Case 13484

A bloody cough

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DOI: 10.1594/EURORAD/CASE.13484
ISSN: 1563-4086
Section: Chest imaging
Area of Interest: Interventional vascular Arteries / Aorta
Thorax
Procedure: Diagnostic procedure
Procedure: Embolisation
Imaging Technique: Conventional radiography
Imaging Technique: CT-Angiography
Imaging Technique: Catheter arteriography
Special Focus: Cavitation Hyperplasia / Hypertrophy
Case Type: Clinical Cases
Authors: Dr Carl Sullivan, Dr David Roberts
Patient: 39 years, male

Clinical History:

A 39-year-old, non-English speaking, Indian, male patient presented with massive haemoptysis. Background history includes: Ex-smoker; Crohn's disease and severe Varicella Pneumonia requiring ventilation, chest drains, a prolonged Intensive Care Unit stay and a slow tracheostomy wean. Physical examination was unremarkable.

Imaging Findings:

Right apical cavity on CXR (Fig. 1).

CTs performed in systemic and pulmonary arterial phases demonstrate abnormal right systemic arteries, apical cavitation, but no active bleeding/pseudoaneurysm (Fig. 2).

Bronchoscopy identified bleeding in the right upper lobe.

Extensive angiography demonstrated abnormal intercostal arteries with shunting into the pulmonary veins. Selective catheterisation and embolisation with 350-500mcg Polyvinyl Alcohol particles was performed (Fig. 3).

Costocervical trunk angiography showed hypertrophic, serpiginous vessels extending into the right upper lobe from the right internal mammary artery with pseudoaneurysm and shunting into the pulmonary veins (Fig. 4). Coil embolisation was performed throughout these arteries (Fig. 5).

Completion angiography demonstrated no filling of the abnormal vessels, pseudoaneurysm or venous shunting.

The patient improved clinically, his haemoptysis resolved and he was discharged within a week. Sputum samples remained negative for acid fast bacilli and QuantiFERON-TB Gold, however, Aspergillus precipitin was isolated.

Follow-up imaging demonstrated regression of the apical cavitation (Fig. 6). The patient underwent interval lobectomy. Cause of cavity remains unproven.

Discussion:

Massive haemoptysis (300–600mL per day) is a respiratory emergency which has a variety of causes. In 90% of cases, the source is the bronchial circulation [1].

However, Non-bronchial systemic arteries can be a significant source of massive haemoptysis, especially in patients with pleural involvement caused by underlying disease. Missing the non-bronchial systemic arteries at angiography may result in recurrent bleeding after successful embolisation of the bronchial artery and many practitioners advocate a concerted search for non-bronchial systemic arterial supply [2].

Pre-procedural CT delineates the site of the lesion, and may identify bleeding vessels. Use of multi-planar reconstructions and meticulous planning can greatly reduce the amount of time required to embolise target vessels.

Massive haemoptysis results from various causes, which differ greatly between the Western and the non-Western world. In the non-Western world, pulmonary tuberculosis (TB) is the most common underlying cause. Bronchogenic carcinoma and chronic inflammatory lung diseases, e.g. bronchiectasis, cystic fibrosis, or aspergillosis are the more prevalent causes of haemoptysis in Western countries [2].

Aspergillus is an opportunistic fungus that exists as moulds and can cause a broad spectrum of pulmonary diseases, usually occurring in patients who have pre-existing cavitary lung disease [3].

Major forms in humans include [4]:
- Acute invasive aspergillosis, invades surrounding tissue, more common in the immunocompromised.
- Disseminated invasive aspergillosis
- Aspergilloma, mass-like collection of fungal hyphae, mixed with mucus and cellular debris, within a pre-existing cavity—the walls of which demonstrate vascular granulation tissue [5].

Diagnosis is often made as a result of an incidental finding on a CXR or CT scan performed as part of the workup for an unrelated condition. However, a small percentage of aspergillomata invade into a blood vessel which can result

in bleeding. There are classical findings associated with the different manifestations of aspergillus infection; haemoptysis being described as the most common symptom, occurring in up to 54% of patients [6]. This may result in life-threatening haemorrhage, though the amount of blood lost is usually inconsequential.

Pulmonary artery pseudoaneurysms secondary to pulmonary tuberculosis are known as Rasmussen aneurysms and usually involve the upper lobes in the setting of reactivation tuberculosis [7].

Treatment of haemoptysis is usually supportive with management of ABC and correction of clotting abnormalities. In the case of life-threatening events, it is vitally important to obtain high-quality MDCT angiography to direct interventional treatment allowing detection of abnormal vessels and target for embolization by an Interventional Radiologist.

Failing this, or in cases of repeated haemoptysis surgical excision with a lobectomy remains the gold standard [8].
Differential Diagnosis List: Life-threatening haemoptysis caused by systemic arterial pseudoaneurysm secondary to aspergilloma., Rassmussen aneurysm (due to TB), Bronchiectasis, Lung abscess, Chronic necrotizing/semi-invasive Aspergillosis

Final Diagnosis: Life-threatening haemoptysis caused by systemic arterial pseudoaneurysm secondary to aspergilloma.

References:

Yoon W, Kim JK, Kim YH, Chung TW, Kang HK. (2002) Bronchial and nonbronchial systemic artery embolization for life-threatening hemoptysis: a comprehensive review. Radiographics Nov-Dec;22(6):1395-409. (PMID:12432111)
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Collins J, Stern EJ (2007) Chest radiology, the essentials. Lippincott Williams & Wilkins. ISBN:0781763142
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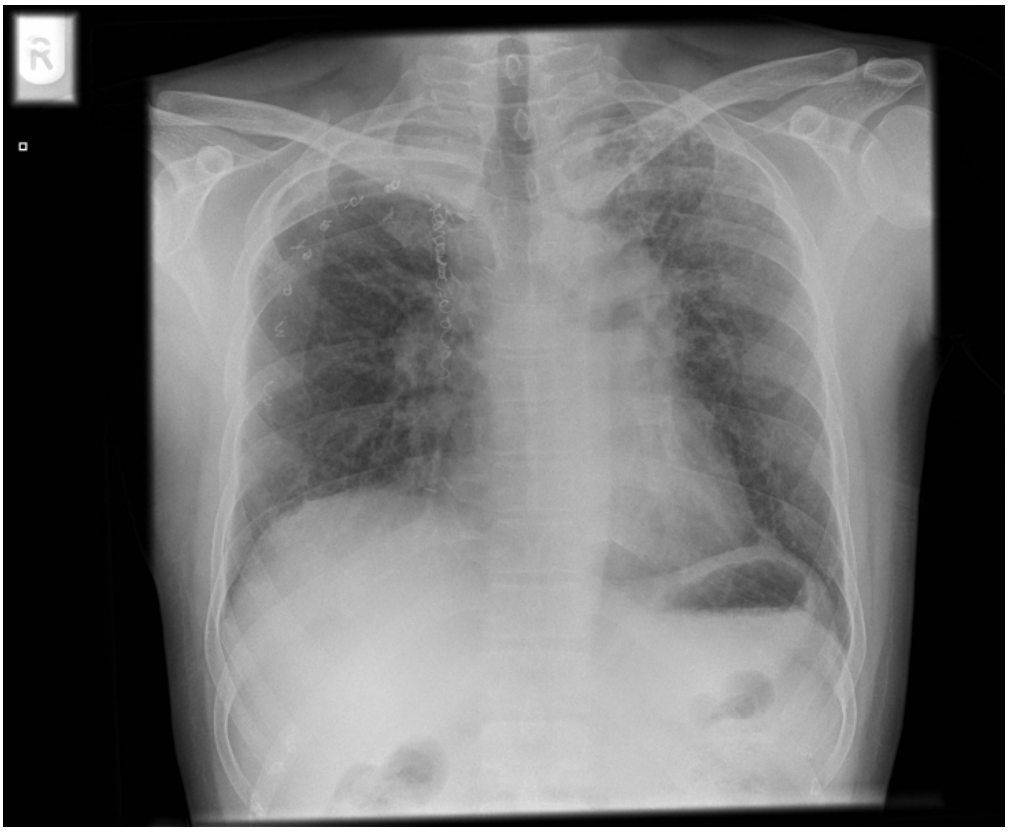
Chen JC, Chang YL, Luh SP et-al. (1997) Surgical treatment for pulmonary aspergilloma: a 28 year experience. Thorax 52 (9): 810-3. (PMID: 9371213)

Figure 1

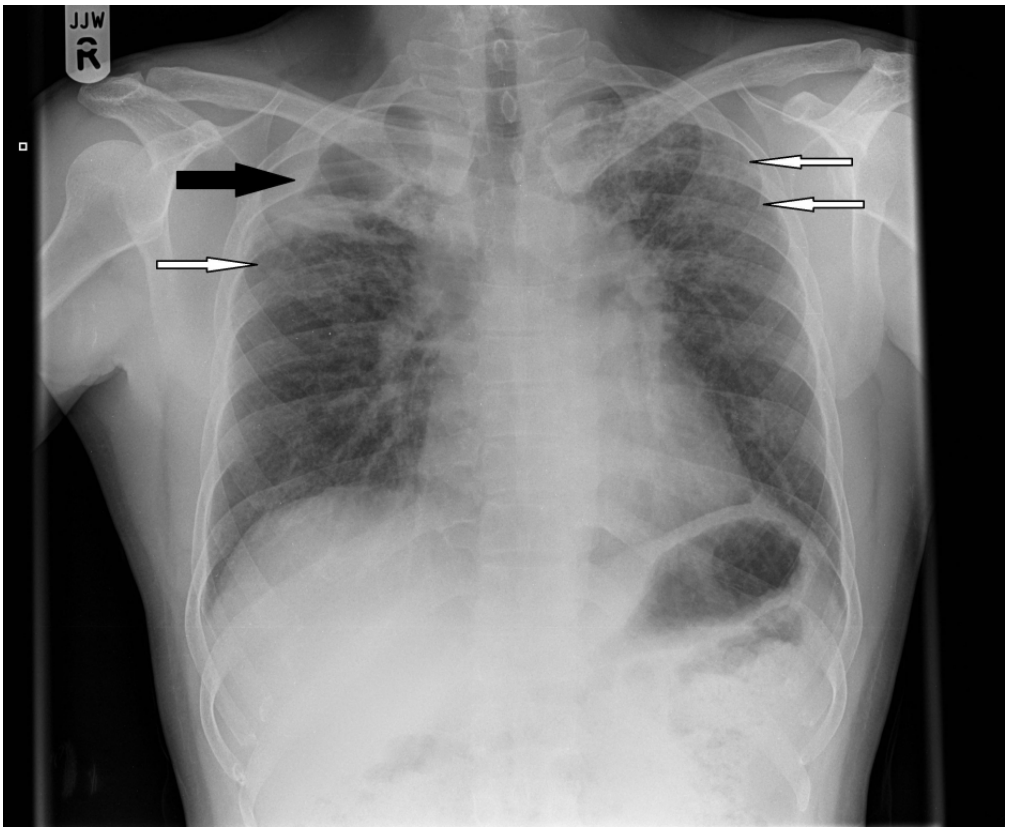
a



Description: CXR showing arterial coils and reduced volume of right apical cavitation. **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

Figure 2

a



Description: Cavitating lesion right lung apex (black arrow) with multiple small lung nodules and loss of volume bi-apically (white arrows).
Subsequently confirmed as an aspergilloma in old tuberculosis cavity. **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

Figure 3

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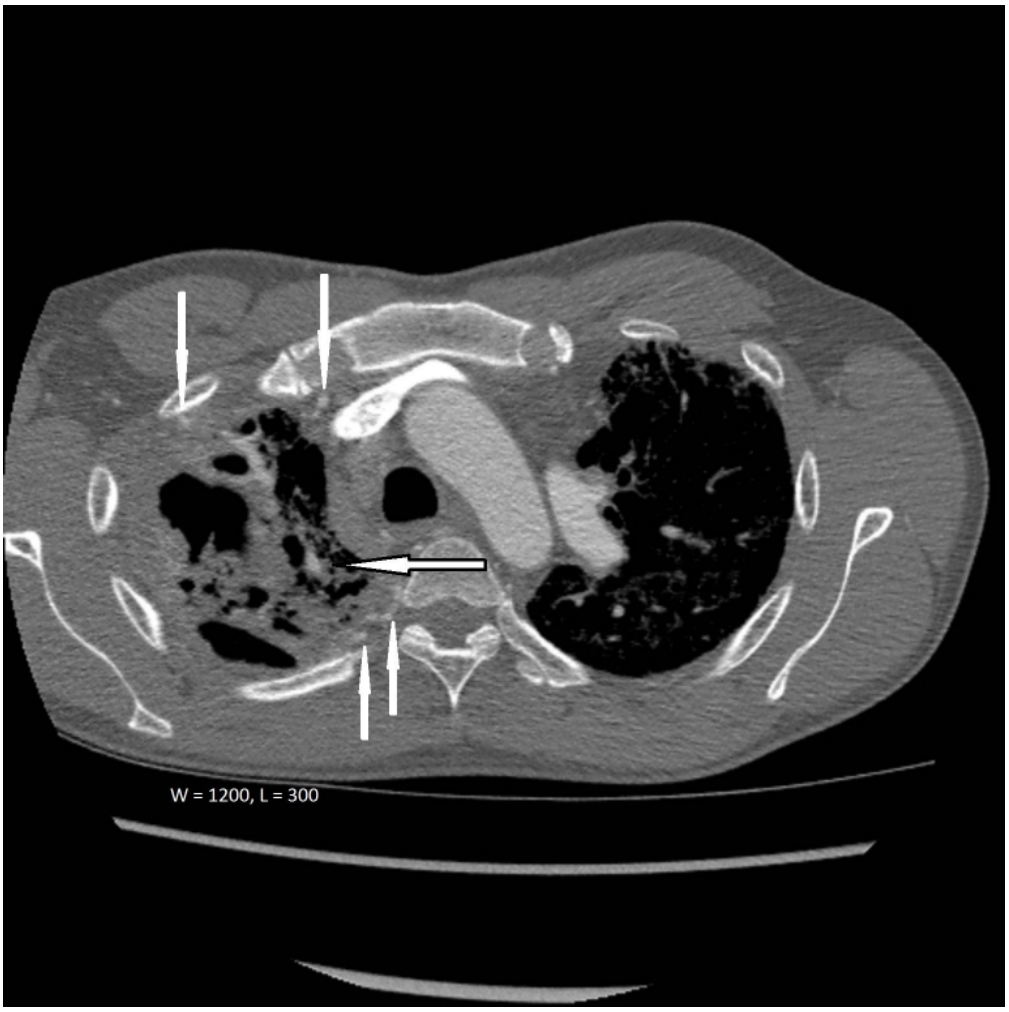
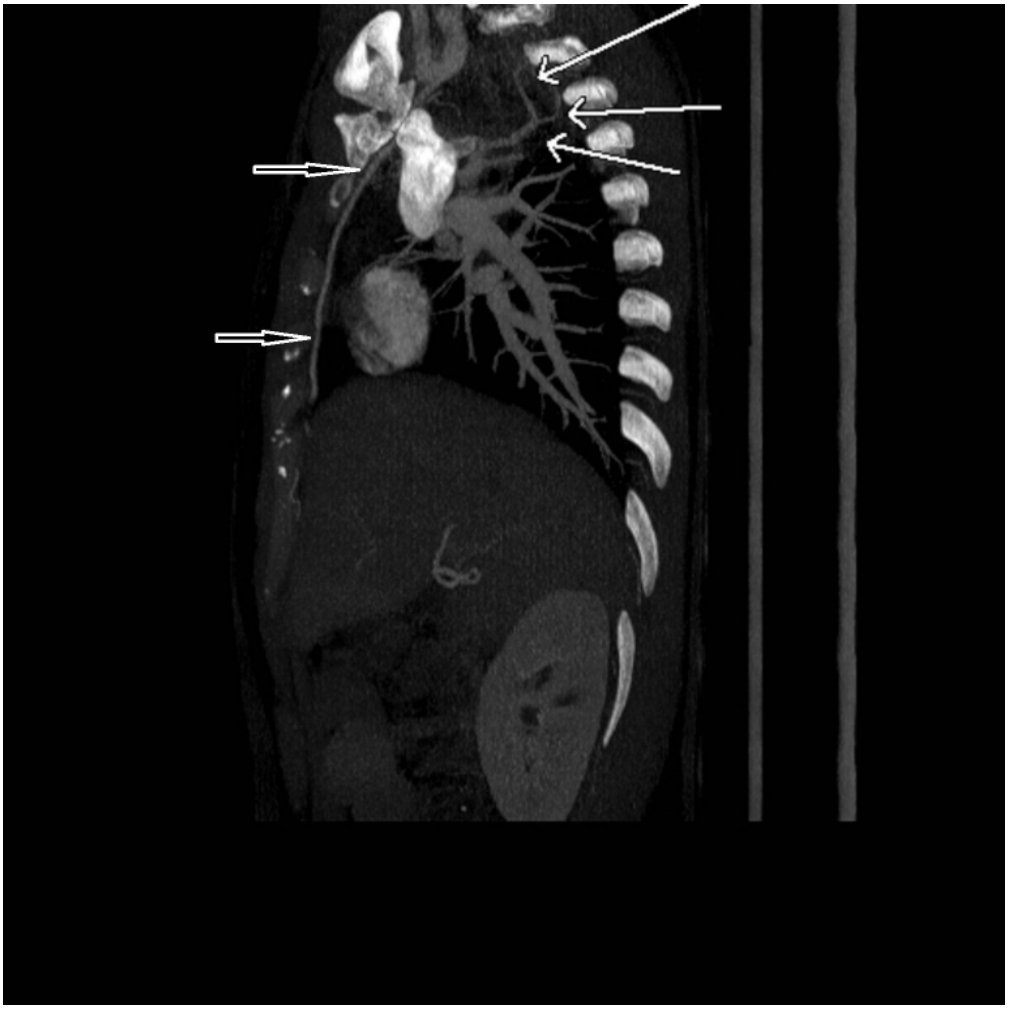


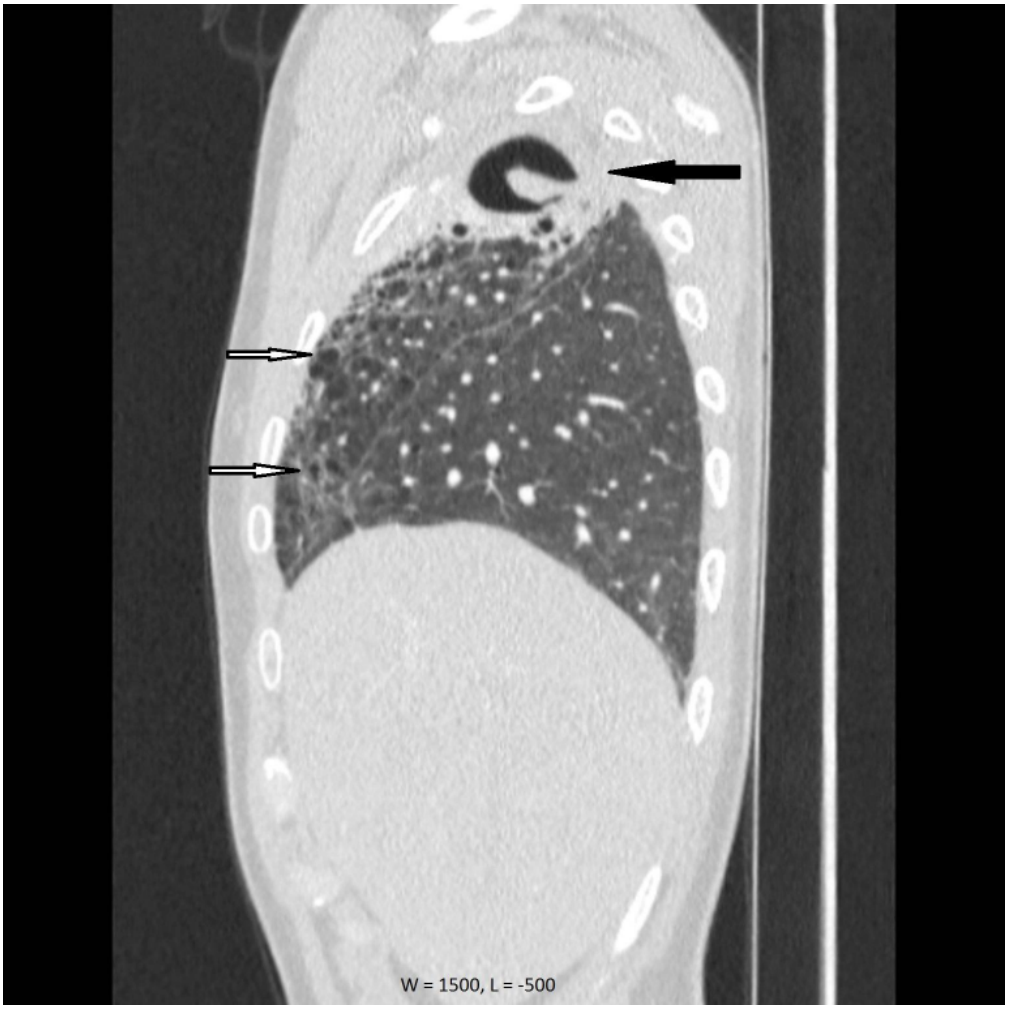
Description: (Axial image, vascular windows).
Hypertrophied right systemic (solid white arrows) and bronchial arteries (white arrow, black border) which can be compared to the normal arterial tree on the left side of the chest. **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

b



Description: (Sagittal plane, MIP image)
Hypertrophied bronchial arteries (thin white arrows) and right internal mammary artery (black arrows, white border). **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

c



Description: (Sagittal plane, lung windows)
Apical mycetoma (solid black arrow), Emphysematous changes (white arrows, black border).**Origin:**
Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

Figure 4

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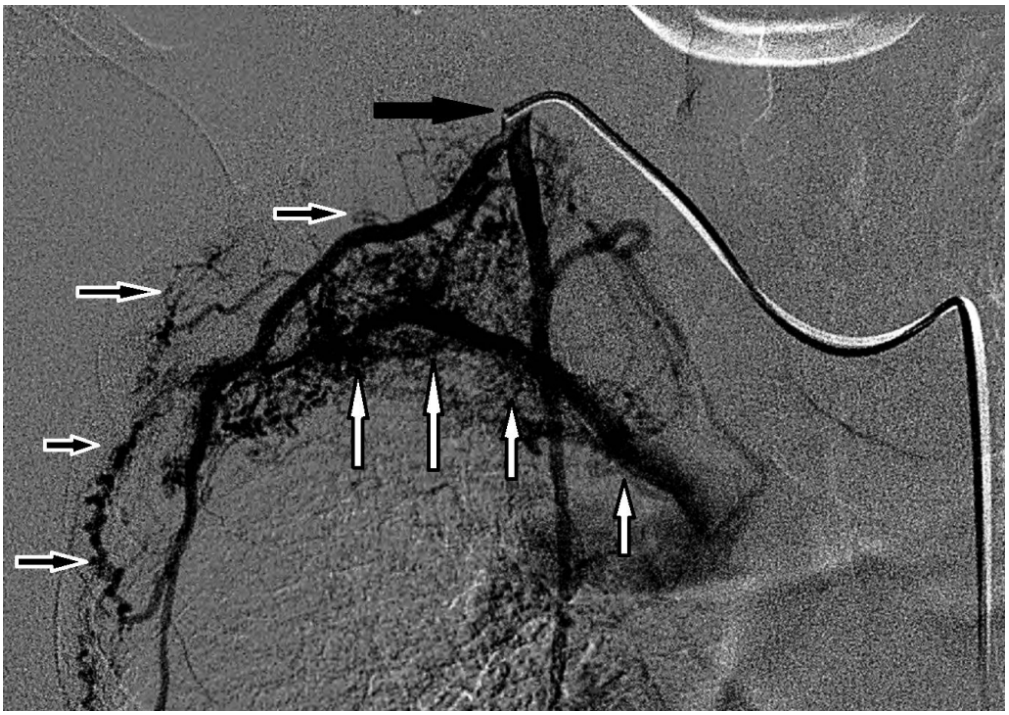
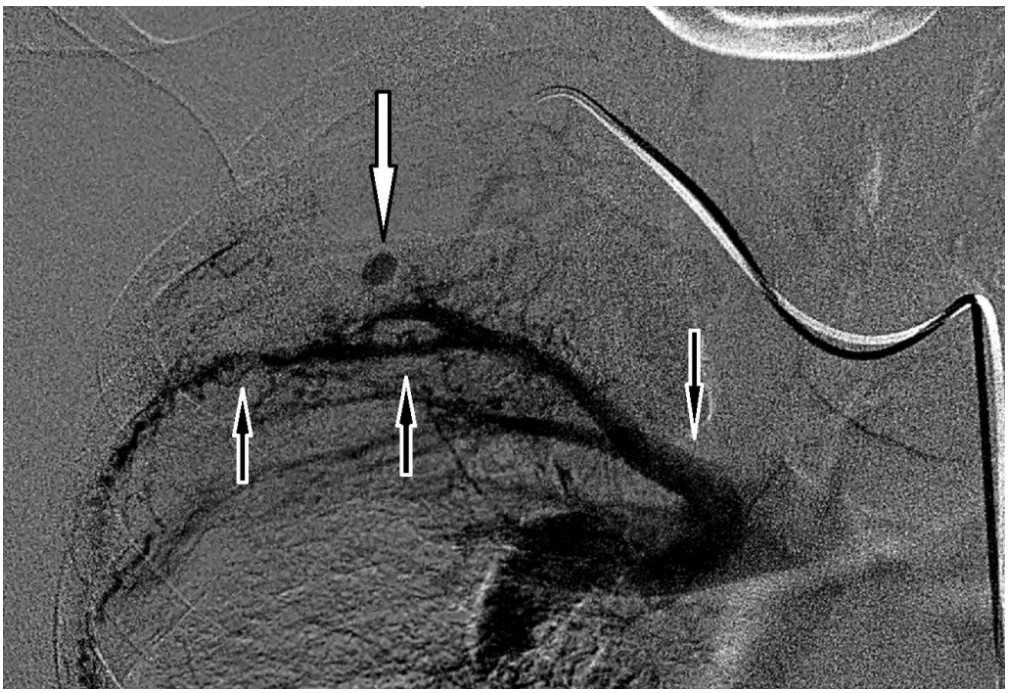


Description: DSA. Catheter in origin of right internal mammary artery (solid black arrow). Angiogram shows hypertrophic, serpiginous systemic arterial branches (black arrow, white border) and rapid shunting into the pulmonary veins (white arrows, black border). **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

b



Description: DSA. Same run, moments later showing venous filling (black arrows, white border) and persistent filling in pseudoaneurysm (white arrow, black border)
[Catheter in origin of right internal mammary artery] **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

Figure 5

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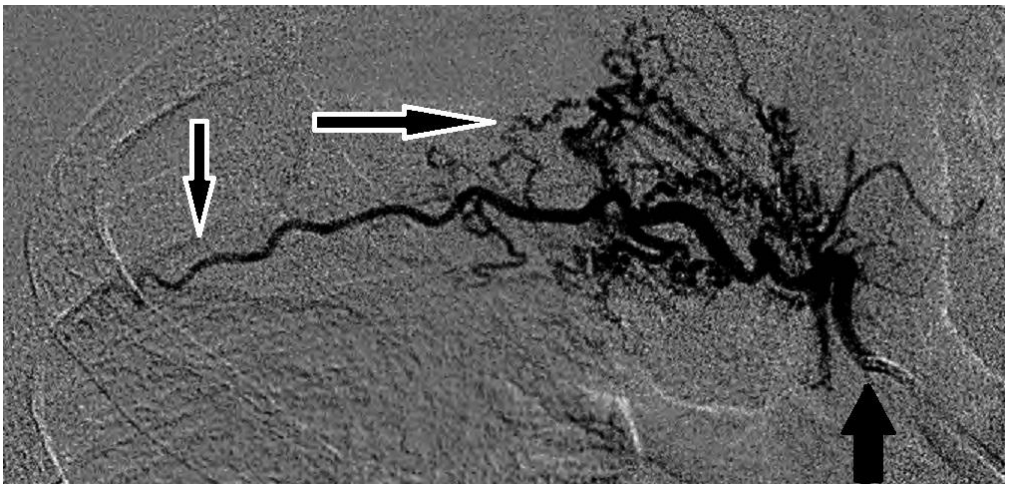
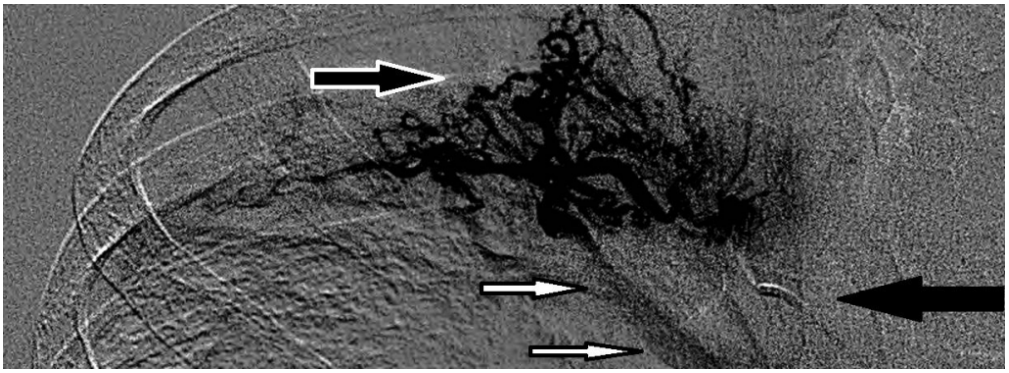


Description: Catheter in origin of intercostal artery (solid black arrow). Demonstrates hypertrophic, serpiginous arteries (black arrow, white border). **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

b



Description: Catheter in origin of intercostal artery (solid black arrow). Demonstrates hypertrophic, serpiginous arteries (black arrow, white border) and rapid shunting into the pulmonary veins (white arrows, black border). **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK

Figure 6

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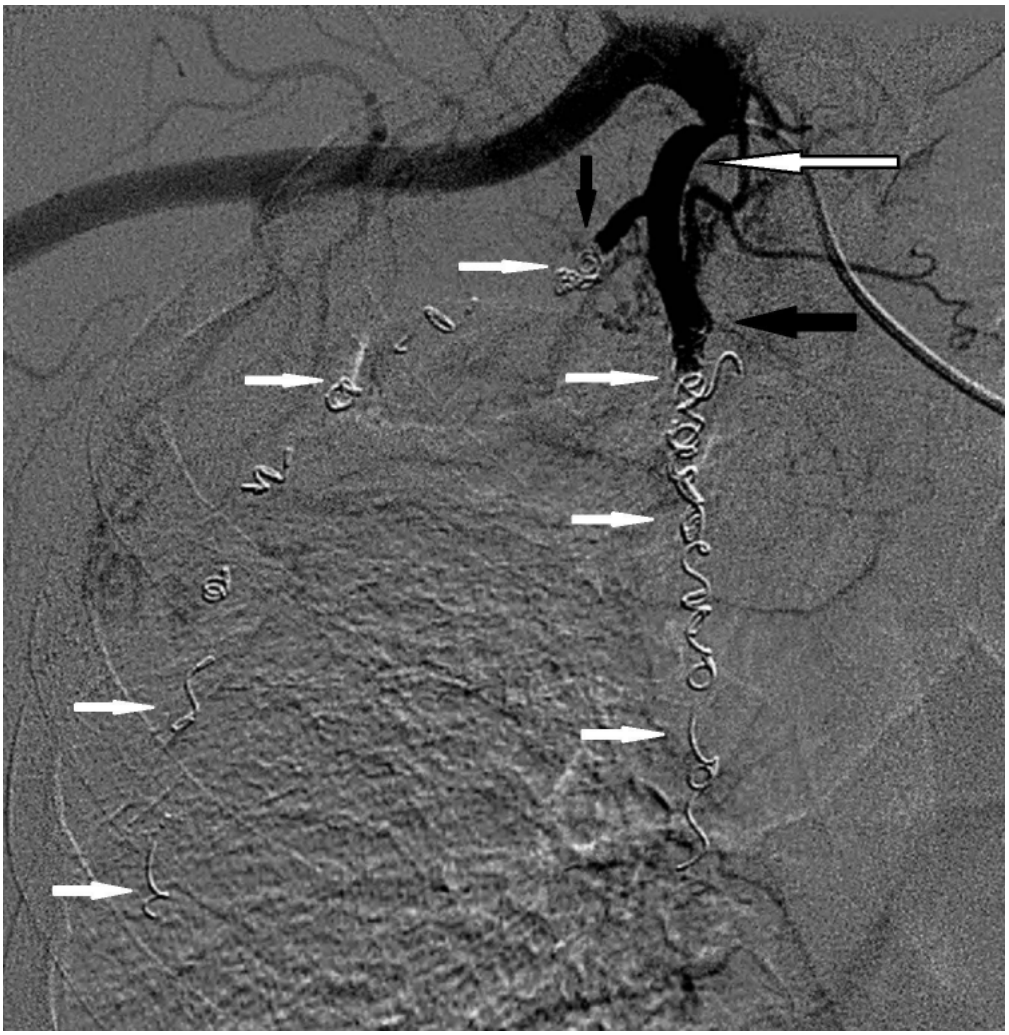

Description: DSA. Catheter in origin of right internal mammary artery (white arrow, black border). Multiple coils along internal mammary arteries (solid white arrows). No flow beyond proximal coils (solid black arrows). **Origin:** Sullivan C, Radiology Dept, Morriston Hospital, ABMU, Swansea UK