Can the Streamliner multilayer flow modulator really streamline the solution to complex arch and thoracoabdominal aortic pathology?

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The Streamliner Multilayer Flow Modulator (SMFM; Cardiatis, Isnes, Brussels, Belgium) is composed of several layers of cobalt braided alloy and is designed to treat aneurysm pathology by reducing arterial wall tension while simultaneously preserving flow into branch vessels. This technology marks a paradigm shift in the treatment of aortic aneurysms. The device promotes laminar flow, with more reliance on the natural healing capabilities of the vascular endothelium. CE Mark approval for aortic procedures was granted in July 2011, and a recent meta-analysis reported a 1-year aneurysm-related survival of nearly 80% in 171 patients combined from 15 studies.1

In their article in this issue of the Journal, Stefanov and coauthors2 report their study of hemodynamic computational data derived from the treatment of complex aortic arch aneurysm with the SMFM. Among their total of 6 patients, 4 with pure arch pathology and 2 with type I thoracoabdominal aneurysm, their computational analysis revealed favorable blood flow patterns within the sac regions and reduction of sac volume in 4 patients at 1-year follow-up. Side branch vessel patency was also favorable in all patients. Stefanov and coauthors2 conclude that SMFM with advanced imaging and computational analysis may offer a new technologic advance in the endovascular therapy of complex arch pathologies.

The treatment for aortic arch pathology has historically consisted of open techniques requiring total arch replacement with period of circulatory arrest. Even in high-risk patient populations, acceptable results can be achieved, and this open surgical approach remains the criterion standard at many centers.3,4 The rapid expansion of thoracic endovascular technology in the past 15 years, however, is expanding the armamentarium for surgeons who manage complex aortic pathologies. With ongoing evolution in this arena, it is imperative to reassess critically the current status of surgical options for treating aortic arch pathologies (Figure 1). It is also incumbent on cardiovascular surgeons to embrace innovation and provide constructive input as the device industry works to develop disease-specific endovascular devices.

In their study, Stefanov and coauthors2 performed a technically rigorous computational analysis, which provided...
several important insights that warrant emphasis. They observed improved flow dynamics when devices were deployed under the instructions for use. In patients with treatment outside the instructions for use, mainly as a result of stent foreshortening during positioning, less favorable flow dynamics were observed. Furthermore, in those patients with treatment outside the instructions for use, aneurysm volume expansion of nearly 25% was seen. One of the patients treated for a thoracoabdominal aortic aneurysm had an extensive aneurysm length, generating a large volume of flow, which could not be modulated by the SMFM devices. This observation led Stefanov and coauthors\(^2\) to conclude that the SMFM device does not offer benefit if the sac volume exceeds 400 cm\(^3\).

The SMFM technology represents a novel approach to the treatment of complex aortic pathology. Although this study was limited to a very small sample of patients, it does provide important insights into a potentially transformative technologic advancement in device design for thoracic endovascular aortic repair. More clinical outcome data are needed before definitive commentary can be made regarding the effectiveness and long term durability of this technology. Stefanov and coauthors\(^2\) should be commended for their significant contribution to this field.

References