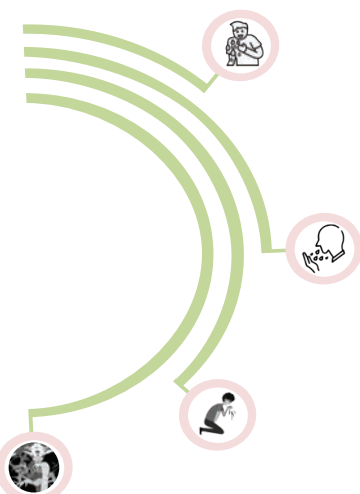




Standard Treatment Workflow (STW)

IMAGE GUIDED MANAGEMENT OF HAEMOPTYSIS

ICD-10-R04.2



INTRODUCTION

- Haemoptysis refers to the expectoration of blood, originating from the lower respiratory tract
- LTH - Any haemoptysis that**
 - (1) is > 100 ml in 24 hr
 - (2) causes respiratory failure (SpO₂ < 60%) necessitating intubation and mechanical ventilation; or
 - (3) causes haemodynamic instability
- LTH is a respiratory emergency, mortality→50 -100%
- Patient dies because of asphyxiation and not exsanguination
- Optimal diagnosis and treatment→mortality < 20%

ETIOLOGY AND SOURCE OF HAEMOPTYSIS

Pulmonary parenchymal source (65 - 79%)

- Tubercular Pneumonia
- Lung abscess
- Mycetoma ("fungus ball")

Tracheobronchial source (31-57%)

- Bronchiectasis
- Neoplasm

Primary vascular source (1-5%)

- Arteriovenous malformation

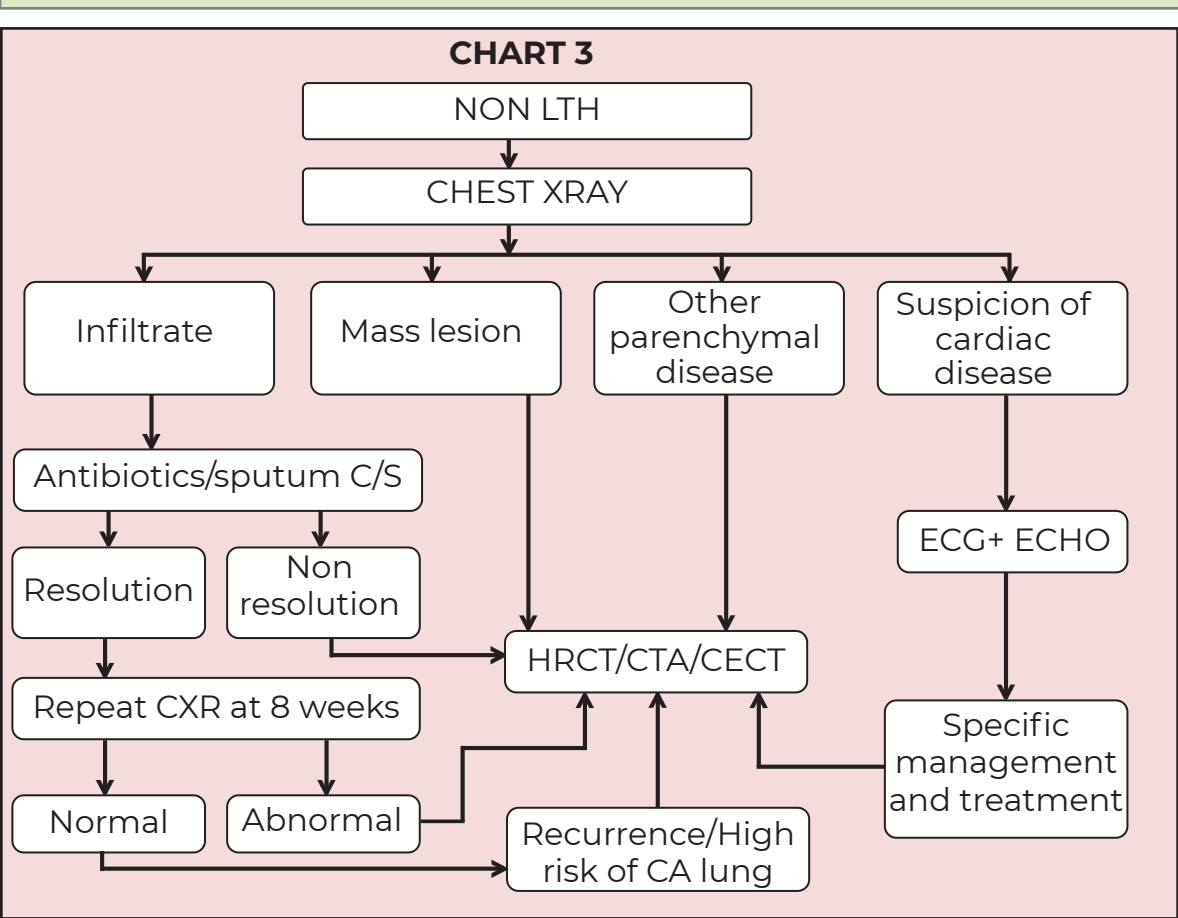
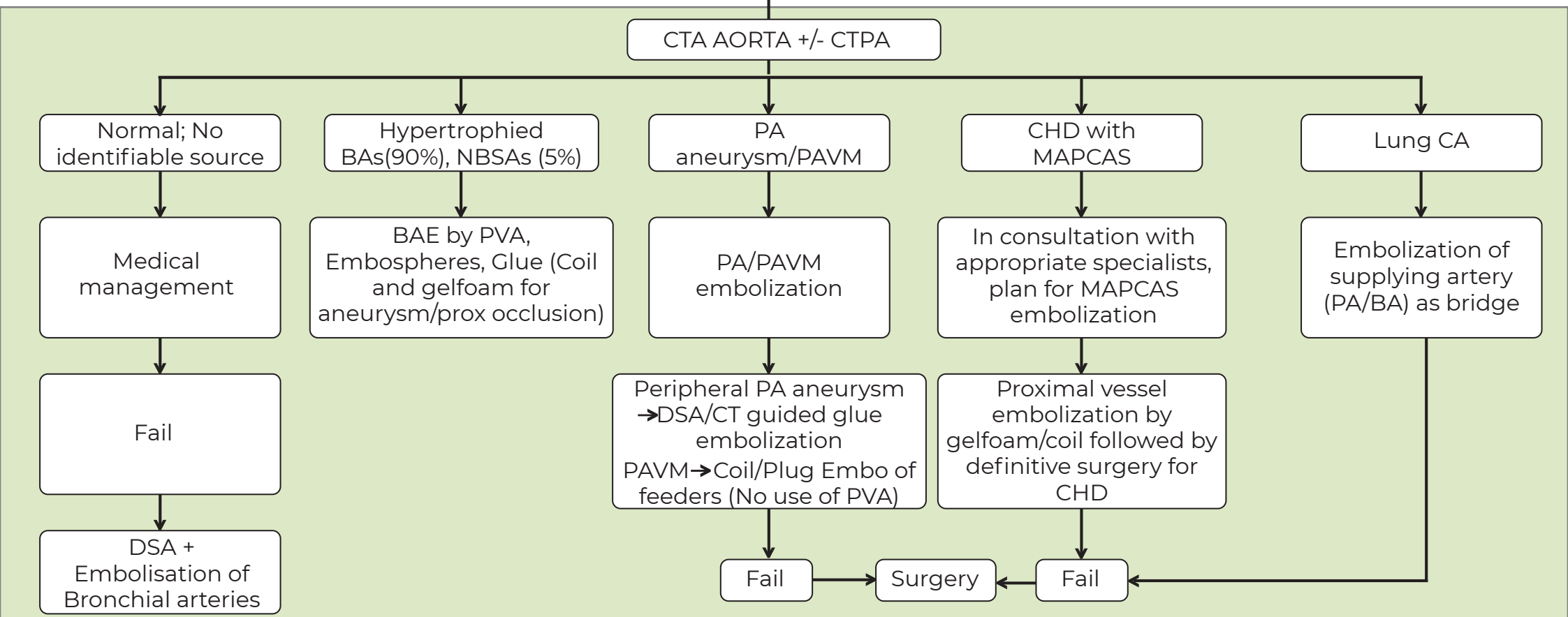
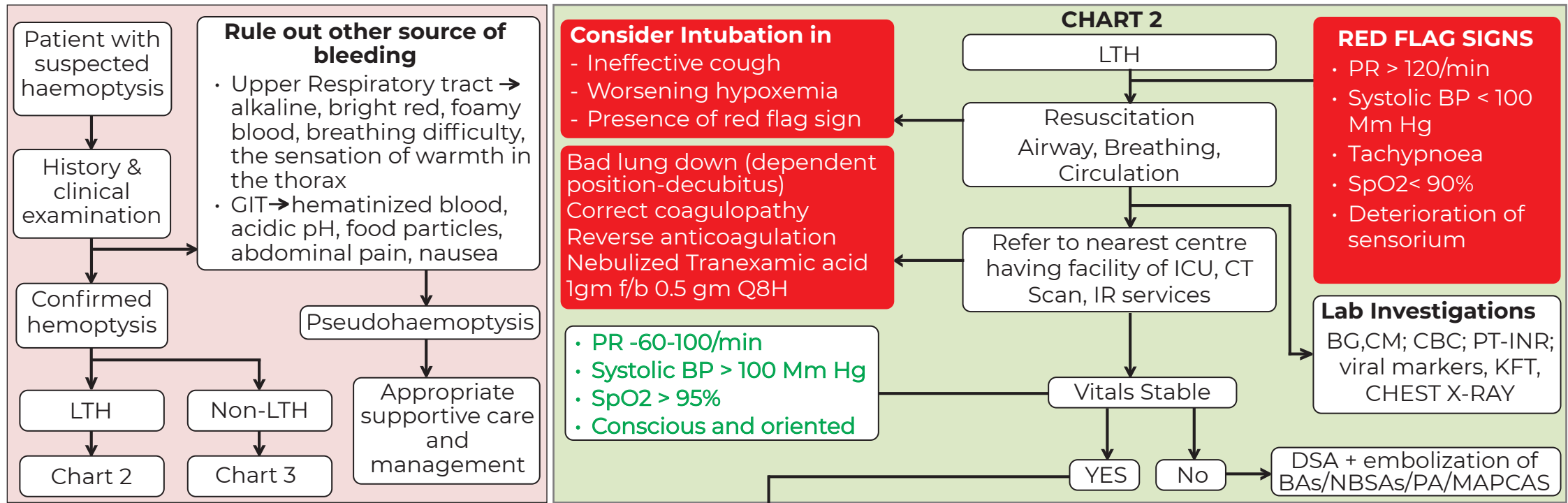
- Pulmonary embolism
- Pulmonary artery aneurysm/rupture

Cardiac source (1-5%)

- Mitral Stenosis
- Pulmonary Edema
- CHD with MAPCAS

Miscellaneous and rare causes

- Systemic coagulopathy or thrombolytic agents



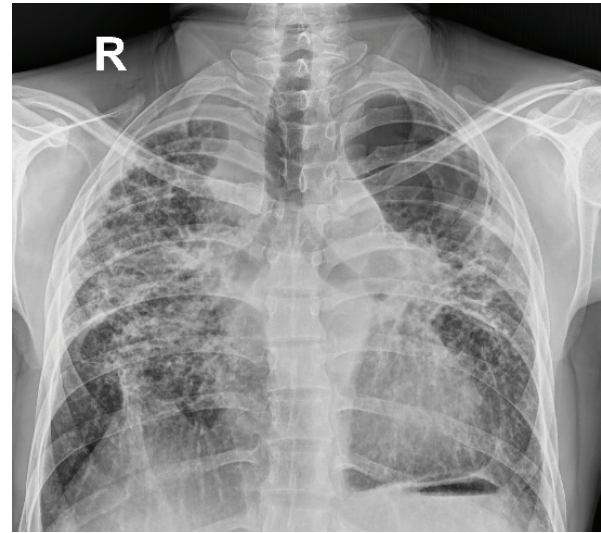
ROLE OF BRONCHOSCOPY

Bronchoscopy may be used for

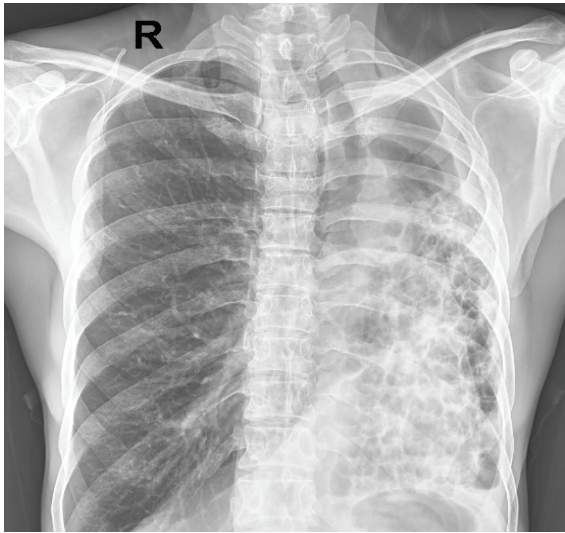
- Lateralization of bleeding (active haemoptysis within 24-48 hrs)
- Clot extraction
- Balloon tamponade

SURGERY FOR SEVERE/REFRACTORY HAEMOPTYSIS

- Cavitating lesion with fungal ball
- In unsuitable anatomy/not amenable for angioembolization/unsuccessful embolization
- > 600 ml/24 hours
- Surgeries: Lobectomy, Pneumonectomy, Cavernostomy
- Large cavity in a patient with very poor pulmonary functions and massive bleeding → Resection and a cavernostomy with cauterization of the bleeding point and packing of the cavity



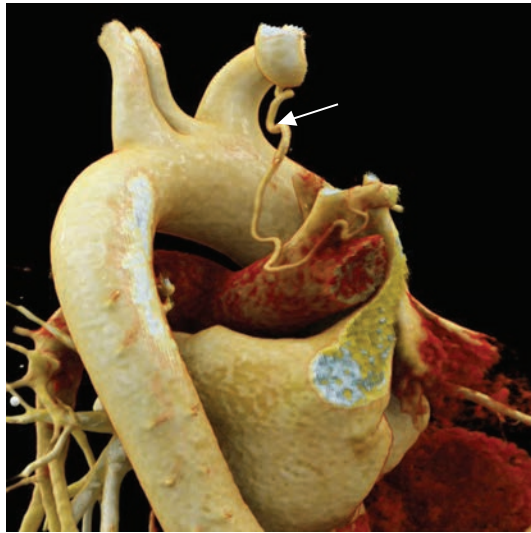
Fibrocalcific lesion




L side-Bronchiectasis



Hypertrophied Bronchial artery in MDCT, MIP and VRT




July/ 2024




सत्यमेव जयते

Department of Health Research

Ministry of Health and Family Welfare, Government of India



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ANGIOGRAPHIC AND CT APPEARANCE OF ABNORMAL BRONCHIAL ARTERIES-INDICATIONS FOR BAE

1. Hypervascularity of lung parenchyma (most common)

2. Hypertrophic tortuous bronchial or non-bronchial arteries (common)

3. Neovascularisation (common) or peri-bronchial hypervascularity

4. Enlarged main bronchial artery (diameter > 2.0 mm)

5. Contrast extravasation (variable)

6. Bronchial-artery aneurysm, pseudoaneurysm (rare)

7. Bronchial-to-pulmonary vein-shunts

8. Pleural thickening > 3 mm adjacent to a parenchymal abnormality

9. Extrapleural fat hypertrophy including enlarged vascular structures

10. 10% of BA may arise from Brachiocephalic, SCA, IMA or abdominal aorta branches

CONTRAINDICATIONS FOR BRONCHIAL ARTERY EMBOLIZATION

• Documented severe iodinated contrast allergy

• Careful to exclude branches supplying the heart, spinal cord or brain arising from bronchial, intercostal or other non-bronchial vessels

• Congenital PA stenosis (bronchial collateral vessels may provide an essential role in pulmonary parenchymal perfusion)

PROCEDURE DETAILS OF BAE

Pre op CTA/Flush DTA and B/L SCA Aortogram

↓

Locate Hypertrophied BAs, search and hook with diagnostic cobra/simmons catheter

↓

Selective hand-injection angiogram→verification of absence of any branches supplying to critical structures

↓

Advance coaxial microcatheter in target vessel distally and access flow dynamics by angiogram through 2CC luer lock syringe

↓

Embolization by pulsatile injection through 1 cc syringe under active fluoroscopy

↓

When resistance/reflux develops, new manual contrast angiogram to be done after flushing residual embolic materials

↓

Locate other BAs and NBSAs and embolise all pathological arteries

EXPECTED OUTCOMES

• **Technical success: 90-100%**

• **Clinical success**

- Within 24 hr- 82-100%; within 30 days-70-92%;
- 1-yr clinical success- 64-92 %
- Recurrence: upto 47% [Repeat Embolization to be performed]

• **Predictors of recurrent Haemoptysis are as follows:**

- Recruitment of non-bronchial systemic collaterals
- Diabetes
- Presence of an aspergilloma
- Feeding vessels from internal mammary artery
- Multidrug-resistant tuberculosis, co-existent pulmonary interstitial lung disease, patients with malignant diseases
- Unstable haemodynamics and prolonged coagulation

• **Associated adverse events/complications**

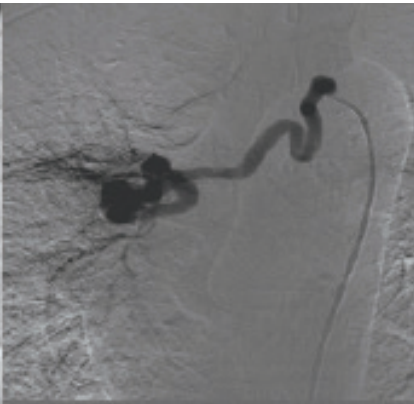
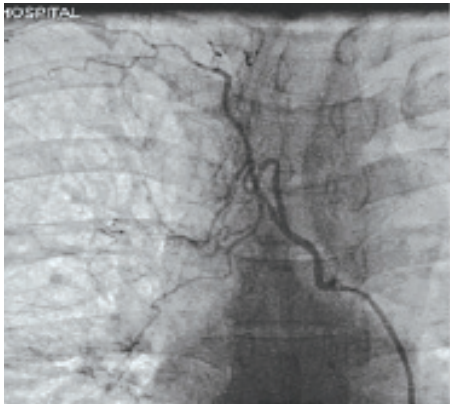
- Post embolization syndrome-1.7-31%
- Spinal cord Infarction, bronchial infarction,stroke <1%

• **After care**

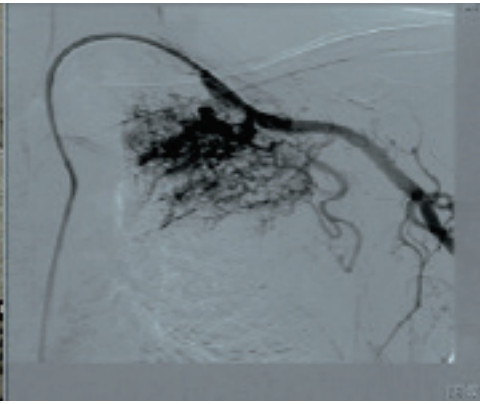
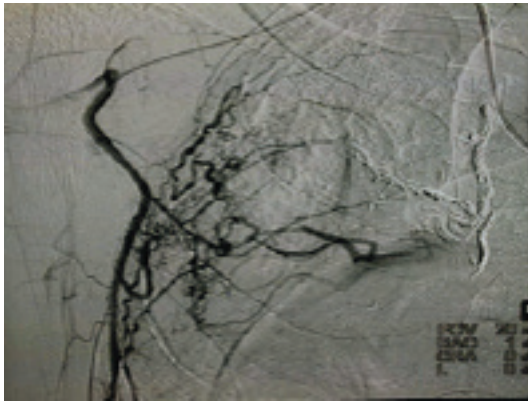
- Pain management: NSAIDS and if required intravenous Narcotics

• **Follow up:**

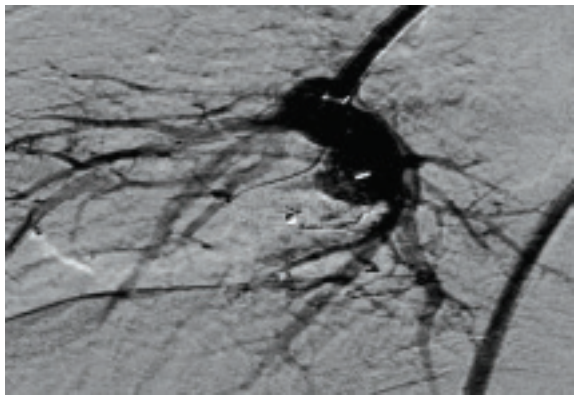
- After 1 week; 1, 3, 6, and 12months post-BAE and yearly thereafter
- Hb
- Chest Xray



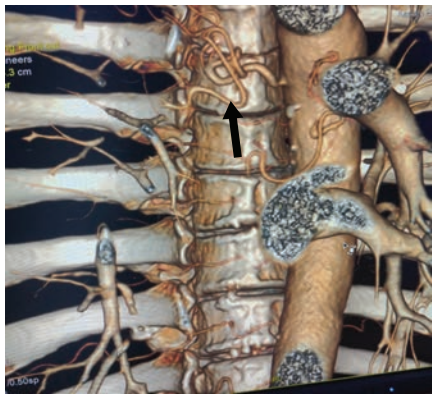
Hypertrophied Bronchial arteries



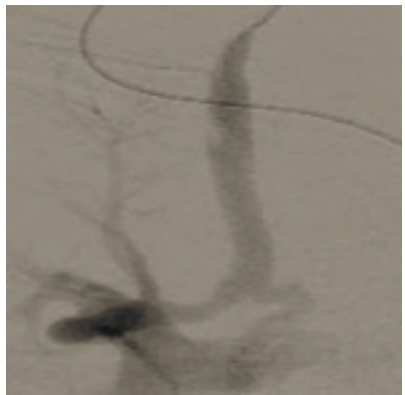
Non bronchial Systemic Artery



Plug Deploy in PAVM



Hypertrophied Bronchial artery in MDCT, MIP and VRT



MAPCAS

ABBREVIATIONS

BA:

Bronchial Artery

BG:

Blood Grouping

CBC:

Complete Blood Count

CE:

Clinical Examination

CHD:

Congenital Heart Disease

CM:

Cross Matching

CTA:

Computed Tomogram Angio

CTPA:

CT Pulmonary Angio

DSA:

Digital Subtraction Angio

ECG:

Electrocardiogram

ECHO:

Echocardiography

FB:

Flexible Bronchoscopy

GA:

General Anaesthesia

HB:

Hemoglobin

ICU:

Intensive Care Unit

IMA:

Internal Mammary Artery

IR:

Interventional Radiology

LTH:

Life threatening Haemoptysis

MAPCAS:

Major Aorto-Pul Collaterals

MDCT:

Multi Detector CT

MIP:

Maximum Intensity Projection

MS:

Mitral Stenosis

NBSA:

Non Bronchial Systemic Artery

OT:

Operation Theatre

PA:

Pulmonary Artery

PAVM:

Pulmonary Arteriovenous Malformation

PT:

Prothrombin Time

PVA:

Poly vinyl Alcohol

KFT:

Kidney Function Test

SCA:

Subclavian Artery

VRT:

Virtual Reality Technology

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