

Asthma with X-Ray findings



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Patient History

- **12 year old healthy Jewish female**
- **No family asthma**
- **Occasional inhalations**
 - **bronchodilators / steroids**
 - **seasonal**
- **Without long-term maintenance therapy**

Emergency Room

Sept 2011

- **Shortness of breath → ER**
- **Saturation 94% RA**
- **Auscultation: prolonged expirium**
- **Inhalations: bronchodilators / steroids**
- **Improvement – discharge (“Asthma Exacerbation”)**

- **After 24 hours: shortness of breath → ER**
- **Saturation 93% RA**
- **Auscultation: prolonged expirium**
- **Inhalations: bronchodilators / steroids**
- **Oral steroids – improvement – discharge**

Emergency Room

Sept 2011

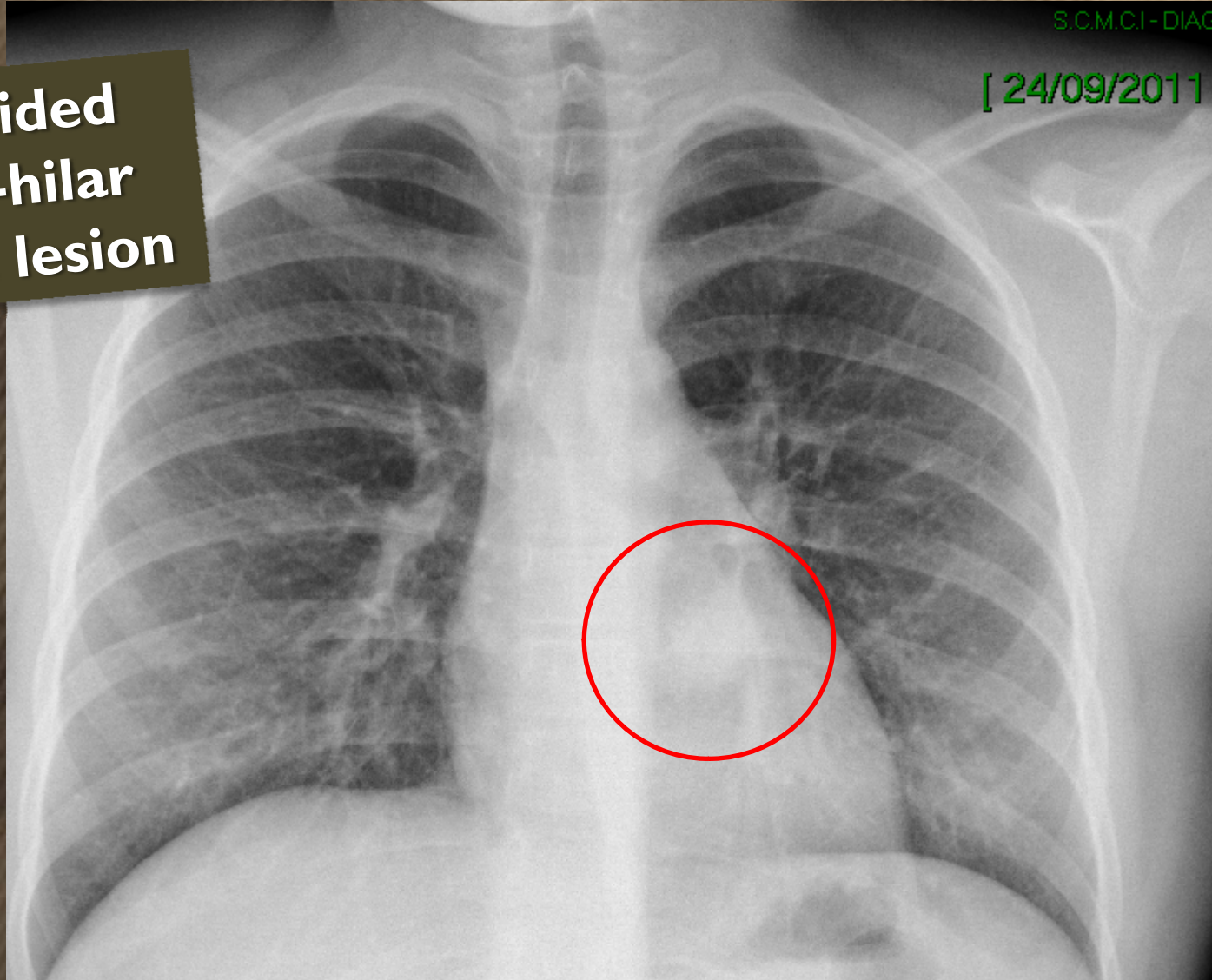
- After 12 hours
- Shortness of breath + tachypnea → ER
- Saturation 91% RA
- pH=7.47 / pCO₂=26 / HCO₃=19 / BE=-4
- WBC=11000 (neut=82%)
- Hgb=15.8
- Chest X-Ray

ER Chest X-Ray

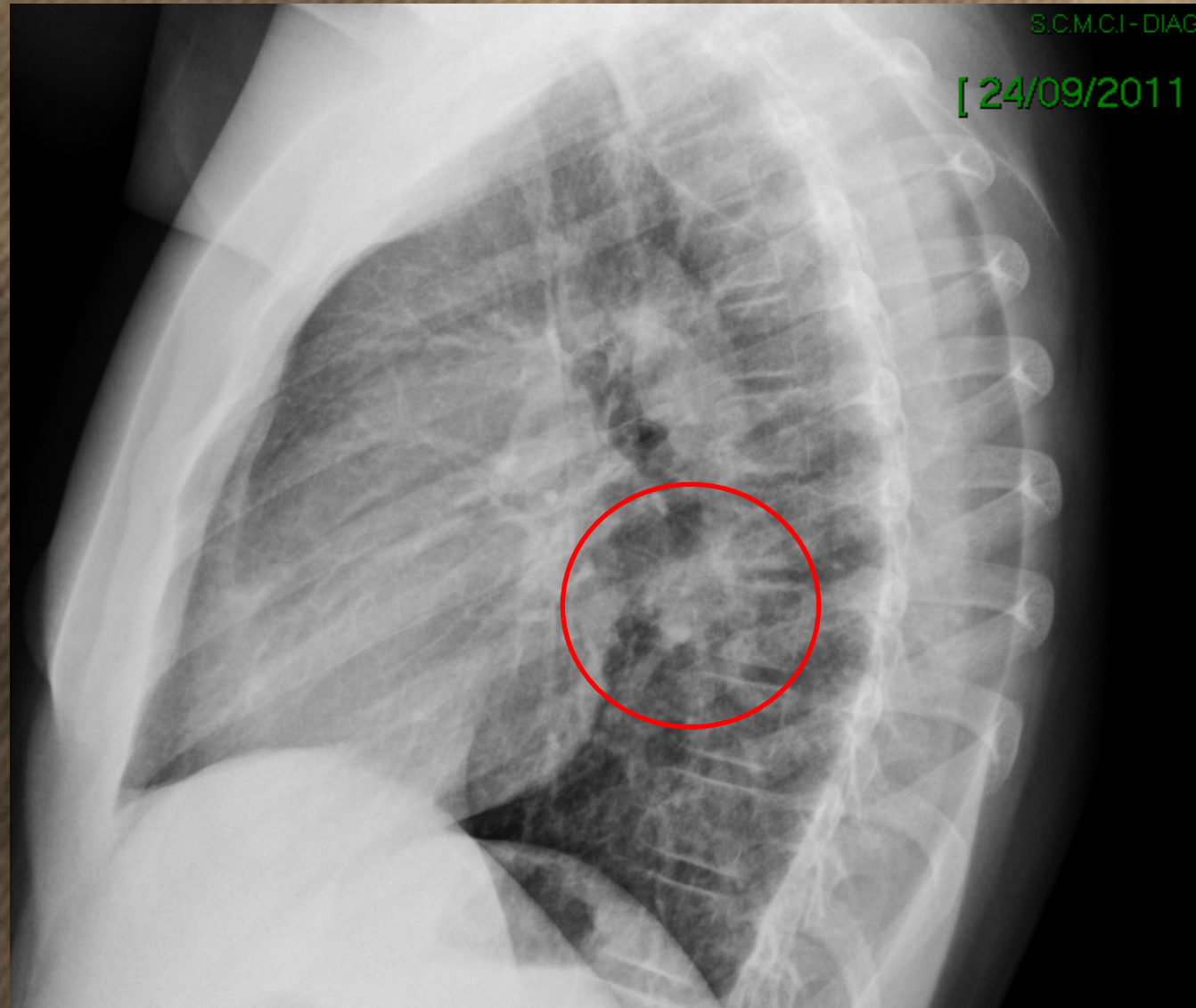
**left sided
infra-hilar
round lesion**

S.C.M.C.I - DIAG

[24/09/2011



ER Chest X-Ray

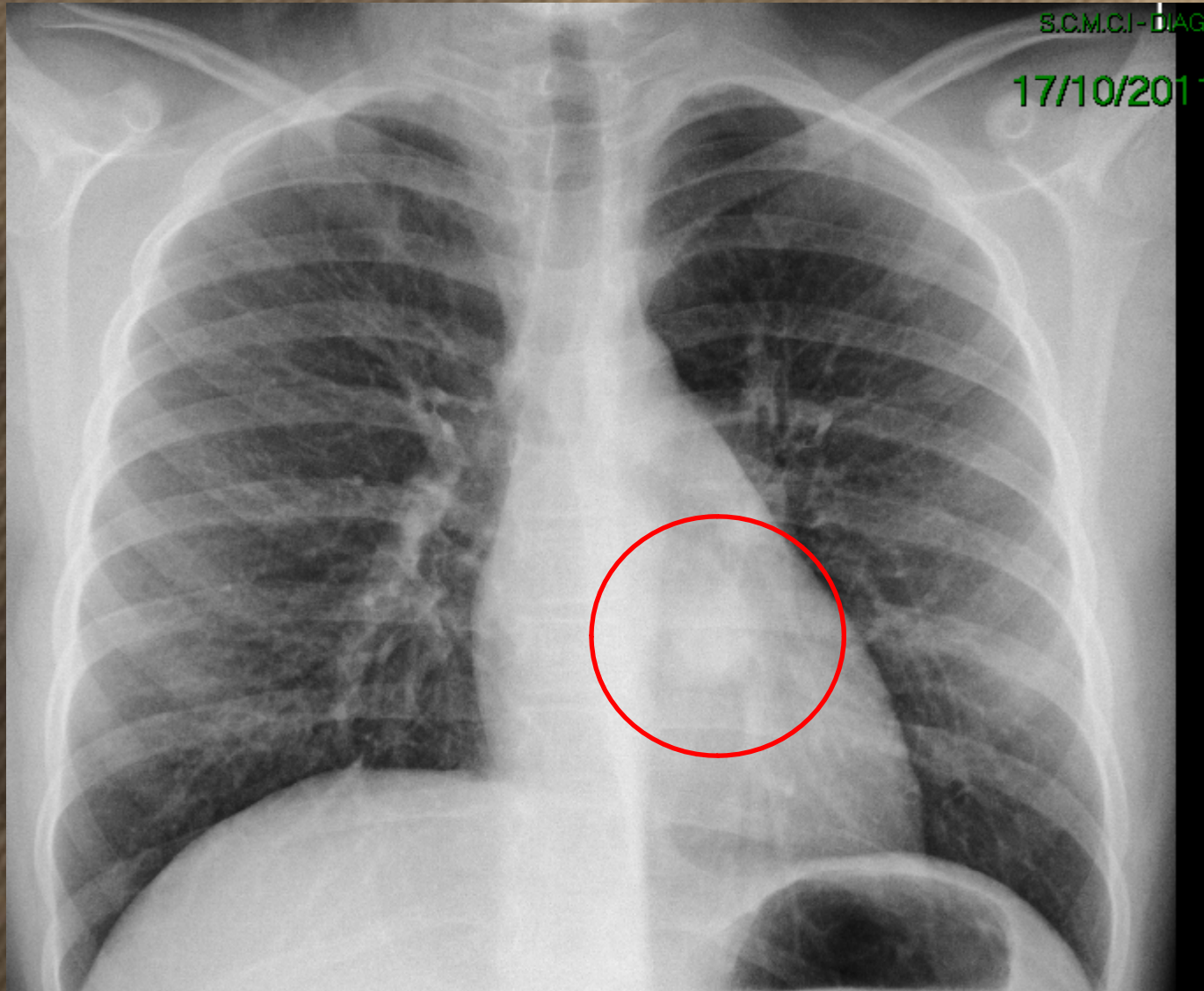


Hospitalization

- **“Asthma exacerbation”**
 - bronchodilators (Bricalin)
 - systemic steroids (Prednisone)
- **Chest X-Ray infiltrate**
 - no fever – no antibiotics
- **Dyspnea resolved**
- **Hypoxemia resolved** (normal saturation)
- **Discharge**
- **Follow-up – persistent lesion on CXR**

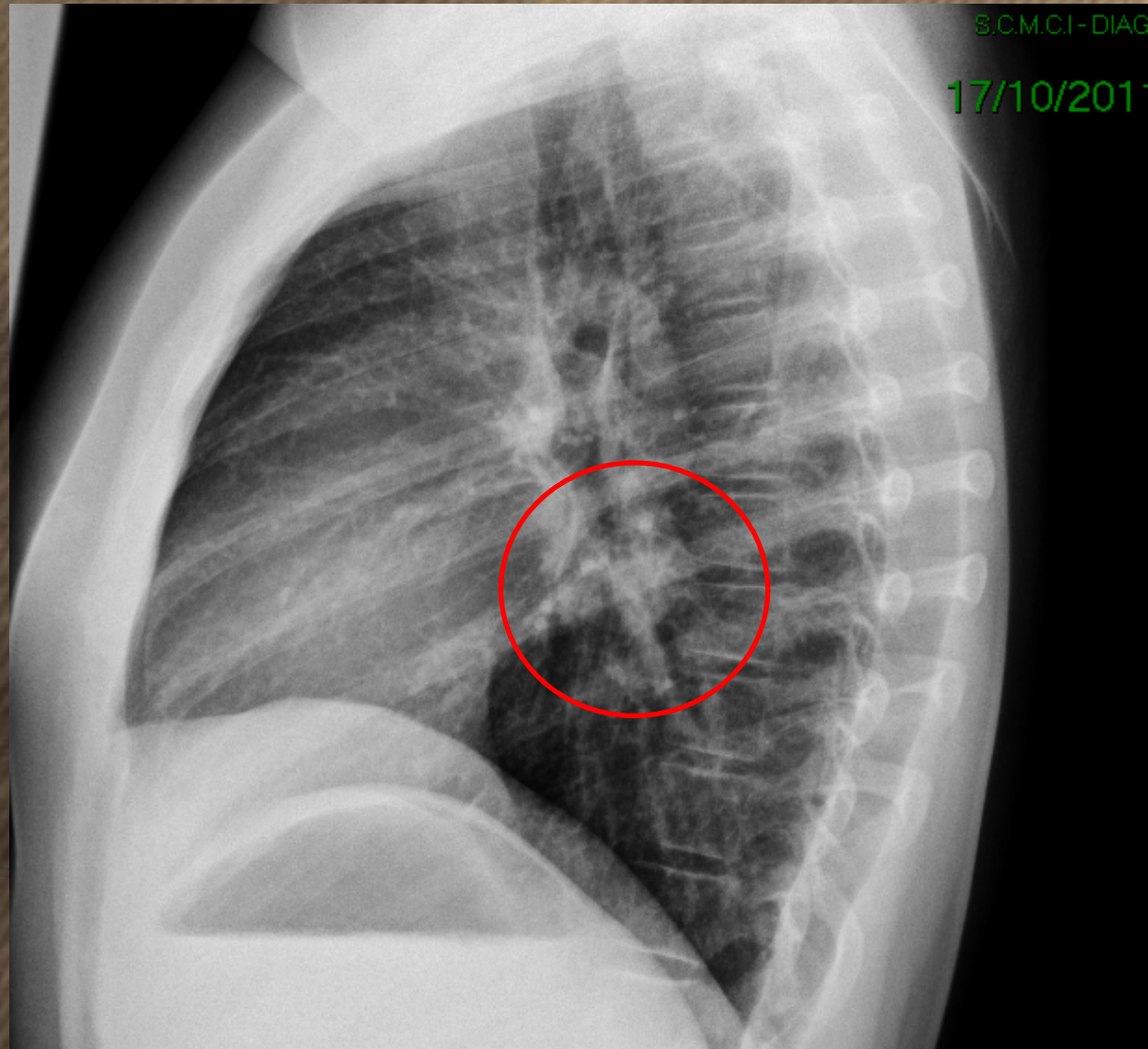
Follow-up

After 2 weeks



Follow-up

After 2 weeks



Lung Function Tests

- **Spirometry**

FVC

Pre-BD

92%

Post-BD

87%

FEV₁

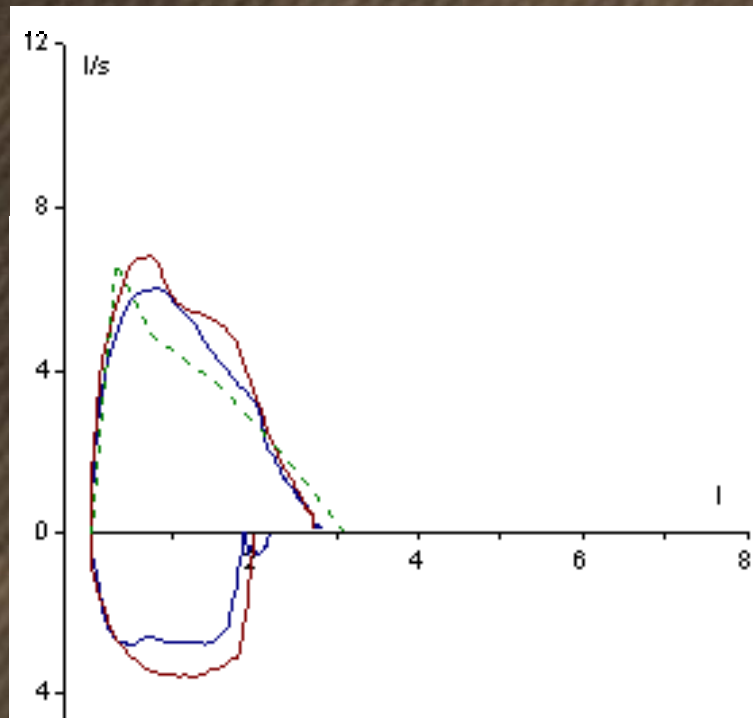
92%

92%

MEF₂₅₋₇₅

131%

153%



FeNO=8 (<20 ppb)

Saturation **88% RA**

Pulmonology Institute

- **Physical examination**
 - lungs clear, no wheezing
 - desaturation ~90% but no dyspnea
- **What would you do next?**
- **Give oxygen!**
- **Saturation ~94% (with 100% O₂)**
- **What next?**
- **Standing vs lying saturation**

• standing erect	91%
• lying supine	96%

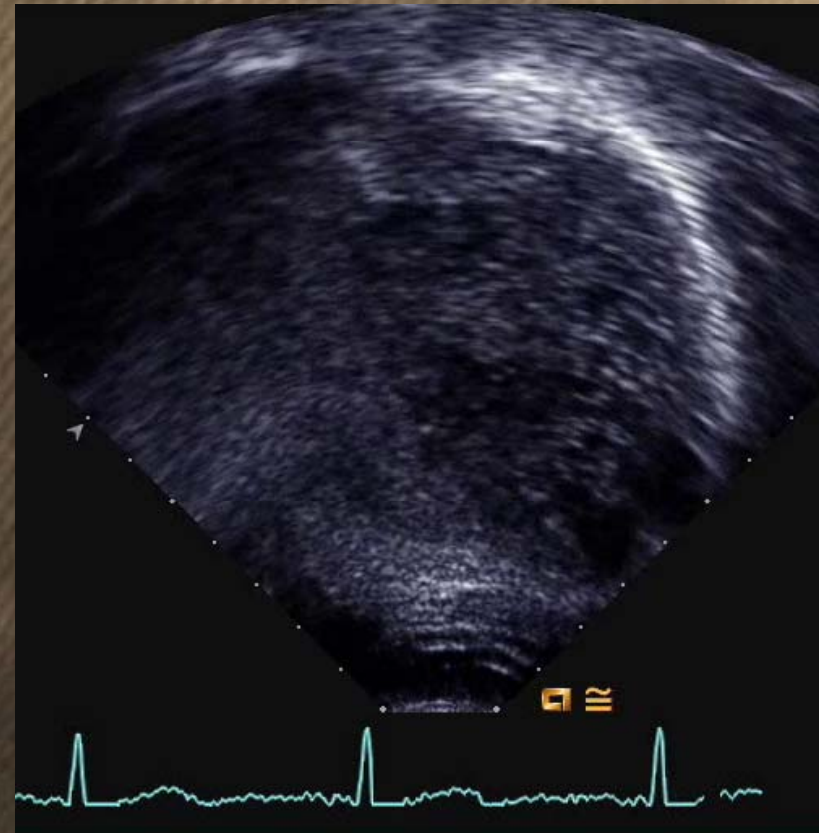
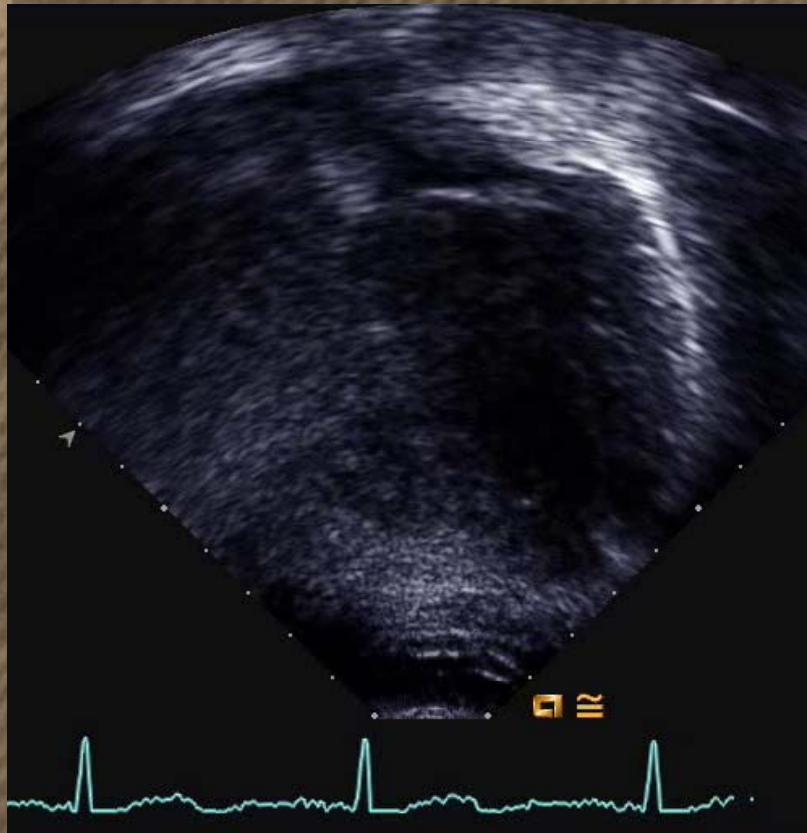
Orthodeoxia

What next?

Bubble Echo-Cardiography

- **Intra-Venous** rapid injection of “agitated” saline
- **Observe left heart**
- **Normal**
 - pulmonary capillaries filter micro-bubbles
- **Cardiac shunt**
 - immediate bubble transition (R→L)
- **Intra-pulmonary shunt**
 - bubbles in L heart 3-4 beats after R

Bubble Echo-Cardiography



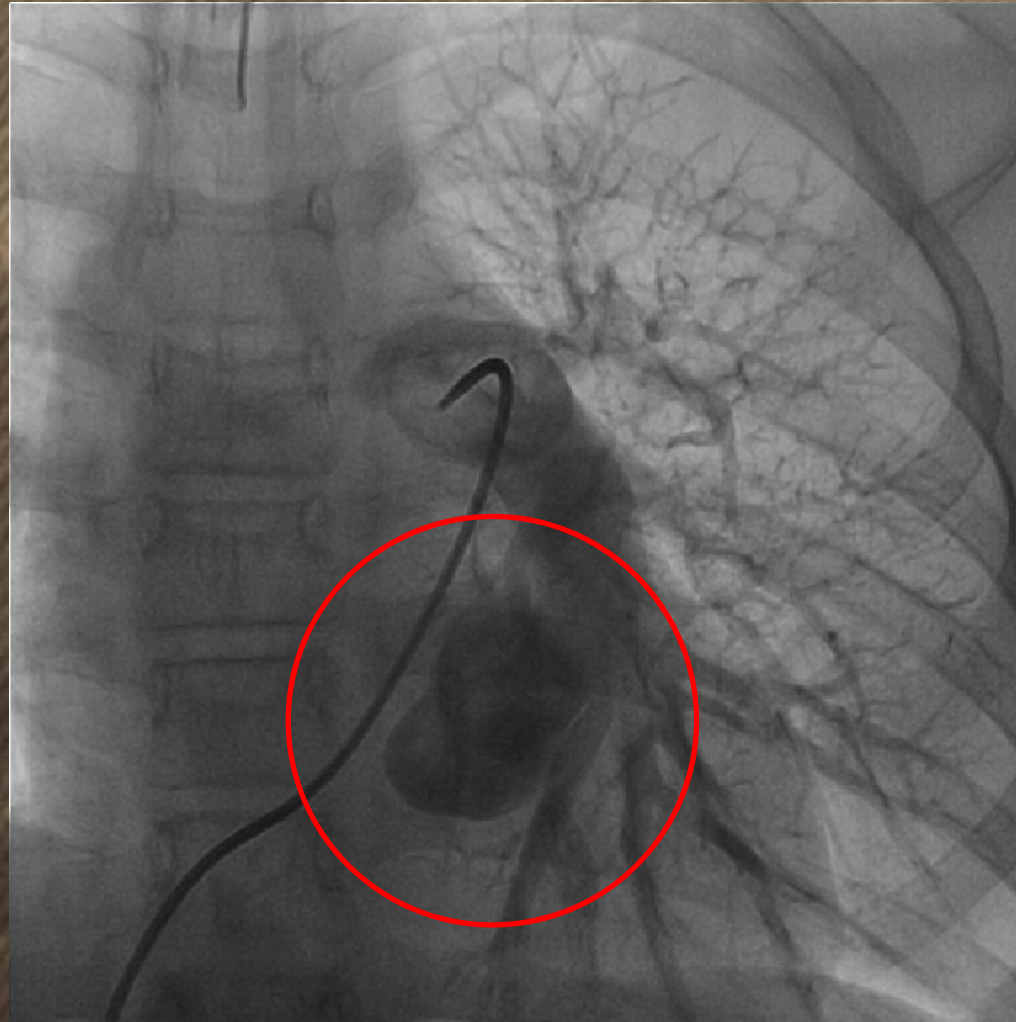
Catheterization

Right

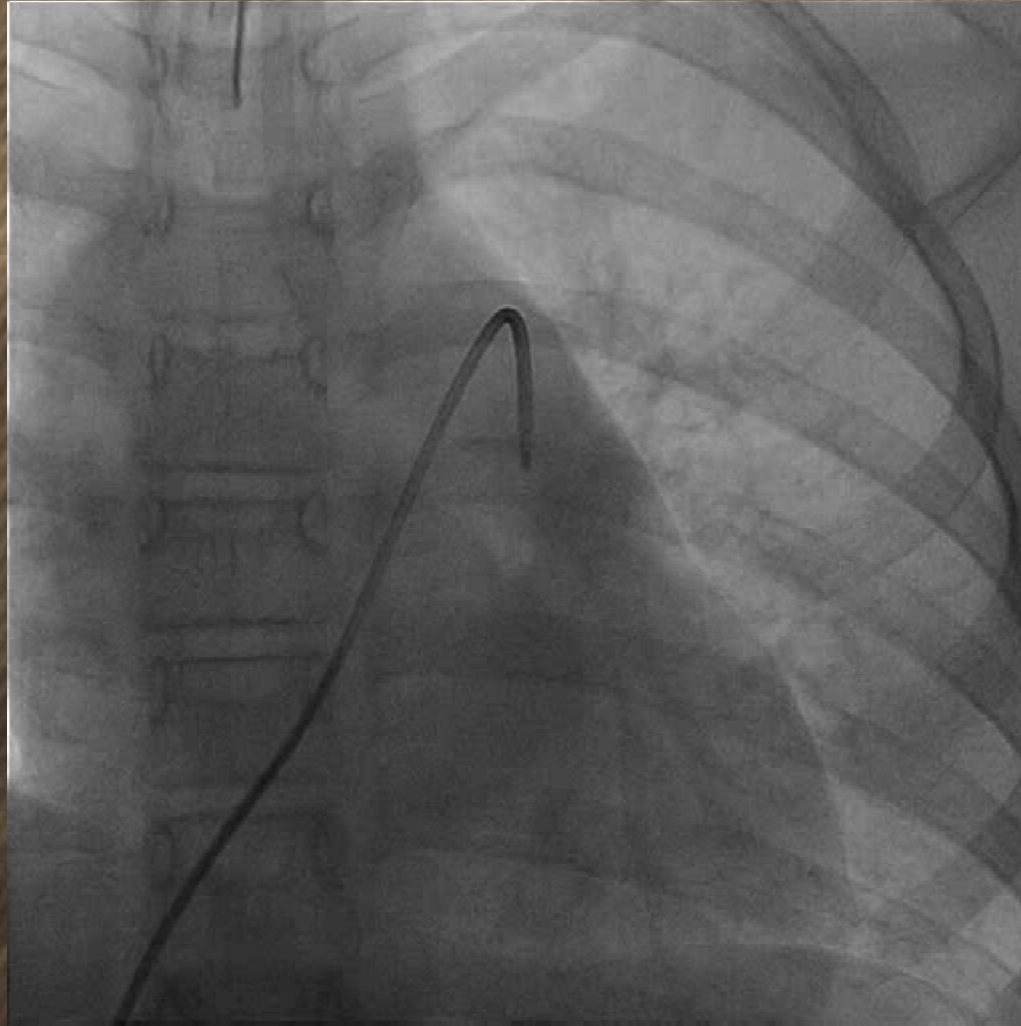


Catheterization

Left



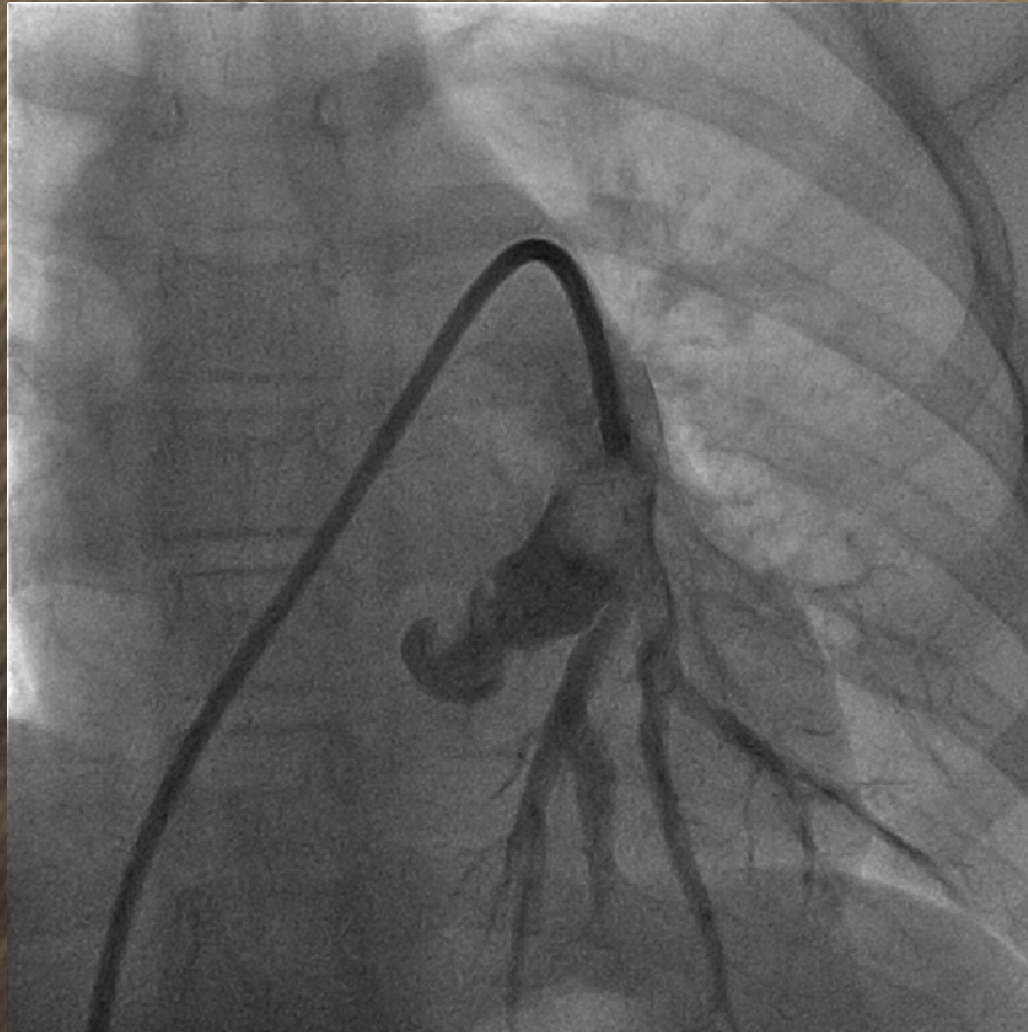
Catheterization



Catheterization

**Post-
Closure**

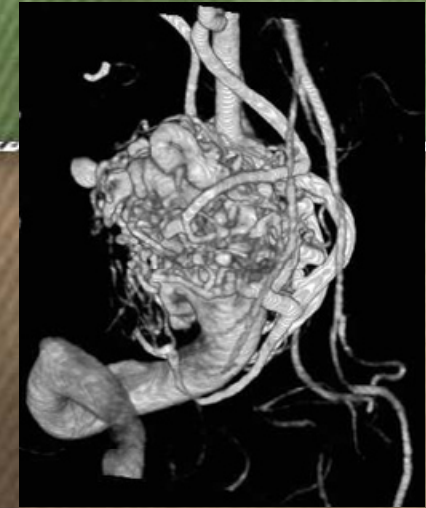
**Room air
saturation
~97%**



Pulmonary AVM

Background

- **Abnormal artery-vein communication**
 - **plexiform dilated vessel mass**
 - **direct A-V anastomosis**
- **Congenital** – most common
(TGF β signaling during vascular development)
- **Uncommon** (Mayo Clinic: 194 PAVM cases ~45 yrs)
- **Women ~ Men**



Gossage JR. Pulmonary arteriovenous malformations. AJRCCMed. 1998 Aug;158(2)

VanGent M. Real prevalence of pulmonary R-L shunt according to genotype in patients with HHT. Chest. 2010 Oct;138(4)

Pulmonary AVM

Clinical

- **Dyspnea** (most common, ~50%)
- **Hemoptysis**
- **Platypnea** (upright dyspnea, recumbent relief)
- **Orthodeoxia** (saturation↓ supine→upright)
- **Exercise tolerance**↓
- **Physical findings**
 - cyanosis
 - digital clubbing
 - telangiectases (face, tongue, lips, upper limbs)

Pulmonary AVM

Osler-Weber-Rendu

Association with Hereditary Hemorrhagic Telangiectasia

- **Schneider is the National HHT Center in Israel**
- **Headed by Dr. Meir Mei-Zahav**
- **Currently following ~150 patients**
- **Reports: 70-90% PAVM associated w/HHT**
- **~35% of HHT patients have visible PAVM on CT**
- **Children with HHT**
 - **PAVM frequency similar to adults**
 - **even if asymptomatic**
- **Our patient: no criteria for HHT (isolated PAVM)**

Pulmonary AVM

Complications

- **Brain** (paradoxical embolization)
 - **stroke** (CVA/TIA)
 - **abscess**
 - **headache, seizures**
- **Hemothorax** (subpleural PAVM rupture)
- **Hemoptysis** (parenchymal / endobronchial PAVM)
- **Polycythemia**
- **Pulmonary hypertension, heart failure**

Pulmonary AVM

Summary

- **Not all that wheezes is asthma**
- **Not all dyspnea / desaturation is asthma**
- **Not all asthma is really asthma...**

Solitary Round Lesion

- **Differential diagnosis**
 - **neoplastic** (pleuroblastoma? neuroblastoma?)
 - **infectious** (pneumonia? bacterial/fungal?)
 - **inflammatory** (lymph node? systemic disease?)
 - **vascular** (PE? AVM?)
 - **traumatic** (rib fracture?)
 - **congenital** (bronchogenic cyst? CPAM? diverticulum?)