Aortic Stenosis

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Aortic Stenosis
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**Introduction**

- Aortic stenosis is becoming more prevalent as the average lifespan of humans increases, with some reporting that greater than 4% of Americans over the age of 75 years old are directly impacted by some degree of aortic stenosis (Cary & Pearce, 2013).
- In aortic stenosis, the heart must work harder to pump blood, leading to increased workloads on the heart's muscles.
- Associated conditions: hypertension and diabetes.

**Significance of Pathophysiology**

- Severity of aortic stenosis is equivalent to morbidity and increased mortality. The more severe the aortic stenosis, the higher the risk of morbidity and mortality (Oshara et al., 2017).
- According to Treibel et al. (2018), aortic stenosis is a slow and progressive disease with major impacts on the left ventricle leading to hypertrophy (LVH) and “afterload-induced heart failure.”
- LVH develops as a compensatory mechanism, in an effort to maintain cardiac output and stroke volume, from the increase in afterload that occurs as the aortic valve stiffens in severity. As a result, LVH places additional strain on the heart and decreases in the elasticity in the heart muscle during contractions, contributing to a decrease in the coronary blood flow and worsening of ischemia.
- Decreased blood flow to the coronary arteries places patients at a higher risk for myocardial ischemia and infarction.
- Associated complications: heart failure, heart murmur, and chest pain.

**Pathophysiology**

- Mechanical stress associated with blood flow through aortic valve stenosis is related to calcium build-up on the aortic valve leaflets. Two different mechanisms can be divided into this category:
  1. **Mechanical stress** due to disease causes microvascular changes within the valve leaflets that changes the valve’s ability to transform from the usual state of maintenance and repair into an rheological state where cell proliferation increases (Cary & Pearce, 2013).
  2. **Mechanical stress** associated with blood flow through the valve due to elevated arterial pressure that causes the leaflets to stretch and eventually tear.

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**Clinical Manifestations**

- Shortness of breath and/or dyspnea on exertion
- Orthopnea: difficulty breathing while lying flat
- Syncope: sudden loss of consciousness
- Fatigue
- Chest pain
- Syncope/myocardial ischemia
- Decreased systolic blood pressure
- Palpitations
- Heart murmur

**Treatment Options**

**Surgical Aortic Valve Replacement (SAVR)**

- Standard treatment of choice for patient with severe aortic stenosis and unable to tolerate the risks of general anesthesia and the postoperative sedation and ventilation required following a sternotomy.
- Surgery involves open sternotomy and cardiopulmonary bypass with the surgeon cutting the sternum and separating the lungs to access the heart. Aortic valve and permanently placing a new aortic valve deemed the best fit for the patient based on preoperative testing.
- Valve replacement may be done in a beating heart (valve-sparing surgery) and in a heart that has stopped (cardiopulmonary bypass).
- Percutaneous transcatheter aortic valve replacement (TAVR) is a minimally invasive procedure that can be performed in a patient’s office under local anesthesia.

**Medical Management**

- No true medical therapy is available to treat or reverse the progression of aortic stenosis (Pauwels, Naeije, & Dewey, 2015).

**Implications for Nursing Care**

- **Assessment:**
  - **Physical assessment:** Identify and record vital signs, oxygen saturation, and pain levels.
  - **Diagnostic tests:** Order tests to assess left ventricular function, echocardiogram, and stress testing.

- **Nursing diagnoses:**
  - **Risk for infection:** Risk for infection due to endocarditis on aortic valve.
  - **Risk for injury:** Risk for injury due to falls or perforations.

- **Medical therapies:**
  - **Beta blockers:** Used to decrease heart rate and blood pressure.
  - **Loop diuretics:** Used to decrease fluid accumulation in the lungs and return fluid to the right heart.
  - **Angiotensin-converting enzyme (ACE) inhibitors:** Used to reduce afterload and improve renal function.

References