

Patient focused evidence-based approach

New York City: 6 December 2018



# Teaching challenging Transcatheter Valvular techniques managing complication of TAVR

Speaker - 7'

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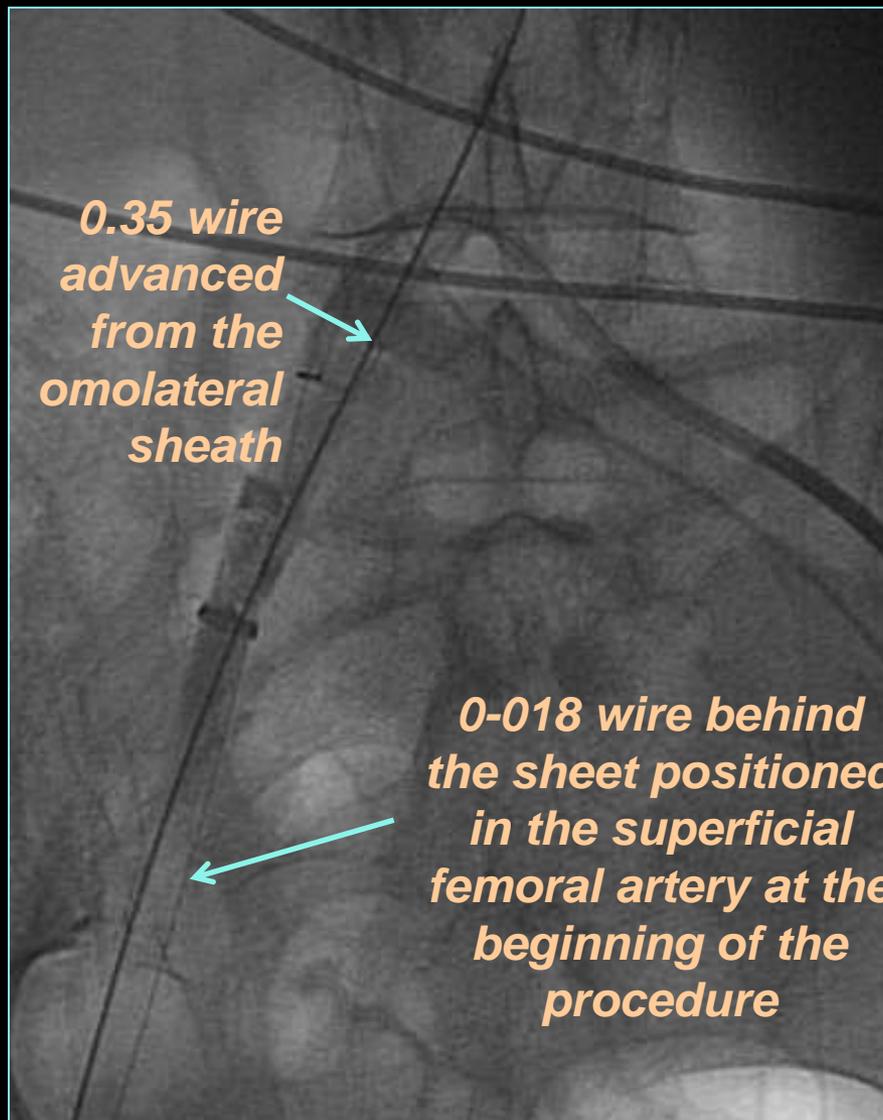
No conflicts to report

# Vascular complications

Annular rupture

Coronary occlusion

LV and Aorta perforation/rupture



A radial approach can be utilized instead of a contralateral femoral approach

*Checking integrity Iliac Vessel with injection from large ipsilateral sheath*

# Vascular complications

They can occur with any valve. In general the smaller the introducer the lowest the risk.

The bottom line is that even when facing the most dramatic vascular complication such as ileofemoral vessel rupture, abdominal aorta balloon occlusion can control the complication and allow strategic solutions

# Annular rupture

Accurate and precise measurement of the aortic annulus should prevent this complication

Nevertheless it is not always possible to obtain accurate and reliable measurements

Valves exposed to this risk:

Balloon expandable valves

Valves requiring postdilatation

Valves requiring predilatation

Active expanding valves

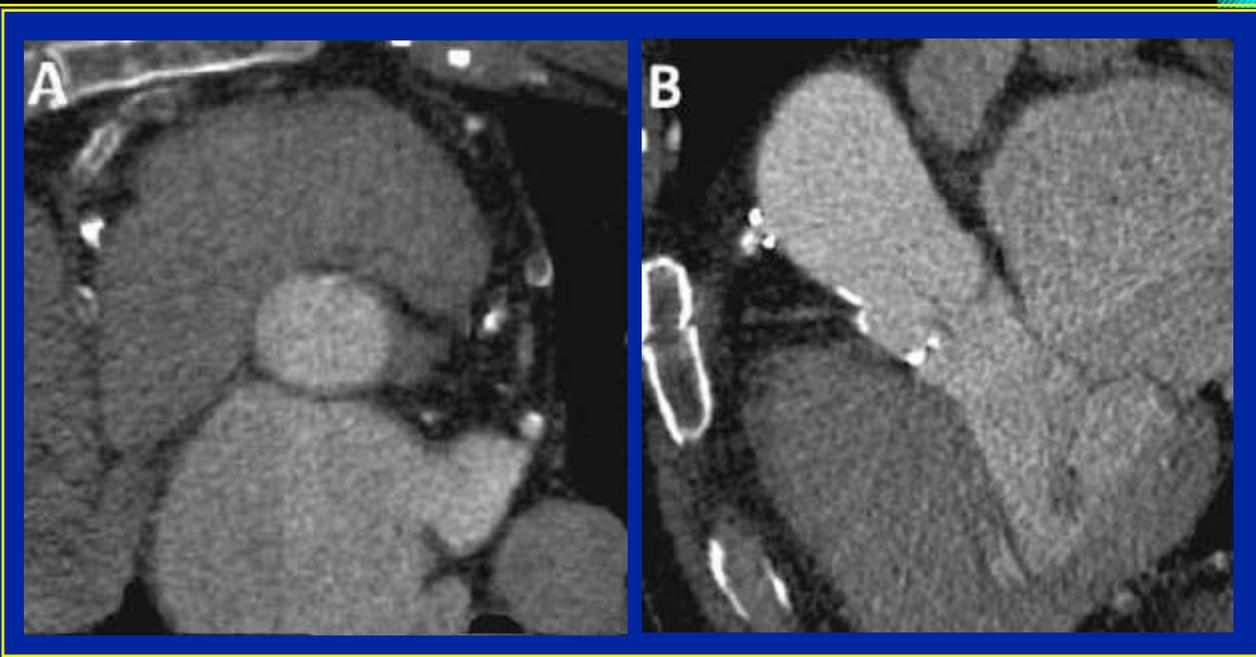
## Valvular Heart Disease

# Anatomical and Procedural Features Associated With Aortic Root Rupture During Balloon-Expandable Transcatheter Aortic Valve Replacement

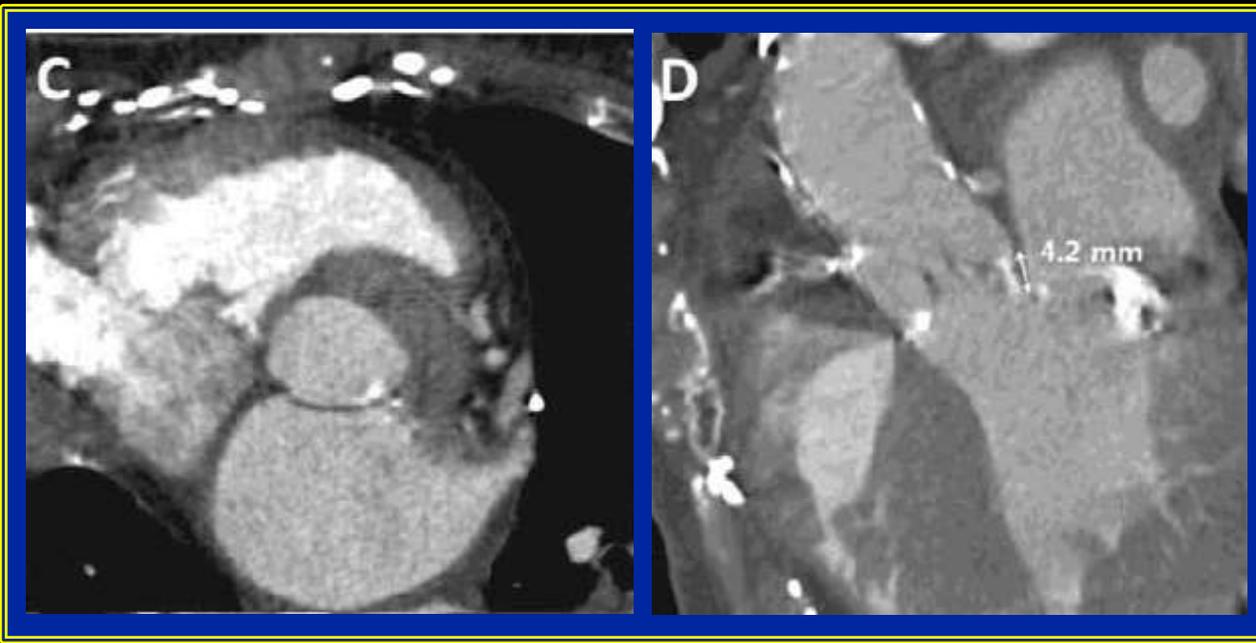
Marco Barbanti, MD; Tae-Hyun Yang, MD, Josep Rodès Cabau, MD; Corrado Tamburino, MD; David A. Wood, MD; Hasan Jilaihawi, MD; Phillip Blanke, MD; Raj R. Makkar, MD; Azeem Latib, MD; Antonio Colombo, MD; Giuseppe Tarantini, MD; Rekha Raju, MD; Ronald K. Binder, MD; Giang Nguyen, MD; Melanie Freeman, MD; Henrique B. Ribeiro, MD; Samir Kapadia, MD; James Min, MD; Gudrun Feuchtner, MD; Ronen Gurtvich, MD; Faisal Alqoofi, MD; Marc Pelletier, MD; Gian Paolo Ussia, MD; Massimo Napodano, MD; Fabio Sandoli de Brito, Jr, MD; Susheel Kodali, MD; Bjarne L. Norgaard, MD; Nicolaj C. Hansson, MD; Gregor Pache, MD; Sergio J. Canovas, MD; Hongbin Zhang, PhD; Martin B. Leon, MD; John G. Webb, MD; Jonathon Leipsic, MD

*Barbanti et al Circulation. 2013;128:244-253*

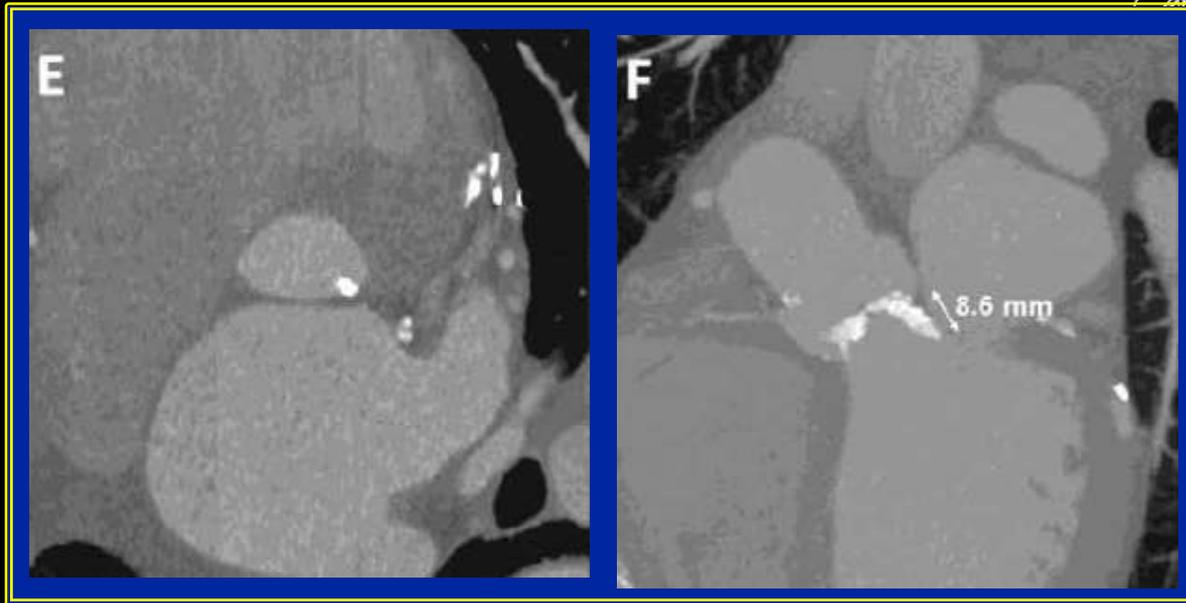
No  
Calcification



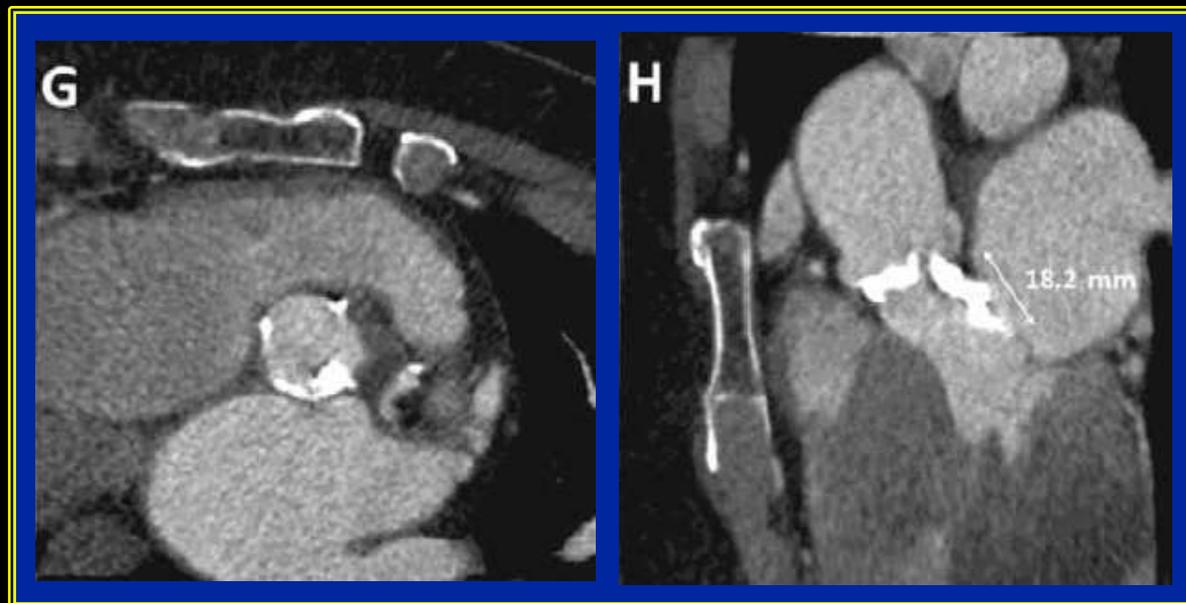
Mild  
Calcification



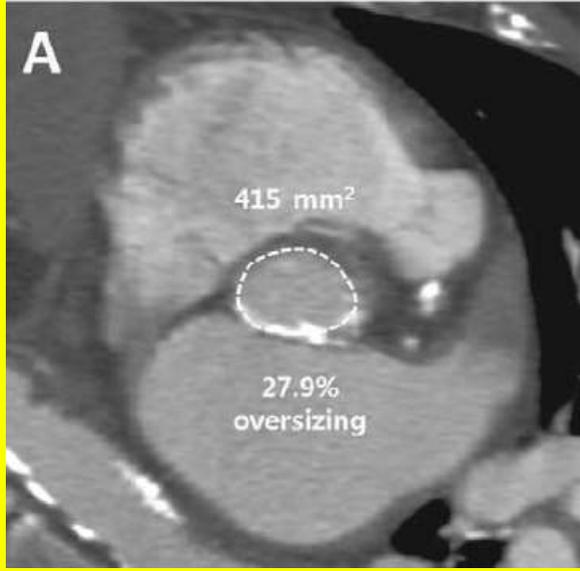
## Moderate Calcification



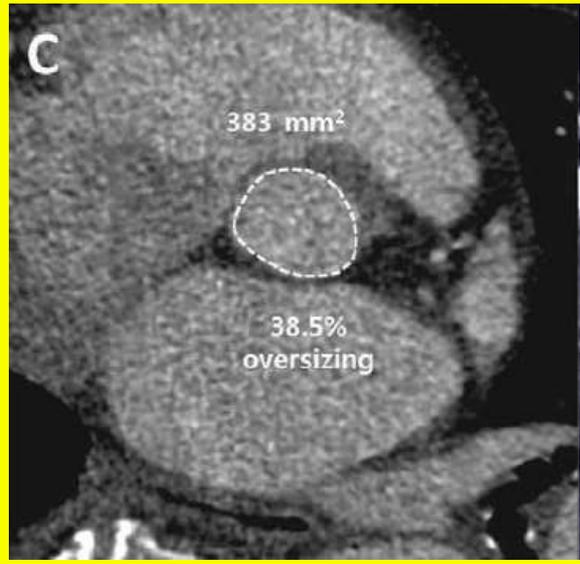
## Severe Calcification



Implanted a 26 mm  
Sapien XT valve= 530  
mm<sup>2</sup> with 27.9%  
oversizing  
leading to RUPTURE



Implanted with 23 mm  
Sapien XT valve=415  
mm<sup>2</sup> with 38.5%  
oversizing  
WITHOUT RUPTURE



# Oversizing complications

Coronary obstruction

Atrio-ventricular block

Mitral valve injury

Peri-aortic hematoma

Septal rupture

Aortic root rupture

**For balloon expandable valves or active expansion the criteria to follow to prevent overexpansion are:**

Avoid >20% predicted annular area oversizing

Avoid >10% predicted annular area oversizing in patients with adverse root features :

- moderate to severe left ventricular outflow tract calcification*
- shallow sinuses of Valsalva*
- extreme age*
- prior chest irradiation*
- small body size*

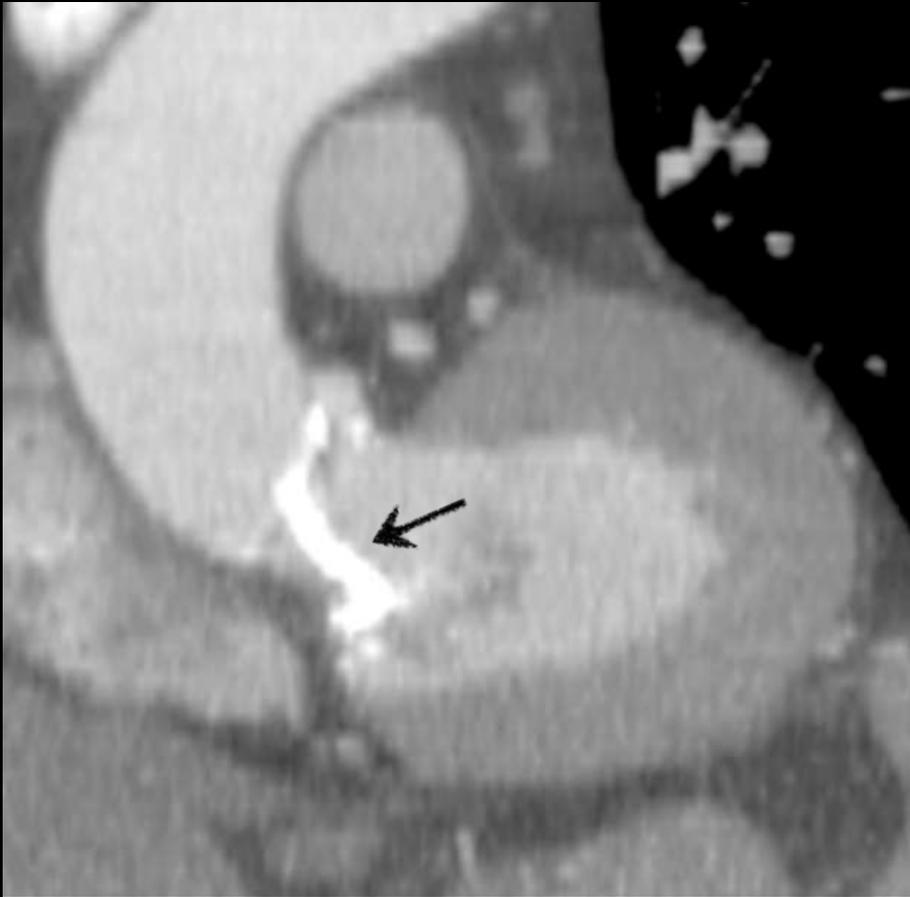
## In situations with severe calcifications especially LV outflow consider

Avoid a balloon expandable valve

If you are using a balloon expandable valve perform aortic injection during predilatation and decide size or under filling

Accept that no or minimal aortic regurgitation will be unlikely

## 2. Asymmetric calcification or extension into the LVOT



Extensive calcification between NCC and LCC

## During BAV and RVP

- Balloon of known diameter:  
20, 23 or 25mm
- Pigtail at the valve level (or above the proximal balloon end)
- Aortography performed at full inflation
- Small amount of contrast: 10ml / 10ml/sec

Useful to finalize valve sizing and to evaluate risk for coronary occlusion

### 23mm or 26mm THV?

#### 23mm Balloon



No AR



23 mm  
confirmed



AR ++



26 mm  
confirmed

# Management of annular rupture

If annular rupture is not complete (periannular staining) observation and conservative management are sufficient

In some conditions: implantation of a second valve may help

For massive ruptures: pericardiocentesis and immediate OR transfer or surgery in the cath. lab should be done. ECMO as first line should not be considered

# Coronary occlusion

Coronary occlusion may occur at the time of postdilatation or at valve implantation.

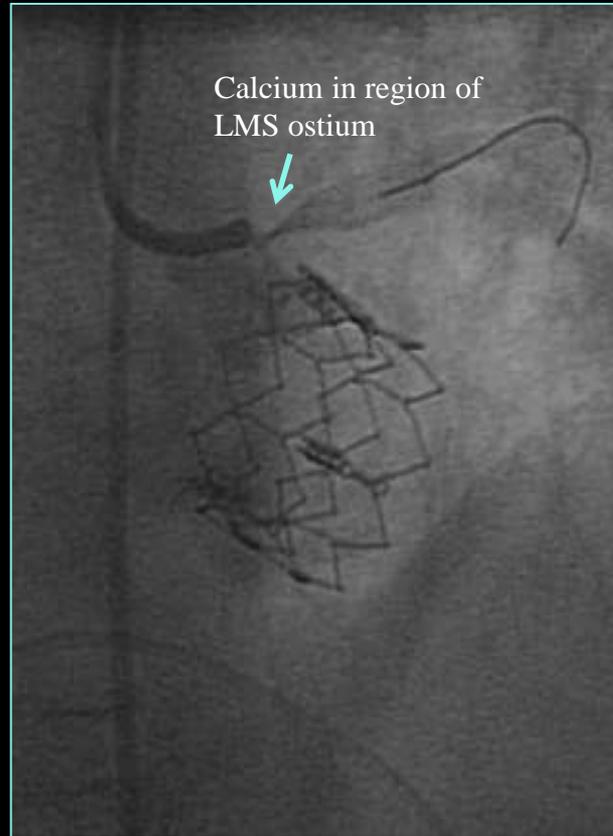
Coronary origin above 12 mm from the annulus seems safe except when implanting a TAVR inside some surgical valves

Large sinus of Valsalva compensate for low origin of coronaries

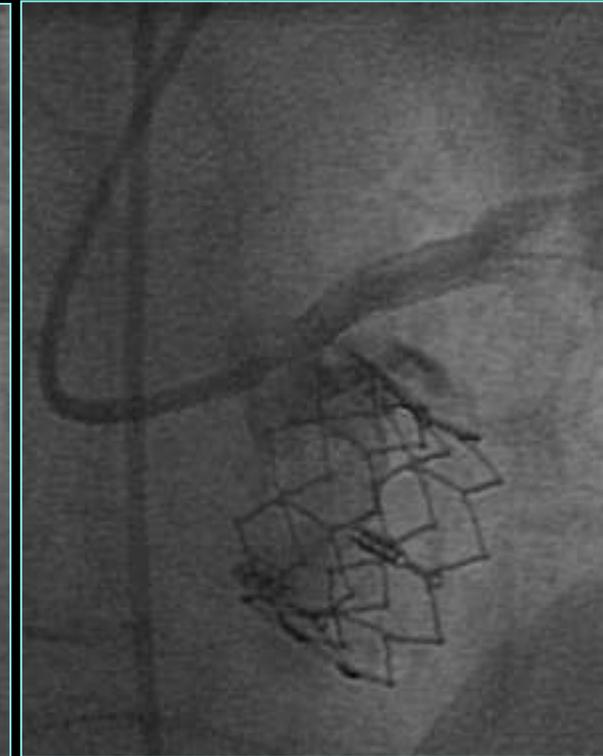
# Acute occlusion of the left coronary ostium following Edwards SAPIENS implantation



Baseline angiography showing normal coronary arteries



Non-selective angiography showing acute occlusion of the ostium of the LMS with extensive calcification in this region



Restoration of LMS patency following implantation of 2 stents back to the ostium.

# Management of coronary occlusion

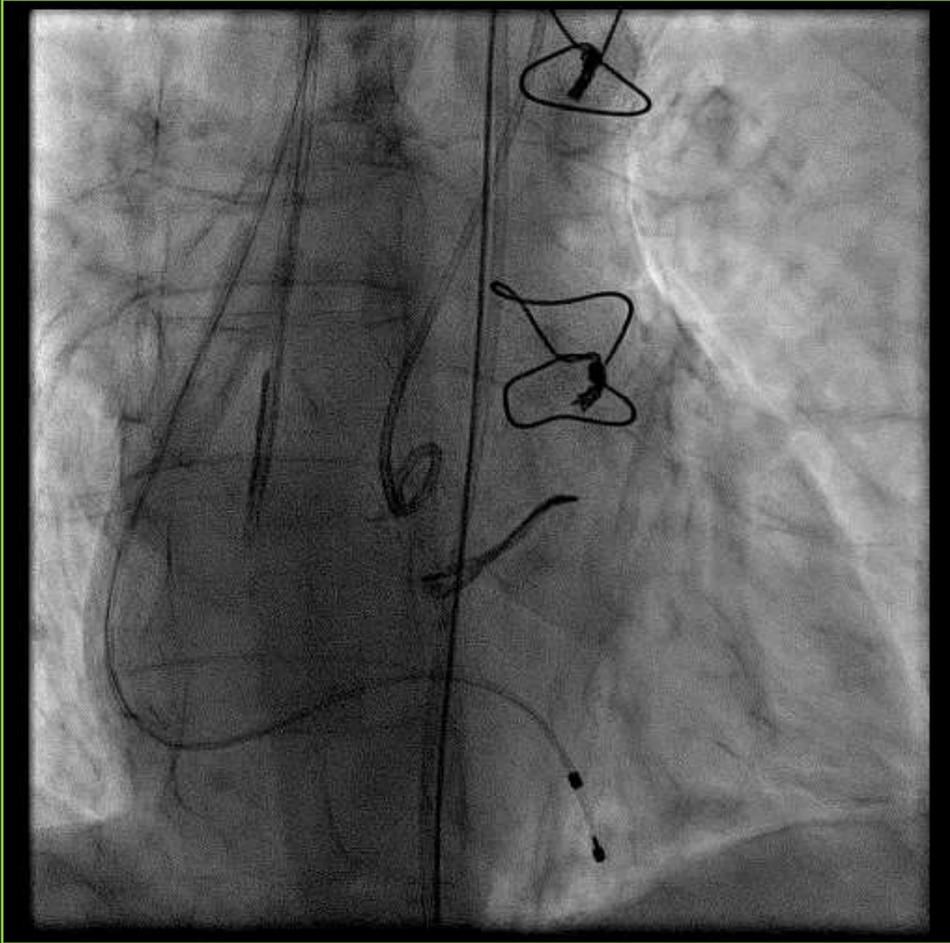
Guide catheter access and stenting of the occluded vessel

When the implanted valve is a self expandable one: gooseneck valve retrieval to the ascending aorta

If everything not successful: ECMO and CABG

# Valve in valve procedure for symptomatic AS due to degeneration of previous surgical valve.

89 year-old, female



SAVR: **Mitroflow 21** (2008)

## Comorbidities:

CKD (stage IV)

May. 2017

Patient became symptomatic (NIHA II).

## TTE

Pressure gradient:

max **85mmHg** /mean **48mmHg**

Vmax **4.6m/s**, EF: **63%**

## CT

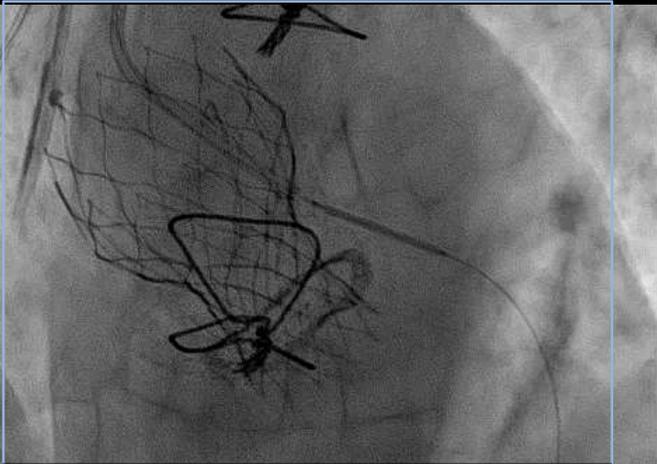
No evidence of thrombus

## Risk score

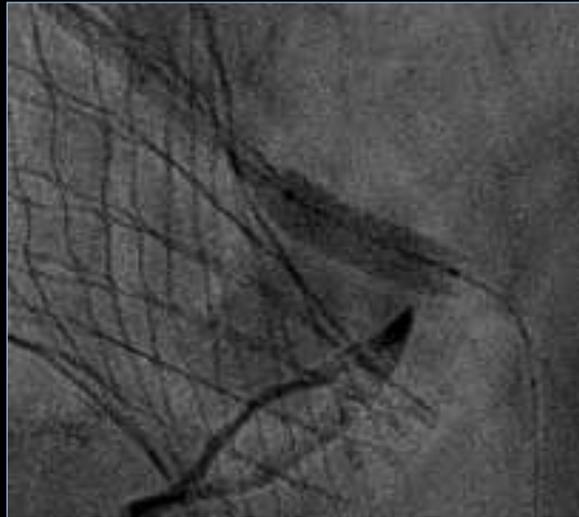
Logistic EuroSCORE: 14%

STS mortality: 4.93

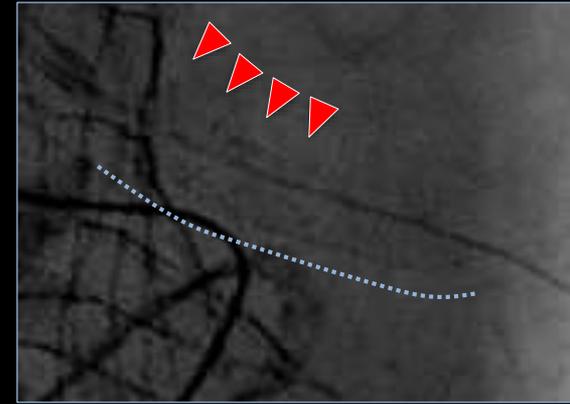
# Stent implantation after valve implantation (EvolutR 23mm)



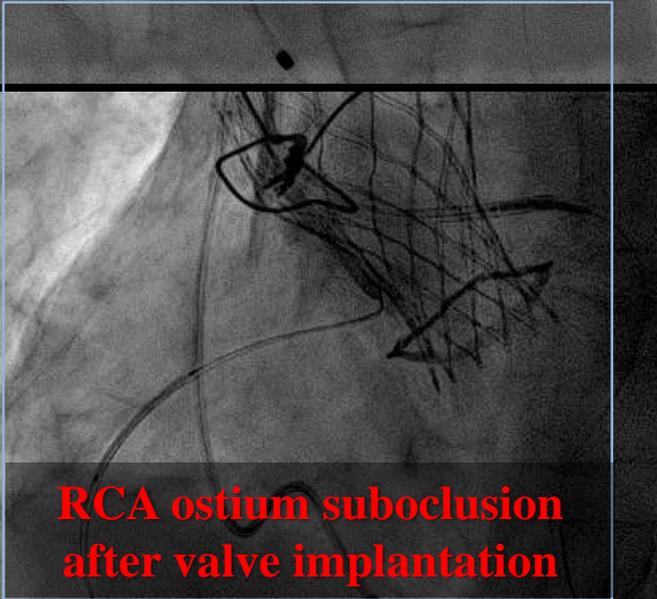
**LMT ostium narrowing  
after valve implantation**



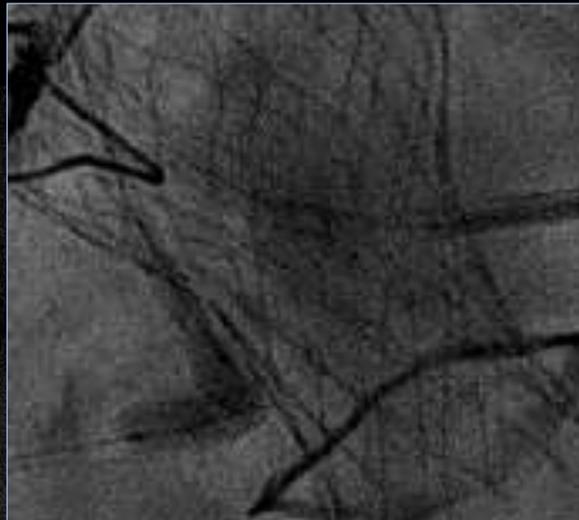
**Onyx 4.0/18mm**



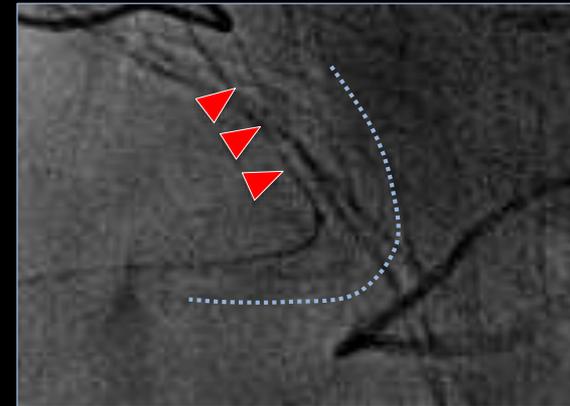
**LMT stenting with  
extensive protrusion to aorta.**



**RCA ostium subocclusion  
after valve implantation**



**Onyx 3.5/18mm**

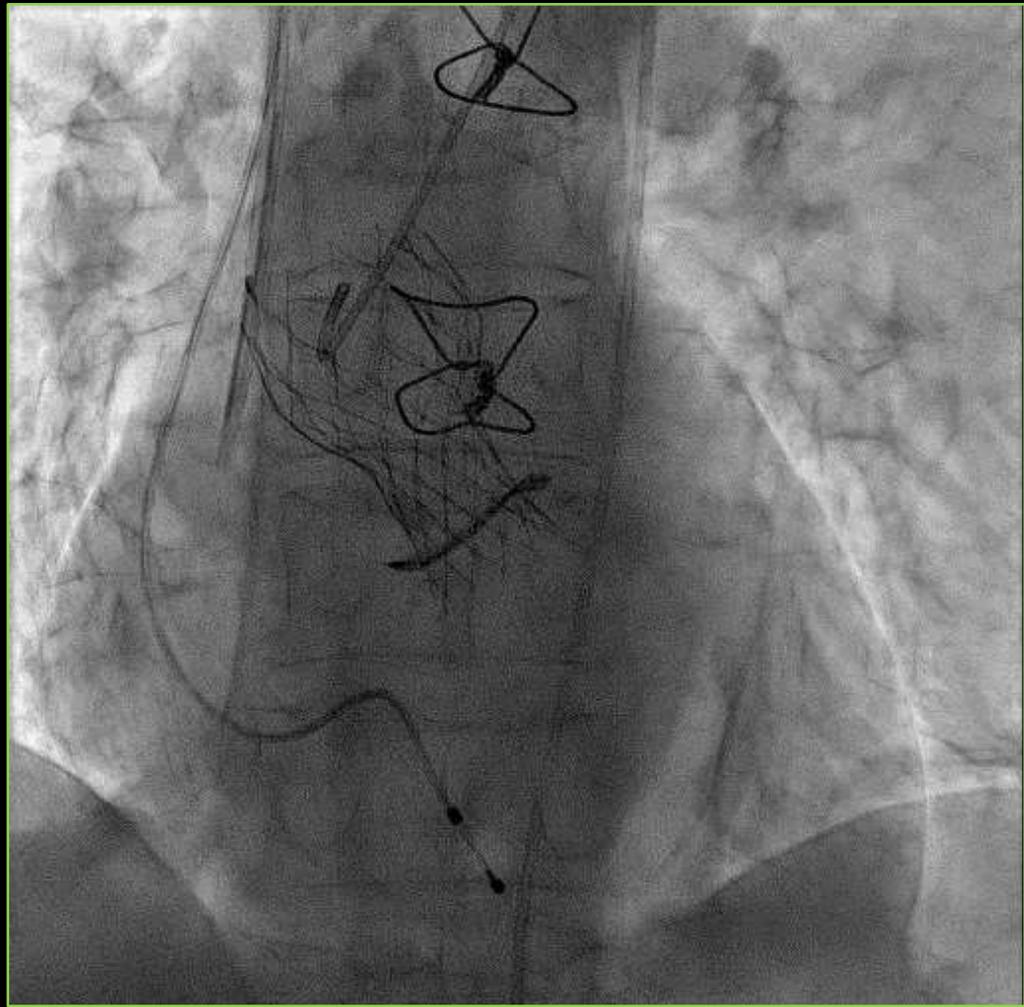


**RCA ostium stenting with  
extensive protrusion to aorta.**

# After stent implantation for both LMT and RCA ostial



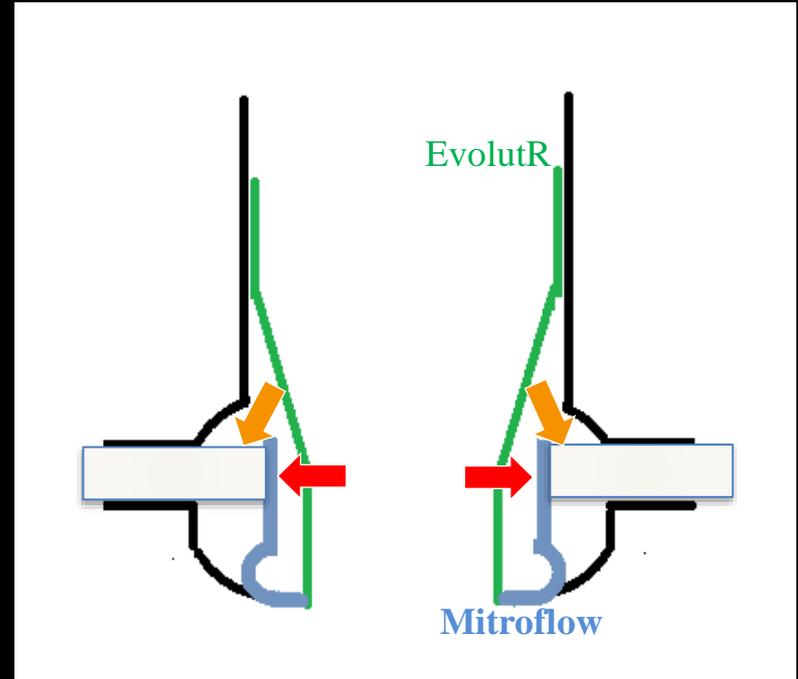
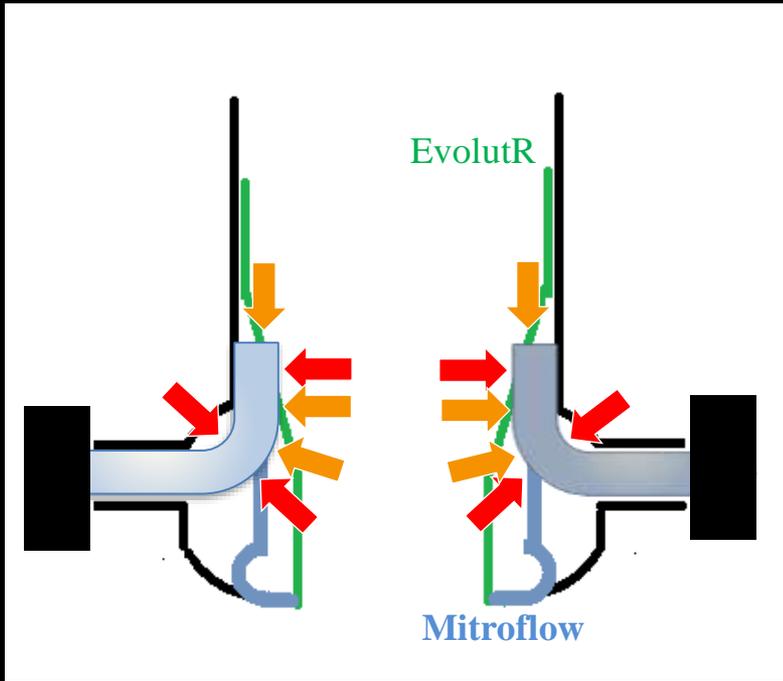
Improved coronary flow  
after stent implantation.



No residual AR and patent coronary artery.

## Extensive protrusion

## Slight protrusion



High

Mechanical stress

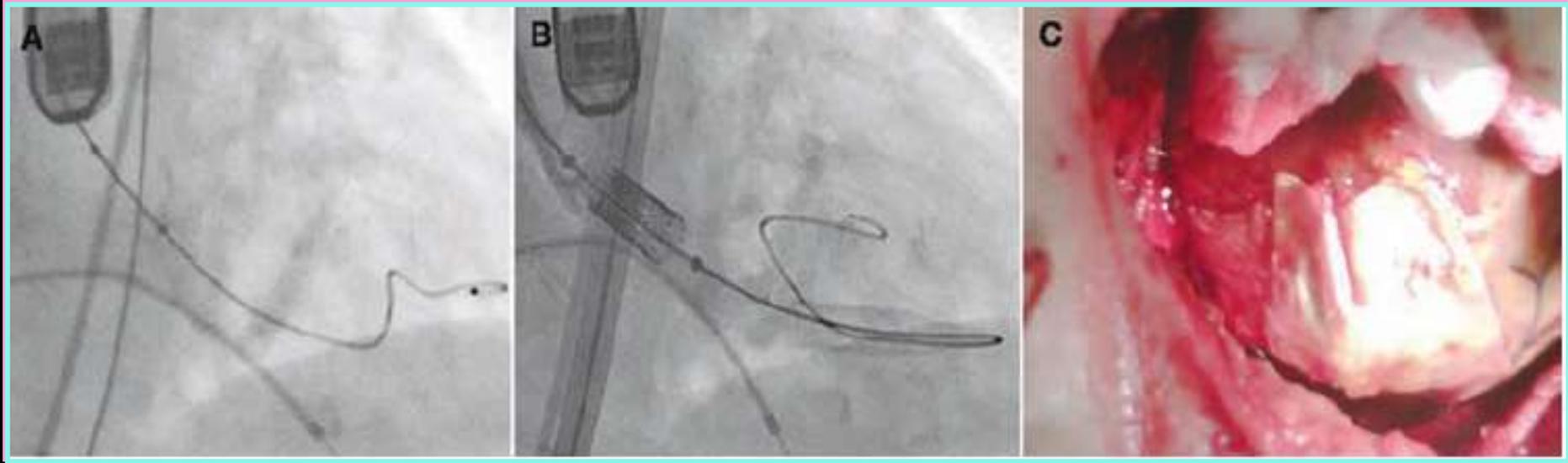
Low

Large

Area for inflow

Small

## **Perforation of the left ventricle**



***(A) An extra-stiff wire is positioned into the left ventricle but is not well elongated***

***(B) As the nosecone is advanced, the relationship between the wire and nose-cone suggest perforation of the ventricle***

***(C) Beating-heart left ventricular patch repair performed under femoro-femoral support***

# LV perforation

New TAVI dedicated wires such as:  
Safari small/medium (Boston Scientific)  
Confida (Medtronic) may prevent this complication

Even if LV perforation is rare always be ready to handle

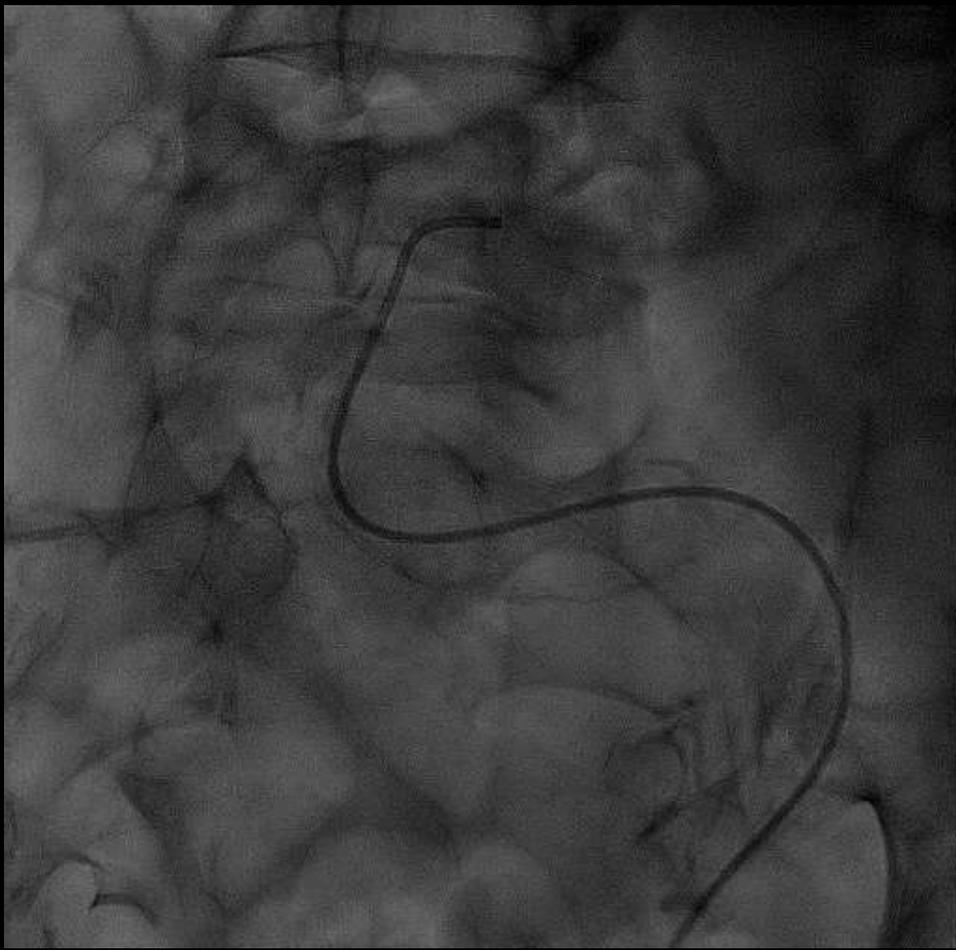
Surgical action in the cath. lab (preferred) or transfer the patient in the OR

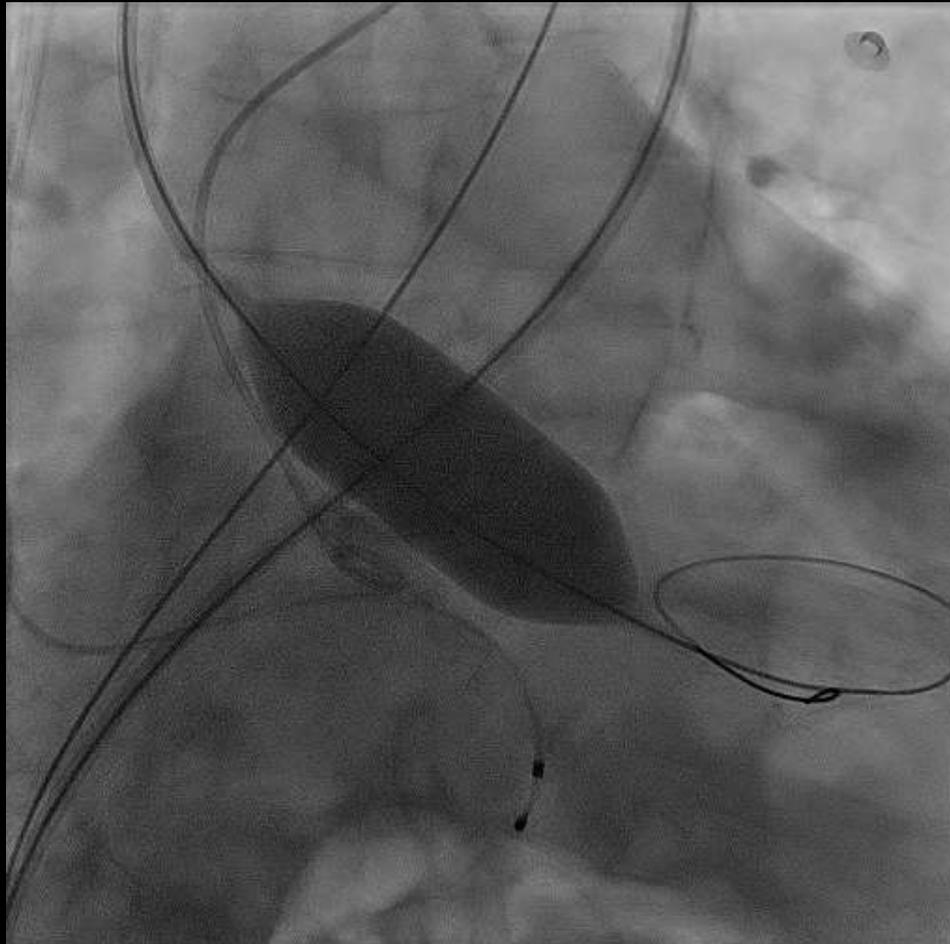
ECMO as a first line should not be considered

# Acute ascending aorta rupture during TAVI



Deviation of the descending thoracic aorta due to large diaphragmatic hernia

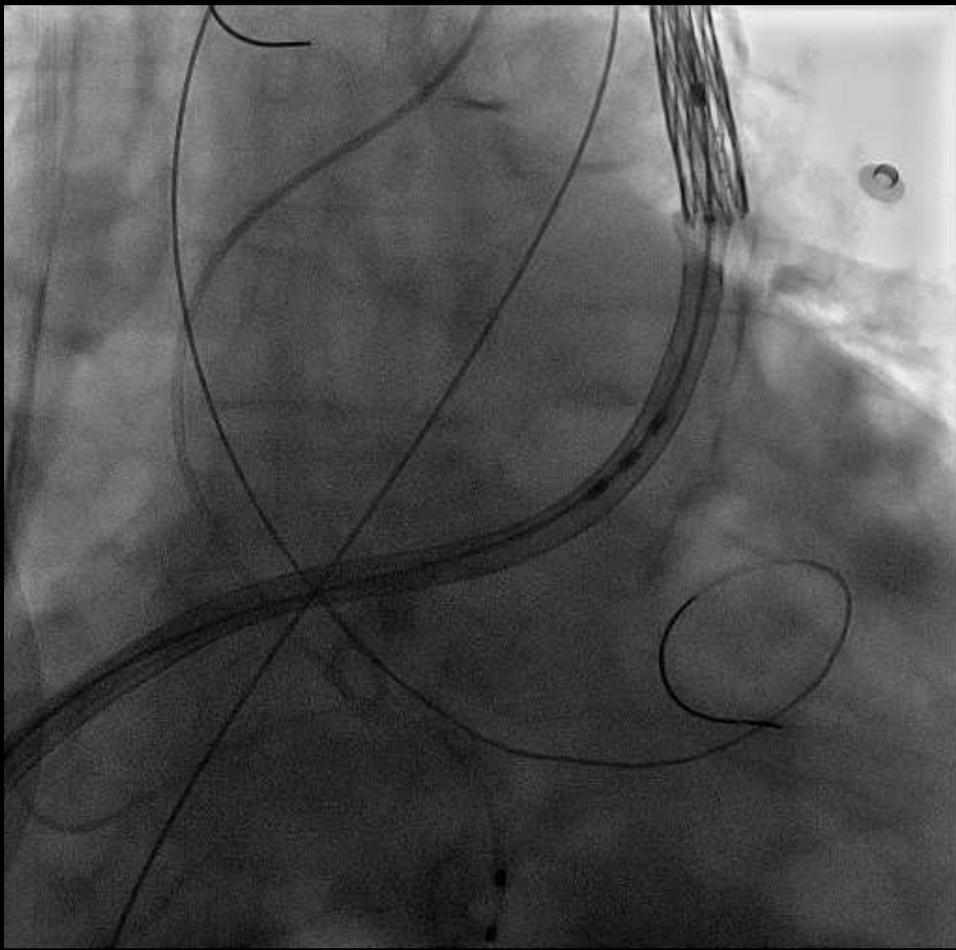


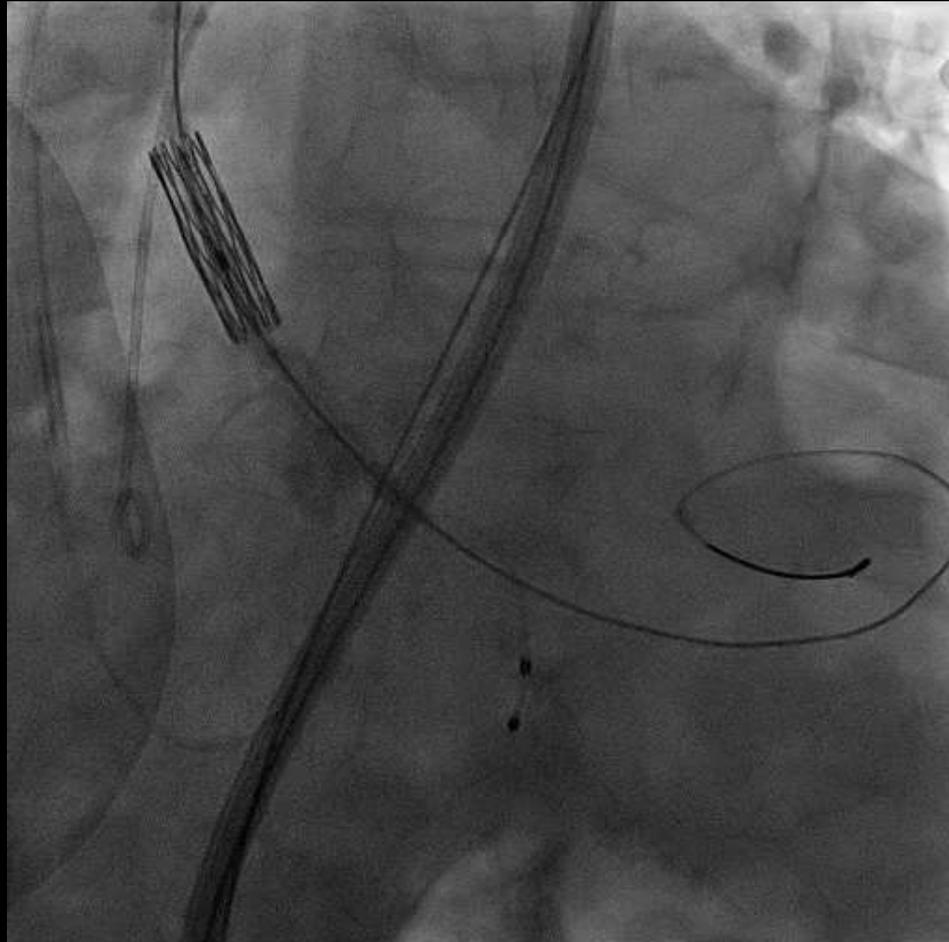


Predilatation with 25 mm balloon



Advancement of Edward  
Sapien ; 29 mm valve





Sudden hemodynamic collapse during attempt  
to cross the valve

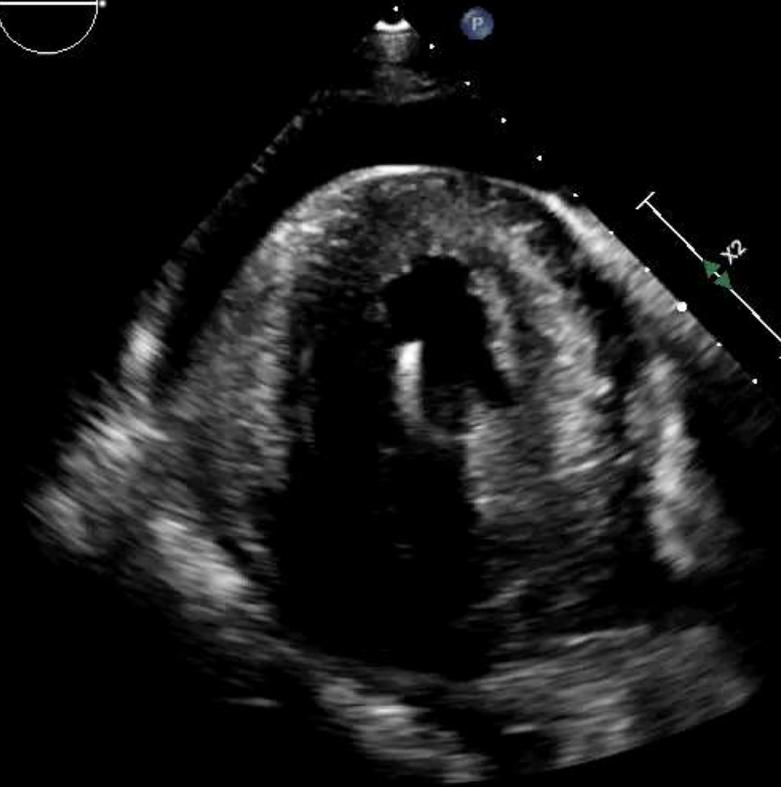
Eco adulti  
X5-1  
50Hz  
15cm



TISO.4 MI 1.3

M3

2D  
61%  
C 50  
P Basso  
AGen



\*\*\* bpm

Cardiac tamponade -> immediate  
pericardiocentesis and fluid resuscitation

A minor complication may become major

**Most of the times is the second complication that puts you into big troubles**