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Why young hearts fail

It is rare for a young person to die suddenly without any apparent cause - only one in 50,000 to 250,000 does, compared to one in 15,000 to 18,000 for older adults.

So the death of teen triathlete Thaddeus Cheong last week raised in many minds, the question of how such a tragedy could befall a young and fit man.

The 17-year-old Raffles Junior College student's heart gave way after he finished third in a selection trial for the South-east Asia Games.

Doctors say it is unlikely that a heart attack would cause the sudden death of anyone under 35. It is the opposite for those over 35, whose hearts would probably be affected by conditions such as high cholesterol, high blood pressure and diabetes.

Some 3 per cent of sudden deaths have no known cause, said Associate Professor Tan Huay Cheem, chief of the National University Hospital's (NUH) cardiology department.

He said: 'Frequently, there is a cause. The challenge is to be able to recognise the condition before the worst happens.'

Sometimes, a weakened blood vessel, called an aneurysm, could burst and cause a fatal stroke or heart attack.

But often the answer is in previously undetected heart abnormalities, or a viral infection of the heart.

Many irregularities are symptomless, and tragically come to light only at the person's death.

About 1 per cent of all babies have inborn heart defects, said Dr James Yip, director of NUH's adult congenital heart disease programme, but not all of these are life-threatening.

>>Hypertrophic cardiomyopathy

One of the most common cardiac causes of sudden death in young people is hypertrophic cardiomyopathy - an ominous thickening of the heart muscle beyond the normal 1.2cm width.

The thickening can occur near arteries which channel blood from the heart to the rest of the body, and this could block the blood supply, said Dr Bernard Kwok, senior consultant of the National Heart Centre's cardiology department.

The thickened heart muscles also interfere with the electrical signals transmitted by the heart, which results in an irregular heartbeat.

Most people with hypertrophic cardiomyopathy would not notice it, but strenuous exercise could exacerbate the condition. The heart could either stop beating or pound so quickly that it can no longer pump out blood. This could lead to acute heart failure and death, if emergency treatment is not given in time.

Studies in the United States have shown that as many as one in 500 people have this condition.

Dr Kwok has more than 30 patients with hypertrophic cardiomyopathy, while NUH is monitoring 400, who make up 40 per cent of its patients with congenital heart diseases.

The genetic condition might not appear at birth but the heart muscle could thicken over time, said Dr Kwok.

Patients typically find out when a relative dies suddenly and the condition is discovered postmortem, or when they have an abnormal electrocardiogram (ECG) result during a health-screening. Family members are then screened for the inherited condition through an echocardiogram, or an ultrasound scan of the heart.

Patients are often given medication, such as betablockers, taken daily to slow down and stabilise the heartbeat.

Dr Yip said: 'It's like putting brakes on the engine, so the patient can drive in second gear, but can't go up to third or fourth.'

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High-risk patients who have had fainting spells or brushes with death are implanted with small devices to jump-start the heart if it stalls.

Such automated implantable cardiac defibrillators can cost between $10,000 and $20,000 - no small sum. Two NUH patients with hypertrophic cardiomyopathy have had such implants put in.

In severe cases, when the heart muscle is thicker than 3cm, the excess muscle may be removed through surgery, but this is rarely done because there are very few such cases.

Usually, patients are asked to avoid strenuous exercise, including competitive sports, resistance training, marathons and activities which require sudden spurts of energy.

Running, cycling or swimming leisurely is usually fine, Dr Kwok said.

'Ninety-nine per cent of people with this condition live to a ripe old age,' he added.

>>Anomalous coronary arteries

A rarer condition which could lead to sudden death involves heart arteries growing in abnormal places.

Part of a coronary artery in some people can grow in, rather than outside, the heart muscle. As the heart pumps, it squeezes the artery and impedes blood flow.

Others have a coronary artery that lies between the heart's major vessels, the aorta and the pulmonary artery.

During exercise, the aorta and pulmonary artery expand, squeezing the smaller artery in between, and blocking blood supply.

For such patients, the standard treatment is to do a bypass to move the problematic artery back to its proper place, said NUH's Prof Tan.

>>Arrhythmogenic right ventricular dysplasia (ARVD)

This is a rare condition in which fat is deposited in the right ventricle, or lower right chamber of the heart, which weakens its ability to pump blood well.

The lack of blood means the heart skips beats or has to pump extra hard, developing an irregular rhythm.

Treatment is largely similar to that for hypertrophic cardiomyopathy - medication to stabilise the heart rhythm, and implantable defibrillators if necessary.

>>Electrical disorders that cause irregular heartbeats, such as Brugada syndrome and long QT syndrome

These conditions result in the heart skipping beats or beating irregularly - a symptom known as arrhythmia.

Again, treatment involves medication and implantable defibrillators.

>>Myocarditis

Sometimes, a sudden death has nothing to do with inborn conditions. Rather, the heart has been infected and weakened by viruses such as flu, and stressing it further with exercise could bring on a collapse and death.

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