CORONARY PERFORATION
SEALING A BURSTING PIPE

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Conflicts of Interest

Speaker's name : Doni, FIRMAN, Jakarta

- ☑ I don't have potential conflicts of interest to report

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INTRODUCTION

- Despite improvements in interventional skills and equipment, PCIs are increasingly complex with a higher prevalence of multivessel disease, worsening comorbidities and increasingly complex procedures including the treatment of chronic total occlusions (CTO)
- **Coronary perforation** is a rare, but potentially life-threatening complication of PCI, with an incidence ranging from 0.1% to 0.5%
- Perforations can be life threating complications, but if recognized quickly and managed correctly can have a positive outcome.

CASE REPORT

70-YEAR- OLD MAN

- Stable angina pectoris
- CAD 3VD with CTO at LAD
- Refused CABG, failed PCI in other hospital
- Admitted to cath lab for CTO LAD PCI

PHYSICAL EXAMINATION

- Fully alert
- BP 146/77 mmHg, HR 102 bpm, RR 12x/m
- Other examination within normal limit

Echo : EF 63%

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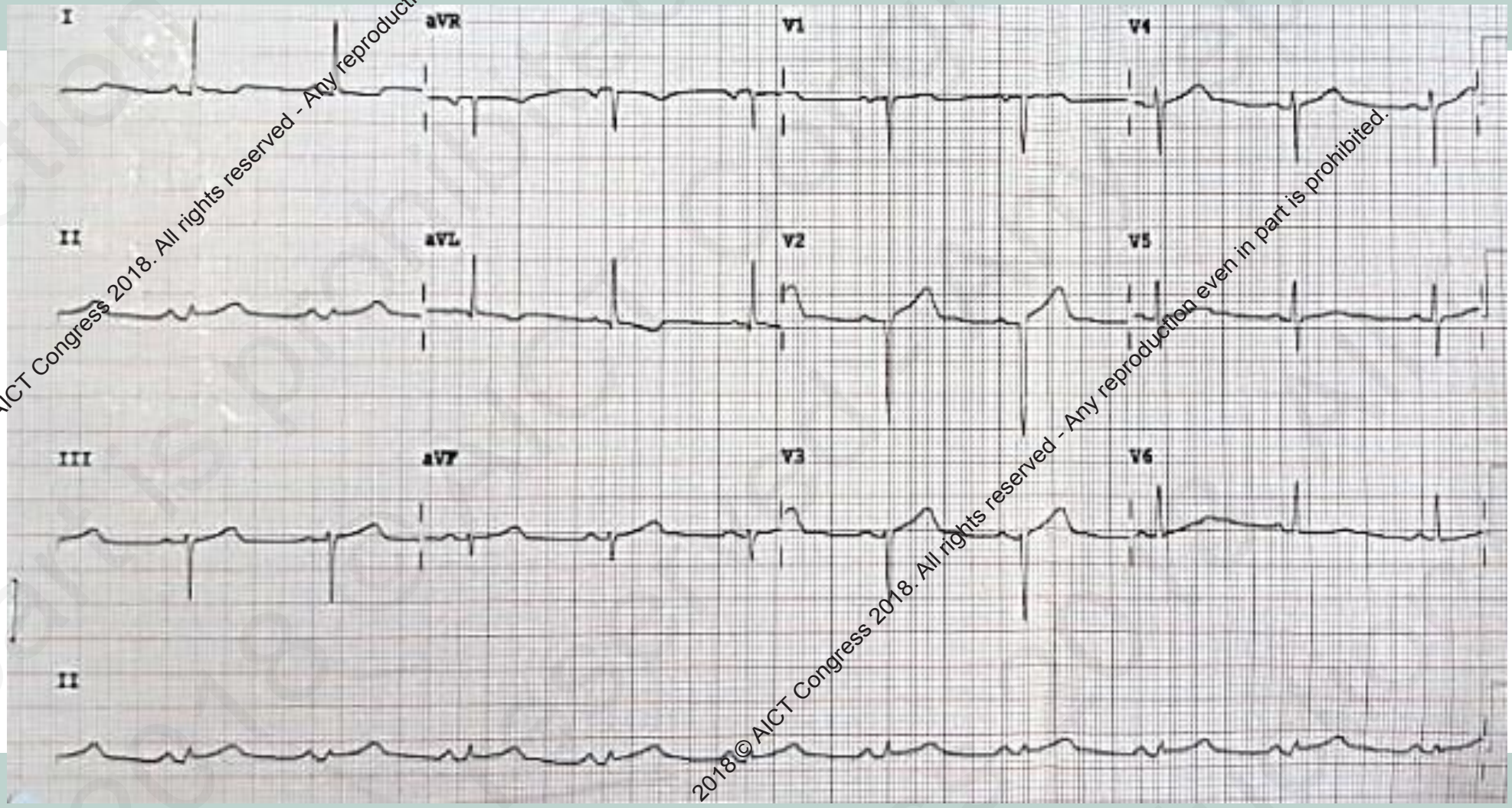
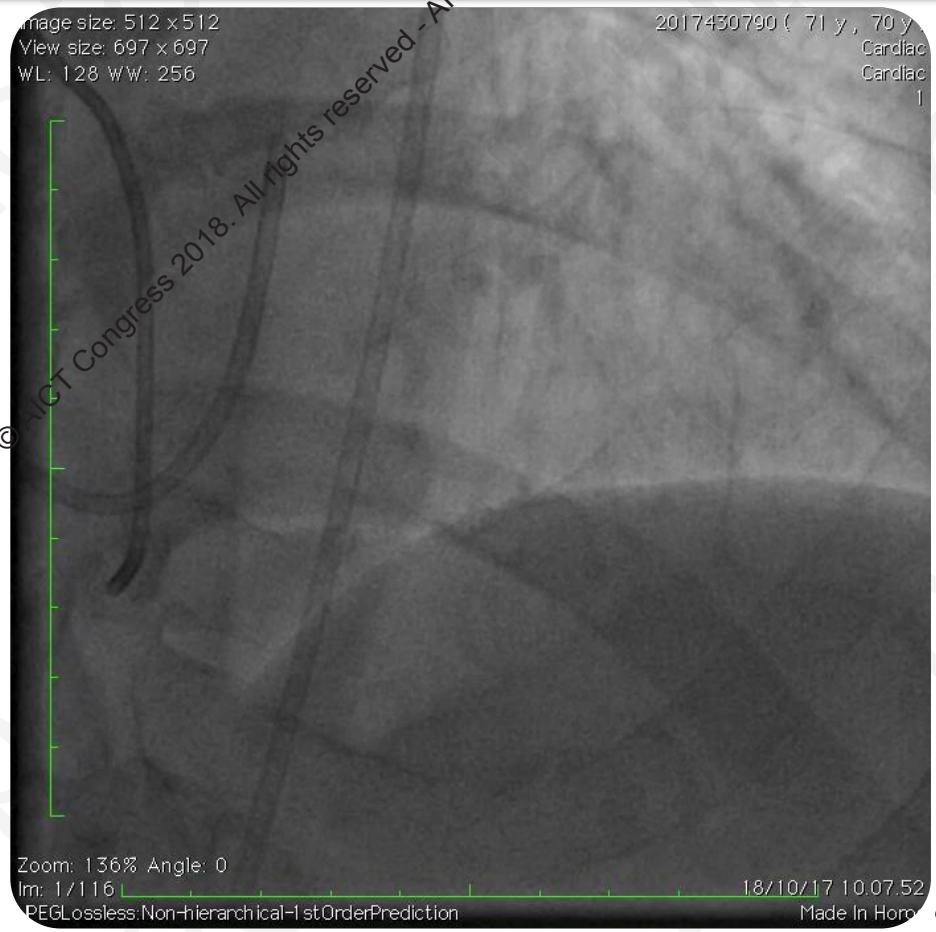
Electrocardiogram



PCI

Double Puncture

OPTITORQUE TO RCA VIA RADIAL ARTERY / XB 3.5/6F TO LCA VIA FEMORAL ARTERY



J-CTO SCORE SHEET

Version 1.0

Variables and definitions

Tapered / Blunt

Entry with any tapered tip or dimple indicating direction of true lumen is categorized as "tapered".

Entry shape
- ☐ Tapered (0)
- ☒ Blunt (1)

point

Calcification

Regardless of severity, 1 point is assigned if any evident calcification is detected within the CTO segment.

Calcification
- ☐ Absence (0)
- ☒ Presence (1)

point

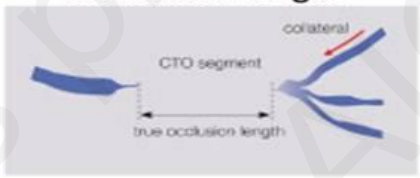
Bending > 45degrees

One point is assigned if bending > 45 degrees is detected within the CTO segment. Any tortuosity separated from the CTO segment is excluded from this assessment.

Bending > 45°
- ☐ Absence (0)
- ☐ Presence (1)

point

Occlusion length



Using good collateral images, try to measure "true" distance of occulusion, which tends to be shorter than the first impression.

Occl.Length
- ☐ <20mm (0)
- ☒ ≥20mm (1)

point

Re-try lesion

Is this Re-try (2nd attempt) lesion ? (previously attempted but failed)

Re-try lesion
- ☐ No (0)
- ☒ Yes (1)

point

Category of difficulty (total point)
- ☐ easy (0)
- ☐ Intermediate (1)
- ☐ difficult (2)
- ☒ very difficult (≥3)

Total

4 points

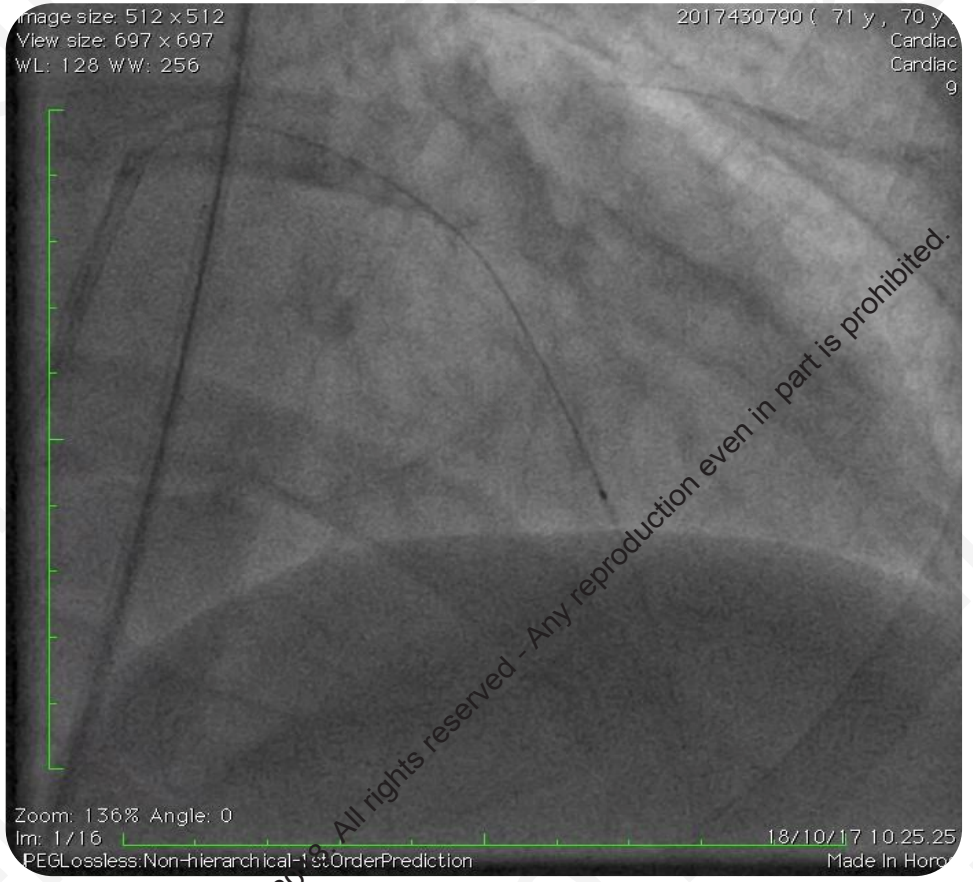
Figure 5. J-CTO Score SheetA calculation sheet for J-CTO (Multicenter CTO Registry of Japan) scoring. A definitions of each variable are summarized and illustrated. The total score is identified as the "J-CTO sc

Wiring to LAD

Wiring to proximal LAD with ASAHI Sion Blue with FineCross microcatheter BACK UP

Change to Fielder XT-R → failed

Wiring to LAD



Successful wire crossing the CTO lesion with Conquest Pro 12

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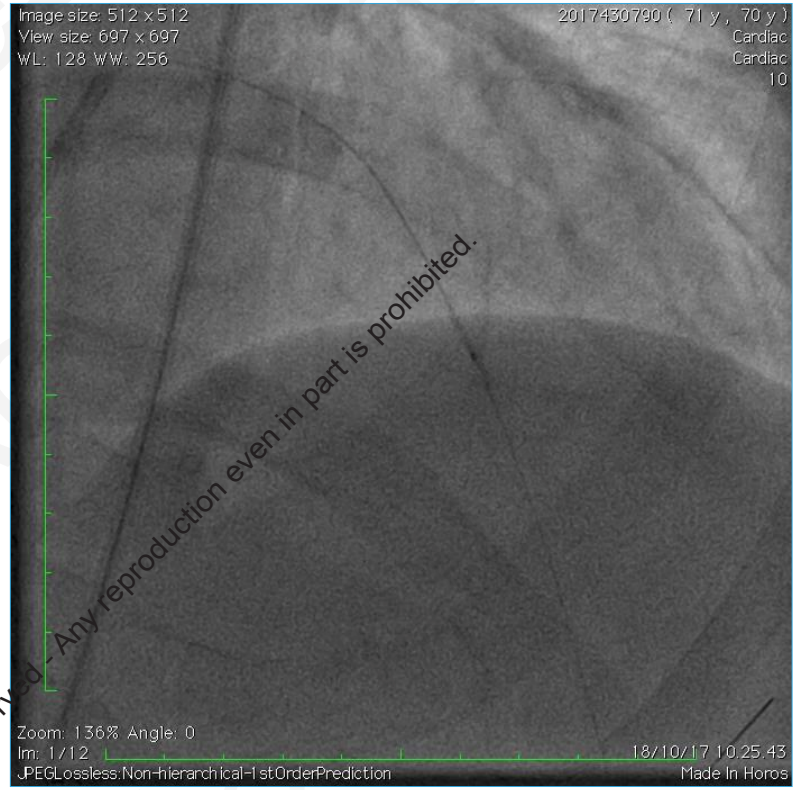
Predilatation



Predilatation at mid to proximal LAD with Balloon 1.25 x 10 mm at 10-16 atm

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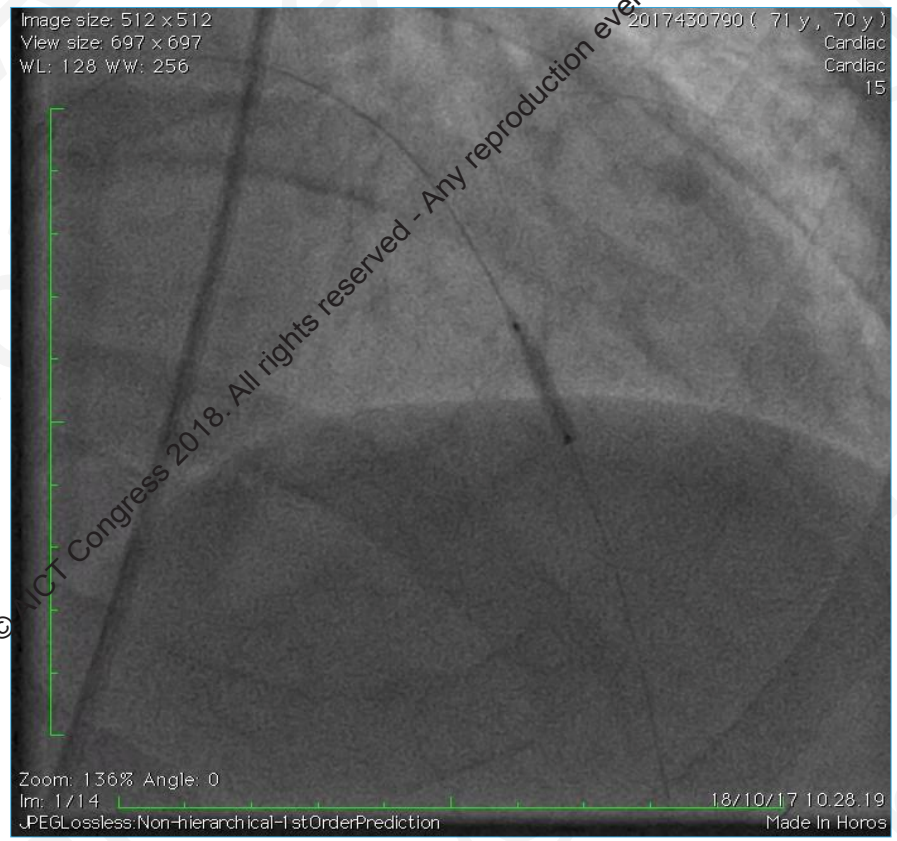
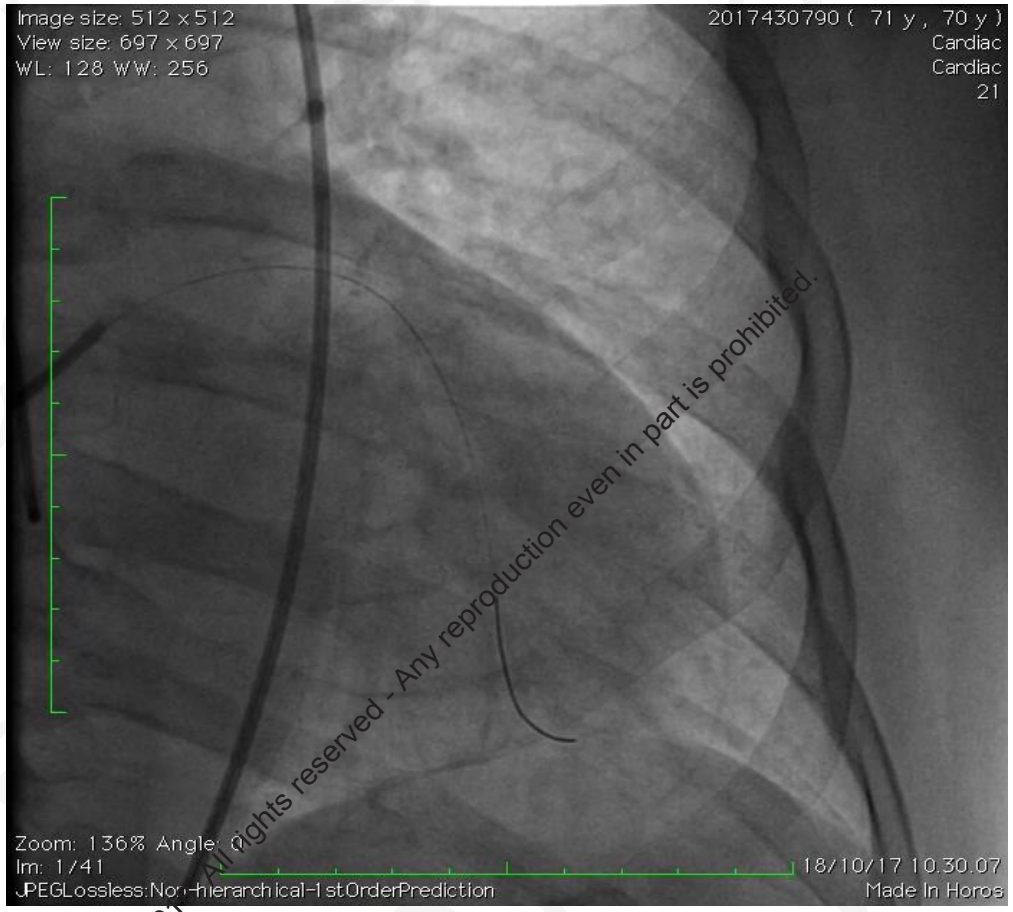
Predilatation



Predilatation at mid to proximal LAD with LARGER BALLOON 2.0 x 10 mm at 12-16 atm

Angiography Evaluation



Unfortunately, coronary perforation occurred

Unstable hemodynamic !!

Sign of massive pericardial effusion
→ *CARDIAC TAMPONADE*

Ellis Type of Coronary Perforation

Table 1. Ellis classification of coronary perforations.

Ellis class	Definition
I	Crater extending outside the lumen only and in the absence of linear staining angiographically suggestive of a dissection
II	Pericardial or myocardial blush without a ≥1 mm exit hole
III	Frank streaming of contrast through a ≥1 mm exit hole
III with cavity spilling (IIICS)	Perforation into an anatomic cavity chamber or coronary sinus

Ellis et al. Circulation 1994;90:2725-2730.

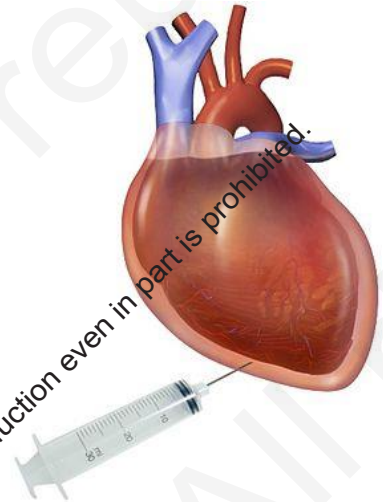
WHAT TO DO??

Be CALM

"HOT heart and COLD mind"

SEEK FOR HELP

Perform **Pericardiocentesis STAT**



Think and do some possibilities

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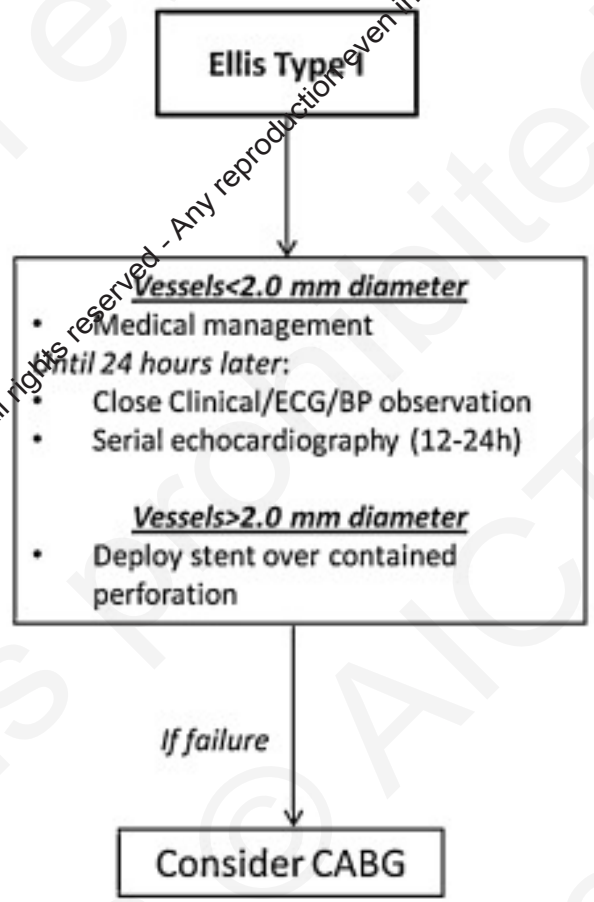
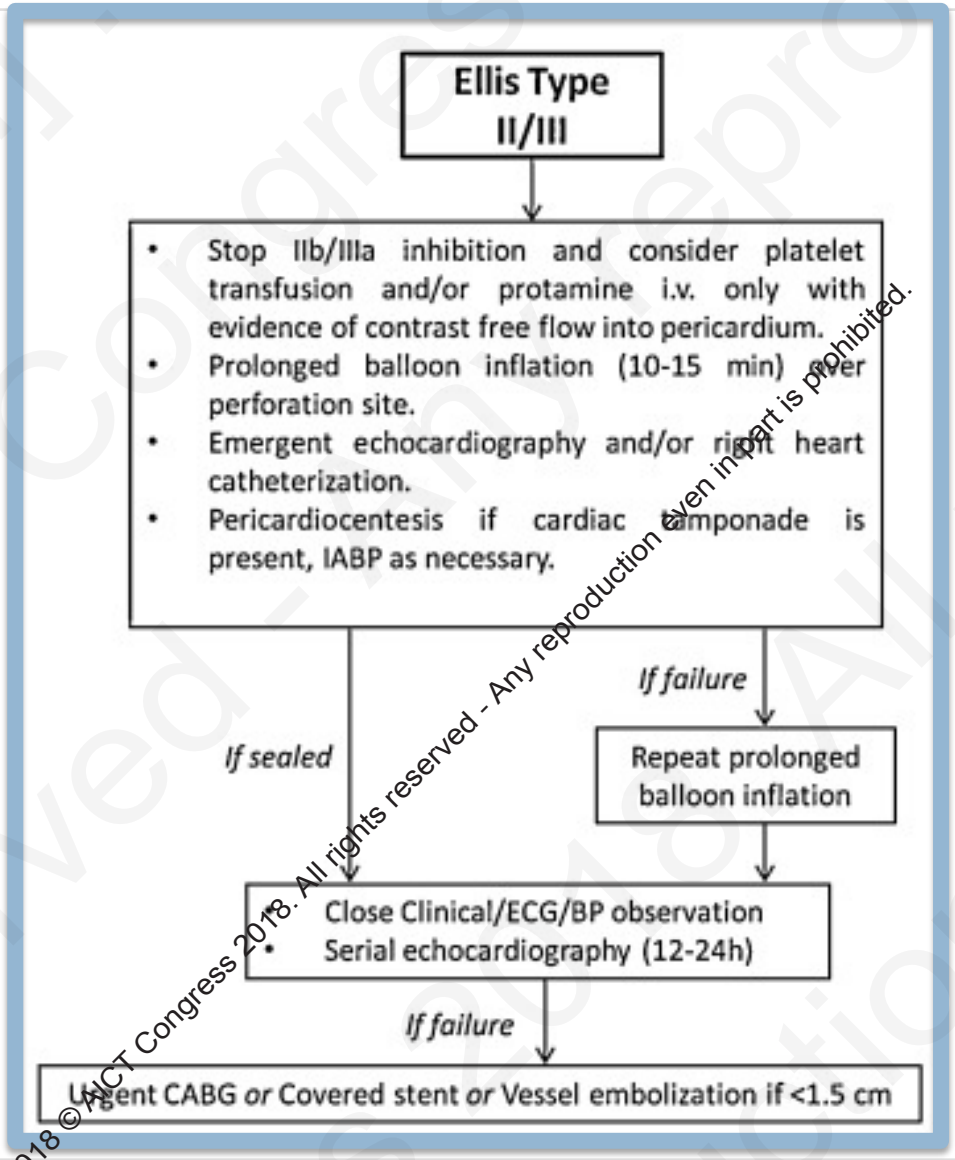
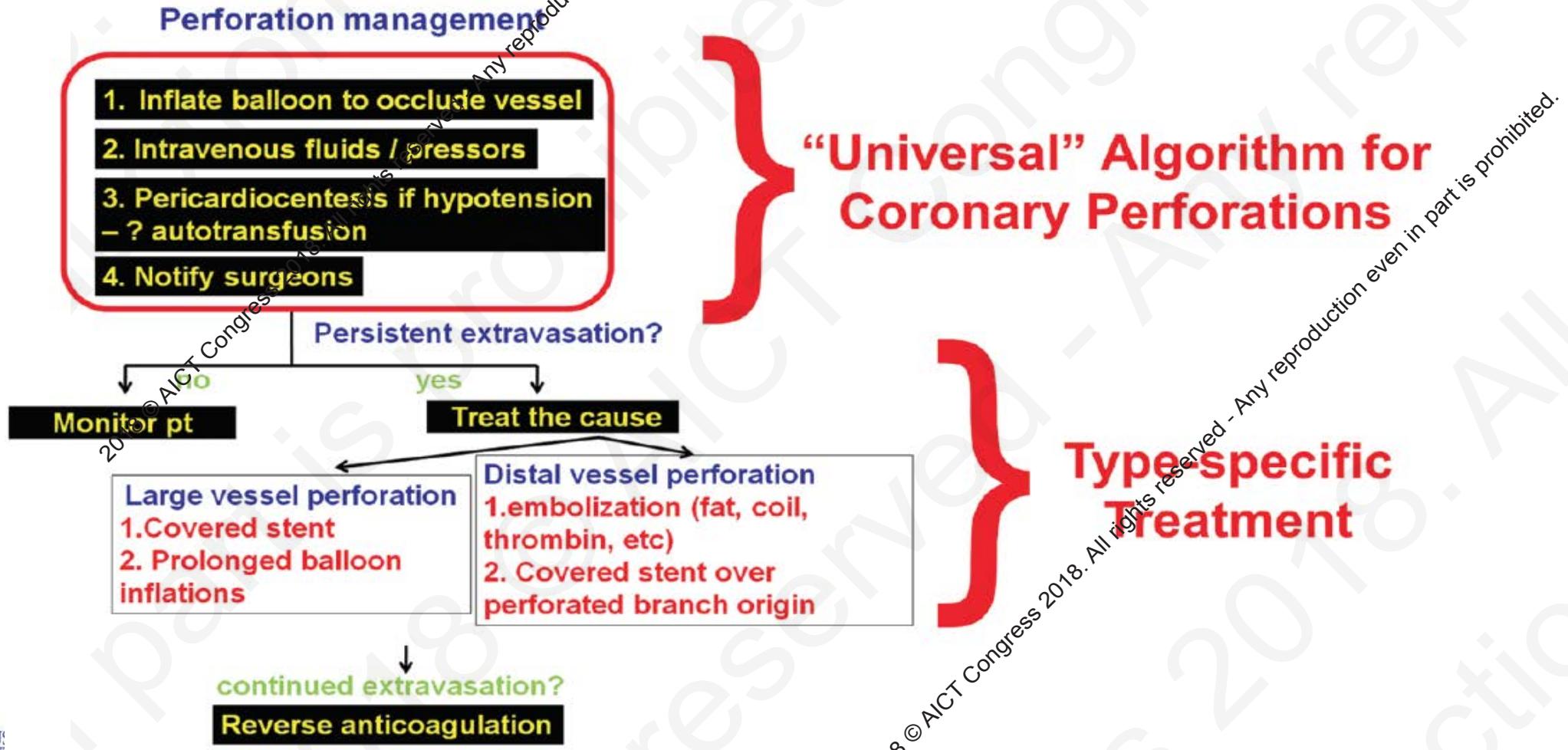
Sealing Strategy





- A. Javaid, A.N. Buch, L.F. Satler, *et al.* (2006), pp. 911-914

General Algorithm for Perforation Treatment



Brilakis E. Manual of Coronary Chronic Total Occlusion Interventions: a Step-by-Step Approach. 2nd ed. Elsevier Academic Press; 2018.

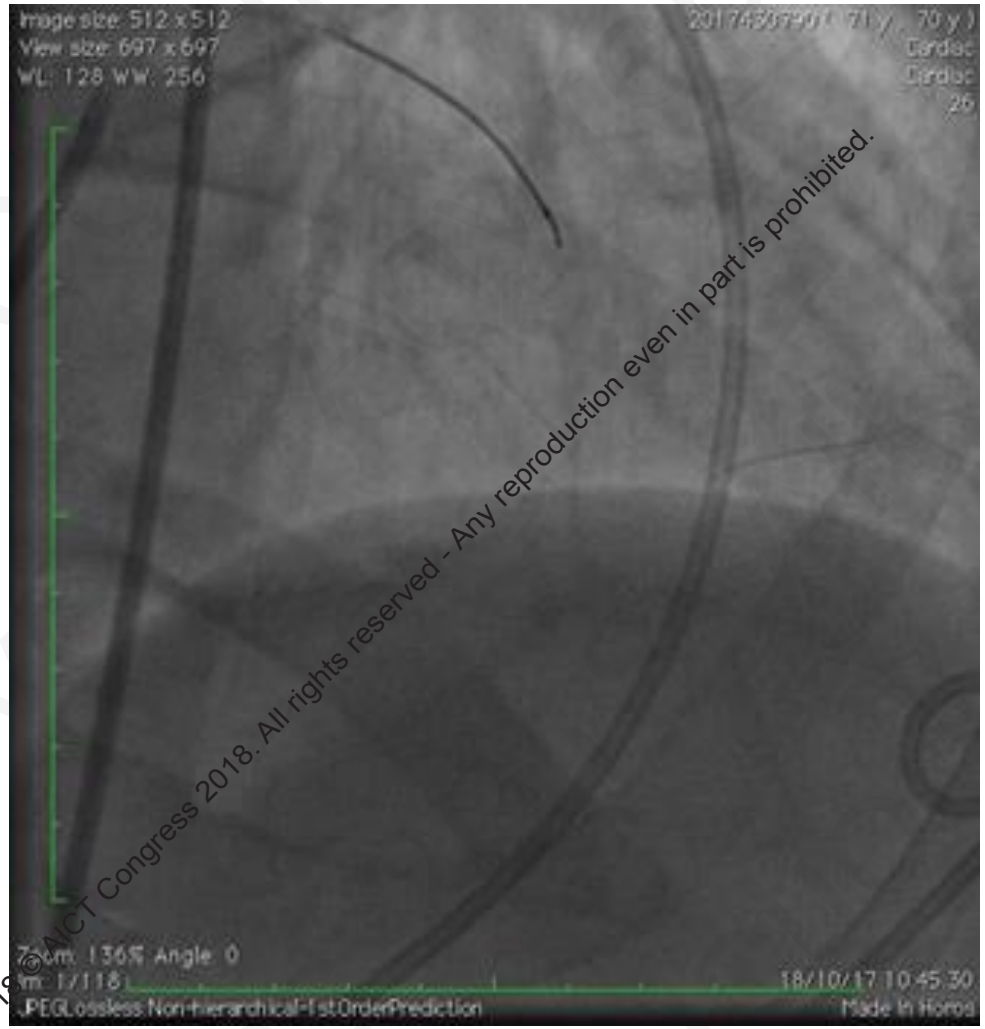
First,
we perform pericardiocentesis stat

To restore hemodynamic stability and ventricular contractility

Via sub xiphoid access
Pigtail catheter

Hemothorax 750 cc
--> auto tranfusion

BP 40/20 mmHg
Fluid rescuscitation



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After doing “universal algorithm”, what should we do next?

A. Long Inflation balloon

B. Rewiring - Covered stent

C. Embolization

D. Urgent CABG surgical Repair

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Our Option

Prolong balloon inflation

FAILED

Covered stent implantation

We cannot sure the distal wire is in true lumen

CABG surgical repair

Limited time and we are still trying non-surgical repair first

Embolization

What kind of embolization that can be used?

A. Polyvinyl alcohol

B. Gelatin foam

C. Microcoil

D. Thrombin or autologous clot

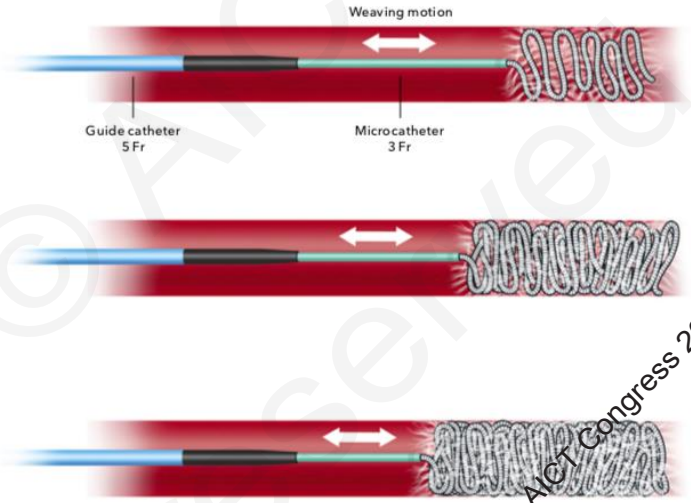
Embolization

Polivinyl alcohol
Gelatin foam

Thrombin
Autologous clot

Microcoil

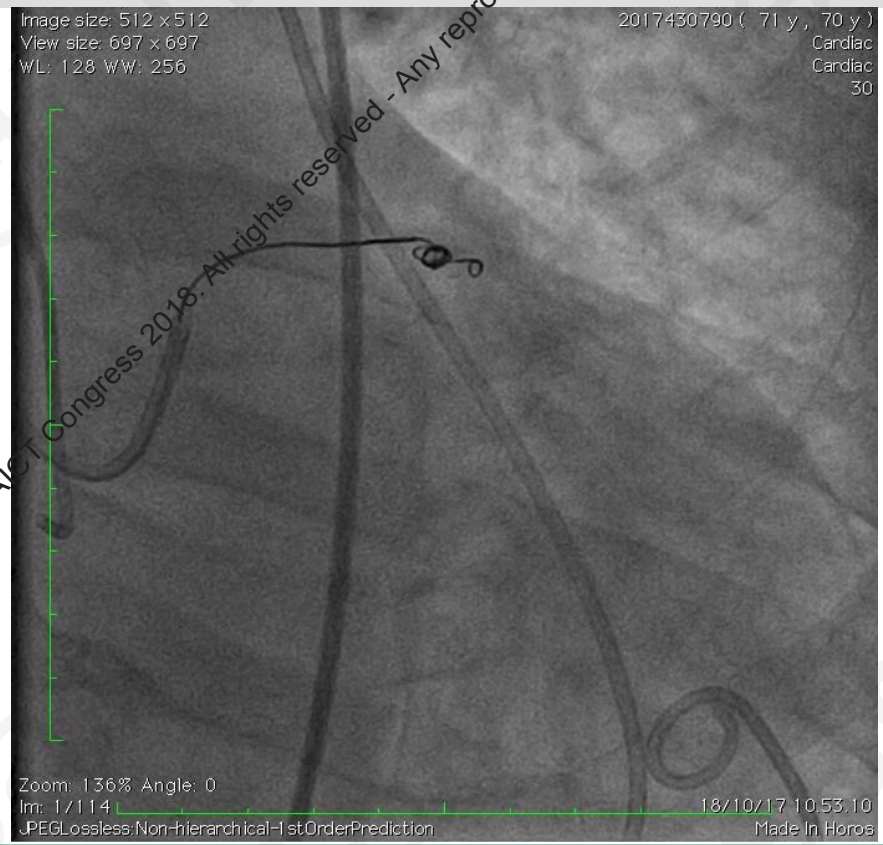
More suited to small <1 mm diameter arteries



Diameter >1 mm
Simple, rapid and safe solution to ongoing extravasation

Embolization

with Coil Tornado 5/2 at proximal LAD



Care must be taken to ensure that the coils do not protrude or extend back into left main coronary artery

Retrograde

No perforation seen from antegrade and retrograde flow

The procedure was stopped and patient was moved to cardiac intensive ward

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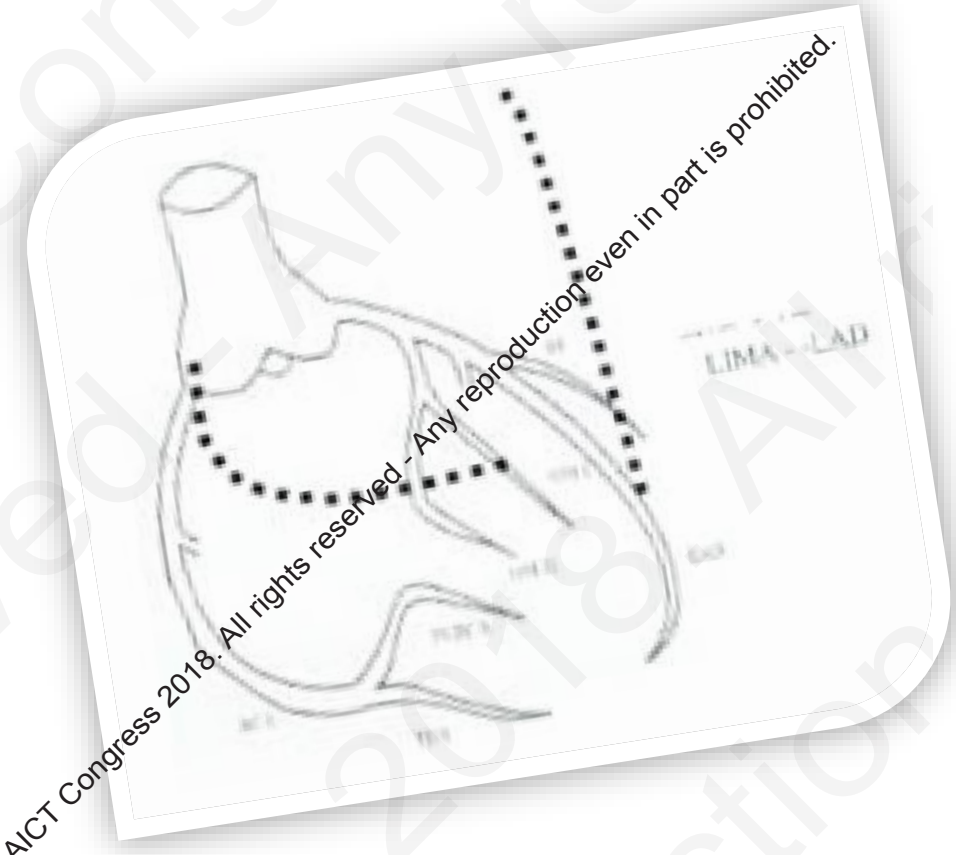
One month later, patient underwent CABG

CABG 2x:

→ *LIMA-LAD & SVG-OM*

No complication occured



Take Home Message

In the management of CTO-PCI, we must be sure **wire position** is in **distal true lumen**

IVUS can be very helpful

Coil embolisation may be required for severe or persisting perforation

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Thank you

Evaluation in CVCU

Chest pain minimal VAS 2/10

Echocardiography: EF 74% / TAPSE 2.1 cm; minimal pericardial effusion 0.3-0.4 cm around the heart

Based on Ellis criteria, what is the type of this coronary perforation?

A. Ellis type I

B. Ellis type II

C. Ellis type III

D. Ellis type III with cavity spilling (IIICS)

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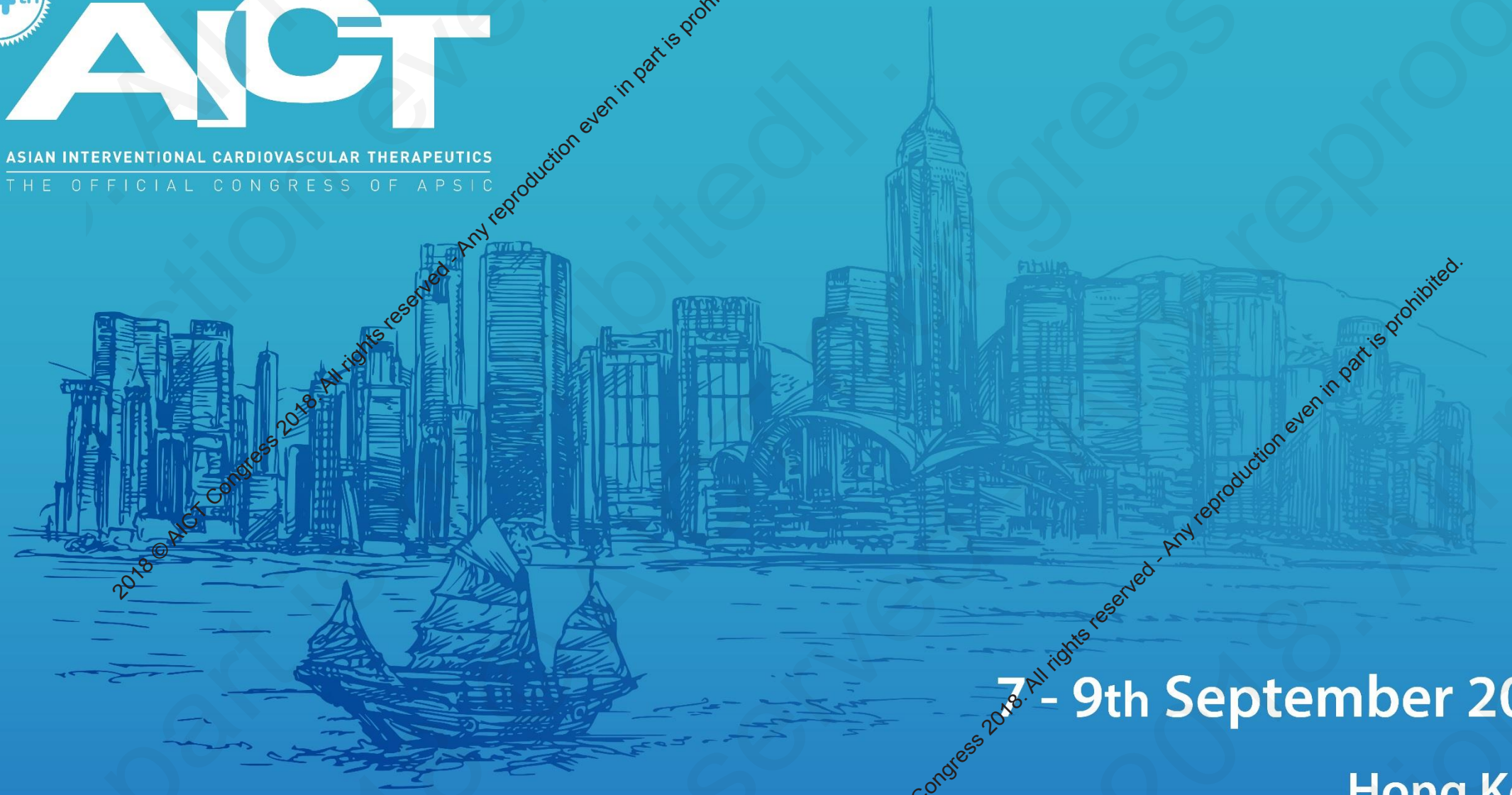

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