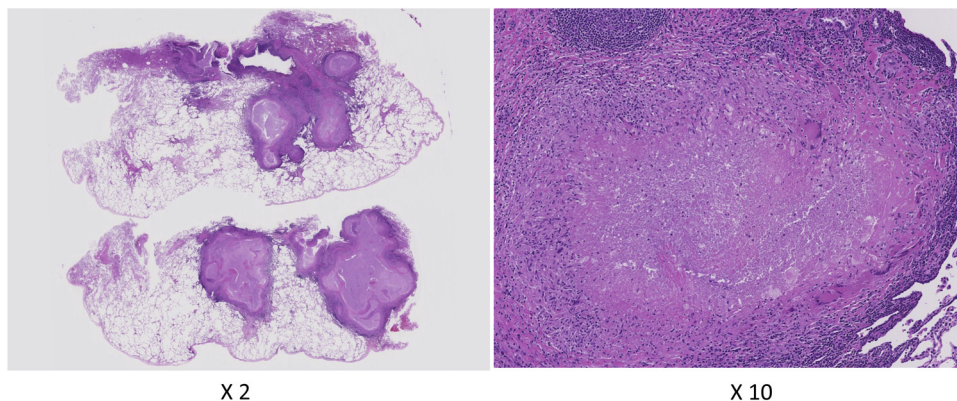
revealed by contrast-enhanced 3D-CT (Fig. 2). Arterial blood gas analysis showed hypoxemia, with arterial oxygen pressure (PaO<sub>2</sub>) 56 mmHg in room air. Thus we made a preoperative diagnosis of PAVM. We performed partial pulmonary resection by VATS. First, the patient was placed in the right lateral decubitus position, and the left lung was deflated. A videothoracoscope was inserted through the seventh intercostal space. Intraoperatively, elastic hard nodule was palpable in the left upper segment and bruit was not convincing. The nodule was nontortuous in shape, covered with the visceral pleura, and neither the feeding artery nor the drainage vein was detected. Histopathological findings revealed multiple foci of coagulative necrosis surrounded by epithelioid cell granuloma containing Langhans-type multinucleated giant cells, involving the medium-sized blood vessels in the pulmonary parenchyma. Abnormal vascular structures, such as PAVM, were not convincing (Fig. 3). Based on these findings, a diagnosis of a lung granuloma mimicking PAVM, was made. The lung granuloma was difficult to be preoperatively distinguished from PAVM, because hypervascular lesion such, as inflammatory changes can present as strongly enhanced nodules after injection of contrast material. The patient had an uneventful postoperative course and was discharged 14 days after the operation.

### 3. Discussion

PAVM is a relatively rare disease, occurring at a frequency of 0.02%.<sup>3</sup> Most of the PAVMs are congenital and considered



**Fig. 2.** Contrast-enhanced three-dimensional CT (3D-CT) revealed an enhanced solitary lung nodule which was connected with linear structures suggestive of feeding artery and drainage vein.



**Fig. 3.** Histopathological findings revealed multiple foci of coagulative necrosis surrounded by epithelioid cell granuloma containing Langhans-type multinucleated giant cells, involving the medium-sized blood vessels in the pulmonary parenchyma. Abnormal vascular structures, such as pulmonary arteriovenous malformation, were not convincing.

abnormal developments of the capillaries. PAVM cases associated with Rendu–Osler–Weber have also been reported.<sup>3,4</sup> Causes of acquired or secondary PAVM include chest trauma, thoracic surgery, hepatic cirrhosis, infections (actinomycosis, schistosomiasis), metastatic carcinoma and systemic disease.<sup>5,6</sup> Twenty eight percent of cases are considered to have no symptoms.<sup>3</sup> It was reported that when a single isolated pulmonary arteriovenous malformation is 2 cm or smaller, no symptoms appear.<sup>7</sup> Generally, when PAVM is 2 cm or more, symptoms such as breathing difficulty, cyanosis, hypoxemia, finger clubbing and polycythemia occur, and the rate of occurrence of severe complications, such as rupture of the malformation, hemoptysis, cerebral infarction and cerebral abscess, is approximately 30%.<sup>3</sup> Therefore treatment is seriously recommended. The patient in the present case was asymptomatic and had no history of chest trauma, surgery, infection or systemic disease. Abnormal vascular structures, such as PAVM are not convincing in histopathological findings. Coincidentally, the inflammatory granuloma of the lung looked almost identical to PAVM because of the nontortuous shape with linear structures suggestive of feeding artery and drainage vein. No bacteria was detected in bacteriological culture of the resected lung granuloma. The cause of inflammation was unknown. The resection of lung granuloma is highly successful for an isolated malformation, and mortality rate is low in this surgery. Embolization is an appropriate treatment modality in multiple PAVM for which surgery is not suitable. Complications of embolization include pleuritic chest pain, pulmonary infection, air embolism, migration of coils and paradoxical embolism.<sup>3,4</sup>

Although pulmonary angiography or contrast-enhanced 3D-CT has been the standard diagnostic tool for PAVM,<sup>8</sup> it has limitations in detecting PAVMs presenting as small nodules and enhanced nodules.<sup>9</sup> In our case, since the enhanced lung nodule size was 22 mm in diameter, it mimicked PAVM.

In this patient, it was difficult to distinguish the lung granuloma from PAVM, preoperatively. Though there is a report which shows lung cancer mimicking PAVM,<sup>10</sup> to our knowledge, this is the first report of a lung granuloma mimicking PAVM.

#### 4. Conclusion

In conclusion, clinicians should pay particular attention to enhanced nodules to rule out a variety of disorders, including neoplasm, infection, inflammatory and vascular abnormality when PAVM was suspected. For the purpose of not only diagnosis but also for safety in treatment of PAVM, the surgical approach seems appropriate.

#### Conflict of interest

None.

#### Funding

None.

#### Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Author contributions

Yoshinobu Ichiki: study design, data collections, data analysis, writing; Junji Kawasaki: data collections; Takayuki Hamatsu: data collections; Taketoshi Suehiro: data collections; Makiko Koike: data collections; Fumihiro Tanaka: study design, data collections, data analysis; Keizo Sugimachi: data collections.

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