Screening for coronary artery disease

Timely diagnosis and intervention key in reducing mortality from this common heart condition.

Dr. Jeremy Chow is a cardiologist and electrophysiologist practising at Gleneagles Hospital in Singapore. His clinical interests are in arrhythmia management and stroke prevention in atrial fibrillation (AF). Dr. Chow also educates athletes and high-risk group for sudden cardiac death screening by giving talks and recommending pre-participation screenings.

It is hardly an overstatement that many consider coronary artery disease (CAD) one of the major threats to global health. The condition – a narrowing of the arteries due to fatty plaque that may cause a heart attack – was responsible for 7.4 million deaths in 2012 alone, according to the Worldwide Health Organization (WHO).

CAD is a chronic ailment that develops over several years or even decades, so early diagnosis is crucial to stop its progression and avoid heart failure.

Coronary angiography: diagnosis and therapy in one

"Coronary angiography is the gold standard for diagnosing coronary artery disease because it is a diagnostic tool with a therapeutic option," says Dr. Jeremy Chow, a consultant cardiologist at the Asian Heart & Vascular Centre in Singapore.

According to Dr. Chow, most physicians now perform this procedure through the radial artery – a small artery in the wrist – where a small catheter, typically 2mm in diameter, is placed in the artery and fed along the artery path to the heart. "Once it is inside the heart, we are able to locate the two main arteries, the left and right coronary arteries and engage the artery using the catheter and inject dye specifically to look at the flow across the artery," he says.

X-ray images are subsequently taken to monitor how the dye moves through the artery and locate any blockage in blood flow.

Dr. Chow explains that when a blockage is found doctors can introduce other equipment into the artery, such as balloons, stents or wires in order to clear the obstruction and thereby prevent a future cardiac arrest.

Coronary computed tomography angiogram: a less invasive option

"The coronary computed tomography angiogram (CCTA) is a less invasive test to diagnose CAD because it only involves an intravenous injection of a contrast dye in the vein and usually can be done in around one hour," explains Dr. Chow.

During a CCTA, the contrast dye is followed through a CT scan to search for any blockage in the arteries without the need for a catheter.

Dr. Chow adds that the accuracy rate of a CCTA is 99 percent, therefore when the machine does not detect any blockages there is no need to proceed with further evaluation.

However, a CCTA is less reliable when it comes to detecting serious obstruction, with its accuracy rate ranging from 70 to 80 percent, says Dr. Chow. This means that someone who starts off with a CCTA may end up needing a coronary angiography as well to obtain a clearer picture of the blood vessels.

In addition, a CCTA needs a slow resting heart rate – normally between 60 and 75 beats per minute – in order to acquire clear images. "If the heart rate is very fast, you may end up having to do the CT scan a couple of times, which means your radiation dose may be a little bit higher," says Dr. Chow. "Whereas the coronary angiography doesn't have that limitation, you can do it at any heart rate because we are seeing actual luminal flow directly during the imaging."

Who needs to do a check-up?

Those individuals with a family history of heart disease or at least two risk factors for artery blockages, including smoking, high cholesterol levels, diabetes, or hypertension are encouraged for screening.

Patients in the at-risk group are required to undergo a stress test first, says Dr. Chow, where an electrocardiography (ECG) machine monitors their heart function while they exercise on a treadmill.

If the stress test is abnormal, patients may then have to do a coronary angiography or CCTA, he adds.