# Persisted Coronary Perforation After Serial Successful Graft Stenting

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# Patient Profile

- 80 y/o male
- C.C:
  - Exertional angina, CCS Fc II
- PH: HTN, Hyperlipidemia, CAD with SVD (RCA-CTO) diagnosed in Feb 2012, he was referred to our H for CTO intervention
- Echo: TAV, with preserved LV function, mild MR

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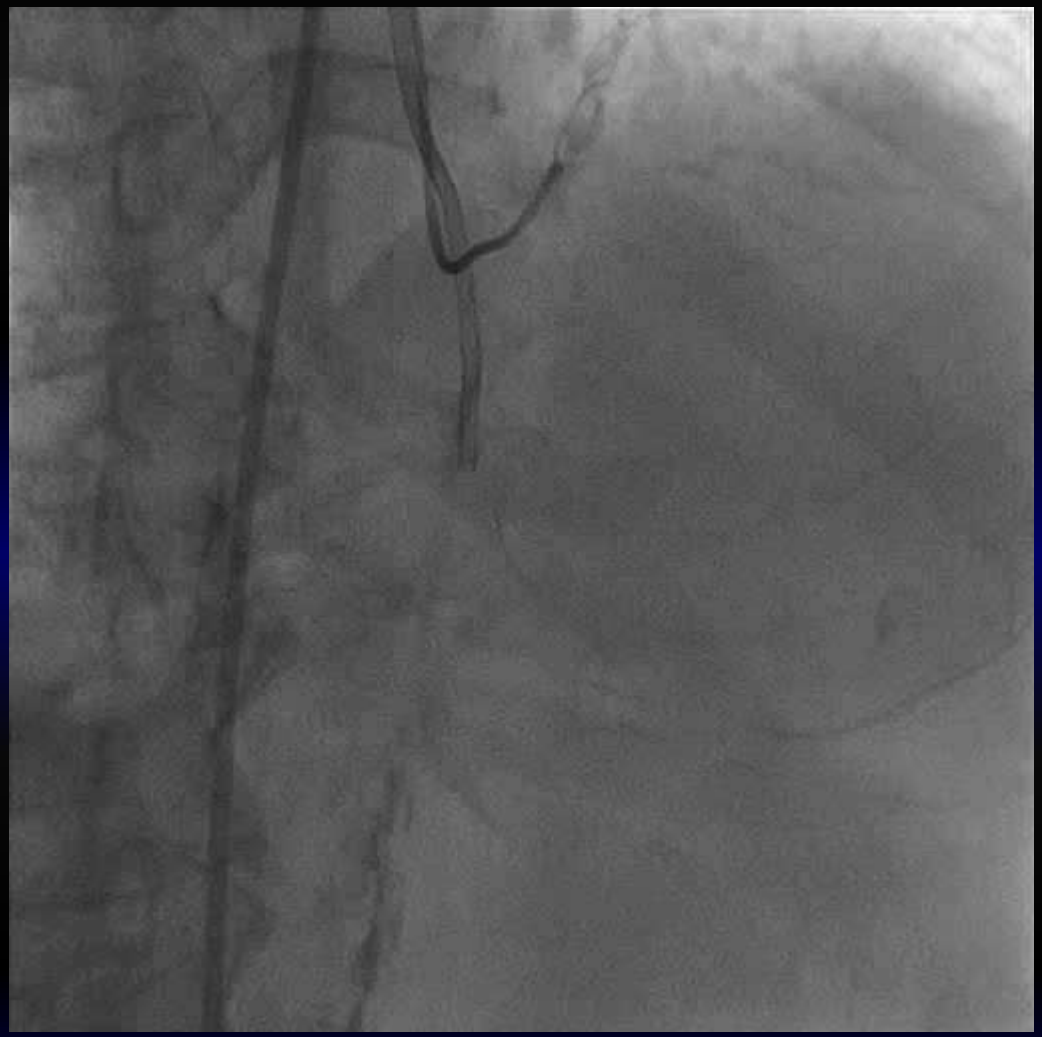

LAD: lumen irregularity

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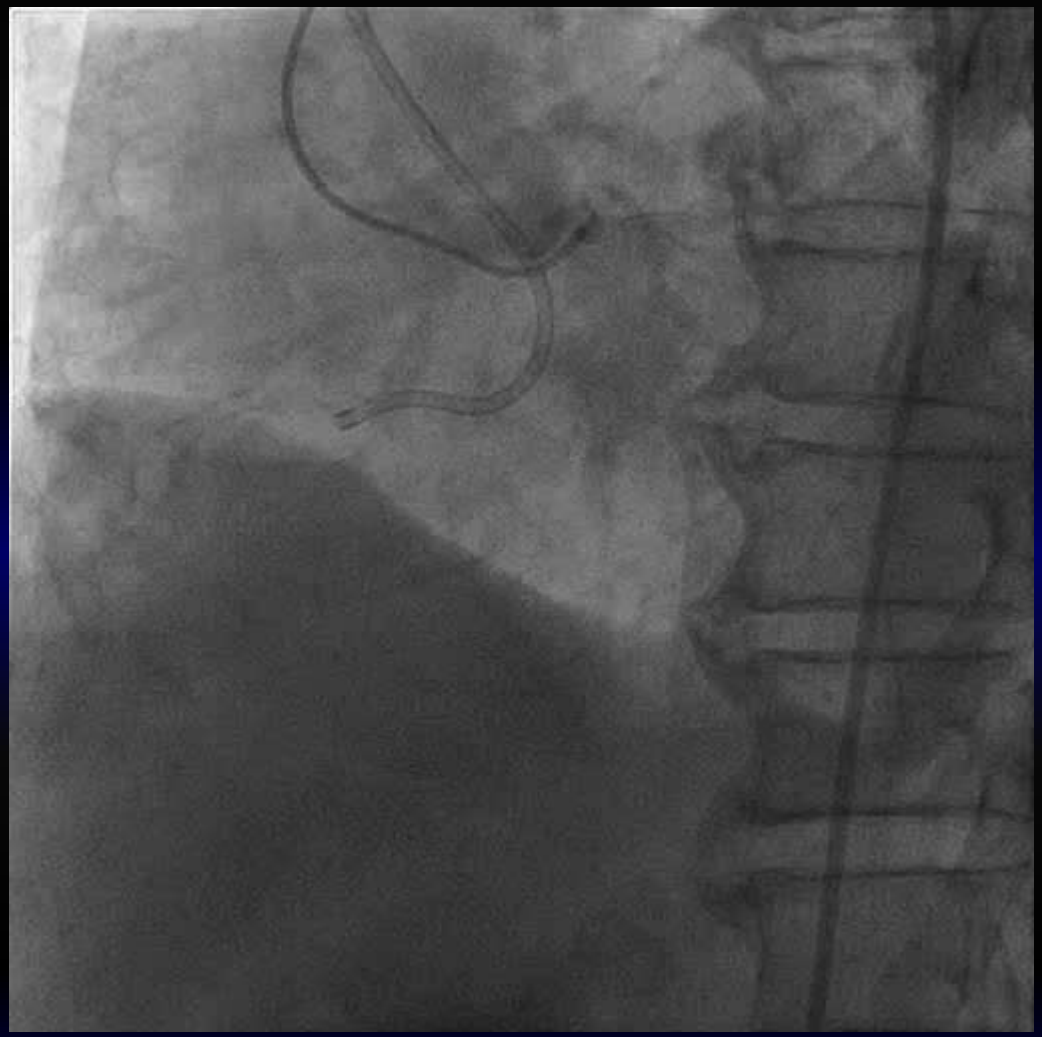
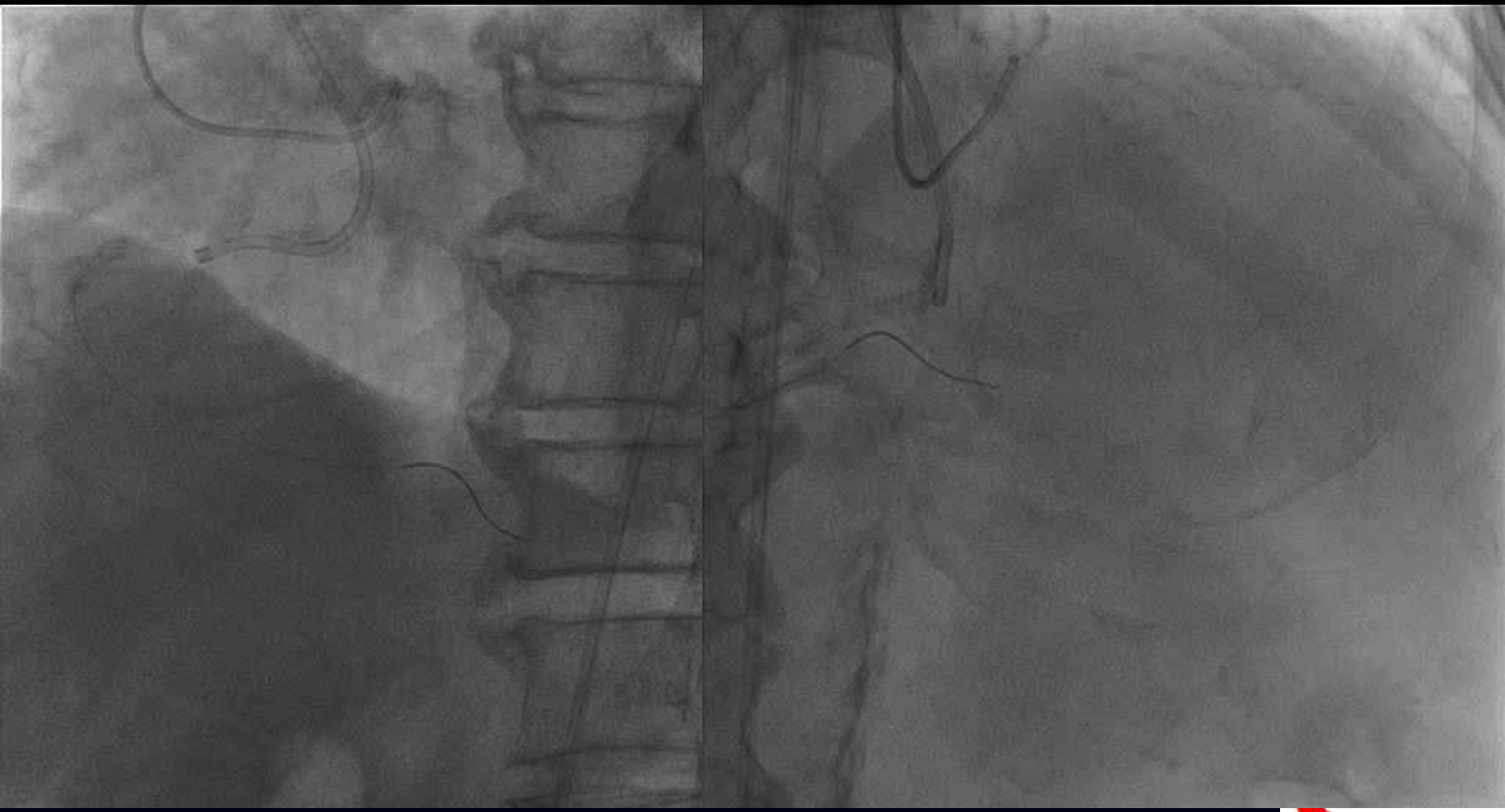
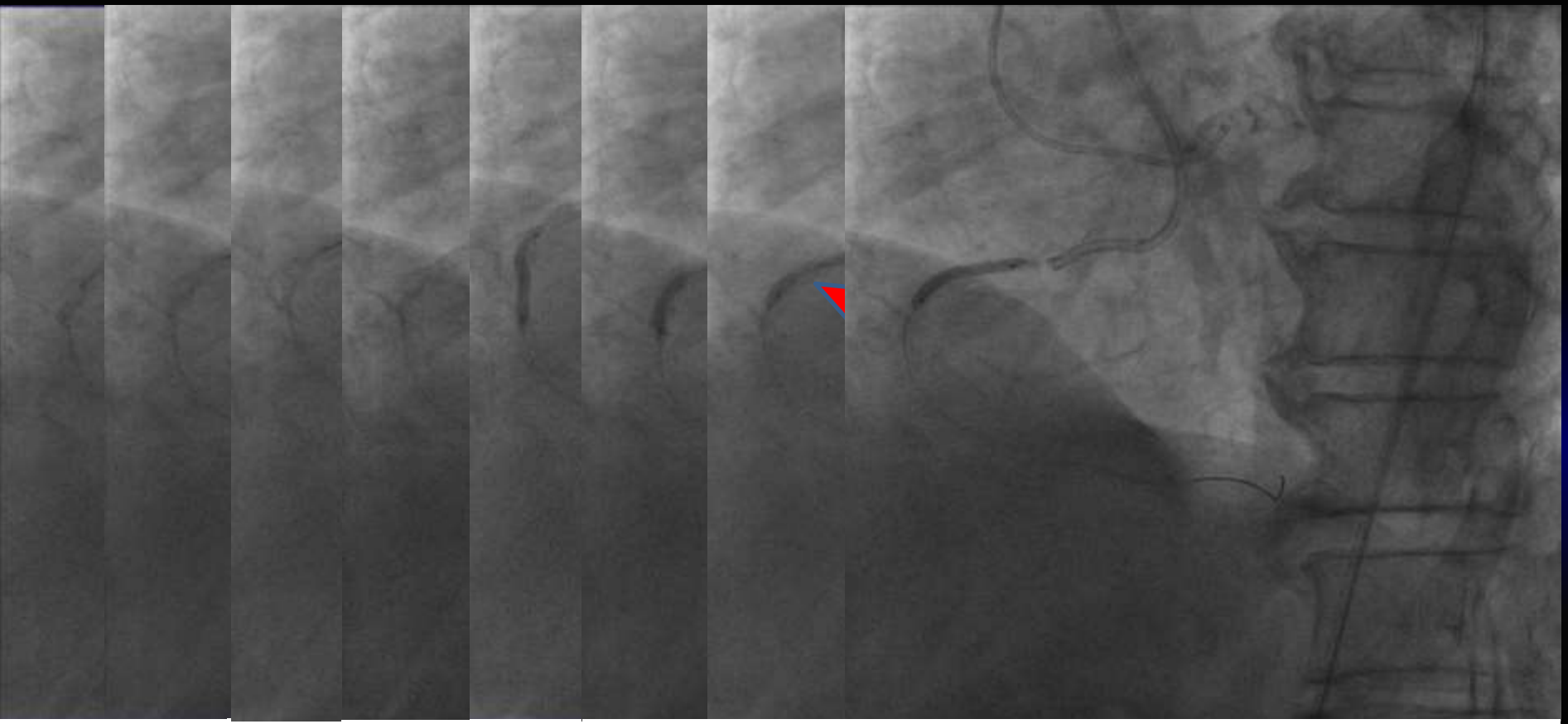


RCA-os : CTO

# PCI Strategy

- Bilateral approach. (Femoral and Radial)
- 7F AL1(Femoral) 5F JL (Radial, LCA)
- Filder Fc with finecross microcatheter. Parallel wire technique, stiff wire…
- Retrograde approach if needed…





2.5 Trek

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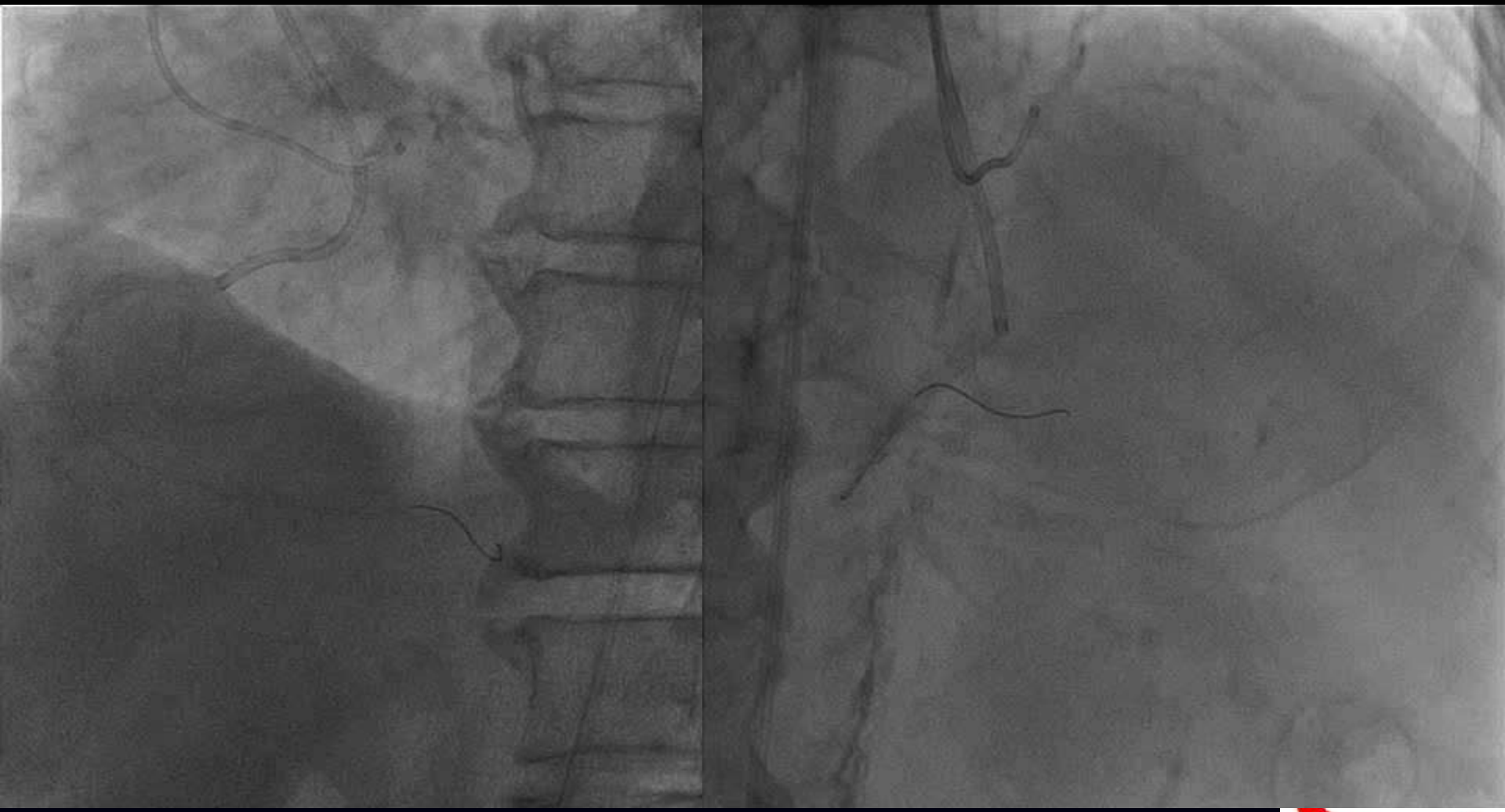
# After 2.0/20 PTCA



# IVUS Exam

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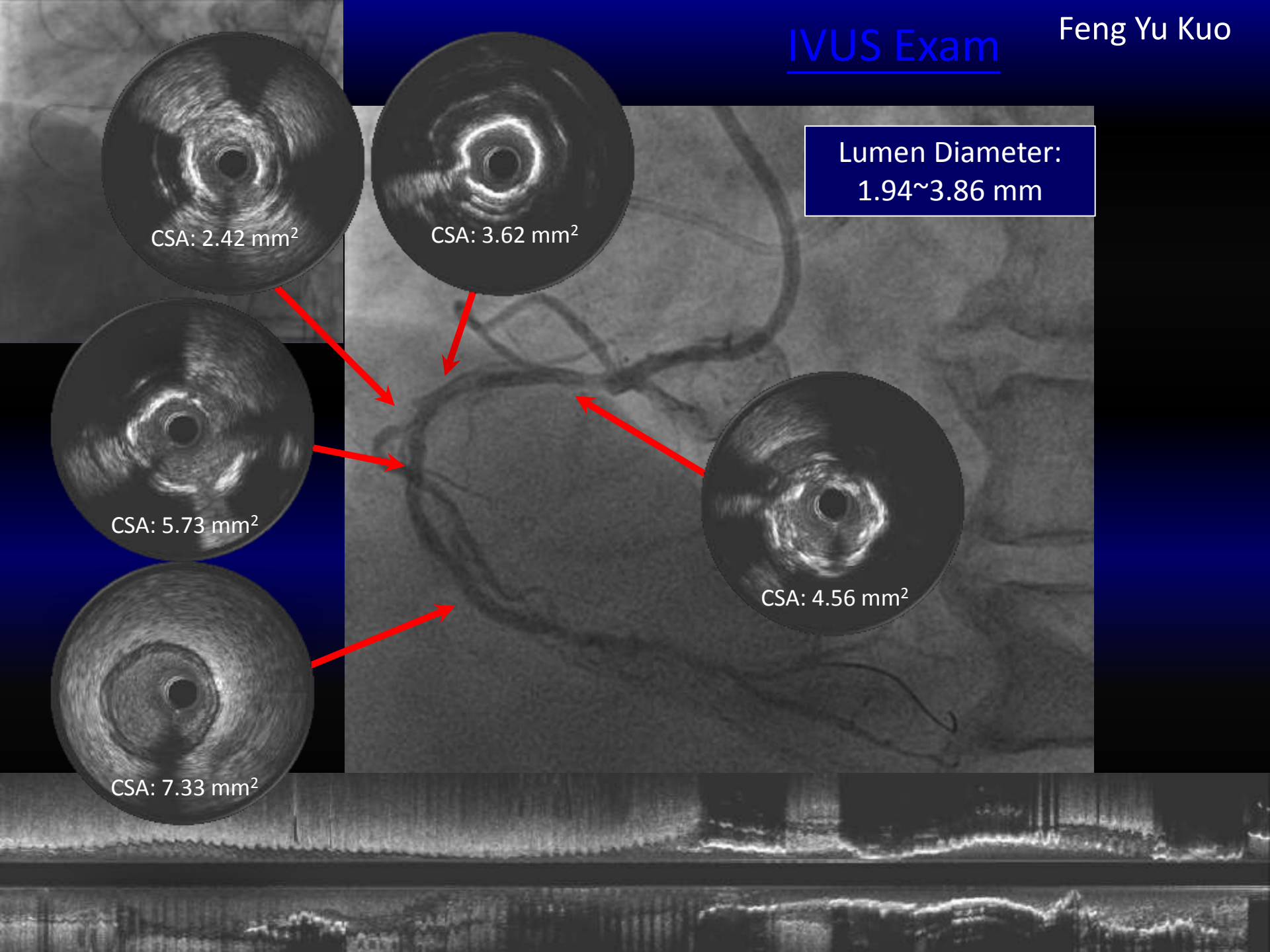

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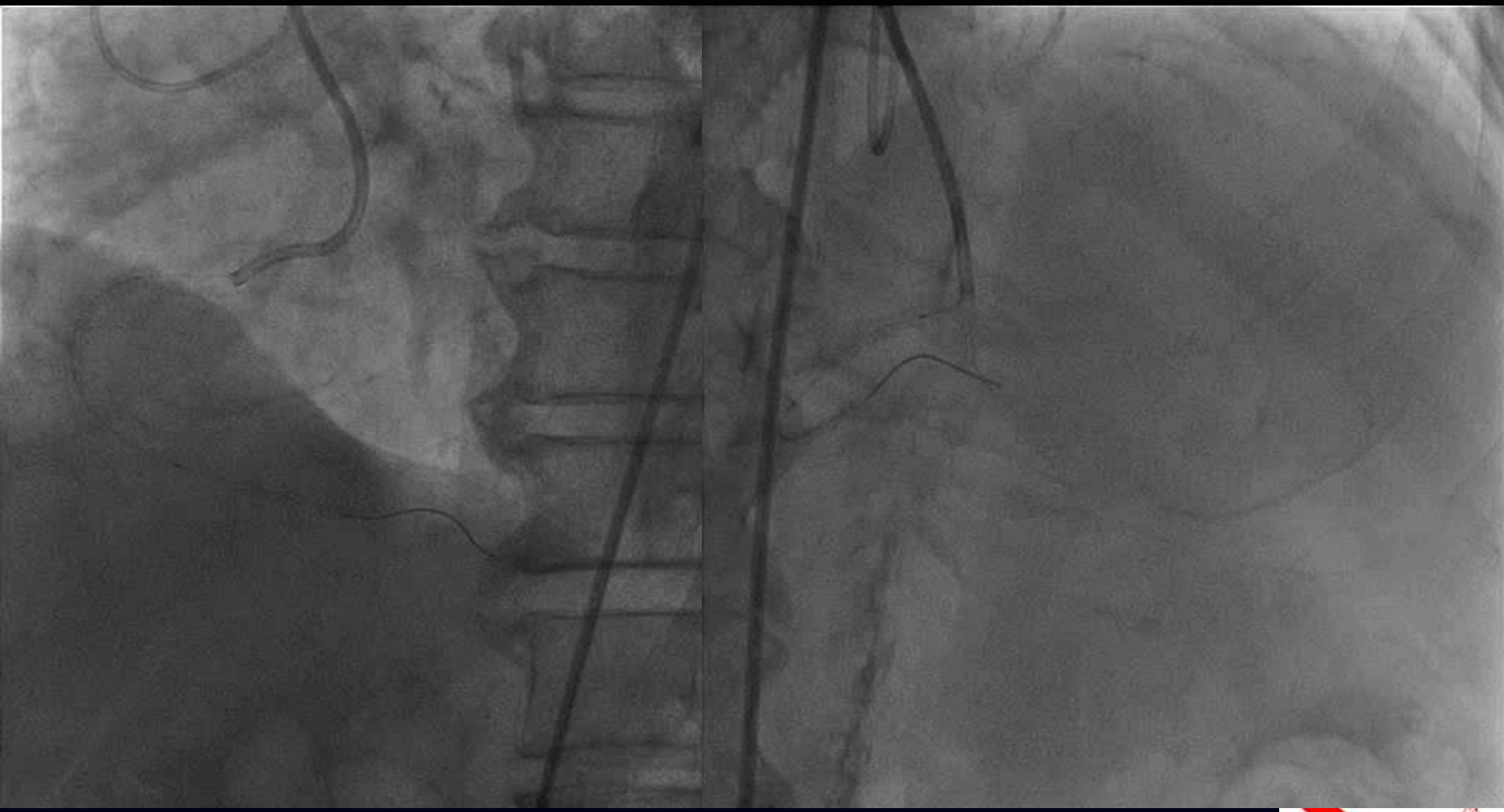
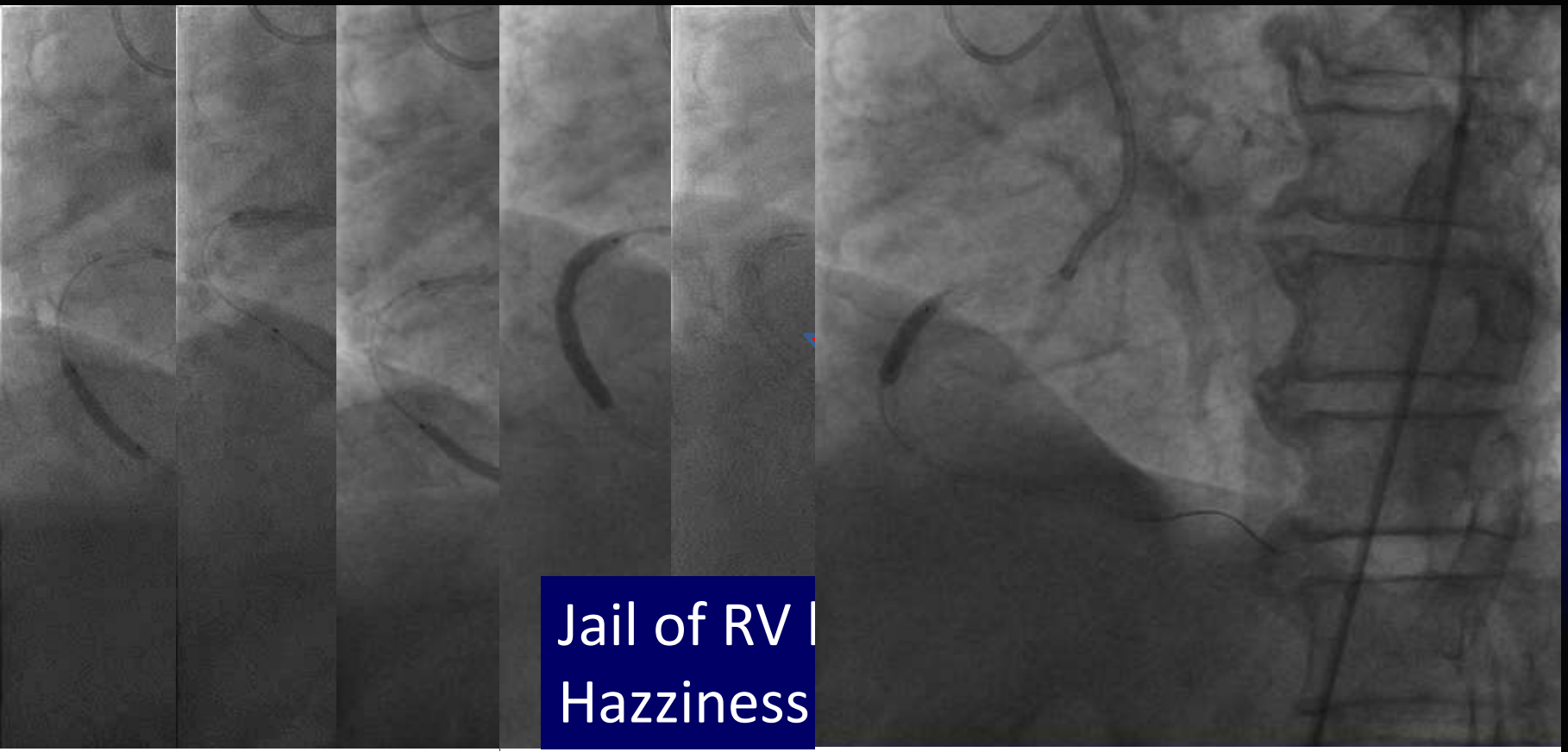
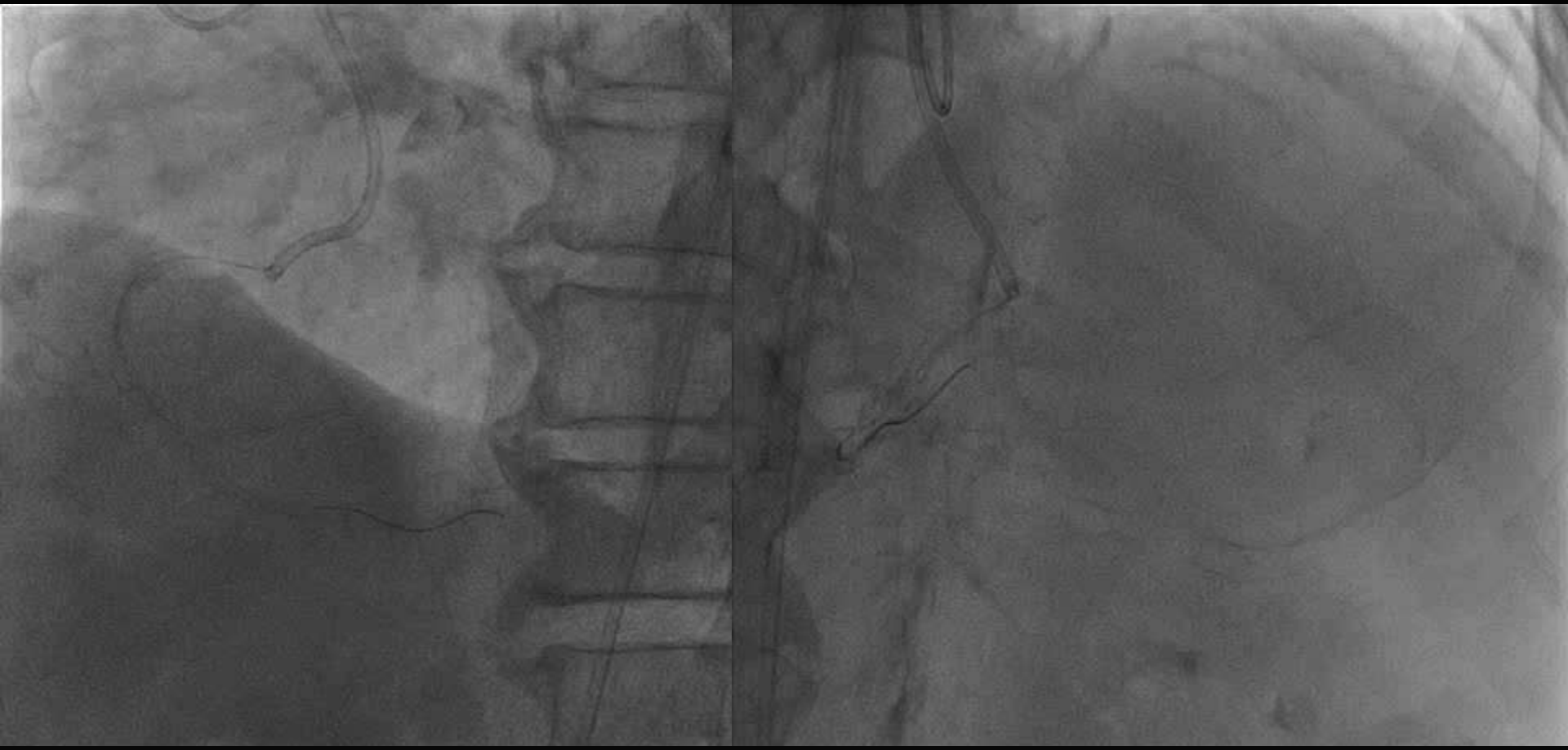
# After 2.5/20 PTCA






2.5 B Aft 3.5 high pressure

# After 3.5 high pressure balloon



Ellis Type III Coronary perforation after high pressure balloon

# Coronary Perforation

- Class I
  - Extraluminal crater without extravasation
- Class II
  - Pericardial or myocardial blush / no contrast jet
- Class III
  - Extravasation through >1mm perforation
- Class IV
  - Extravasation into a chamber or coronary sinus not pericardial space

Ellis classification, *Circulation 1994*

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# Cause of Coronary Perforation

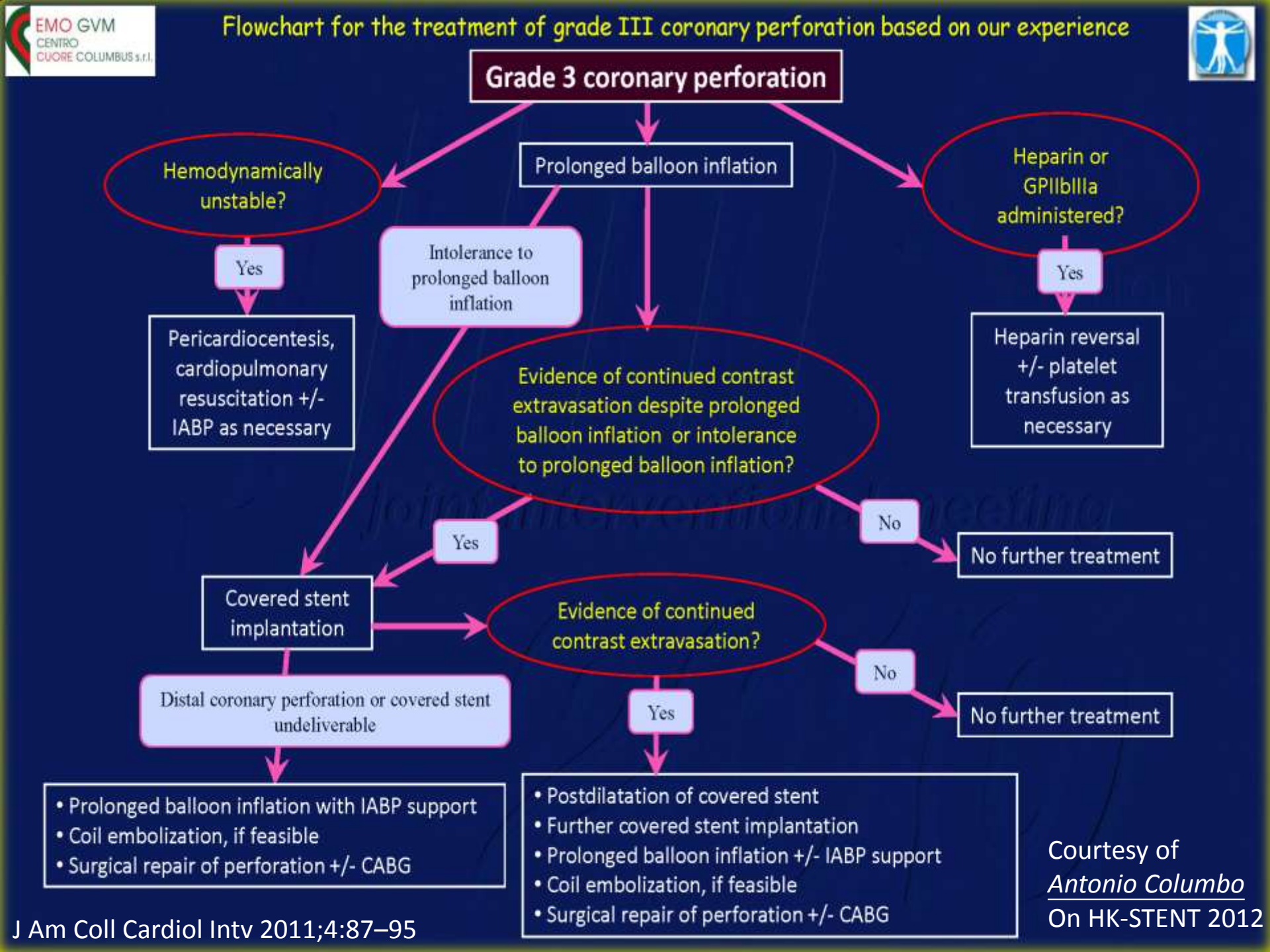
| Study | Year | Wire causative | Rota | DCA | Laser |
|---|---|---|---|---|---|
| Von Sohsten | 2000 | 5/15 (33%) | 8/15** | 2/15 | |
| Gruberg | 2000 | | 19/84 | 7/84 | 14/84 |
| Fejka | 2002 | 10/31 (33%) | 5/31 | 1/31 | 1/31 |
| Fukutomi | 2002 | 27/69 (39%) | | | |
| Gunning | 2002 | | 4/52 | 0 | 0 |
| Fasseas | 2003 | 29/95 (31%) | | 6/95 | 3/95 |
| Witzke | 2004 | 20/39 (51%) | | ? | |
| Ramana | 2005 | 17/25 (68%) | | 2/25 (causative) | |
| Javaid | 2006 | 15/72 (21%) | | 14/72 | |
| Shirakabe | 2007 | 3/12 (25%) | 3/12 | | |

***Other mechanisms .. Post dilatation, de novo POBA, de novo stent deployment***

# Class III Coronary Perforation

- *Class III* coronary perforation is the *most serious* form of perforation
- Associated mortality rates : 7% to 44%.
- Predictors : Complex coronary lesions,coronary total occlusions, and the use of rotablation and IVUS
- Treatment modalities: Prolonged balloon inflation, covered stent implantation,pericardiocentesis, surgical repair/CABG, and microcoil embolization

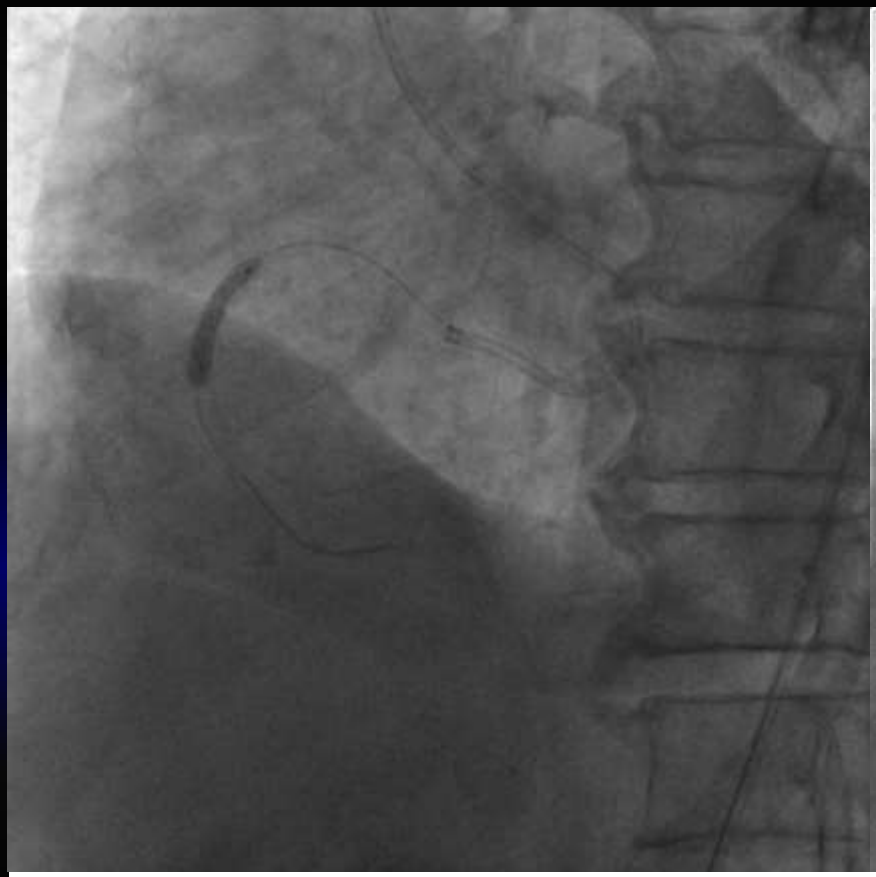
J Am Coll Cardiol Intv 2011;4:87–95,
Am J Cardiol 2009;104:1674 –7.
Am J Cardiol 2006;98:911– 4.
J Invasive Cardiol 2005;17:606–8.
Circ J 2002;66:349 –56.


EMO GVM
CENTRO
CUORE COLUMBUS s.r.l.
Flowchart for the treatment of grade III coronary perforation based on our experience
Grade 3 coronary perforation
Hemodynamically unstable?
Prolonged balloon inflation
Heparin or GPIIbIIIa administered?
Yes
Intolerance to prolonged balloon inflation
Yes
Pericardiocentesis, cardiopulmonary resuscitation +/- IABP as necessary
Heparin reversal +/- platelet transfusion as necessary
Evidence of continued contrast extravasation despite prolonged balloon inflation or intolerance to prolonged balloon inflation?
No
Yes
No further treatment
Covered stent implantation
Evidence of continued contrast extravasation?
No
Distal coronary perforation or covered stent undeliverable
Yes
No further treatment
• Prolonged balloon inflation with IABP support
• Coil embolization, if feasible
• Surgical repair of perforation +/- CABG
• Postdilatation of covered stent
• Further covered stent implantation
• Prolonged balloon inflation +/- IABP support
• Coil embolization, if feasible
• Surgical repair of perforation +/- CABG
Courtesy of
Antonio Columbo
On HK-STENT 2012
J Am Coll Cardiol Intv 2011;4:87–95

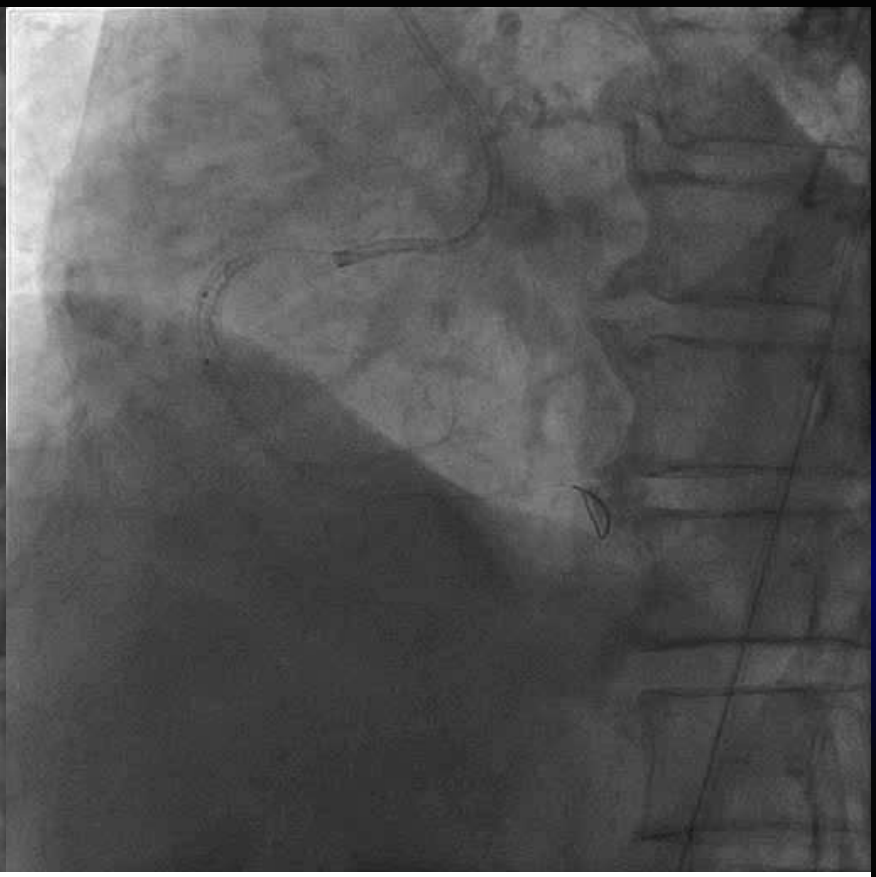
# Strategy in our Case

- Reverse coagulation (35 mg Protamine sulfate, 7500 u heparin bolus at beginning of PCI)
- Prolonged balloon inflation
- Pericardiocentesis and IV hydration if unstable hemodynamic
- Cover stent if failed balloon inflation
- Consider surgical repair if all the above procedure failed

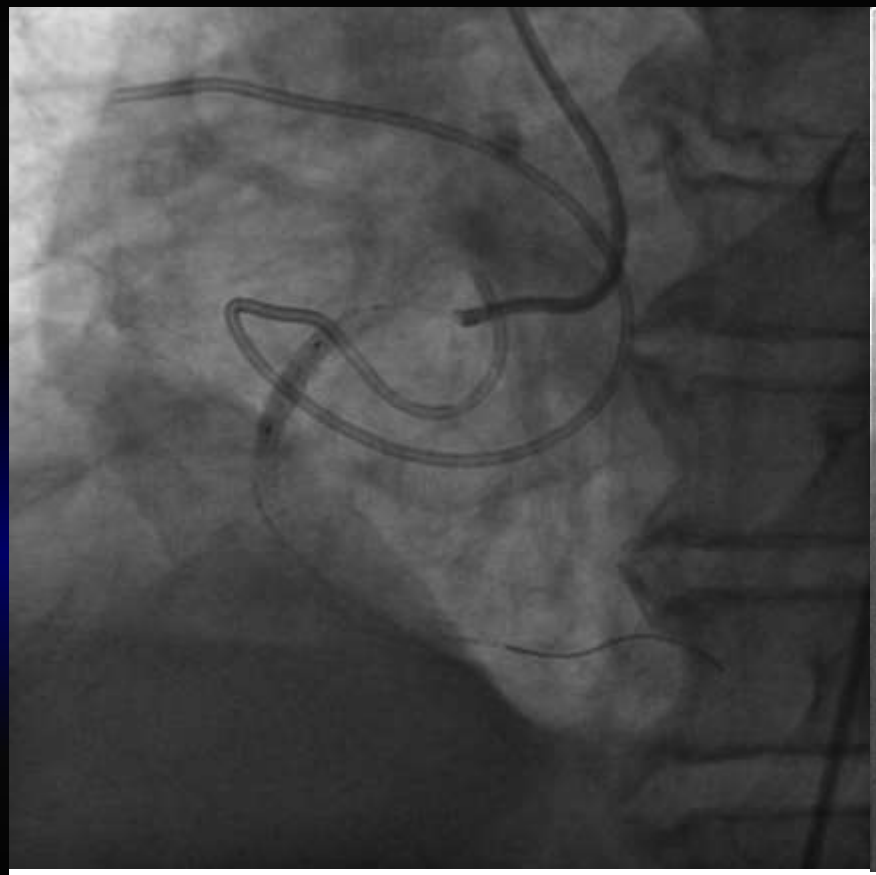
# Rescue RCA-M Perforation



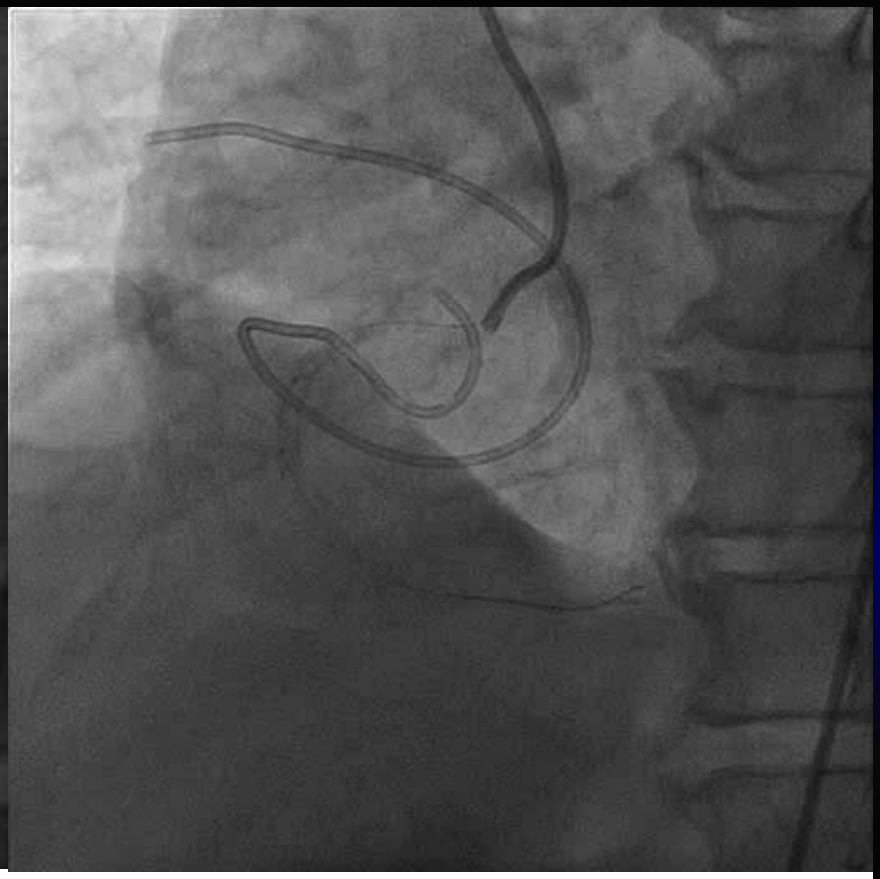
3.5/19 JOSTENT GraftMaster



After 3.5/19 Cover stent

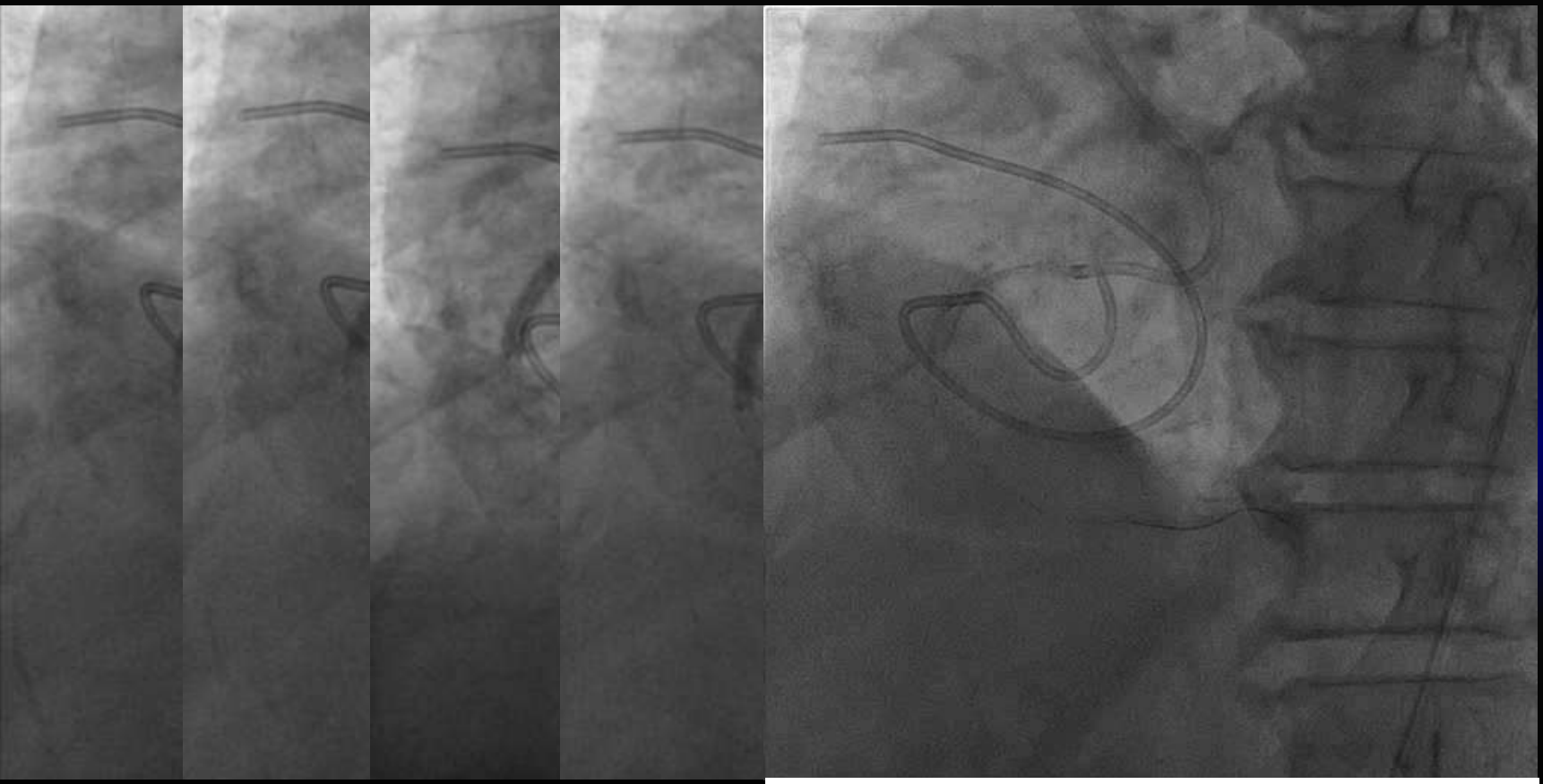


4.0 balloon over cover stent

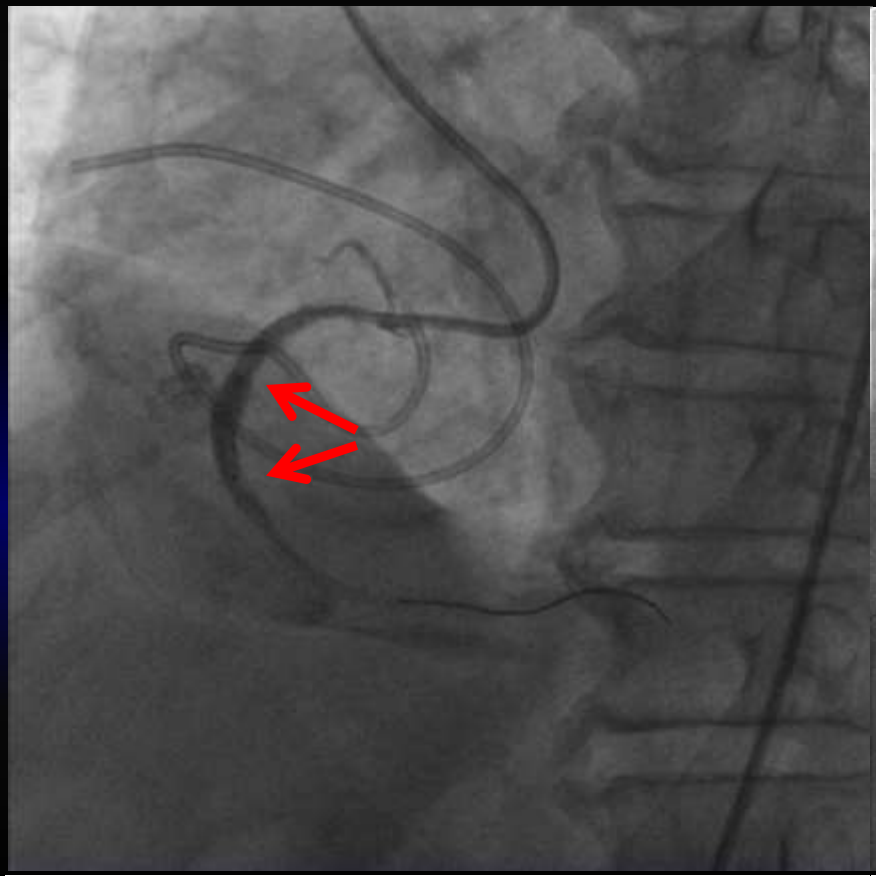


Persisted perforation

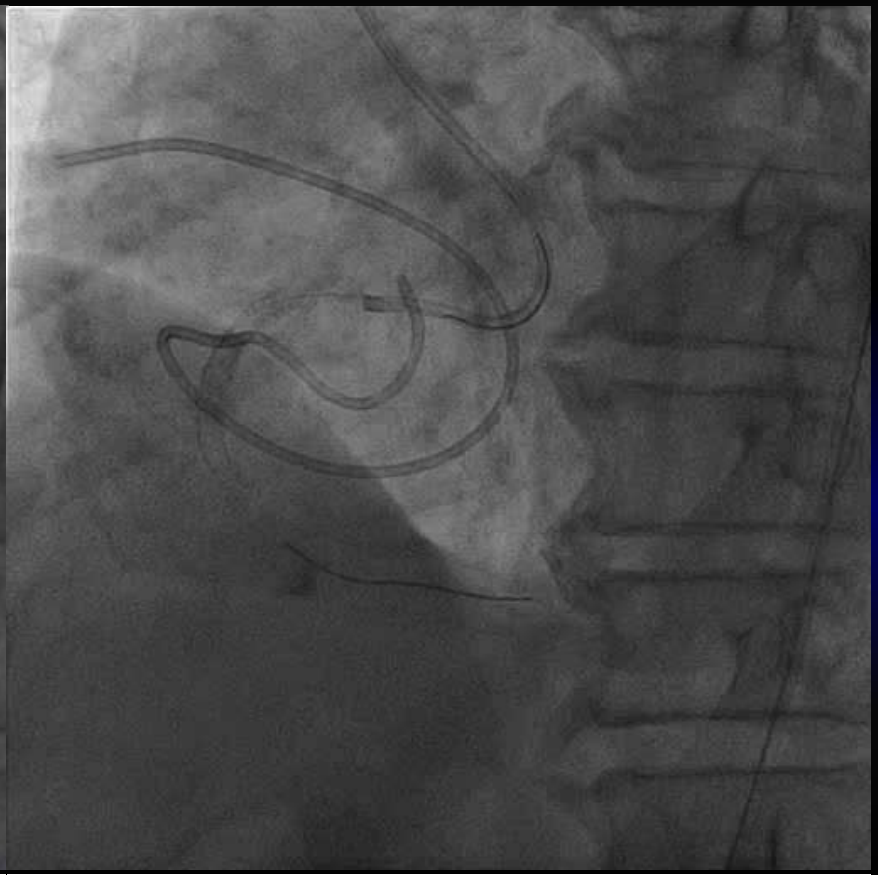
# 4.0 balloon inflation over graft stent



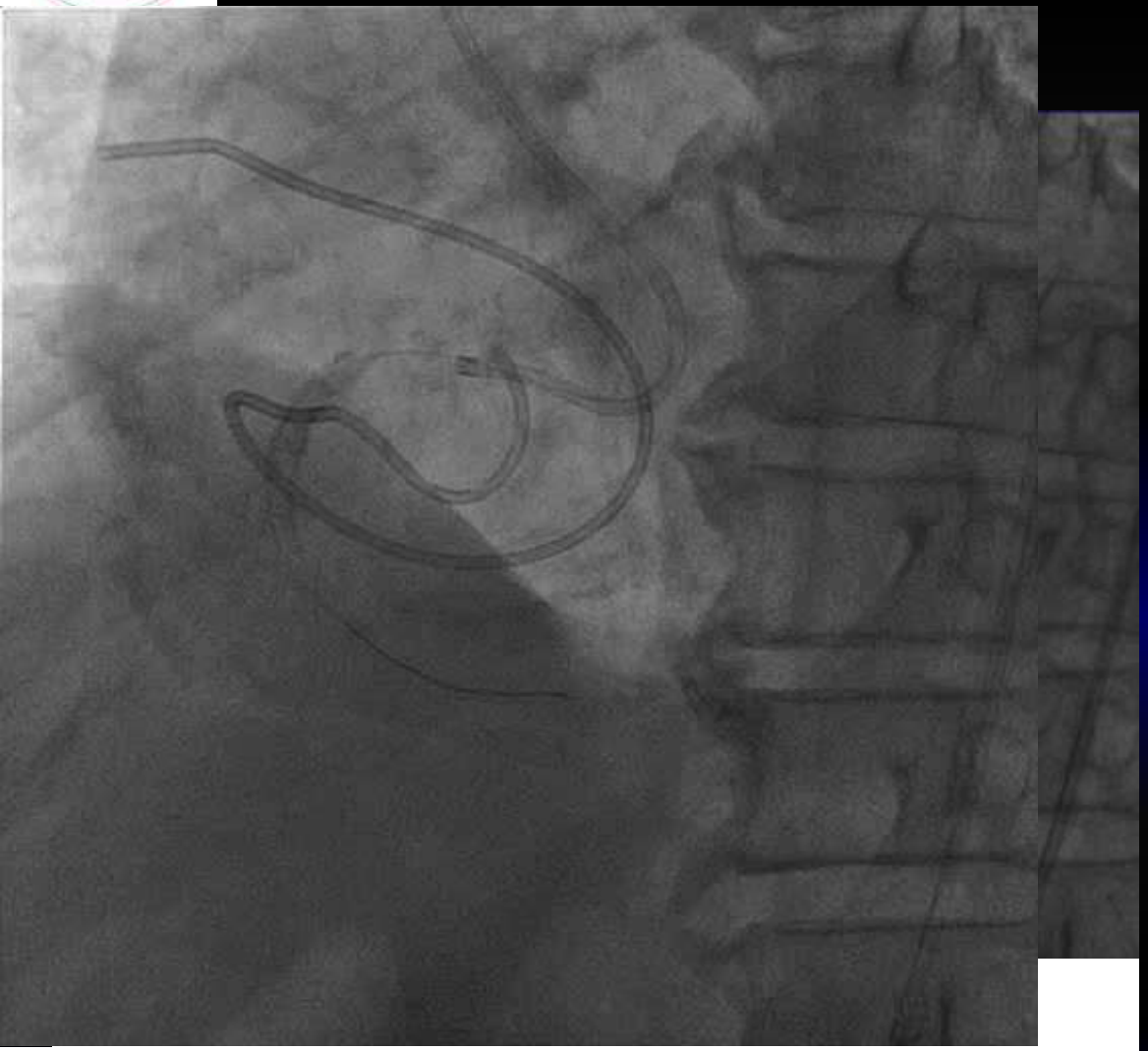
After 5 times of 4.0 balloon dilatation



2nd cover stent 4.0/16



After 2nd cover stent



After 4.5 high pressure to 20 atm

Persisted perforation after two graft stenting

What happened ???

Improper position of graft stent ??

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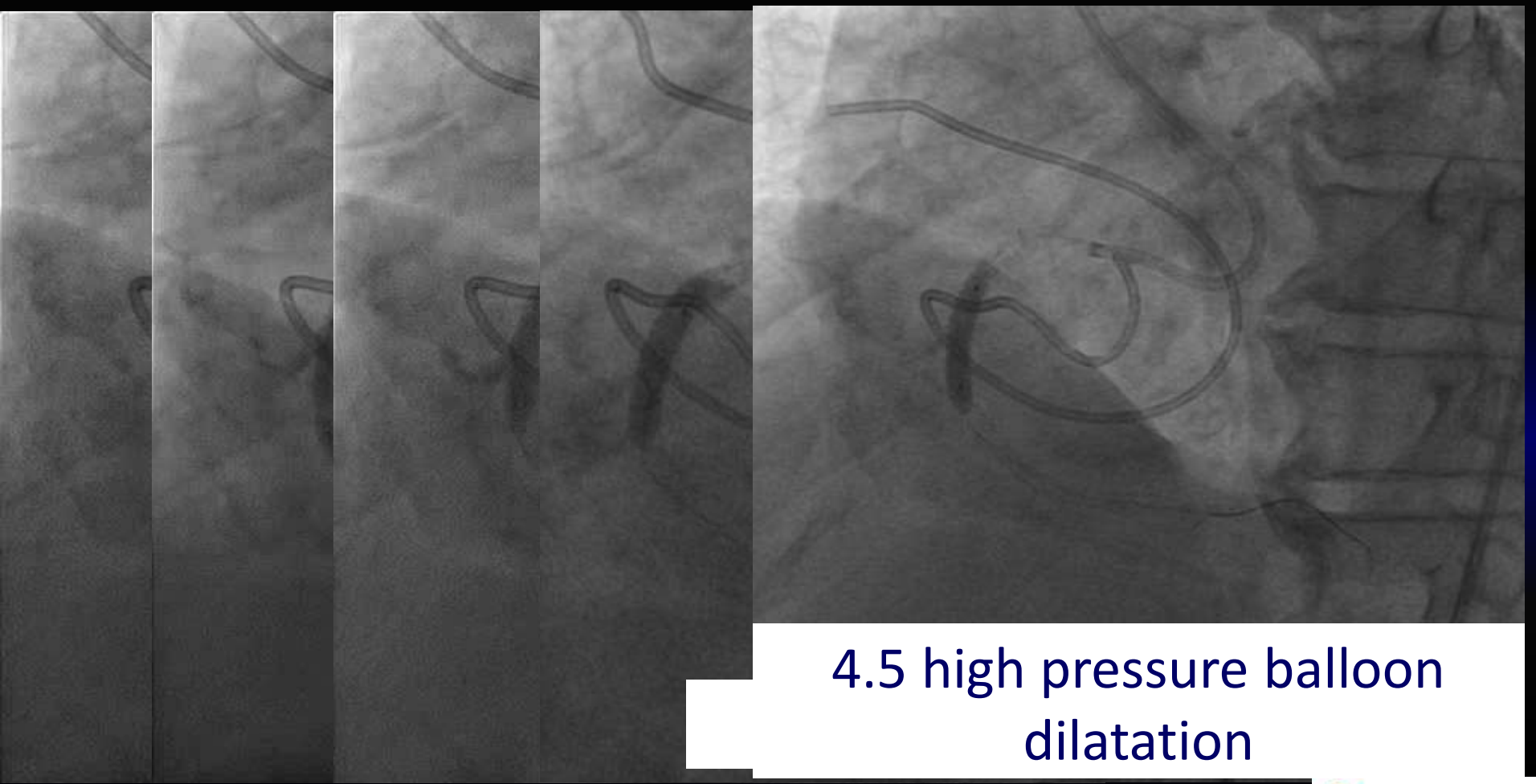
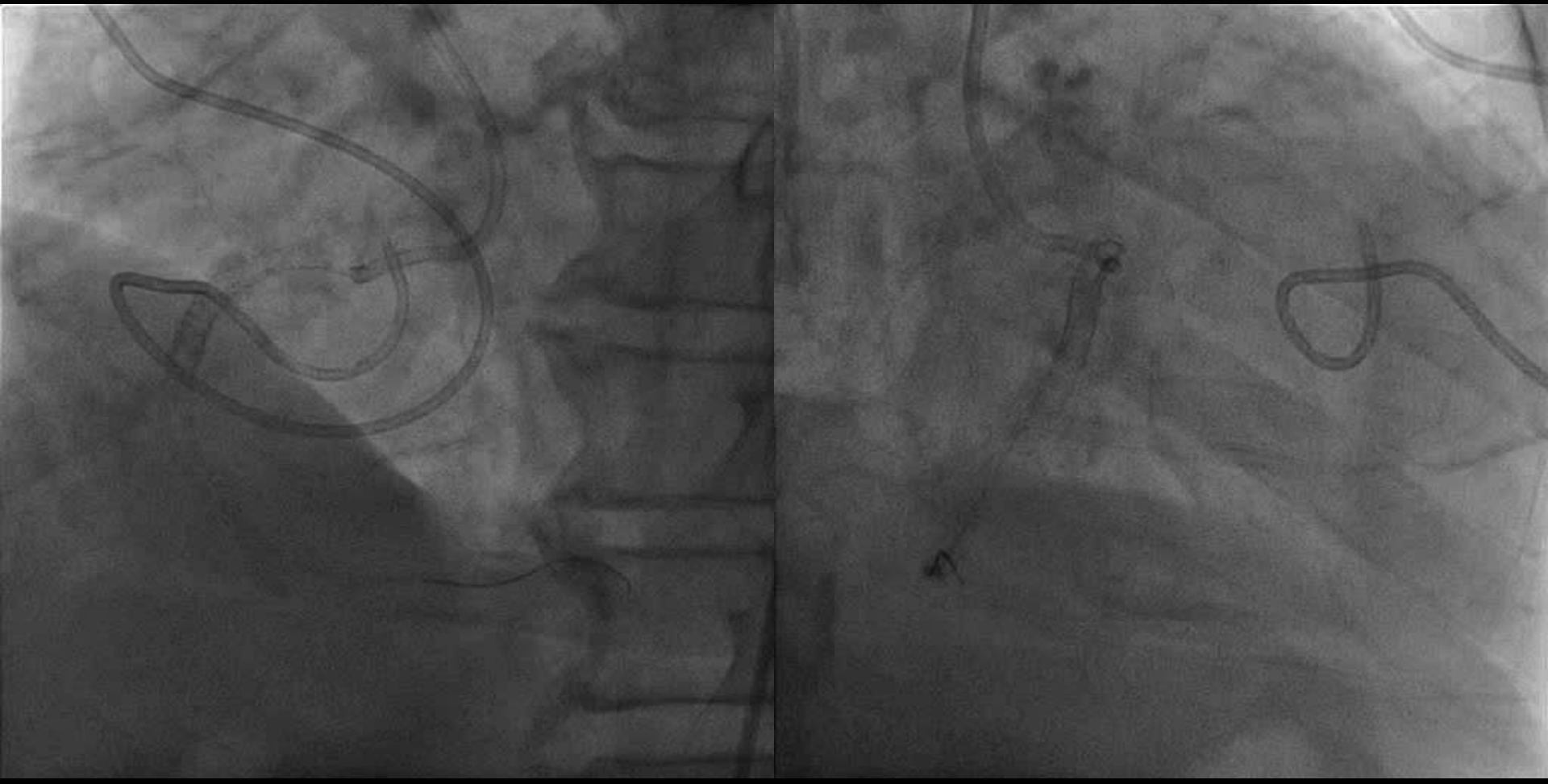
# 4.5 balloon inflation over RCA-M to confirm site of bleeding



4.5 high pressure balloon dilatation

# After 4.5 high pressure baloon Dilatation over 3rd graft stent



- Persisted bleeding after 3 successful graft stenting.
- Surgical repair and by pass surgery now ????
- Re-check ACT 5 hours' procedure :

783 sec ……

# Clinical Course

- Refer to ICU and correct coagulopathy.
- Consider surgical repair If persisted bleeding after corrected coagulopathy

# Lab Data

| Date | WBC | RBC | Hb | HCT | MCV | MCH | MCHC | RDW | PLT |
|---|---|---|---|---|---|---|---|---|---|
| Unit | x1000/Cumm | m/Cumm | g% | % | Cuu | pg | g/dL | % | x1000/Cumm |
| 2014-04-01 | 5.59 | 3.71 | 11.1 | 32.9 | 88.7 | 29.9 | 33.7 | 15.4 | 167 |
| 2014-03-31 | 8.66 | 3.75 | 11.3 | 33.0 | 88.0 | 30.1 | 34.2 | 15.7 | 163 |
| 2014-03-30 | 9.25 | 3.63 | 10.8 | 31.9 | 87.9 | 29.8 | 33.9 | 16.3 | 169 |
| 2014-03-29 | 10.49 | 3.52 | 10.9 | 31.2 | 88.6 | 31.0 | 34.9 | 16.2 | 190 |
| 2014-03-29 | 7.49 | 3.12 | 9.5 | 27.4 | 87.8 | 30.4 | 34.7 | 16.1 | 199 |
| 2014-03-29 | 7.80 | 3.20 | 9.8 | 27.9 | 87.2 | 30.6 | 35.1 | 15.7 | 214 |
| 2014-03-29 | 9.12 | 3.21 | 9.8 | 28.2 | 87.9 | 30.5 | 34.8 | 15.3 | 220 |
| 2014-03-28 | 8.48 | 2.87 | 9.1 | 25.9 | 90.2 | 31.7 | 35.1 | 13.3 | 253 |
| 2014-03-28 | 11.56 | 3.25 | 10.8 | 30.2 | 92.9 | 33.2 | 35.8 | 12.3 | 161 |
| 2014-03-27 | 4.14 | 3.46 | 11.7 | 32.1 | 92.8 | 33.8 | 36.4 | 12.2 | 158 |

# Clinical Course

- After FFP transfusion, the coagulopathy corrected.
- Bleeding stopped on the next day after ICU admission
- Discharged 1 week later.
- Declined 2nd cath study, with dual antiplatelet at OPD.

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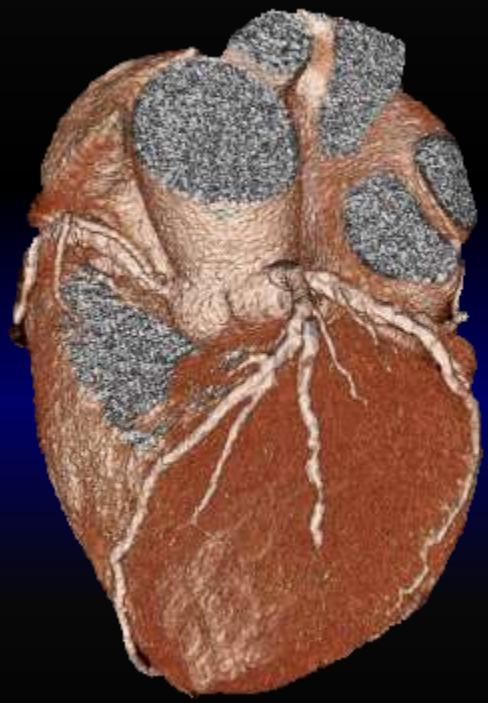
# Follow up CTA



64 slice CT
6 months later:

Patent Coronary stent

# Take Home Message

- With high morbidity and mortality of coronary perforation, interventional cardiologists should be aware of this rare complication and familiar with it's management.

- Be sure coagulopathy was corrected before send patient to surgical repair.

# *Thanks for your attention*