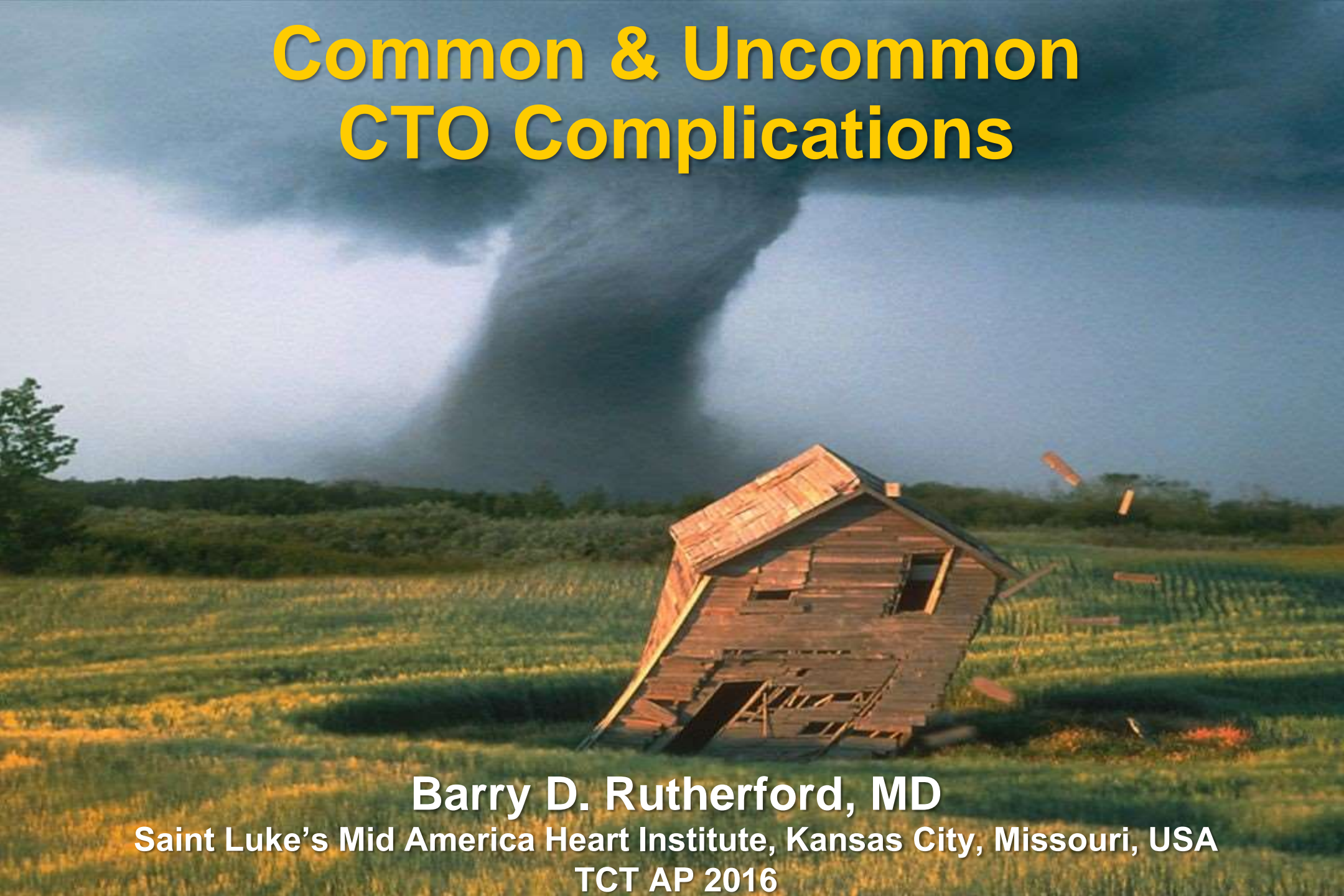


# Common & Uncommon CTO Complications



**Barry D. Rutherford, MD**

**Saint Luke's Mid America Heart Institute, Kansas City, Missouri, USA**

**TCT AP 2016**

# Disclosures

**Barry D. Rutherford, MD**

- **Abbott Vascular – Speaker's Bureau**
- **Medtronic – Speaker's Bureau**
- **Volcano Corp. – Speaker's Bureau**

***“Sometimes I feel if I don’t get complications, then I am not trying hard enough”***

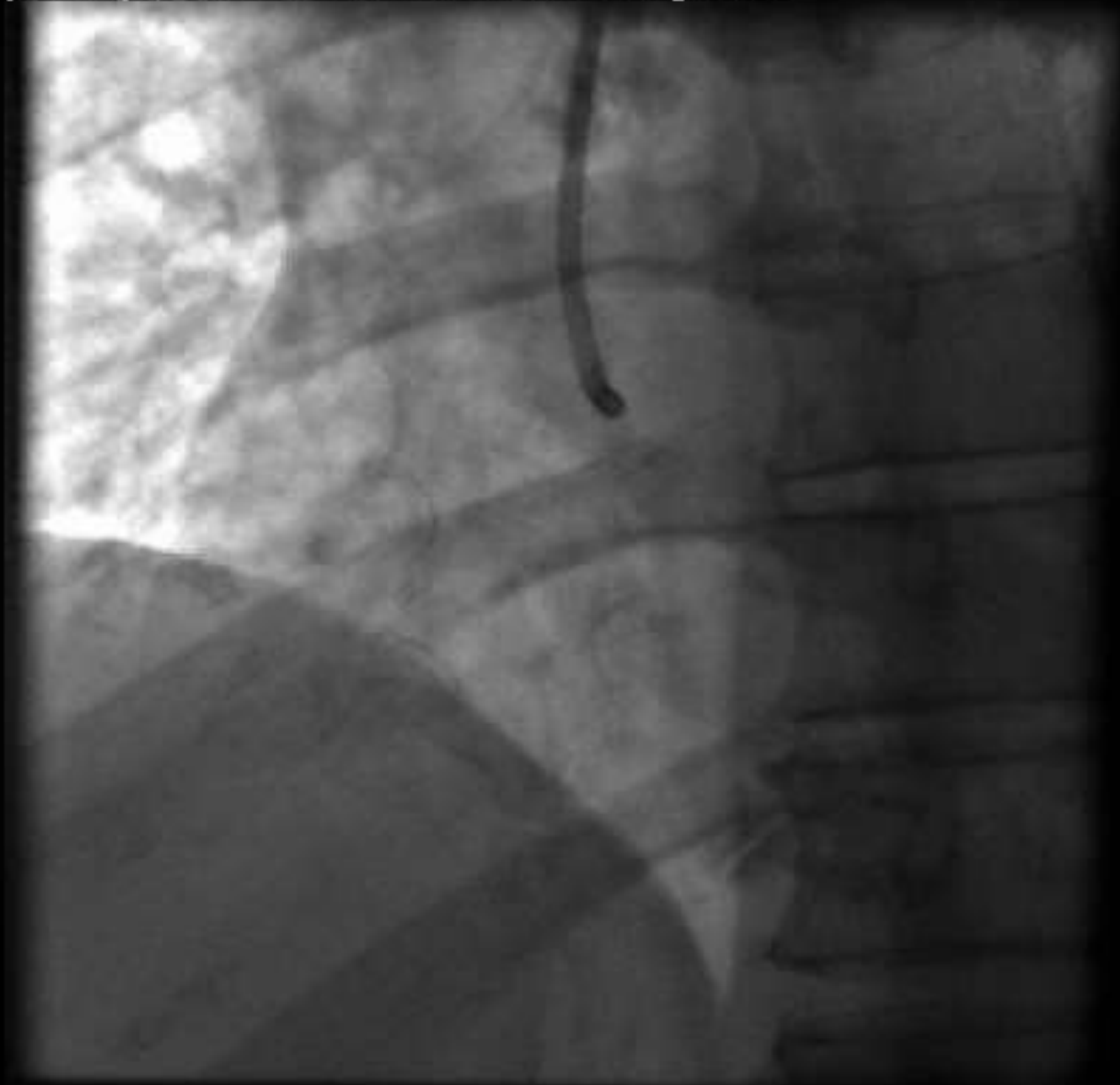
**Antonio Colombo**

**Hawaii, 1997**

Lossy Compression - not intended for diagnosis

**59-Year-Old  
Male**

**CTO of RCA**



# **Review of Common & Uncommon CTO Complications**

## ***Critique***

- **Never undertake “drive-by” CTO PCI**
- **Careful evaluation of the angio (30-40 min)**
- **Always use double guide injections**
- **One-dimensional operator not acceptable**
- **Skills in antegrade, dissection/re-entry, retrograde**
- **Discuss with colleagues**



Lossy Compression - not intended for diagnosis

**64-Year-  
Old  
Female**

**Functional  
CTO of  
RCA**



# 64-Year-Old Female Functional CTO of RCA

**Start Time:** 8:39 am

8:44 am, Heparin 5,500 Units

**9:45 am, ACT 211**

9:50 am, Heparin 3,000 Units

10:03 am, ACT 312

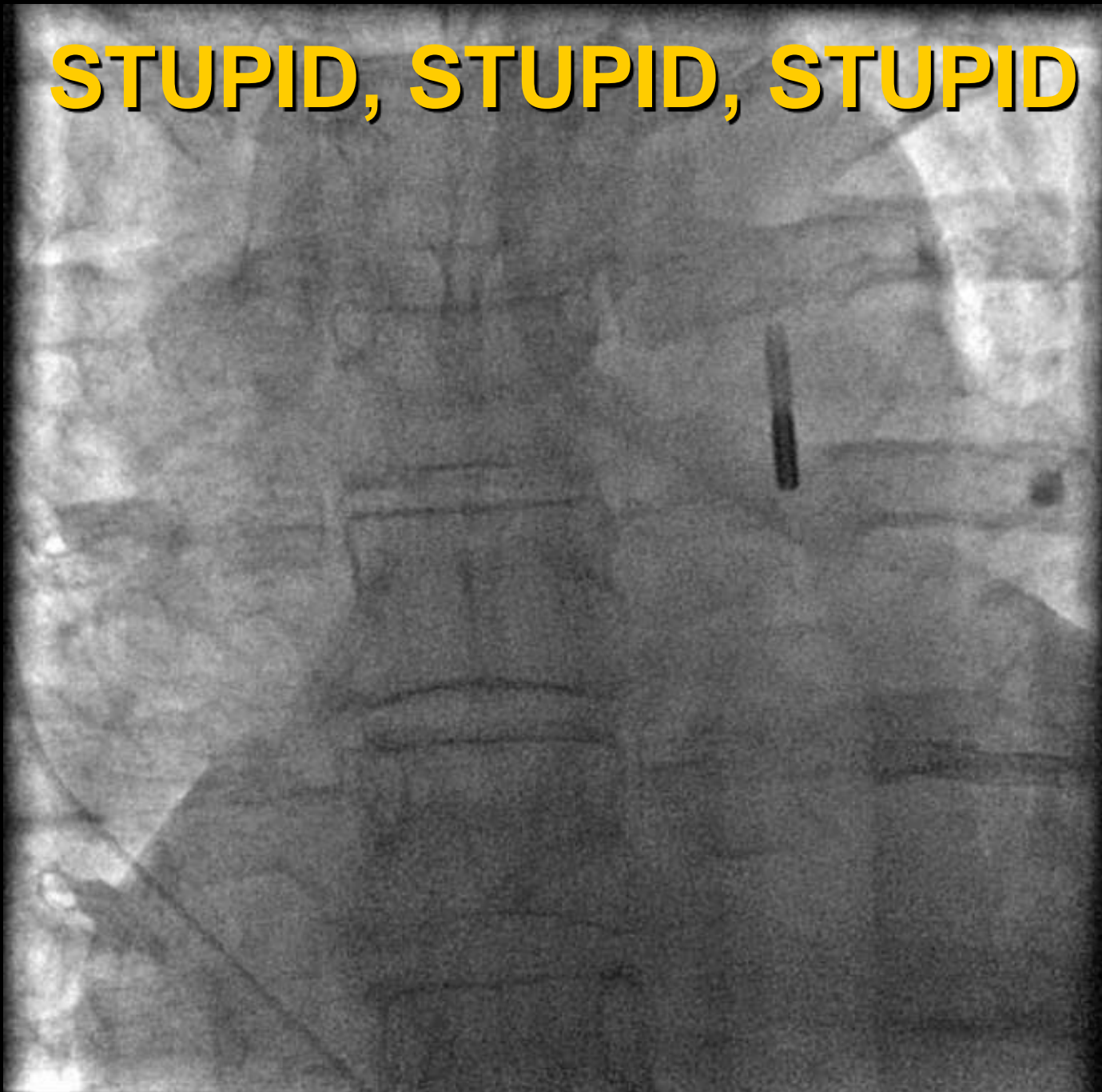
10:46 am, Pt transferred out of cath lab

**Procedure time:** 2 hours, 7 minutes

**Fluoro Time:** 34 minutes

**Contrast Volume:** 290 cc's Visipaque

**STUPID, STUPID, STUPID**





**2/10/16**

**51-Year-Old  
Female**

**CTO of RCA  
Factor V  
Leiden  
Deficiency  
on  
Long-term  
Coumadin  
Therapy**



# **51-Year-Old Female – CTO of RCA**

*Factor V Leiden Deficiency on Long-term Coumadin Therapy*

## ***Critique***

- **Set up initial freeze frame as road map**
- **No repeat injections**
- **IVUS guidance is mandatory**
- **With aortic root dissection, always stent across the ostium**
- **Consider visualizing the LMCA**
- **Surgical intervention almost never necessary**

**2/11/16**

**51-Year-Old  
Female**

**CTO of RCA  
Factor V  
Leiden  
Deficiency  
on  
Long-term  
Coumadin  
Therapy**



# **51-Year-Old Female – CTO of RCA**

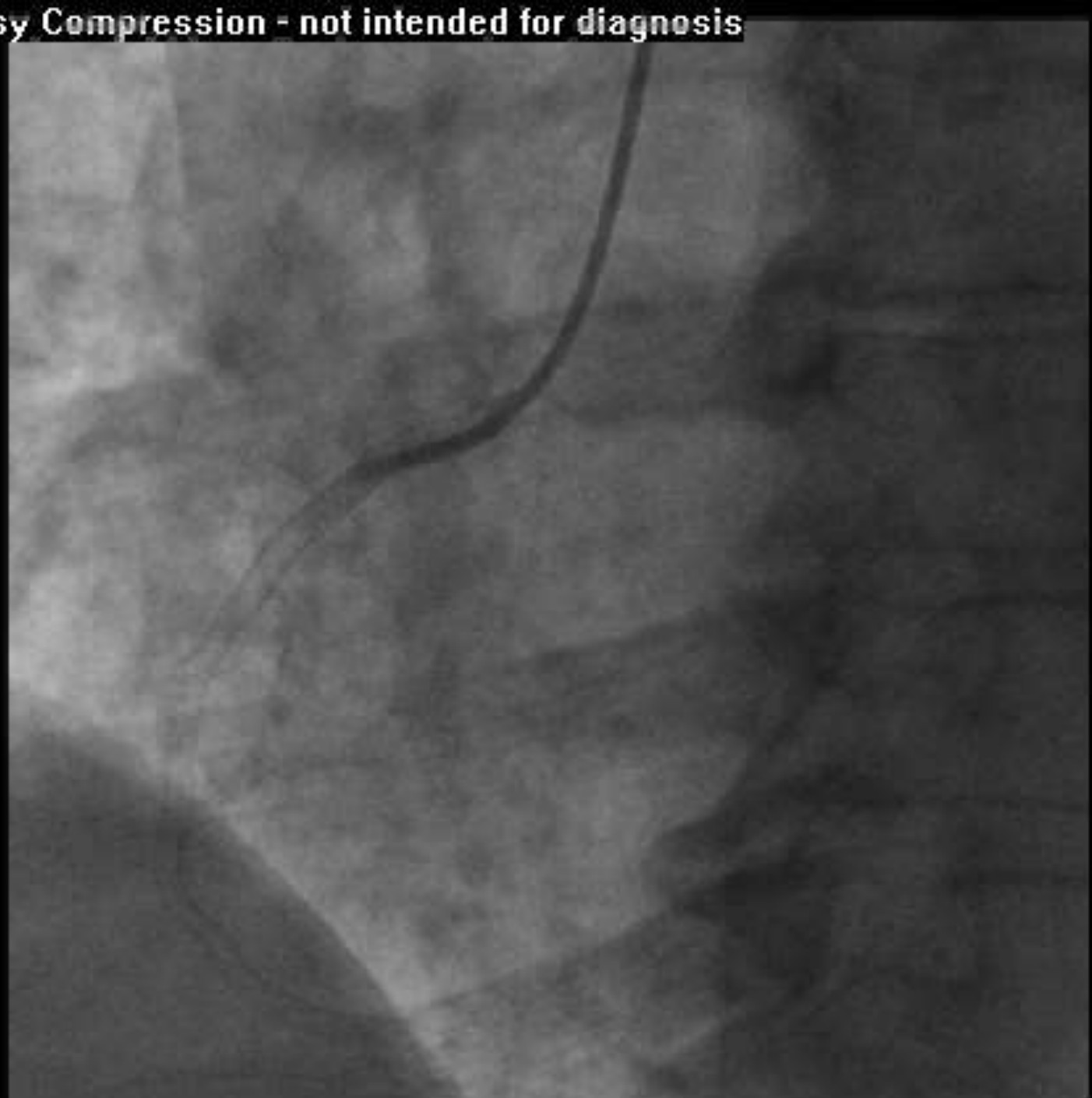
***Factor V Leiden Deficiency on Long-term Coumadin Therapy***

- **Post intervention: Large, retroperitoneal bleed**
- **ASA, Plavix and Coumadin withheld**
- **Developed severe retrosternal chest pain**
- **Taken back to cath lab at outside facility for repeat angiography**

**2/14/16**

**51-Year-Old  
Female**

**CTO of RCA  
Factor V  
Leiden  
Deficiency  
on  
Long-term  
Coumadin  
Therapy**





# Radiation Dermatitis





**30 days**



**16-21 weeks  
depigmentation  
and atrophy**



**3-6 months  
ulceration**

# Prevention of Radiation Dermatitis

- Alert to staged procedures
- Knowledge of previous fluoro times
- Physician alerts at 2 Gy intervals
- >5 Gy skin dose
  - Patient education regarding radiation exposure
  - Skin monitoring and skin care
  - Documentation of patient
  - Notification to PCP
- > 10 Gy or > 50 min fluoro time
  - Consider aborting the procedure
- >15 Gy is “Sentinel Event” reported to Dept of Health

# Review of Common and Uncommon CTO Complications

## *Safety Devices: Emergency Kit*

- Covered stents
- Embolization coils and delivery systems
- Pericardiocentesis trays
- Thrombectomy devices
- Hemodynamic support systems



**78-  
year-  
old  
Male**

**CTO of  
RCA**



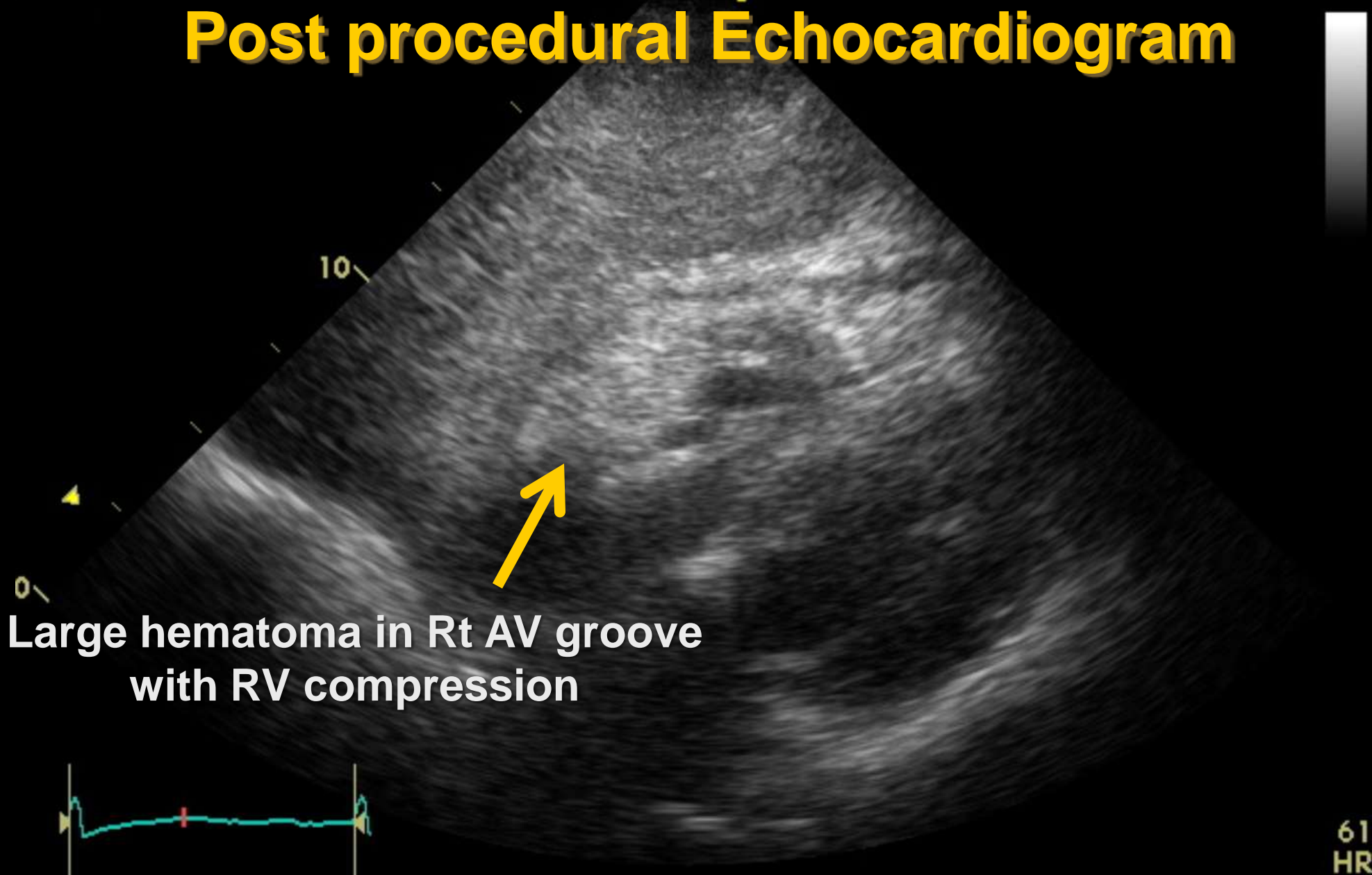


**78-  
year-  
old  
Male**

**CTO of  
RCA**



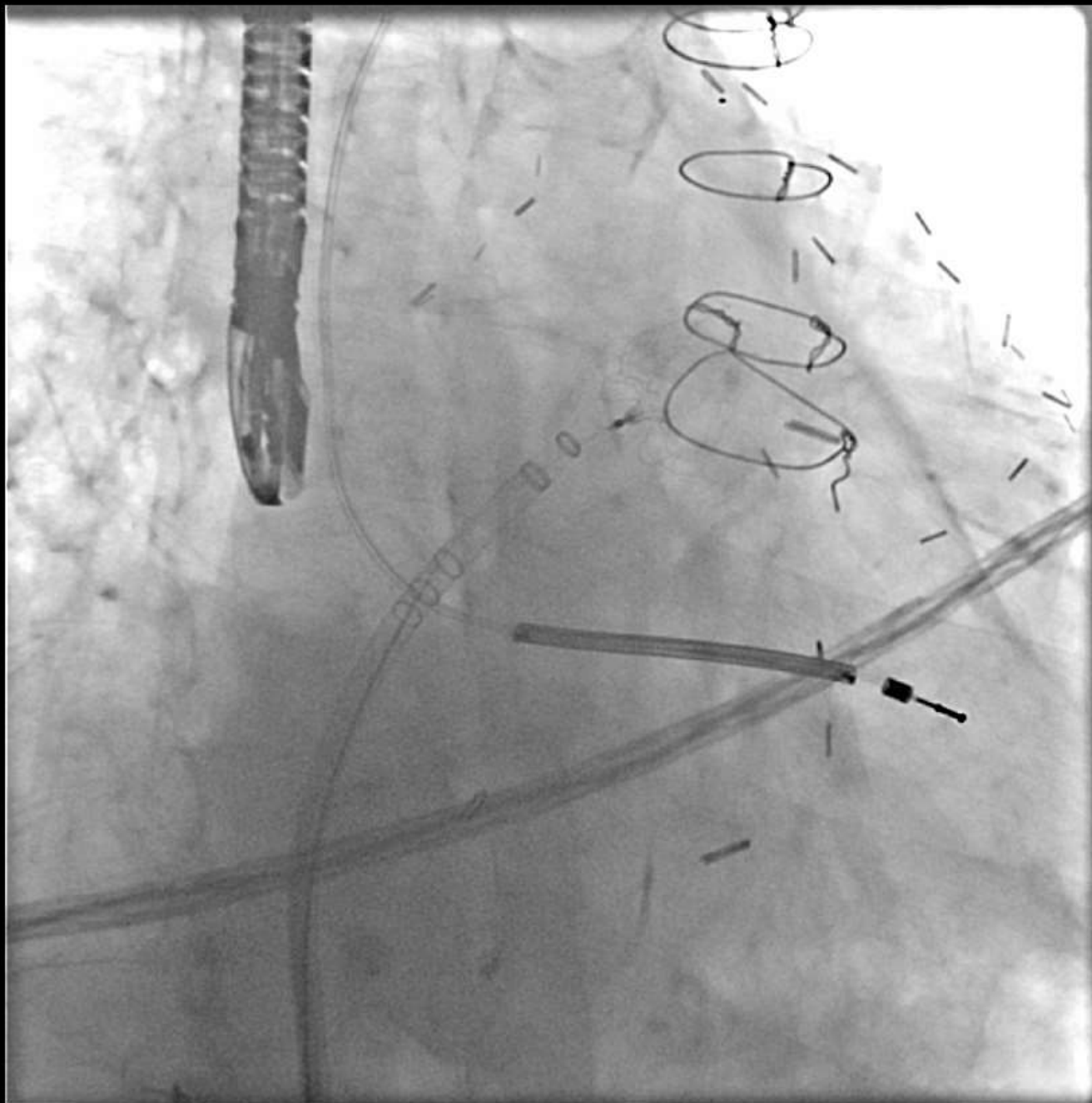
# 78-year-old Male, CTO of RCA Post procedural Echocardiogram



**78-year-old  
Male**

**CTO of RCA**

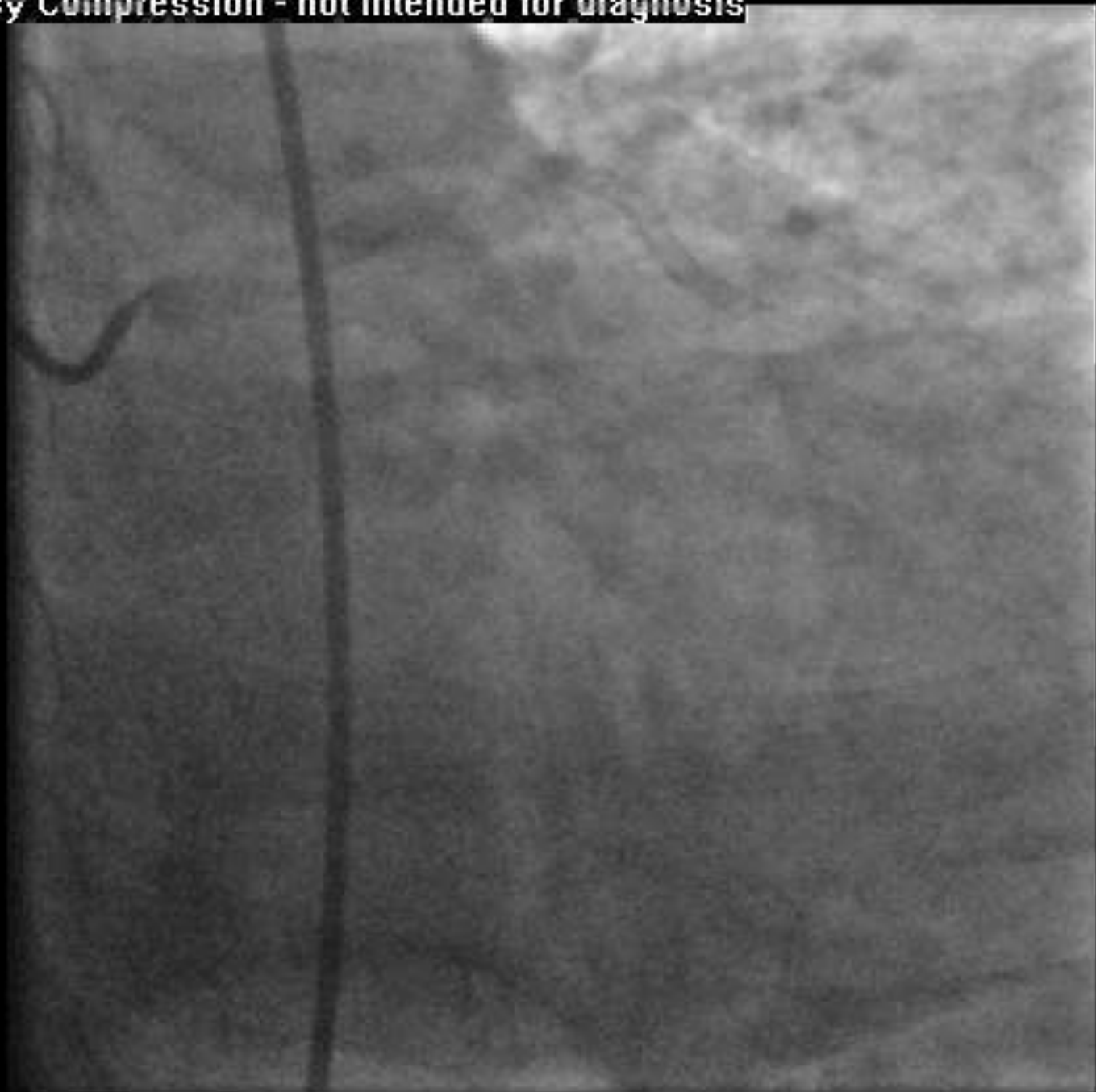
**WATCHMAN  
Device**



Lossy Compression - not intended for diagnosis

**63-yo  
Male**

**CTO of  
RCA**



# Management of Coronary Perforation

- **DO NOT PANIC!**
- **Prolonged balloon inflation (do not remove balloon)**
- **Reverse heparin: DC Angiomax (do not use in CTO's)**
- **Echocardiogram – pericardiocentesis (remember echo later if suspicion of perforation)**
- **Access other femoral artery (ping-pong guides)**
- **Alert cardiac surgery team**

***Punishment should fit the crime –  
most guidewire perforations are minor events,  
but this is a MAJOR event***



# Management of Coronary Perforation

- **Thrombus injection**
- **Adipose tissue injection**
- **Gel foam**
- **Polyvinyl alcohol (PVA) AngioDynamics™**
- **Thrombin injection**
- **Coils:**
  - **Cook: Hilal-Embolization MicroCoil™ (2mm);**
  - **Boston Scientific: VortX™ Diamond-18 (3x3.3mm)**
  - **Boston Scientific: Renegade™ Delivery Catheter (Tip 2.5 Fr)**
- **Covered Stent (JoStent)**
  - **Diameter 3.0-5.0**
  - **Length 12-26**

Lesion Compression - not indicated for diagnosis



**63-yo  
Male**

**CTO of  
RCA**

Lossy Compression - not intended for diagnosis

**63-yo  
Male**

**CTO of  
RCA**

**Follow  
up**

