

## Special Article – Surgery Case Reports

# Lethal Surgical Outcome of a Large Pulmonary AVM with Severe Right to Left Shunt

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## Abstract

Between October, 2001 and January, 2007, three female patients underwent lung resection for pulmonary Arteriovenous Malformation (AVM). The last two patients both with pulmonary AVM in right middle lobe were uneventful after lobectomy. The first one patient with a large pulmonary AVM presenting severe right to left shunt died of congestive heart failure on post-operative day 12. Here, we present the peri-operative images and clinical course focusing on the case of mortality. Surgical resection of a large pulmonary AVM with severe right to left shunt should be carefully concerned.

**Keywords:** Pulmonary AVM; Lung resection; Right to left shunt

## Introduction

Between October, 2001 and January, 2007, three female patients underwent lung resection for pulmonary arteriovenous malformation (AVM) (Table 1). The last two patients both with pulmonary AVM in right middle lobe were uneventful after lobectomy. The first one patient with a large pulmonary AVM presenting severe right to left shunt died of congestive heart failure on post-operative day 12. The event occurred 16 years ago. To share the painful experience, we herein present the unique case of mortality.

## Case Presentation

### Presentation of the fatal case

A 37 year-old female patient presented to the out-patient-clinic on October 12, 2001 with pale in looking, dyspnea, and leg edema. Physically, bruit sounds were audible at right 4<sup>th</sup>- 5<sup>th</sup> intercostals space. She was treated as pulmonary tuberculosis 10 years before. Since the early of 2001, she persisted short of breaths and severe cough. She was admitted on October 17, 2001 for surgical intervention after confirmation of pulmonary AVM. Preoperative work-up included chest film (Figure 1), chest computed tomography (Figures 2 & 3), MRI (Figure 4), and MRA, etc. Right thoracotomy with ligation of feeding artery (Figure 5) of AVM and wedge resection of right lower lobe lung, including the sac of AVM (Figure 6) was performed on October 18, 2001. Central venous pressure was 17~19 cm H<sub>2</sub>O on postoperative day 1. Oliguria was observed on post-operative day 2. Central venous pressure was elevated to 24~29 cm H<sub>2</sub>O, and cardiac echography revealed dilated right atrium and right ventricle, and pulmonary arterial pressure 50-60 mmHg on postoperative day 6. She died of heart failure on post-operative day 12.

### Comments

Pulmonary AVM have a prevalence of 1 in 2,600. Paradoxical emboli lead to strokes and cerebral abscesses [1]. Untreated pulmonary AVM had risk of stroke, brain abscess and high mortality rate [2]. The Mayo Clinic experience suggested a morbidity of 26-33% and mortality of 8-16% in untreated patients [3]. Complications of the pulmonary AVM also included intrapleural rupture and massive

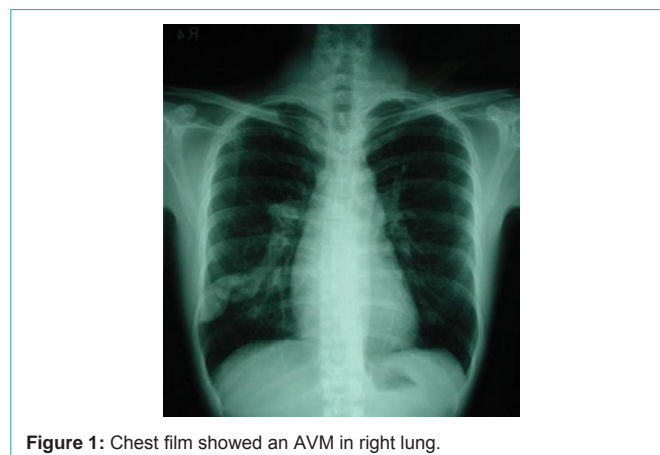


Figure 1: Chest film showed an AVM in right lung.

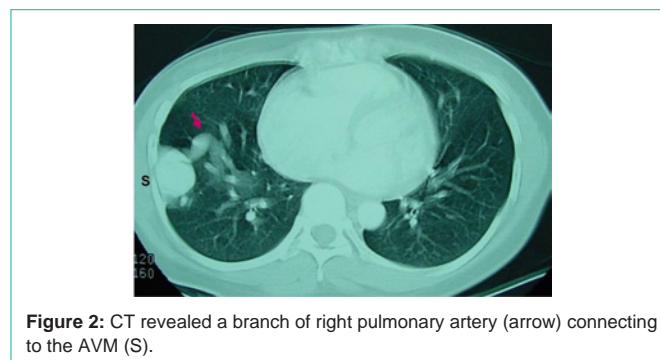
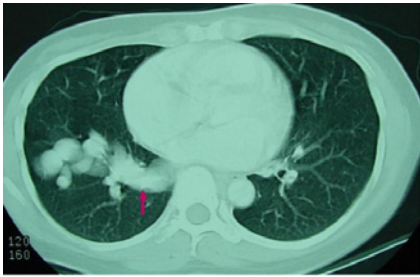
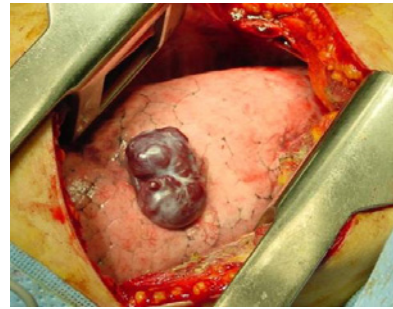
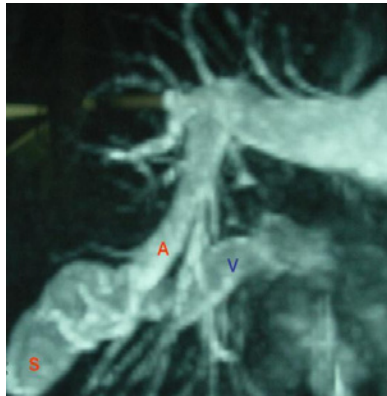
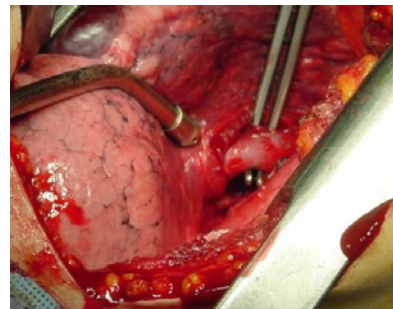


Figure 2: CT revealed a branch of right pulmonary artery (arrow) connecting to the AVM (S).

hemoptysis [4]. The high incidence of associated major neurologic complications mandates aggressive treatment whenever feasible. Two therapeutic options are transcatheter embolization and surgical resection [5]. Pulmonary AVM was historically treated with surgical resection [6]. Balloon embolization offers an alternative therapy for patients who are poor surgical risks or those whose lesions are too numerous to resect [5]. Transcatheter embolization is less invasive procedure with success rate of 85-98% [6]. Most surgical resections were performed using thoracotomy [7,8]. Recently, thoracoscopic surgical resection for well-selected patients with pulmonary AVM

**Table 1:** Three patients with pulmonary AVM.

Case	Gender, age	Date of operation	Location of AVM	operation	Outcome
1	Female, 37	Oct.18,2001	Right lower lobe	Arterial ligation and resection of sac	Dead
2	Female, 64	Mar.25,2002	Right middle lobe	lobectomy	well
3	Female, 61	Jan.2,2007	Right middle lobe	lobectomy	well

**Figure 3:** CT revealed predominate right inferior pulmonary vein (arrow).**Figure 6:** The feeding artery of the AVM was identified.**Figure 4:** MRI revealed an AVM (S) supplied by a branch of right pulmonary artery (A) and drained to right inferior pulmonary vein (V).**Figure 5:** A sac of AVM was at the surface of right lower lobe lung.

was recommended [9]. The minimally invasive lung resection was also suggested for the treatment of solitary large arteriovenous malformations [10]. Pulmonary AVM with severe hypoxemia could be considered for lung transplantation [11]. In our fatal case was treated as pulmonary tuberculosis in other hospital 10 years before. The pulmonary AVM was not recognized at that time. The large AVM with severe right to left shunt led to poor outcome. Lung transplantation was mentioned by a cardiologist on postoperative day 4. Majumdar et al. reported a salvage pneumonectomy for a 12-year-old boy with a large right to left shunt pulmonary AVM resulting in fatal outcome. Comparing to our presenting fatal case, careful preoperative evaluation and patient selection are necessary.

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