Successful management of life threatening coronary perforation

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19 th Joint Meeting of Cardiovascular Intervention and Revascularization

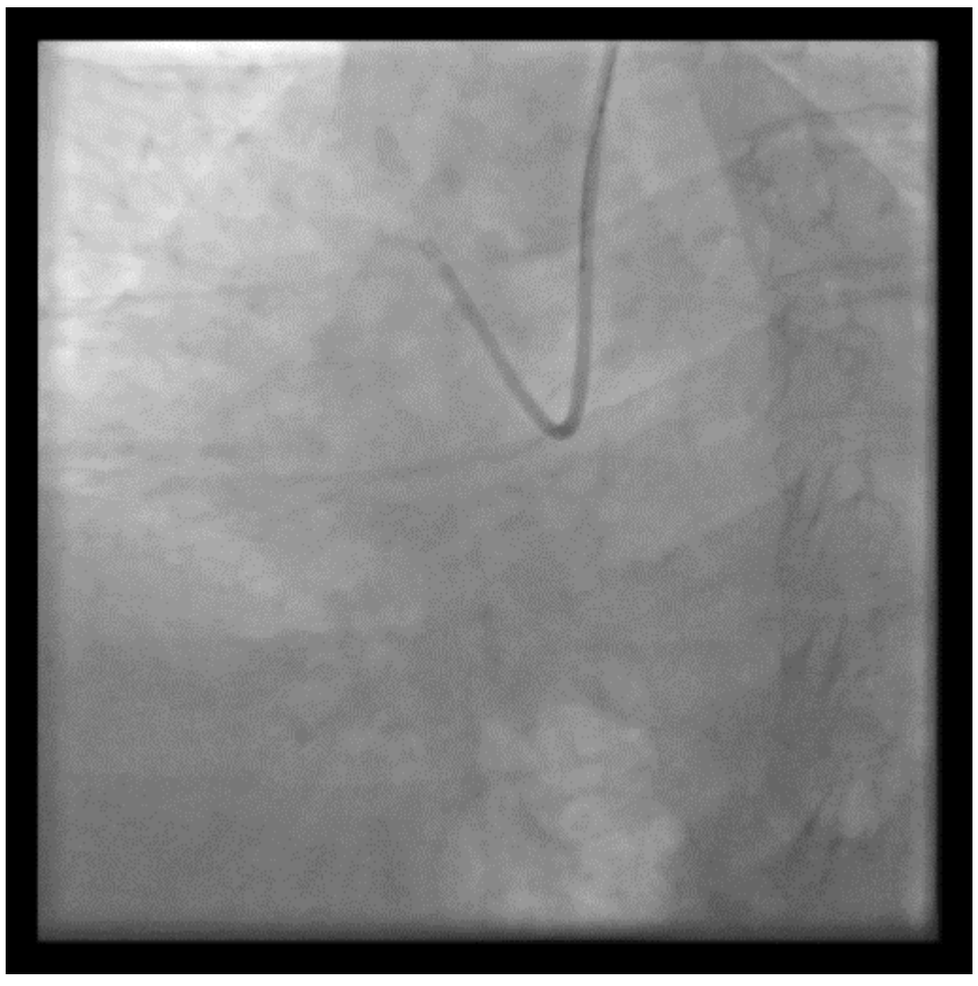
Case Summary

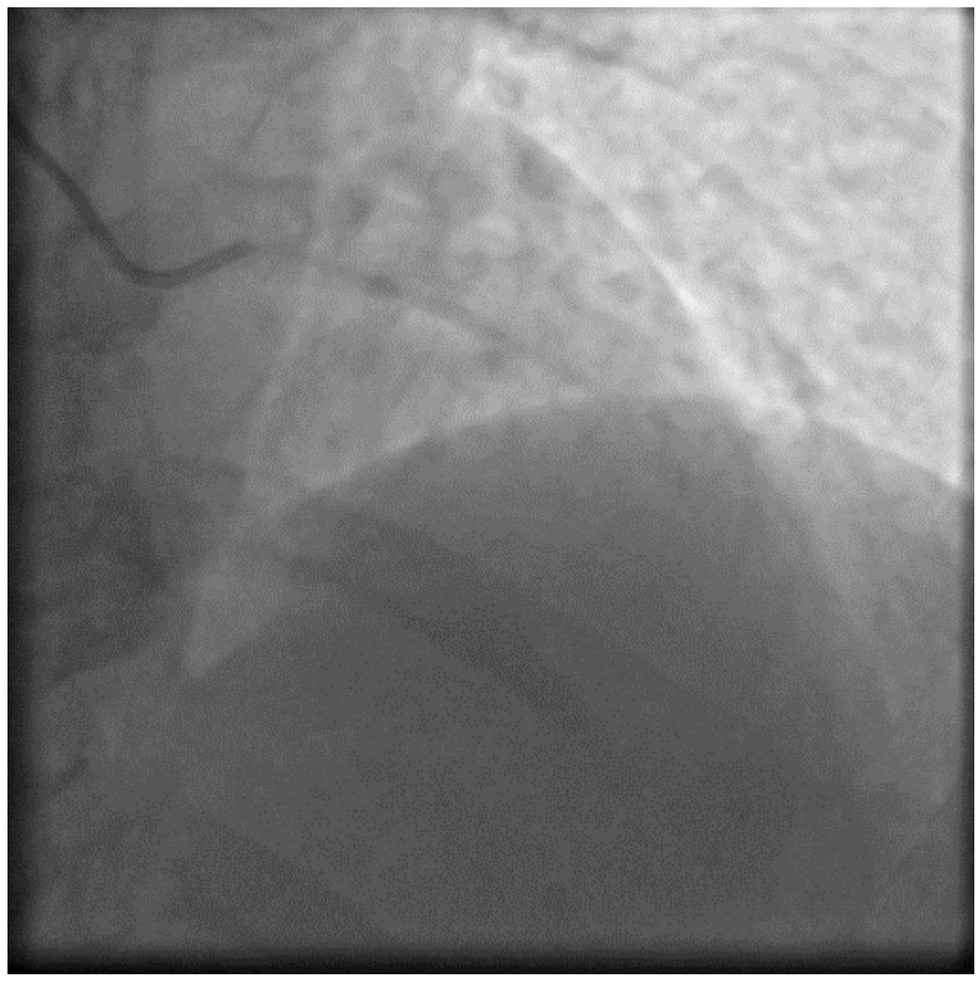
- 54 Year old housewife, Presented with NYHA class II Shortness Of Breath for 8 months duration.
- Obese patient with BMI of 37.2 kg/m2.
- No other conventional risk factors for ischemic heart disease
- ECG normal
- Ejection fraction 60%
- TMT II positive
- FBC & Renal function- Normal

Coronary Angiogram

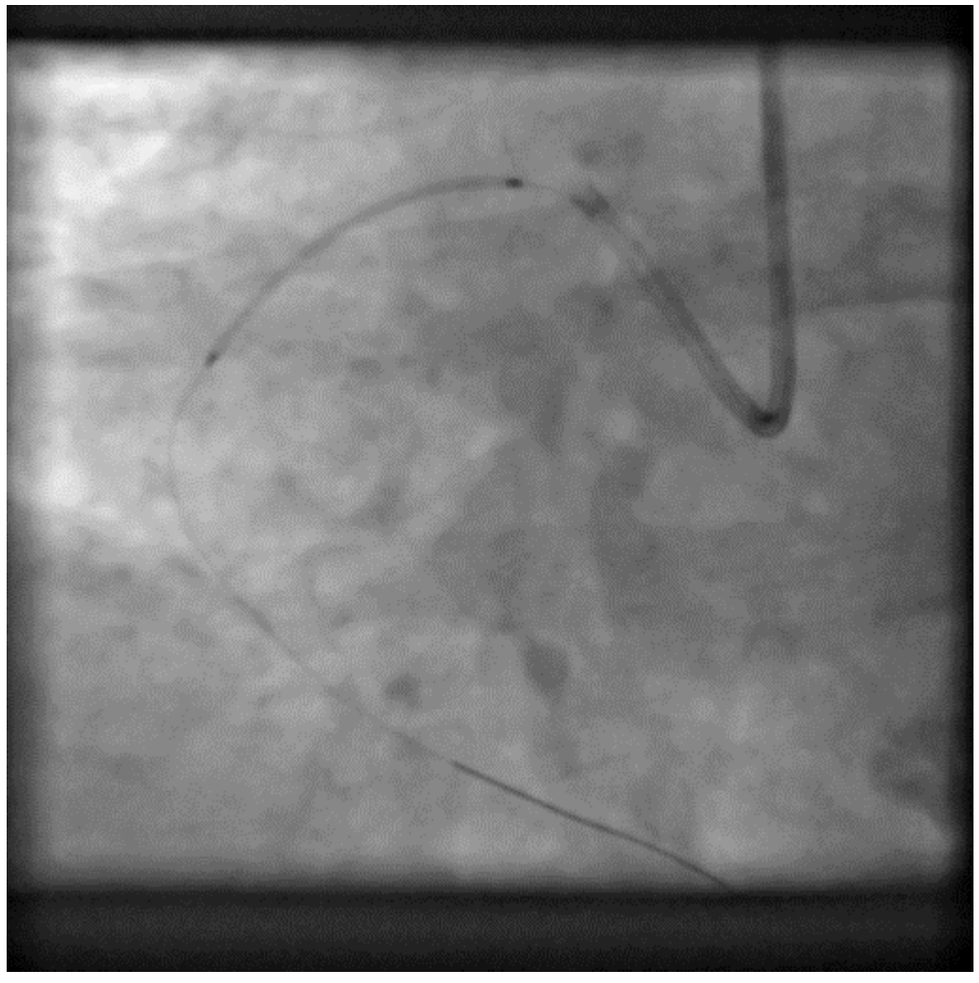
- Right radial access
- LMCA -Normal
- LAD – Mid vessel severe disease
- LCx – Mid and distal vessel moderate disease
- RCA – Dominant vessel, proximal severe disease
- Decided for PCI to RCA and LAD

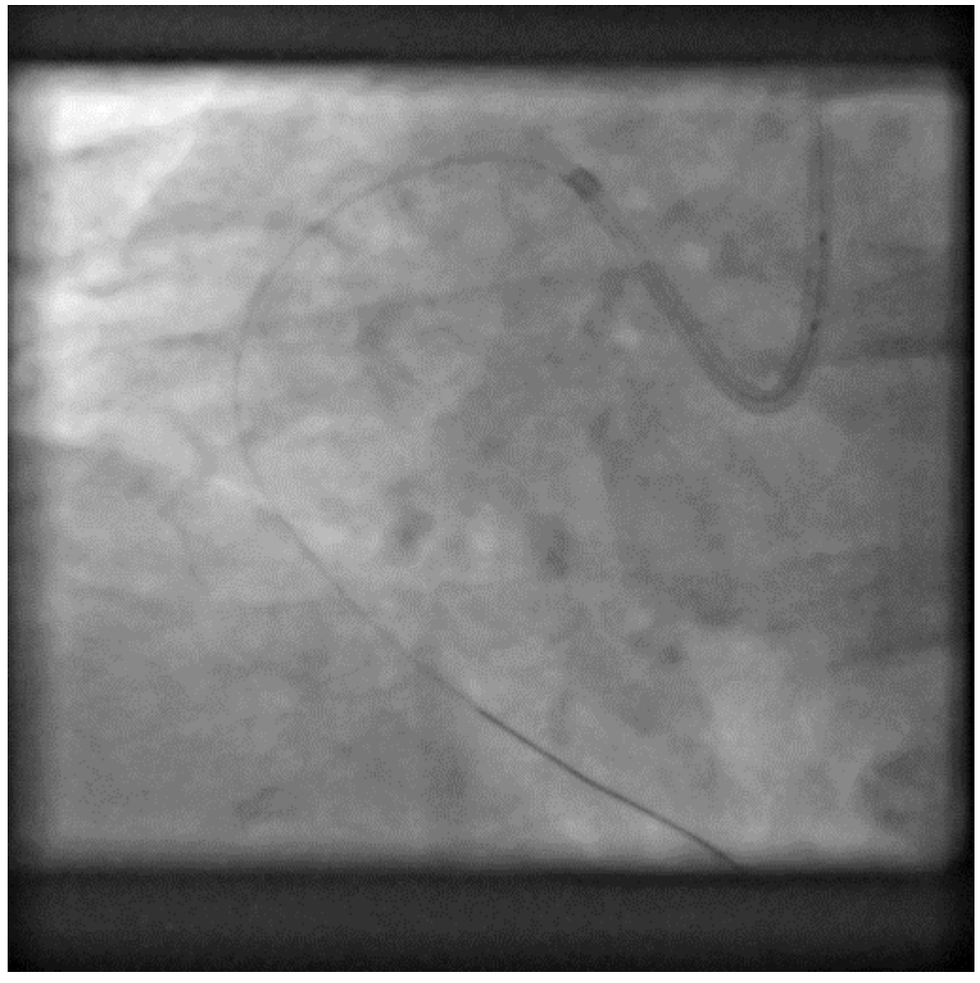
Baseline Angiogram



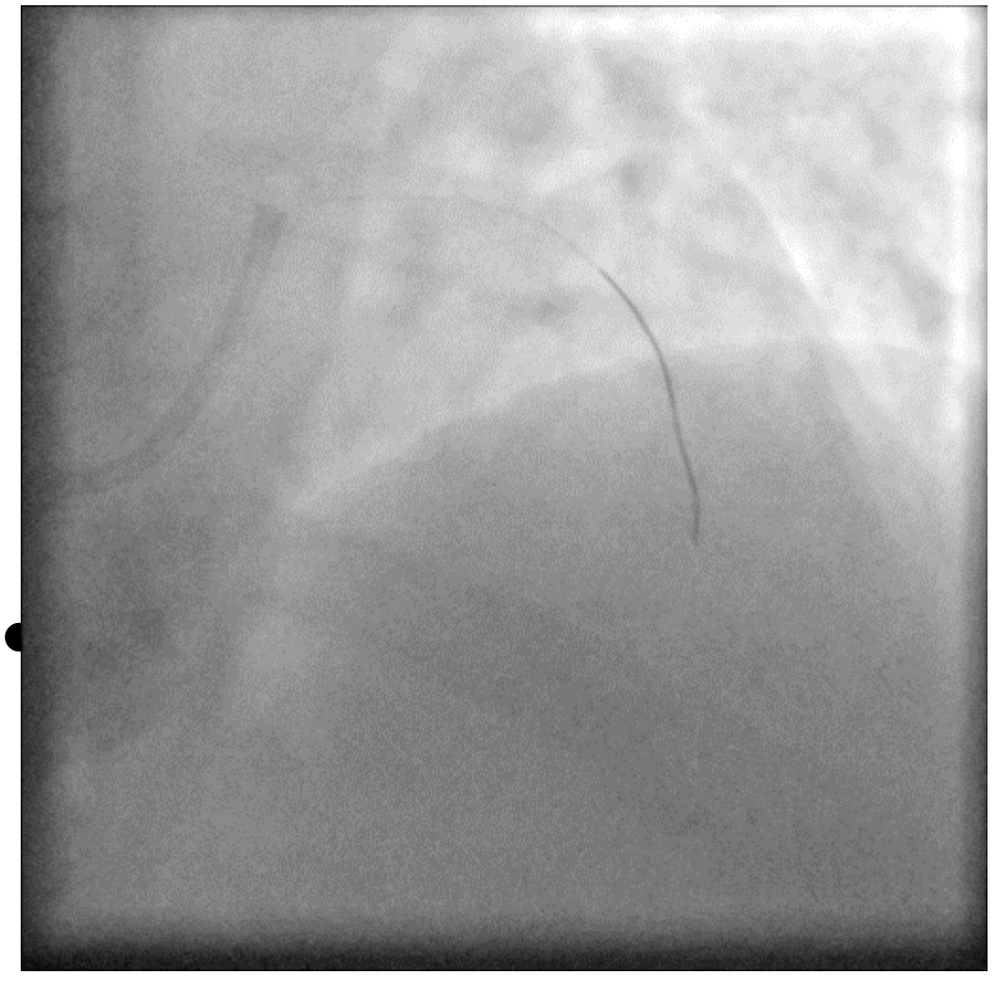


Successful PCI to RCA

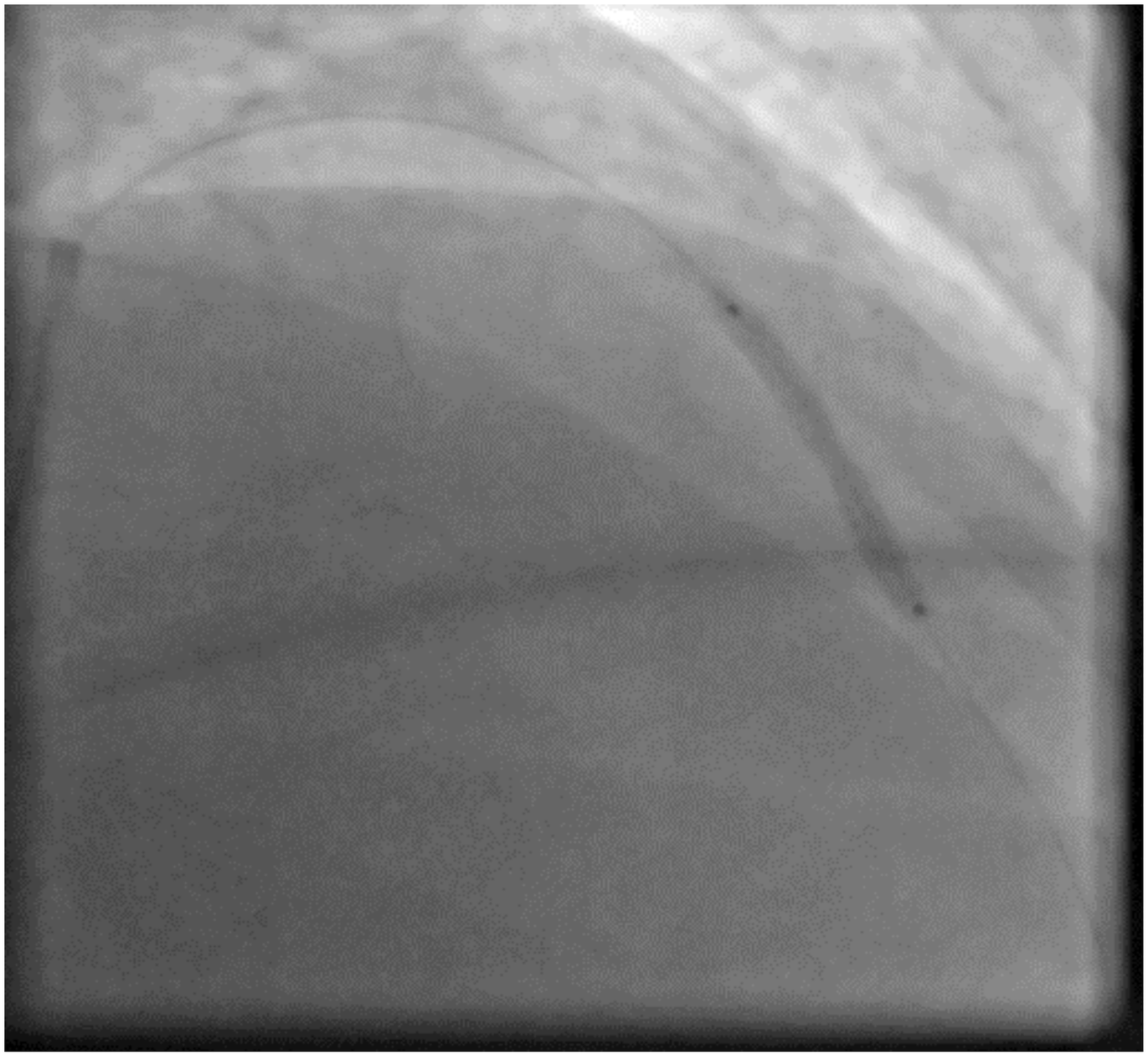




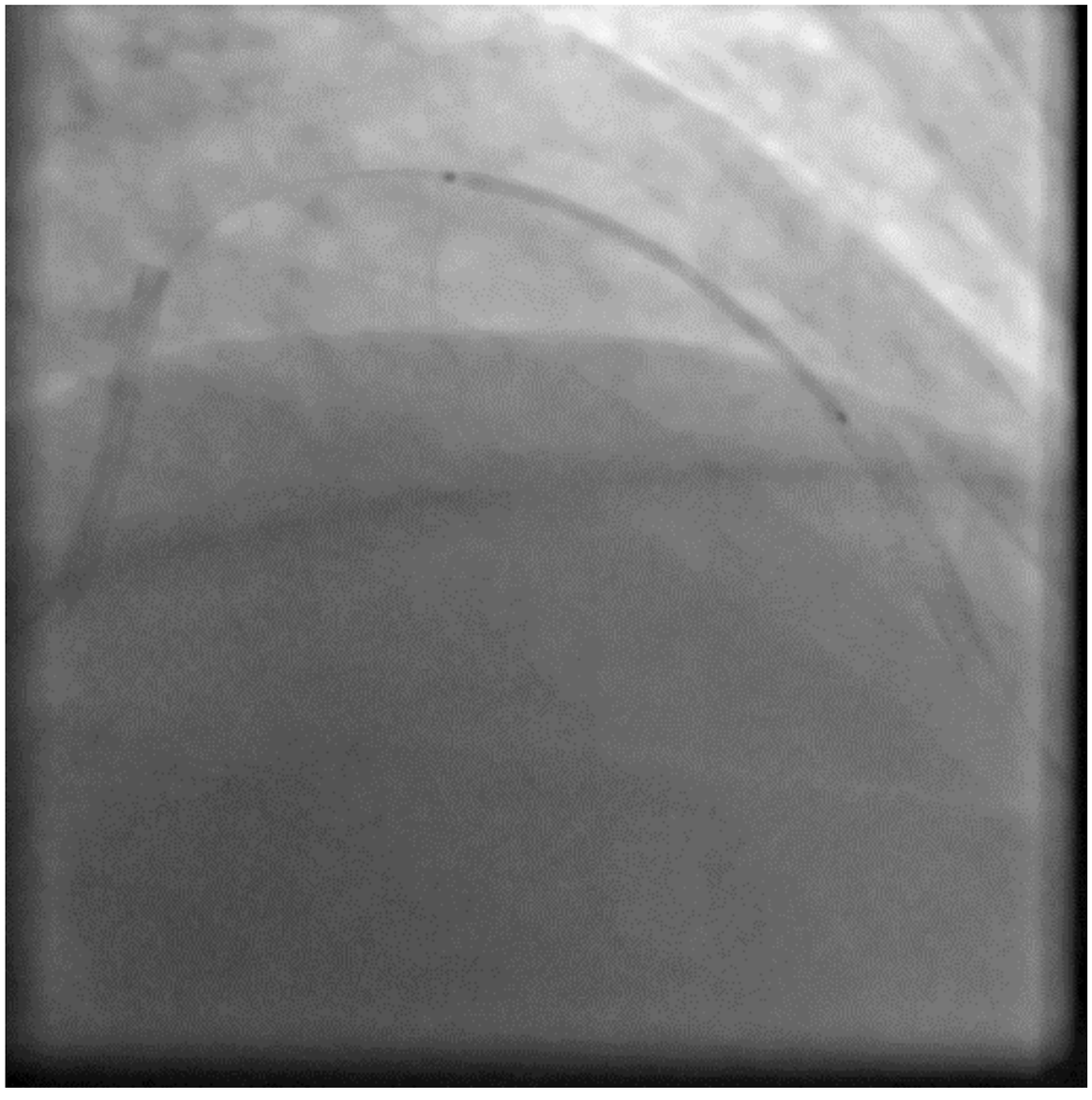
LAD PCI



3 x 24 mm DES at distal lesion (12 atm)



3.5 x 32 mm DES placed proximally overlapping the first stent



- Stent under expansion was noted at mid segment and this segment and overlapping segment post dilated with second stent balloon at 16 atm.

Patient became unstable

- Patient complained of severe chest discomfort just after post dilatation
- Rapidly patient went in to hemodynamic instability with bradycardia and hypotension leading to impending arrest.

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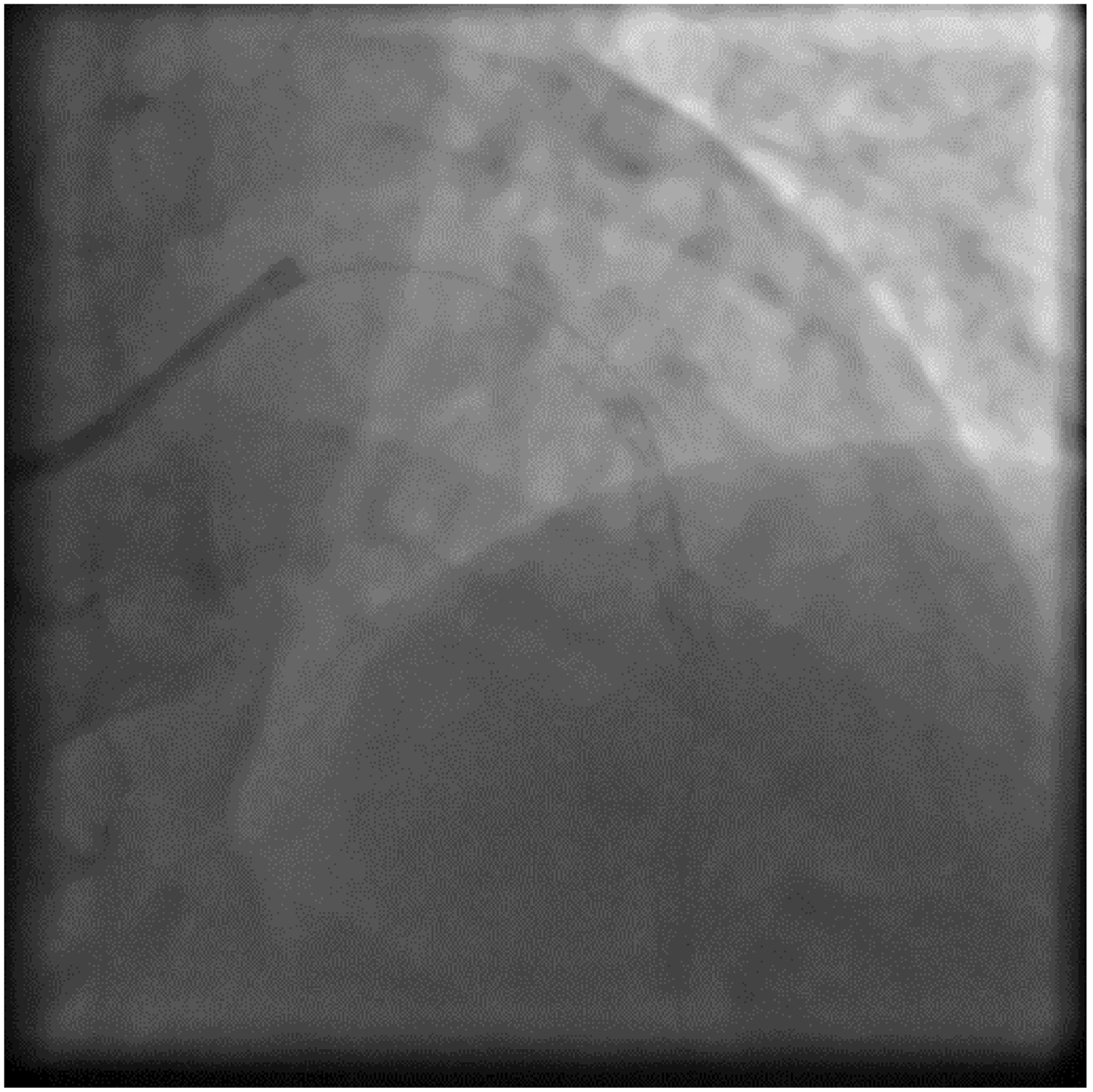
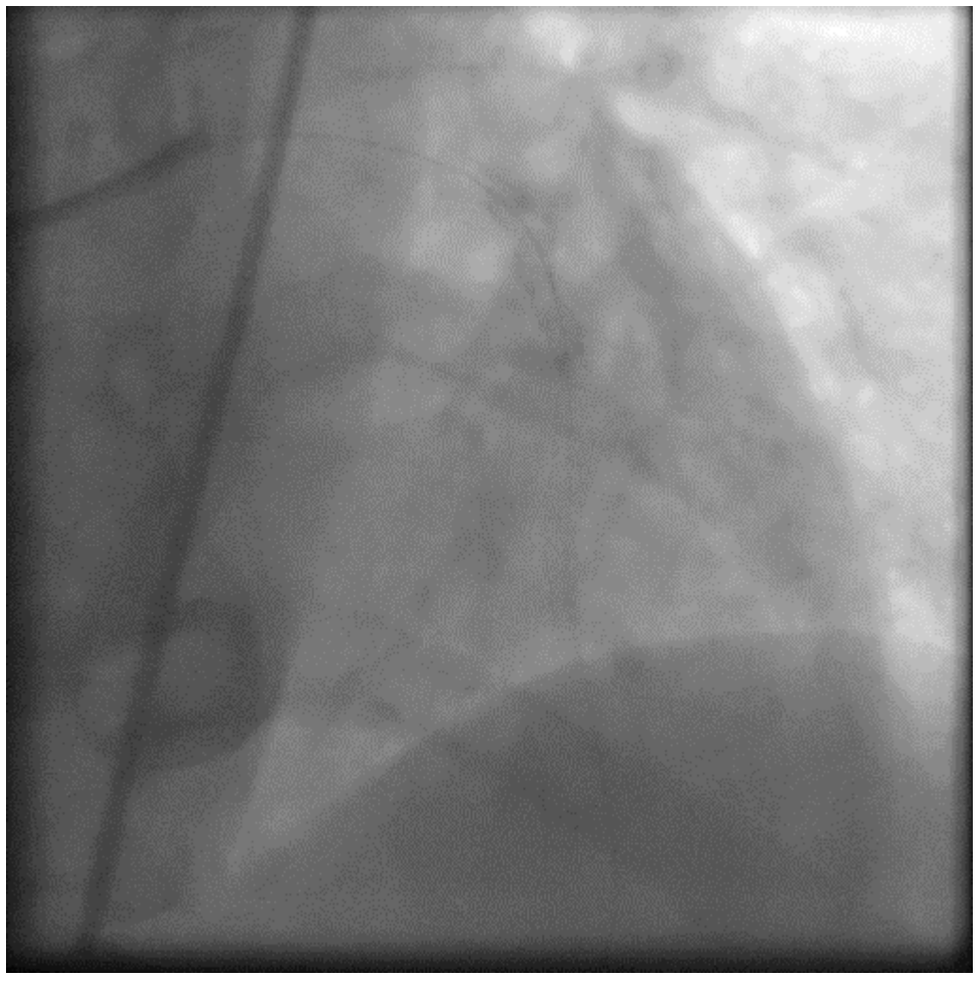


What to do ???



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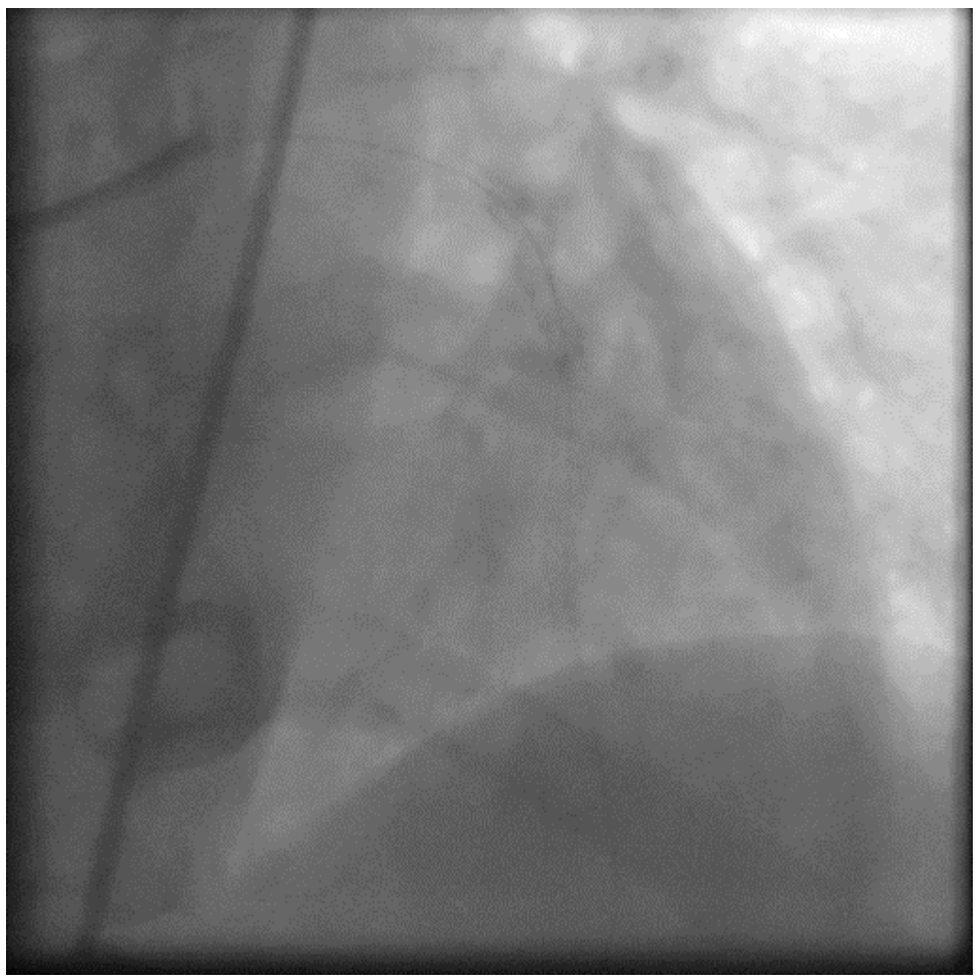


Kept the stent balloon inflated

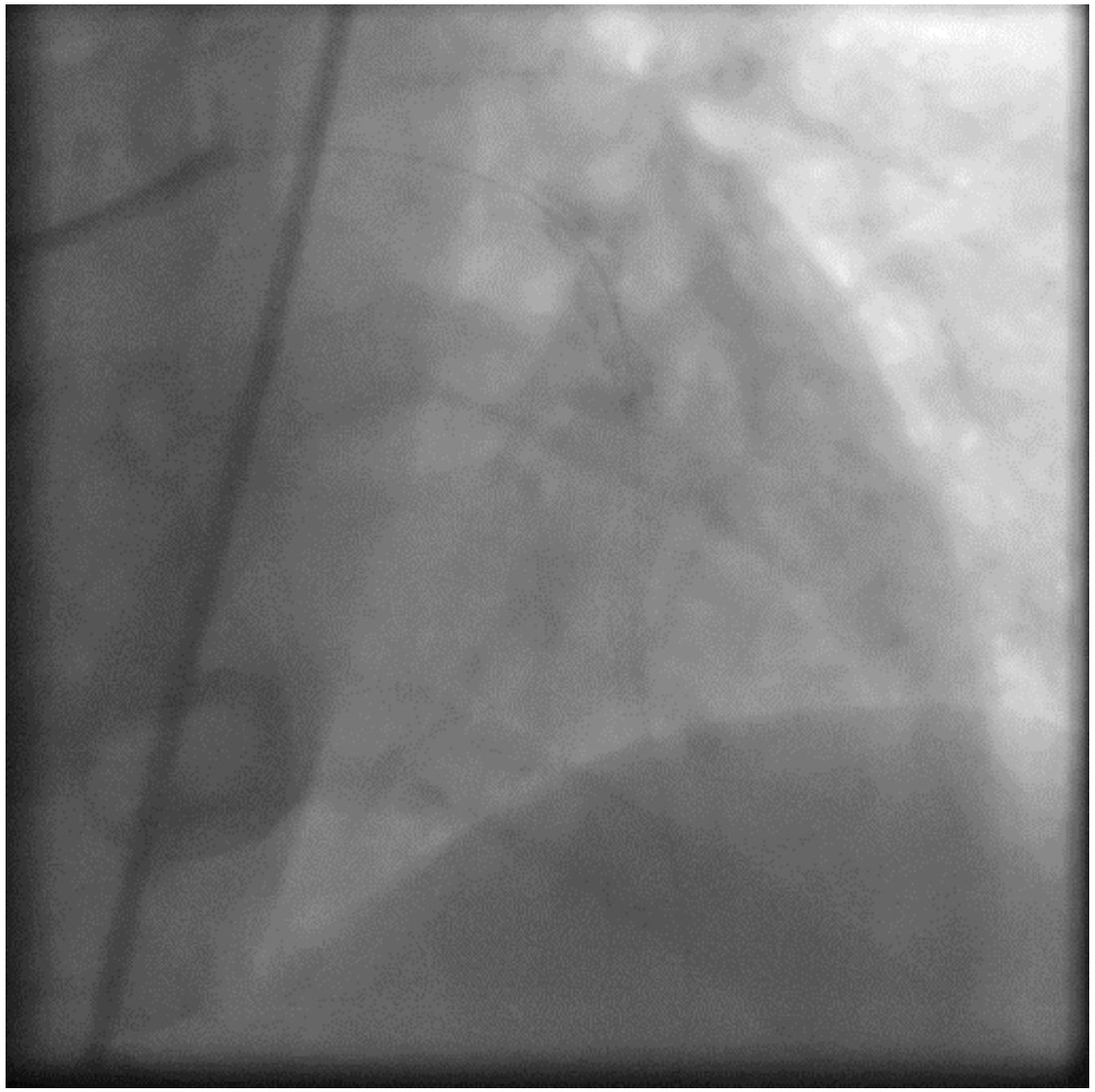
cardiac tamponade was suspected and emergency pericardiocentesis performed with rapid improvement of hemodynamics

Next

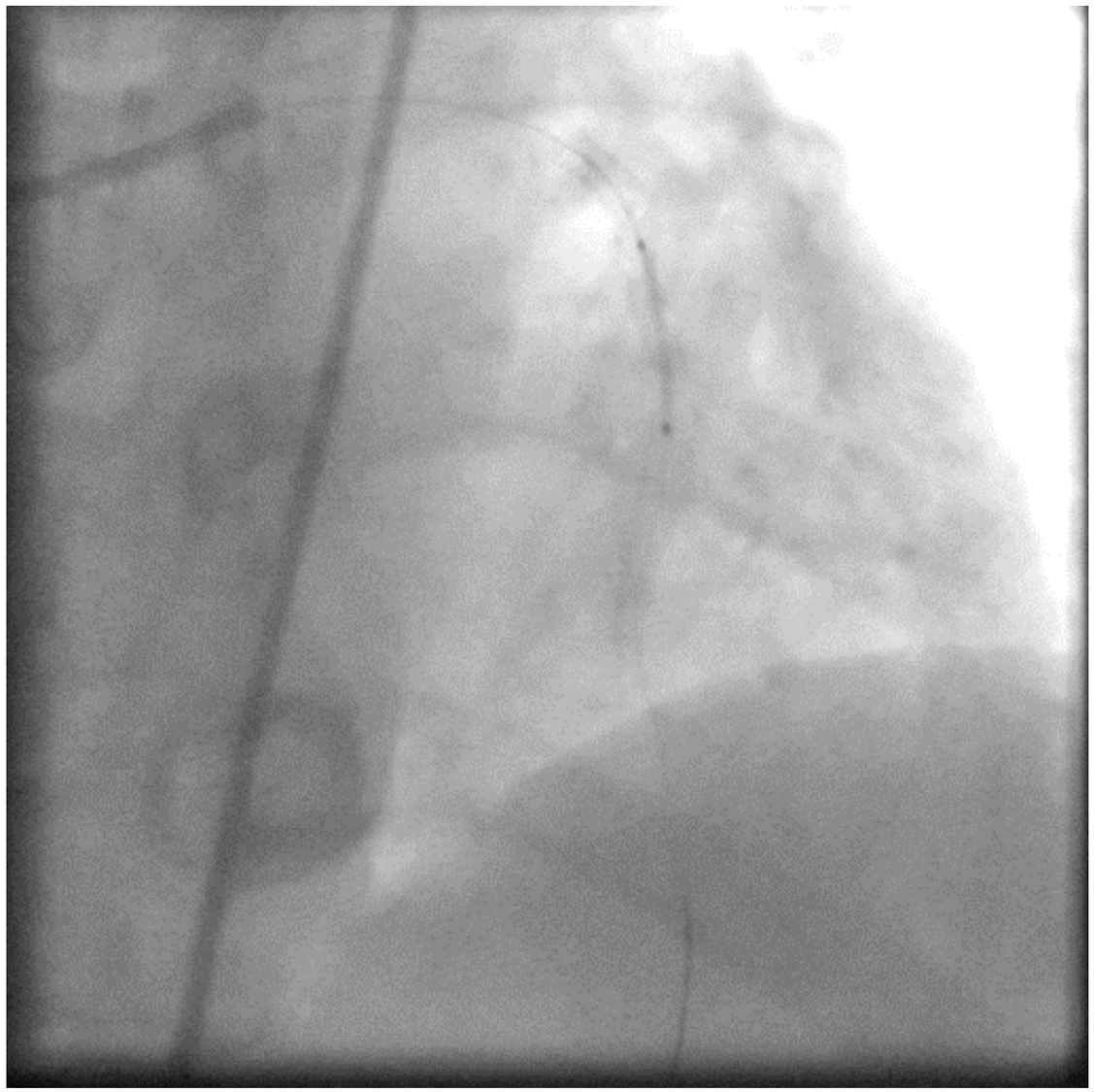
- Right femoral arterial and venues access was taken with 7F sheaths
- Prolonged balloon inflation of 15 min

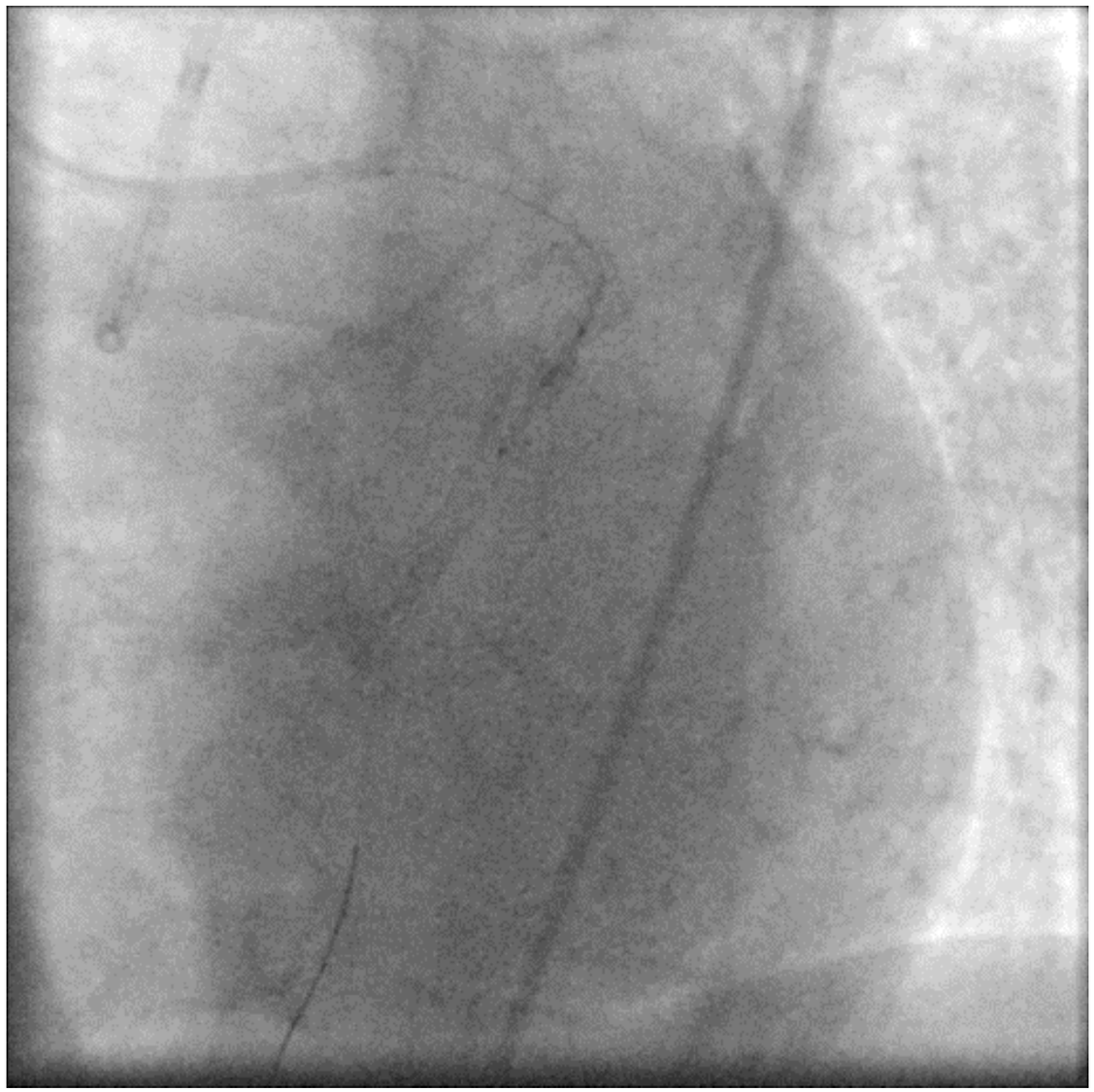
- But there was continues extravasations of blood with rapid collection in pericardial space

What to do next???

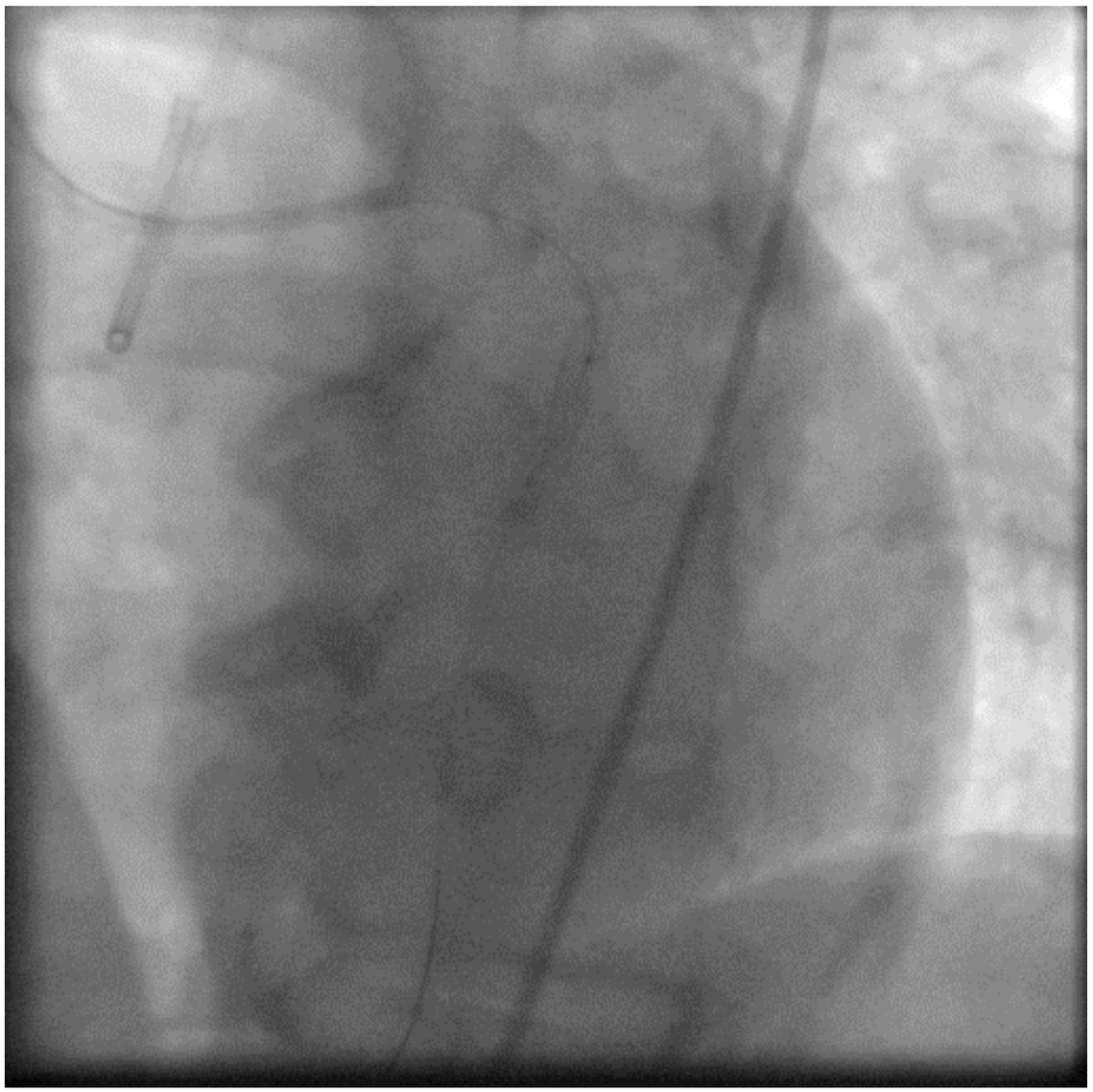


Decided to put a covered stent





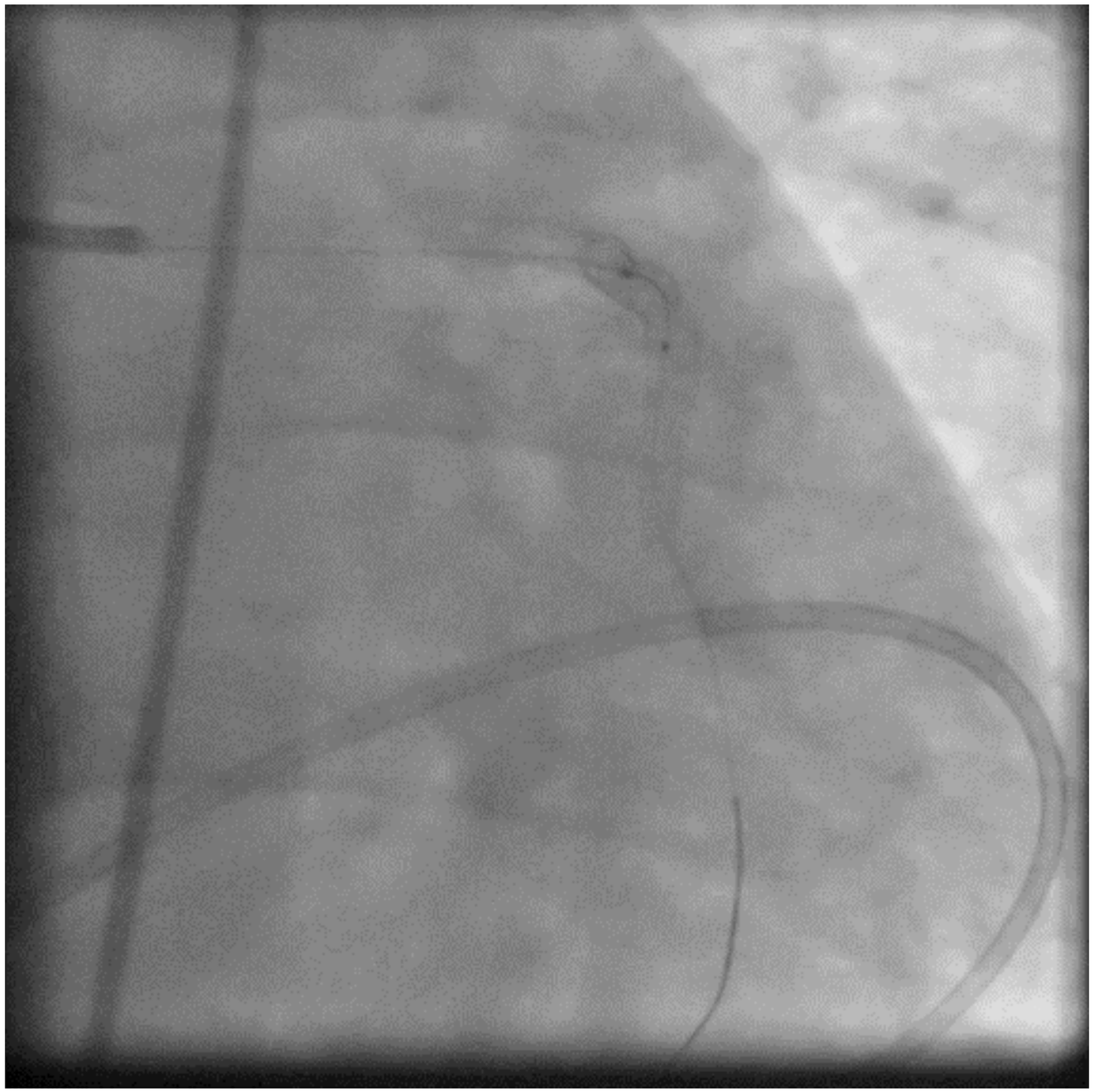
Reduced the bleeding



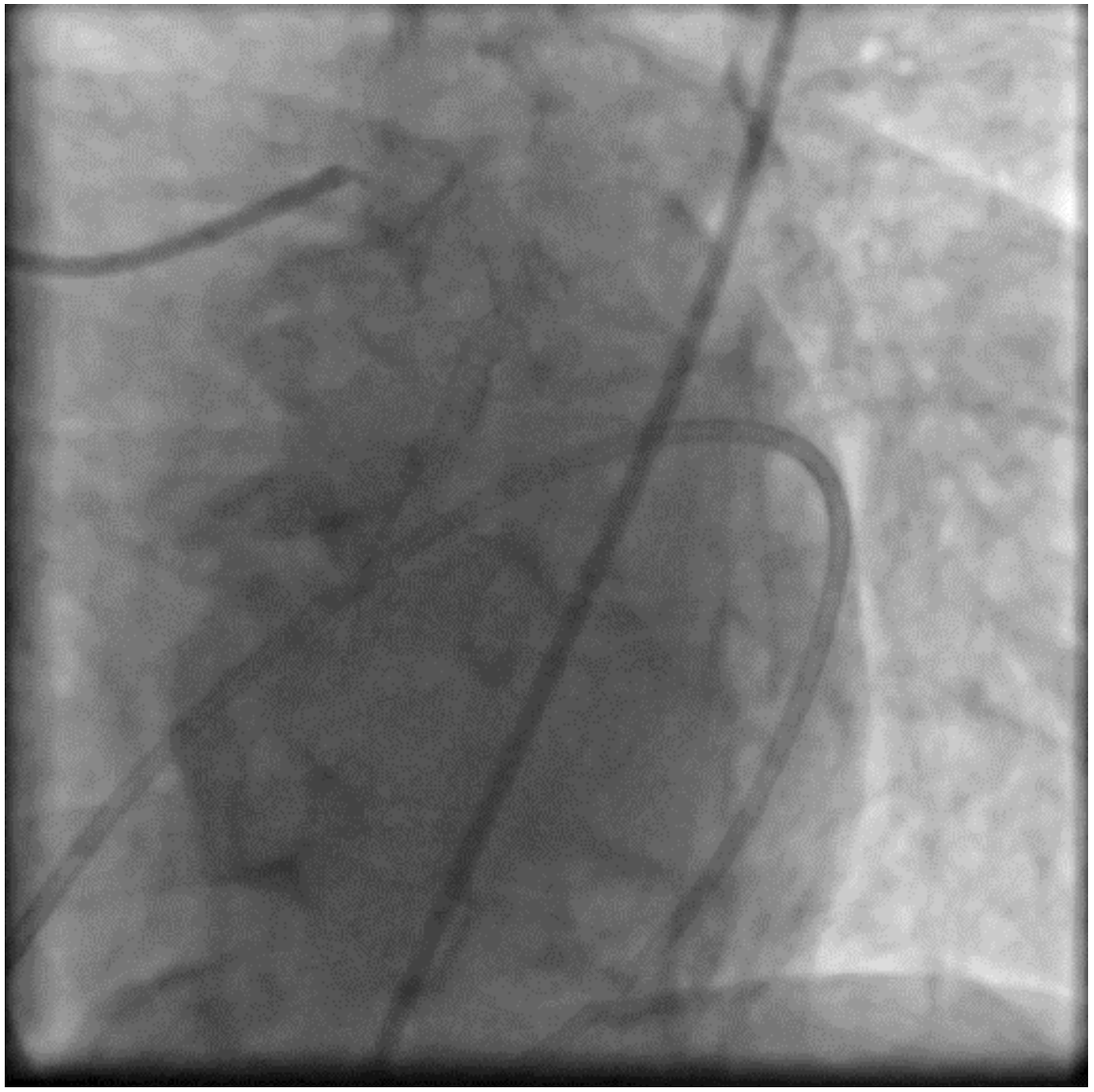
Persistent bleeding

What to do next?

Post dilated with 3.5 x 9 mm



Final Angiogram



Discharge and follow up

- Home on day six of the procedure.
- Remains well at one month, 6 month and one year follow up.

Take home Messages

- CAP is a potentially lethal rare complication of PCI , warranting Prompt recognition and management

- Caution is needed while advancing guide wires and dilating the coronary lesion or stents

- If patient has arrested or showing signs of impen ding arrest, treatment for tamponade is needed before further coronary intervention

- Use of covered stent can save a life or prevent emergency surgery

Take home Messages

- post dilatation of covered stent is a successful method when there is residual leak (specially when used under size covered stent)
- If a disaster occurs remain calm … and act promptly
- Do not hesitate to call for help and advice from a colleague with experience.

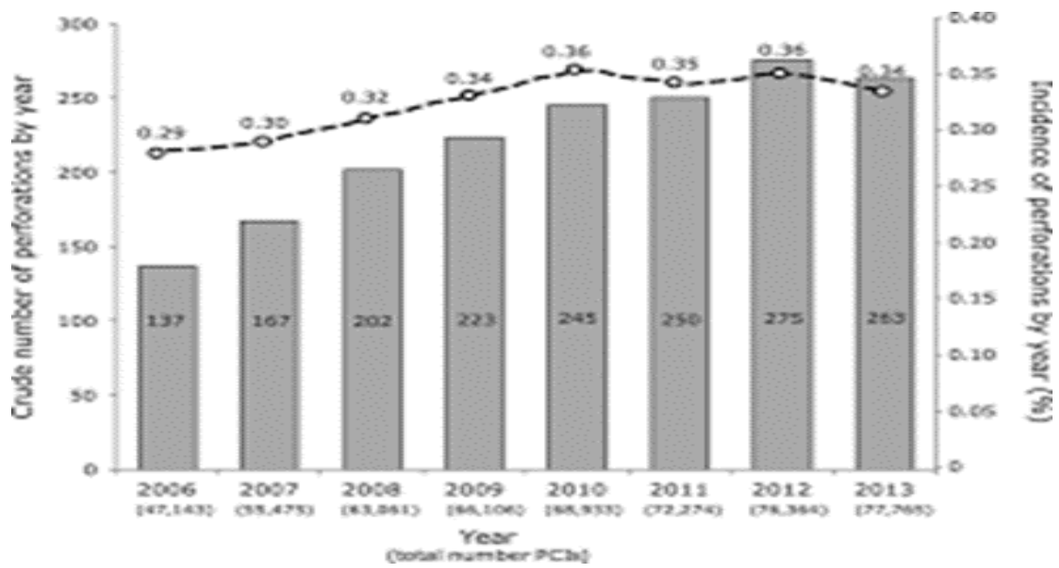
Coronary artery perforation (CAP)

CAP is defined as evidence of extravasation of contrast medium or blood from the coronary artery during or following percutaneous intervention.

Incidence

The incidence of coronary artery perforation has not changed significantly over two decades.

- It is reported between 0.2% and 0.9%.



Aietiology

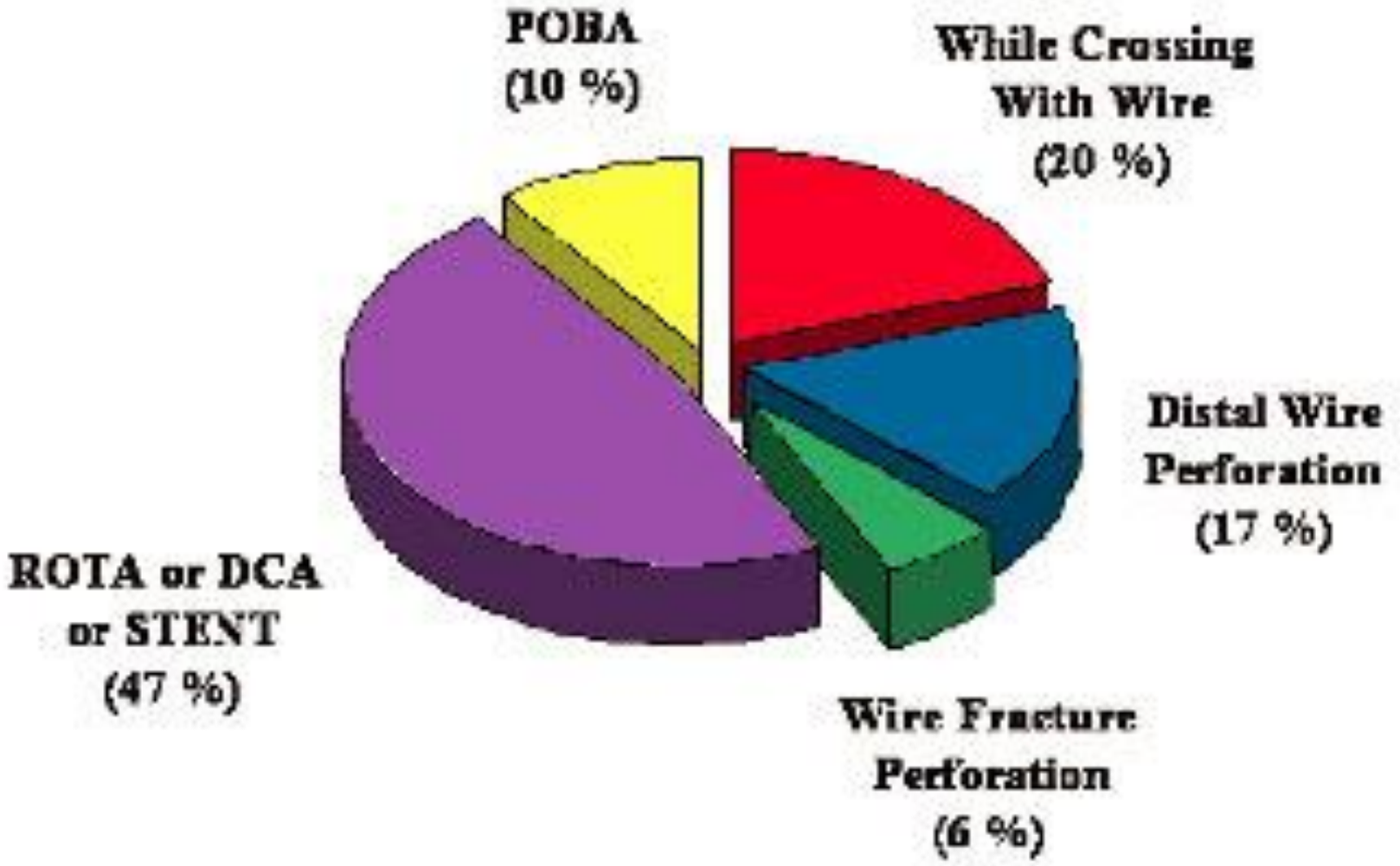


Figure 1. *Etiology of coronary perforation during percutaneous coronary intervention. POBA = percutaneous balloon angioplasty; ROTA = high-speed rotational atherectomy; DCA = directional coronary atherectomy.*

Risk Factors

Table 1. Factors associated with increased risk for vessel perforation.

Clinical Factors	Angiographic Factors	Technical Factors
Advanced age	CTO	Hydrophilic/extra stiff wires
Female gender	Calcification	Atheroablation devices
Renal failure	Type C lesions	Balloon:artery ratio >1:1.3
NSTEMI	Severe tortuosity in CFX, RCA	IVUS-directed optimal PCI with high pressure stenting
	Long (>10 mm) lesions	Cutting balloon (Boston Scientific)
	Eccentric stenoses	

CTO = chronic total occlusion; NSTEMI = non ST-elevation myocardial infarction; CFX = circumflex artery; RCA = right coronary artery; IVUS = intravascular ultrasound; PCI = percutaneous coronary intervention.

Classification

Table 1. Ellis classification.[8]

Type	Definition
I	Crater extending outside the lumen only and in the absence of linear staining, angiographically suggestive of dissection.
II	Pericardial or myocardial blush without >1 mm exit hole.
III	Frank streaming of contrast through >1 mm exit hole.
III cavity spilling (III CS)	Perforation into an anatomic cavity chamber or coronary sinus.

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Diagnosis

- Not all perforations are immediately visible on coronary angiography
- Remarkable proportion of patients may develop tamponade more than 2-6 hours after procedure
- Varying Clinical manifestation e.g. chest pain to progressive hypotension
- A high index of suspicion should be maintained in order to secure a correct diagnosis in a timely fashion.

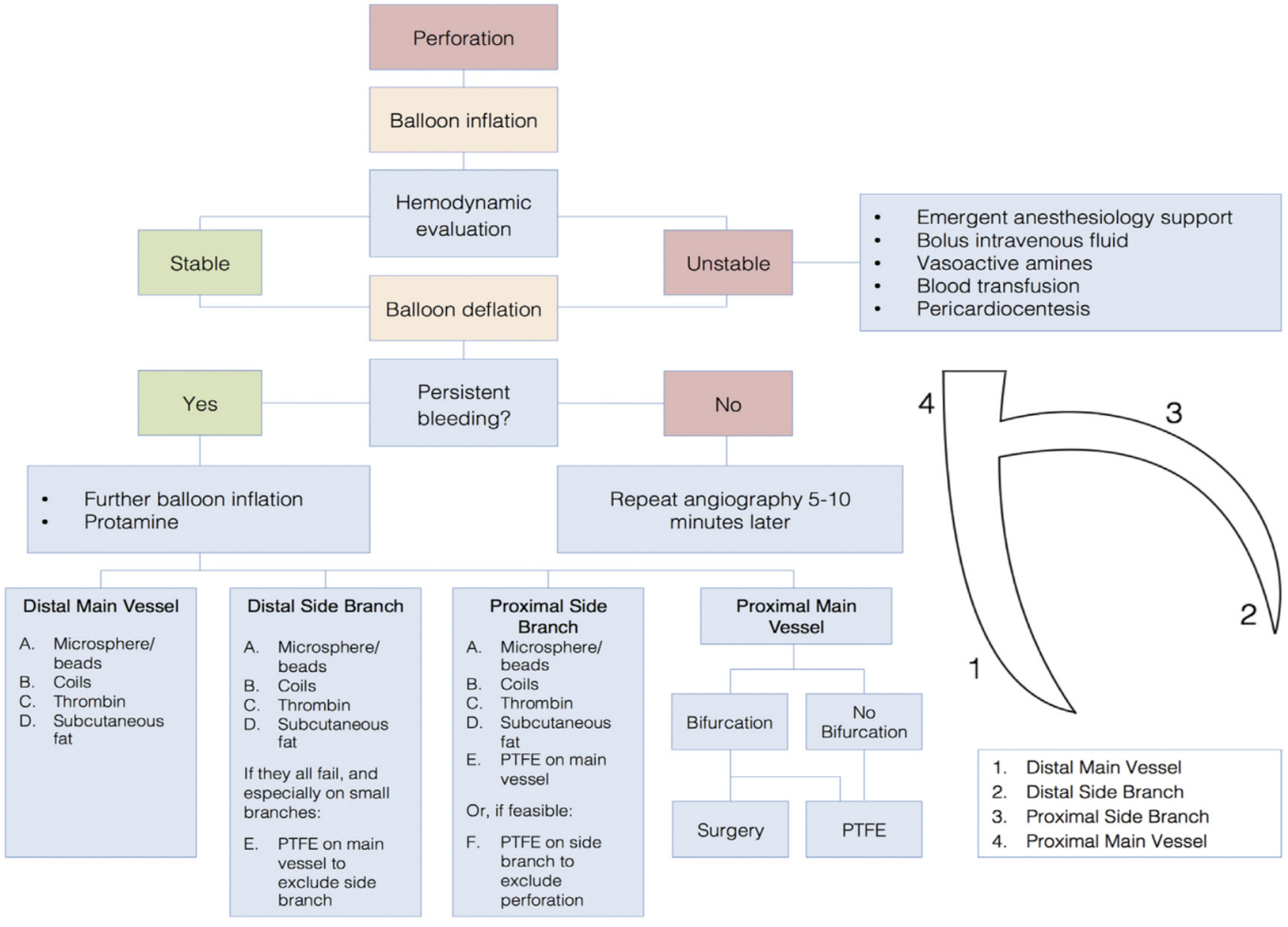
MANAGEMENT

- Always prevention is better
- Most important step in to recognize and identify presence of perforation

HIGH INDEX OF SUSPICION

- Subtle signs : unusual migration of wire tip ,dye staining, unexplained hypotention

FIGURE 1 **Coronary Perforation**



Achieving immediate hemostasis with low-pressure (2 to 4 atm) balloon inflation proximal or at the site of perforation is the first step. Invasive hemodynamic evaluation and transthoracic echocardiography differentiate stable from unstable patients. In unstable patients, pericardiocentesis, aggressive resuscitation, and volume support should be initiated to achieve stabilization. The balloon is deflated after typically 5 to 10 min to evaluate persistence of bleeding. If resolved, angiography should be repeated after 5 to 10 min, confirming definitive hemostasis. If bleeding persists, further balloon inflation or intravenous protamine should be considered. Further management depends on the site of perforation. The distal main vessel **(1)** should be addressed with microsphere or beads, endovascular coils, local thrombin injection, or subcutaneous fat embolization. The distal side branch **(2)** can be treated like **1**, plus possible delivery of a polytetrafluoroethylene (PTFE)-covered stent in the main vessel to exclude the perforated branch. The proximal side branch **(3)**, if sufficiently large, can be considered for direct PTFE-covered stent implantation, or should be alternatively managed like **2**. Perforations of the proximal main vessel **(4)** can be effectively treated with PTFE-covered stents if not at bifurcation sites. Otherwise, perforations near vessel bifurcations should be managed with either a PTFE-covered stent or emergency conversion to surgery.

Anticoagulant therapy and CAP

- No clear recommendation regarding which level of the heparin anticoagulation effect should be maintained after CAP.

- ACT should be measured immediately after CAP.

- Because intervention devices remain in the patient ,the heparin effect should not be completely reversed, and it might be acceptable to maintain ACT at 150 s.

- UFH may be neutralized with intravenous protamine (iv protamine 1mg for each 100 units of UFH)

Thank you

Sigiriya - Sri Lanka