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Singapore's NUHCS leverages advanced aortic care with 3D-printed models

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Custom-fitted aortic sleeve implant minimises risk of life-threatening rupture while providing long-term heart support



Singapore's NUHCS advances aortic care with personalised preventive treatment using 3D-printed models for patients at high risk of deadly heart disease.

An aortic aneurysm is an enlargement of the aorta, formed when the wall of the aorta becomes weakened and begins to bulge outward. This can be due to many factors, including high blood pressure, genetic conditions and aortic valve issues. Often underdiagnosed or delayed in diagnosis, the bulge that continues to grow over time is at high risk of rupturing along the elastic wall, leading to rapid and life-threatening blood loss.

PEARS is a proactive approach that reinforces a weakened aorta with a tailored, open mesh support sleeve. Applied when a patient's aorta has only just increased in size or is mildly aneurysmal, the support sleeve acts as a protective "glove" around the vessel to prevent further expansion and significantly reduces the risk of a rupture.

"The open-mesh sleeve used to support the weakened aorta in PEARS is custom shaped to a 3D-printed model of a patient's aorta from their CT scan. Due to the customised nature of this sleeve, it provides personalised long-term structural support to the heart vessel, which is crucial in stopping the aneurysm from growing larger," explained Adjunct Associate Professor Vitaly A Sorokin, Head and Senior Consultant, Division of Adult Cardiac Surgery, Department of Cardiac, Thoracic and Vascular Surgery (CTVS), NUHCS.

An aneurysm that does not grow in size greatly reduces the risk of a rupture. For patients with aortic aneurysms who are eligible for PEARS, the need for an aortic root replacement is also avoided. This not only reduces surgical risks and future complications, but also significantly shortens the surgical treatment time by half.

"PEARS represents a shift in aortic care, emphasising personalised prevention over a later intervention for patients. These patients can now experience life just like their peers without constantly worrying about their aortic health and the risk of a sudden rupture. The tremendous improvement in their quality of life cannot be discounted," said Adj A/Prof Sorokin.

***Image Caption**:*

(Left) Adjunct Associate Professor Vitaly A Sorokin, Head and Senior Consultant Division of Adult Cardiac Surgery, Department of Cardiac, Thoracic and Vascular Surgery (CTVS) National University Heart Centre, Singapore (NUHCS)

(Right) Adjunct Associate Professor Low Ting Ting, Senior Consultant Department of Cardiology, National University Heart Centre, Singapore (NUHCS)