New aortic stenosis in a middle-aged woman

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Articles in this section use cases to illustrate the emergency management of patients presenting in general practice with cardiac problems. They are inspired by, but not based on, real patient situations.

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A 57-year-old woman is brought in to your general practice by her husband, who witnessed her become faint after using the stairs. Although the symptoms have since disappeared, your secretary alerts you of a new arrival and asks the patient to take a seat.

How should you proceed?

Answer: You invite the patient and her husband into your room and you do a quick basic life support ABC. You then proceed to take a combined history from the couple, identifying that the patient has noticed episodes of presyncope on exertion for at least the past six months. The episodes resolve with a couple of minutes of rest. There is no associated chest pain, dyspnoea or wheeze, and there have been no episodes of syncope or falls.

This patient is new to your practice, and you can see that one of your colleagues has electronically documented a past history of gastro-oesophageal reflux disease and hysterectomy. You quickly clarify with the patient that there is no history of cardiac, respiratory or other significant disease. Her medications include a proton pump inhibitor, and she has no known drug allergies. Her family history is also unremarkable.

What are the most important points regarding a physical examination?

Answer: The patient is alert and comfortable, and so this is not an immediate emergency. Her respiratory rate is normal and there is no use of accessory respiratory muscles. Her heart rate is 70 beats per minute, her pulse is low volume in quality and regular, and her blood pressure is 125/90 mmHg. There is no conjunctival pallor. Her mucous membranes are moist and there is no postural blood pressure drop, so your impression is she is euvolaemic.

Her apex beat is easily palpable but not displaced. On chest auscultation, there are normal vesicular breath sounds with no wheezes or crackles. There is a noticeable systolic murmur in the aortic region and apex. The murmur has a crescendo-decrescendo quality, is loudest on full expiration and radiates to both carotid arteries. She appears grossly neurologically intact.

What is the likely cause of this patient's presyncope?

Answer: The likely cause of her presyncope is a new diagnosis of aortic stenosis without heart failure.

Table. Key differences between aortic stenosis and aortic sclerosis

Feature	Aortic stenosis	Aortic sclerosis
Definition	• Obstruction to outflow due to impaired valve function • It is a clinical diagnosis	• Valve thickening with or without leaflet mobility and obstruction to outflow • It is a pathological diagnosis
Clinical signs	• Low-volume peripheral pulse • Slow-rising carotid pulse • Thrill in aortic area • Pressure loaded apex beat • Crescendo-decrescendo systolic murmur in aortic area • Murmur radiation to carotids or to praecordium • Signs of left ventricular failure	• Signs are either absent or those of aortic stenosis (i.e. may have an ejection murmur but will not have the peripheral signs described for aortic stenosis)
Echocardiography	• Obstruction to outflow • Severity determined by pressure gradient and calculated from the velocity across the valve as well as the valve area	• Thickened leaflets with or without obstruction
Clinical significance	• May require intervention (surgery or transcatheter aortic valve implantation)	• Risk factor for cardiovascular events • Minority will progress to aortic stenosis

What is the difference between aortic stenosis and aortic sclerosis?

Answer: Aortic stenosis results from abnormal aortic valve function, caused by leaflet thickening and calcification, which leads to restriction of leaflet motion and consequently to obstruction of left ventricular outflow.[1] The three main aetiologies of aortic stenosis are calcific valvular disease, a congenitally abnormal valve (usually bicuspid) and rheumatic heart disease.

Aortic sclerosis is a common clinical entity in the elderly, which results from leaflet thickening and focal calcification without restriction of leaflet mobility or significant obstruction to left ventricular outflow. Typically, aortic sclerosis is an asymptomatic pathological entity that may or may not progress to the clinical entity of calcific aortic stenosis, defined by obstruction to blood flow (see Table).

What are the symptoms and signs of severity of aortic stenosis?

Answer: Symptoms of advanced aortic stenosis are exertional dyspnoea, decreased exercise tolerance, chest pain, presyncope and/or syncope. These symptoms depend on the patient's level of physical activity and degree of heart failure. Interestingly, angina in the setting of aortic stenosis may occur with or without coronary artery disease. In the case of normal coronary arteries, angina results from increased oxygen demands and reduced coronary flow reserve in hypertrophied myocardium.

Signs on clinical examination that indicate severity are a low-volume radial pulse, a slow-rising carotid pulse (so-called 'anacrotic pulse'), a pressure-loaded apex beat owing to concentric left ventricular hypertrophy, a mid-to-late peaking systolic murmur, and reduction in intensity of the second heart sound. The presence of an aortic thrill or a fourth heart sound are important signs of severe stenosis and clinical signs of left ventricular failure.

Physical findings and symptoms may not be sensitive or specific to the severity of the stenosis. Further investigation should always be pursued if aortic stenosis is suspected, even if symptoms are mild.

Does this patient also have mitral regurgitation?

Answer: The patient has a murmur loudest in both the aortic and the apical regions. Occasionally, the murmur of aortic stenosis may even be louder and 'clearer' in the apex, mimicking mitral regurgitation. This is known as the Gallavardin phenomenon. For this reason, when suspecting concomitant mitral regurgitation it is worth examining for the presence of atrial fibrillation, loss of the first heart sound and radiation of the murmur to the axilla.

What further investigation is required in this woman?

Answer: The patient should receive a 12-lead ECG examining for left ventricular hypertrophy. Voltage criteria are met when the sum of the S wave in lead V1 and the R wave in leads V5 or V6 is greater or equal to 35 mm (Figure).

Presyncope is a worrying symptom because it may suggest that left ventricular outflow obstruction is preventing physiological increases in cardiac output, which are required during exertion. The development of symptoms such as syncope, angina and heart failure is associated with increased mortality and warrants urgent evaluation.

This woman requires a transthoracic echocardiogram for the initial evaluation and follow up of aortic stenosis. This imaging modality evaluates the cause and degree of aortic stenosis, and examines for concentric left ventricular hypertrophy, left ventricular function/dysfunction and mixed valvular disease. The three salient echocardiographic parameters of aortic stenosis are aortic jet velocity, aortic orifice area and mean transvalvular gradient. The 2012 European Society of Cardiology guidelines have specific values for classifying severe aortic stenosis based on these parameters (see Box).[2] The 2014 American Heart Association/American College of Cardiology guidelines also make use of these parameters, in addition to valve anatomy and patient symptoms, in their classification system.[3] These classifications help define further intervention. Stress testing, especially in asymptomatic patients to ensure the patient is truly asymptomatic, and more invasive testing (e.g. cardiac catheterisation) may be required in some cases to better evaluate the stenosis and help direct further intervention.

Classification of the severity of aortic stenosis according to ESC/EACTS[2]

- Jet velocity: >4.0 m/s
- Valve area: <1.0 cm^2
- Mean gradient: >40 mmHg

Abbreviations: ESC = European Society of Cardiology; EACTS = European Association for Cardio-Thoracic Surgery.

What surgical options are available for patients with aortic stenosis?

Answer: The decision to progress to aortic valve replacement depends heavily on the presence of exertional symptoms such as angina, dyspnoea, presyncope or syncope. It also depends on the patient's comorbidities and respiratory function.

Patients over the age of 65 years are usually offered tissue valve replacement, with the life expectancy of the valve being 15 years or more, whereas patients under the age of 65 years are more likely to receive a metallic valve replacement. Metallic valves have a longer lifespan but require lifelong anticoagulation. The anticoagulation should be warfarin, given a recent clinical trial showing its superiority over the novel nonvitamin K anticoagulant dabigatran in the setting of metallic heart valves. Therefore, at this time, there is only evidence for the use of these newer oral anticoagulants in patients with nonvalvular atrial fibrillation and venous thromboembolism.

For patients with severe aortic stenosis but who also have high surgical risk there is an option for transcatheter biprosthetic aortic valve replacement. This procedure is increasingly used and has the major advantage of symptom control in patients who cannot safely undergo open surgery. There is no difference in one-year survival between surgical replacement and percutaneous intervention. However the long-term durability of transcatheter biprosthetic valves is not yet known. Therefore, open surgical aortic valve replacement remains the commended treatment in patients with aortic stenosis who do not have a prohibitive or high surgical risk.

What should you tell the patient?

Answer: The patient will need to know that she has a heart murmur suggestive of a narrowed valve such as aortic stenosis, which you can explain with a diagram. Although the murmur may be incidental, you arrange a review by a cardiologist and a transthoracic echocardiogram as further investigation. The advantage being that this is a noninvasive test providing valuable information that may explain the patient's symptoms. If the valve is not severely narrowed, she can enjoy moderate exercise and a normal sexual relationship, and she can continue to drive. However, if left unmonitored for some time, a narrowed valve can lead to heart failure, blackouts and sudden death. If symptoms worsen, the patient must know to notify her doctor or go to the emergency department. A time may come when the symptoms become severe and the valve needs replacing.

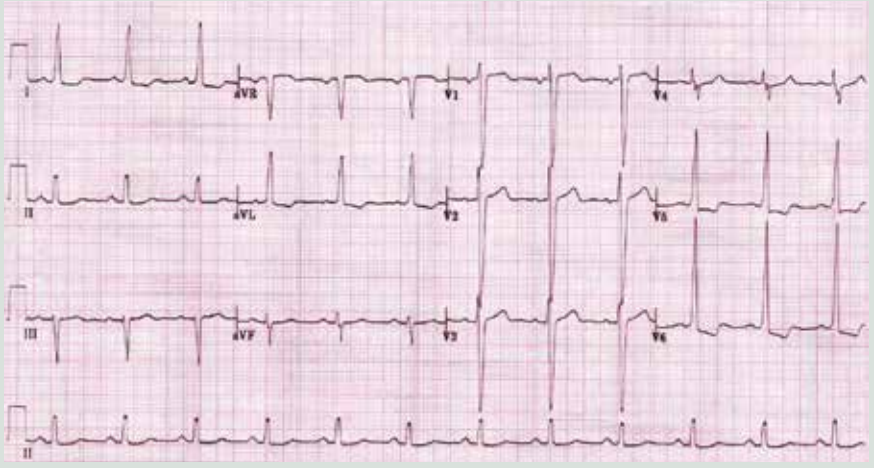

Figure. ECG demonstrating left ventricular hypertrophy, a potential consequence of aortic stenosis.

Key points

- **Aortic stenosis has an insidious course and is associated with considerable morbidity.**
- **Exertional symptoms prognosticate severe disease and should prompt referral of patients to a cardiologist.**
- **Transcatheter aortic valve implantation is increasingly common in patients with aortic stenosis and is used in those with unacceptably high surgical or anaesthetic risk.**

If this is required, the best long-term outcomes are with open heart surgery.

Outcome

The patient's exertional symptoms were taken as a warning sign, and the cardiologist referred the patient to the cardiothoracic surgeon. The patient underwent metallic aortic valve replacement and commenced lifelong warfarin. Except for a painful sternotomy wound, the patient's postoperative recovery was excellent. Three months after the operation her exercise tolerance has increased considerably. **CT**

References

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