

Management of Coronary Perforation

~ Micro-catheter **D**istal **P**erfusion **T**echnique ~



Shozo Ishihara

Mimihara General Hospital

Osaka, Japan

Potential conflicts of interest

Speaker's name: Shozo Ishihara

I do not have any potential conflict of interest

Background

Coronary artery perforation is an uncommon but life-threatening complication of percutaneous coronary intervention (PCI).

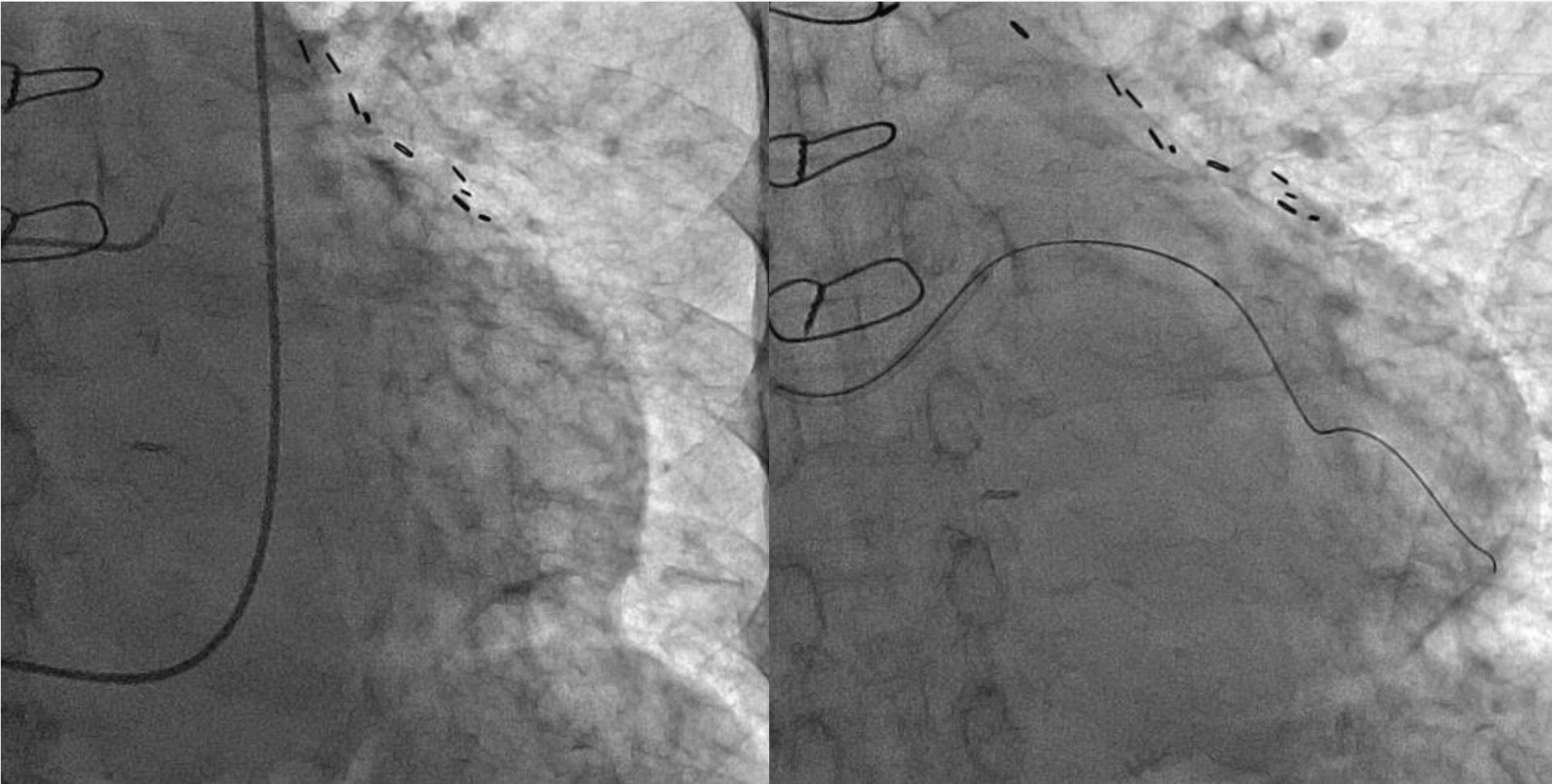
Frequency 0.2-0.9%

We cannot experience many perforation cases, therefore it is important to **learn from others** and to **prepare just in case**.

To get hemostasis...

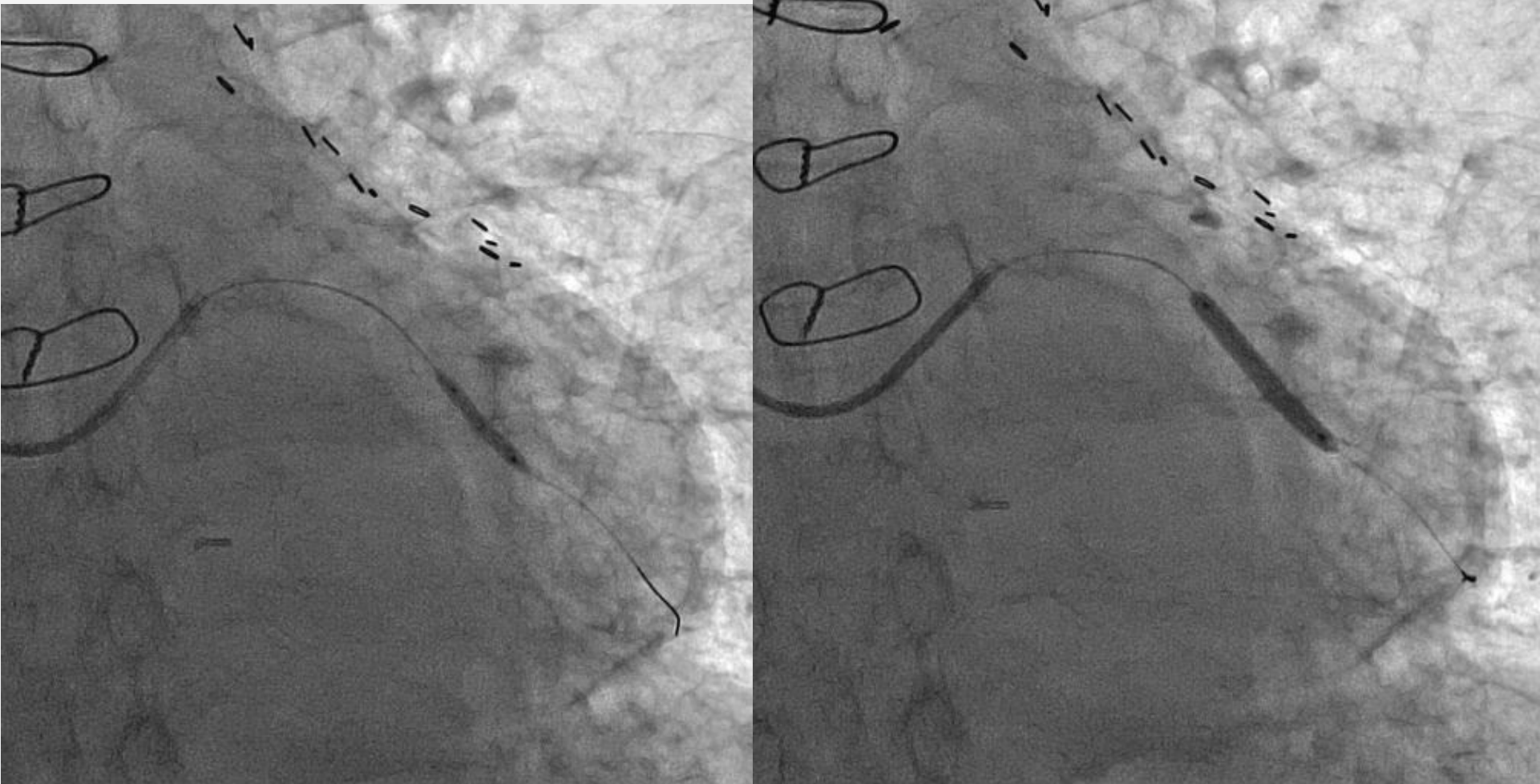
- Long time balloon inflation
(Perfusion balloon catheter might be effective)
- Heparin half reverse and control ACT within 150-200
- Check the pericardial effusion by UCG, and pericardial centesis in case of tanponade
- PTFE covered-stent
- Surgical operation

Case 81 y.o. male



Target Lesion:mid LCx 99% (Graft Failure)

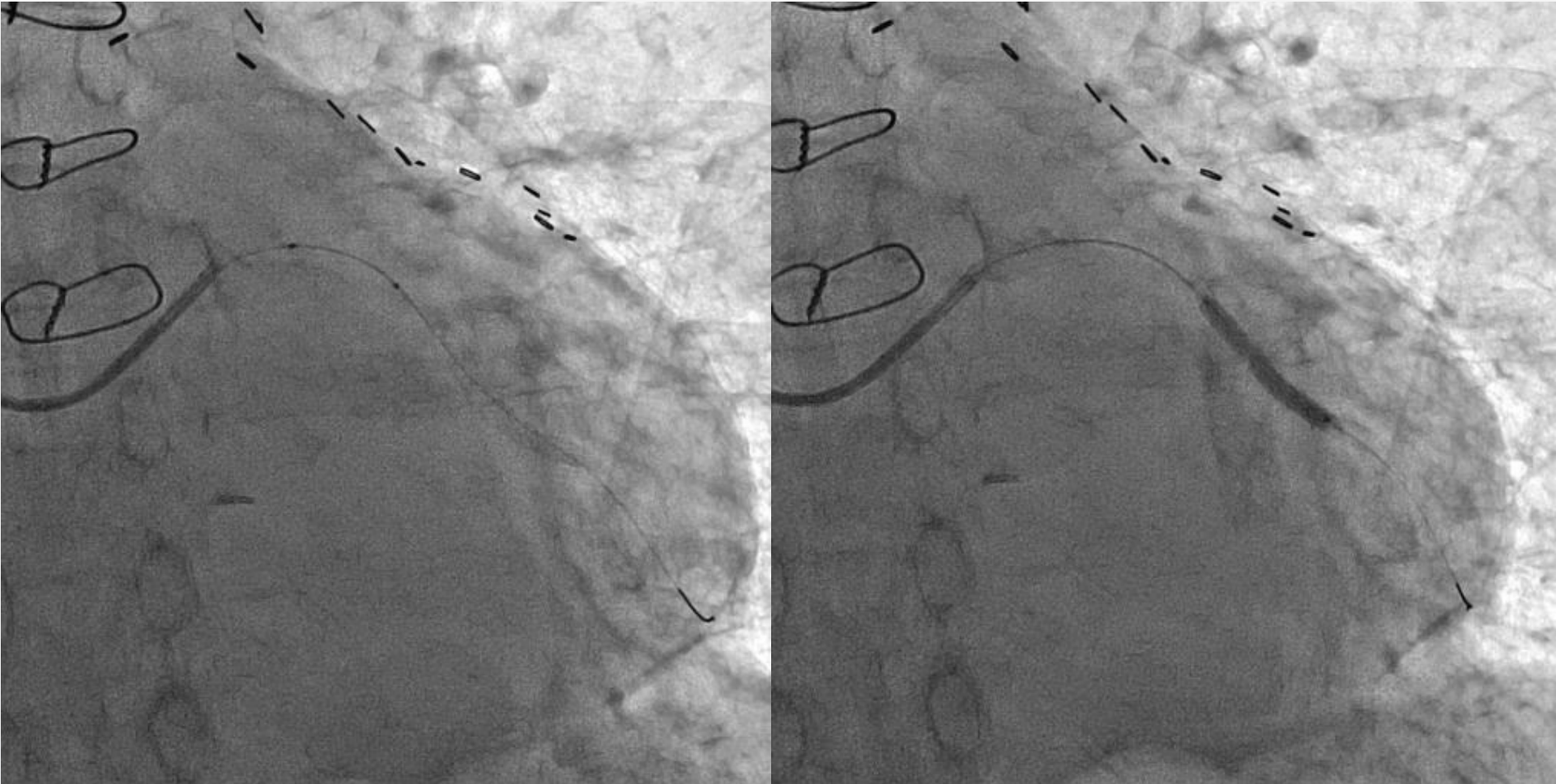
Case 81 y.o. male



Pre Dilatation: 2.5mm

Resolute: 3.0x22mm 16atm

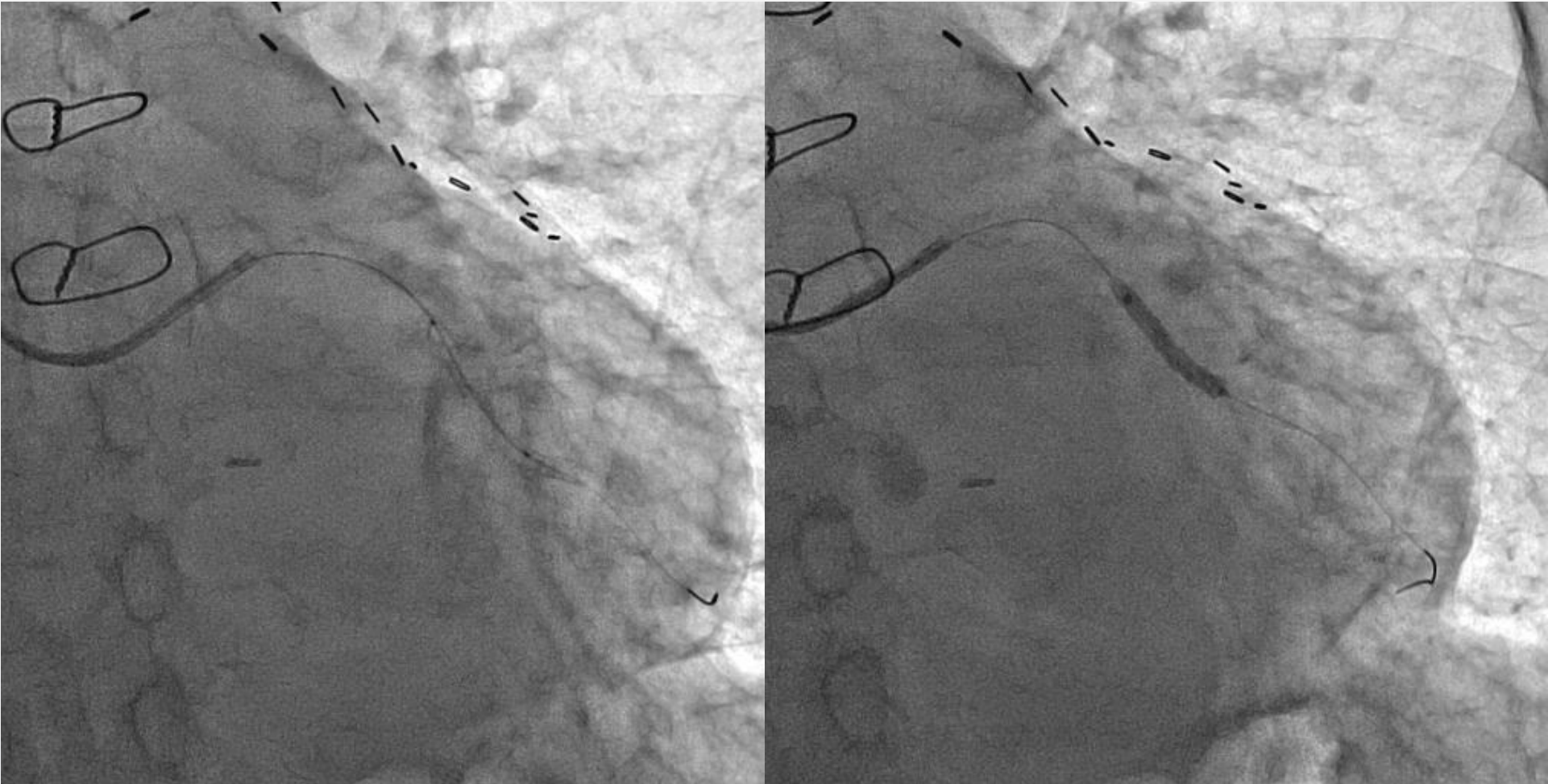
Case 81 y.o. male



Perforation !!

**Immediately, occlusion with
stent balloon**

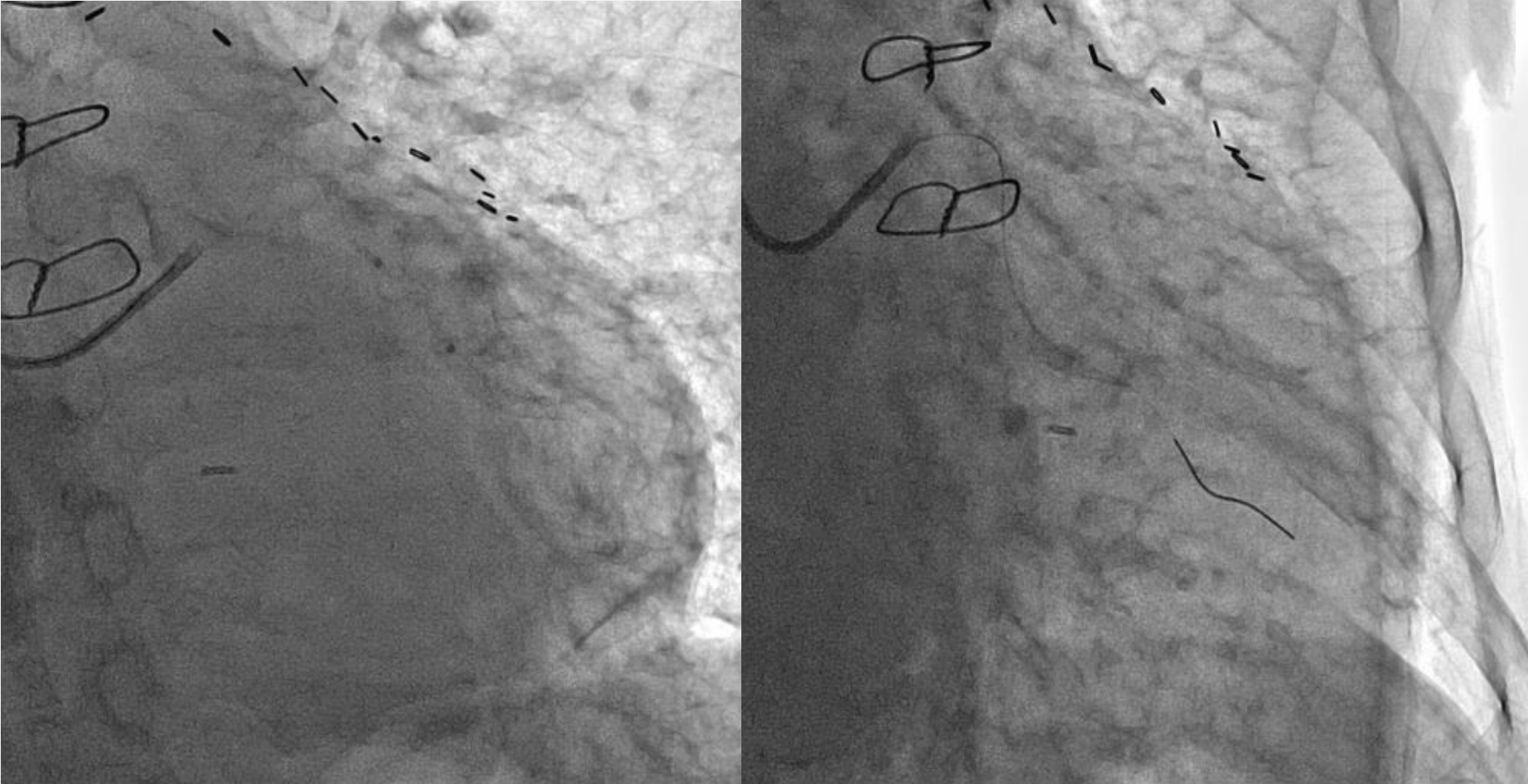
Case 81 y.o. male



Bleeding continue...

Perfusion Balloon(Ryusei): 3.0x20mm

Case 81 y.o. male

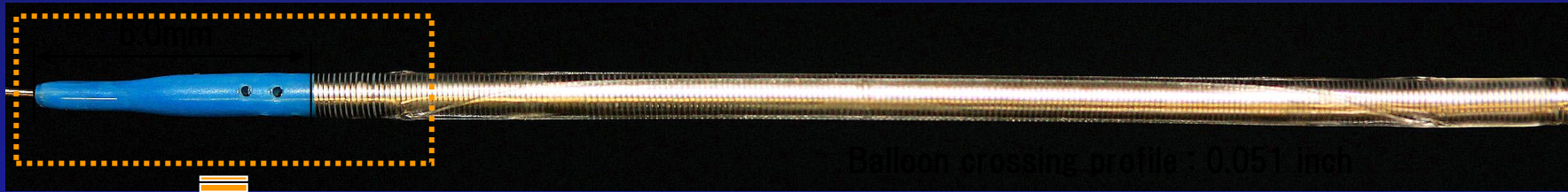
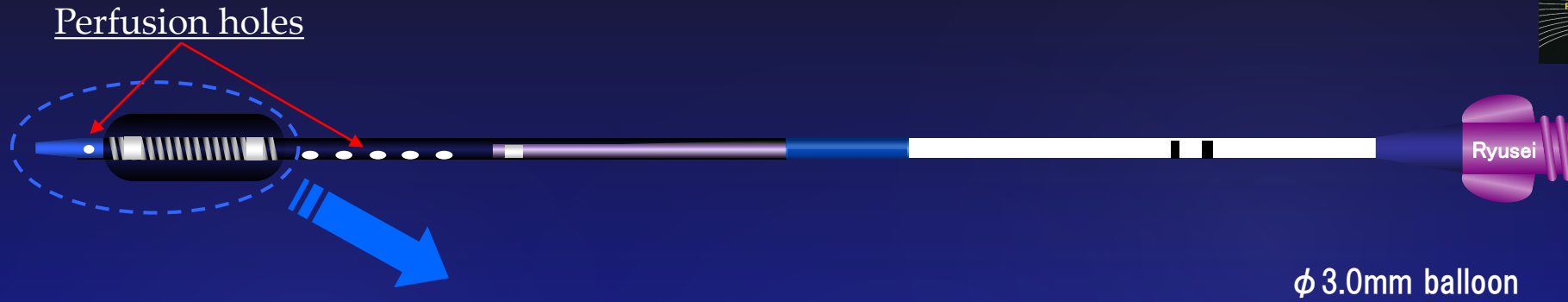


Complete hemostasis with 20 min balloon occlusion

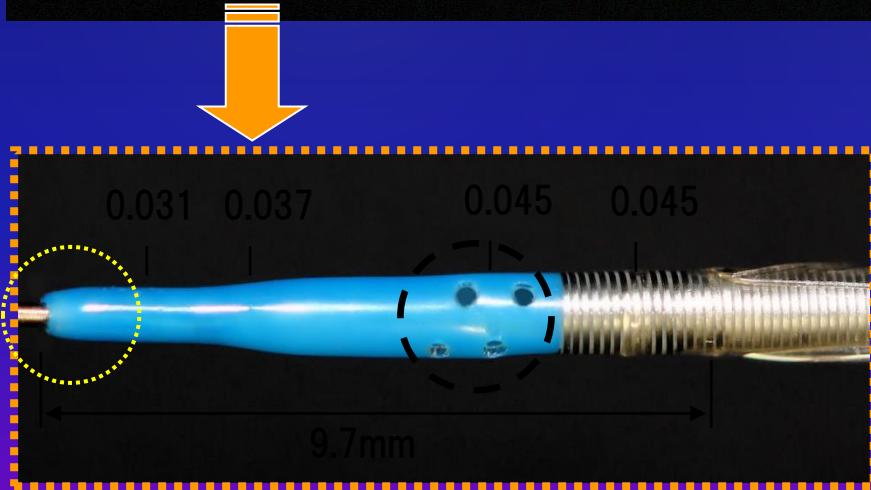
Perfusion Balloon



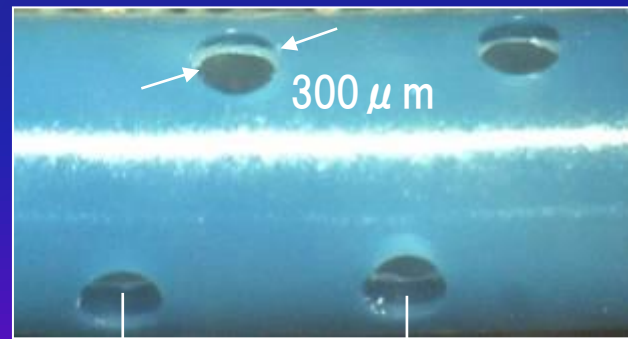
Perfusion Balloon (Device Profile)



(crossing profile)

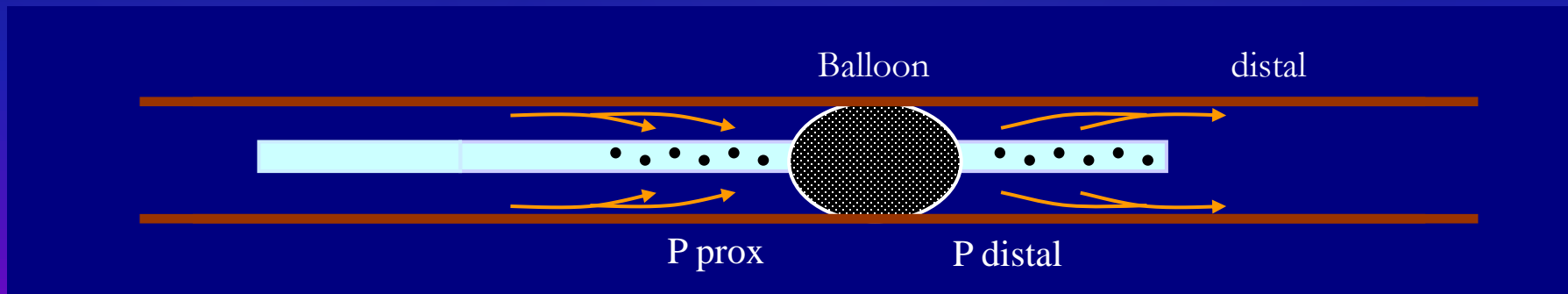
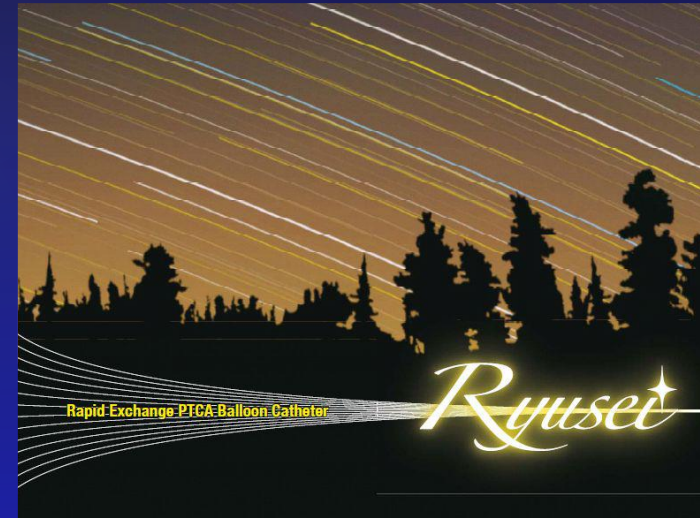
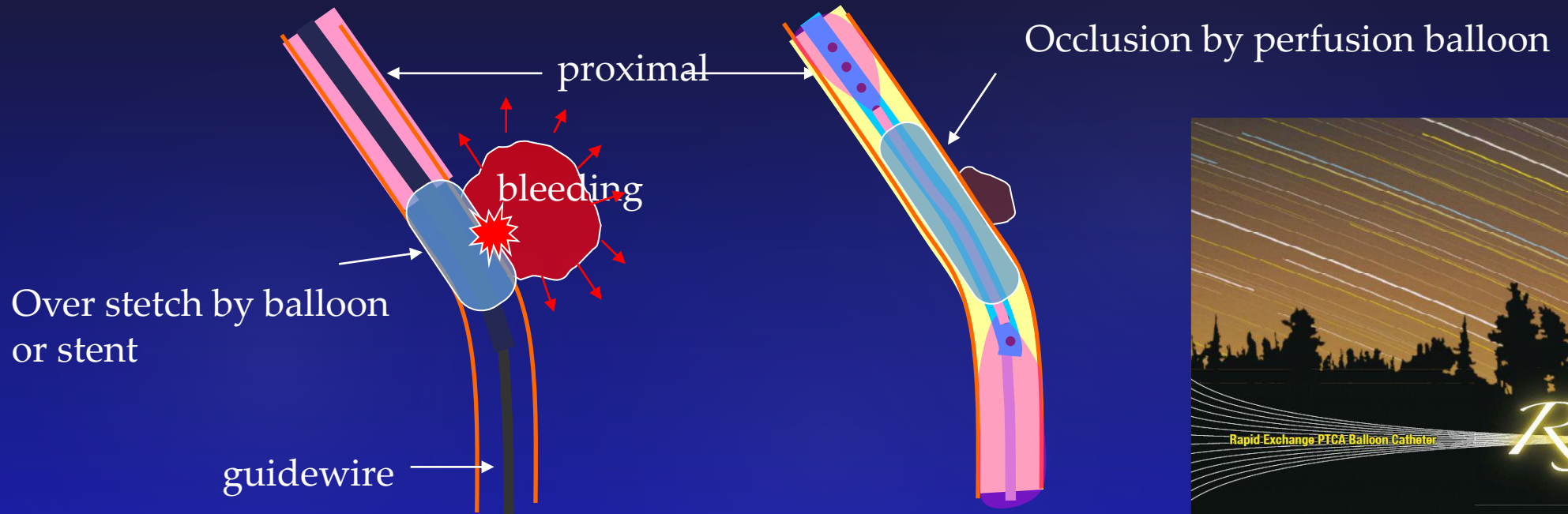


*Entry profile : 0.017 inch



1.0mm

Perfusion Balloon



Perfusion volume: 20-30ml / min (official data)

Management of severe perforation

- Longtime inflation in large vessel is needed, but it causes serious ischemia.

ex) chest pain, ST elevation, blood pressure decrease, fatal arrhythmia (AV block, VT/VF...)

- **Perfusion balloon** sometimes works effective, but available only in limited countries.
- **Covered-Stent** (Graft master, etc..) might be an option, but it has some problems about **difficulty of delivery** and **high restenosis rate**.

Case Report

A Novel Method to Bail out Coronary Perforation: Micro-Catheter Distal Perfusion Technique

Shozo Ishihara,* MD, Shiro Tabata, MD, and Takehiro Inoue, MD

Coronary perforation is a rare, but life-threatening complication during percutaneous coronary intervention. Prolonged balloon inflation is one option for achieving hemostasis, but it often causes ST elevation, chest pain, decreased blood pressure, or fatal arrhythmia due to ischemia. We present the case of a 73-year-old woman who suffered severe coronary perforation after stent implantation and post-dilatation. To allow prolonged balloon inflation without ischemia, we perfused the distal area with the patient's own arterial blood injected via micro-catheter. With this method, we could prolong balloon inflation for 20 min, successfully achieving hemostasis. This novel technique, which we named the "distal perfusion technique," is useful to minimize ischemia during prolonged balloon inflation. © 2015 Wiley Periodicals, Inc.

Key words: percutaneous coronary intervention; coronary perforation; complication; hemostasis

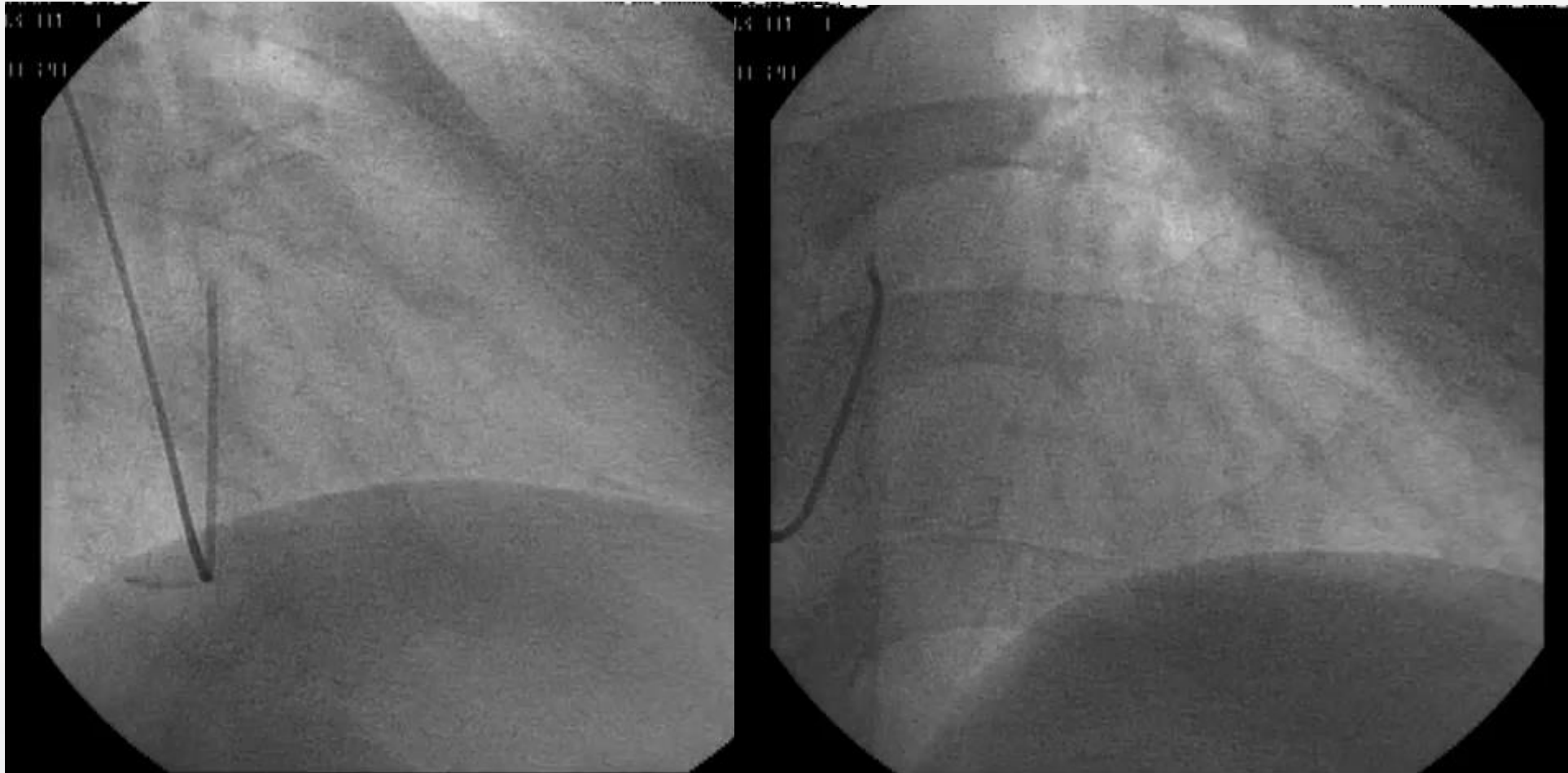
S Ishihara, et al. Catheter Cardiovasc Interv. 2015 Sep 1;86(3):417-21

Case 73y.o. female

CAG (6Mo after AMI)

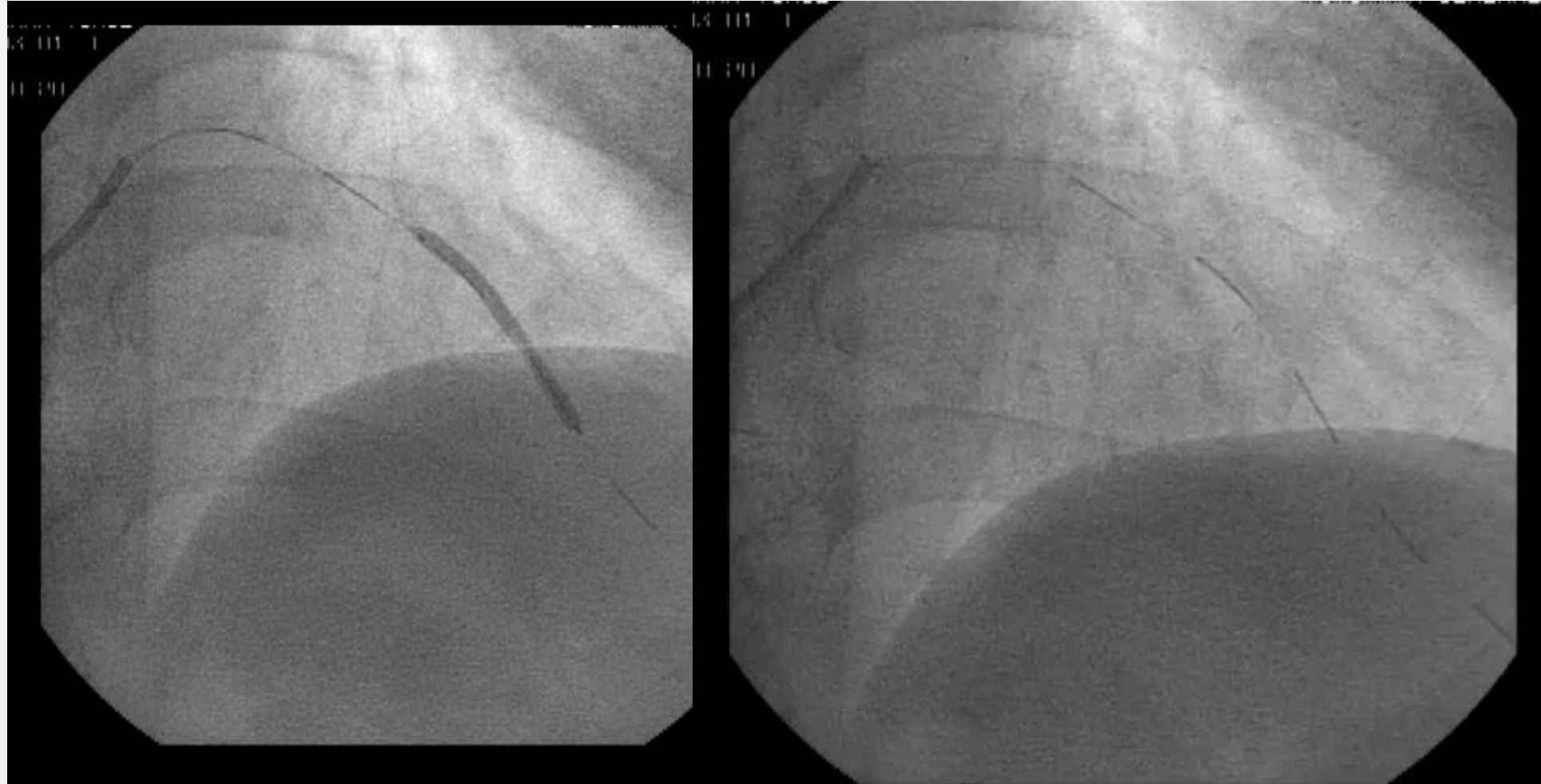
RAO30° CRA30°

AP CRA30°



mid LAD 75-90% (progression)

DES implantation



PES 2.5x32mm 14atm

Post Dilation

IVUS: not full expansion

→ dilate upto 24atm (2.75mm)



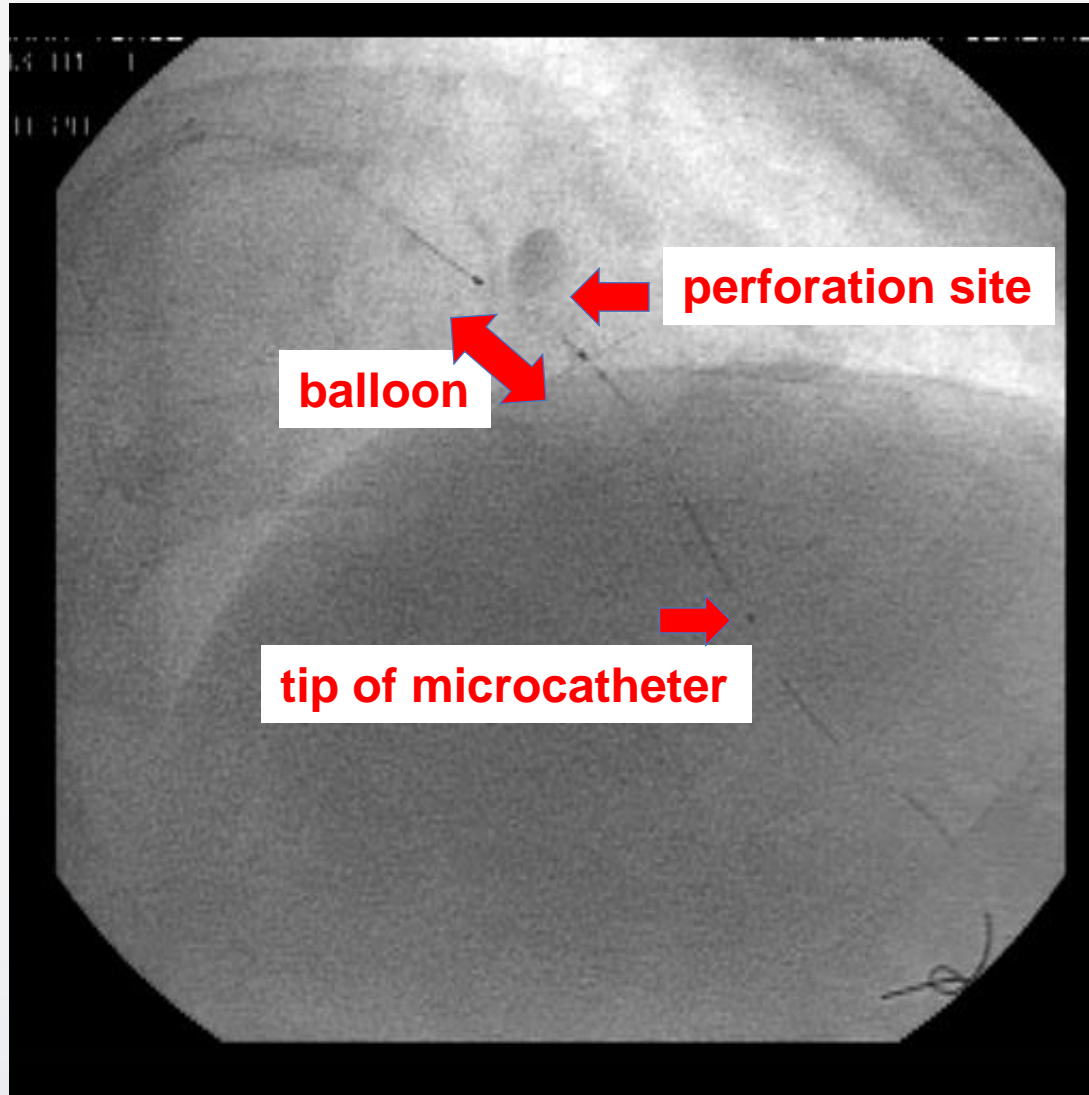
Indentation disappeared



**After dilatation
(24atm)**

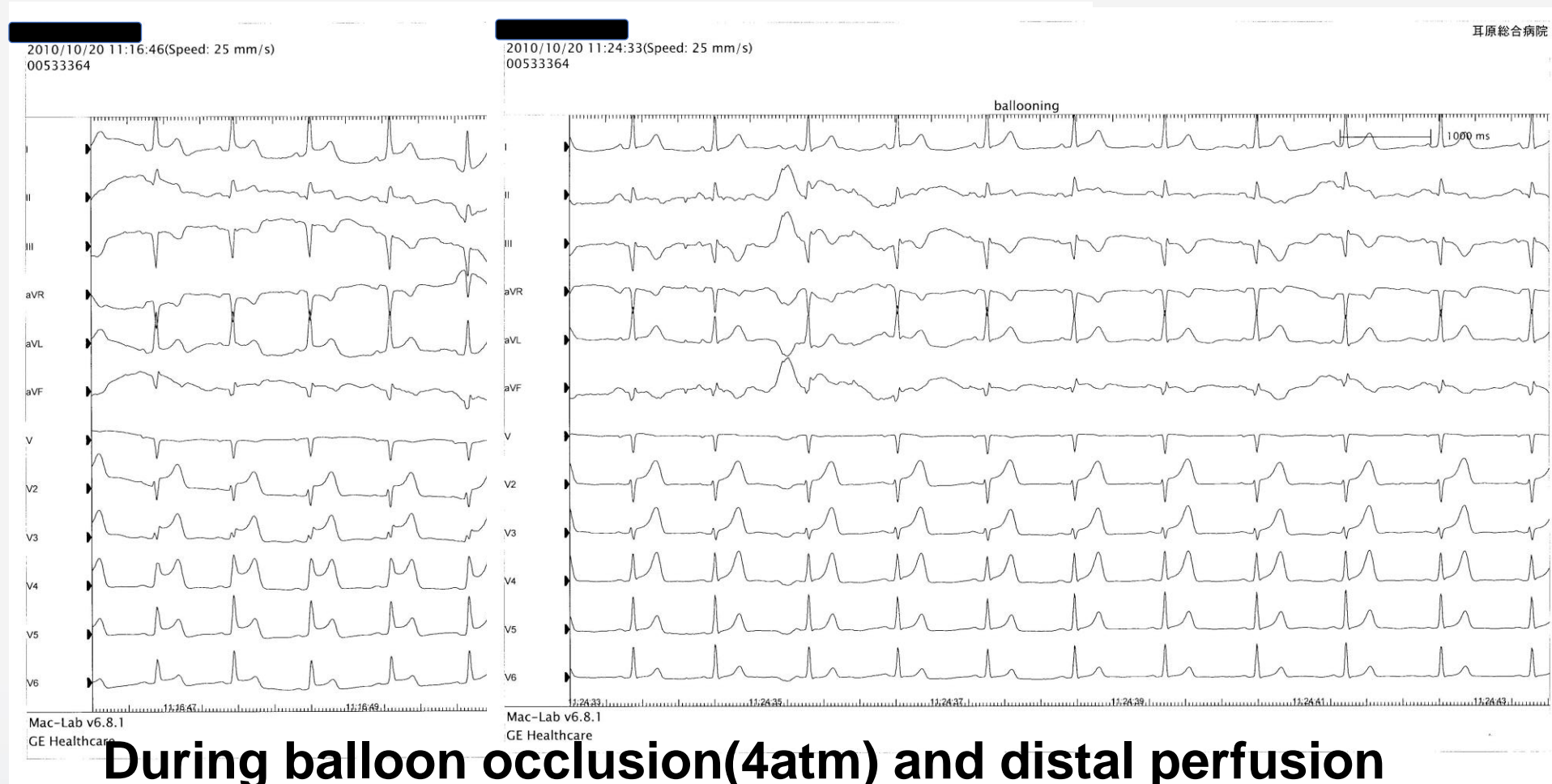
Perforation !!

Distal Perfusion via Microcatheter



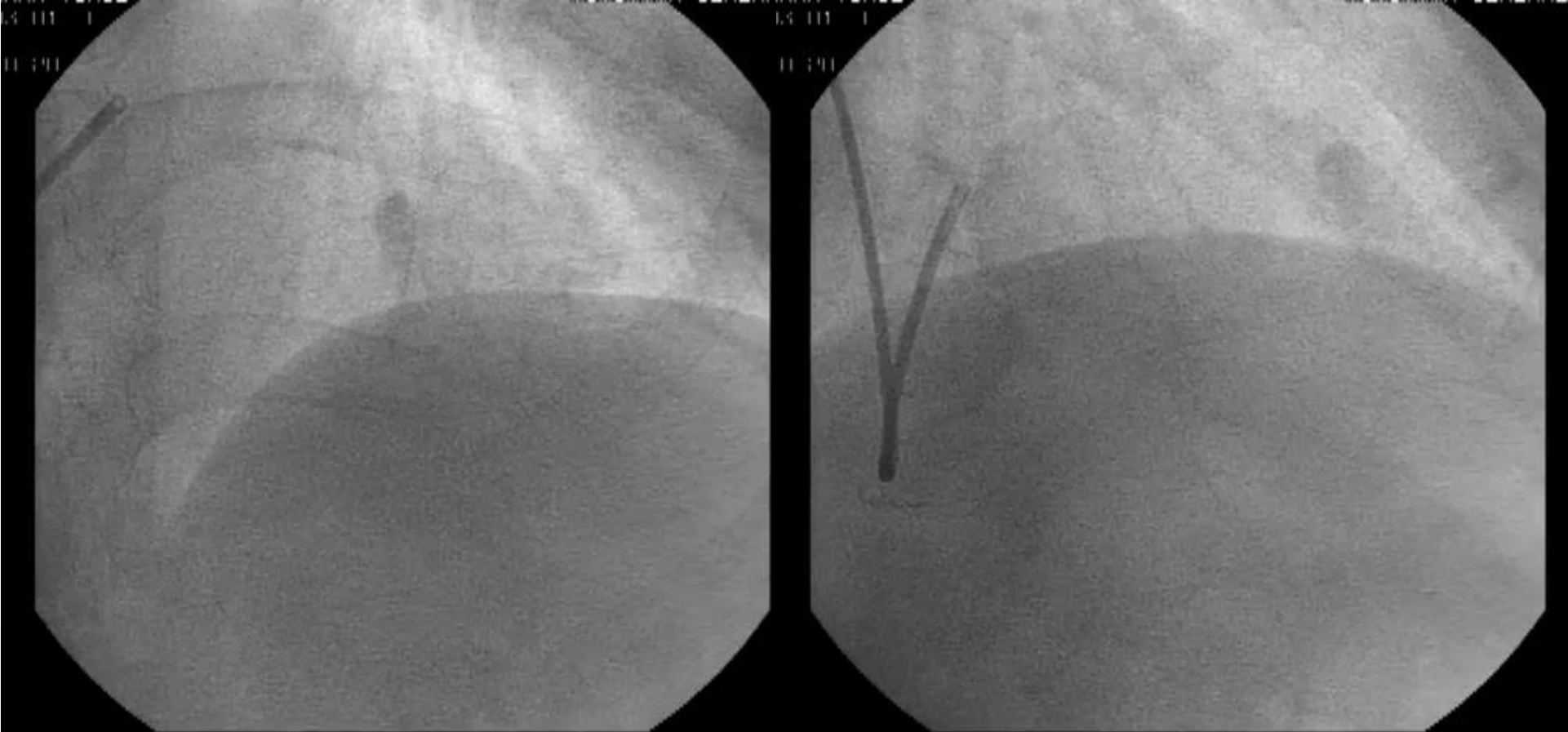
- 1) insert a guide wire and a micro-catheter to the proximal site of the balloon occlusion
- 2) deflate the balloon and quickly insert the wire and micro-catheter to the distal site of perforation, and soon inflate the balloon again
- 3) during balloon occlusion, pull out the wire and inject blood via micro-catheter which is taken from the patient's artery

ECG during occlusion



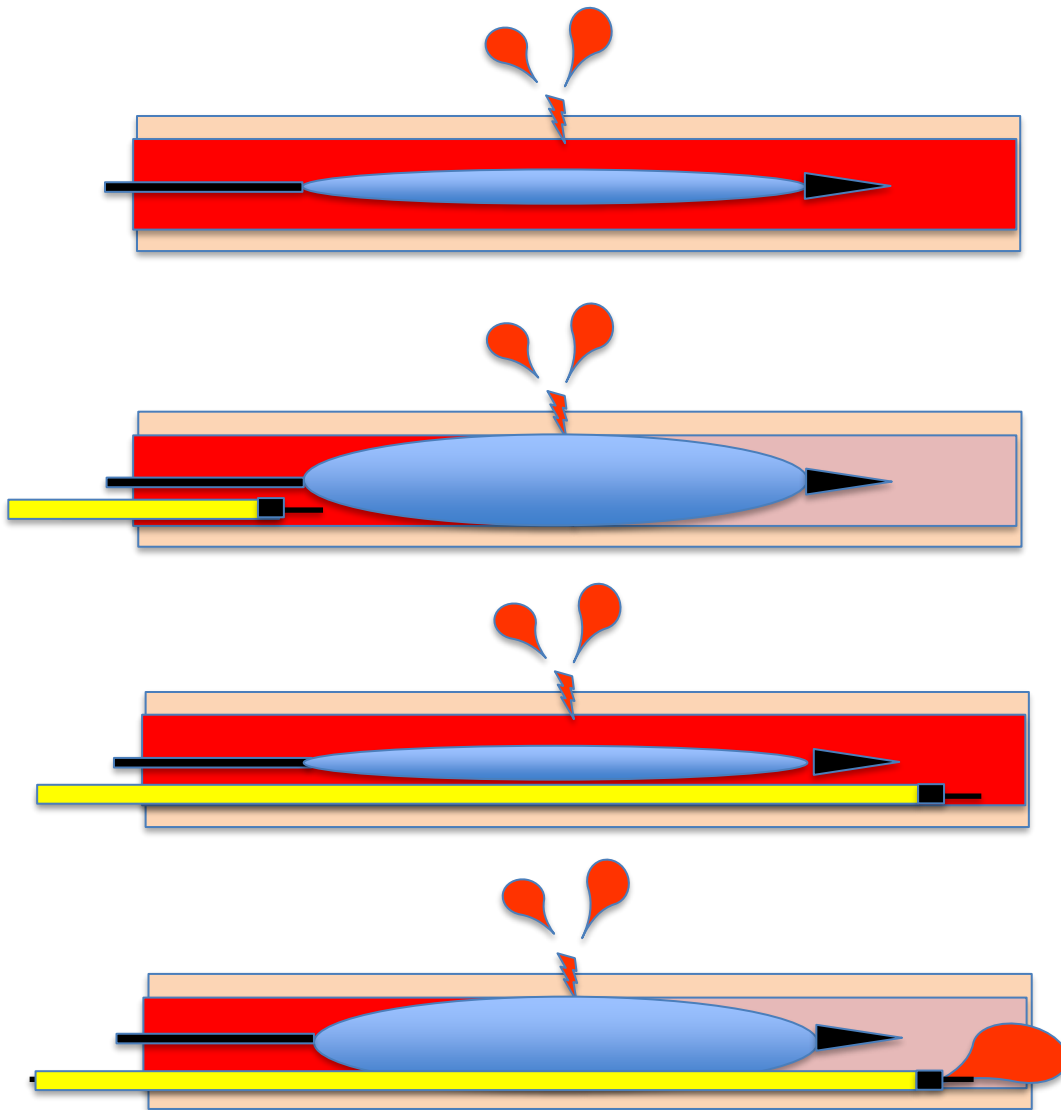
During balloon occlusion(4atm) and distal perfusion via microcatheter (Finecross), tall T wave is still remain but ST elevation and her chest pain were disappeared.

Final CAG



**After 20 minutes, bleeding stopped.
No pericardial effusion.**

Micro-catheter Distal Perfusion Technique



1) insert a guide wire and a micro-catheter to the proximal site of the balloon occlusion

2) deflate the balloon and quickly insert the wire and micro-catheter to the distal site of perforation, and soon inflate the balloon again

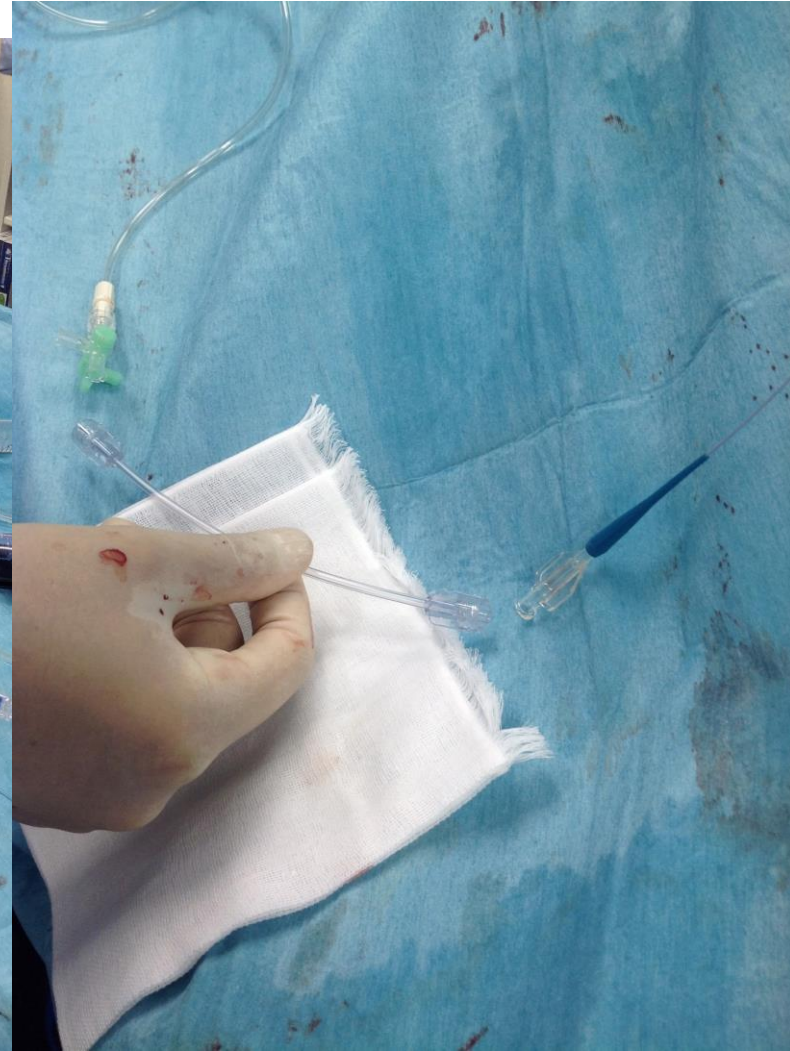
3) during balloon occlusion, pull out the wire and inject blood via micro-catheter which is taken from another sheath

Micro-catheter Distal Perfusion Technique

Image



**3-way cock and
extension tube**



Micro-catheter Distal Perfusion Technique

Image



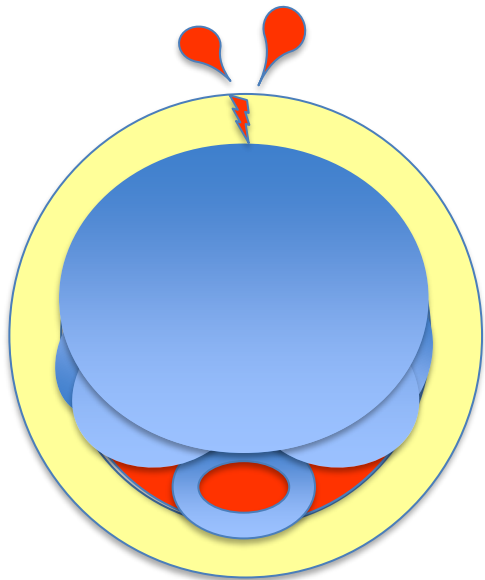
Micro-catheter Perfusion Method

1) Can we get complete occlusion and stop bleeding?

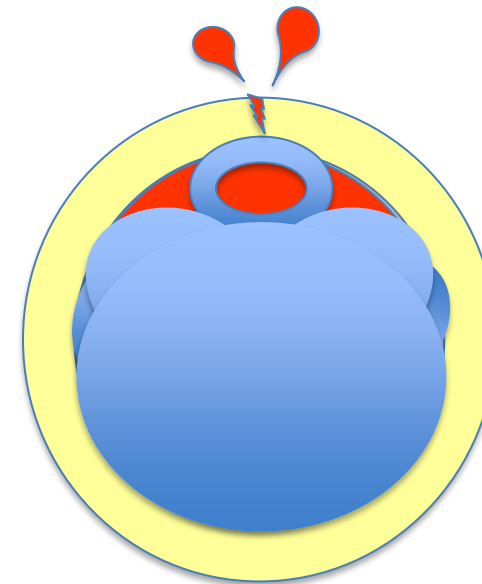
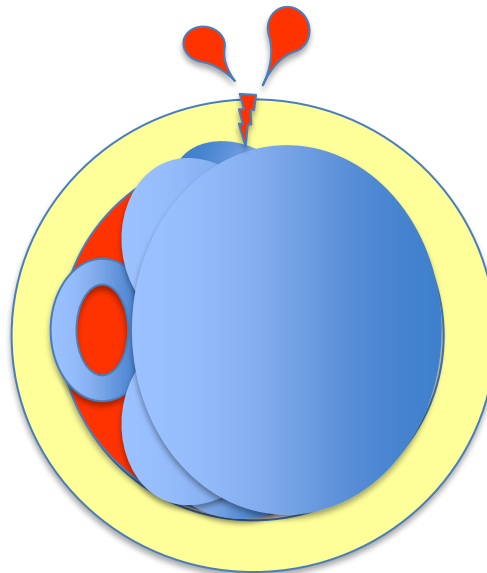
▪ MC at opposite side
or lateral side

▪ MC at perforation site

→stop bleeding!

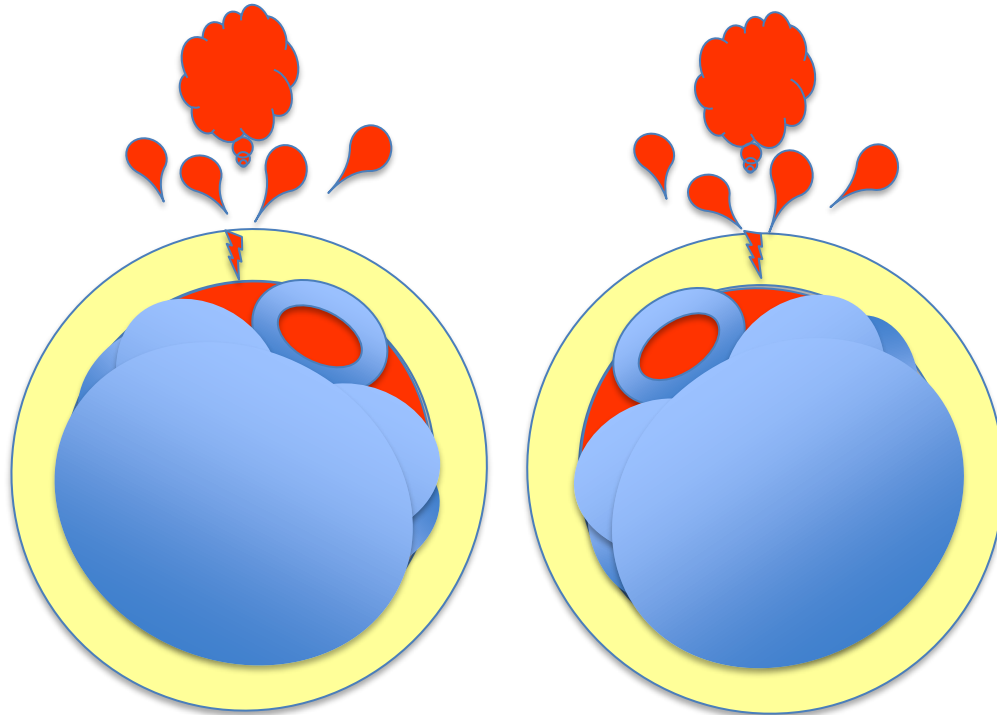


→almost OK



Micro-catheter Perfusion Method

- MC is near the perforation site
→ continue bleeding



There are small spaces
between the balloon and MC.

After insert MC and
balloon inflation, inject
contrast to check
bleeding or not.

If bleeding continue,
pull back GW and MC
and insert again, so we
can change the location
of MC.

In our study,
(1st. attempt)

70% success

(good location)

30% continue bleeding

Mimihara General Hospital

Take Home Message

- **Micro-catheter distal perfusion technique are useful when long inflation is needed.**
- **If it is not effective enough to stop bleeding, but we can consider and carry out other therapeutic options (covered stent, surgical, etc) during occlusion and distal perfusion.**

Thank you for your attention!

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