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SCTIMST develops technology for treating brain aneurysms

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The research team of Sree Chitra Thirunal Institute of Medical Science and Technology (SCTIMST), Thiruvanthapuram, an Institute of National Importance under the Department of Science and Technology has developed an innovative intracranial flow diverter stent for the treatment of aneurysms of the blood vessels of the brain. It is ready for transfer and further testing in animals, followed by human trials.

Flow diverters stents when deployed in the artery in the brain bearing the aneurysms, divert blood flow away from the aneurysm, thus reducing the chances of its rupture from the pressure of blood flow. Intracranial aneurysm is a localized ballooning, bulging or dilation of arteries in the brain caused by progressive weakening of the inner muscles of the wall of the blood vessels.

Spontaneous rupture of the aneurysm can result in bleeding into the space around the brain resulting condition called a subarachnoid haemorrhage (SAH). Subarachnoid haemorrhage can lead to paralysis, coma or death. The Surgical treatment of an aneurysm involves opening the skull and a clip on the neck of the aneurysm, so that it is cut off from the path of blood flow.

There are three non-surgical, minimally invasive endovascular treatments of aneurysms of the brain. In two of these procedures, the aneurismal sacs filled with platinum coils or occluded using high viscosity liquid polymer which solidifies when released into the sac thus sealing the sac. All these techniques have some limitation or the other.

A more attractive third minimally invasive option is deploying a flow diverter stent to bypass the segment of the blood vessel which has the aneurysm. Flow diverters have the advantages of being flexible and adaptable to the shape and course of the vessel. Also, flow diverters promote healing of the vessel wall by removing the constant stress of blood flow on it.

The Chitra flow diverter is designed to have a better grip on the walls of arteries of complex shapes in order to reduce the risk of migration of the device. The unique design is in its weave also makes this stent resistant to kinking or twisting, when it is placed in tortuous arteries and those with complex shapes. Even a 180 degrees bend does not occlude the lumen of the stent. A portion of the wires is made radio-opaque for better visibility in X –Rays and fluoroscopy thus aiding accurate delivery of the diverter in the blood vessel.

Nitinol, a superelastic alloy with shape memory was acquired from National Aero Space Laboratories, Bengaluru (CSIR-NAL). When the device is deployed at the site, it is released from its crimped locked position and assumes the desired and originally designed shape because of the

shape memory property of Nitinol. The flow diverter is delivered to the aneurysm in the brain using a delivery system. The delivery system has also been developed by the team

The imported flow diverter stents cost Rs 7-8 lakhs and are not manufactured in India. With the availability of the indigenous technology from SCTIMST and Nitinol from NAL, a well-established industry should be able to manufacture and sell at a much lower price. The device is expected to be transferred to the Industry very soon and will subsequently undergo testing in animal and human clinical trials before commercialization.

SCTIMST has filed separate patents for the stent and the delivery system. The team was led by Dr Sujesh Sreedharan, Mr Muraleedharan CV, Mr Ramesh Babu (Biomedical Technology Wing, SCTIMST), Dr Jayadevan ER, Dr Santhosh Kumar K. (Department of Imaging Sciences and Interventional Radiology, Hospital Wing, SCTIMST), Mr Rajeev A, Mr Subhash Kumar, MS, Mr Anku Sreekumar, Ms N. J. Jnana. Mr Sree Hari U and Ms G.V Liji