Aortic Stenosis: An Increasing Risk for Structural Heart Disease

Alicia White, MSN, RN, CEN

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Objectives

1. Explain the pathophysiological mechanisms and symptoms leading to structural heart disease
2. Describe the barriers and disparities to early identification and effective treatment for aortic stenosis
3. Discuss current trends, emerging therapies, and advancements in the diagnosis and treatment of aortic stenosis such as AVR, TAVR and balloon valvuloplasty

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Aortic Stenosis Background (Mentimeter)

- Aortic Valve stenosis is the most prevalent heart valve disease worldwide. True or False
- Symptomatic aortic stenosis has a 30% mortality within a few years of onset. True or False
- What is the most common cause of aortic stenosis for elderly patients?
  - Calcification, rheumatic heart disease, bicuspid aortic valve, endocarditis
- Which of the following is NOT a risk factor for aortic stenosis?
  - Hypertension, High cholesterol, Smoking, Type 1 diabetes
- What happens to the left ventricle in response to severe aortic stenosis?
  - Atrophy, Hypertrophy, Dilation, Thinning of the wall

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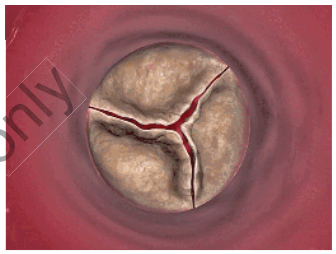
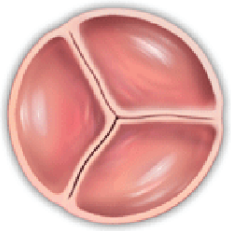
Aortic Stenosis Defined

- "Aortic stenosis is a narrowing of the aortic valve opening and can sometimes be referred to as a failing heart valve. Aortic stenosis restricts the blood flow from the left ventricle to the aorta may also affect the pressure in the left atrium." (AHA, 2024)





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Risk Factors

Non-Modifiable

- Male
- Age > 65
- Bicupsid aortic valve
- Rheumatic heart disease hx

Modifiable

- High blood pressure
- High cholesterol
- Coronary artery disease
- Diabetes type 2, metabolic syndromes, CKD, obesity
- Lifestyle choices (smoking, diet, exercise)

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Aortic Stenosis Causes

- Calcification
  - Hyperlipidemia, metabolic disorders, renal disease, DM, aging
- Rheumatic Heart Disease
  - Rheumatic fever after strep, kids in underdeveloped countries
- Bicuspid Aortic Valve
  - Most common birth defect
- Endocarditis
  - Infection that involves the leaflets of the valves (prosthetic or native) along with the endocardial surface

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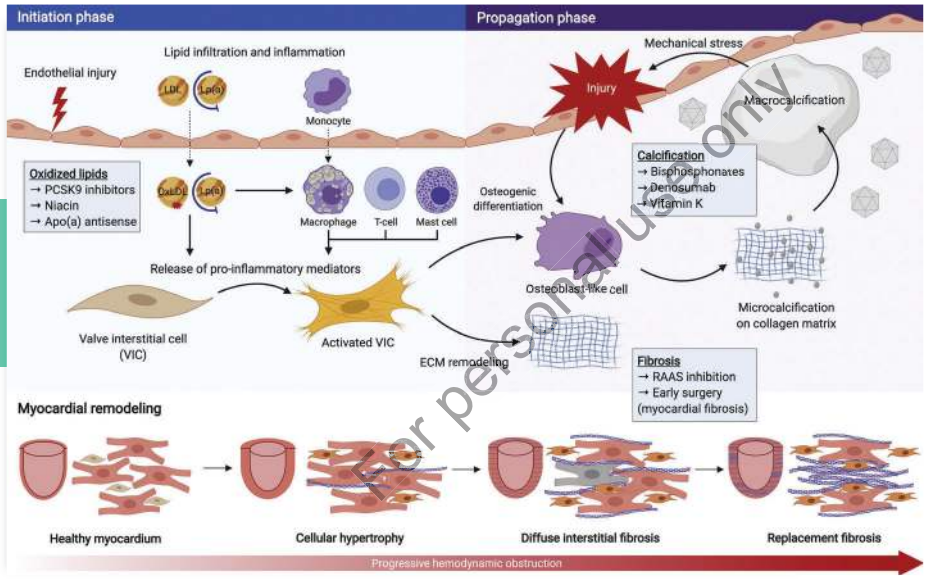
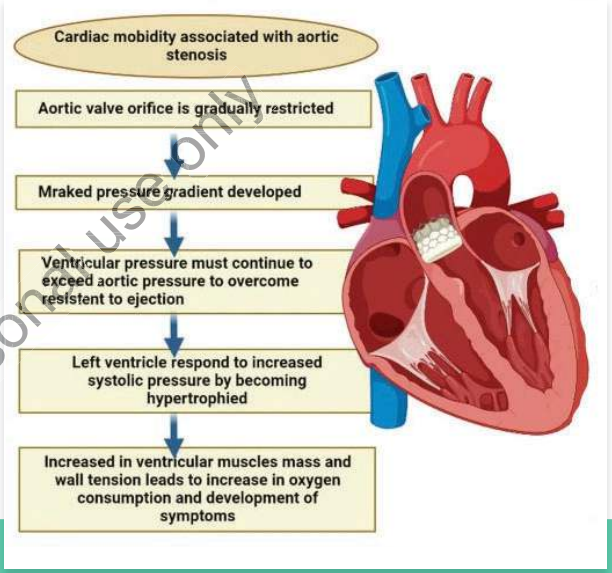


Pathophysiology of Aortic Stenosis: Cellular

Pathophysiology of Aortic Stenosis: Function

Progressive aortic stenosis leads to LV obstruction and failure

- Increased LV ejection time
- Decreased aortic pressure
- Increased LVEDP
- Increased myocardial 02 consumption
- Increased LV mass = hypertrophy



Aortic Stenosis Presentation

- Aortic stenosis symptoms typically appear in the early stages of the disease. True or False
- Which triad of symptoms is classically associated with severe aortic stenosis?
  - Chest pain, shortness of breath, syncope. Palpitations, fatigue, cyanosis. Cough, hemoptysis, peripheral edema. Fever, joint pain, weight loss
- What is the hallmark finding on auscultation in a patient with severe aortic stenosis
  - Mid-diastolic rumble, Continuous murmur, Systolic ejection murmur with crescendo-decrescendo pattern,
- Which imaging modality is the gold standard for diagnosing aortic stenosis?
  - Chest X-ray, Echocardiography, CT angiography, MRI

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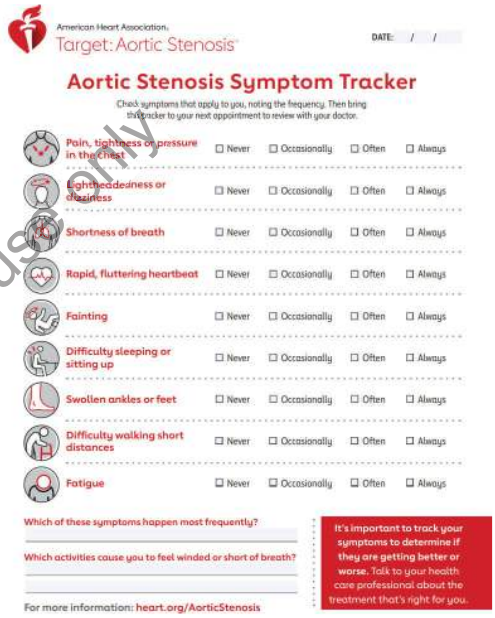
Symptoms

- Chest Pain
  - Occurs with increased 02 needs, reduced delivery to vessels,
- Syncope
  - Cerebral perfusion decreased, inadequate cardiac output
- SOB
  - Decreased exercise tolerance, exertional dyspnea, fatigue



American Heart Association.
Target: Aortic Stenosis

DATE: / /

Aortic Stenosis Symptom Tracker

Check symptoms that apply to you, noting the frequency. Then bring this tracker to your next appointment to review with your doctor.

Pain, tightness or pressure in the chest	☐ Never	☐ Occasionally	☐ Often	☐ Always
Lightheadedness or dizziness	☐ Never	☐ Occasionally	☐ Often	☐ Always
Shortness of breath	☐ Never	☐ Occasionally	☐ Often	☐ Always
Rapid, fluttering heartbeat	☐ Never	☐ Occasionally	☐ Often	☐ Always
Fainting	☐ Never	☐ Occasionally	☐ Often	☐ Always
Difficulty sleeping or sitting up	☐ Never	☐ Occasionally	☐ Often	☐ Always
Swollen ankles or feet	☐ Never	☐ Occasionally	☐ Often	☐ Always
Difficulty walking short distances	☐ Never	☐ Occasionally	☐ Often	☐ Always
Fatigue	☐ Never	☐ Occasionally	☐ Often	☐ Always

Which of these symptoms happen most frequently?

Which activities cause you to feel winded or short of breath?

It's important to track your symptoms to determine if they are getting better or worse. Talk to your health care professional about the treatment that's right for you.

For more information: heart.org/AorticStenosis

History

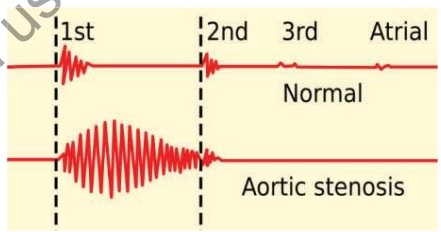
Presentation to PCP

- First symptom: exertional dyspnea
- Ongoing symptoms or new/worsening
- What were you doing last year, 6 months ago?
  - Walking to the mailbox
  - Yardwork
  - Shopping

Referral to Cardiology

Findings On Exam

- Cardiac Auscultation:
  - Right sternal border, 2nd intercostal space
  - Crescendo-decrescendo systolic murmur
- Carotid Auscultation:
  - Carotid pulse is typically in sync with S2
  - With AS, it is delayed
    - Syncope red flag
  - Follow the murmur to the carotids



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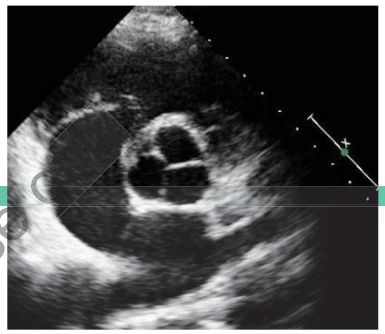
Diagnostics



- Chest X-ray
  - Cardiac enlargement
  - Calcification of aorta
- ECG
  - LV hypertrophy
- Stress Test
  - Utilized in asymptotic patients
  - Assessing for SOB, syncope, and hypotension
- Echo
  - Gold standard
  - Evaluates valves and chambers

Classifications of Aortic Stenosis Severity

Severity	Aortic jet velocity (m per second)	Mean gradient (mm Hg)	Aortic valve area (cm^2)
Normal	< 2.5	–	3 to 4
Mild	2.5 to 2.9	< 25	1.5 to 2
Moderate	3 to 4	25 to 40	1 to 1.5
Severe	> 4	> 40	< 1

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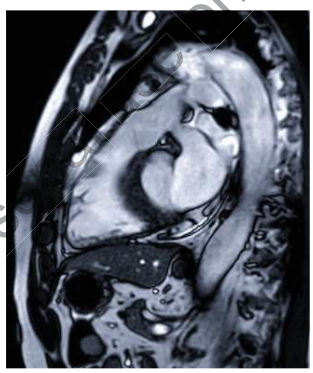
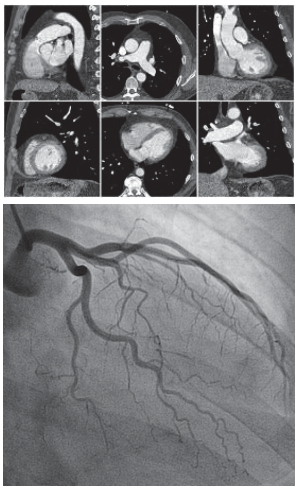
Pre-Intervention Diagnostics

- Cardiac CT Scan
  - Anatomy, extent of calcification, severity, etc.
- Cardiac MRI
- Cardiac Cath
  - Anatomy and assessment
  - Measure pressures and gradients





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Aortic Stenosis Treatment

- What is the primary goal of treatment for asymptomatic aortic stenosis?
  - Start statins to slow disease progression B. Monitor with serial echocardiogramsC. Immediate valve replacement D. Initiate diuretics to relieve symptoms
- In patients with symptomatic severe aortic stenosis, studies point to early TAVR having better results than surveillance. True or False
- Which of the following is the definitive treatment for severe symptomatic aortic stenosis?
  - Medical therapy B. Balloon valvuloplasty C. Aortic valve replacement (surgical or transcatheter)D. Pacemaker implantation
- Which patients are typically considered candidates for transcatheter aortic valve replacement (TAVR) rather than surgical aortic valve replacement (SAVR)?
  - Young, healthy adults B. Elderly patients with high surgical risk C. Patients with moderate aortic stenosis D. Patients with severe mitral regurgitation
- Take a poll: How many are at a facility that has a TAVR/valve program?
- Take a poll: How many are at a facility that have balloon valvuloplasty?

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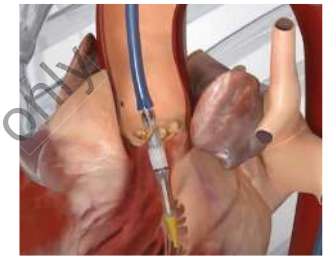
Transcatheter Aortic Valve Replacement (TAVR)



- Catheter placed in femoral artery and fed through to the aortic valve
- Stent and valve deployed
- Approved in 2011
  - Safer for high-risk patients
  - Bail out option

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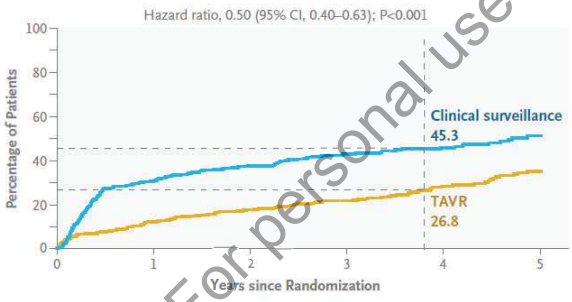
RESULTS

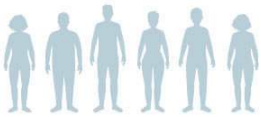
During a median follow-up of 3.8 years, the incidence of death from any cause, stroke, or unplanned hospitalization for cardiovascular causes was significantly lower in the TAVR group than in the clinical surveillance group.

Death, Stroke, or Unplanned Hospitalization for Cardiovascular Causes



Death from any cause occurred in 8.4% of the patients in the TAVR group and 9.2% of those in the clinical surveillance group, stroke in 4.2% and 6.7%, respectively, and unplanned hospitalization for cardiovascular causes in 20.9% and 41.7%.

VALVE REPLACEMENT IN THE CLINICAL SURVEILLANCE GROUP



87% of patients assigned to clinical surveillance underwent aortic-valve replacement during follow-up; the median time from randomization to valve replacement was 11.1 months.

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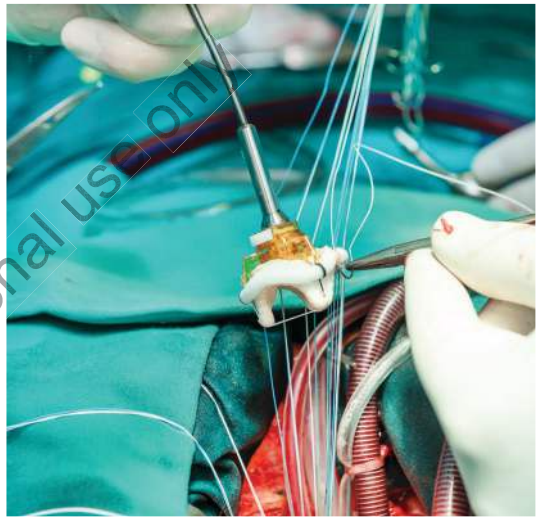
Surgical Aortic Valve Replacement (SAVR)

- First case in 1961
- Major surgery
  - Open heart (sternotomy, bypass)
  - Intubation
  - ICU admission
- Common for low-risk patients
- Longer recovery, 4–5-day hospital stay



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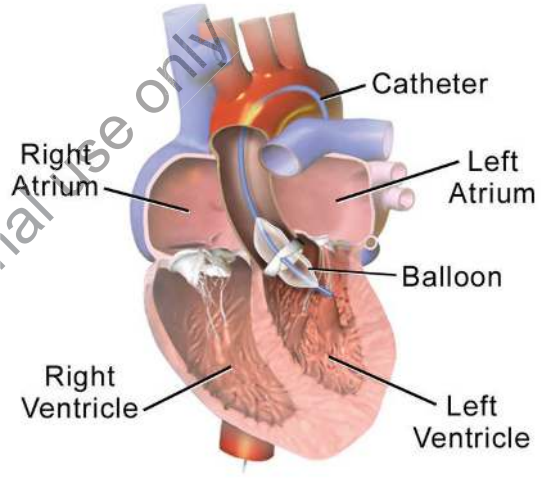
Balloon Valvuloplasty

- Catheter placed in femoral artery and fed through to the aortic valve
- Balloon is to open stenotic valve
- Available for use on other valves
- Bridge to other options
- Poor long-term survival



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Case Study #1

John, a 72-year-old retired farmer from a rural community, has been experiencing increasing fatigue, shortness of breath, and occasional dizziness for over a year. He assumes it is just “old age” and doesn’t seek medical attention until his symptoms become severe. His nearest primary care provider (PCP) is a 90-minute drive away, and the local clinic only has a visiting cardiologist once a month.

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Challenges:

- Access to Care: Limited availability of primary and specialized healthcare services in rural areas can lead to delays in diagnosis and treatment of AS.
- Transportation Barriers: Long distances to healthcare facilities pose significant challenges for routine check-ups and follow-up appointments.
- Healthcare Diagnostics: Rural hospitals may lack advanced diagnostic tools and specialized personnel required for AS management.

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Change up for Discussion

- How can rural healthcare improve early detection of AS?
- How does telehealth play into bridging the gap for rural patients?
- What community events can offer programs designed to raise awareness about AS symptoms and the importance of early medical evaluation?
- How can healthcare providers educate rural patients on recognizing early symptoms of aortic stenosis and to seek timely care?

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Case Study #2

Maria, a 68-year-old Hispanic woman living in a large metropolitan city, experiences fatigue and occasional dizziness. She visits a community health clinic where language barriers and limited resources result in a misdiagnosis. Despite the proximity to advanced medical centers, Maria remains undiagnosed for severe AS.

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- Socioeconomic Factors: Even in urban settings, socioeconomic disparities can limit access to specialized care for AS.
- Cultural and Language Barriers: Miscommunication between healthcare providers and patients from diverse backgrounds can lead to misdiagnoses or delayed treatment.
- Healthcare Navigation: Patients may struggle to navigate complex healthcare systems to access appropriate AS care.

Change up for Discussion

- How can healthcare providers improve cultural sensitivity to ensure accurate diagnosis and treatment of AS?
- What strategies can be implemented to ensure underserved urban populations have access to specialized cardiac care?
- How can community health workers assist patients in navigating the healthcare system to receive timely AS treatment?

Mentimeter what do you do to beat disparities?

- Clinics are better than other (some pretest, some screen only with symptoms)
- Community driven screening exams

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