

Complications in the Cath Lab

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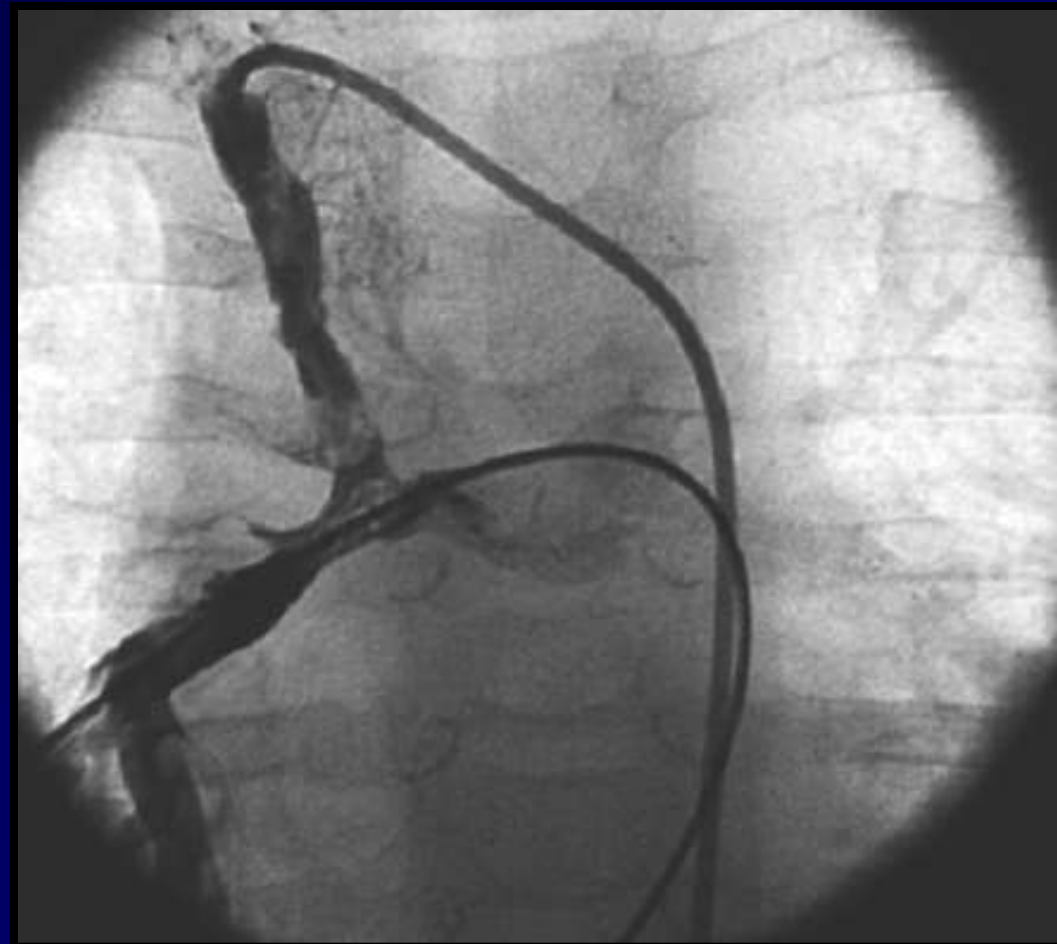
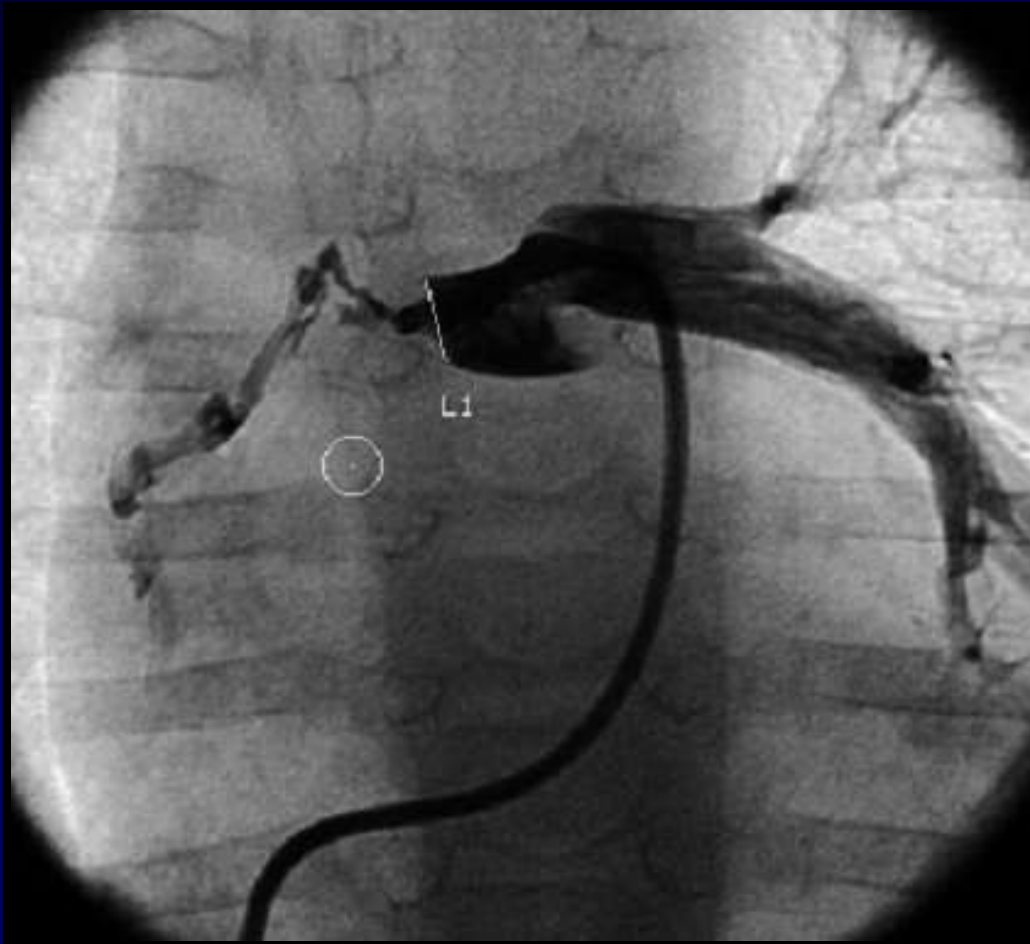


Complications of Cardiac Catheterization: Prevention and Cure

- Defeat by substrate
- Poor technique
- Poor judgement
- Technical failure:
exacerbated by lack of custom built
equipment
- Imponderable

Complete occlusion Blalock & RPA

tPA intralesional 2 doses



CT Scan 48 hrs post initial intervention



What we don't want to hear....

- In conclusion:
- 99% success
- No complications

We are often too quick to
criticise others

What We Really Need to Know

- Patient selection, selection, selection - what are the substrate limitations?
- Technology available
- Experience of the procedure
- Strategy for dealing with complications

Complications of Cardiac Catheterization: Prevention and Cure

- Preparation
 - Know the patient
 - Review chart
 - Review investigations
 - Review old angios
- Inform the patient / parent of the risks / document
- Educate the anaesthesiologist
- Anticipate worst scenario
- Surgical back up?

What can we learn from our mistakes?

- Poor / suboptimal results should be acknowledged and not buried
- Take responsibility - this is not to say develop a culture of blame
- Preparation next time
- Education (The team) and the rest of us
- Lead

Not a complication but important
indicator of performance and quality

Residual
Shunt following
ASD closure



Local Vascular Complications

Femoral bleeding complications after
coronary angiography vs coronary
interventions (n=309)

Berry, Kelly, Cobbe, Eteiba

Am J Cardiol 2004;94:361-3

Percentage of patients requiring
prolonged admission for access
site complications? **23%**

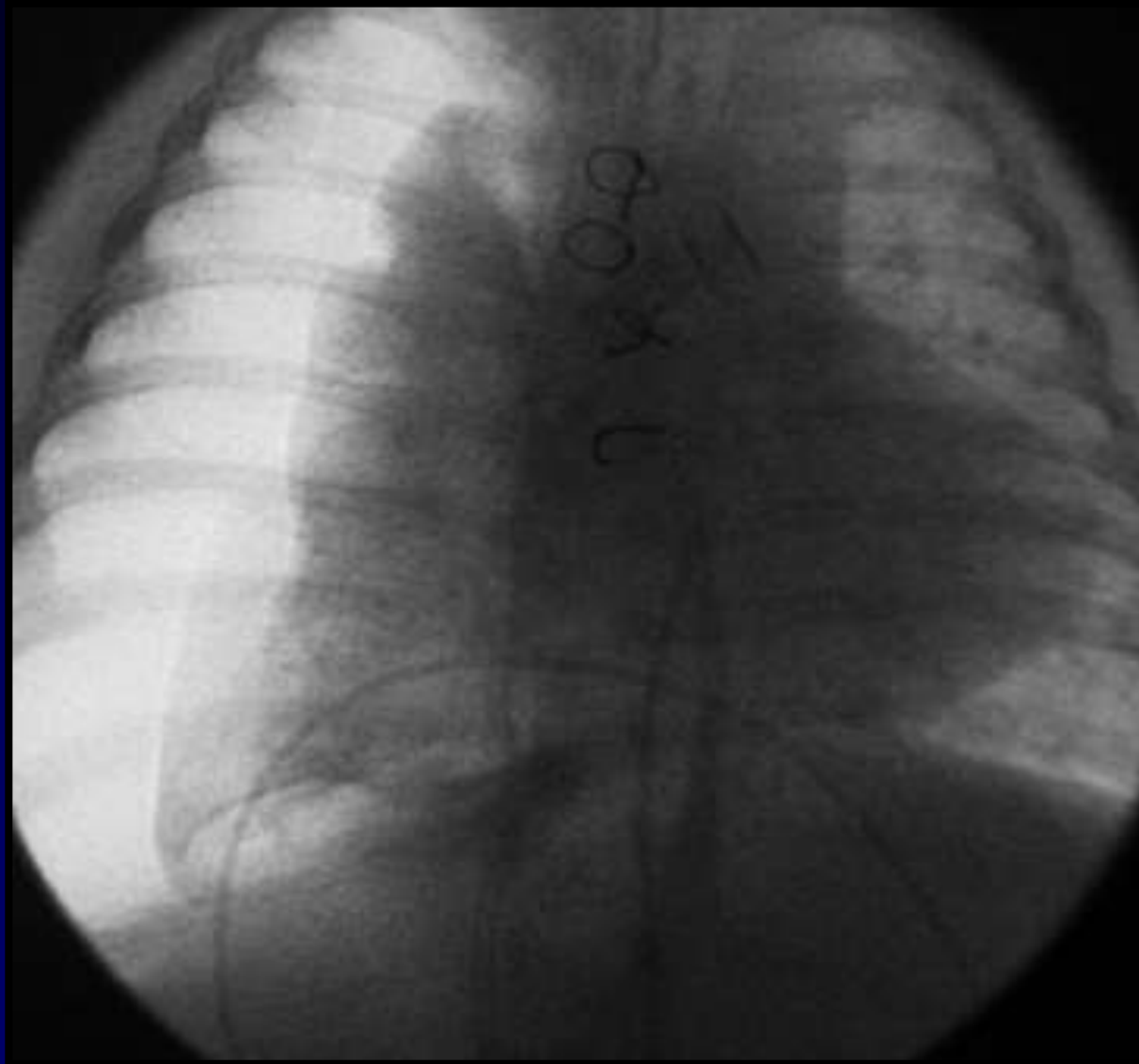
Access site haematoma



Anticoagulation / Thrombolysis In Paediatric Patients

- We are tackling smaller and smaller patients
- NO thrombolytic drugs approved for use in paediatrics
- Drug metabolism differs widely by age / maturity / condition
- Monitoring 'Levels' unreliable markers of effective / excessive thrombolysis

Pneumothorax post transhepatic access



Perforation

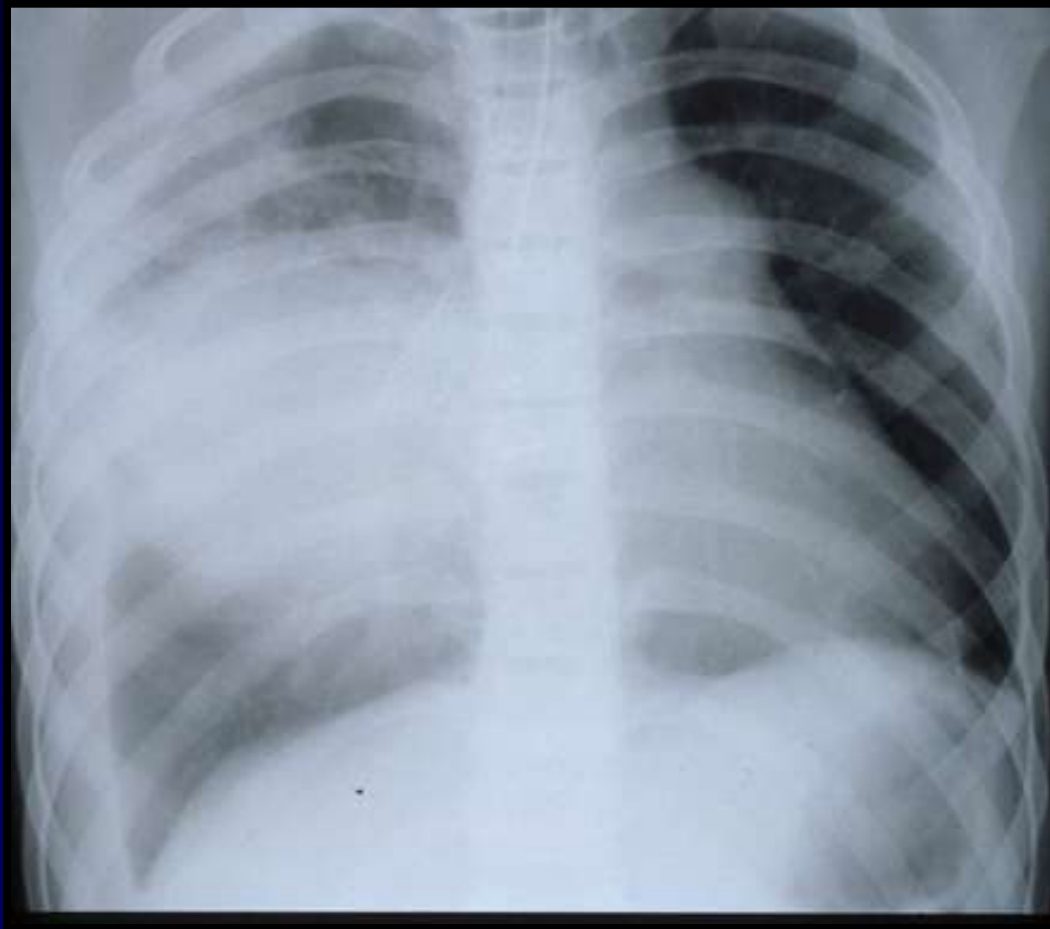
- Intracardiac
- Intrapulmonary
- Intravascular

Usually remarkably well tolerated when prior surgery

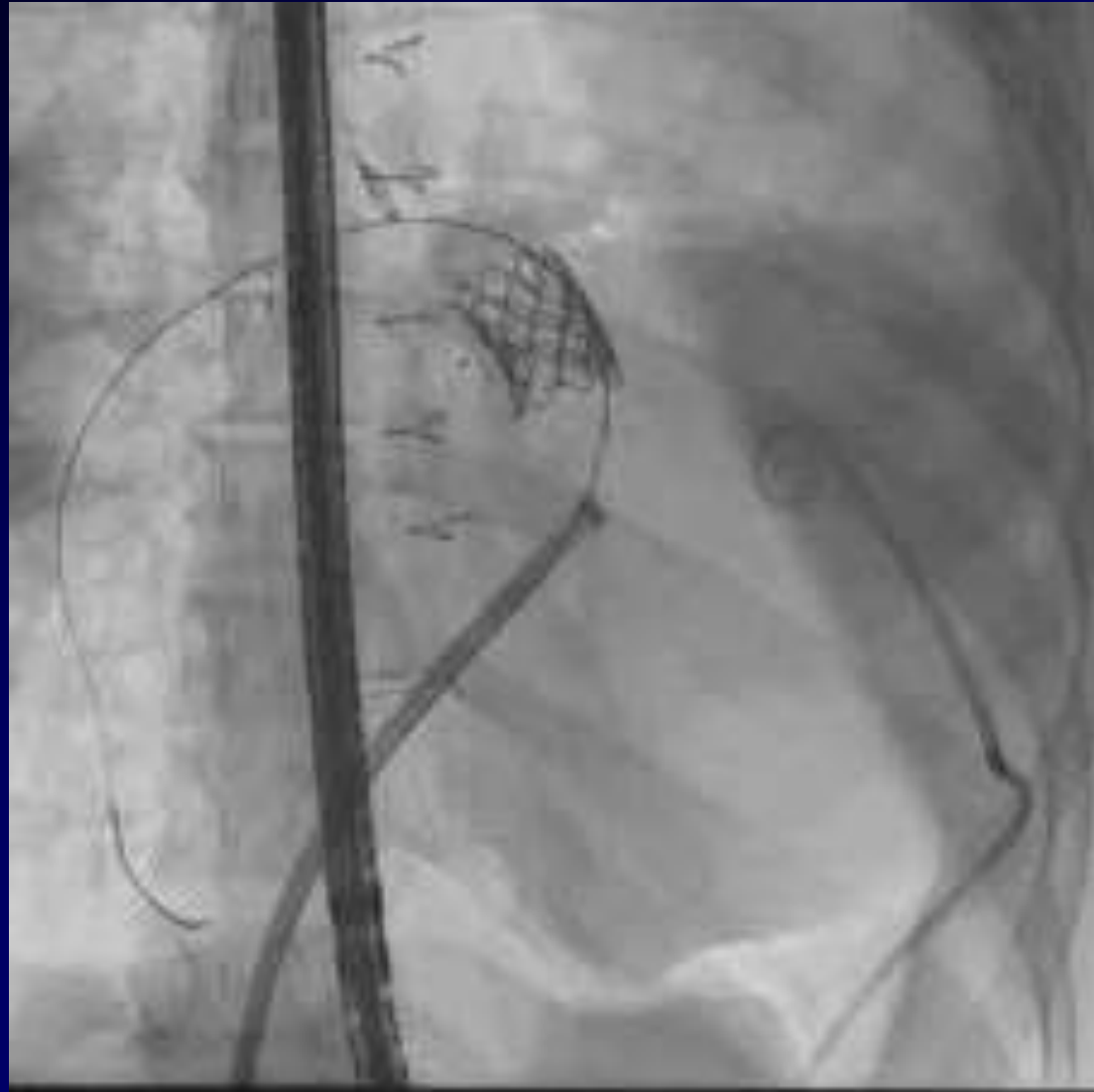
Tamponade: aspirate & autotransfuse

Consider covered stent

Massive haemothorax post stent



Perforation



Complications of Cardiac Catheterization: Prevention and Cure

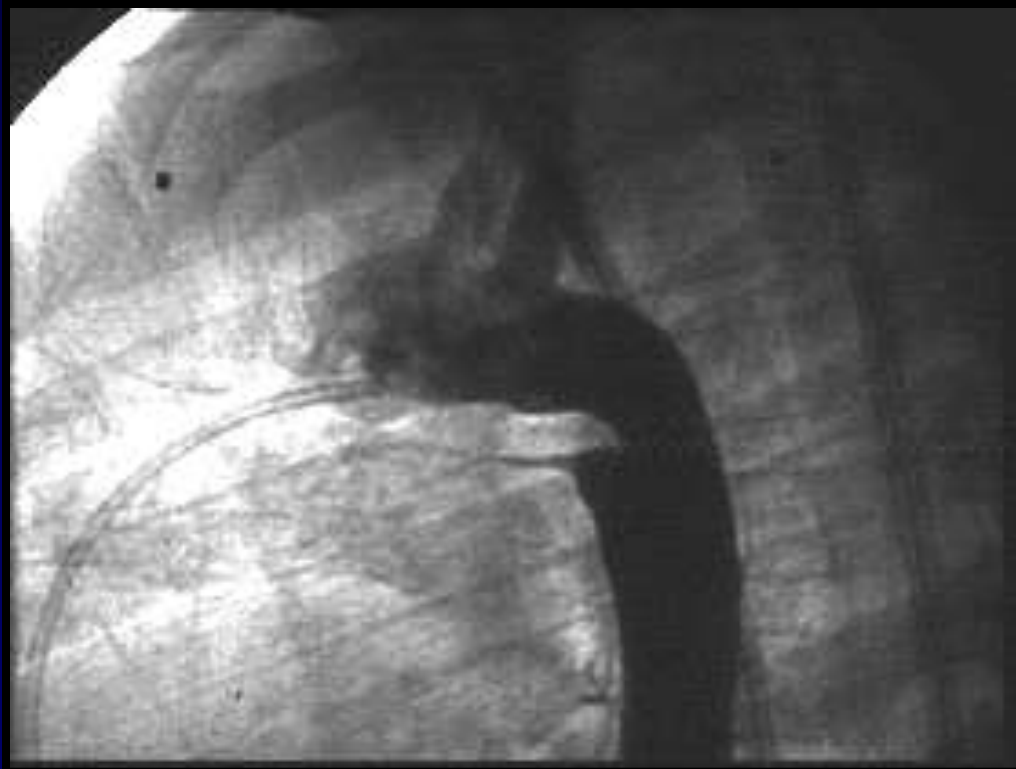
Device embolisation

- Use all imaging modalities at delivery
- Retrieval is almost always possible
- Be conscious of the route of retrieval and alternatives
- No barrier to completing the intervention

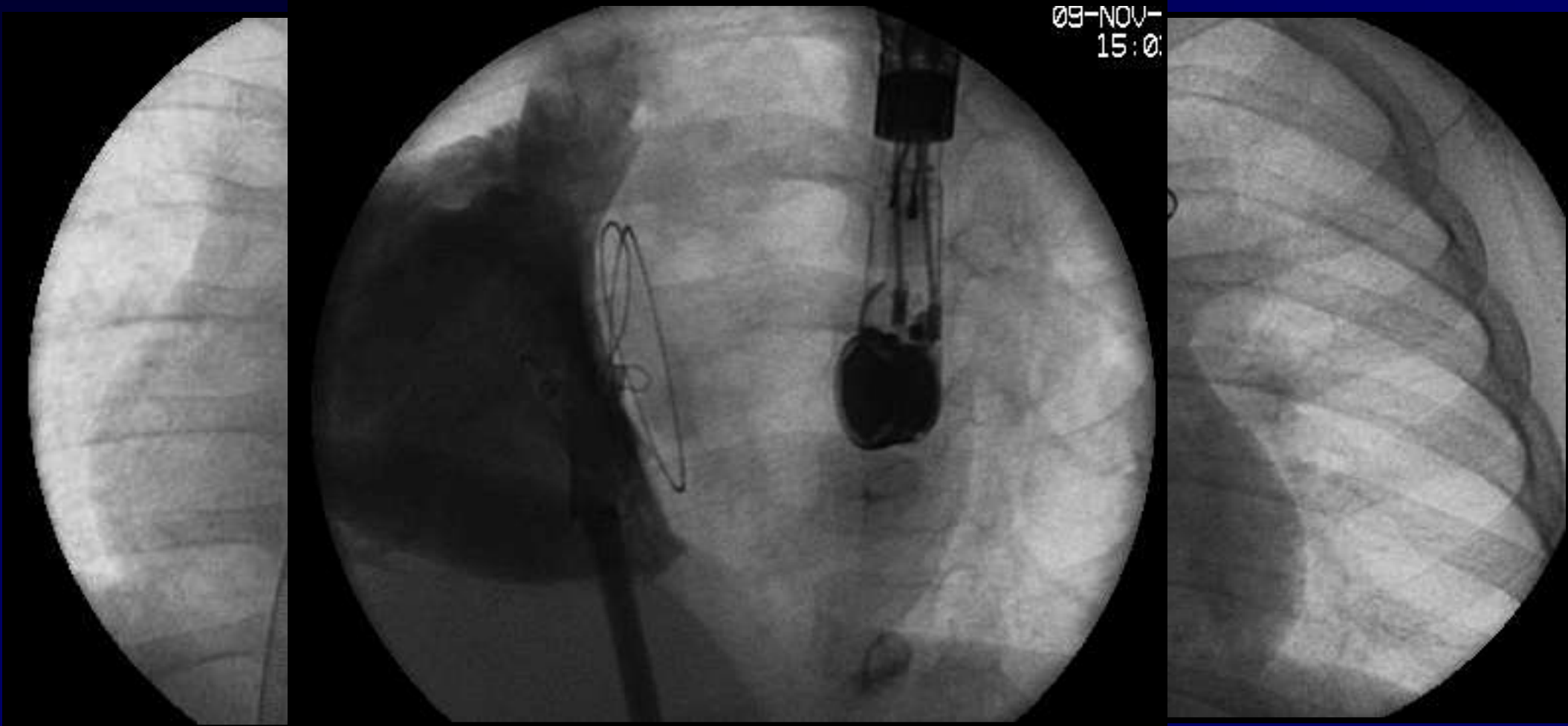
Coil embolisation and retrieval



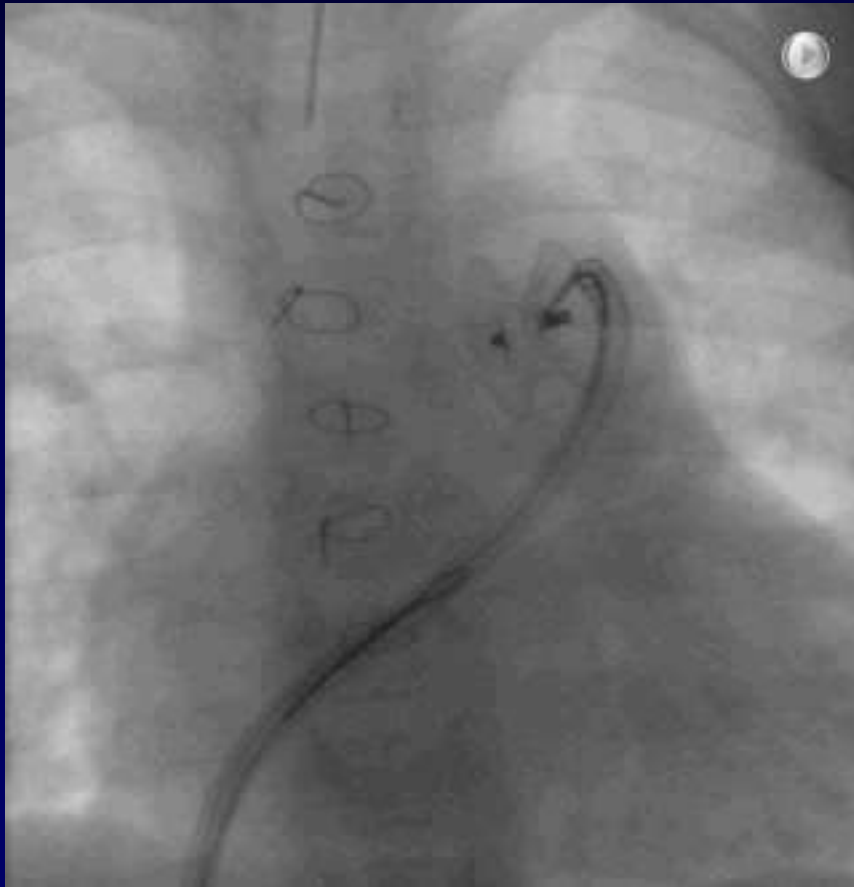
Beware spasm of the duct



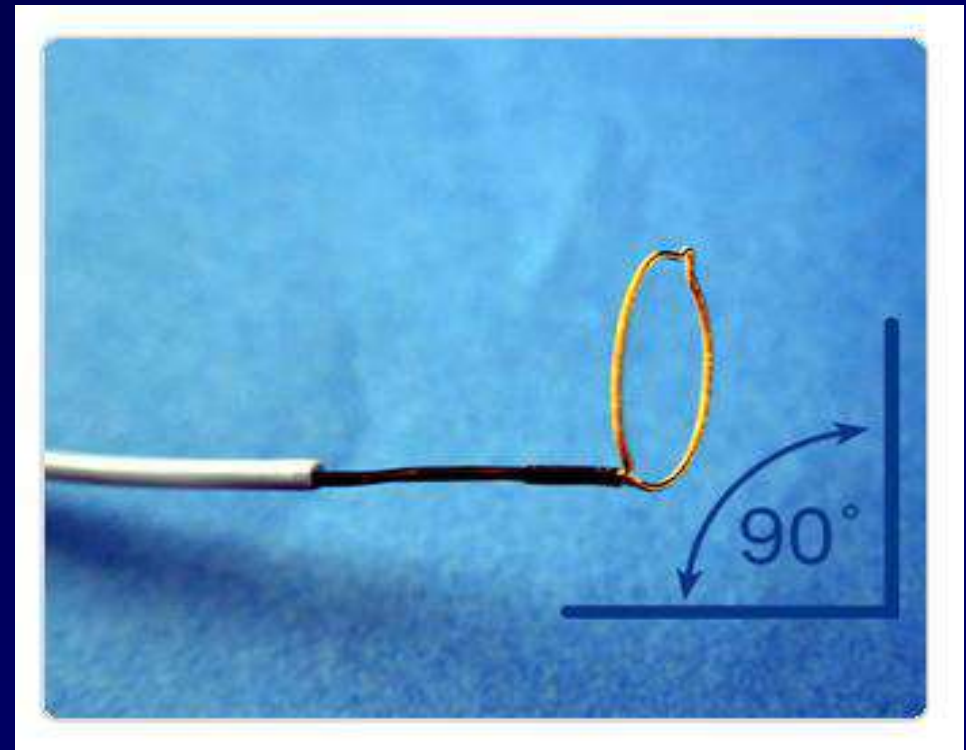
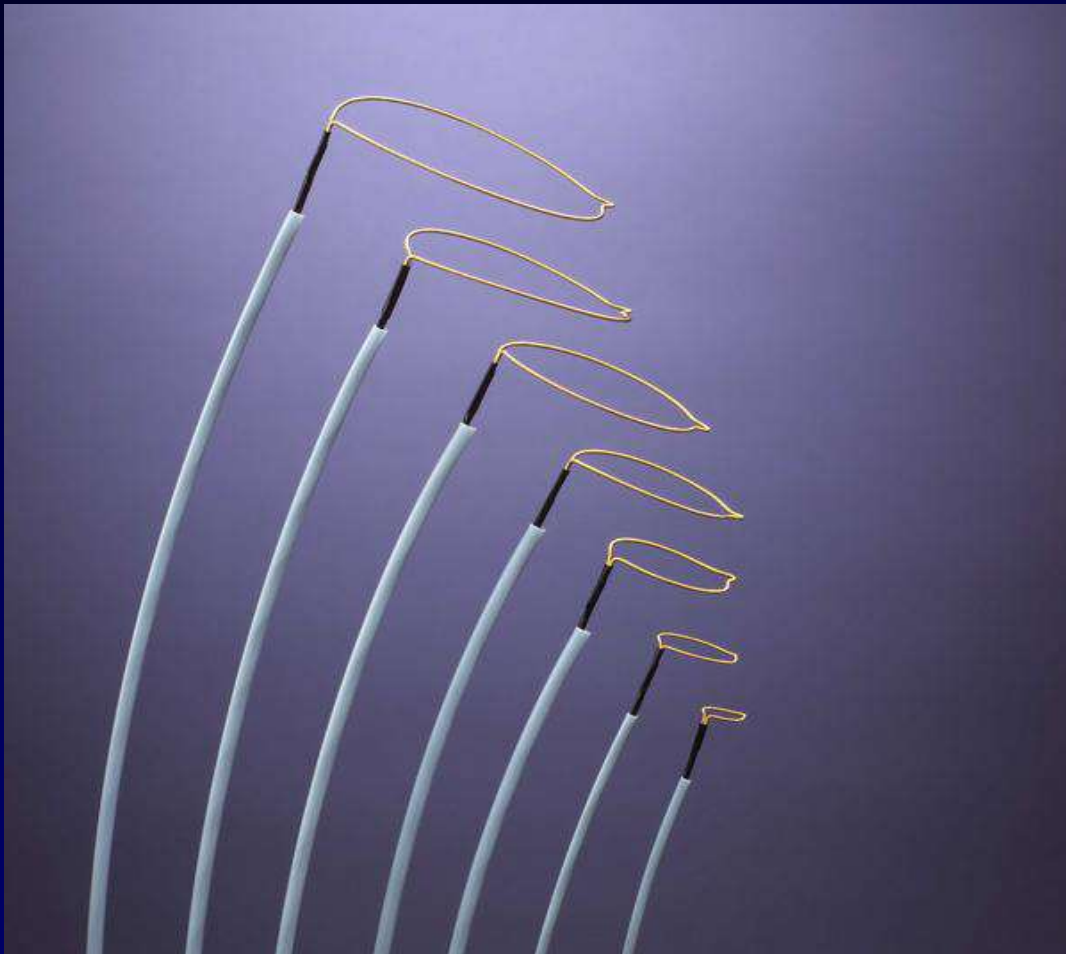
Embolisation & retrieval



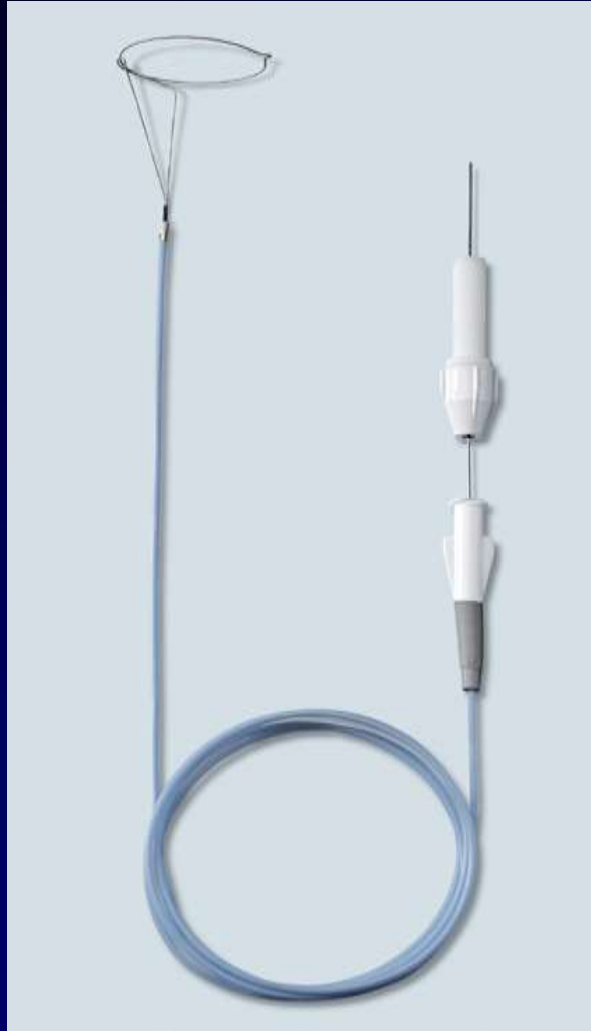
VSD Device (not in the septum)



Amplatz Gooseneck Snare

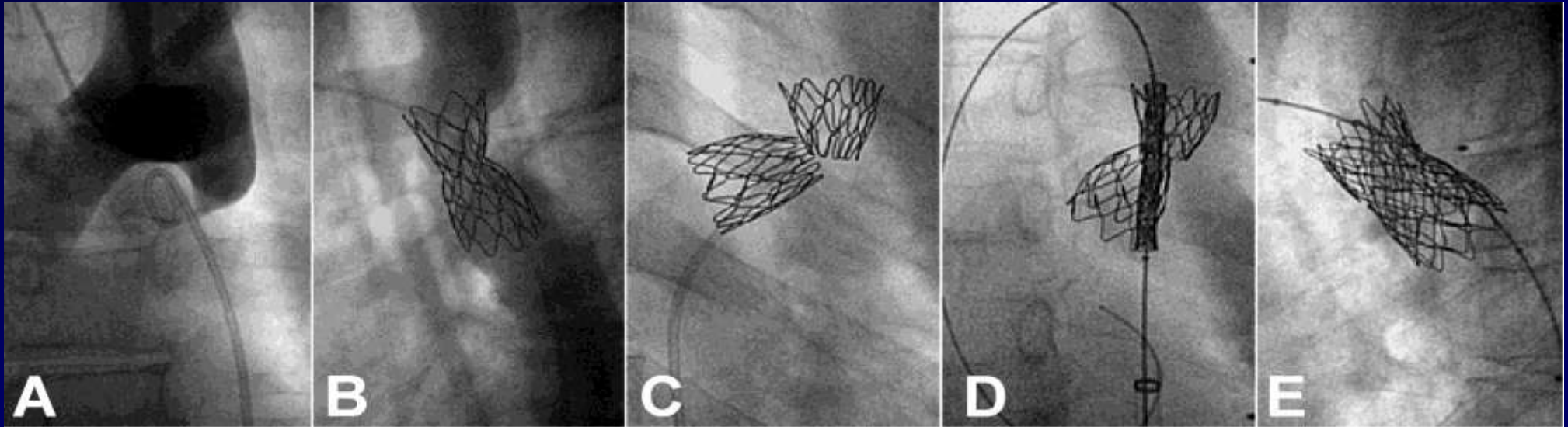


Pfm Multisnare



Stent Angioplasty for Coarctation

Stent Fracture



Infection - exceptionally rare

MRSA vegetation on VSD device
5 months post implant



5 days post balloon valvuloplasty for critical PS

Lossy compression - not intended for diagnosis

Depth: 7.0 cm



Technical Failure?

Balloon shaft fracture



When things go wrong

- Recognise the problem
- Visualise the solution
- Inform the team
- Summon help if necessary
- Form strategy
- Physical tips to stay in control
- Shouting does not help speed or efficacy

Performance

- Anticipate difficult / long cases
- Schedule accordingly
- Assess case duration realistically
- Have experienced help
- First time procedure - have proctor

Performance

- Prepare your anatomical & physiological knowledge of the patient
- Discuss the case with colleagues
- Informed consent: particularly the bad news
- Take responsibility for your mistakes
- Take something positive from failure

Failure / Complications

- No INDIVIDUAL should be to 'blame'
- We are all responsible
- Accept responsibility for your mistakes
- Learn from failure
- Discuss failures with colleagues as eagerly as you would success

Quality

- Why wouldn't you want to be compared with your colleagues / peers?
- Catheters - including diagnostics becoming potentially more hazardous
- Mortality is very low and thus not a good indicator of performance

Quality

- Morbidity
- Subjective - c.f. femoral / foot pulses
- Doppler? Foot temperature? Use of Heparin post procedure?
- Length of stay?...
- Procedure time - when to start the clock?
- Sheath in sheath out?
- Fluoroscopy time?
- Radiation dose?

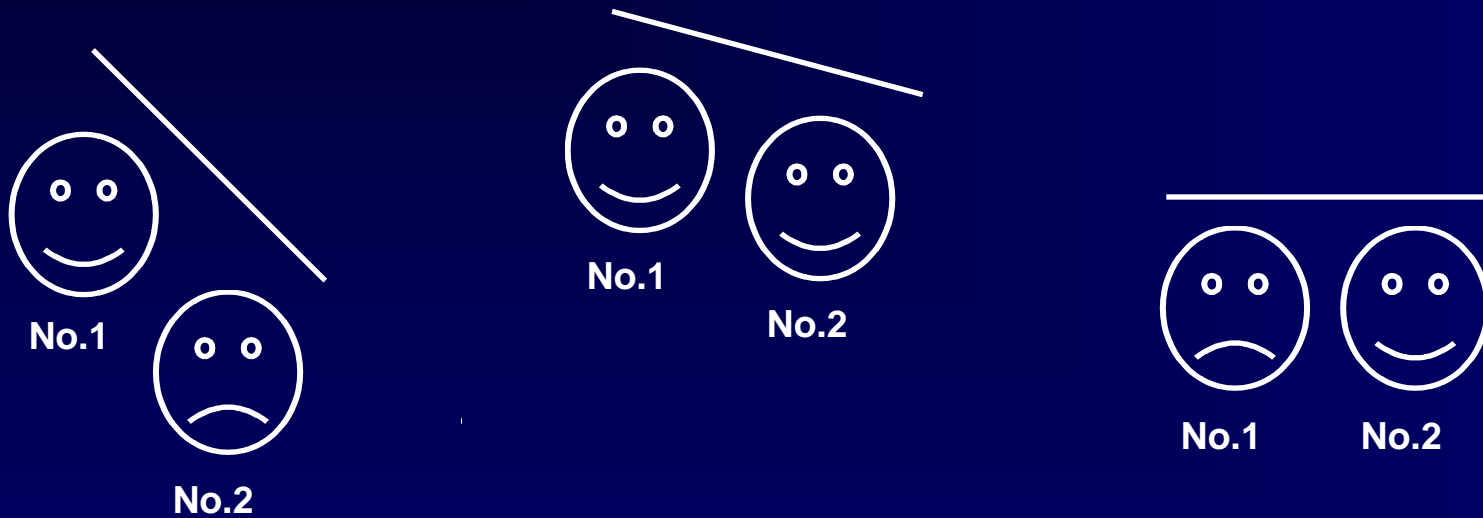
Quality Databases

- Concern of not comparing like with like
- Concern of results interpreted without explanation
- UK CCAD '200% mortality'
- IMPACT
- CCISC
- CPO3

Quality

- Teaching / proctoring / mentoring
- Guidelines and Protocols
- Anatomical and haemodynamic variation
- Clinical condition of patient
- Variations in technique of anaesthesia and catheter technology

Teaching / Proctoring / Mentoring hierarchical structure



Protocols - sometimes give bad advice



Protocols - give advice nobody follows



Constraints

- Failure to accept responsibility for actions
- Industrial commitment inhibited by restricted volume

Animal / Simulator models could be more widely available

Accepting proctor status for new procedures

FINISHED FILES ARE THE
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Wladimir Horowitz

If I don't play piano for one day, I
feel it myself...

...on the second day the critics will
notice it...

...and on the third day the audience
will hear it.

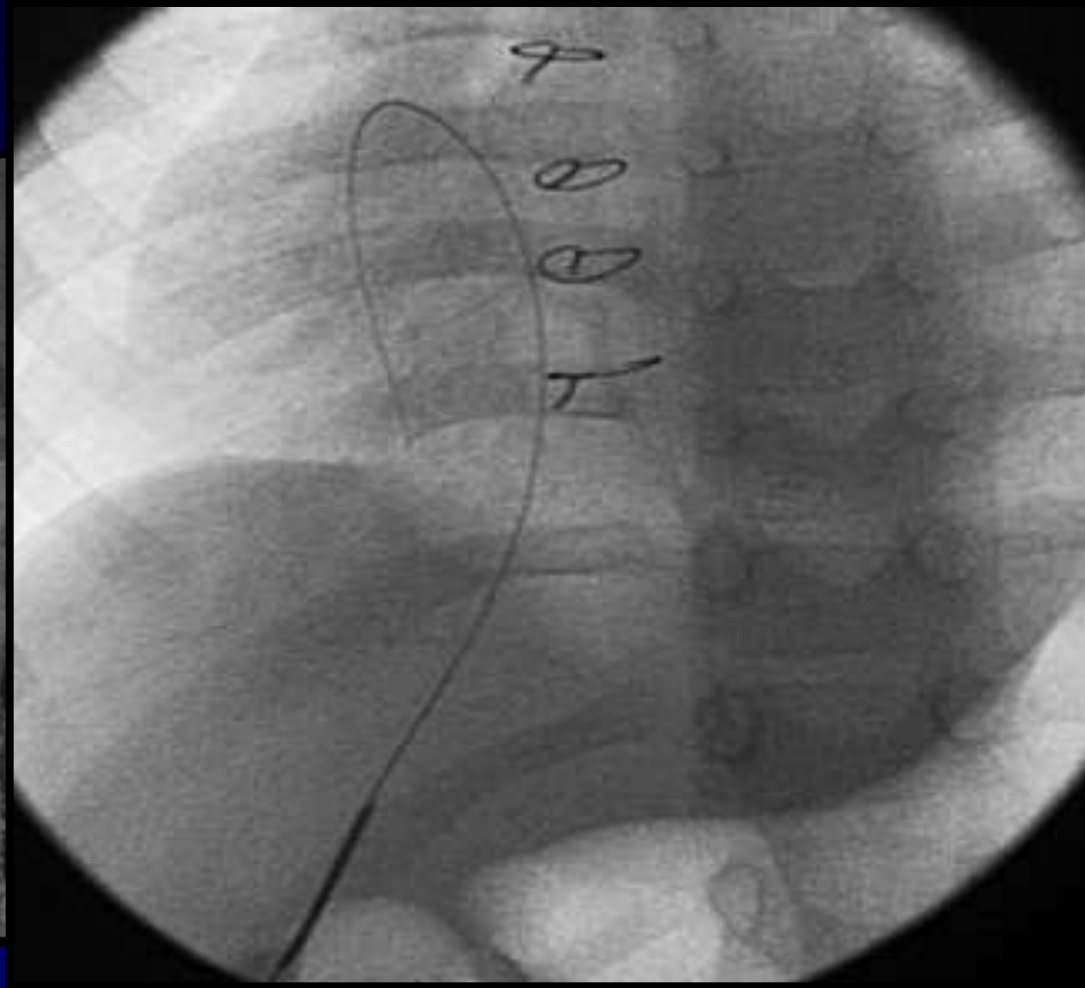
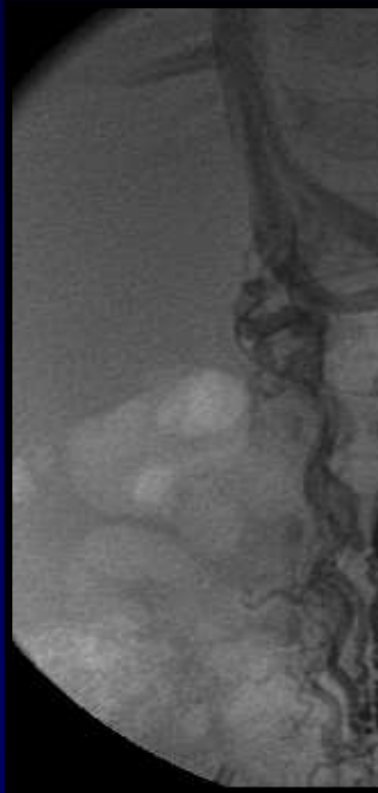


It Sounds Good.....

'Far better it is to dare mighty things even though chequered by failure, than it is to dwell in that perpetual twilight that knows not victory nor defeat'

Theodore Roosevelt

Vascular Access Problems in Congenital Heart Disease



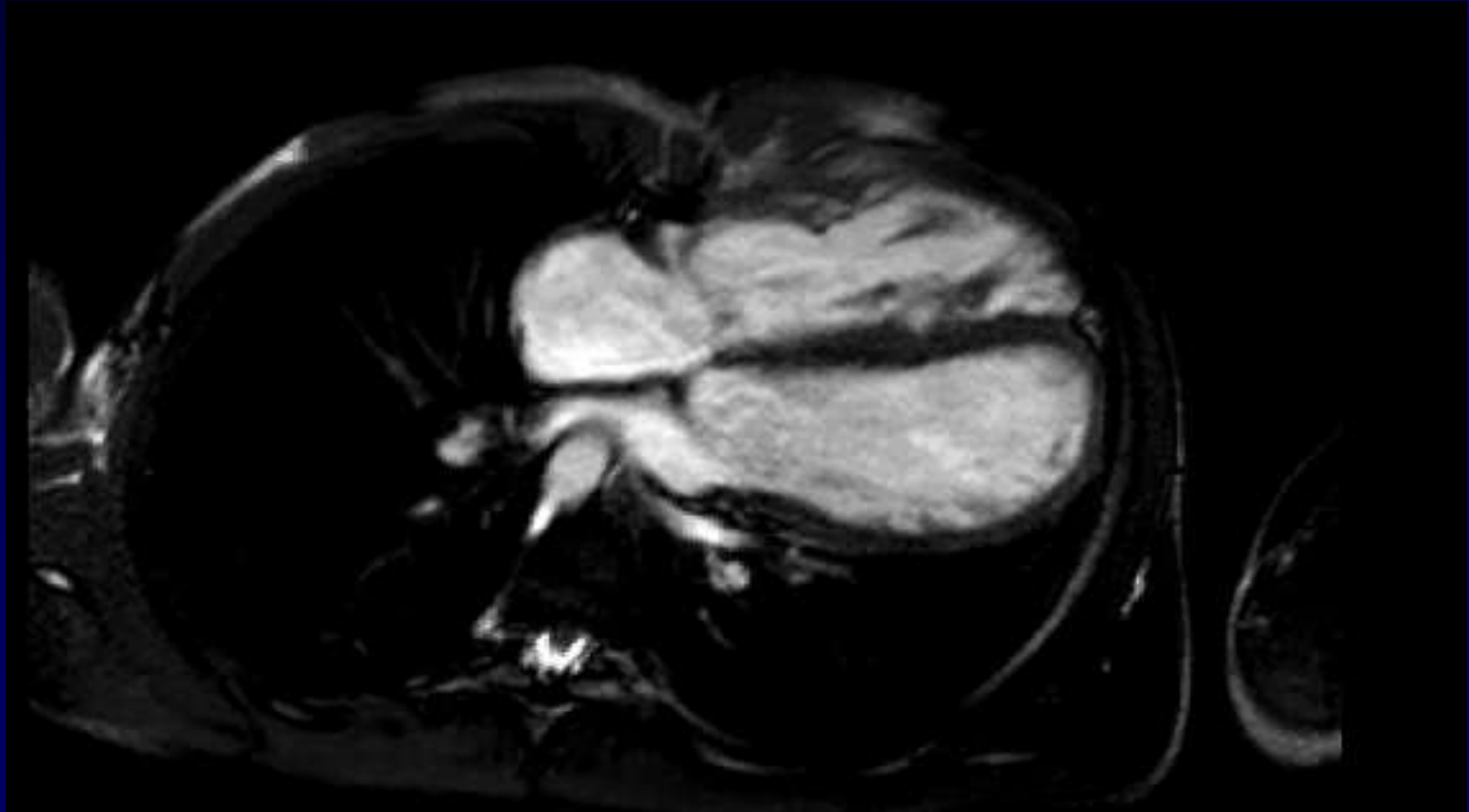
JM

- 17 yr old male
- PA VSD MAPCAS s/p repair Hanley 14mm RV>PA conduit age 4/12
- Most recent (2nd op) 20mm RV>PA Homograft 9 yrs ago
- Lethargic / chest pain / SOB/OE
- Echo signs severe conduit stenosis
- MRI

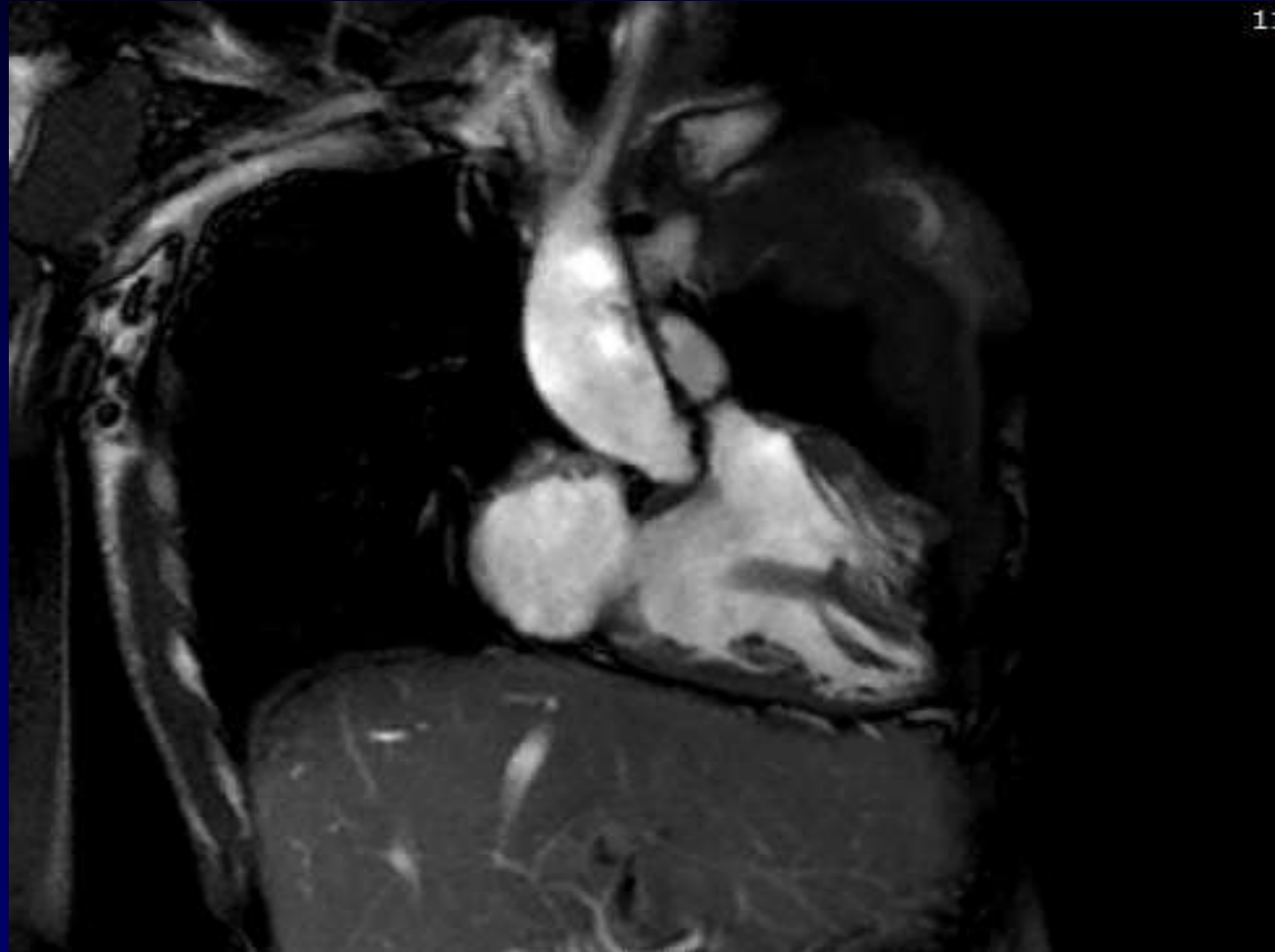
JM

- MRI
- Normal RV DV 94ml / m²
- RV Ejection fraction 40%
- PV Regurgitant fraction 7%
- Aortic Regurgitant Fraction 22%
- Pulmonary blood flow 54% R 46% L

JM



JM



JM



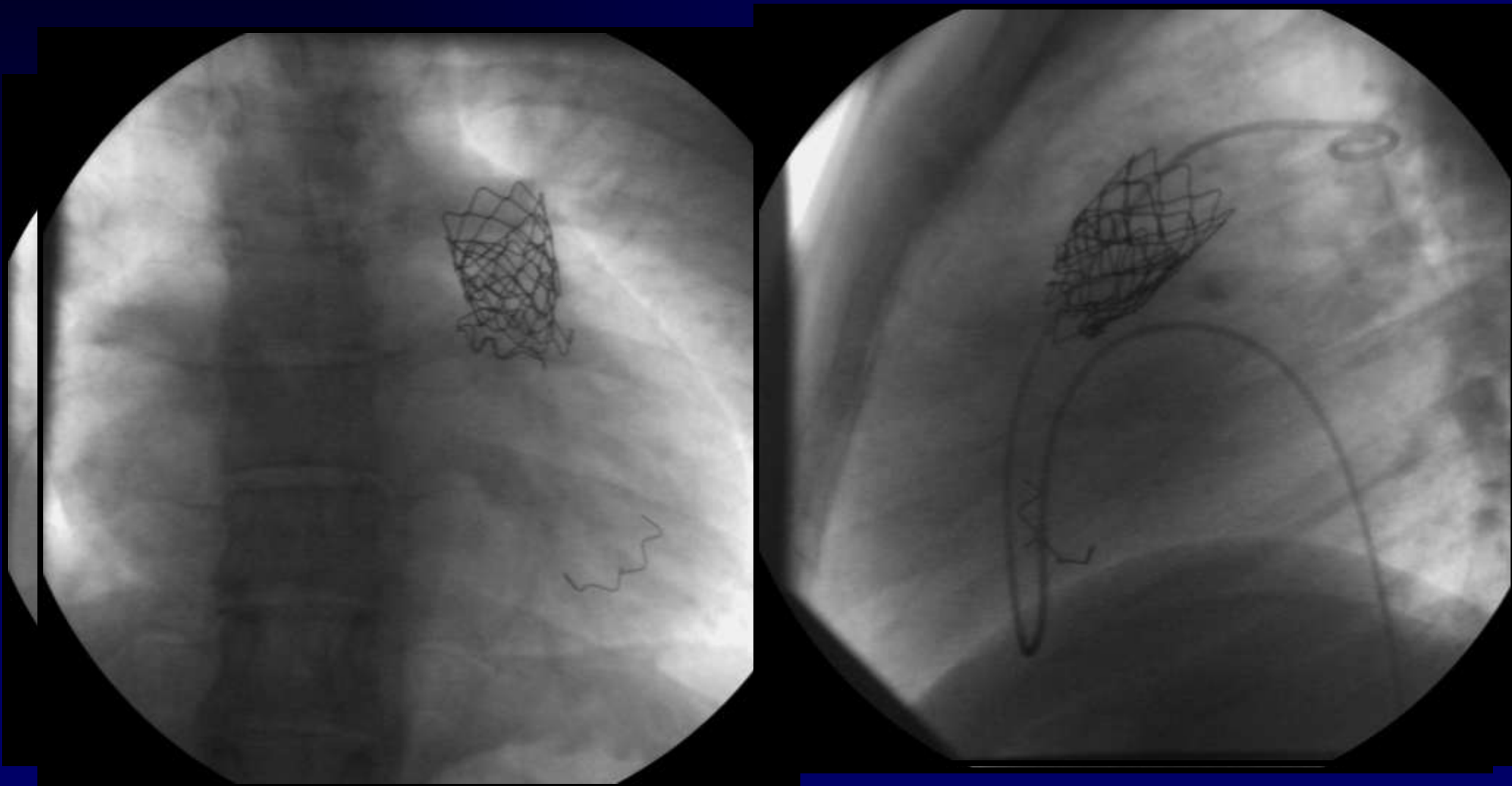
Angioplasty for Coarctation

- No argument with residual coarctation
- Be highly selective with native coarctation
- Isthmus / desc aorta ratio 2/3 or more
- Balloon size isthmus / descending aorta fudge

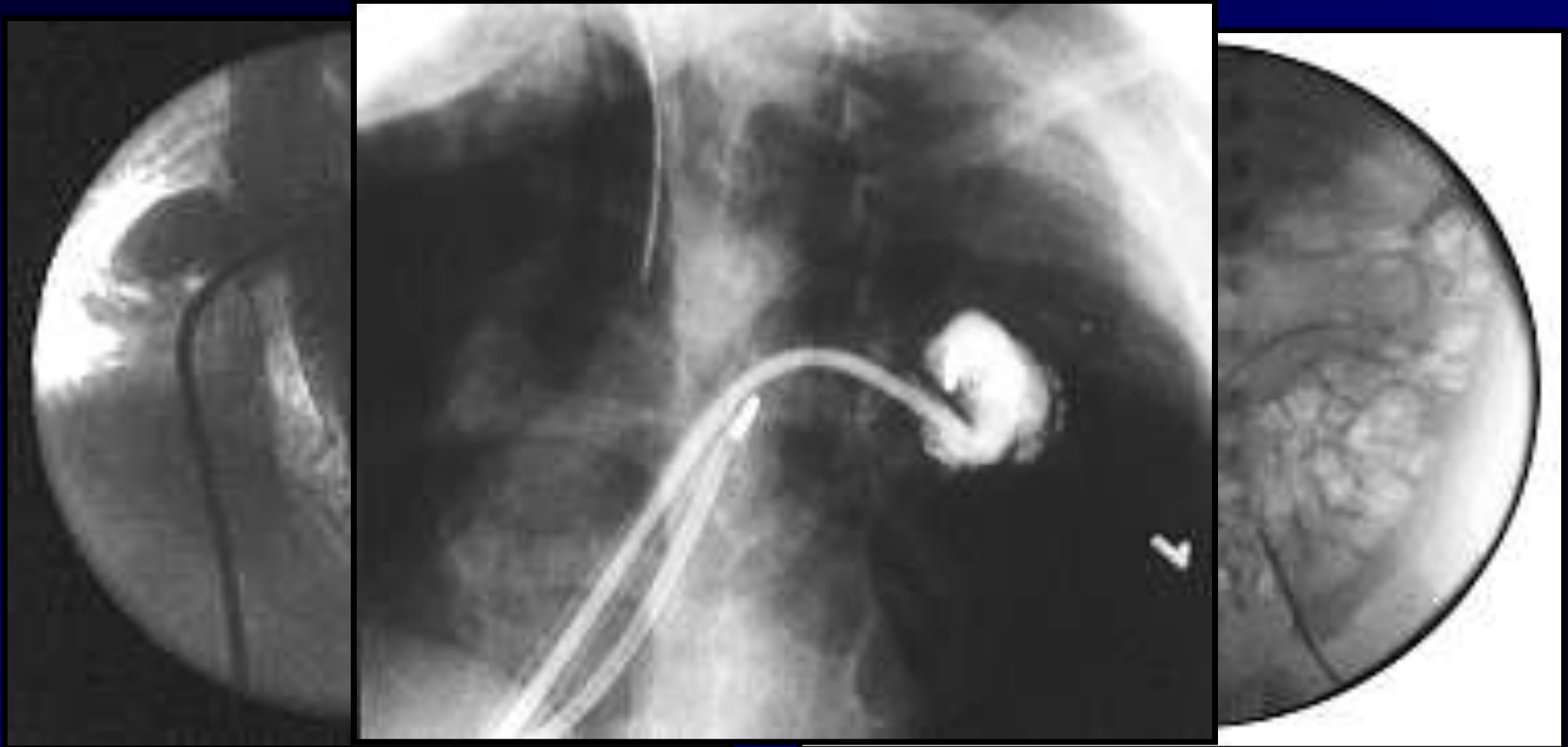
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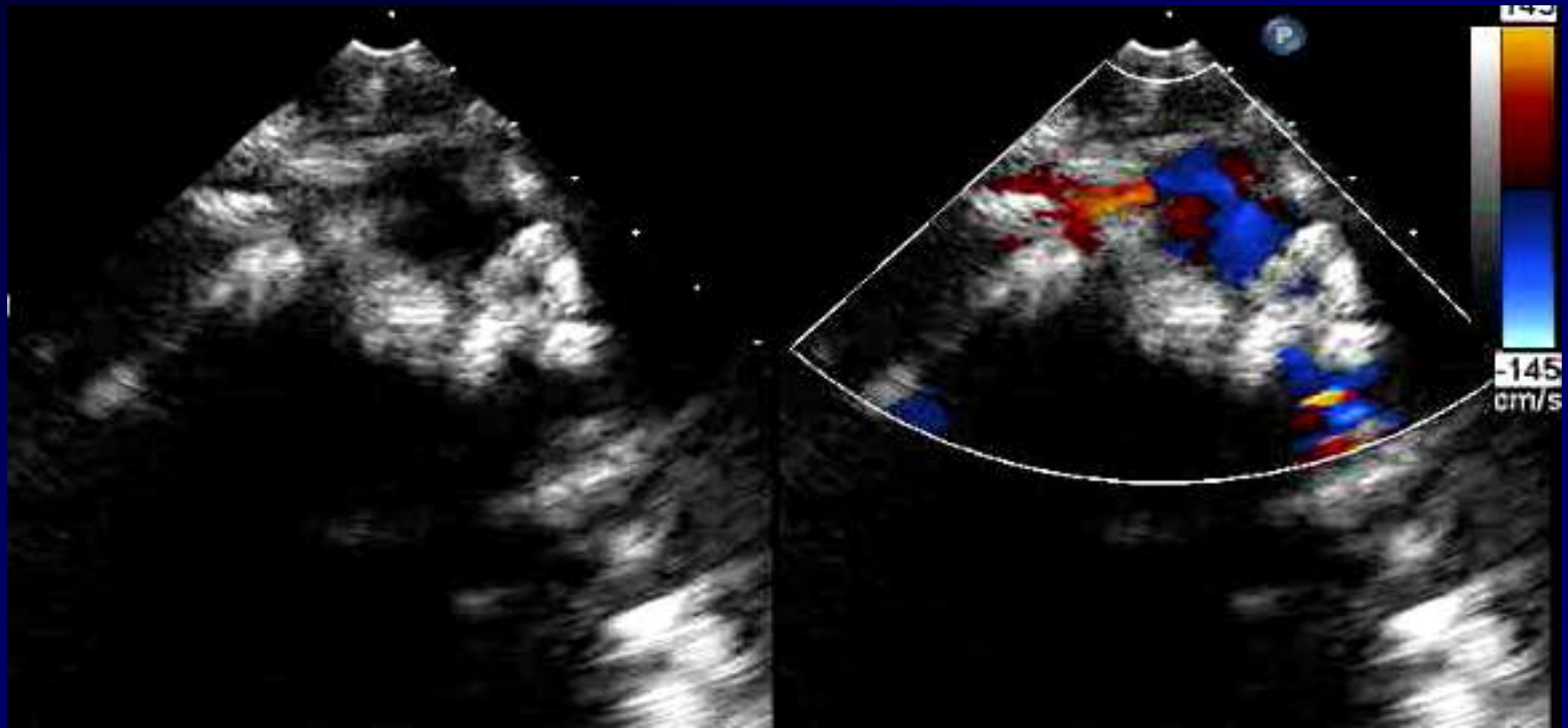
- See precath Echo
- Calcification homograft ++ gradient approaching 90mmHg mild PR
- Mild - moderate aortic regurgitation
- Catheter:
- RV 93/9 Ao 80/50
- PA 20/9
- RVOT angio severe calcified conduit v stenosed more noticeable in AP dimension

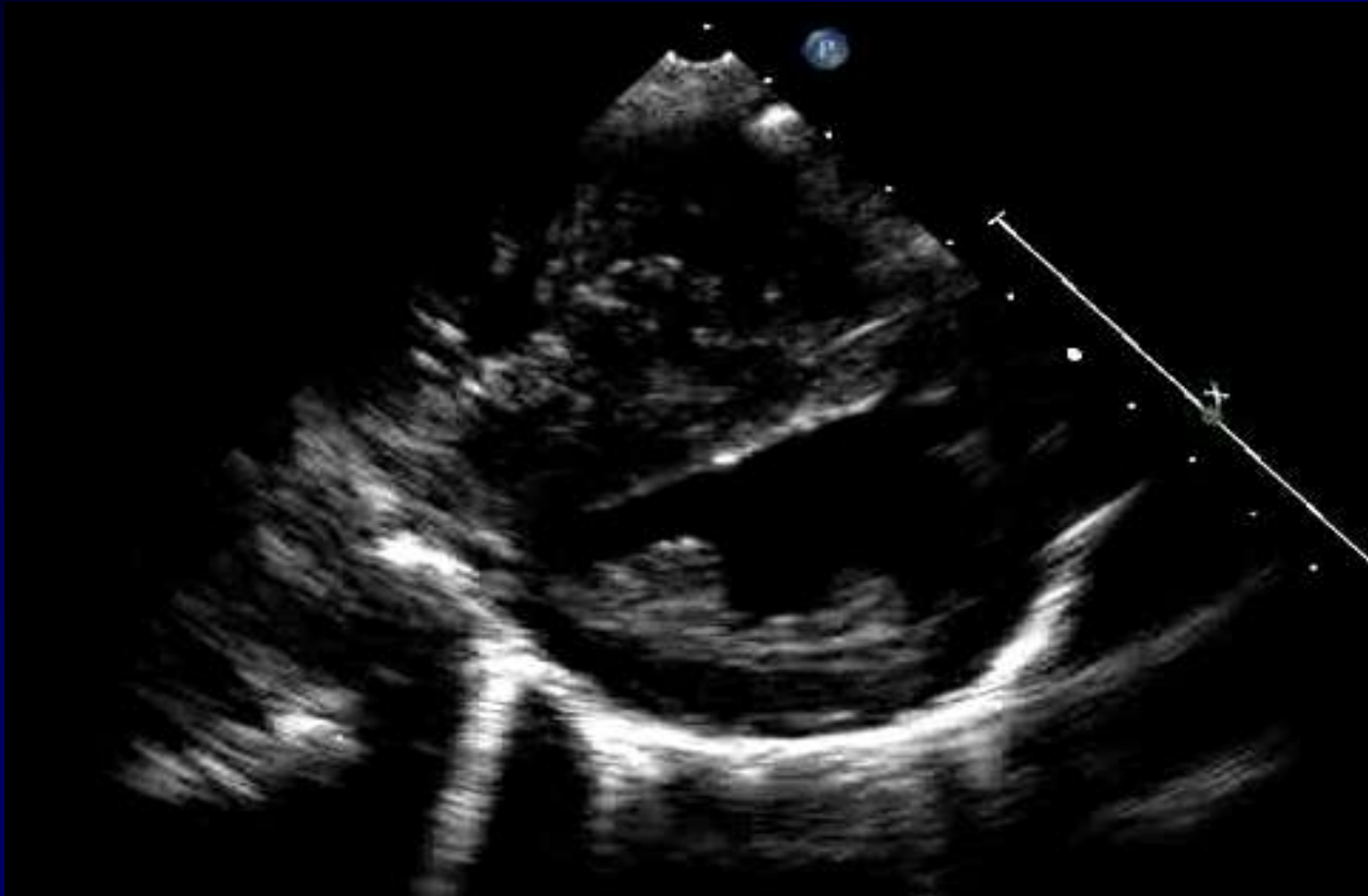
Stent Fracture 1 year post implant



Extravasation

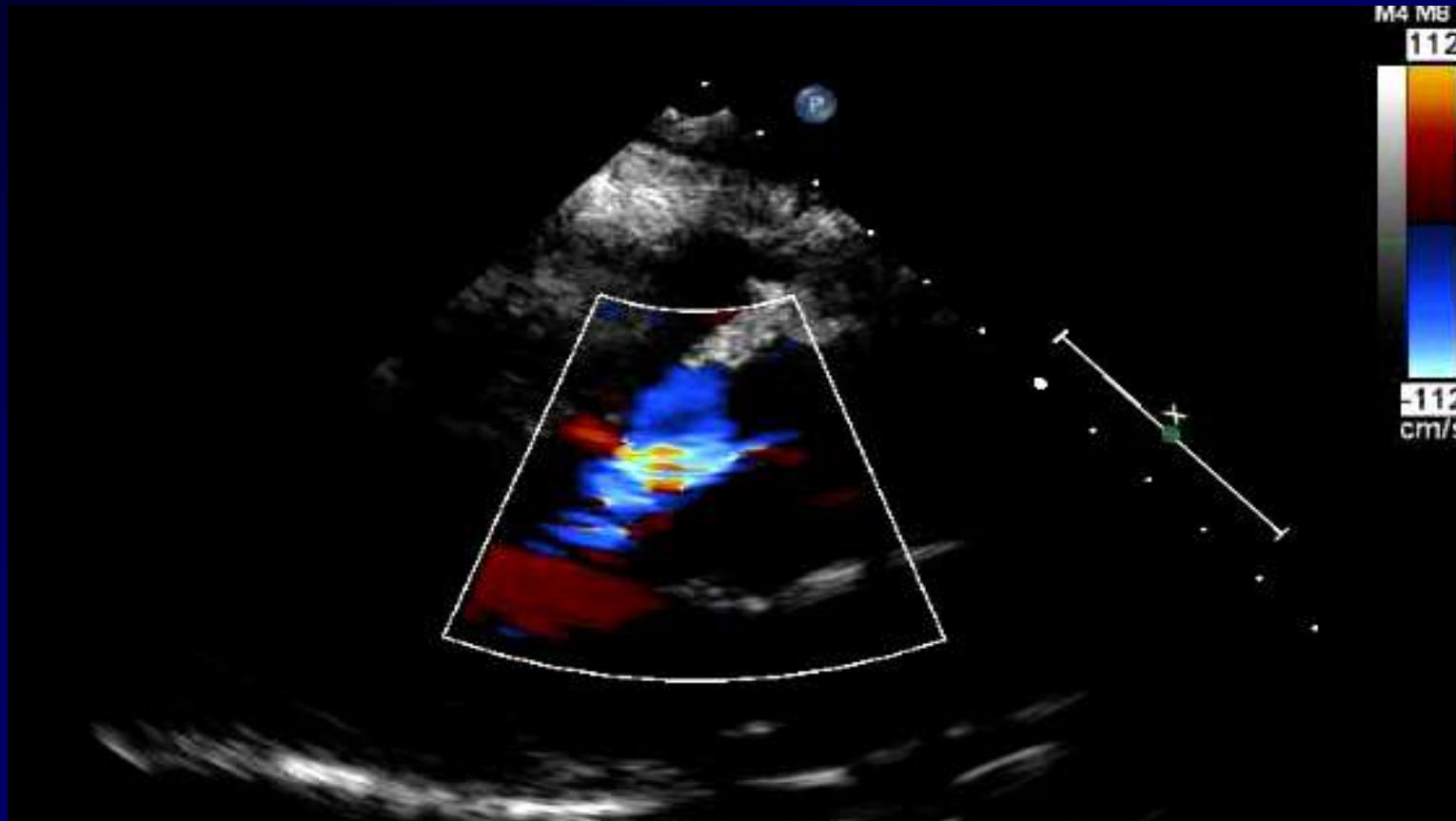






AR

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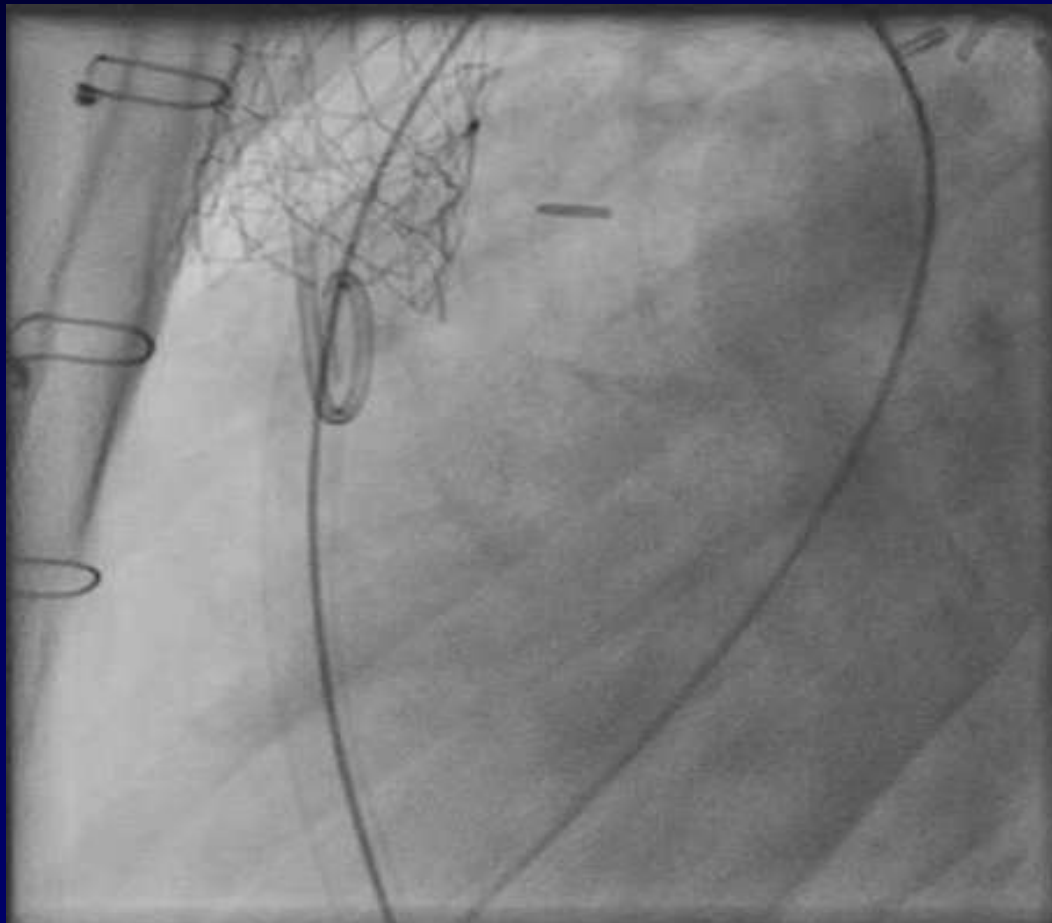


JM

- Dilation with 16mm Atlas Gold 14 atmospheres
- Dilation 20mm Atlas & simultaneous Aortogram
- Coronaries fine
- Prestent with Palmaz 3010 on 20mm Atlas Gold
- ST segment elevation: HR 87 BP 87/54
- Aortogram coronaries unequivocally OK
- Second prestent Palmaz 3010 on 20mm Atlas Gold

JM

Aortogram after prestent when ST segments elevated



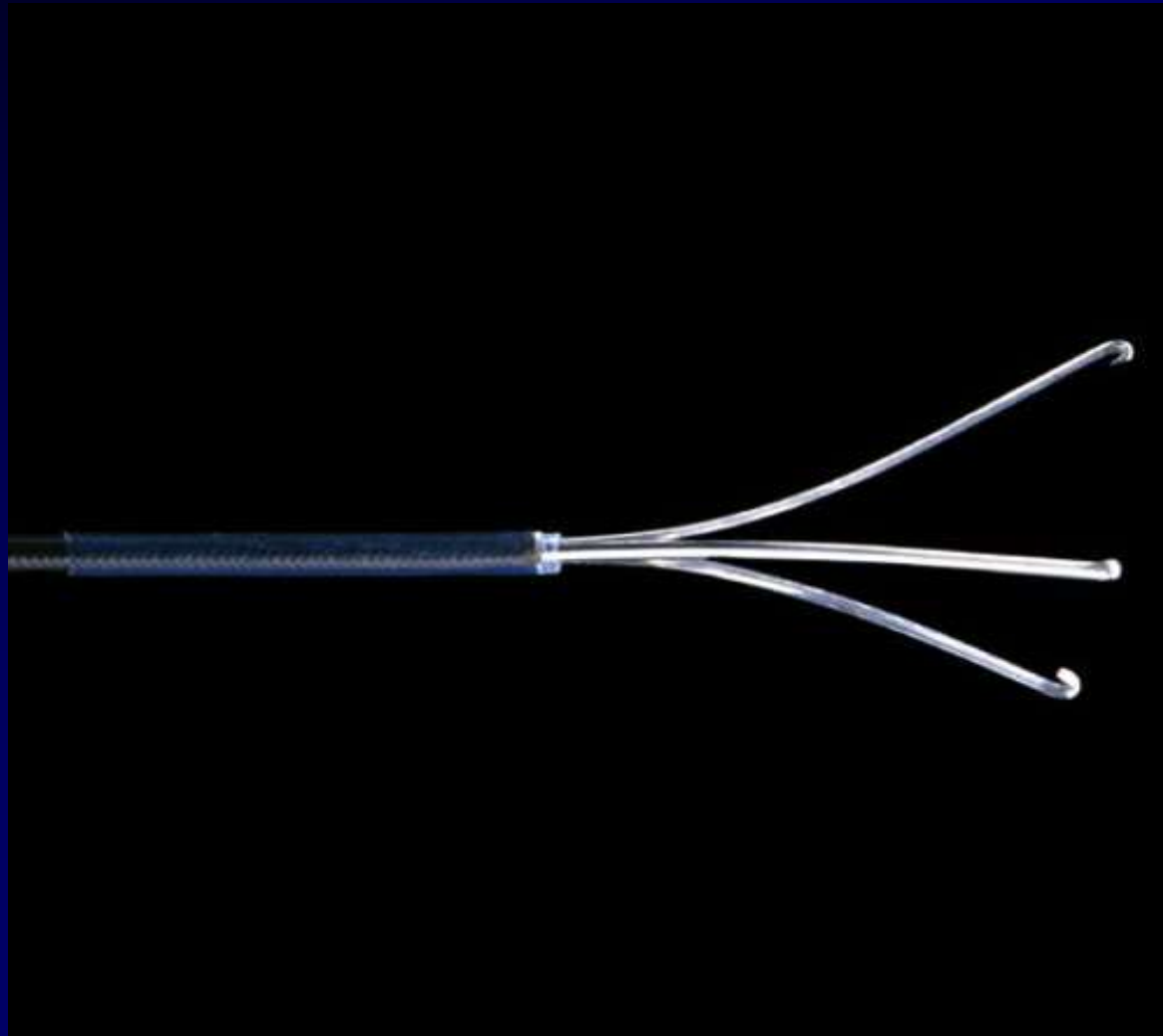
Double switch for 'double discordance' +VSD (previous banding)



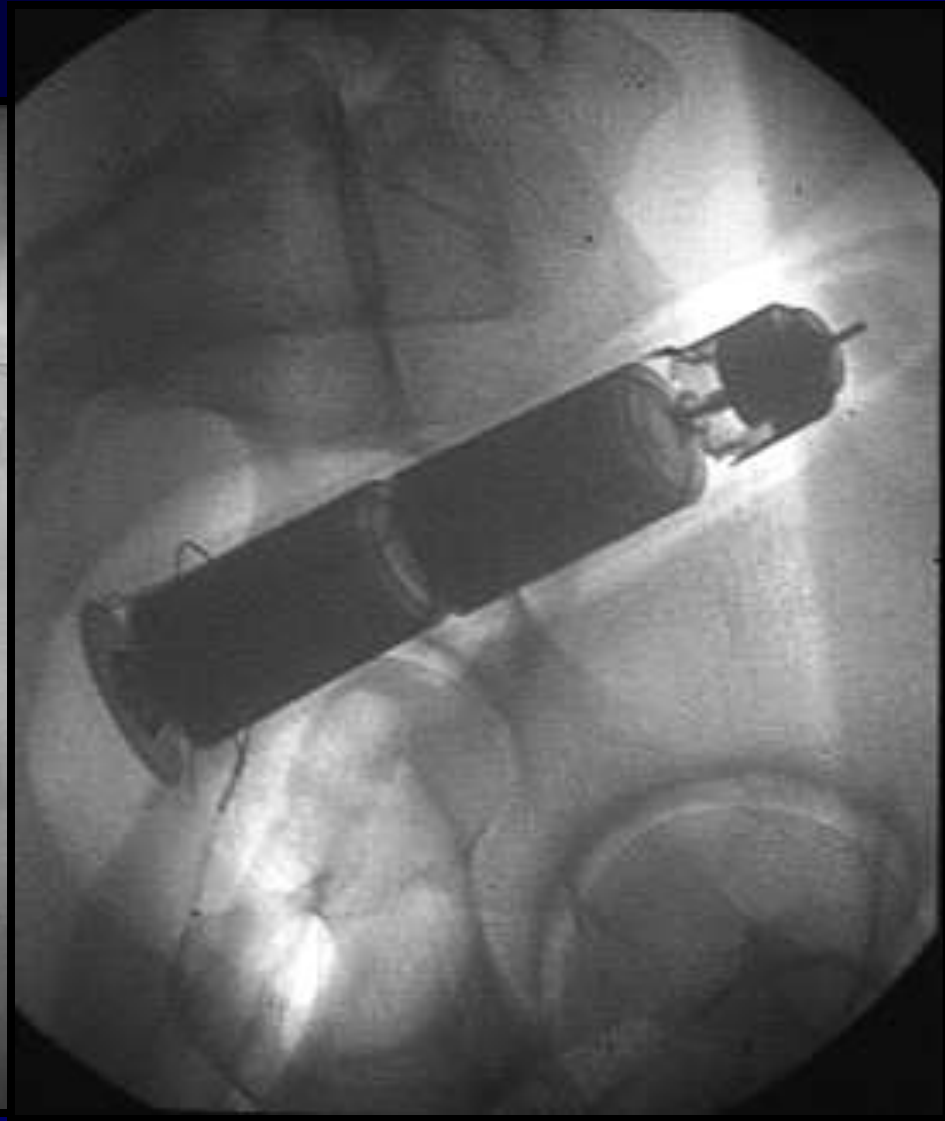
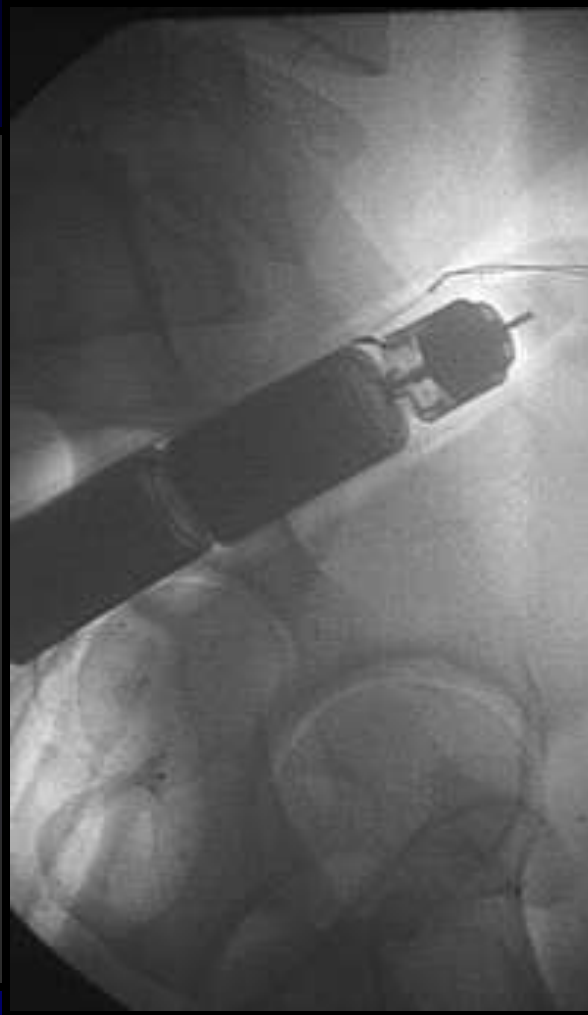
JM

- ST segments remain elevated
- HR 108
- BP sagging mid - high 70s
- Angiogram
- Anterior leak proximal third

Cook Grasper Forcep



Unusual use of a retrieval Device for Embolisation



JM



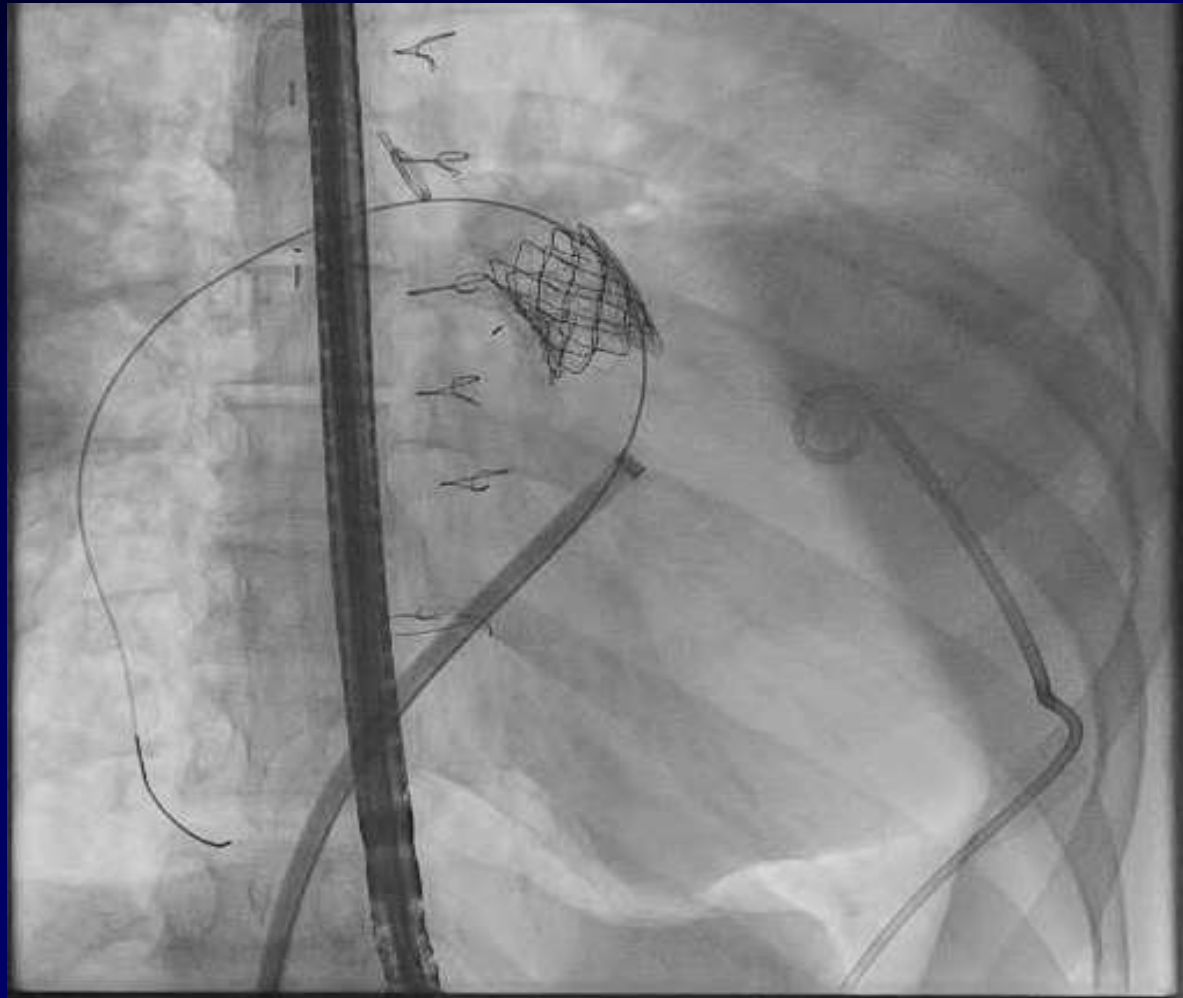
JM

- Echo > pericardial > pleural effusion
- Pericardiocentesis & autotransfuse
- Keeping HR 110 & BP 80s mmHg
- ?
- Reverse heparin?
- And see what happened
- Proceed with Melody on 20mm Ensemble
- Repeat angio shows persisting leak
- Try second Melody

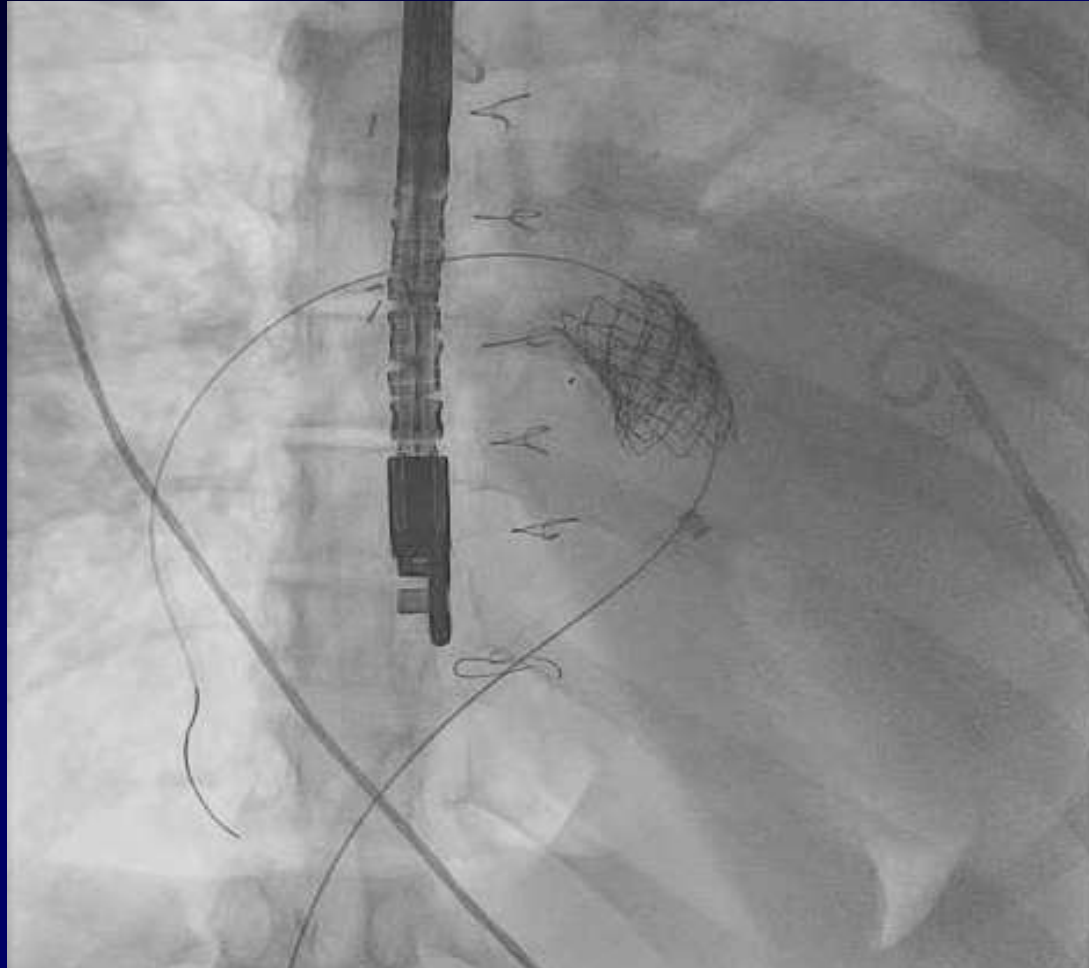
JM



JM



JM



JM

- Pressures falling
- Very little from drain
- Worsen and worsen
- > CPR 3-4 minutes with recovery
- > Fem Fem bypass in lab (18Fr venous sheath in situ)
- > Surgery & PVR
- Findings long tear transventricular wall of RVOT 2.5 - 3cm

I taught him all the bad habits

But evidently not dress sense



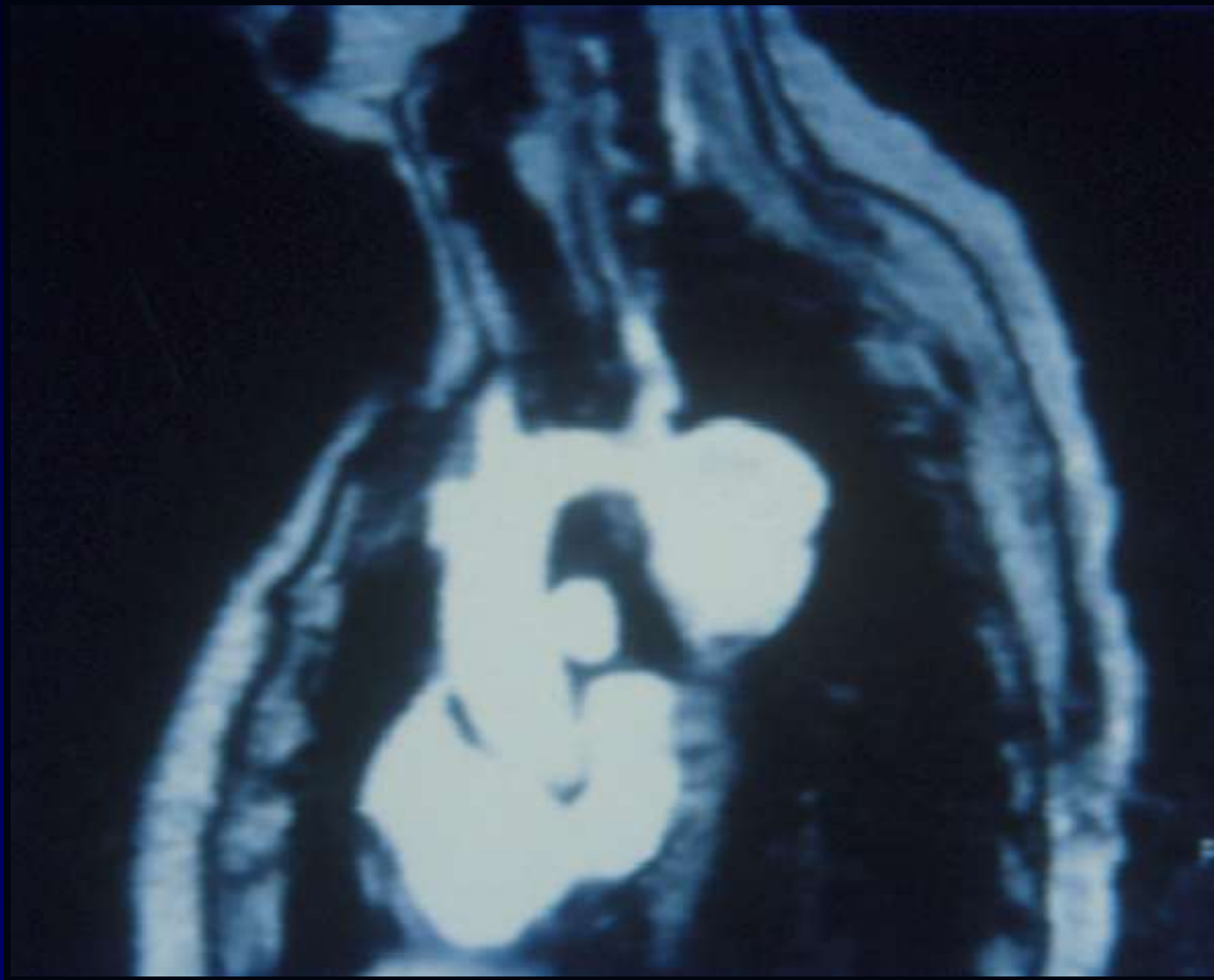
Stenting Coarctation



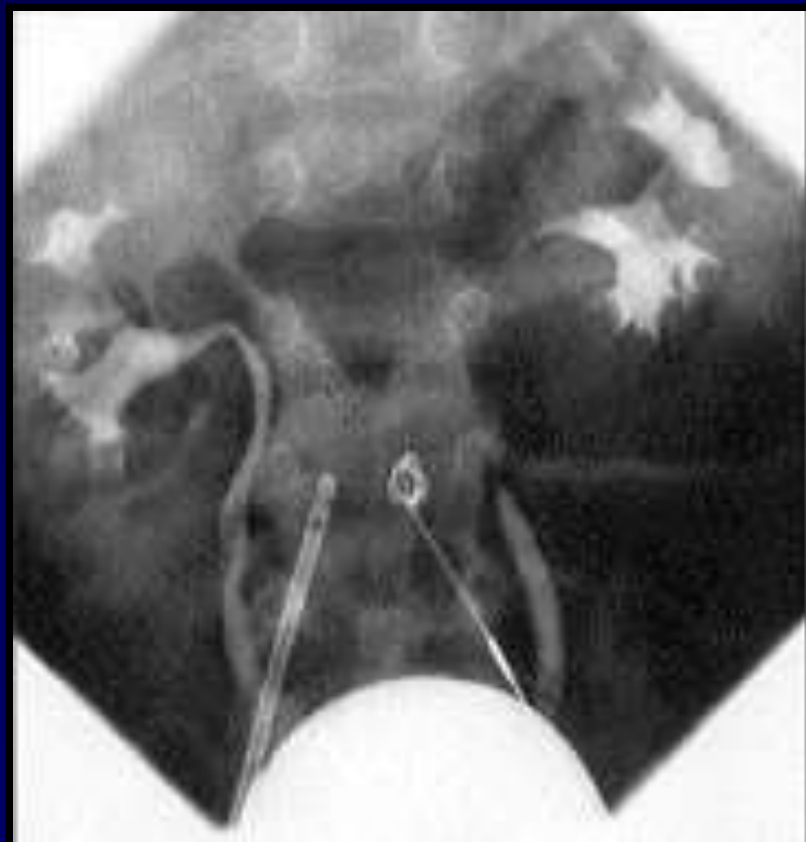
JM



Aneurysm post dacron patch surgical angioplasty



More coil embolisation!



Remember the Rashkind umbrella?

Severe LPA stenosis post duct closure



Ensnare



Expro Elite



Cook Flexible Biopsy Forcep



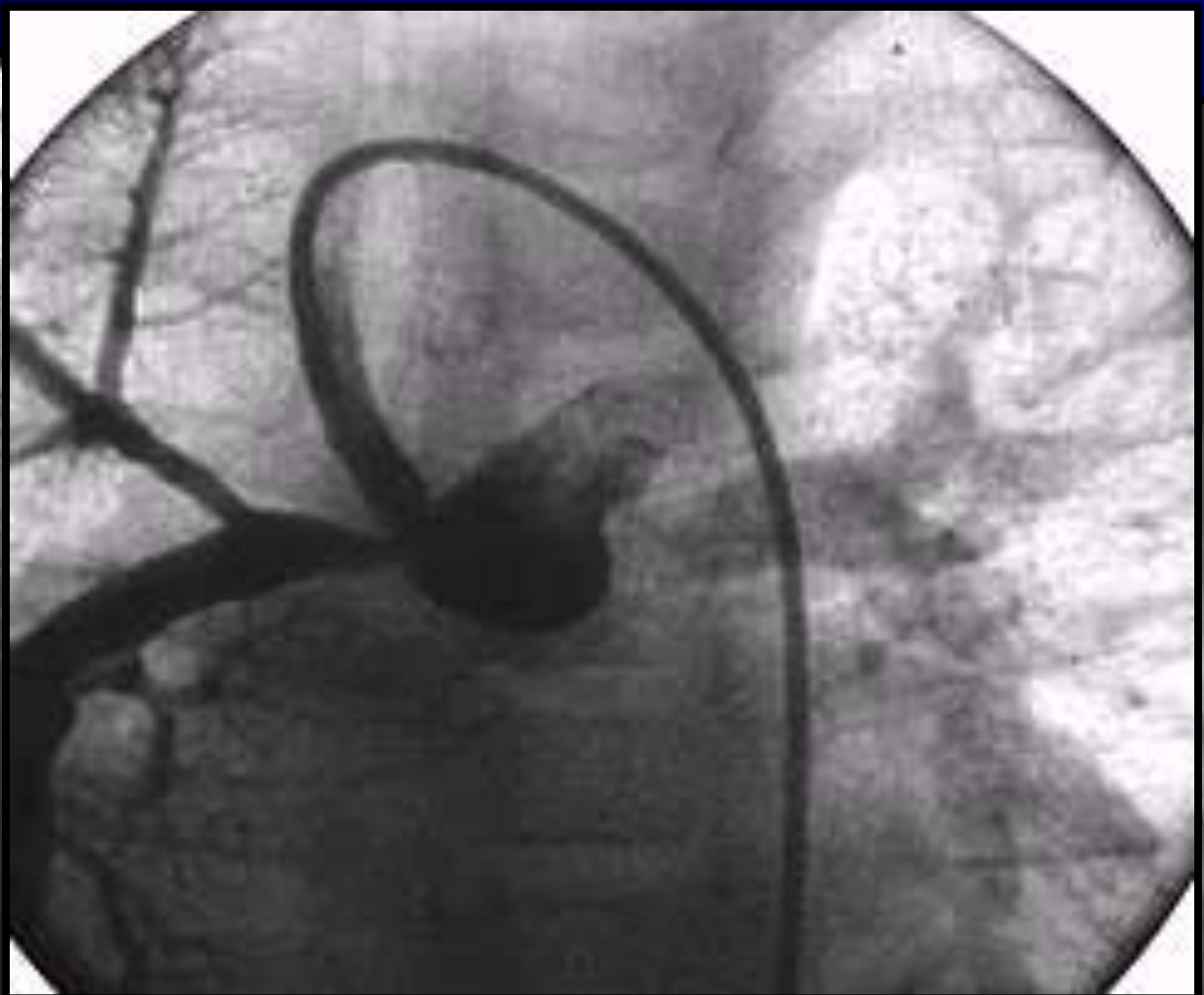
Cook Grasper Forcep



Aneurysm post angioplasty native coarctation



Surgical complications



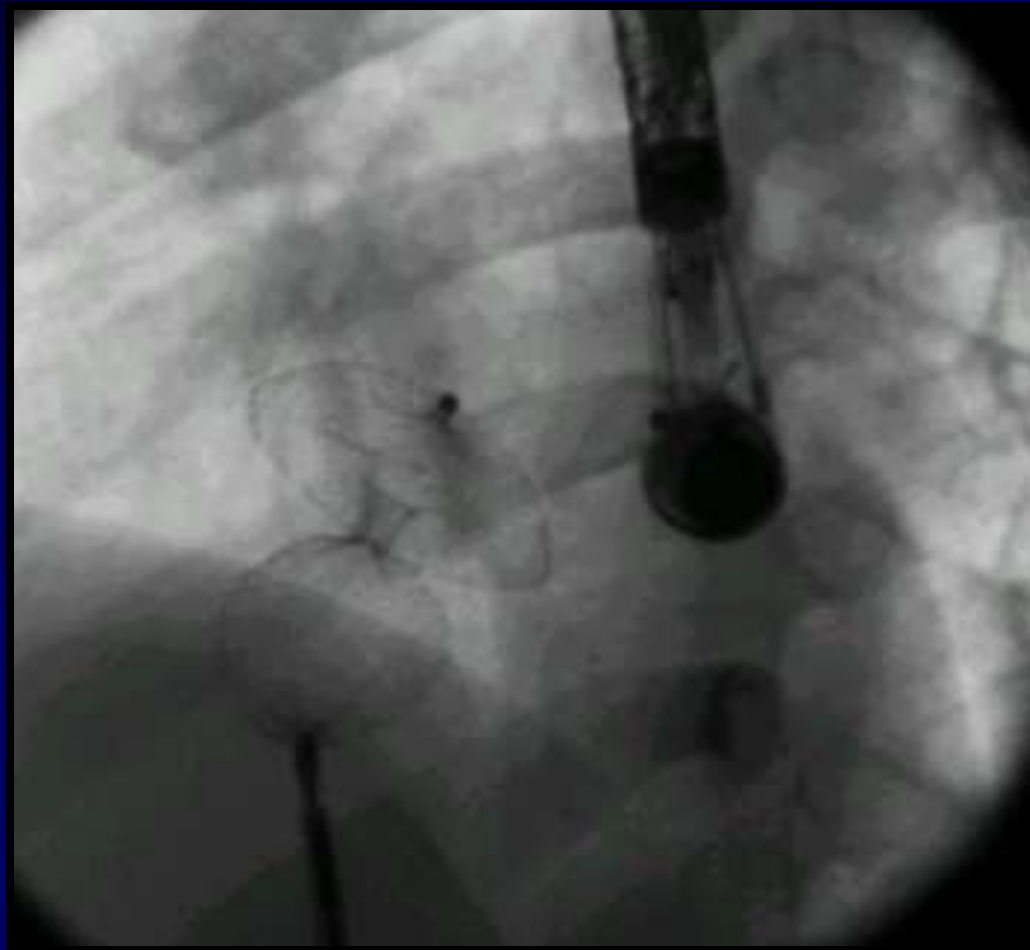
Local vascular complications

- Femoral artery occlusion
- Not just related to sheath size
- No of puncture attempts relevant
- Heparin protocol
- Post procedure protocol
- High Frequency Ultrasound more

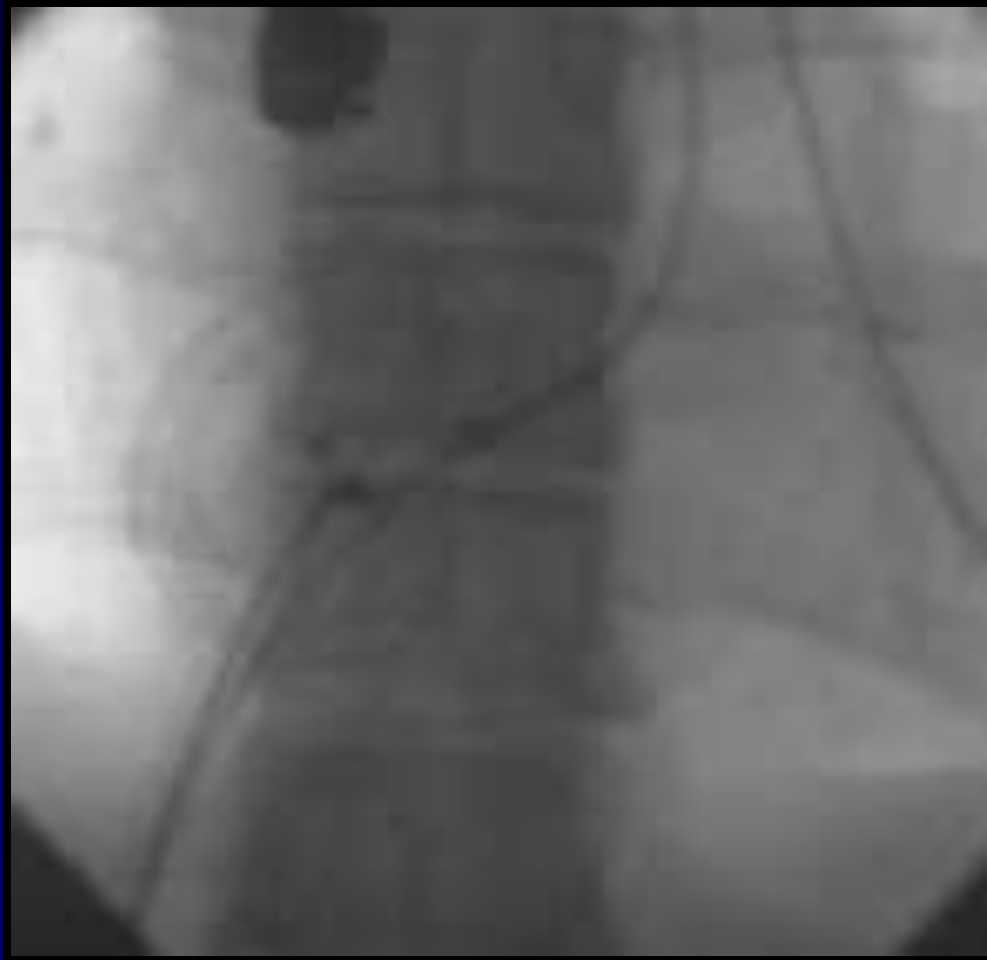


Unconstituted Amplatz device

Multifenestrated ASD



Amplatz ASO Embolisation



Haemopericardium during RF valvuloplasty



Amplatz Embolisation

RA>RV>RA>RV>RA etc etc

