

**HIVERSACK  
KEEPS HIM  
ALIVE**

Mr Chow (second from right), 78, carries a black haversack wherever he goes. This is because the mechanical pump, which was implanted to replace his heart is connected via a tube to a computer and batteries which are in the haversack. With him are (from left) Dr C. Sivathanan, his wife, Madam Fu, and Dr Kenneth Ng.



ST PHOTO: LIM WUI LIANG

**Retiree saved from**

Mr Chow Tien Sheong, 78, has lived with a failing heart since 2004.

But it was in the last two years that his disease dramatically deteriorated. He became much more breathless and lethargic.

In October last year, his heart gave out. Suffering recurrent ventricular tachycardia – a heart rhythm greater than 100 or 120 beats per minute – he was admitted to hospital.

In the intensive-care unit, he collapsed. While the doctor and hospital staff leapt into action to resuscitate him, Mr Chow's wife was asked to wait outside the room.

As she left, she said to the attending physician, Dr Kenneth Ng, that her husband dying was "not an option".

"I was really sweating," recalled Dr Ng, a cardiologist at Novena Heart Centre.

Thankfully, he managed to revive Mr Chow.

But for what? Mr Chow has idiopathic cardiomyopathy – a

**the brink of death**

disease of the heart muscle with no known cause leading to a weakened and often enlarged heart, one of the principal reasons for heart failure.

Left to struggle on, the retired accounts executive had at most weeks left to live.

Dr Ng consulted Dr C. Sivathanan, a cardiothoracic surgeon, about Mr Chow's options.

As a temporary measure, they placed a balloon pump in him. It is a mechanical device that increases cardiac output – the amount of blood pumped out of the heart every minute.

The improved coronary blood flow helped to deliver oxygen to the heart and stabilised his abnormal heartbeat.

But the balloon pump was not a permanent solution.

It can cause an infection in the patient's bloodstream if it is used for too long. The balloon may overinflate and tear the patient's aorta, the largest artery in the body that carries oxygenated blood from the heart to the rest of the body.

A longer-term solution, such as bypass surgery or insertion of a mechanical heart implant, was needed.

Dr Ng said: "After we revived him and put him on the balloon pump, we discussed implanting the Heartmate II with Mr Chow and his wife."

The couple, who have two children and two grandchildren, felt positive about the option. He was fit enough to undergo the operation and they could afford it.

Dr Ng said: "His other organs, such as his liver and kidneys, were still in good working order. Some heart failure patients may also suffer from kidney failure or liver failure, which makes them not ideal candidates for the surgery."

The operation took about five hours. Mr Chow spent 10 days in intensive care and another month in the general ward at Mount Elizabeth Hospital.

Then he was transferred to the National Heart Centre Singapore for rehabilitation, where he stayed for six weeks before being discharged on Dec 30.

His age was a factor in the slow recovery, said Dr Sivathanan.

However, he did recover. His weight, which had plummeted from 60kg to 39kg just before the operation, is now 50kg.

At the interview in the Mount Elizabeth clinic, he shouldered a haversack that held parts of the device keeping him alive. Heartmate II comprises a pump the size of a D-cell battery implanted inside the body to the left heart chamber and attached by a tube to an external computer and batteries inside the haversack.

It takes over the heart's function of pumping blood around the body.

Mr Chow looked steady on his feet and breathed easily.

"I hope to be able to eat better and put on more weight gradually. But I'm very glad not to be breathless any more. I was a goner and these doctors saved me," he said.

His wife, Madam Fu Chia Foon, 75, could not stop beaming. Holding his hand, the housewife said: "I told the doctor I did not want my husband to die. I want to have my husband with me for a long time more."

**Ng Wan Ching**

# Temporary pump to serve as permanent heart for some

A mechanical heart was used only in those awaiting a transplant. Now, it is being put in patients with end-stage heart failure who do not qualify for a transplant because of their age or health. **Ng Wan Ching** reports

In the last several years, at least 20 people who needed a heart transplant averted death through a mechanical heart implant which kept them – and their hopes – alive while they waited for a new organ.

That device may now give new life to another group of patients who cannot get transplants because of their age or health.

The implant could become their permanent heart instead.

In October last year, medical history was made here when the Heartmate II was implanted in the chest of retiree Chow Tien Sheong to take over his heart's function of pumping blood around the body.

The 78-year-old retired accounts executive became not only the oldest patient to have the mechanical heart-assist device implanted, but also the first to have it permanently replace his own damaged heart, said his surgeon, Dr C. Sivathanan.

Using a mechanical heart as "destination therapy" – when there is no chance of eventually providing the patient with a heart transplant – was a treatment option approved in 2010 by the United States' Food and Drug Administration.

In Singapore, the device is registered only as a bridge to a heart transplant.

The Health Sciences Authority (HSA) has yet to receive any application to register it for destination therapy. "Nevertheless, should an application be made for the additional indication, HSA will assess the suitability of the product for the intended population in Singapore based on the clinical data submitted. The decisions of our overseas regulatory counterparts will also be taken into consideration," said its spokesman.

The primary function of a mechanical heart is as a

"bridge", supporting patients with terminal heart failure while they await a heart transplant.

The National Heart Centre Singapore (NHCS) piloted a mechanical heart device programme in 2001, which became a full-fledged clinical service in 2006, said a spokesman. Heartmate II was first used in 2009.

At 78, Mr Chow did not qualify for a heart transplant, which has a cut-off age of 60 according to national regulations.

Dr Sivathanan said: "It could go up to 65, depending on the patient's condition. If the patient is otherwise fit and all his other organs are not affected by his heart failure, we could consider a heart transplant for a 65-year-old."

Dr Sivathanan, who is the co-director of the heart and lung transplant programme at NHCS, divides his time between the public institution and a private group practice at Mount Elizabeth Medical Centre. Mr Chow had his operation at Mount Elizabeth Hospital.

In the United States, the device can be used in patients with end-stage heart failure, who have received optimal medical therapy for at least 45 of the previous 60 days and are not eligible for a heart transplant.

A US trial of 200 patients in 2009 showed that patients implanted with the Heartmate II device had statistically significant improved two-year survival rates compared to those who continued with usual care.

Dr Sivathanan said 68 per cent of those who had the implant were alive at the one-year mark, compared to 25 per cent of those who did not have the device.

At the two-year mark, it was 58 per cent compared to 8 per cent.

For some patients here, the device has worked so well that they have taken themselves off the heart transplant list.

An NHCS spokesman said: "There are currently two patients in their 40s and 50s, supported on Heartmate II, who have been living very comfortably with the device and are not keen for the option of heart transplant. They both have end-stage heart failure."

A third patient, Ms Angelique Schoeber, 39, had the device implanted at the heart centre. When she returned to her home country, the Netherlands, she decided to opt out of waiting for a heart transplant there.

This is something that Dr Sivathanan is excited about. The trial results show that people like Mr Chow now have a second chance at life.

Dr Sivathanan said: "There are many people who do not qualify for a spot on the transplant list, either because they are too old or their countries do not have transplant programmes. This will give them the option of having a good quality of life without a transplant."

More than 7,000 people were admitted to public hospitals due to heart failure last year.

With better medical care prolonging lives these days, people are likely to be living and dealing with heart failure for more years now than they did before.

In an editorial in the Annals Academy Of Medicine last September, doctors noted that the number of new cases of heart failure spiked significantly to 65 per 1,000 people for those aged 85 years and above, compared to 15 per 1,000 for those aged between 65 and 74, and 32 per 1,000 for the 75 to 84 age group.

However, it is not known how long the device will last in the human body. To date, the longest it has been known to last is seven years.

"That was when the first patients were implanted with Heartmate II. Some of these patients have gone on to heart transplants while others, who may not have been found suitable for transplant, are still alive today with the device in them," said Dr Sivathanan.

But examinations of devices removed from patients who finally got transplants hold out hope that they could outlast their wearers.

"The devices that were explanted looked almost new. The pumps were all in good working order," said Dr Sivathanan.

Based on a study conducted by its engineers, Thoratec, the company that manufactures Heartmate II, estimates that the device can last for at least 20 years inside a person's body, he added.

And with technology improving all the time, newer devices should last even longer, he said.

But it will also take some time before the technology becomes accessible to more patients, given its exorbitant price tag.

The device itself costs about \$160,000. With surgery and hospitalisation, costs can add up to \$450,000 to \$500,000 as patients need about four weeks of hospitalisation, including one week of intensive care therapy before surgery.

The cost includes accessories, such as batteries and chargers.

The Heartmate II is not subsidised when it is used as destination therapy as it has not been approved for that use here.

If more people use the device and a larger number of it is manufactured, the cost could come down, Dr Sivathanan said.

Although the mechanical heart remains out of reach of most people now, it is an important development, especially for Asia where heart transplants remain a challenge, he said.

Even though 60 per cent of the world's population lives in Asia, only about 4 per cent of heart transplants are performed there.

North America, which has 8 per cent of the world's population, performs 71 per cent of transplants and Europe, with 12 per cent of the world's population, makes up the other 25 per cent.

One reason is the lack of donors in Asia. The number of cardiac donors in the United States in the year 2000 was eight per million population (pmp), while in Asia, it was 0.03 pmp.

There are other reasons, such as the lack of infrastructure, funding, trained personnel and facilities, cultural barriers and beliefs.

The ability to offer this treatment option to Asian patients would give Singapore an added advantage in medical tourism, Dr Sivathanan noted.

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