

Customized Endovascular Devices

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Technology description

It is estimated that about one in fifty people have an unruptured brain aneurysm in the United States alone. Endovascular coiling is one of the most common minimally invasive treatment for cerebral aneurysms. However, aneurysm geometry is highly patient-specific, and commercial coils come in pre-defined shapes. This can result in incomplete packing of the aneurysm sac and high failure rates with aneurysms having unique morphologies.

Researchers at Arizona State University have developed customized cerebral aneurysm fixtures for endovascular coil design. A computation fixture model is created from patient-specific data and then used to create 3D printed coil fixtures with shape memory materials. Testing of these fixtures shows that even with exposure to the high temperatures required for shape setting processes, the devices were able to maintain their shape. Because these custom devices are designed from patient-specific aneurysm geometry, treatment outcomes can be greatly improved. Custom design of aneurysm coils hold great promise in treating all aneurysms, not just those that have the typical spherical or elliptical shape.

This technology has the potential to aid the clinical community by delivering a patient-centric treatment approach for cerebral aneurysm repair, mitigating possible treatment failures due to improper coil sizing and optimizing the process of pre-treatment planning.

Application area

- Patient-centric aneurysm fixtures
- Optimized aneurysm pre-treatment planning

Advantages

- Takes patient aneurysm geometry and morphology into account when planning coil treatment
- Works with typical and non-typical aneurysm sacs
- Optimal aneurysm occlusion
- Reduces the risk of long-term complications such as aneurysm recanalization or recurrence
- Uses machinable materials that are still able to withstand high temperatures without deformation
- Can be manufactured with high levels of accuracy

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