ASIAN INTERVENTIONAL CARDIOVASCULAR THERAPEUTICS
THE OFFICIAL CONGRESS OF APSIC

Cardiac Arrest During TAVR

Doni Firman, MD
National Cardiac Center Harapan Kita, Jakarta

2018

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Conflict of Interest

Speaker's name : Doni, FIRMAN, Jakarta

- ☑ I don’t have any potential disclosure

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

AICT

Introduction

- TAVR has emerged as the standard procedure for elderly patients with severe aortic stenosis
- Complication rates have declined considerably due to improvements in the valve prostheses and their delivery systems and, of course, to the tapering out of the learning curve due to increasing experience.
- Nonetheless, the procedure still bears specific risks for complications that may critically influence the outcome

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Identity

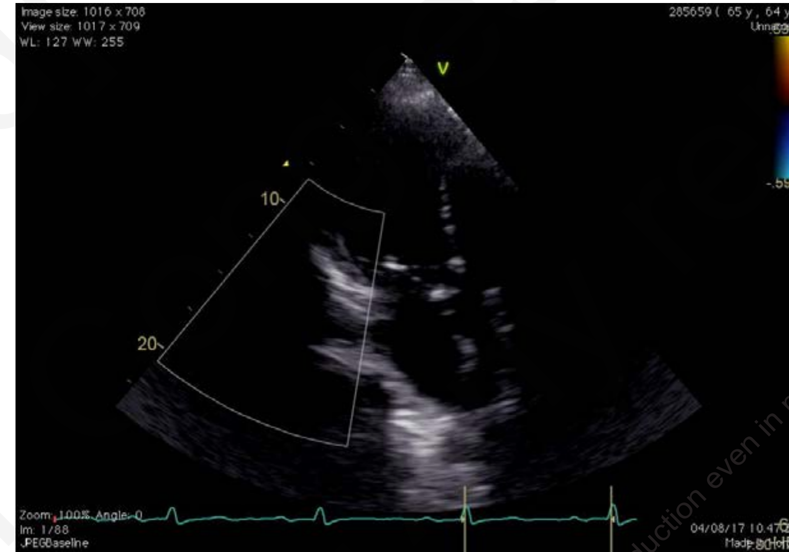
- Name : Mr. Kusnadi Sairin,
- Age : 64 y.o
- History of Presenting Illness :
  - CABG ec CAD3VD (June 11th, 2011)
  - Routine Control at outpatient clinic with chief complaint : recurrent chest pain and dyspneu on effort
  - BAV (2017)
- Risk Factor : Hypertension, DM

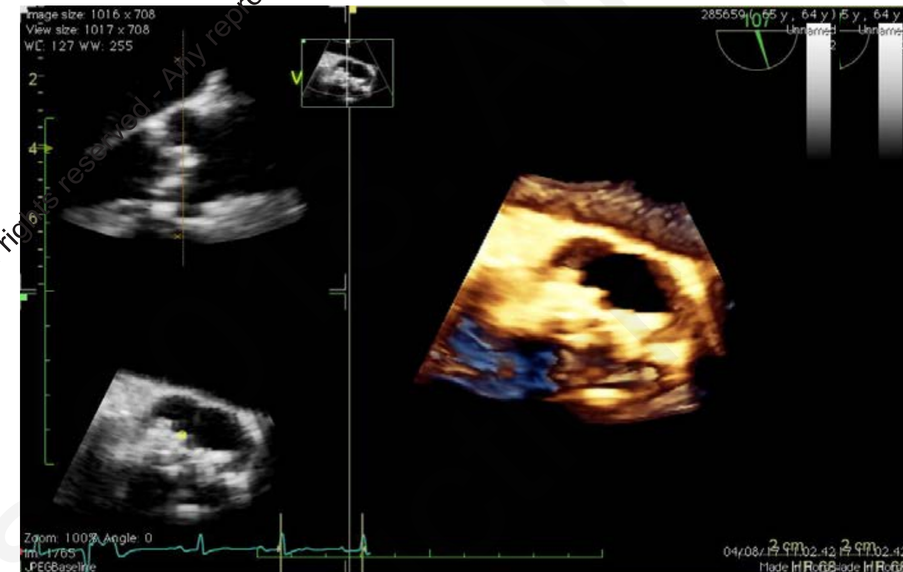
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Echocardiography

- EDD 52 mm / ESD 24 mm
- LVEF 58%, TAPSE 1,9 cm
- Hypokinetic anteroseptal, Other segment normal
- Aortic Valve : 3 cusp, calcified (+), Severe Aortic stenosis, AVA planimetri 1,3 cm2, AVA (VTI) 0,9 cm2, peak AVG 51 mmHg, mean AVG 31 mmHg, moderate AR, AR PHT 369 ms
- Other Valve: MR mild, MS mild, TR severe TVG 50 mmHg, PR moderate

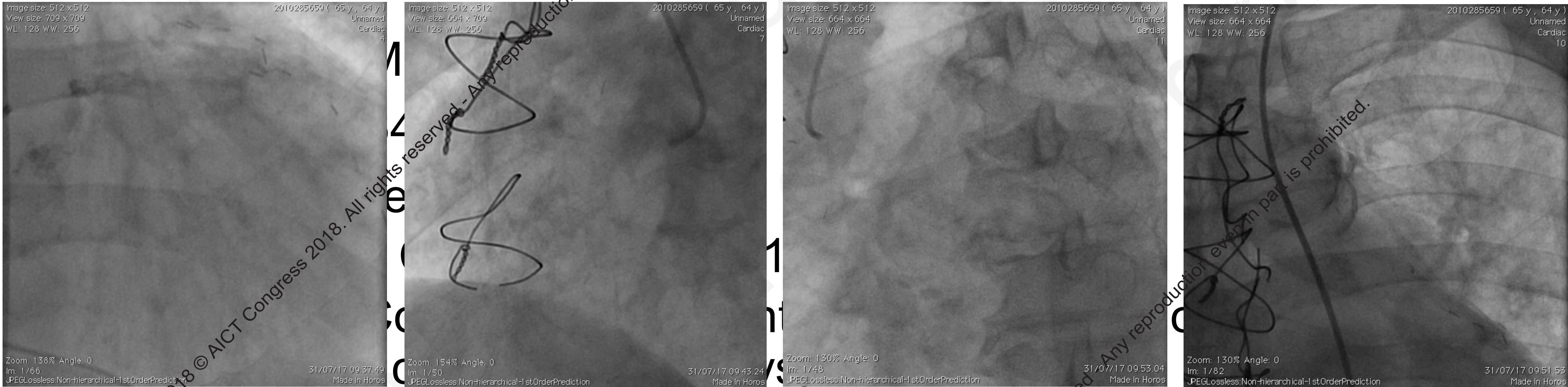
→ Severe Aortic Stenosis with moderate aortic regurgitation





2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Coronary Angiography



• BAV (2017)

LM : Normal
LAD : 60-80% diffuse stenosis at proximal, total occlusion at mid after D2
LCx : 60-70% stenosis at proximal, 80% stenosis at proximal OM1
RCA : Total occlusion at proximal

Graft :
SVG – PL : Patent
SVG – OM : Patent
LIMA – LAD : Patent

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Surgical Conference

- Name : Mr. Kusnadi Saim
- Age : 64 y.o
- Problem : Euroscore : 0,9%
- Decision : TAVR
- Risk Factor : Hypertension, DM

- Diagnosis : Aortic Stenosis moderate-severe ec degenerative, Moderate AR, Mild MR, Mild MS, TR Severe, PR Moderate, post CABG 2011
- History of Presenting Illness :
  - CABG ec CAD3VD (June 11th, 2011)
  - Routine Control at outpatient clinic with chief complaint : recurrent chest pain and dyspneu on effort
  - BAV (2017)

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

MSCT - Size Measurement

Max Ascending Aorta Diameter (mm) 32,2

Sinotubular Junction Diameter (mm) 28,3 (Min) x 28,9 (Max)

ANNULUS

Diameter (mm) 21,4 (Min) x 31,2 (Max), 26,3 mm (Mean)

Perimeter (mm) 85,5, 27,2 (Derived Diameter)

Area - mm², - mm (Derived Diameter)

Sinus of Valsalva Diameter (mm): 33,6 (LCC), 30,9 (RCC), 35,9 (NCC)

Sinus of Valsalva Height (mm): 23,3 (LCC), 25,6 (RCC), 23,1 (NCC)

Coronary Ostia Height (mm): 17,4 (Left), 23,4 (Right)

LVOT Diameter (mm): 19,8 (Min) x 31,1 (Max)

5mm

RIGHT

CIA Min Diameter (mm) 8,0 x 8,4

EIA Min Diameter (mm) 7,4 x 8,4

Femoral Min Diameter (mm) 6,7 x 8,3

LEFT

CIA Min Diameter (mm) 7,9 x 8,2

EIA Min Diameter (mm) 7,2 x 8,0

Femoral Min Diameter (mm) 6,9 x 7,4

RIGHT

Subclavian Min Diameter (mm) - x -

Annular Angulation 47°

LEFT

Subclavian Min Diameter (mm) - x -

Please review images for direct aortic evaluation.

Calcium: Mild ☑ Moderate ☐ Severe ☐

Sair

ess

une

tpat

and

on,

aint :

Size	23 mm	26 mm	29 mm	34 mm
Annulus Diameter	18 - 20 mm	20 - 23 mm	23 - 26 mm	26 - 30 mm
Annulus Perimeter π x Diameter	56.5 - 62.5 mm	62.8 - 72.3 mm	72.3 - 81.7 mm	81.7 - 94.2 mm
Sinus of Valsalve (Mean)	≥25 mm	≥27 mm	≥29 mm	≥31 mm
SOV Height (Mean)	≥15 mm	≥15 mm	≥15 mm	≥16 mm

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

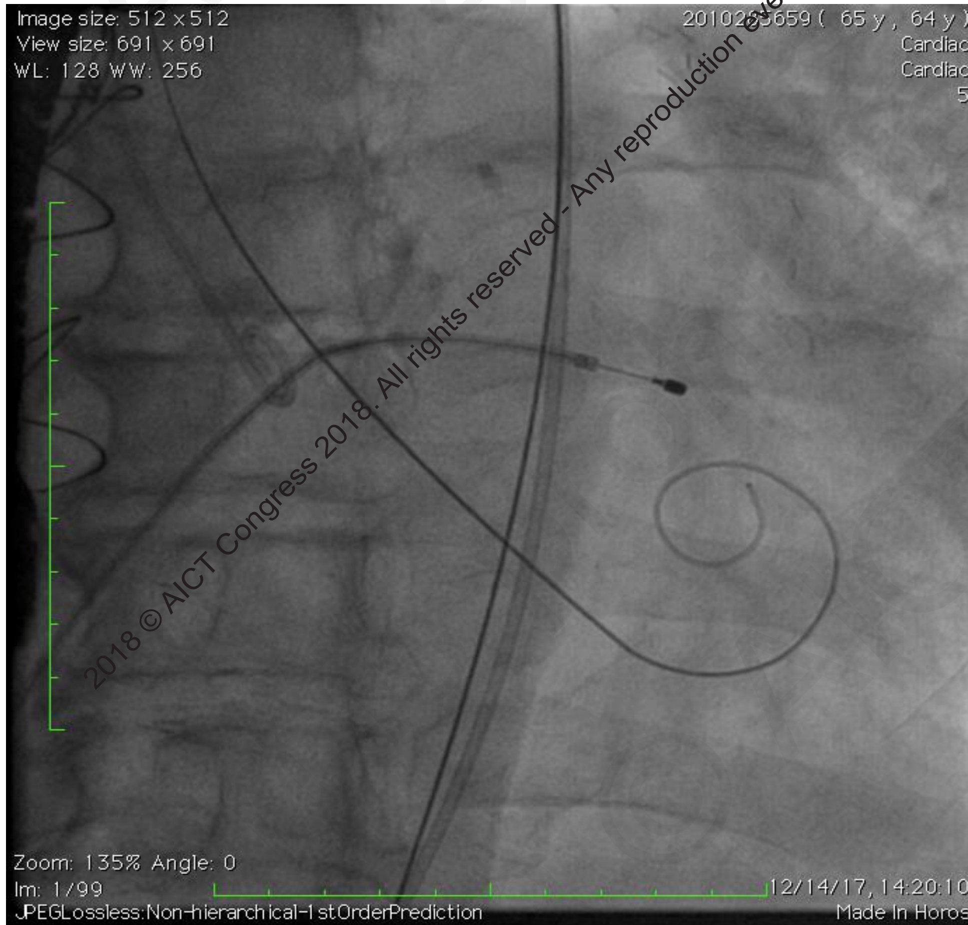
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Procedural Plan

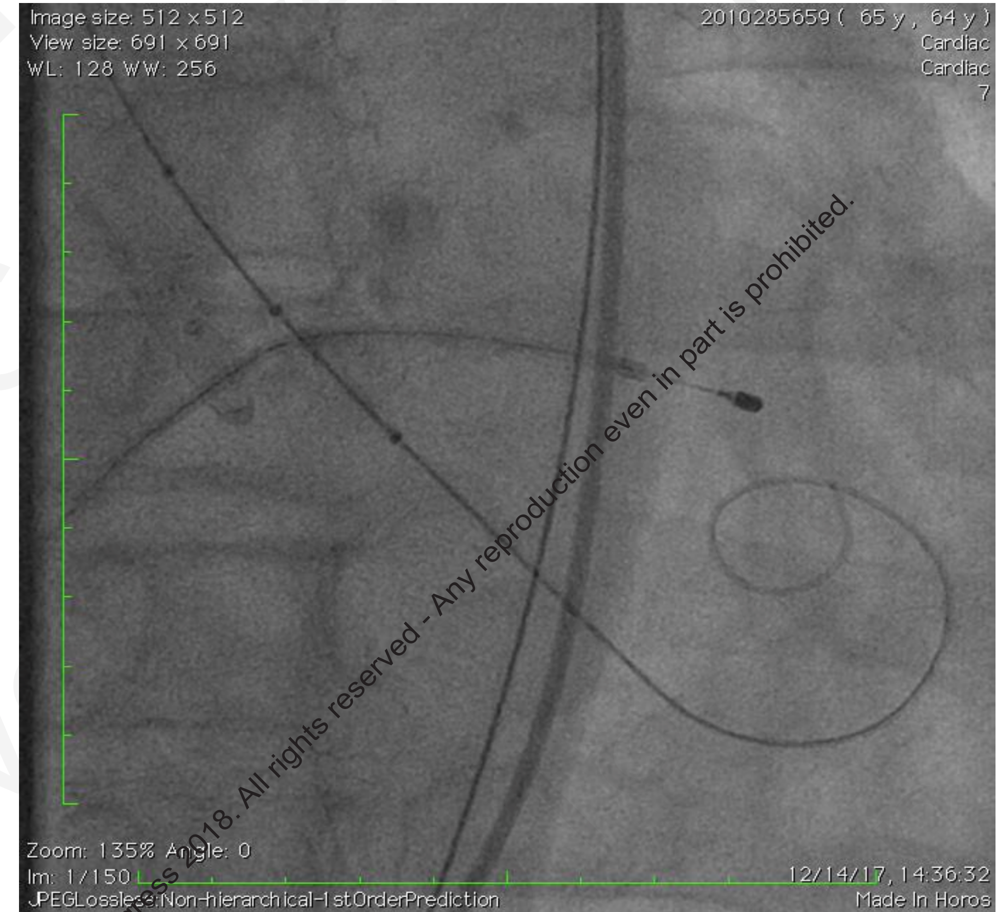
- General anesthesia and transoesophageal echo guidance
- Main access right femoral artery
- Balloon predilatation
- Evolut-R 34 mm

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

TAVR Procedure



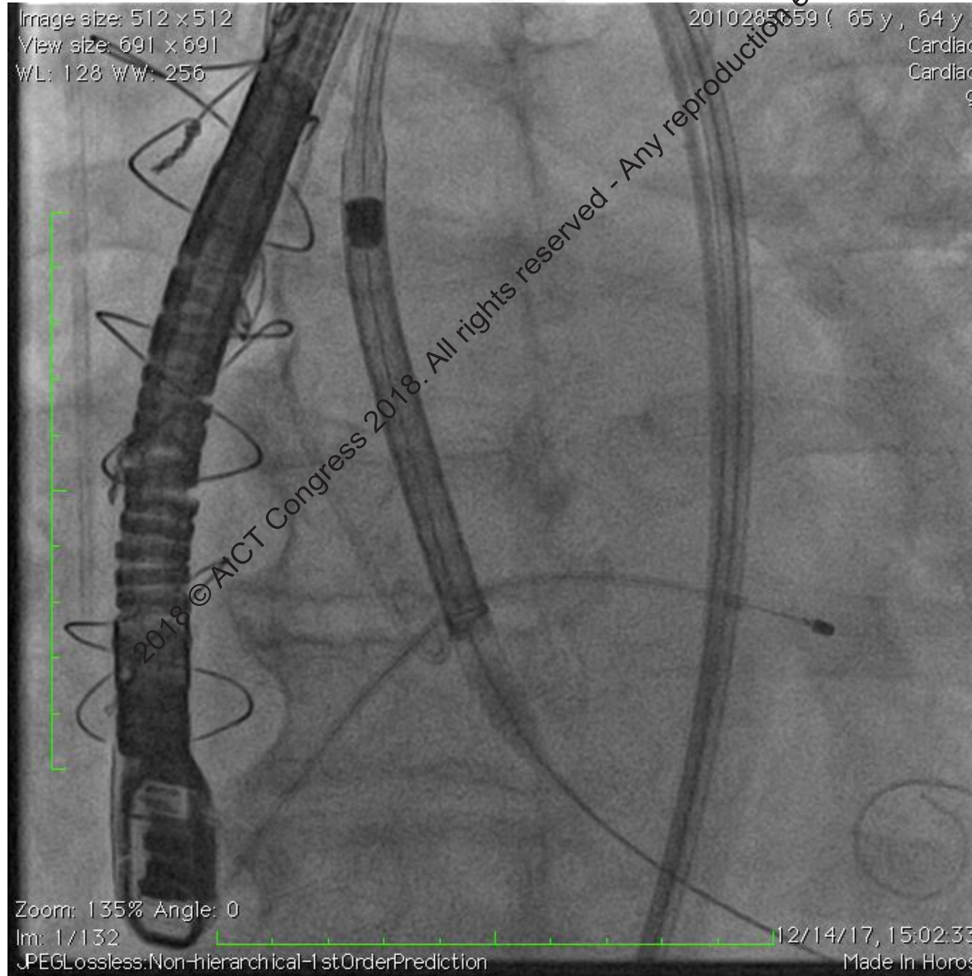
Aortography :
Aortic Regurgitation
Sellers Grade II

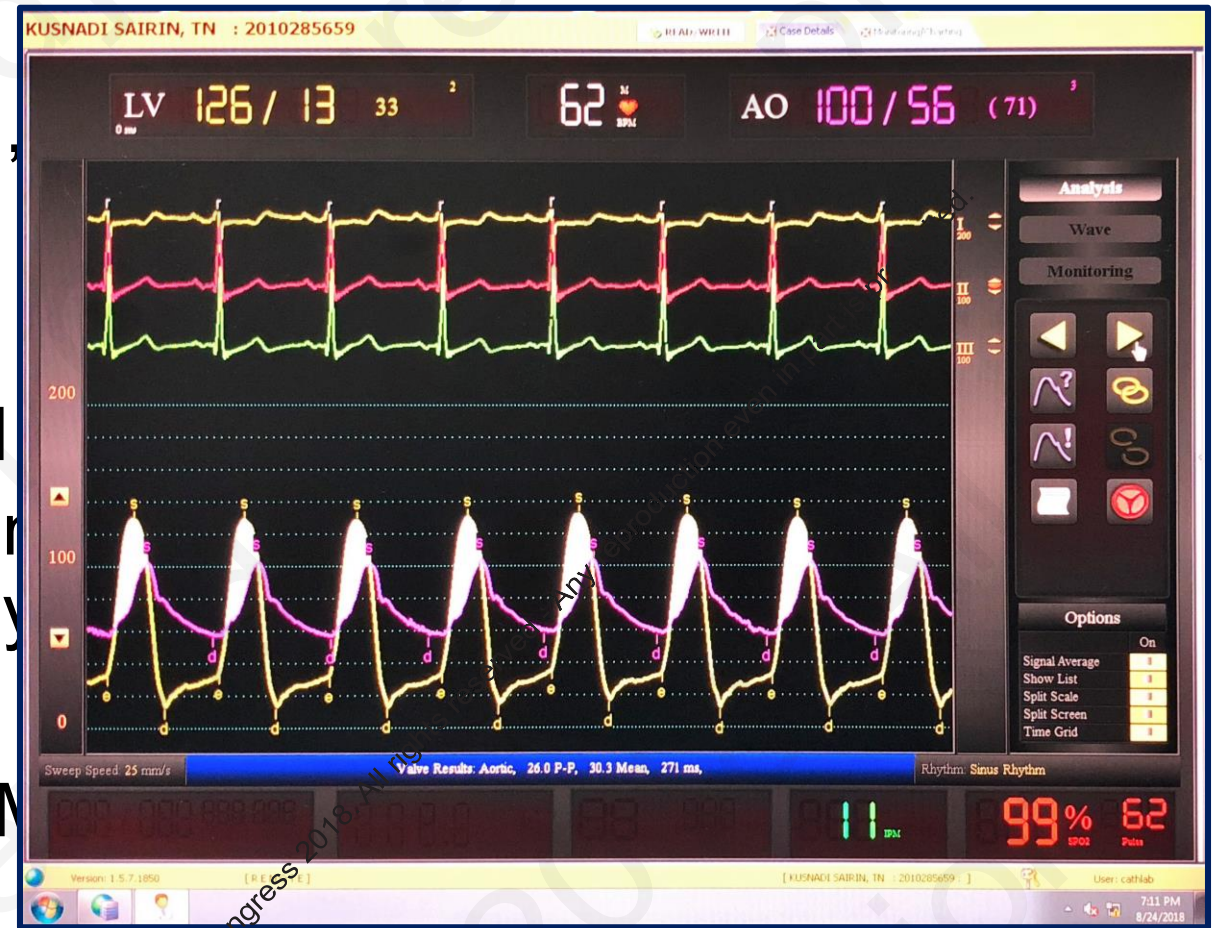


- Wiring with **Confida**
- Predilate with ballon **NUCLEUS** 20x4x110 mm

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Post Ballooning





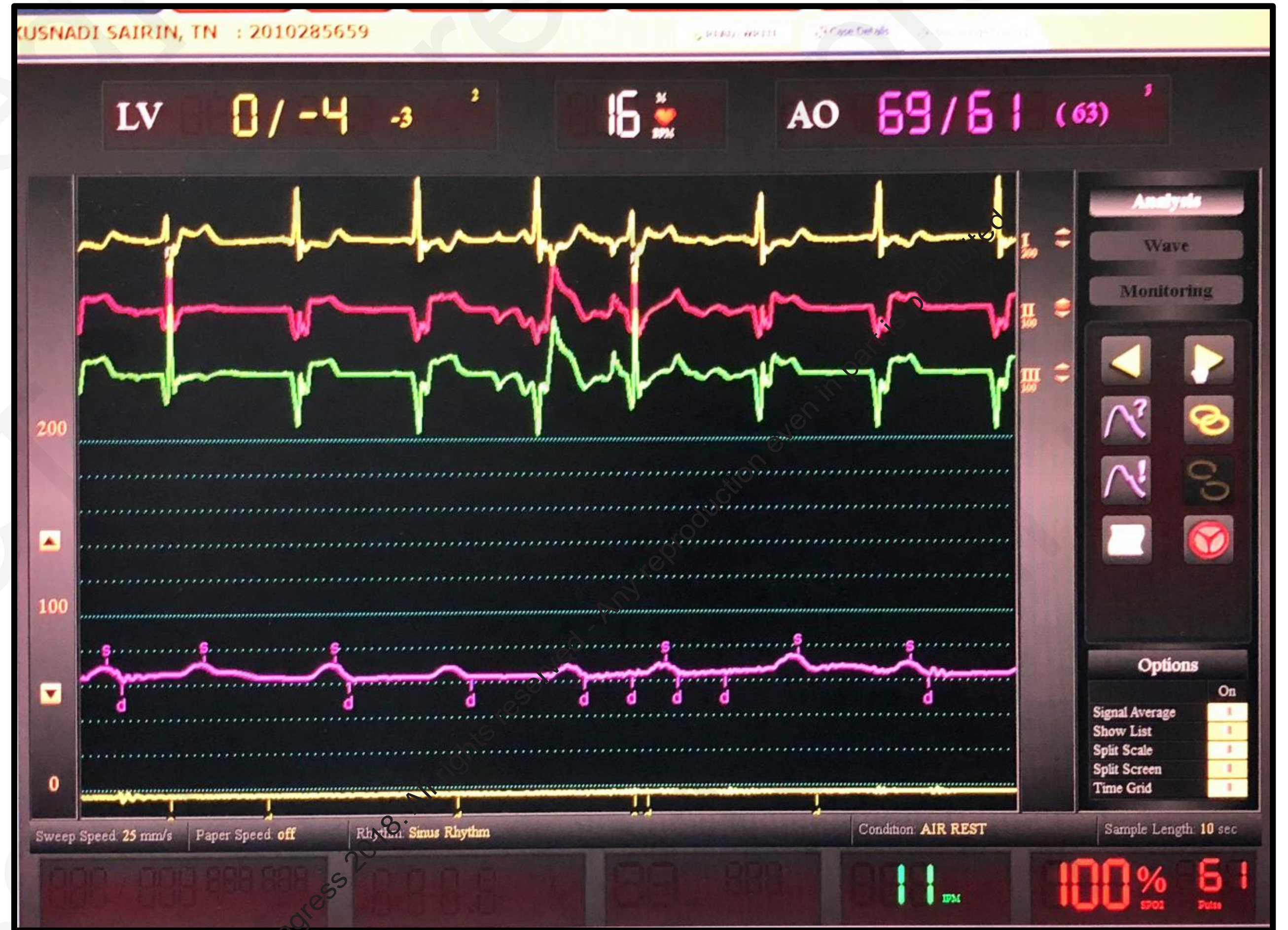
Minimal Aortic Regurgitation seen

Mean gradient 30 mmHg

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

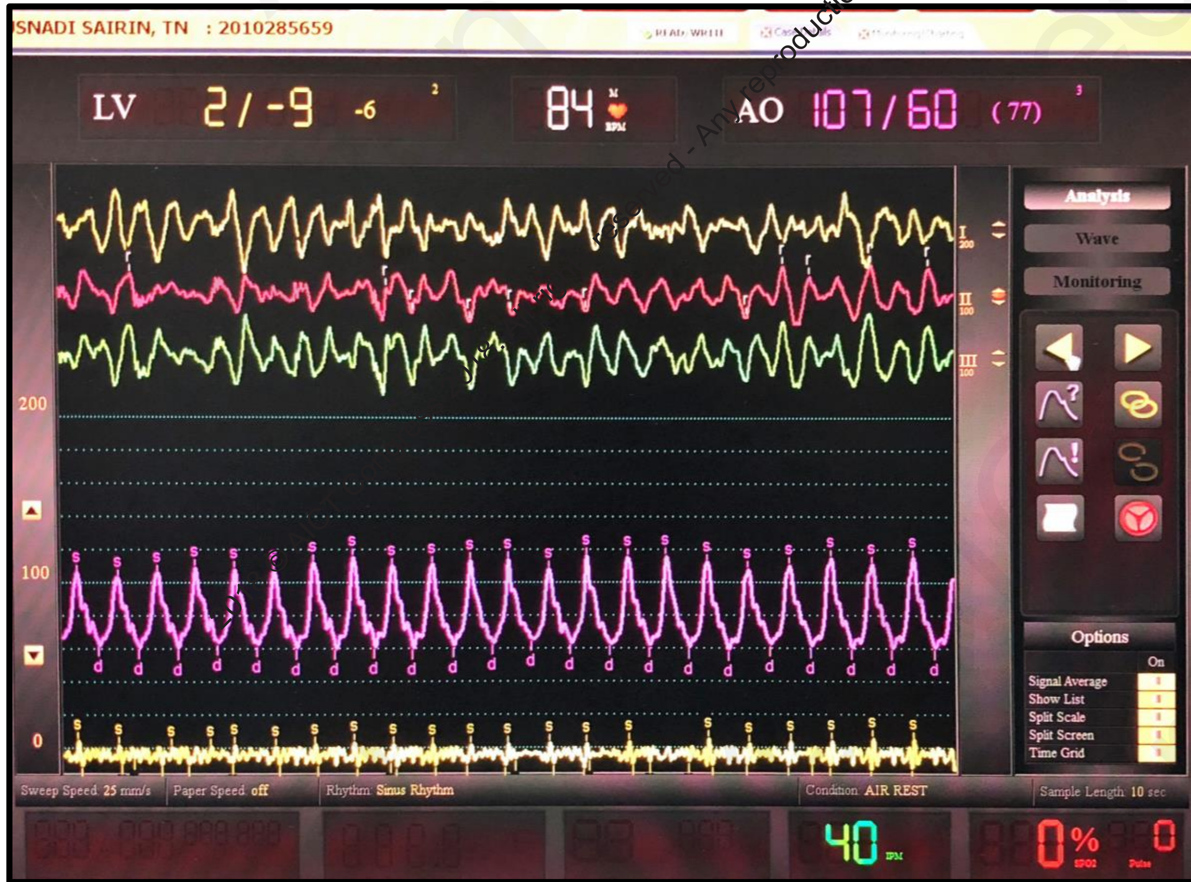
AICT

Suddenly..
Blood Pressure drop to 69/61 mmHg



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

And then….Heart Stop beating !!!



TEE confirmed : **Heart Stop Beating**
Monitor VT/VF → DC shock 200J 2x

Continuing **CPR** → PEA
Adrenalin total 10 mg,Bicnat

15 min rescucitation did not work

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

What’s the possible mechanism ?

• Age : 64 y.o

recurrent chest pain and dyspneu on effort

Cardiac Tamponade

- TEE and Flouroscopy confirmed no leakage in pericardium

Coronary Occlusion

- Angiography : not issue --- post CABG, all graft are patents

Acute Aortic Regurgitation

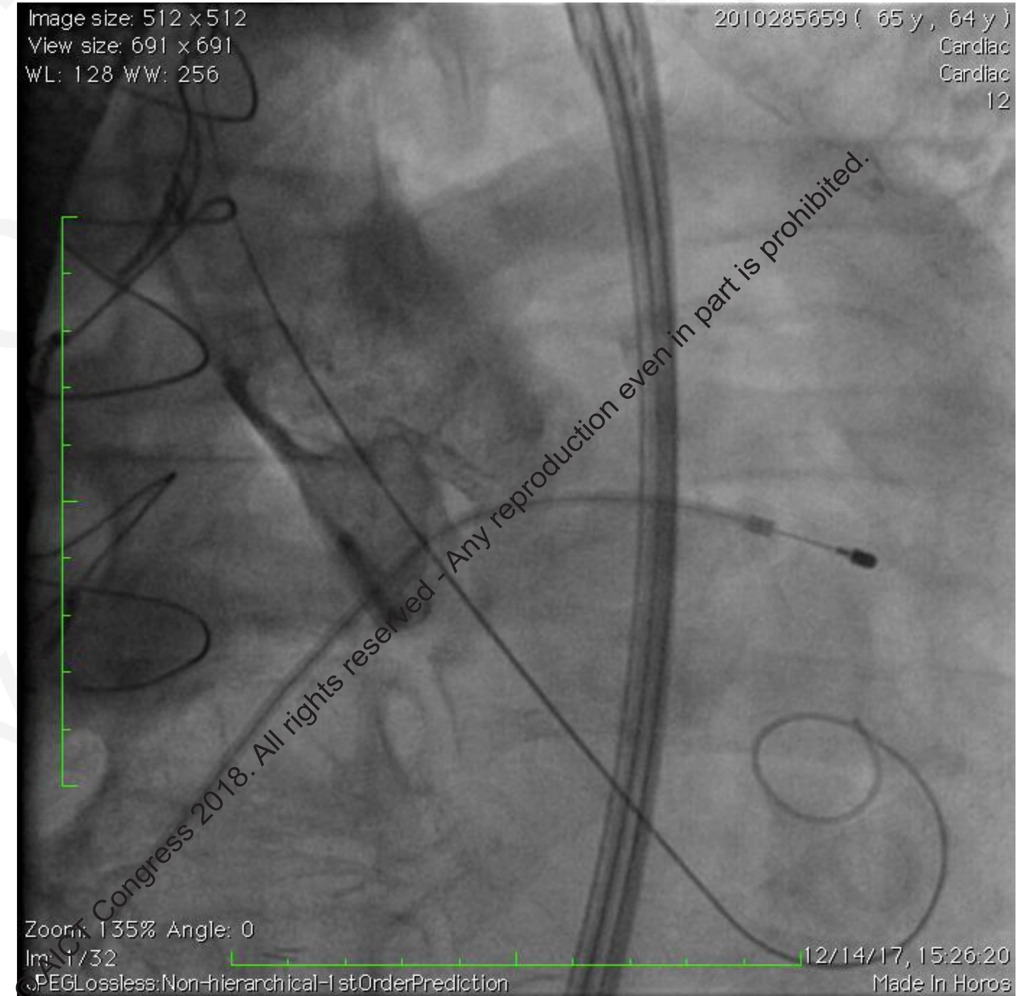
- First Aortography evaluation showing grade II AR

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Aortography to confirm..

Acute severe AR !!!

So what to do next..??



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

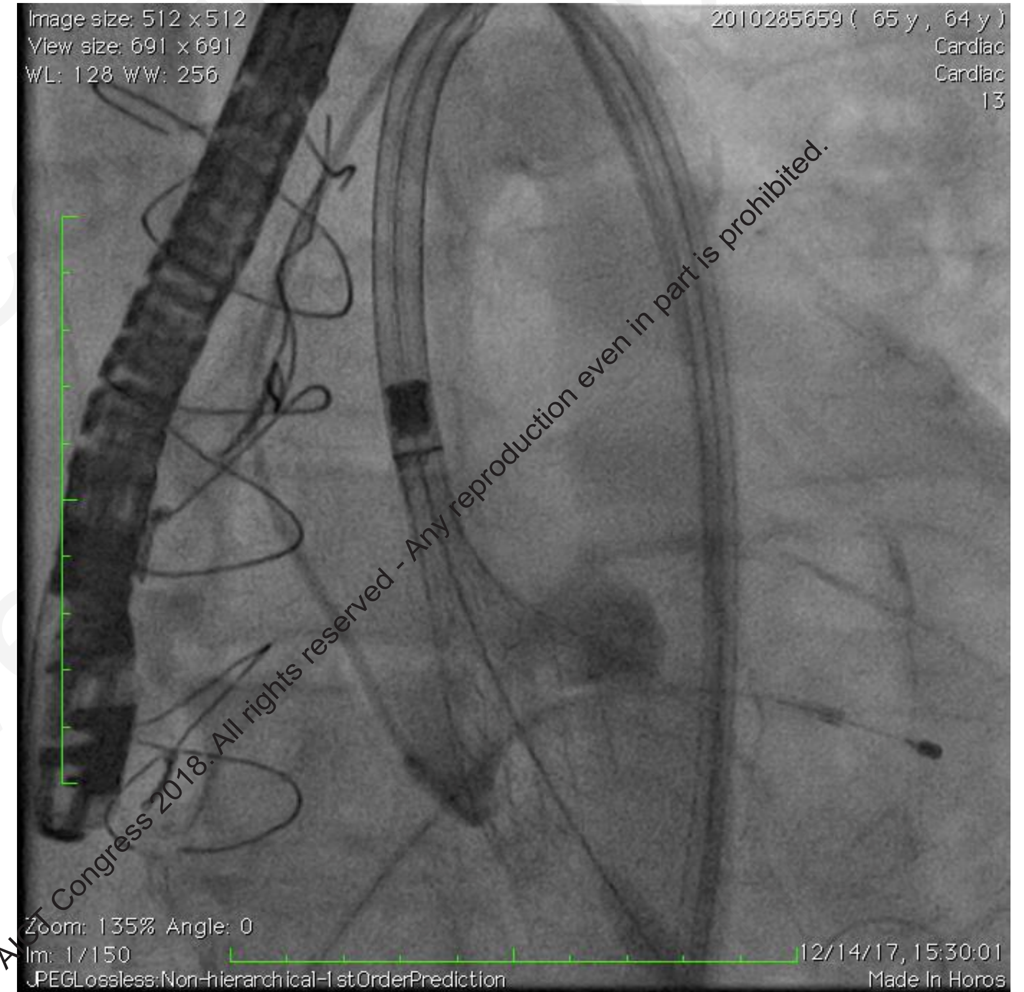
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

What's next…

Decided to deploy

Evolute-R 34

Continuing CPR



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

AICT

Identity

After 30 sec...Heart Start beating again

irin,

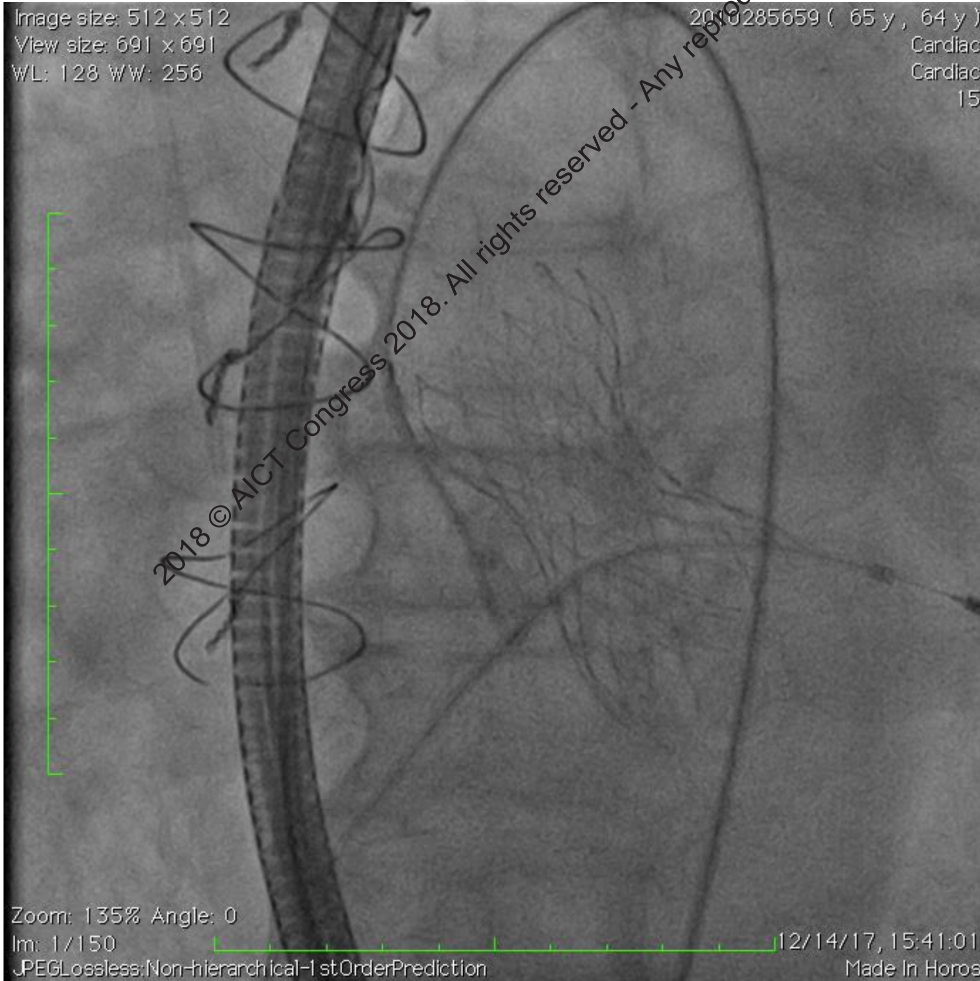
s :

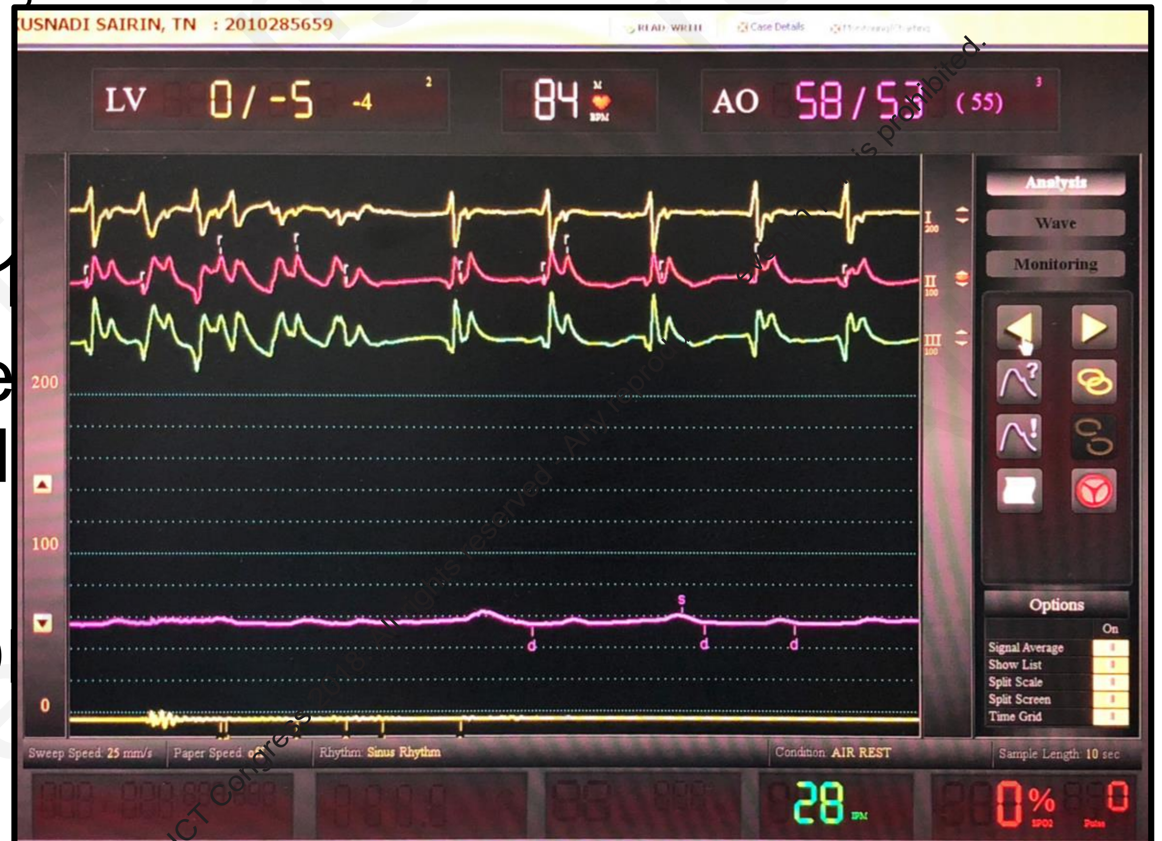
ne 1

atie

d d

, DI

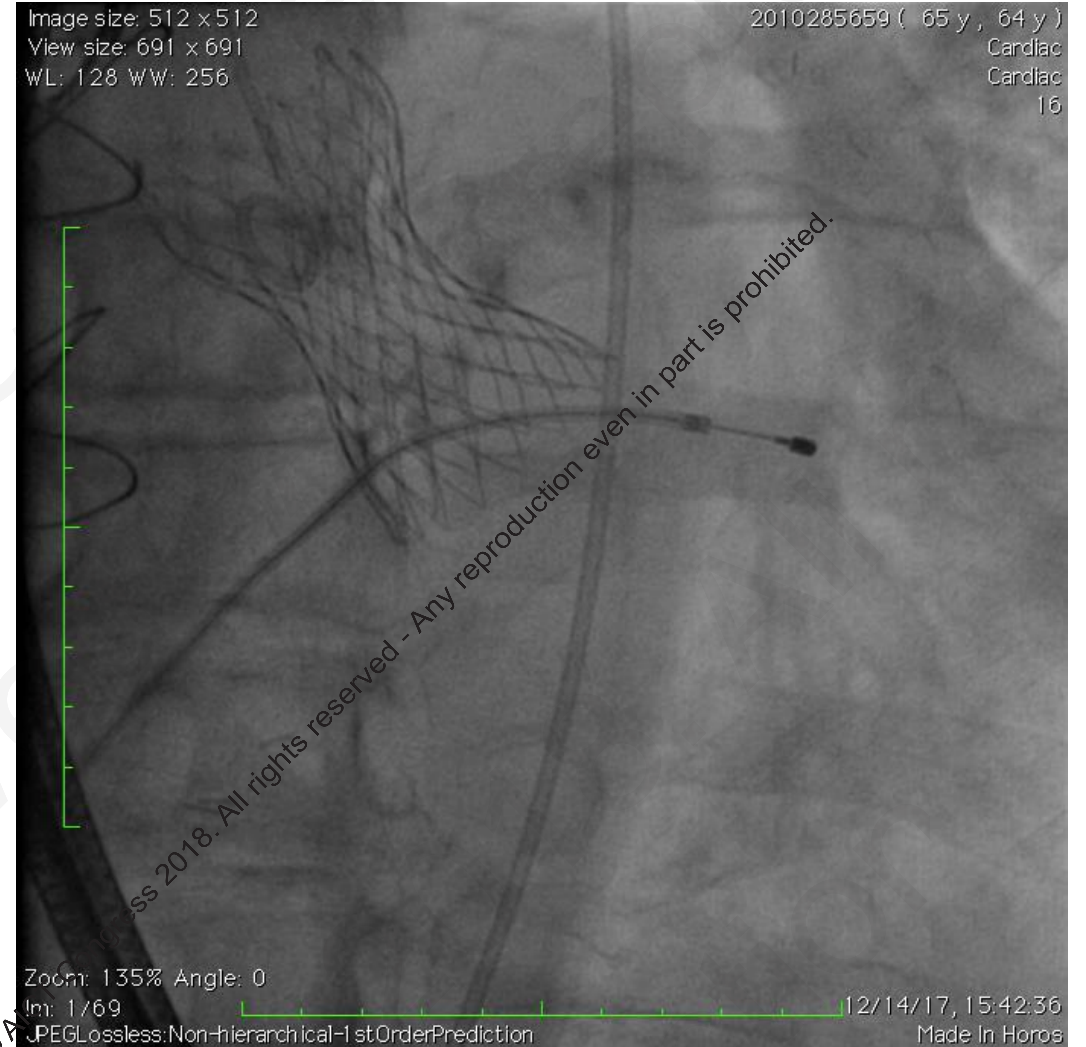




2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Evaluation Post Procedure

- Aortografi : **no aortic regurgitation**
- TEE : minimal leakage



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Follow Up

- Name : Mr. Kusnadi Sairin,
- ...o
- ...ting Il...
- ...D3VD ...)
- ...ol at o... ...with ch...
- ...st pain... ...n effor...
- ...pertens...

0 – 2nd day

- ICCU
- Brain Cooling
- Syok Hypovolemic ec bleeding
- Sepsis ec HAP

- Bleeding and haemolysis resolved
- Extubated
- Move to Intermediate Ward

- Hemodynamic stable without support vasoactive drugs
- Fisiotherapy
- **Discharged from hospital**

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Take Home Messages

- Several specific TAVR complication associated with important clinical consequence, including cardiac arrest and mortality
- Acute AR after BAV during TAVR is one of the complication that make devastated complication
- It is important to make a right decision to manage lethal complication in this case : just deploy the valve !

- Name : Mr. Kusnadi Sairin,
- Age : 64 y.o
- History of Presenting Illness :
  - CABG ec CAD3VD (June 17th, 2011)
  - Routine Control at outpatient clinic with chief complaint : recurrent chest pain and dyspneu on effort
  - BAV (2017)
- Risk Factor : Hypertension, DM

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

SAVE THE DATE !

ISICAM-InaLive

Indonesian Society of Interventional Cardiology Annual Meeting

23 - 25 November 2018

A Decade of ISICAM - Driving Towards Excellence

Fairmont Hotel Jakarta

SKP IDI & SKP PPNI

- Live Demo
- Symposia
- Workshops
- Joint Sessions
- Oral & Poster Presentation
- Nurse Session

Registration Fees in Rupiah (Rp)	BEFORE SEP 30, 2018	AFTER SEP 30, 2018
1. Overseas	300 USD	400 USD
2. PIKI / PERKI Members	Rp. 2.500.000,-	Rp. 3.500.000,-
3. Specialists / Non PERKI Members	Rp. 3.000.000,-	Rp. 4.000.000,-
4. General Practitioners	Rp. 1.300.000,-	Rp. 1.500.000
5. Nurses / medical technicians	Rp. 1.300.000,-	Rp. 1.500.000,-
6. Workshops	Rp. 2.000.000	
7. Nurse Session	Rp. 1.500.000	

Bank Mandiri Cab RS Harapan Kita
A/C Number : 117-00-0697890-2
Acc Name : PP PERKI.ISICAM

Secretariat
INDONESIAN SOCIETY OF INTERVENTIONAL CARDIOLOGY (ISIC) / PIKI
Heart House, Jl. Katalia Raya No.5
Kota Bambu Utara, Jakarta 11430
INDONESIA
Phone : (62) (21) 568 1149 Ext. 111 / 113
(62) 813 1522 7958 (Santi)
E-mail : isicam@isic.or.id

www.isic.or.id

THE INDONESIAN SOCIETY OF INTERVENTIONAL CARDIOLOGY
PERHIMPUNAN INTERVENSI KARDIOLOGI INDONESIA

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

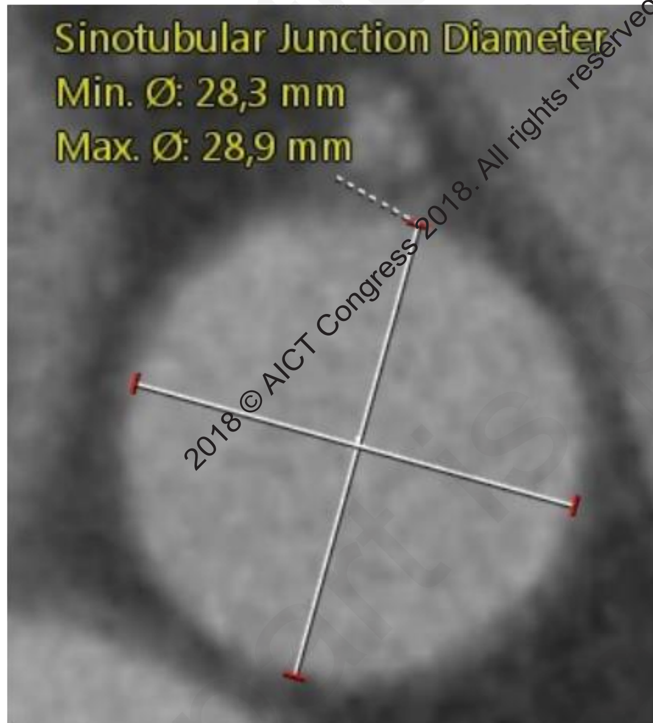
THANK YOU

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

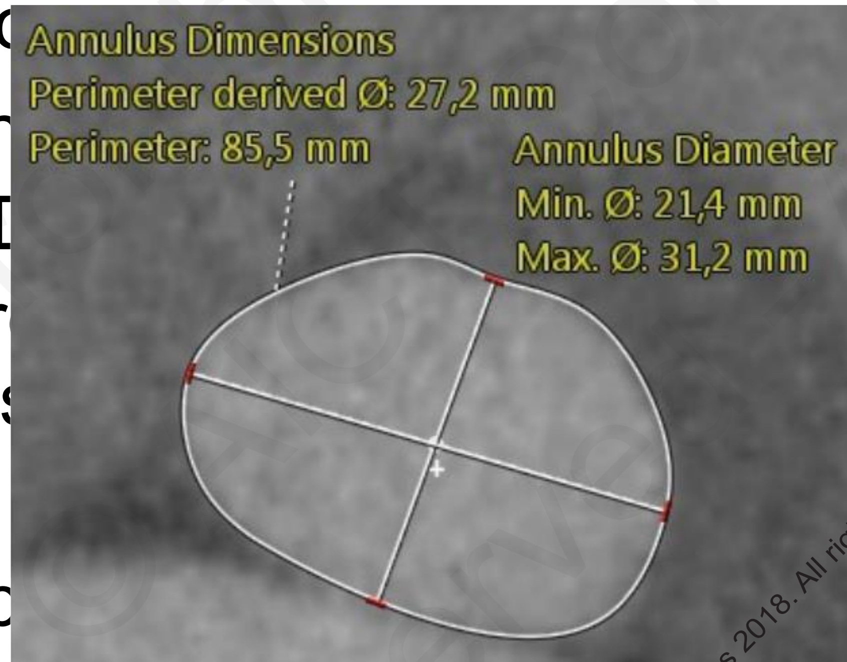
MSCT Aorta – size measurement

• Name : Mr. Kusnadi Sairin,

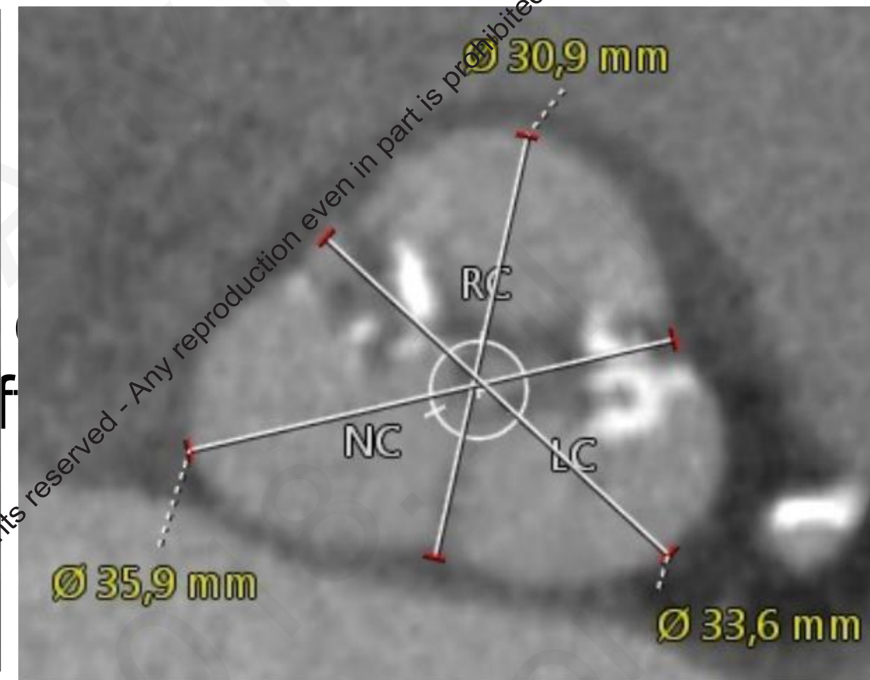
STJ



Annulus



SOV
Diameter

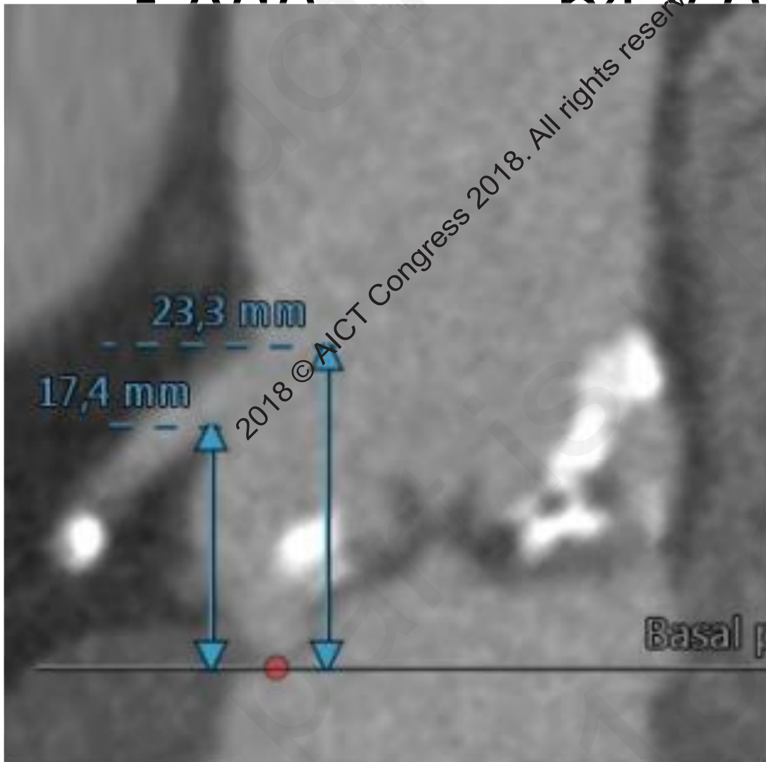


2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

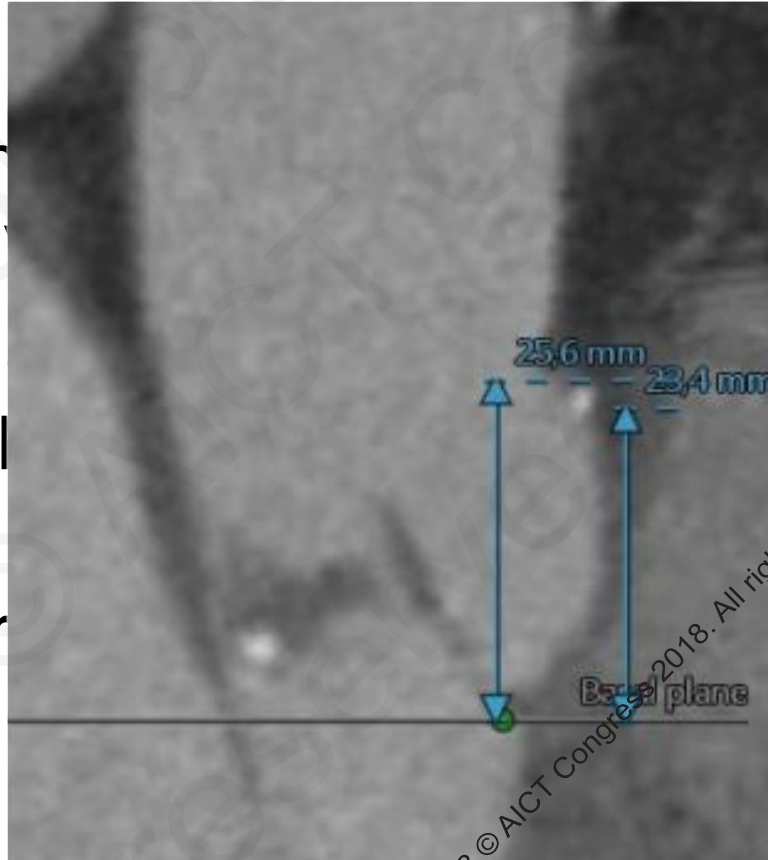
MSCT – Sinus Height

- Name : Mr. Kusnadi Sairin,
- Age : 64 y.o

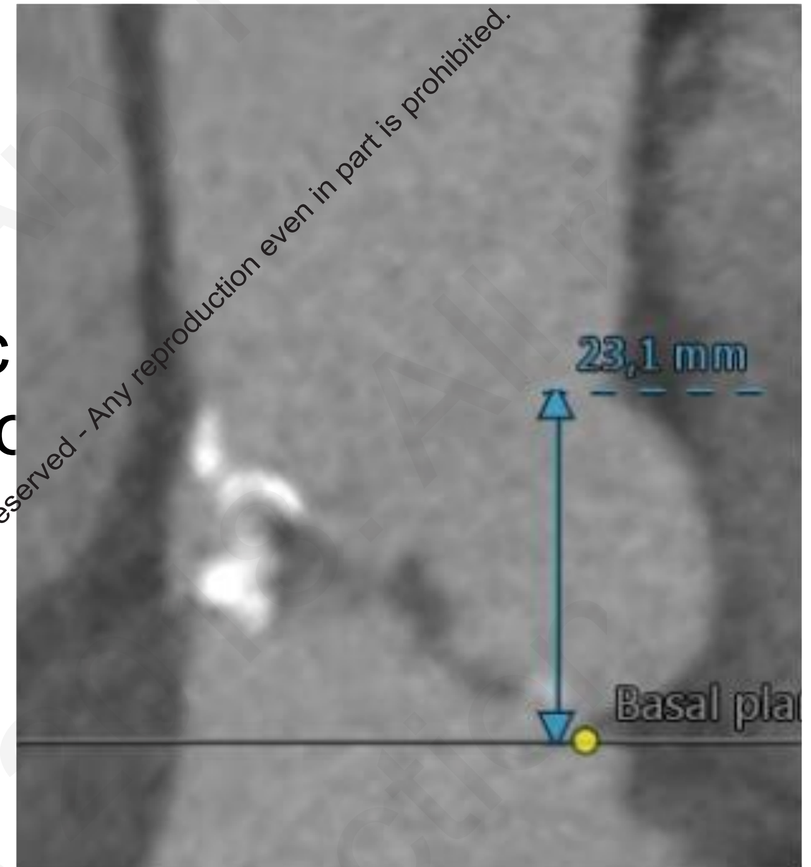
LCC



RCC



NCC



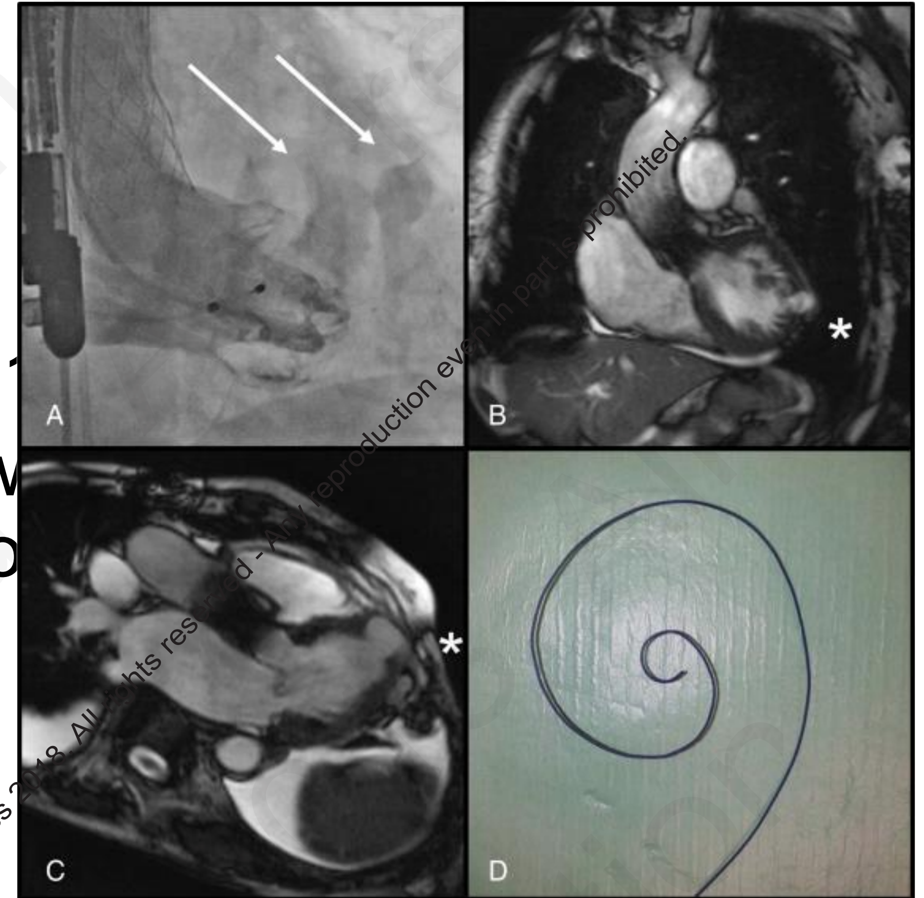
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

TAVI Complications – Cardiac Tamponade

- Occurring in 0.2–4.3% of cases
- There are **three major pathophysiological** situations :

1. Annular rupture during balloon valvuloplasty & valve implantation with subsequent arterial bleeding in the pericardium
2. Perforation of the RV caused by the temporary pacing lead
3. Perforation of the LV by an extrastiff guidewire during its placement or at later stages of the procedure

- Name : Mr. Kusnadi Salim,
- Age : 64 y.o
- History of Presenting Illness :
    - CABG ec CAD3VD (June 11th, 2011
    - Routine Control at outpatient clinic w
      recurrent chest pain and dyspneu o
    - BAV (2017)
- Risk Factor : Hypertension, DM



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

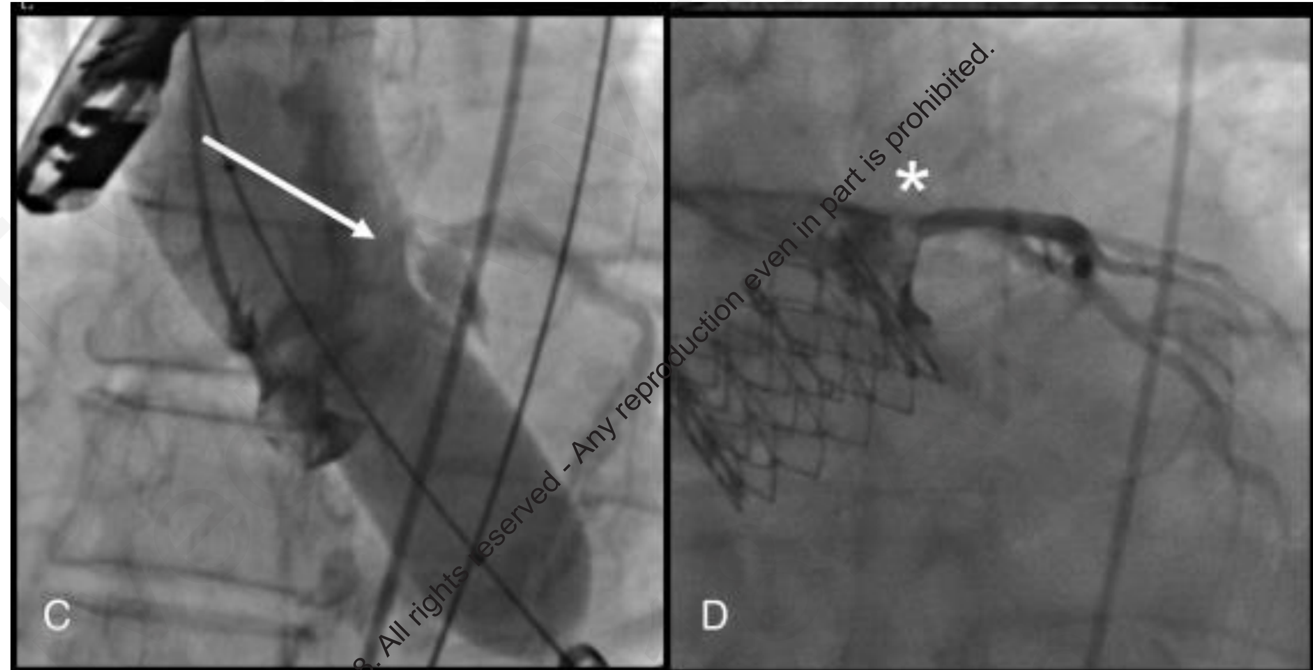
TAVI Complications – Acute Coronary Occlusion

Epidemiology:

- Prevalence of less than 1% in contemporary practice
- Left coronary artery is the most commonly involved (87%)

Established risk factors:

1. Coronary height < 10mm
2. Sinus of Valsalva diameter <28mm



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

TAVI Complications – Acute Coronary Occlusion

Mechanism :

- Native valve leaflets are displaced over and obstruct the coronary ostia
- Leaflet avulsion and migration into the coronary ostium
- Aortic root dissection or hematoma extending near or into the coronary ostia
- Dislodgement of calcified material

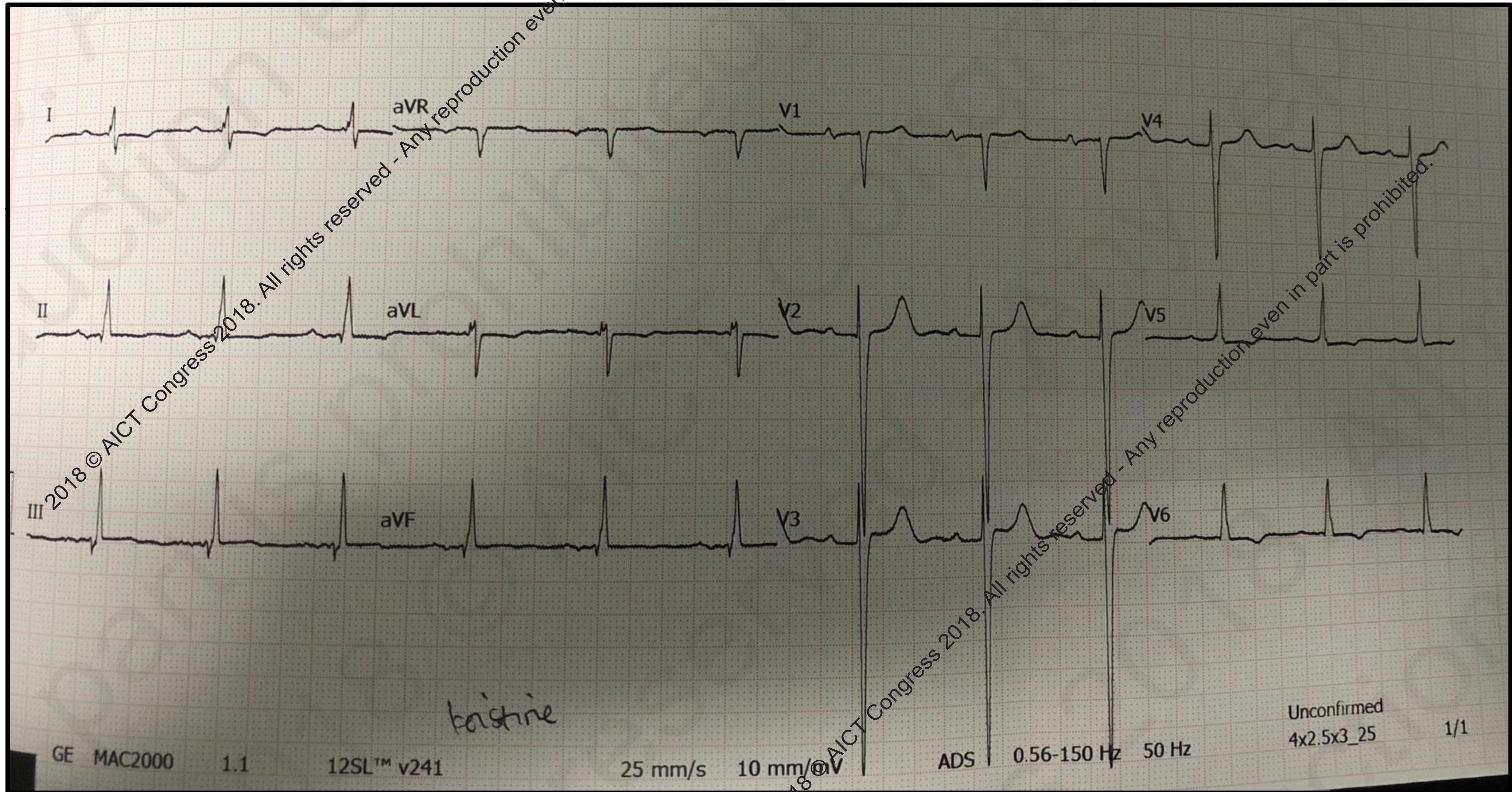
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

TAVI Complications – Stone Heart

- ❖LV Ischemic Contracture
  - ▪ Described in 1960s and 1970s
    - • After cross-clamping aorta for CABGs
  - ▪ Associated with ↓ high-energy phosphates
    - • Presumed to be energy failure
- ❖No ability to perfuse myocardium due to microcirculatory collapse from tetanic systolic contraction

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

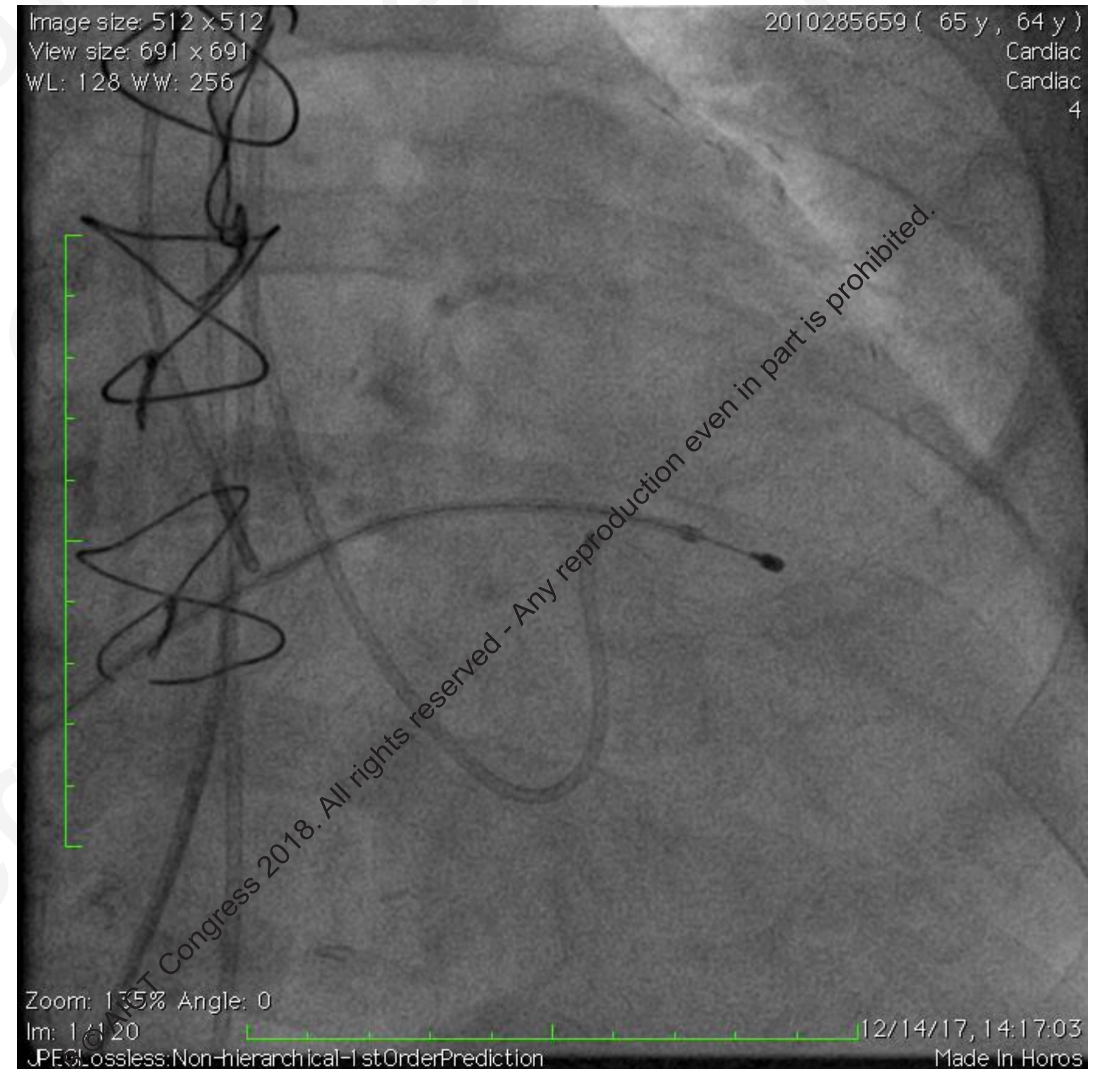
ECG



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

TAVR Procedure

- Bipolar 6F pacemaker in RV
- wiring to LV
- LV – Ao pullback 30 mmHg



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

Monitoring Hemodynamic

- Name : Mr. Kusnadi Sairin,
- Age : 64 y.o
- History of Presenting Illness :
  - CABG ec CAD3VD (June 11th, 2011)
  - Routine Control at outpatient clinic with chief complaint : recurrent chest pain and dyspneu on effort
  - BAV (2017)
- Risk Factor : Hypertension, DM

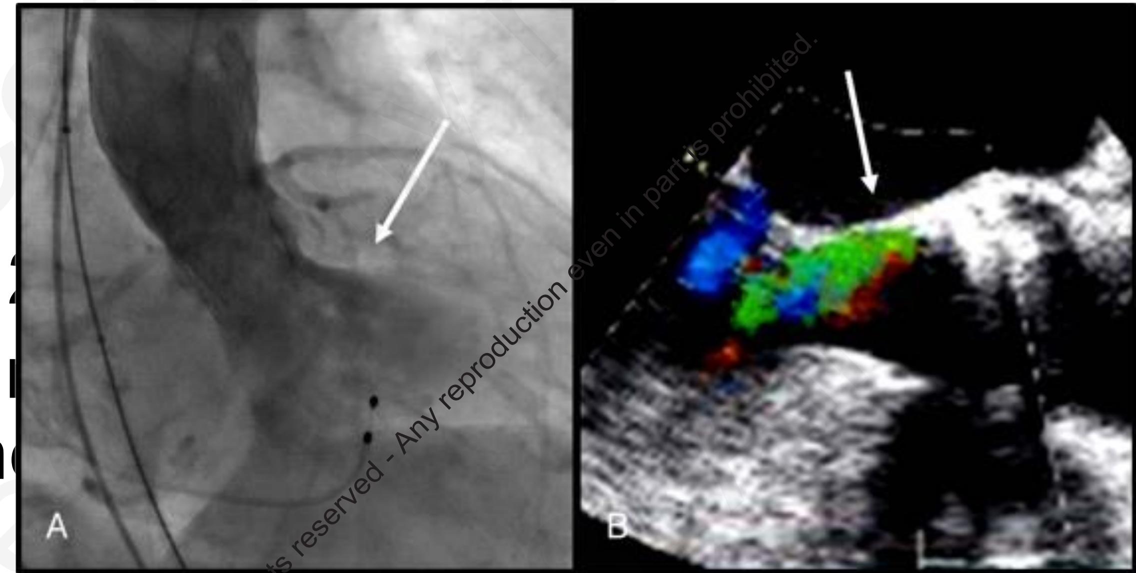
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

AICT

TAVI Complications – Aortic Regurgitation

- Transvalvular or Paravalvar form.
- **Transvalvular (central) AR** :
  - rare
  - caused by leaflet dysfunction due to crimping or during implantation, particularly following overdilatation or uneven expansion of the prosthesis
- **Paravalvular AR** :
  - eccentric shape or severely calcified annular 'landing zone' and undersizing → incomplete or uneven device expansion
- GARY Registry, AR after transvascular in 62.8% of cases, with moderate AR in 7% and severe AR in 0.3%

- Name : Mr. Kusnadi Sairin,
- Age : 64 y.o
- History of Presenting Illness :
  - CABG ec CAD3VD (June 11th, 2
  - Routine Control at outpatient cli
  - recurrent chest pain and dyspn
  - BAV (2017)
- Risk Factor: Hypertension, DM



2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.

14th AICT

ASIAN INTERVENTIONAL CARDIOVASCULAR THERAPEUTICS

THE OFFICIAL CONGRESS OF APSIC

7 - 9th September 2018

Hong Kong

Convention and Exhibition Centre (HKCEC)

2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.
2018 © AICT Congress 2018. All rights reserved - Any reproduction even in part is prohibited.