My Tips and Tricks for Aortic Intervention With Hemodynamic Instability

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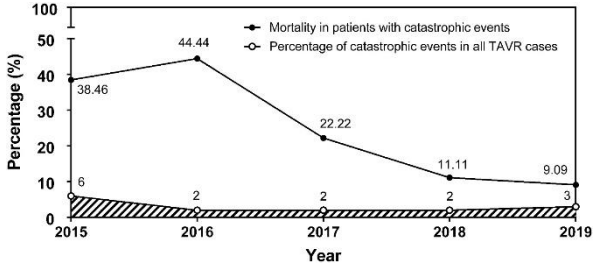
Within the prior 24 months, I have had a financial relationship with a company producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients:

Nature of Financial Relationship	Ineligible Company
Consultant Fees/Honoraria	Medtronic, Edwards LifeSciences, Abbott, Valve Medical, MicroTech LifeCord, SmartValves
Executive Role	Append Medical

All relevant financial relationships have been mitigated.
Faculty disclosure information can be found on the app

Incidence of hemodynamic collapse during TAVI: *2102 cases 2015-2019*

- 51 (2.5%) - catastrophic cardiac events
  - Cardiac perforation and tamponade (n=19, 37.3%)
  - Acute left ventricular failure (n=10, 19.6%)
  - Coronary artery obstruction (n=10, 19.6%)
  - Aortic root disruption (n=7, 13.7%)
  - Device embolization (n=5, 9.8%).



- Twenty-four patients (47.0%) required stabilization by either IABP or ECMO.
- In-hospital mortality rate increased by 11.7-fold for patients with catastrophic cardiac events compared to those without (25.5% vs 2.0%, p<0.001).
- Aortic root disruption - the highest mortality rate (42.8%).
- The incidence of catastrophic cardiac events remained stable over a 5-year period, but the associated mortality decreased from 38.5% in 2015 to 9.1% in 2019.

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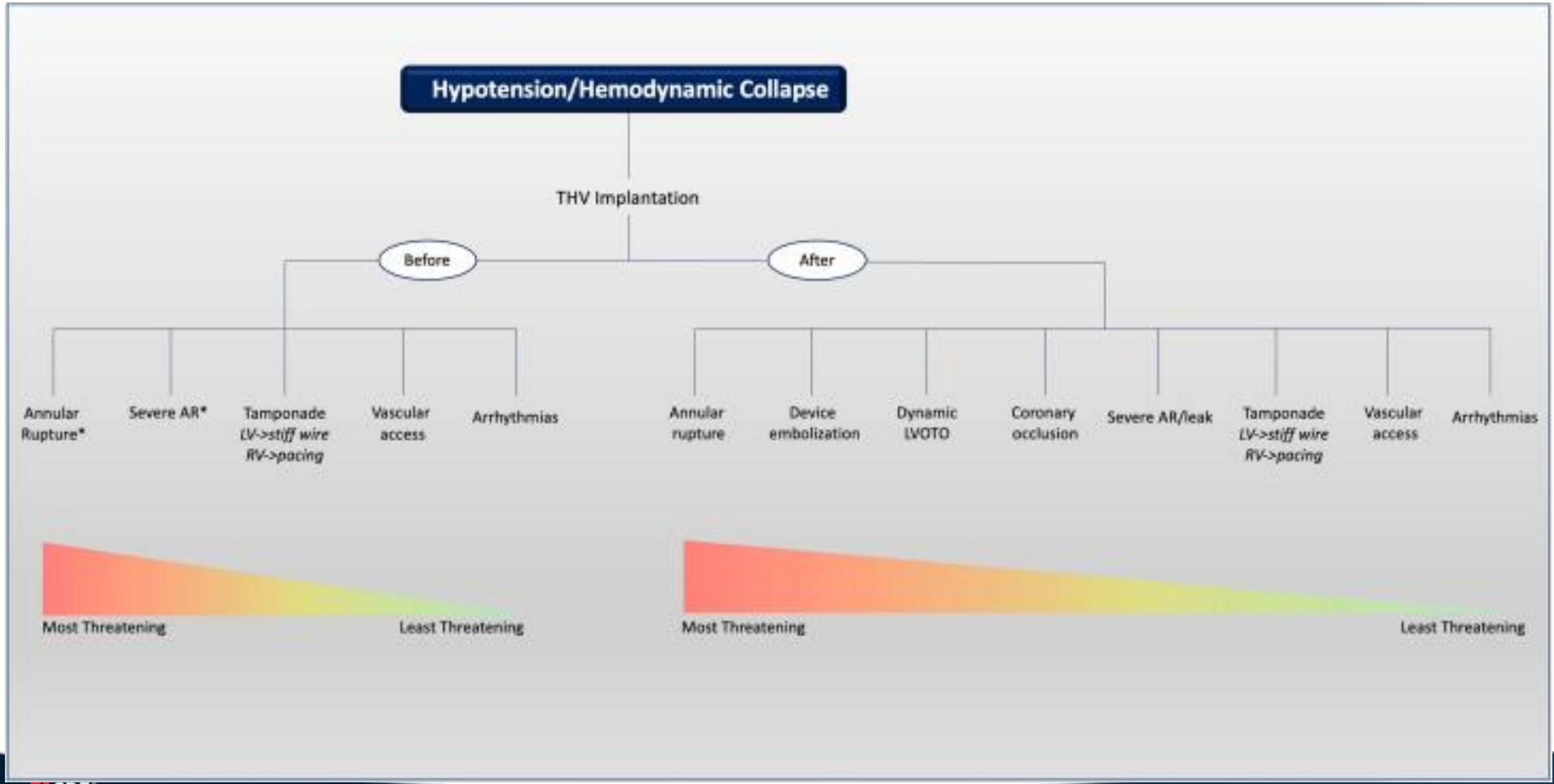
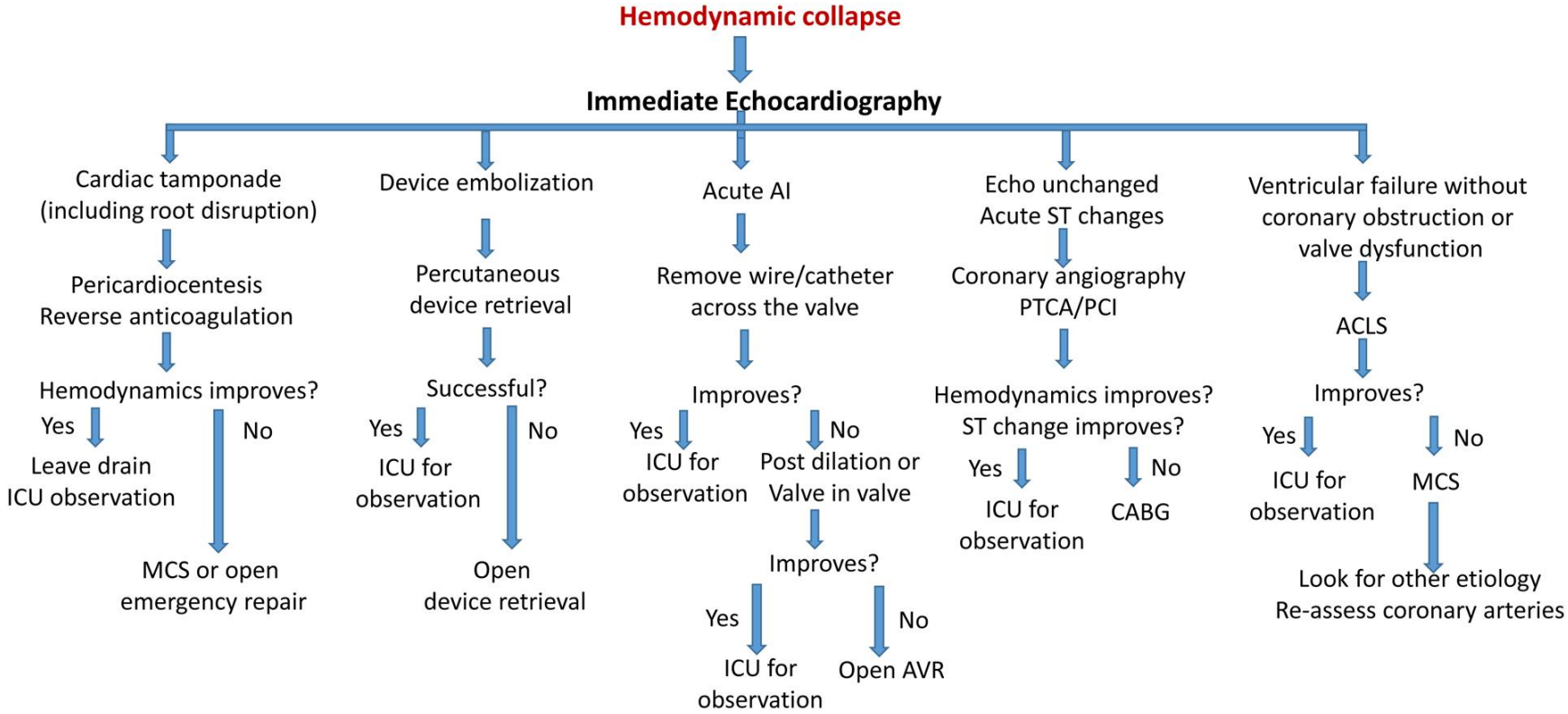
Hemodynamic collapse during TAVI - Causes

- Severe aortic insufficiency
- Aortic annular rupture
- Tamponade
- Perforation of aorta
- Perforation of membranous interventricular septum (VSD)
- Acute Mitral insufficiency (wire/device)
- Coronary artery occlusion
- LVOT dynamic obstruction
- Anesthesia induced
- Arrhythmia induced
- Access bleeding
- Anaphylaxis
- ...


Hypotension/Hemodynamic Collapse
THV Implantation
Before
After
Annular Rupture*
Severe AR*
Tamponade LV->stiff wire RV->pacing
Vascular access
Arrhythmias
Annular rupture
Device embolization
Dynamic LVOTO
Coronary occlusion
Severe AR/leak
Tamponade LV->stiff wire RV->pacing
Vascular access
Arrhythmias
Most Threatening
Least Threatening
Most Threatening
Least Threatening



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Anticipate

- LVOT obstruction post TAVR predicting factors
  - Women
  - Hypertrophic septum
  - Small ventricle
  - Hyperdynamic contractility on pre-TAVR echocardiographic assessment
  - An intraventricular gradient before TAVR was found in half of the cases.

Prevent

- Meticulous preparation and sizing
- Choose the right balloon and right THV
- Use pre-shaped wires, deploy via pigtail
- Consider alternative approach when needed
- Protect the coronaries (leaflet splitting / stent..)
- LVOT obstruction considerations (fluids, pressors..)

"If I had eight hours to chop down a tree, I'd spend the first six of them sharpening my axe." ***Abraham Lincoln***

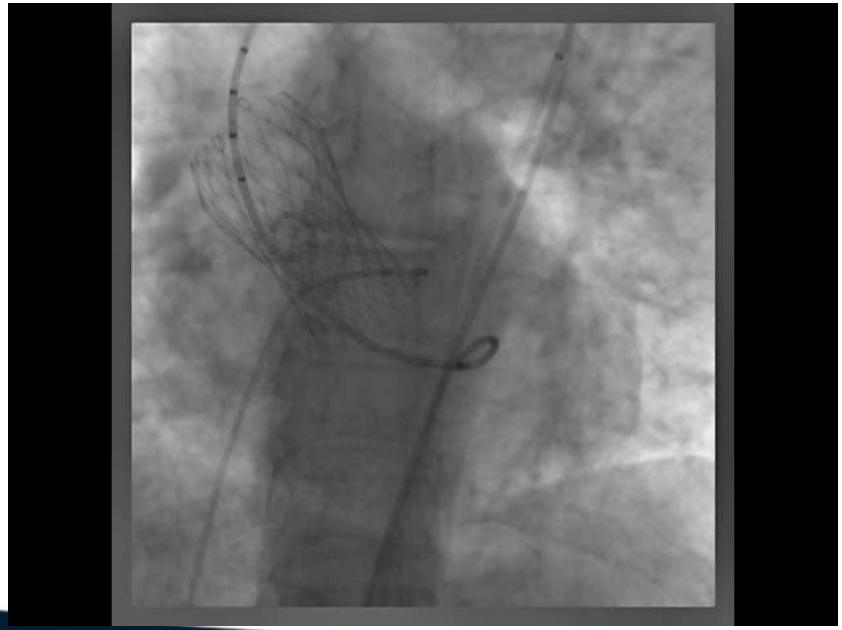
Be ready with an immediate solution

- Additional imaging:
  - TTE / TEE
- Teammates:
  - Anesthesia
  - Cardiac surgery
  - Vascular surgery
- Hemodynamic support:
  - ECMO
  - IABP

- On your shelf:
  - Spare valves..
  - Snares
  - Pericardiocentesis kit
  - Peripheral equipment:
    - Balloons, crossover sheath…
    - Aortic occlusive balloons
  - Covered stents..
  - Blood

Know well the patient anatomy!! Sinuses width.. STJ.. Femoral diameter….

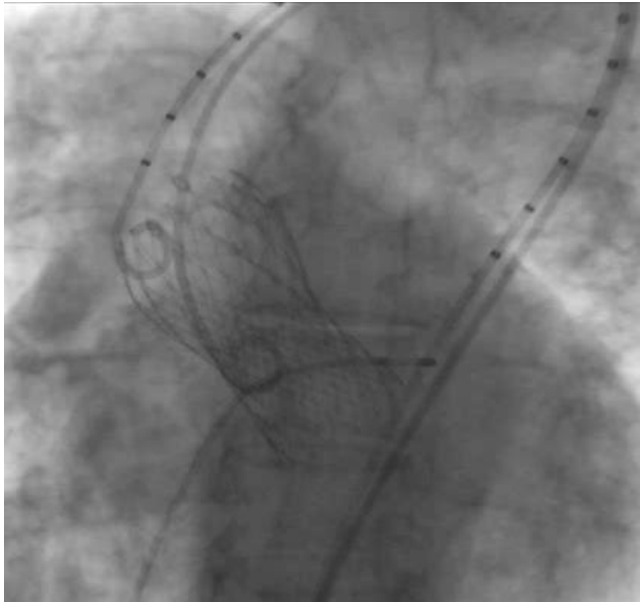
Hemodynamic collapse immediately after valve deployment



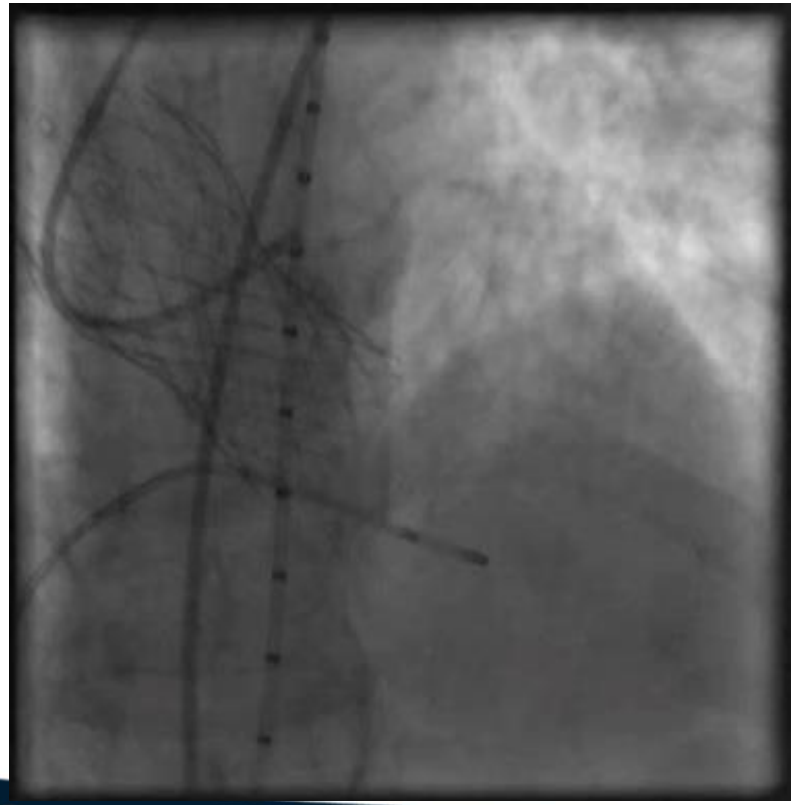
- 84 y-o
- TF TAVI under mild sedation
- CoreValve 26mm

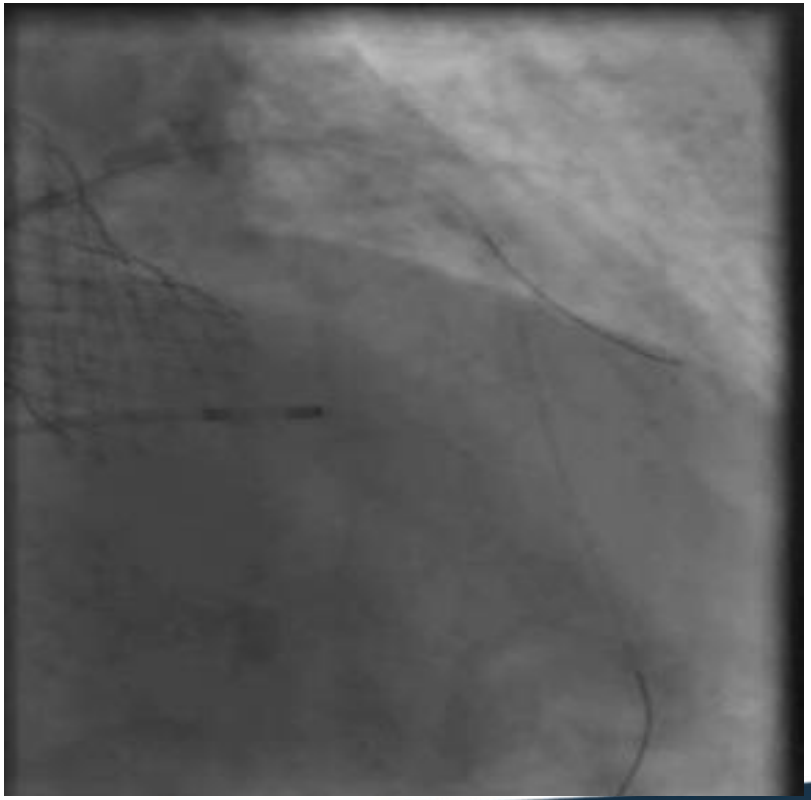
TTE

- No pericardial effusion
- Mild AR
- No signs of annular rupture
- No VSD
- No LVOT obstruction
- **Anterior wall akinesia**



Selective injection, stenting, recovery





Hemodynamic collapse during TAVI T&T

- Anticipate complications, prevent & be ready with solutions
- Stay calm & lead a team
- Stabilize the patient (hemodynamic support, pressors, pacing..)
- Work according to the differential diagnosis and treat promptly