Assessment and Preparation of Patients with TAVI

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My patient has aortic stenosis and needs non-cardiac surgery

Should (s)he get a TAVI?

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Conflicts of Interest

• None
Objectives

At the conclusion of the lecture the participant will be able:

• To identify, from consensus guidelines, the recommendations for patient with severe aortic stenosis coming for non-cardiac surgery

• To extrapolate which patients with severe aortic stenosis might benefit from TAVI before non-cardiac surgery

• To discuss the pertinent steps of the pre-operative assessment for TAVI patients
Case

- A 81 year male is scheduled for a shoulder arthroscopy. His past medical history includes HTN, GERD. His exercise tolerance is excellent. A murmur is heard and the surgeon ordered a pre-op TTE. This reveals severe aortic stenosis (AVA 0.95cm$^2$, mean pressure gradient 45 mmHg) with normal bi-ventricular function.
Case

• You see the patient in the pre-operative clinic. What do you recommend?

  • A) proceed with case
  • B) refer for AVR
  • C) refer for TAVI
  • D) refer to cardiology
Case

• How does your decision change if:

  • He is symptomatic?
  • He is 50 years?
  • He is coming for a low anterior resection?
  • He is coming for an open AAA repair?
Aortic Stenosis - Definition

• Most common valvular heart disease
• Poor prognosis after onset of symptoms

• Echo definition of severe AS:
  • $\text{AVA} < 1.0 \text{ cm}^2$
  • Maximum jet velocity $> 4 \text{ m/s}$
  • Mean pressure gradient $> 40 \text{ mmHg}$
AS Pathophysiology

- Symptoms
  - Dyspnea, syncope, angina, CHF
Aortic Stenosis - When to intervene?

• Key questions:
  • How severe?
  • Symptoms?
  • Patient’s life expectancy and QOL?
  • Benefits of intervention outweigh risks?
  • Patient preference?
AVR Indications

ACC/AHA 2014 (2017 update)

• Symptomatic patients with severe AS – class I
• Decreased LV function (EF<50%) – class I

• Asymptomatic patient
  • with very severe AS (Vmax > 5 m/s) – class IIa
  • Rapid progression and low surgical risk – class IIb
TAVI – Transcather Aortic Valve Implantation
TAVR in American
TAVI
Key Studies

  • TAVI better than medical therapy in inoperable patient
  • Death rate at 1 year (30.7% vs 50.7%)

  • TAVI vs SAVR in high risk patients
  • TAVI had similar all-cause mortality to SAVR at 1 yr (24.2% vs. 26.8%)

  • TAVI vs SAVR in intermediate risk patients
  • TAVI non-inferior to SAVR with all-cause mortality at 2 yr (12.6% vs 14%)
TAVI Complications

• 30 Day
  • All cause mortality – 2.2%
  • CV mortality – 1.1%
  • Stroke – 1.4%
  • Major vascular complication – 4.1%
  • Pacemaker – 12%

• 1 year
  • All cause mortality – 12.6%
  • CV mortality – 8%
  • Stroke 3.1%
  • Pacemaker – 13.2%
TAVI or SAVR

- Indication for TAVI vs SAVR:
  - Evaluation by Heart Team – class I
  - SAVR for patients at low surgical risk – class I
  - TAVI for patients at prohibitive surgical risk – class I
  - TAVI or SAVR for patients at high surgical risk – class I
  - TAVI an option for patients at intermediate surgical risk – class IIa
TAVI or SAVR

• Other factors to consider
  • Age
  • Previous cardiac surgery
  • Need for additional cardiac surgery
  • Anatomic
Back to the case

• A 81 yr male is scheduled for a shoulder arthroscopy. His past medical history includes HTN, GERD. His functional capacity is excellent. A murmur is heard and the surgeon ordered a pre-op TTE was ordered. This reveals severe aortic stenosis with normal ventricular function.

• Does the availability of TAVI change anything?
AS and Non-cardiac surgery

• For over 30 years, severe AS has been recognized as risk factor for perioperative M&M

• In general, increased complications with:
  • Increased severity of AS
  • Increased complexity of surgery
  • Increased symptoms

• But... ↓ cardiac risk in recent times due to:
  • Increased awareness/vigilance of hemodynamic concerns
  • Newer surgical/ anesthetic techniques
Aortic Stenosis and Non-cardiac Surgery Guidelines

• Guideline emphasize general measures – careful selection of mode of anesthesia, use of invasive monitors, avoiding volume changes, ICU post-op etc

• Guidelines base on a heterogeneous group of studies:
  • Different surgical scenarios
  • Different risk settings
  • Different severity of AS
  • Both in elective and emergent surgery
  • Symptomatic or asymptomatic patient groups
Aortic Stenosis and Non-cardiac Surgery
ACC/AHA Guidelines

• Severe symptomatic AS → AVR
  • If high-risk for AVR → proceed with NCS, balloon valvuloplasty, or TAVI

• Asymptomatic AS
  • Elevated-risk elective noncardiac surgery with appropriate intraoperative and postoperative hemodynamic monitoring is reasonable to perform in patients with asymptomatic severe aortic stenosis – IIa
Management of severe AS and need for elective non-cardiac surgery

- **Symptoms**
  - No
  - Risk of non-cardiac surgery
    - Low-moderate
      - Non-cardiac surgery
  - Yes
    - Patient risk for AVR
      - Low
        - AV before non-cardiac surgery
      - High
        - AVR before non-cardiac surgery

- **Risk of non-cardiac surgery**
  - High
    - Patient risk for AVR
      - Low
        - AVR before non-cardiac surgery
      - High
        - AVR before non-cardiac surgery

- **Patient risk for AVR**
  - Low
    - Non-cardiac surgery under strict monitoring
  - High
    - AVR before non-cardiac surgery
AS and Non-cardiac Surgery – Newer Studies

  • 256 patient with severe AS (both symptomatic and non) vs 256 controls having intermediate to high risk surgery
  • No difference in 30-day mortality between AS and control
  • Presence of symptoms had trend toward higher 30 day mortality

• Major findings:
  • Perioperative mortality in AS patients lower than previously reported
  • Emergency surgery was the major determinant of mortality
    • mortality <5% in both severe AS patients and controls having non-emergent NCS
  • Presence of symptoms an important risk factor
    • Asymptomatic severe AS have same risk as controls
Figure 4  Event rates (%) in patients with asymptomatic severe aortic stenosis (AS) having intermediate-risk or high-risk non-cardiac surgery. (A) Shows the 30-day mortality and (B) the rate of myocardial infarction (data from Agarwal et al, Tashiro et al and Calleja et al).
When to worry about AS

- Symptoms
- Mean gradient >45-50mmHg
- LV dysfunction
- Associated significant MR
- Significant CAD
- > 18 mmHG increase in gradient with exercise

Samarendra and Mangione - JACC 2015, 65: 295-303
Severe AS patient requiring non-cardiac surgery

Symptoms

No

Non-cardiac surgery with extra monitoring

Yes

Patient risk for SAVR

Low

AVR before non-cardiac surgery

High

Non-cardiac surgery under strict monitoring
Consider TAVI
What about TAVI in guidelines?

• TAVI recommended as an option before high-risk NCS in **high-risk symptomatic patients**
• TAVI not mentioned as option in asymptomatic patient

• Prior to NCS, TAVI has several advantages over SAVR:
  • Lower procedural mortality in high and intermediate risk patients
  • Less invasive
  • Quicker time to recovery which would facilitate earlier NCS
TAVI before NCS - Bottom Line

• In asymptomatic patients, severe AS does not seem to increase the perioperative risk of NCS

• In symptomatic patients, a TAVI before NCS will depend on patient’s age, risk status for valve intervention, risk of NCS, and patient preferences
TAVI before NCS - Bottom Line

• Risks of TAVI versus risk of NCS without treatment
  • Mortality at 30 days - 2-5% in patients with severe AS having NCS
  • Mortality TAVI at 30 day – 2-5%, plus significant other peri-procedural complications

• Total risk needs to be assessed
  • Risk of AV intervention
  • Risk of delay of non-cardiac surgery
  • Risk of the non-cardiac surgery itself

• This is where a multidisciplinary Heart Team is required
TAVI - Patient Selection

• Heart Valve Team

• Candidates:
  • Elderly high risk and intermediate patients with severe symptomatic AS
  • Previous CABG with at risk grafts
  • Bioprosthetic AV dysfunction

• Contraindications
  • Estimated life expectancy < 1 year
  • Futility – probability of symptoms improvement <25% at 2 year
  • Anatomic
TAVI - Assessment

• Risk Estimation – STS Score
  • Estimate 30-day mortality
    • Low - <4%, Intermediate - 4-8%, High - >8%

• Predictors of poor post-TAVI outcome
  • Severe chronic lung disease – home oxygen, 6 MWT < 150 m
  • CKD – dialysis dependency
  • Frailty - physical function, cognitive function and independence
  • CVS - EF <30%, pul HTN, Low CO states, severe MR, Afib
Assessment - One Take Home from the ACC

“Of critical importance in all patients, but in particular among those at risk for cardiovascular compromise, is a baseline evaluation of the airway.”
Assessment

• Suitability for MAC/sedation vs GA
  • Ability to lie flat
  • Cooperativity
  • Hearing
  • Airway

• Contraindications for TEE
  • Dysphagia – stricture or other structural disease
  • Mediastinal radiation

• Code status
Considerations for a Patient with Previous TAVI

• Anticoagulation
  • ASA lifelong, clopidogrel 3-6 months

• Permanent pacemaker
  • incidence 10-25%

• Post TAVI paravalvular leak
  • much more frequent after TAVI than SAVR
  • Any degree – 60%

• Leaflet thrombus formation
  • Incidence -10-15%

• Durability – good up to 5 years, then ???
Case

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Conclusion

• TAVI is an option for patients with severe AS who need non-cardiac surgery, but generally not indicated.
  • Heart Team assessment mandatory

• More studies and probably more indications may make pre-NCS TAVI more reasonable:
  • Low risk patients - PARTNER 3 Trial
  • Asymptomatic Patients – EARLY TAVR Trial

• More data about durability to come
Questions
Management of severe AS

Symptoms

No

LVEF < 50%

No

Physically active

No

Exercise Test

No

Presence of risk factors and low individual surgical risk

No

Re-evaluate in 6 months or when symptoms occur

Yes

SAVR

Yes

SAVR or TAVI

Yes

Absence of comorbidity or general condition that make benefit unlikely

No

Medical therapy

Yes

Low risk and no other characteristics that favour TAVI

Yes

Careful individual evaluation of technical suitability and risk-benefit ratio of intervention modes by the Heart Team

No

Medical therapy
TAVI before NCS

• TAVR is a reasonable alternative to surgical AVR for symptomatic patients with severe AS and an intermediate surgical risk, depending on patient-specific procedural risks, values, and preferences - ACA/AHA 2017 update

• The guidelines go on to note there are no data that demonstrate the efficacy or safety of TAVI for patients with aortic stenosis who are undergoing NCS.

• Many ASx AS patients still undergo surgery/TAVI with an inherent risk 2-4x higher than reported for the procedure done in the presence of AS