TAVR: When Things go Wrong

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Disclosures

• Academic Echo Core Lab
  – Abbott / St Jude Medical
  – Edwards
  – Medtronic
  – Livanova / Caisson
  – DirectFlow
  – Boston Scientific / Symetis
  – JenaValve
  – Biotronik
  – NeoVasc

www.CardiovascularCoreLab.com
TAVR Compares Favorably to SAVR

Adams et al. NEJM 2014; 370:1790
Leon M et al. NEJM 2016;374:1609

Inoperable
Extreme Risk
High Risk
Intermediate risk
Low Risk?
Bicuspid AV
Valve in Valve

TAVR - The bar keeps going lower
Despite all the fantastic results...

Things can go Wrong

TAVR complication rates – US 2012

TAVR complication rates – TVT ACC/STS Registry

Mod or severe AR = 8.5%
Worsening MR 11%


TAVR complication rates – meta-analysis 2012

What can Go Wrong?

PVL is most common

PVL significance – PARTNER trial

PVL significance – Newer devices
PARTNER 2, intermediate risk

Leon M et al. NEJM 2016;374:1609

PVL severity declining overtime
(improved practice and devices)

PARTNER Registry
2011-12

Beohar N et al. JACC Intv 2016;9:355
## ASE/EAE Guidelines – VARC 2

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PVL evaluation

• Color Doppler: SAX
  – PVL lower portion of the stent, % of circumf
  – Central: at the leaflet coaptation point
• Color: LAX
  – Jet width/ratio
  – Vena Contracta
• Regurg volume:
  – LVOT\textsubscript{sv} – RVOT\textsubscript{sv}
• Flow Reversal in descending aorta

PVL: look in the LVOT/stent transition
Regurgitant volume Quantification

\[ \text{AI R Vol} = \text{LVOT SV} - \text{RVOT SV} \]


3D EROA and RV

Aortic flow reversal- Desc Aorta

But some cases of AR are not that common
TAVR migration / Dislodgement
Solution: Patient had surgery

THV migrated to an oblique position, partially in the Ao root

Bioprosthetic AVR 6 years ago

AVR dysfunction with degeneration

Valve in Valve Implant planned
ViV deployment

Valve Embolization
Solution: Second Valve Deployed
Severe AS, TAVR implanted

Acute cardiogenic shock: BP 170/70 down to 92/32

**Acute Severe Transvalvular Aortic Regurgitation**
Defective/torn Cusp, failure to close

Solution: Valve in Valve
But the device got dislodged from its cath...

Solution: implant in Desc Aorta
But we are not done yet...

Still have Severe AI

ViV (3rd Valve) implanted
After valve in valve deployment
Trace aortic regurgitation

No prosthetic stenosis
Dimensionless Index=0.55

• V1=1.1m/s
• V2=2m/s

His blood pressure =126/52mmHg
What can Go Wrong?

Pericardial Effusion

- TVP perforation
- Annular Disruption

Pre Post
Annular disruption

Annular Calcification – Extension and location
Non-Contrast CT
Annular Dimensions and device size selection
Non-Contrast MRI (alternative to contrast CT/3D TEE)

- Hypotensive & Hypoxic
- Immediately post TAVR
- Required Intubation
- Emergent TEE w pleural effusion
PeriAortic Hematoma distal to L Subclavian Aortic Transection

TEVAR of Arch / Descending Aorta
What can Go Wrong?

Coronary Ischemia

Baseline  Post-deployment

Courtesy of Dr S Goldstein
Prosthesis too “high” (ie too aortic)
Prosthesis too “high” (ie too aortic)

Note prosthesis at level of L-coronary
Distance to L-Main

Distance from Annulus to L-coronary

1.5 cm
Coronary Height

Measure from annulus (projected stent position)

Importance of Retrievable Devices
What can Go Wrong?

Sources of embolism!
Aorta - Atheroma

Courtesy of Dr S Goldstein
Thrombi on Catheters/Wires
Thrombus resolved quickly with Heparin bolus
Other things can go wrong

Summary

• Despite overwhelming success, TAVR procedures still come with complications:
  – Shock, Stroke

• Look for:
  – Pericardial Effusion – Annular disruption or LV laceration
  – Coronary obstruction or embolization
  – Acute Mitral Regurgitation
  – Aortic Regurgitation / PVL
  – Valve embolization
  – Cath Thrombosis
  – Severe Atherosclerosis
Summary

- Complications are rare but best evaluated with TEE
- Escalate to TEE whenever complications are suspected