Hypertrophic cardiomyopathy

Hypertrophic cardiomyopathy (HCM) is a myocardial disorder defined by ventricular hypertrophy that cannot be explained by another cardiac or systemic disease. The left ventricle is most commonly affected. HCM is a lifelong condition that can worsen over time. It is the most common inherited cardiac disorder.

Could my patient have HCM?

The symptoms of HCM vary from person to person.

- Sometimes people have few or no symptoms and/or no complaints of physical limitations.
- A person may underestimate or under-report their symptoms and the impact on their exercise capacity.
- People may have a family member who died suddenly or prematurely, or has similar symptoms or a diagnosis of HCM.
- Importantly, HCM symptoms can be non-specific, overlapping with other heart conditions and diseases (see below).

Be aware that, before a definitive diagnosis is made, symptoms can be mistakenly attributed to:

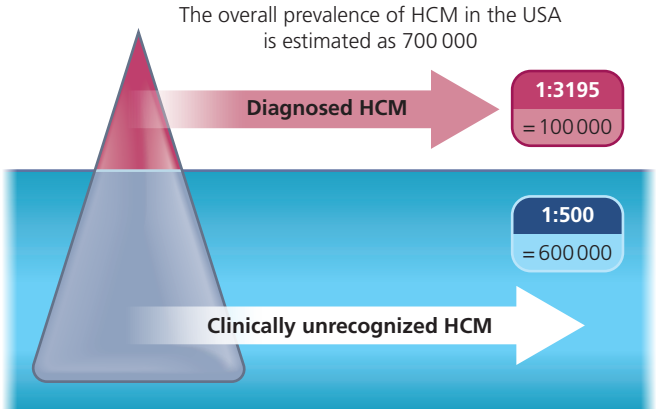
- Asthma
- Coronary artery disease
- Sleep apnea
- Deconditioning
- Chronic obstructive pulmonary disease
- Mitral valve prolapse
- Athlete's heart
- Anxiety

In older people, symptoms may be misattributed to valvular or hypertensive heart disease or heart failure.

HCM is underdiagnosed and misdiagnosed

Anyone can have HCM, regardless of sex, age or race

It is likely that only a fraction of people with HCM are correctly identified



HCM is caused by dysfunction of the cardiac sarcomere (the structural unit of the cardiac muscle), mostly as a result of genetic mutations.

Just under half of people with HCM have a pathogenic or likely pathogenic sarcomere mutation. Over 1400 different mutations in 11 genes have been associated with heritable forms of HCM. About 70% of known pathogenic HCM mutations affect the *MYH7* and *MYBPC3* genes, which encode the β-myosin heavy chain and cardiac myosin-binding protein C, respectively.

Mutations that cause HCM lock myosin in an 'on' state, causing hypercontractility and decreased sarcomere relaxation.

In non-familial HCM, a genetic change cannot be identified and there is no family history of HCM. These individuals tend to be older; many also have hypertension and/or a combination of other comorbid factors such as obesity, diabetes and obstructive sleep apnea.

Why does diagnosis matter?

Correct diagnosis is key to ensuring the right monitoring and management arrangements are in place to reduce symptoms and the risk of adverse outcomes.

Common symptoms†

- Dyspnea
- Fatigue
- Palpitations
- Lightheadedness
- Atypical chest pain

† Some individuals do not experience symptoms

Higher mortality

- Sudden cardiac death may be the first sign, but this is rare overall
- 3× increased mortality compared with the general population

Increased risk of:

- Atrial fibrillation
- Stroke
- Heart failure

Reduced function over time

- Activity and quality of life decrease over years to decades

High burden in younger people

- High risk of adverse cardiac outcome by age 60 in those diagnosed before 40

Genetic changes are linked with disease course

- Onset of complications/ death is earlier if a known gene mutation is recognized

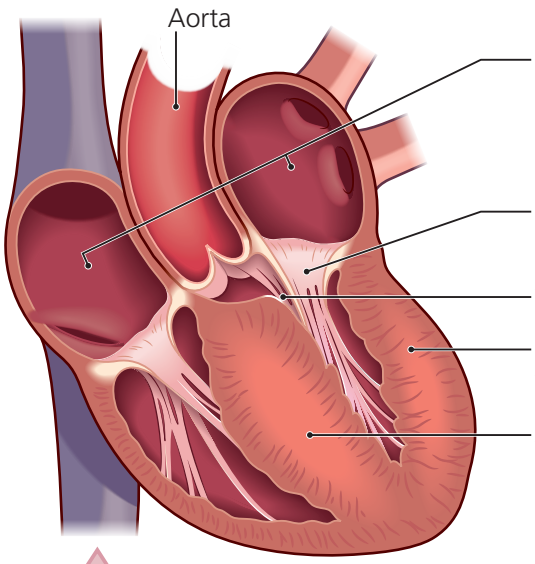
Heart failure (HF) affects up to 45% of people with HCM. Important differences exist in the clinical profile, pathophysiology, management and outcome between HF in HCM and conventional congestive HF, so accurate diagnosis is important.

In a survey of 444 patients with HCM:*

- 43% were originally diagnosed with an innocent heart murmur
- 25% waited 3 years or longer for a diagnosis of HCM after developing symptoms
- 85% said that, since their diagnosis, their symptoms had increased or interfered with their regular activities

*Salberg et al. 2016.

What happens in HCM?



Changes within the cardiomyocyte sarcomere lead to **hypercontractility and slower relaxation**.

Over time, cardiac tissue stiffens and thickens as a result of the hypercontractility and impaired relaxation. Fibrosis in the heart may also contribute to the stiffening.

Stiffening and hypertrophy of the heart can lead to heart failure.

This shows the obstructive subtype of HCM (70% of people with HCM)

The thickened ventricular septum protrudes into the area called the outflow tract, partially blocking the blood flowing out of the left ventricle. This can happen at rest or develop/worsen with exercise.

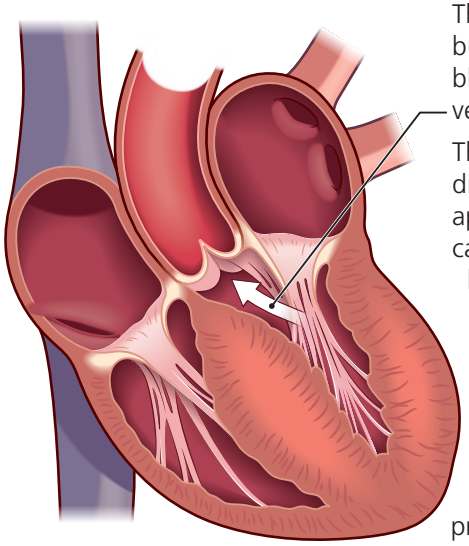
High pressures may build up in the left ventricle due to the force needed to get the blood through the narrowed outflow tract with each heartbeat.

Primary mitral valve abnormalities are sometimes present in HCM. Together with the effects of septal thickening, these abnormalities can lead to systolic anterior motion (SAM) of the mitral valve. The mitral valve leaflets are pulled over toward the septum when the heart contracts. The valve may become leaky, leading to mitral valve regurgitation.

Outflow tract obstruction is, typically, the primary cause of symptoms (dyspnea, chest pain, lightheadedness, exercise intolerance).

Typically, the **clinical presentation** of HCM is hypercontractility (or hyperdynamic contractions) and impaired relaxation and compliance. Histopathological findings can include myocardial disarray (enlarged, disorganized cardiomyocytes) and fibrosis.

Non-obstructive HCM (30% of people with HCM)



The heart muscle is thickened but this does not interfere with blood flow out of the left ventricle.

The hypertrophy can vary in its distribution: the septum or the apex or bottom of the heart can be affected, or the hypertrophy can be evenly distributed throughout the left ventricle.

The difficulty in relaxation of the cardiac muscle can cause symptoms.

Non-obstructive HCM can be progressive and cause symptoms, including heart failure.

Ask: could this person have HCM?

Sources

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