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Deployment of Interwoven Stents in an Artery With Moderate Stenosis

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Interwoven self-expandable stents demonstrate distinct characteristics compared with laser-cut ones. In this study, the deployment of interwoven stent in a stenotic artery was evaluated through finite element analysis. Moreover, a laser-cut stent with the same nominal dimensions as the interwoven one was simulated to assess the effect of manufacturing method on mechanical behavior of self-expandable stent. The results showed that relative sliding between struts reduced the strain on the interwoven stent under compressive loadings and larger strain occurred on the struts of laser-cut stent due to its restricted longitudinal extension. After deployment, the interwoven stent restored the patency of the stenotic artery; however, the dogbone shape was observed immediately after the releasing of the stent, which may lead to less lumen gains and higher risk of arterial dissection at both ends of the stent. Lesion preparation prior to the deployment of the stent may help relieve underexpansion of the stent.

A Pulsatile-Flow Model for Intracardiac Surgical Device Development

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Percutaneous treatments for heart disease have created new challenges for both physicians and medical device developers and manufacturers. In order to deliver the highest-quality care to patients, developers and physicians must be able to more easily access the intracardiac environment during the initial phases of device development and while learning to implement new tools and methods. We have developed a pulsatile flow model (PFM), which simulates the intracardiac environment using a bellows-pump and closed fluid flow circuit. The PFM is also outfitted with video imaging and other sensors to provide real-time feedback to a user. The PFM was used to aid in the development of a catheter for the percutaneous treatment of mitral regurgitation via chordal cutting. Knowledge gained from tests with the PFM are now being used by a manufacturer to produce catheters, which would be appropriate for more in-depth trials in both animal and human models. The pulsatile flow model provide physicians and manufacturers of cardiac surgical devices a platform for increasing the efficiency of the development process as well as the physicians ability to better treat patients.

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