CORONARY ARTERY DISEASE AND CORONARY INTERVENTIONS

Aniff YEAROO
Interventional Cardiologist
Wednesday 29/01/2020

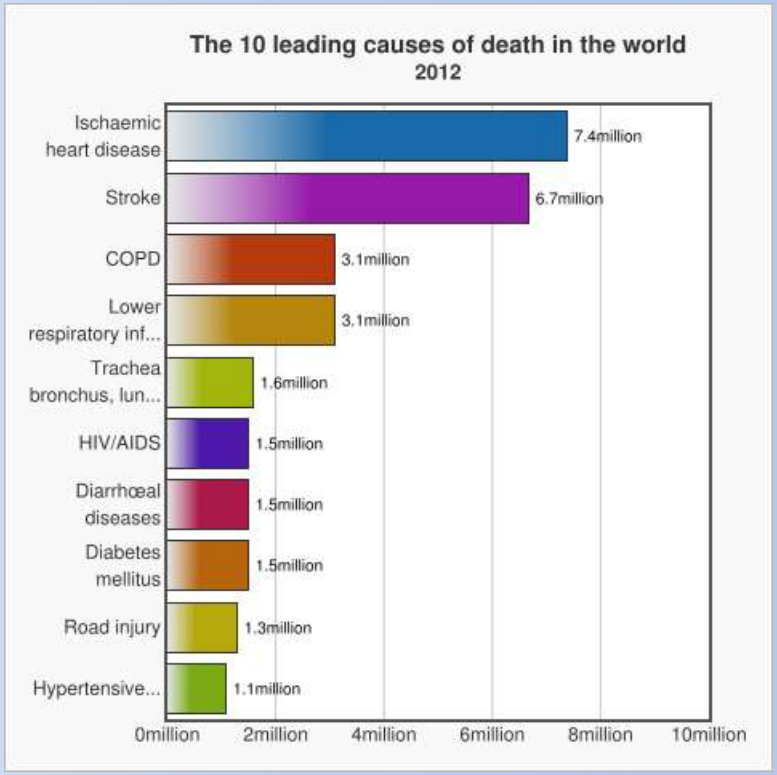
INTRODUCTION

- Ischemic Heart Disease (IHD) manifests as a spectrum of presentations ranging from asymptomatic states, chronic stable IHD, Acute Coronary Syndrome and Sudden death.

- Presentation: Exertional angina pectoris, atypical chest pain, dyspnea, fatigue, effort intolerance or Acute Chest Pain suggestive of ACS.

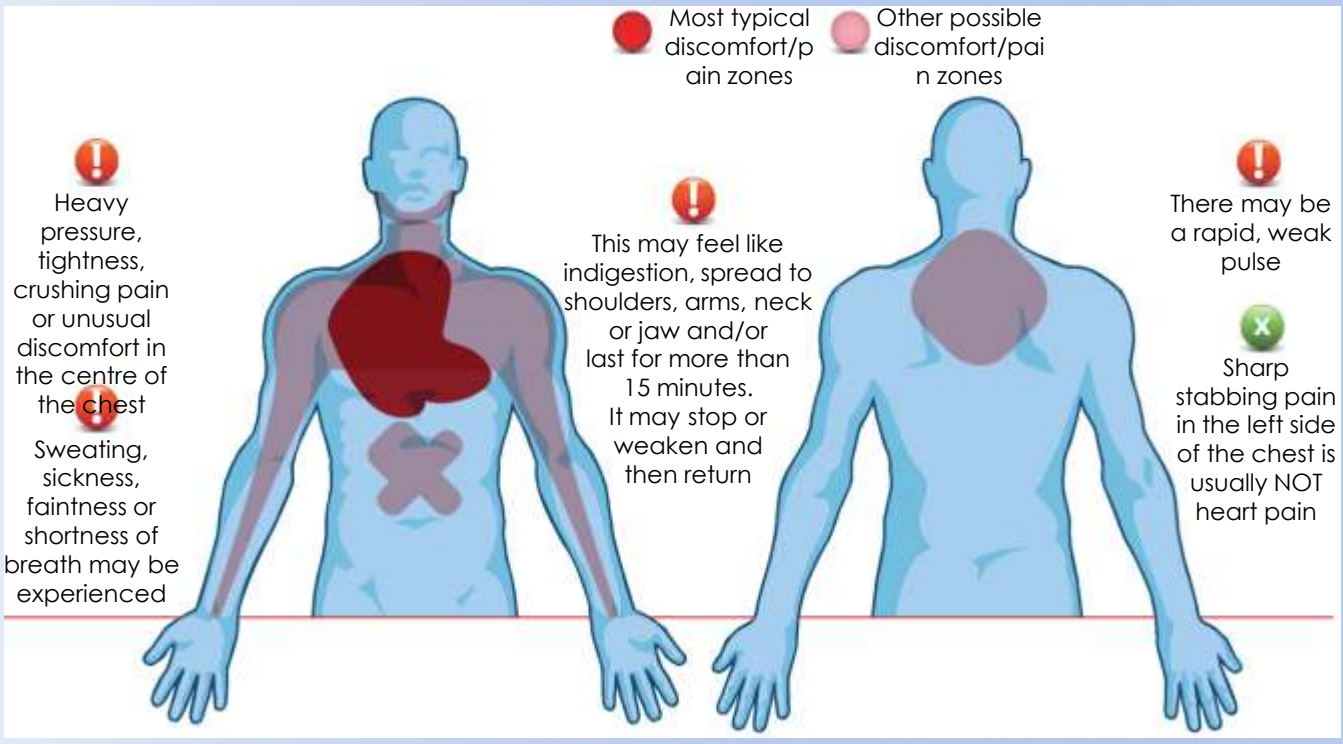
- Abnormal ECG findings, CT Scan or Exercise ECG.

IHD leading cause of death globally



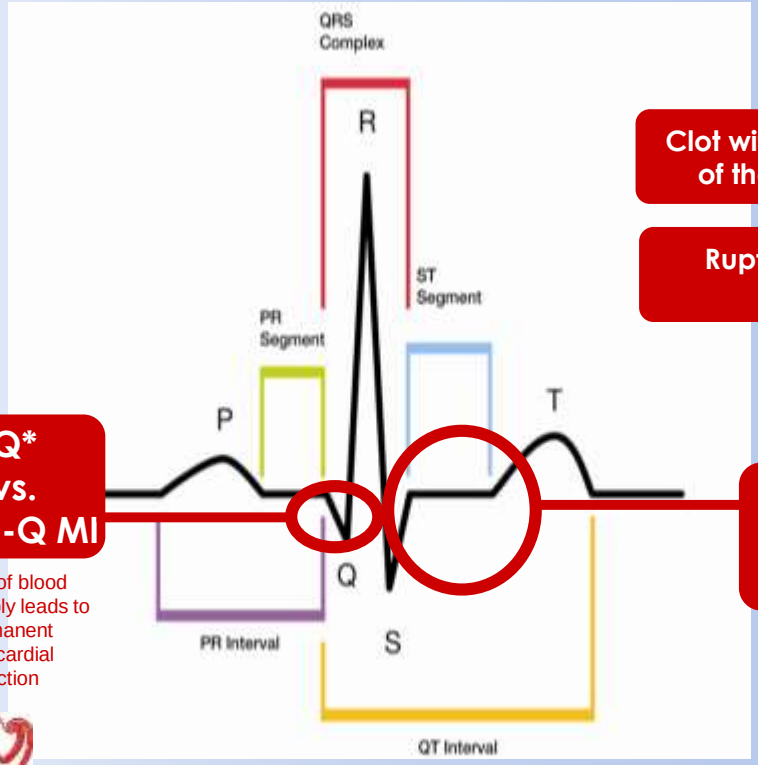
World Health Organization

Symptoms of Ischemic Heart Disease



http://www.heartfoundation.co.za/how-your-heart-works/symptoms-heart-attack (accessed on 7 Feb 2013

ECG Diagnosis

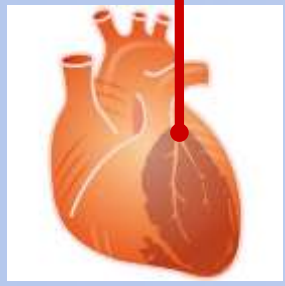


Q* vs. Non-Q MI

* lack of blood supply leads to permanent myocardial infarction

Clot within the main lumen of the coronary artery

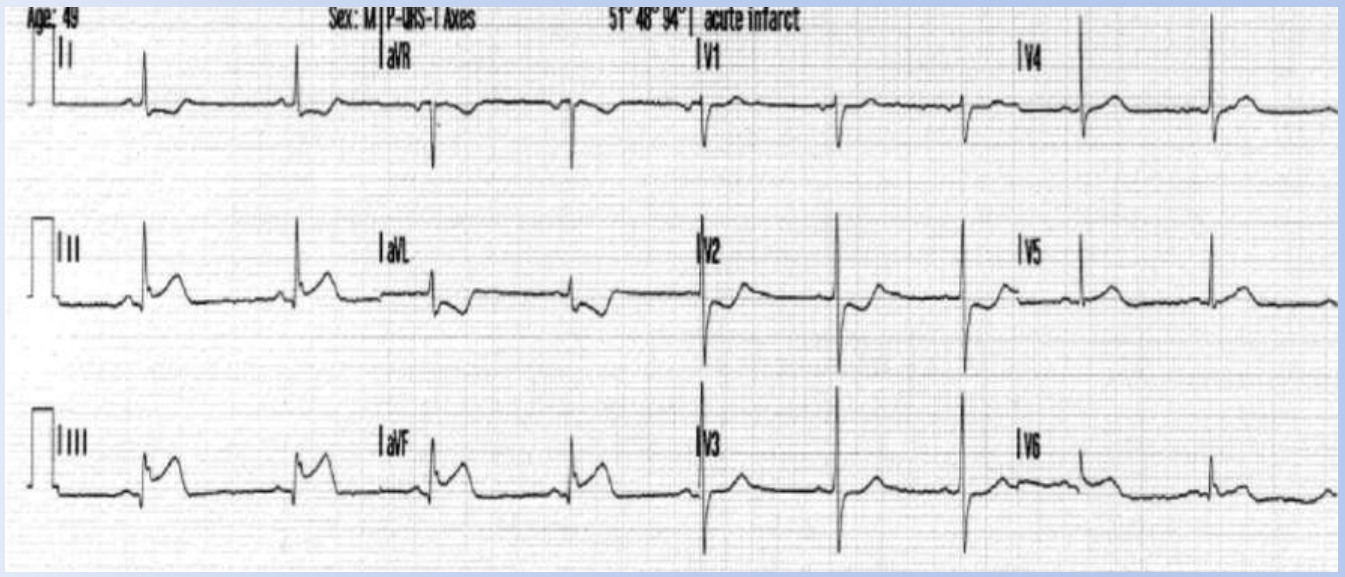
Ruptured plaque with hemorrhage



STEMI vs. NSTE-ACSI

Adapted from J Davies (pathological specimen)

ECG

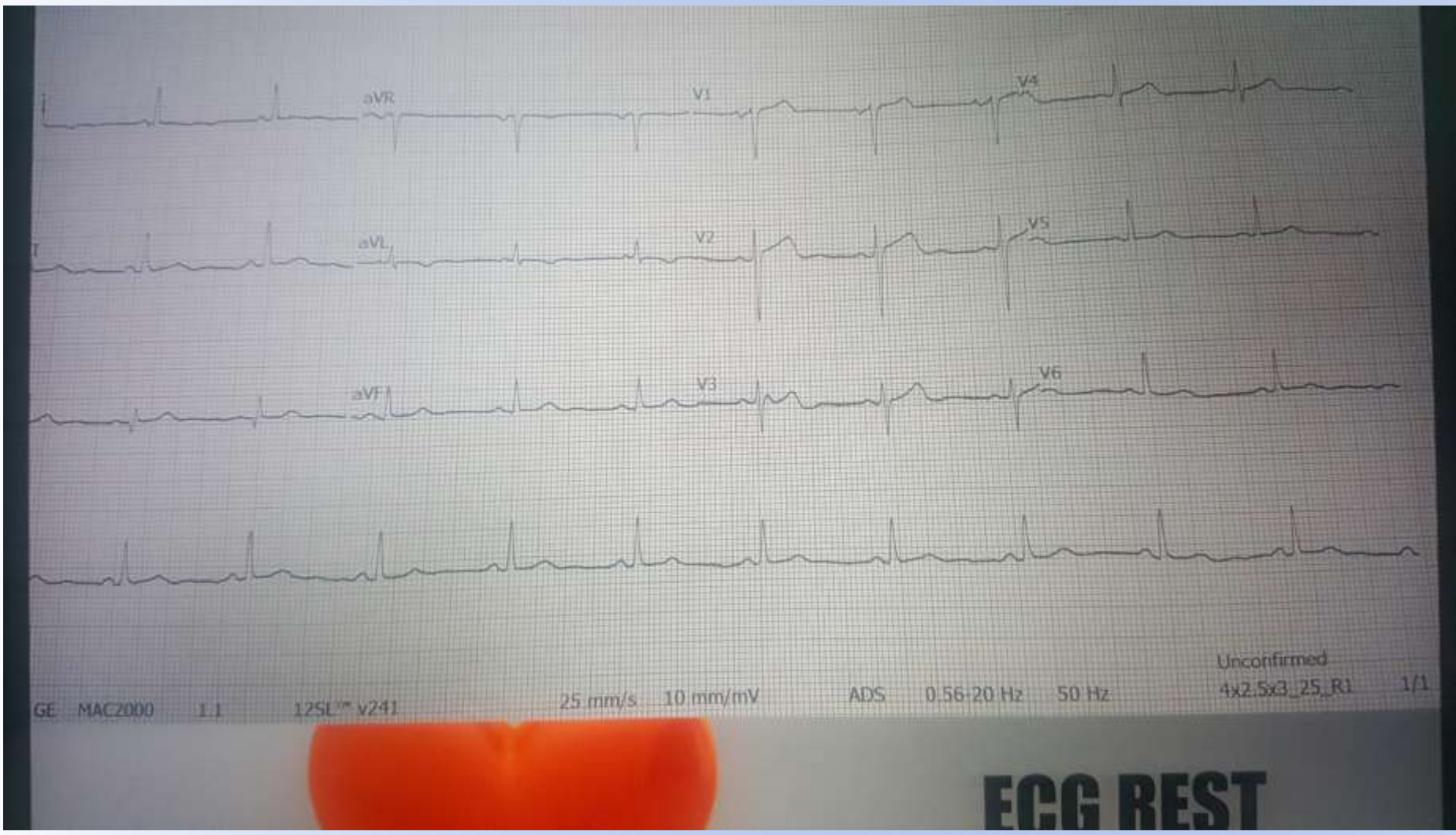

Age: 49
Sex: M
P-QRS-T Axes
51° 48° 94°
acute infarct
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

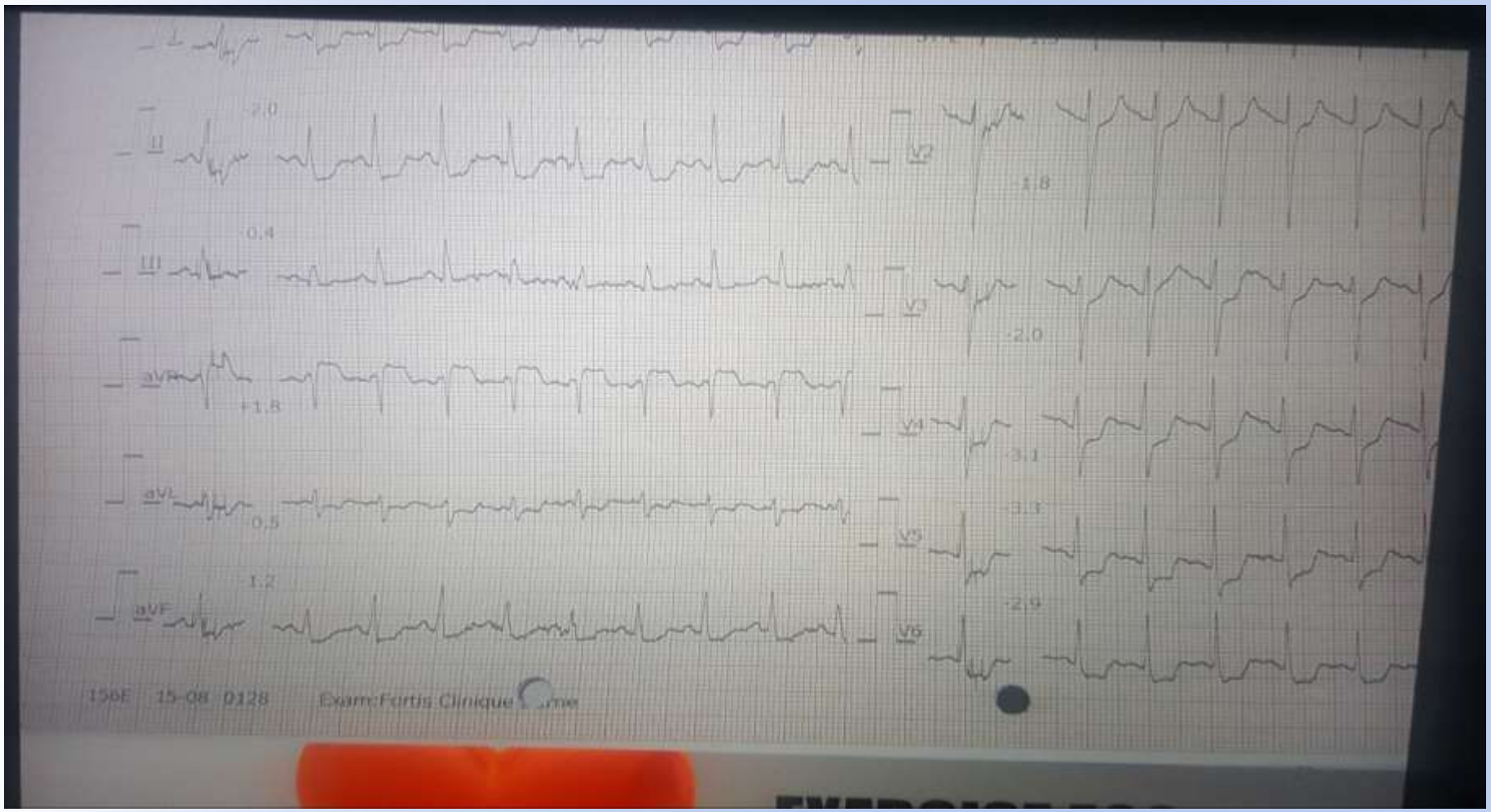
Test	Utility	Indication
Blood exams	Control disease progression and ischemia triggers	Every patient, every year
ECG	Discover ischemic signs and prognosis	Every patient, every year
Echocardiography	Exclude other cardiopathy and evaluate ejection fraction	Every patient
Stress test	Diagnosis and stratification	Diagnosis and follow-up of high risk patients
Angiography	Revascularization or anatomy investigation	Uncontrolled symptoms or possible complex lesions or high risk patients

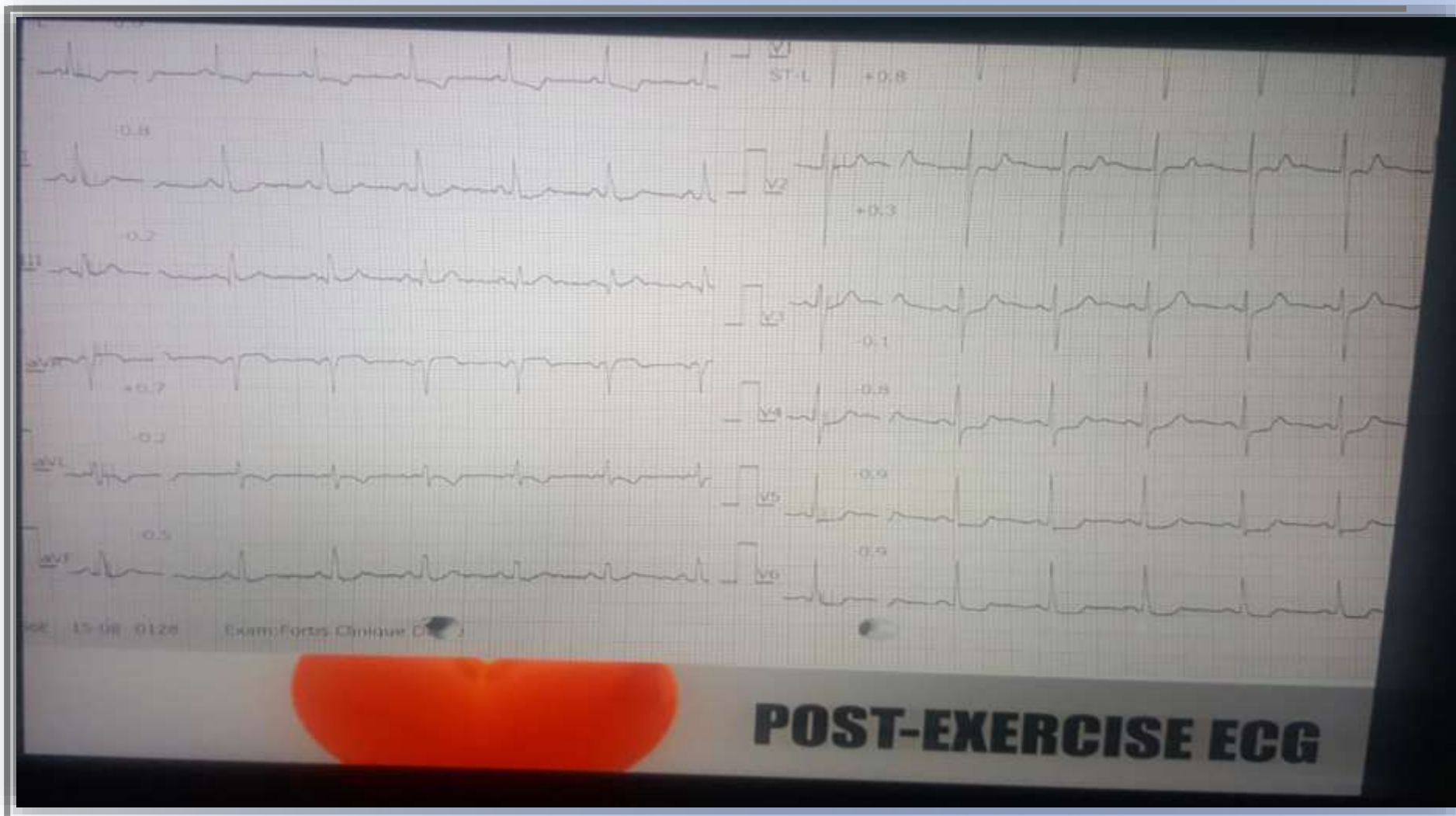
Main tests in stable Ischemic Heart Disease

Non-invasive test	High-risk outcome
Exercise Treadmill	>2 mm of ST depression at low workload
	Exercise-induced ST elevation
	Exercise-induced ventricular tachycardia/fibrillation
	Failure to increase blood pressure >120 mmHg or sustained decrease >10 mmHg during exercise
Myocardial perfusion imaging	Resting perfusion abnormalities >10% of the myocardium
	Stress-induced perfusion abnormalities >10% of the myocardium or indicating multiple coronary obstruction
	Severe stress-induced left ventricular dysfunction
Stress echocardiography	Inducible kinetic abnormalities involving >2 coronary beds
	Kinetic abnormalities developing at low dose of dobutamine
Coronary computed tomographic angiography	Multi-vessel or left main stenosis

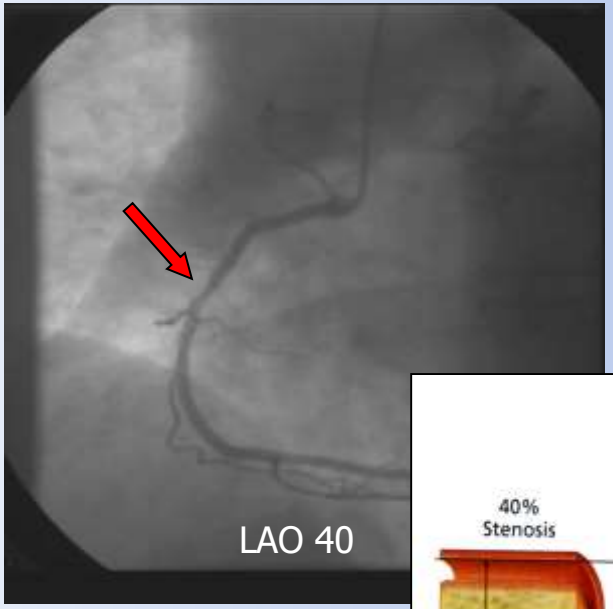
Stratification of risk outcome

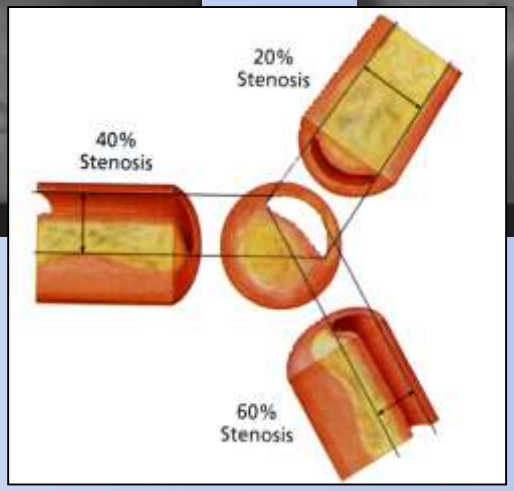

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
GE MAC2000 1.1 12SL™ v241
25 mm/s 10 mm/mV
ADS 0.56-20 Hz 50 Hz
Unconfirmed
4x2.5x3_25_R1 1/1
ECG REST

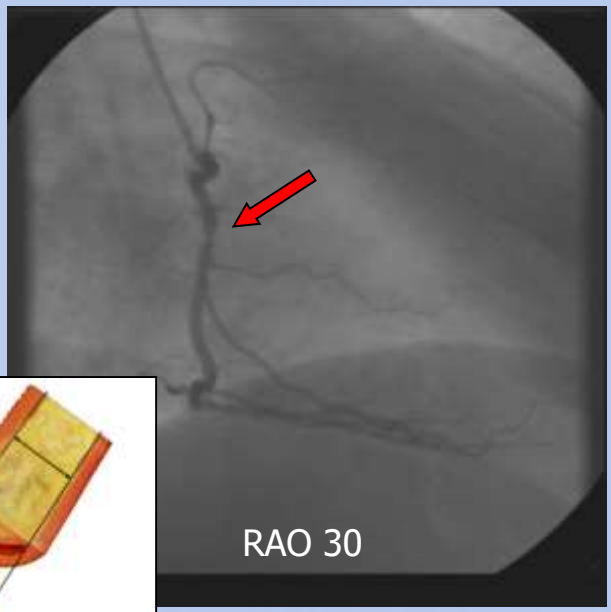

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
2.0
0.4
+1.8
0.5
1.2
1.8
-2.0
-3.1
-3.3
-2.9
156F 15-08 0128
ExamenFortis Clinique

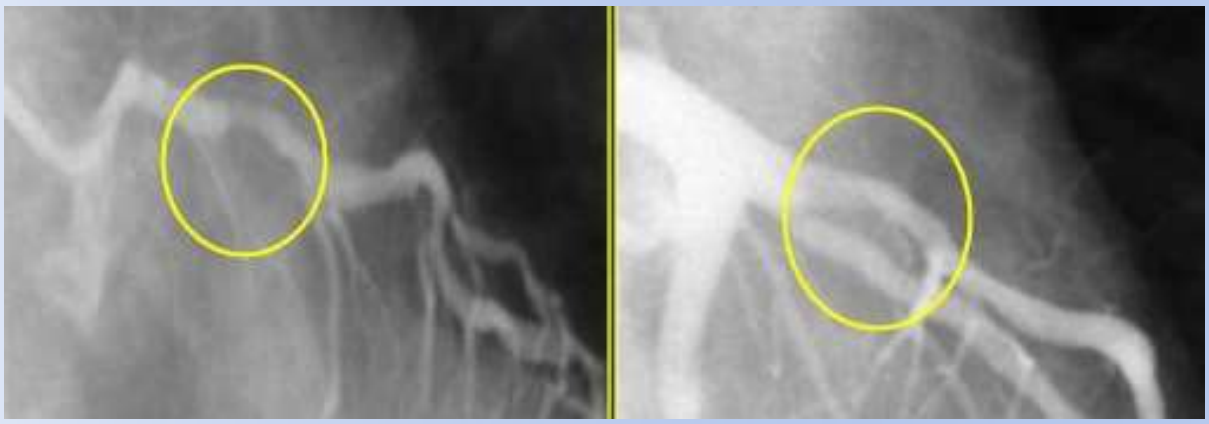

POST-EXERCISE ECG

RCA Angiogram





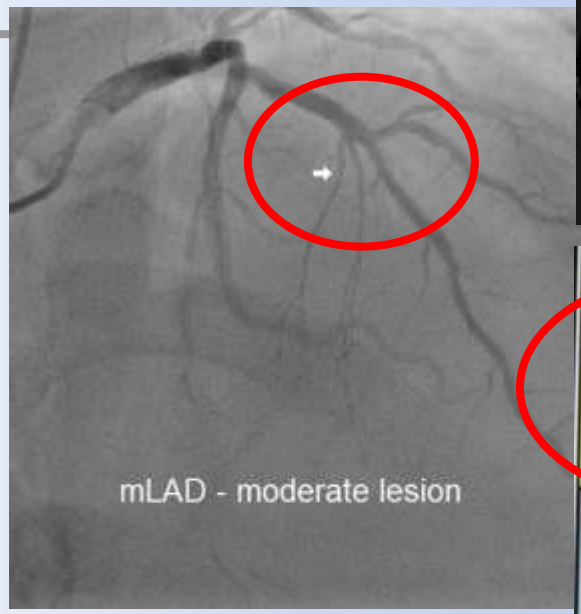


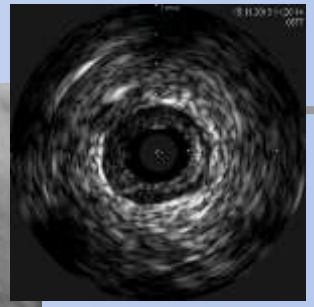


How can we access the lession?

1. QCA
2. Physiology
3. Imaging (IVUS or OCT)

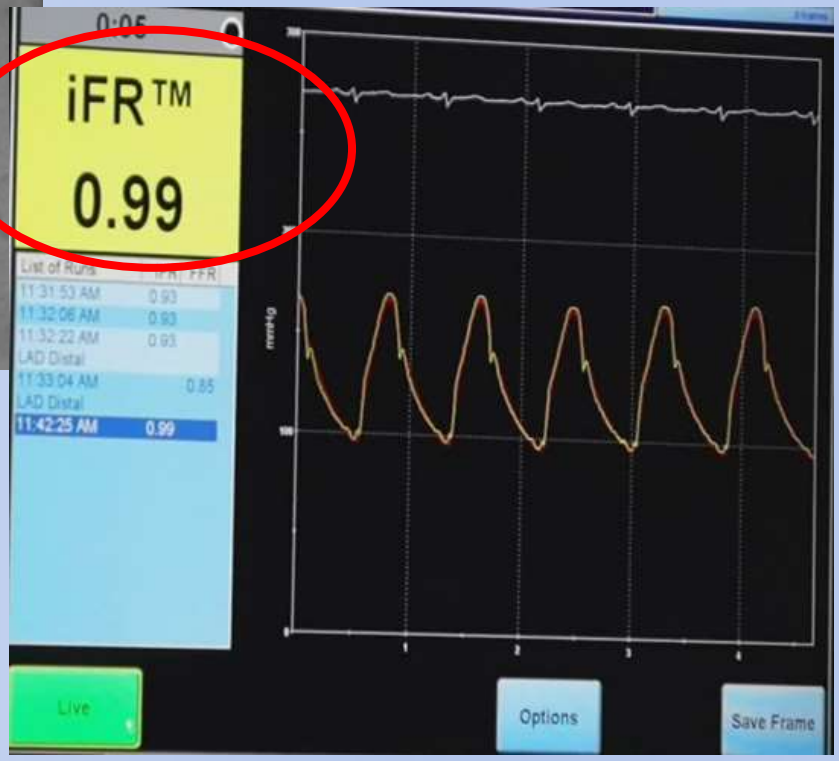
- Lumen Diameter and Lumen Area
- Vessel Diameter and Vessel Area
- Lesion length





i-FR (Physiology)

Min CSA 3.5 mm sq

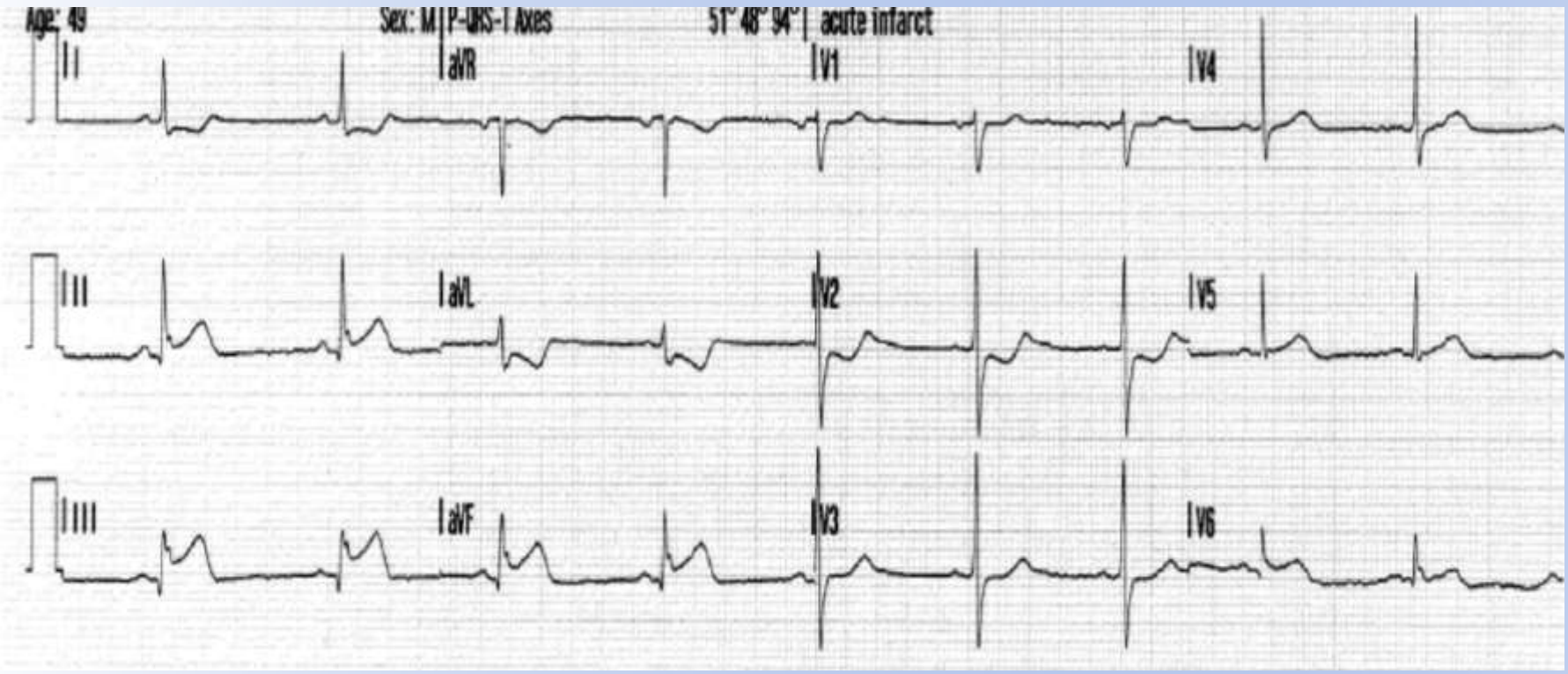


NO MAXIMAL HYPEREMIA

ACS-ST Elevation Myocardial Infarction

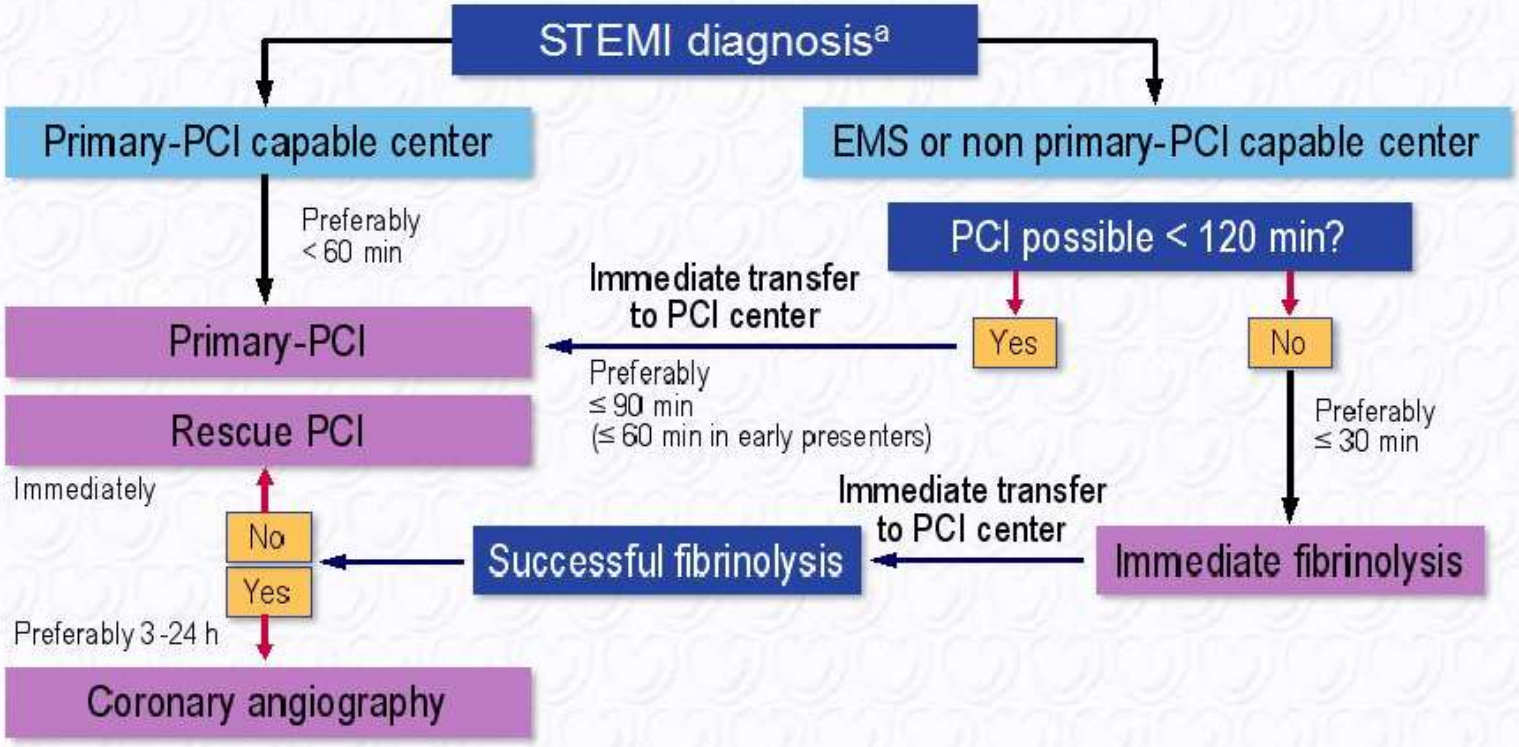
- Percutaneous Coronary Intervention
- Fibrinolysis

STEMI ECG


Age: 49
Sex: M
P-QRS-T Axes
51° 48° 94°
acute infarct
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

When is thrombolysis then an option?

Prehospital and in-hospital management and reperfusion strategies within 24 h of FMC



[a] The time point the diagnosis is confirmed with patient history and ECG ideally within 10 min from the first medical contact (FMC). All delays are related to FMC (first medical contact).

Cath = catheterization laboratory; EMS = emergency medical system; FMC = first medical contact; PCI = percutaneous coronary intervention; STEMI = ST-segment elevation myocardial infarction.

European Heart Journal (2012) 33, 2569–2619
doi:10.1093/eurheartj/ehs215

www.escardio.org/guidelines

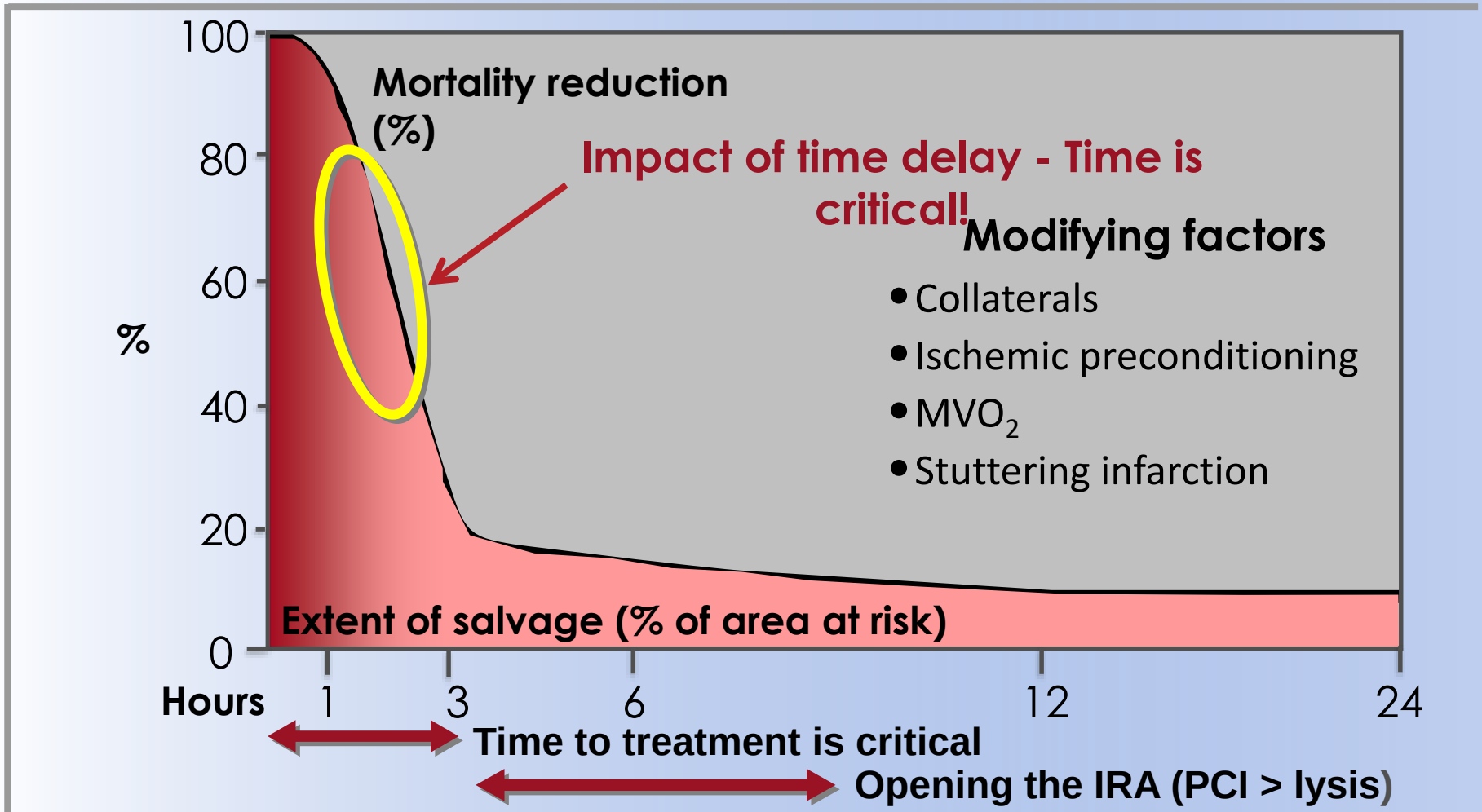
EUROPEAN SOCIETY OF CARDIOLOGY®

Choice of fibrinolytic agent

	Initial treatment	Specific contraindications
Streptokinase (SK)	1.5 million units over 30–60 min i.v.	Prior SK or anistreplase
Alteplase (tPA)	15 mg i.v. bolus 0.75 mg/kg over 30 min (up to 50 mg) then 0.5 mg/kg over 60 min i.v. (up to 35 mg)	
Reteplase (r-PA)	10 units + 10 units i.v. bolus given 30 min apart	
Tenecteplase (TNK–tPA)	Single i.v. bolus: 30 mg if <60 kg 35 mg if 60 to <70 kg 40 mg if 70 to <80 kg 45 mg if 80 to <90 kg 50 mg if ≥90 kg	

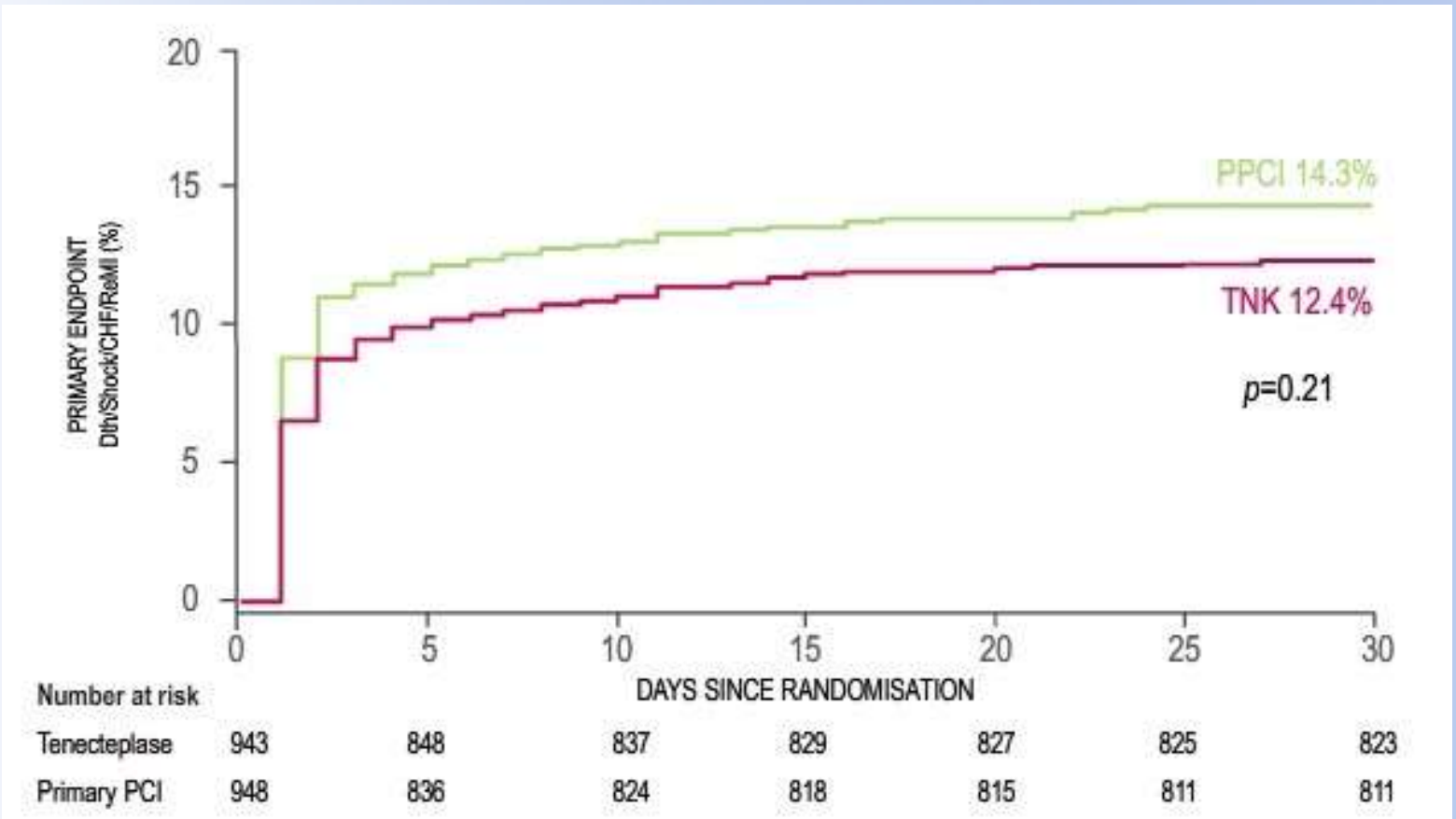
European Heart Journal (2012) 33, 2569–2619
doi:10.1093/eurheartj/ehs215

Relationship Between Mortality Reduction and Extent of Salvage



Gersh: JAMA, 2005

Primary end point at 30 days



Mortality and morbidity the same between the two groups

Armstrong et al 2013. NEJM 2013;368:1379-87

Conclusions

- STEMI patients who presented within 3 hours of symptom onset:
  - No difference in outcomes irrespective of whether they received early fibrinolysis (and subsequent PCI) or primary PCI

Armstrong et al 2013. NEJM 2013;368:1379-87

A patient with STEMI with failed Fibrinolysis

- 50 years old man – 80kg
- Teacher with active lifestyle
- NIDDM 5yrs – Non smoker – Dyslipidemia
- No Past History of CAD
- Presented with persistent 2hours of chest pain – ECG – Anterior ST elevation

In Hospital Management

- Oral Aspirin
- Clopidogrel 600mg (Ticagrelor, Prasugrel)
- Esomeprazole 40mg IV
- Heparin IV
- Morphine (analgesic)
- Blood Tests sent
- Tenecteplase 40mg IV bolus in 10secs administered in I.C.U (patient initially refused P.C.I)
- Metoprolol and Atorvastatin

Immediate Follow up

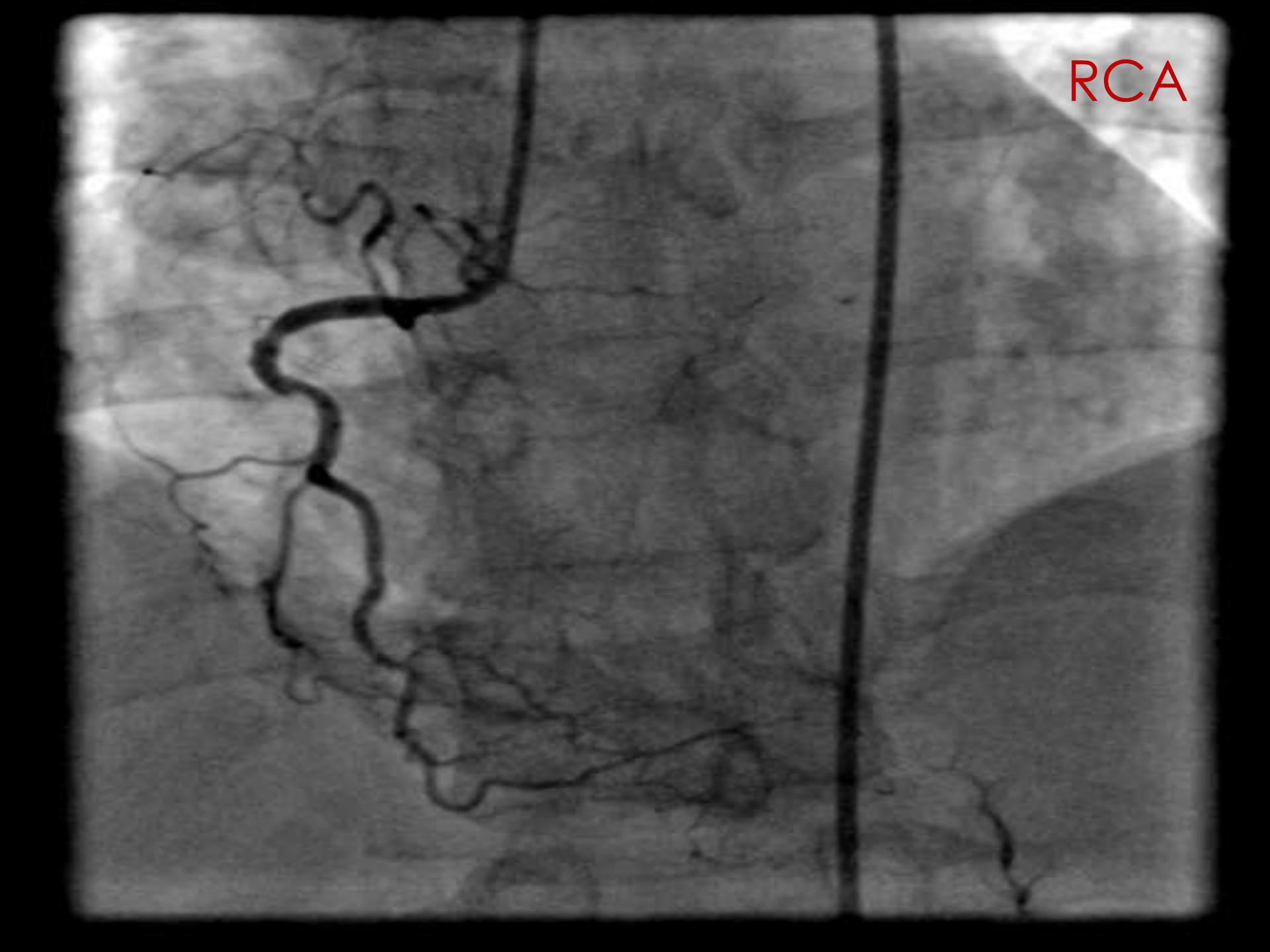
- Persistent of chest pain and ST elevation
- No sign of heart failure – Bp 130/80 - P 80bpm
- Troponin mildly elevated
- Renal function normal
- TT Echocardiography – Antero septal Hypokinesia - LVEF 0.50 - SPAP 25mmhg
- Urgent Coronary Angiography

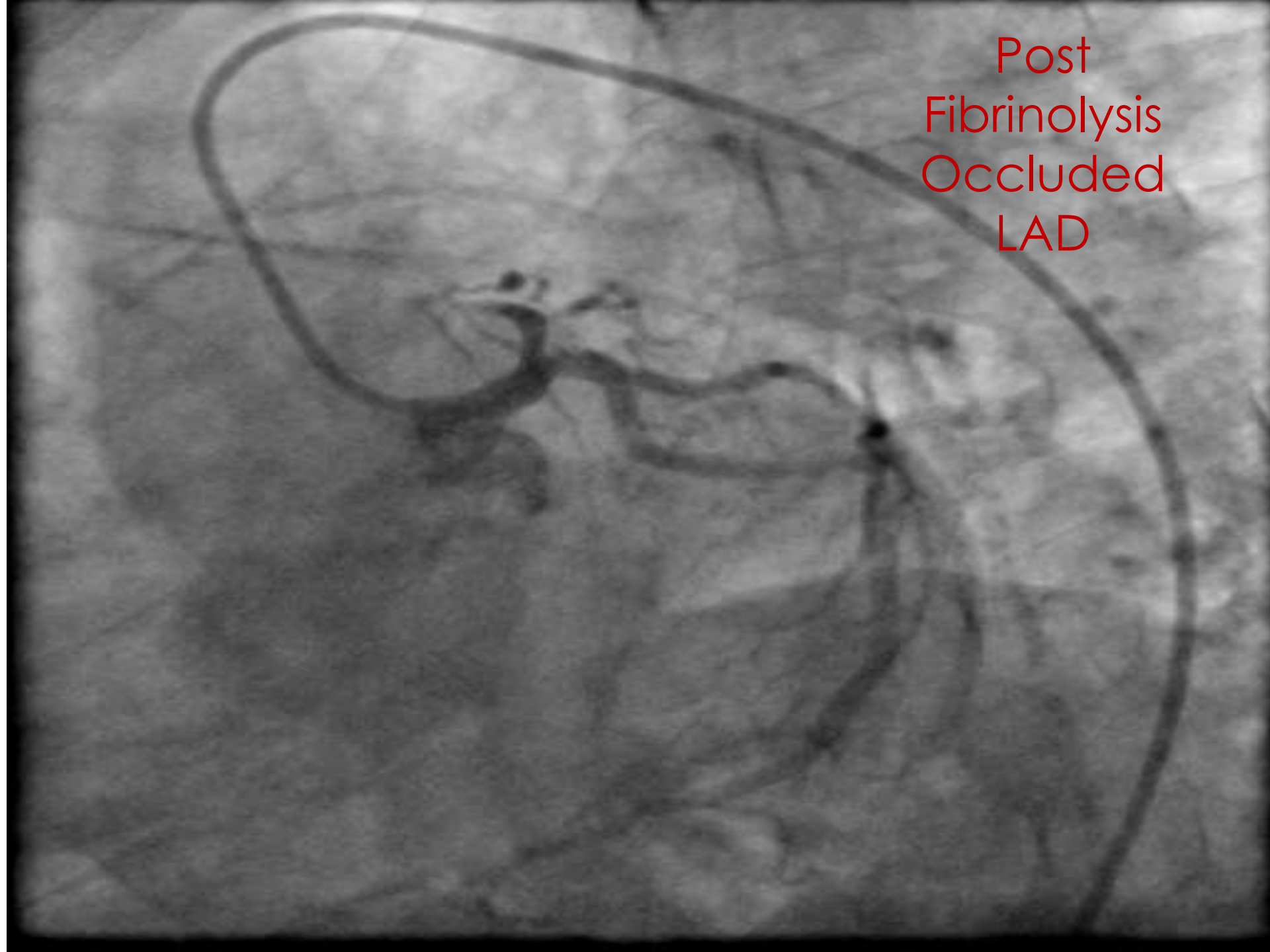
Coronary Angiography

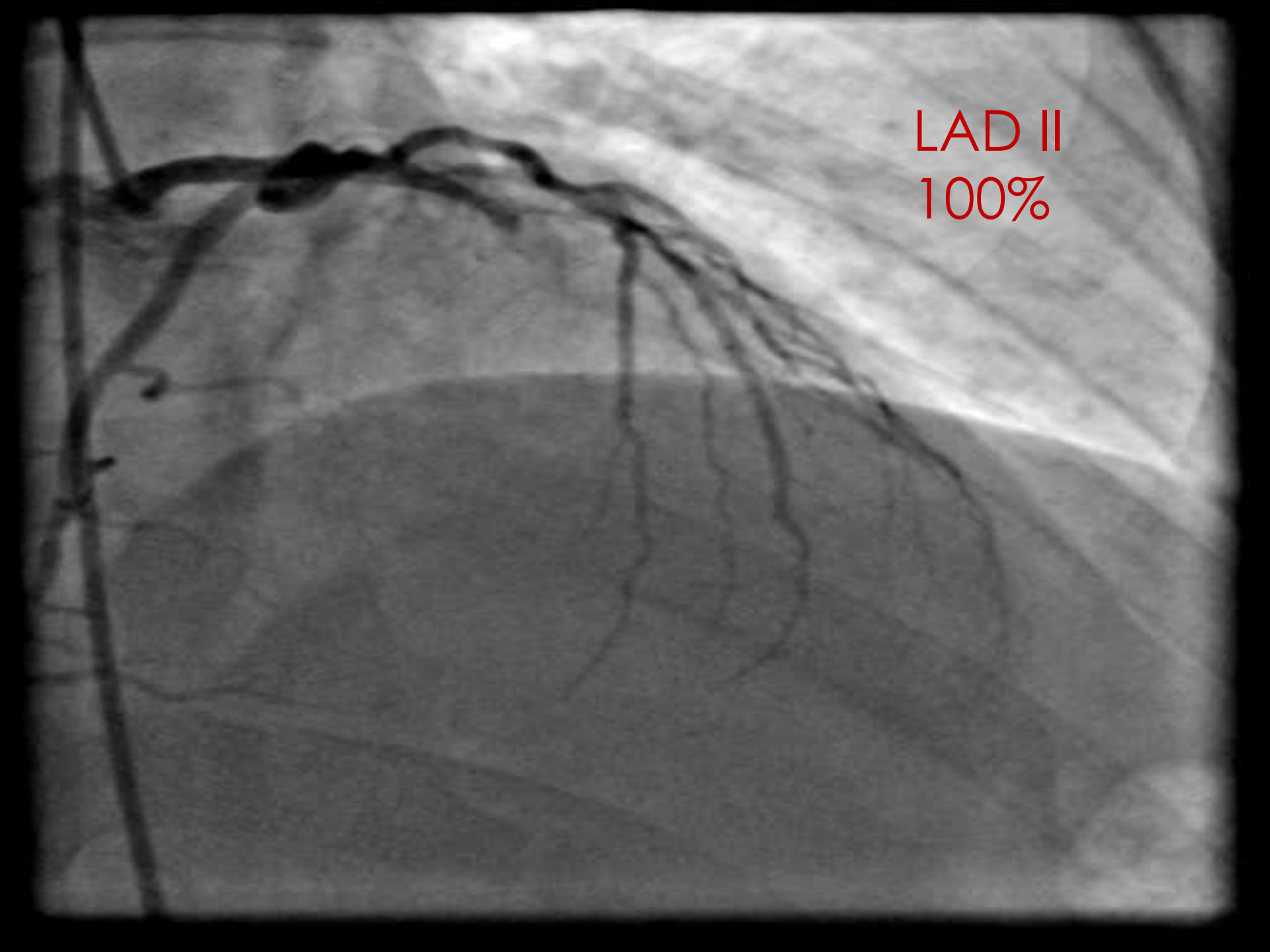
- 4 hours after onset of pain
- Baseline Coronary Angio by Right Radial approach – LAD II 100%
- Insufficient support to cross the lesion - switch to femoral approach
- Lesion wired, pre-dilated, DES 3x28, high pressure inflation
- Flow TIMI3

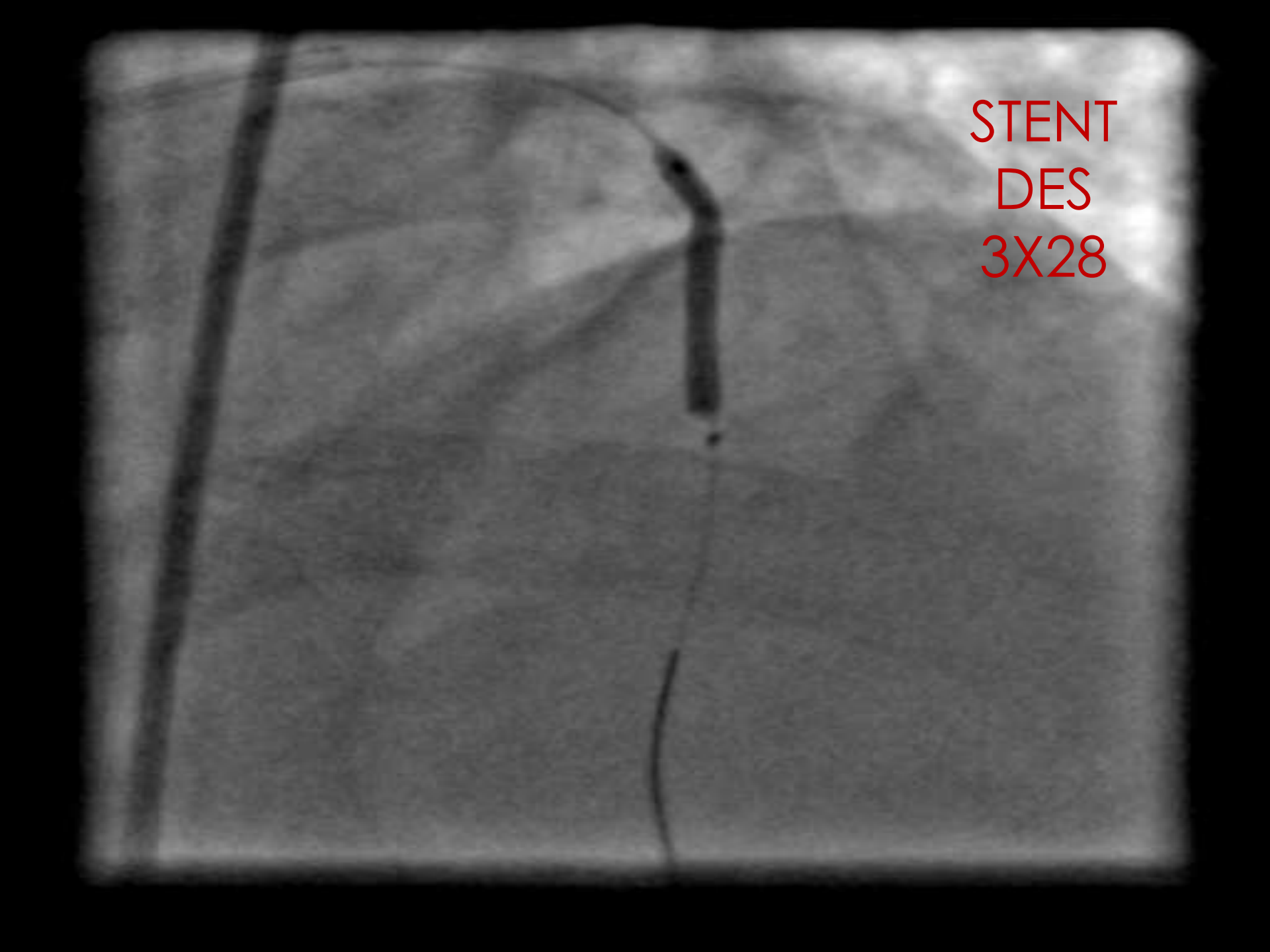
Post Procedure

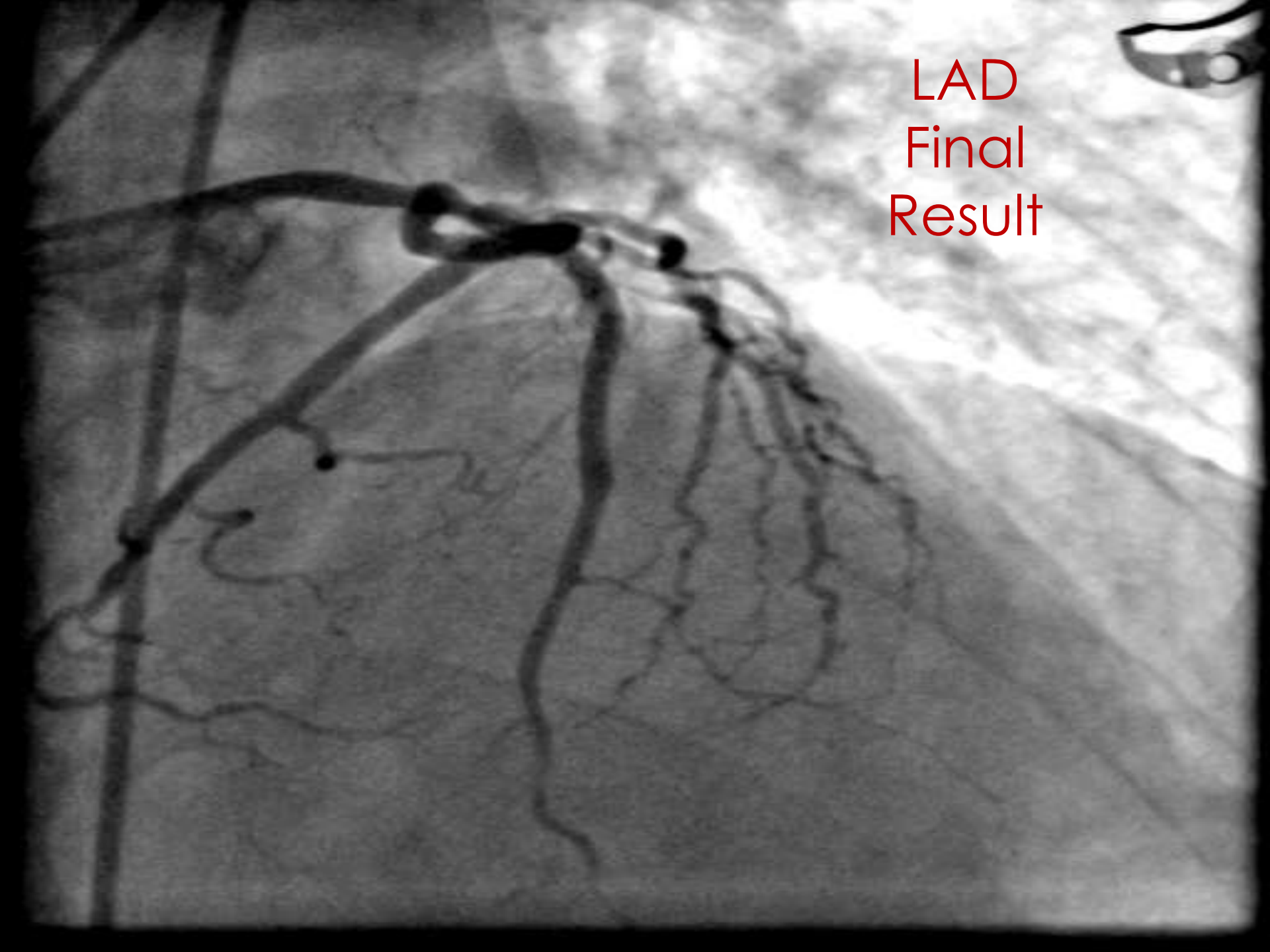
- Relief of chest pain and ST elevation
- TT Echo – Anterior wall Hypokinesia – LVEF 0.45 – 0.50, SPAP 35mmhg. No pericardial effusion
- Heparin 48hours – Clopidogrel – ASA – Metoprolol – Ramipril - Atorvastatin
- Discharge Day 6 and Reviewed regularly – At twelve months was Asymptomatic – LVEF 0.5
- TMT 9 mins Stage 3 Bruce Protocol – Asymptomatic – Non significant ST Depression Anteriorly – 90% THR


RCA


Post
Fibrinolysis
Occluded
LAD

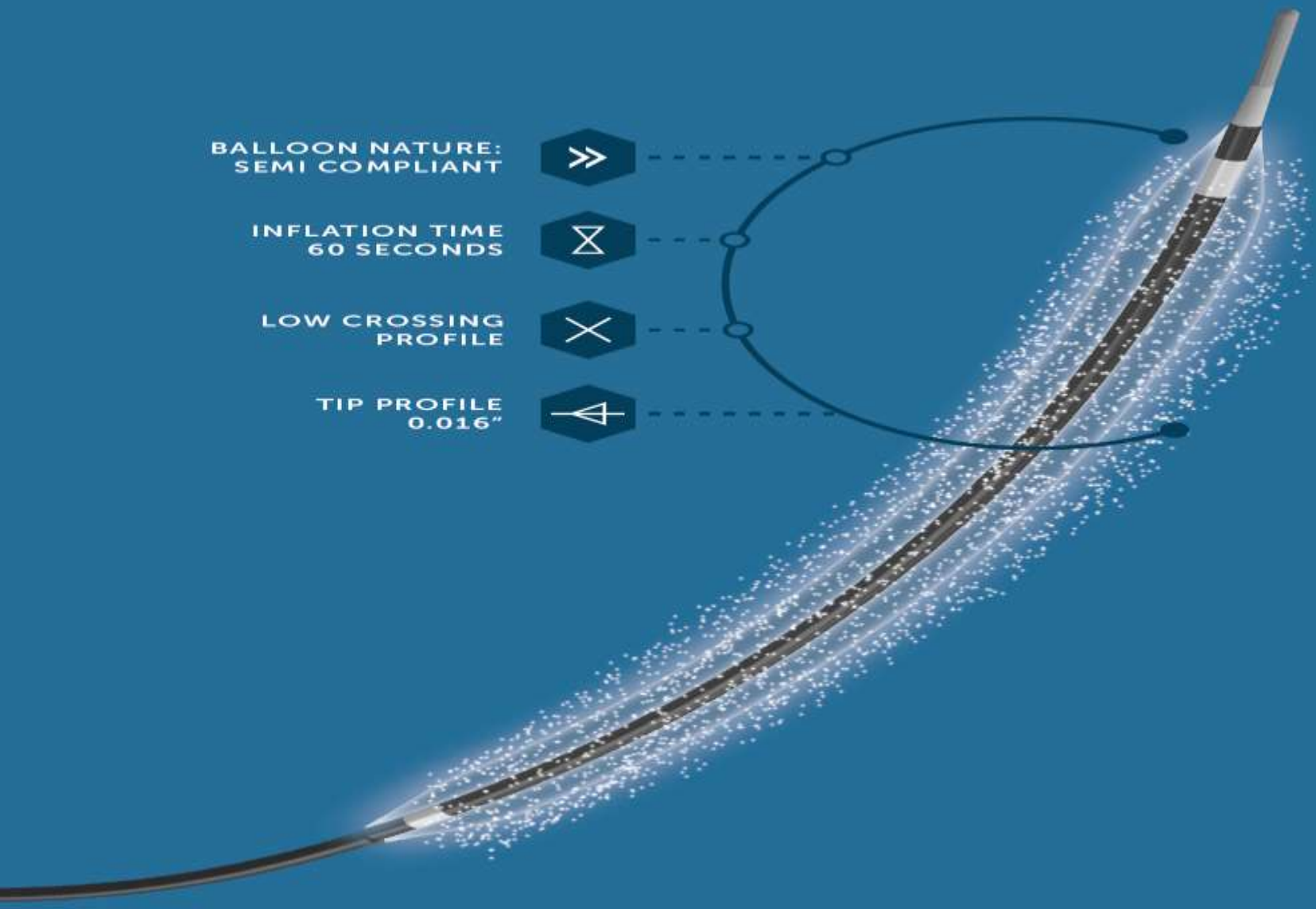

LAD II
100%


STENT
DES
3X28


LAD
Final
Result

Management of In Stent Re Stenosis

- POBA (Plain Balloon)
- Stent in Stent
- Drug coated Balloons


BALLOON NATURE:
SEMI COMPLIANT
INFLATION TIME
60 SECONDS
LOW CROSSING
PROFILE
TIP PROFILE
0.016"

Drug Coated Balloon Catheter for Percutaneous Transluminal Coronary application.

Intended for applications like In-stent restenosis, small vessels, bifurcation lesions and De-Novo lesions.

Based on the concept of Nanolute technology, it provides more benefits than the existing balloons available in the market and has broad horizon in terms of treatment.

FOLDED BALLOON

HANDLE WITH CARE

Do not rub the coated balloon

Do not use any protective/insertion sheath to advance the SCB through the introducer sheath and/or haemostatic valve

LESION

PRE-DILATATION

SCB

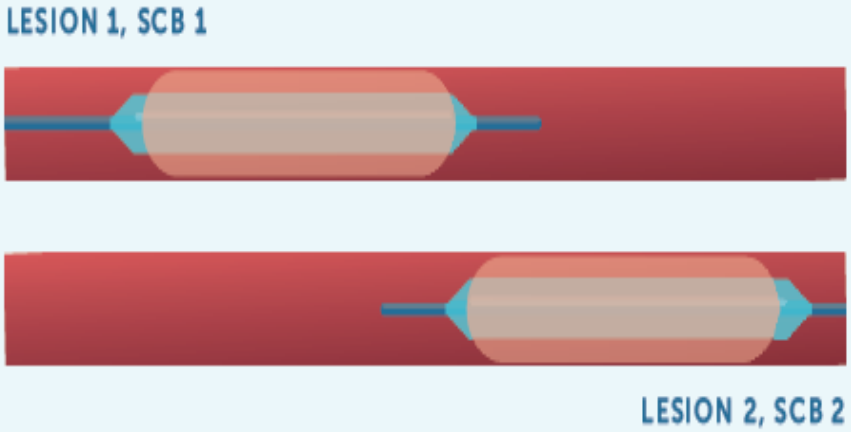
PRE-DILATATION RECOMMENDED IN ALL CASES

For pre-dilatation in all cases use a standard balloon (approx. 0.5mm smaller than RVD)
Choose a SCB with nominal size equal to reference diameter.

Duration time 30-60 sec

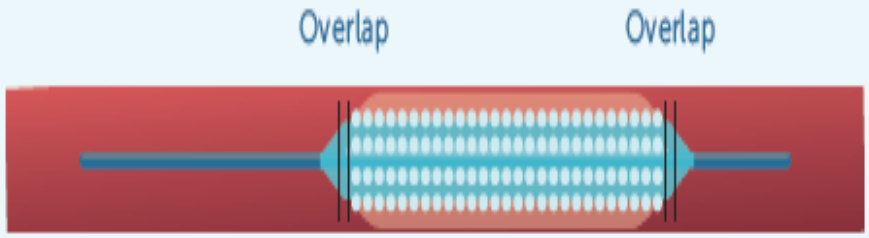
DRUG RELEASE WITHIN 60 SECONDS

Longer inflation times are possible at discretion of operator - to pursue optimal mechanical dilatation - but do not lead to further drug release.



ONE DRUG-ELUTING BALLOON FOR EACH LESION

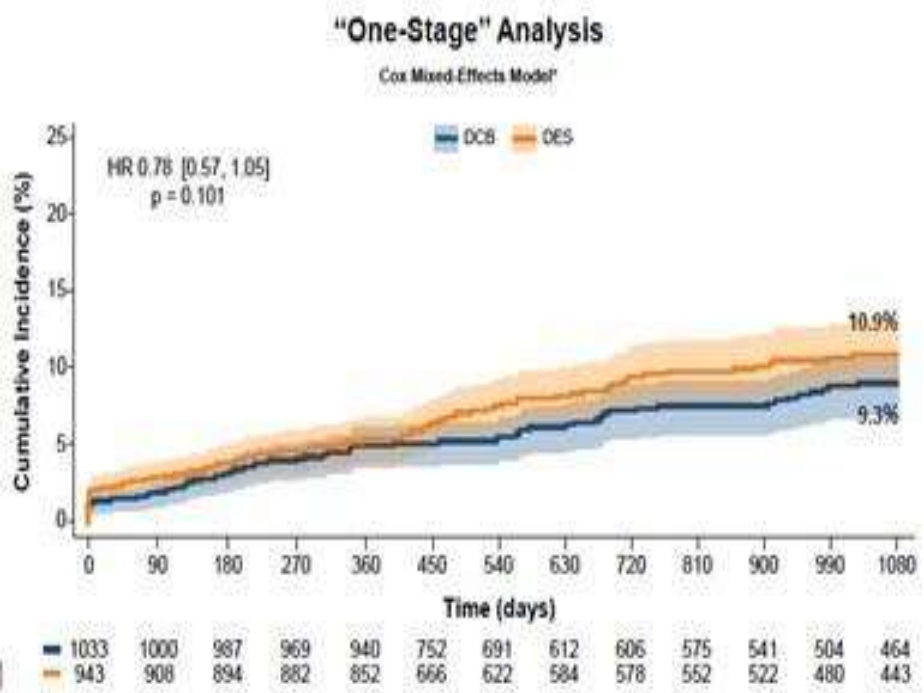
Each lesion should be addressed with a separate balloon.
In longer lesions SCB overlapping is indicated

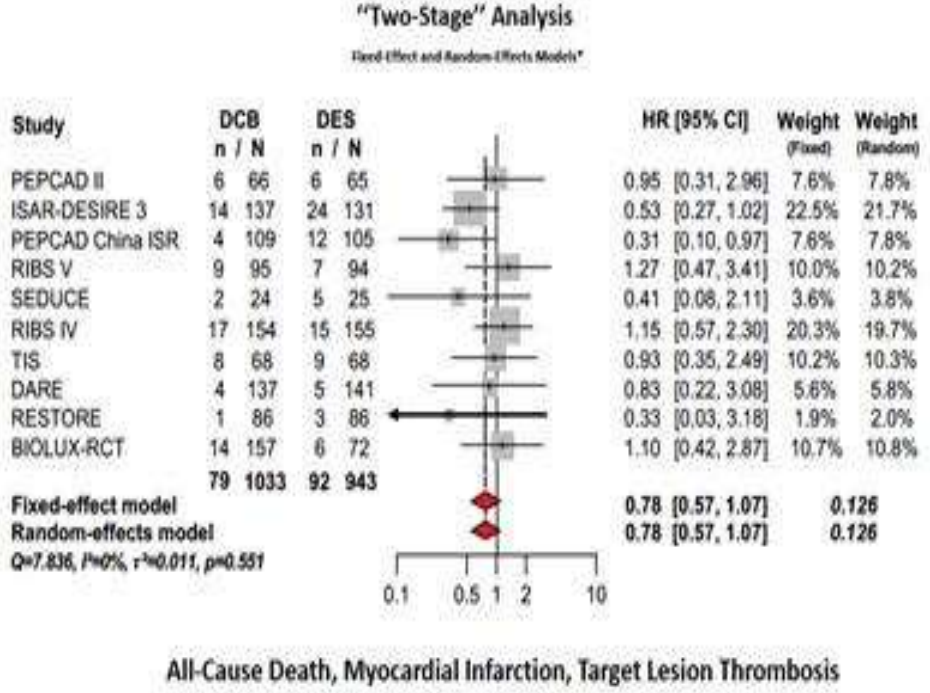


IF A STENT IS PRESENT, SIZE OF BALLOON SHOULD BE GREATER THAN STENT BY 0.5MM ON EACH SIDE.

DAEDALUS: Pooled analysis of DCB Trials for Coronary ISR

1976 patients treated for coronary ISR with DCB (N=1033) versus DES (N=943)
Safety (all death, MI, ST) at 3 years favors DCB





No mortality signal in coronary trials of DCB

Giacoppo, D et al Euro PCR 2018

In patients with recurrent ISR, implantation of new DES would result in a vessel with multiple metal layers ("onion skin" phenomena). These "frequent flyer" patients seem to be at high risk for additional recurrences. SCB might emerge as the treatment strategy in this setting.

Nanolute ISR subgroup results showed good clinical outcomes with no death reported at 12 months.