Managing complications of TAVR

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Nothing to disclose
In very high risk patients we can expect and hopefully successfully treat complications

In medium and low risk patients we should not expect complications
Hard End Points
Vascular complications

Annular rupture and intracardial holes

Coronary occlusion

LV perforation

Strokes etc.
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 ileo-femoral vessel rupture, abdominal aorta balloon occlusion can control the complication and allow strategic solutions.
Right Femoral Approach

Preprocedural CT report tortuosity of iliac arteries, more calcified left side, diameter > 8mm, no stenosis

Rupture of left common iliac artery during attempts to cross-over from left to right femoral artery to prepare and protect right approach (18 French)
Patient went immediately in shock requiring cardiac massage, liquids, adrenaline, intubation..

Immediate positioning of aortic occlusion balloon
CrossOver (right to left): terumo wire and Simmons catheter
Lazoo to capture terumo and left exteriorization of Simmons
Rupture of a small vessel

Difficult to be localized by angio, CT is needed
Annular rupture

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

In some conditions it may not be possible to obtain accurate and reliable measurements.

Valves exposed to this risk:

- Balloon expandable valves
- Valves requiring postdilatation
- Valves requiring predilatation
- Active expanding valves
Rupture of LV outflow-tract

Aortic annulus/LV outflow tract rupture with sudden hemodynamic collapse
multiple 0.035” Vortex (BSC) coils deployed in pericardium with cessation of bleeding. Drained and partially re-infused 1000cc
Severe tortuosity
Predilatation with 25 mm balloon
Difficulty to cross the native valve
Sudden hemodynamic collapse during crossing of the valve
Cardiac tamponade -> immediate pericardiocentesis and fluid resuscitation
Free wall aortic rupture
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.
Other 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 >10% predicted annular area oversizing

Avoid >5% 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
- Bicuspid with dilatation of the ascending aorta
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
Coronary occlusion occurs at the time of postdilatation. The lower the need for postdilatation the lower the risk.

Exception is when implanting a Balloon Expandable valve. In this condition valve implantation is practically synonymous of post-dilatation.

Any valve which may require predilatation or postdilatation is exposed to this risk.
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
Prevention

Extensive protrusion and TWO stents on each side

Slight protrusion

Follow-up still unclear: we need a better approach. BASILICA a possible solution but complex.
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
Strokes after TAVR
PARTNER A: High Risk for Surgery

All neurological events at 30 days and 1 year
PARTNER Cohort A Trial (ITT)

Smith CR, ACC 2011, NEJM in press
Major Stroke: CoreValve study

Atrial fibrillation an important problem

No. at Risk

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**All Stroke**

- Surgery: 2.4% at 0.6 months, 3.1% at 12 months
- TAVR: 1.2% at 12 months

**HR [95% CI]** = 0.38 [0.15, 1.00]

**P** = 0.04

**Number at risk:**
- Surgery: 454, 435, 427, 423, 421, 417
- TAVR: 496, 491, 491, 489, 487, 484

*The Partner 3 Trial*
Protection devices

They need to be effective and

User Friendly
Paravalvular leaks
Lotus

Sapien 3

Acurate

Evolute R and PRO
Paravalvular Leak
Moderate / Severe at 30 Days

Valves designed to mitigate PVL have brought mod / severe rates to 5% or less

Lessons

1. Many complications may be prevented by patient selection and procedural planning
   - Correct evaluation of peripheral vessels: diameters, calcification, extension of PAD

You cannot afford to create a second complication while solving the first one

2. Always have a plan on how you would manage complication should it occur
   - The cross-over technique saves lives
   - Experience in peripheral intervention
   - Correct equipment easily accessible in Cath Lab: covered stents, aortic occlusion balloon

3. Complications in TAVI patients are unforgiving. Thus always try to prevent them and be ready to deal with them