

Catheter-Induced Pulmonary Artery Dissection and Contrast Extravasation During Pulmonary Angiography

Daniel T. Ginat, M.D., M.S., and Lawrence Sahler, M.D.

Pulmonary artery injury during pulmonary angiography is an uncommon complication. We describe two cases of iatrogenic pulmonary artery extravasation that resulted from the use of pigtail catheters for pulmonary angiography. No further complications occurred and no treatment was necessary in either case. Thus, mild contrast extravasation appears to be a self-limited complication that likely requires little more than short-term observation.

Introduction

Although CT angiography has now largely supplanted conventional catheter pulmonary angiography for the assessment of pulmonary embolism, catheter angiography has long been considered the gold standard modality [1]. Pulmonary angiography has generally been regarded as a safe procedure [2-6]. Major complications of pulmonary angiography most commonly include renal dysfunction requiring hemodialysis, significant hemorrhage requiring transfusion, cardiac perforation,

major arrhythmias, cardiac arrest, and severe contrast reactions. Such complications occur in 0.3 to 1% of cases of pulmonary angiography and death directly related to the procedure occurs in 0.2 to 0.5% [2, 3, 5, 6]. Minor complications, such as transient angina, small hematomas at the puncture site, urticaria, and drug-responsive renal dysfunction, hypotension, and respiratory distress result in 1.4 to 4.8% [2, 4]. Catheter-induced intramural deposition of contrast is a rarely reported complication of pulmonary angiography [7, 8]. In this report, we describe two cases of iatrogenic contrast extravasation from the pulmonary arteries during pulmonary angiography.

Case Report I

A 58 year-old woman with a history of melanoma presented with several days of progressive cough and shortness of breath. She had been discharged from the hospital two days earlier following resection of a right thigh melanoma. On readmission, an arterial blood gas yielded a pO₂ of 67mmHg on room air. A ventilation-perfusion scan was performed and interpreted as inter-

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Abbreviations: CT, computed tomography

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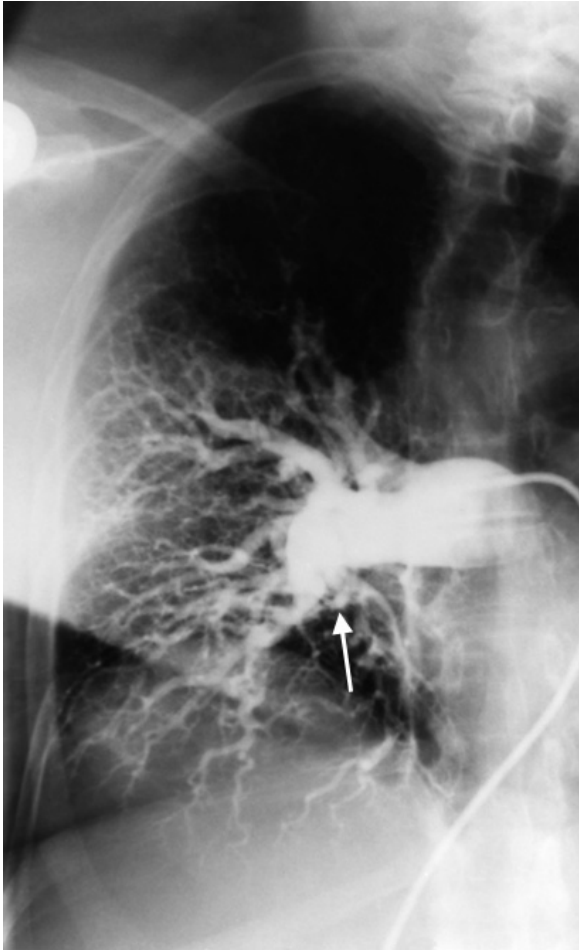


Figure 1A. 58-year-old woman with suspected pulmonary embolism. Pulmonary angiogram of the right pulmonary artery obtained shortly after injection of contrast reveals an embolism within the right lower lobe pulmonary artery (arrow).

mediate probability for pulmonary embolus. Selective bilateral pulmonary angiograms were performed using an 8 French pigtail catheter (Cook Inc, Bloomington, IN), through which 55ml of contrast was injected at a rate of 27 milliliters per second. The left pulmonary arteriogram demonstrated no evidence of thromboembolic disease. The catheter was easily re-directed in to the right pulmonary artery over a 0.038" soft tip guide wire (Cook Inc, Bloomington, IN). The right pulmonary angiogram showed a right lower lobe pulmonary embolus

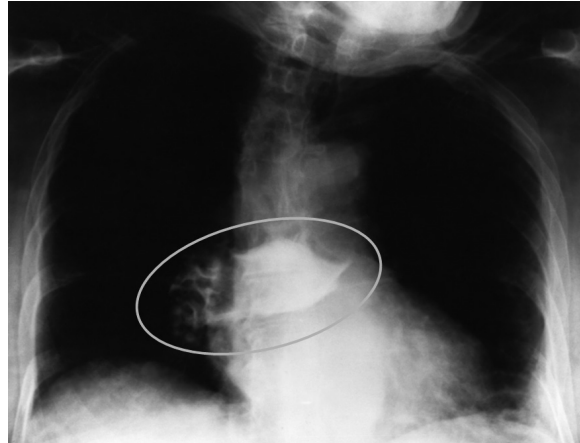


Figure 1B. 58-year-old woman with suspected pulmonary embolism. Pulmonary angiogram at the completion of contrast injection demonstrates a large area of contrast extravasation (encircled) in the region of the right pulmonary artery with extension into the middle mediastinum.

(Figure 1A). In addition, extraluminal accumulation of contrast adjacent to the right main pulmonary artery occurred and persisted at 45 minutes (Figure 1B). The patient was asymptomatic and a follow-up chest X-ray 8 hours after the procedure demonstrated resolution of the contrast stain. The remainder of the patient's hospital course was uneventful. Anticoagulation was initiated and a Greenfield filter was inserted.

Case Report 2

A 25-year-old, 22-weeks pregnant female presented with vaginal bleeding. Two days after delivery of a non-viable fetus, the patient experienced shortness of breath and chest pain. An arterial blood gas sample revealed a pO₂ of 62mmHg. A ventilation-perfusion scan was performed and interpreted as low probability. Selective bilateral pulmonary angiograms were performed as described in the previous case. No pulmonary embolus was identified. However, a small amount of subintimal contrast extravasation was identified in the superior margin of the right pulmonary artery (Figures 2A and B). There were no clinically significant sequelae or abnormalities on follow-up chest X-ray.

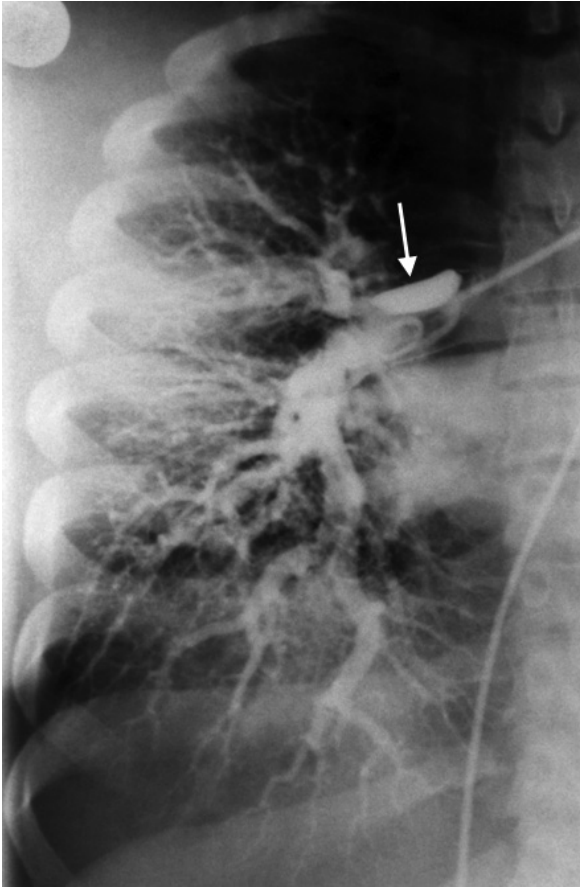


Figure 2A. 25-year-old woman with suspected pulmonary embolism. Pulmonary angiogram suggests the presence of a small collection subintimal contrast within the superior margin of the right pulmonary artery (arrow). Otherwise, the right pulmonary artery branches are normal.

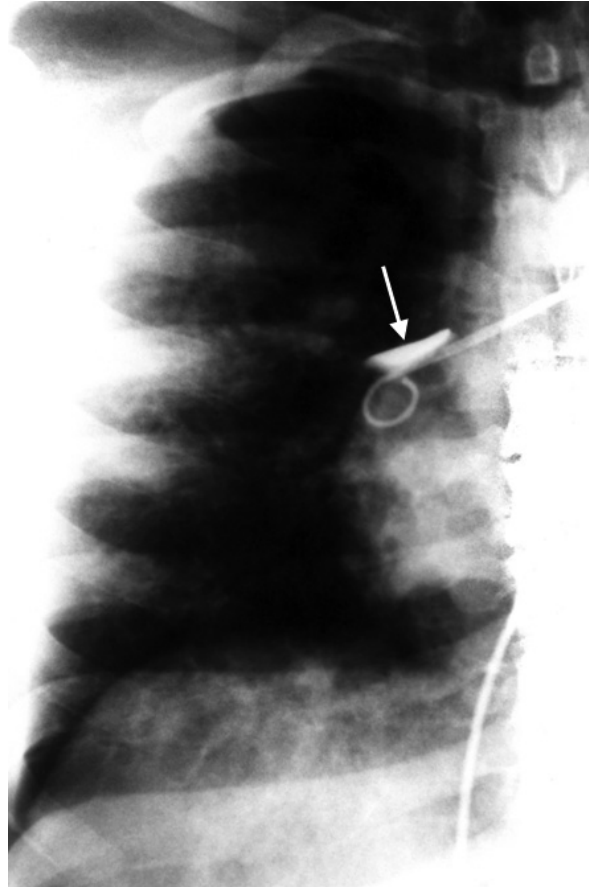


Figure 2B. 25-year-old woman with suspected pulmonary embolism. A delayed fluoroscopic image after pulmonary angiography reveals a persistent contrast blush, which confirms right pulmonary artery injury resulting in contrast extravasation into the vessel wall (arrow).

Discussion

Subintimal contrast staining is considered a rare minor complication of pulmonary angiography, occurring in less than 0.4% of cases [6]. In a series of 122 pulmonary angiograms using pigtail pulmonary-artery-seeking catheters, one case of right pulmonary artery extravasation occurred without sequelae [9]. At our institution, among 626 pulmonary angiograms performed over the course of 20 years, only two such cases were encountered. In contrast, pulmonary artery rupture occurs

more frequently during placement of pulmonary artery catheters without fluoroscopic guidance [10].

With regard to our cases, the distal positioning of the catheter and perhaps fluctuations in the catheter position during deep inspiration may have wedged the pigtail creating a localized high-pressure jet at the end hole. This may have led to subintimal contrast injection and subsequent contrast extravasation. This phenomenon has been described in association with the use of a wedge-shaped pulmonary catheter during angiography of an interlobular pulmonary artery [11]. This complication is preventable using fluoroscopic guidance,

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particularly through cautious positioning of the catheter in such a way that there is adequate range of motion for the tip and preventing the end-hole from abutting the arterial wall. In addition, the catheter should be sufficiently undersized for the selected pulmonary artery branch. The benign course of our patients and the lack of morbidity reported in the literature suggest that observation alone may suffice.

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