IOPS-Guided Antegrade In Situ Laser Fenestration in an Aortic Model

Emily Burnett, BA, Eastern Virginia Medical School, Norfolk, Virginia
Ben Samburg, BS, Eastern Virginia Medical School , Norfolk, VA
Allie Olmstead, DO, Eastern Virginia Medical School, Norfolk VA
Animesh Rathore, MD, Eastern Virginia Medical School, Norfolk, VA

Objective:

Fenestrated endovascular aneurysm repair (fEVAR) is routinely being used for visceral vessel incorporation in complex aneurysmal pathology, however, it is associated with prolonged procedure times, high radiation exposure, high contrast usage, and multiple staged procedures. To combat these limitations, Centerline Biomedical® developed the 3D surgical navigation and visualization technology: Intraoperative Positioning System (IOPS). We previously presented our IOPS-guided antegrade *in situ* laser fenestration (ISLF) in a standard aortic model. This case report details experience using IOPS guidance during a fEVAR procedure in a representative AAA model

Methods:

A silicone abdominal aortic segment (phantom) was 3D-printed (Fig. 1a) based on high-resolution CT imaging of a patient previously treated with fEVAR. An experimental fEVAR procedure was performed on the phantom through simulated vascular entry points in a heated water bath. We deployed a thoracic endograft within the phantom, then, using IOPS guidance, ISLFs were made for each visceral vessel (Fig. 1b, c). Bridging stents were placed through the created fenestrations into the respective visceral vessels. There was minimal to no radiation use for each branch cannulation except for confirmation of cannulation.

Results:

Stent deployment was confirmed via single shot X-ray (Fig. 1d). Completion angiogram demonstrated widely-patent renal arteries, celiac artery, superior mesenteric artery, with accurately aligned stent grafts.

Conclusion:

This case report describes IOPS guidance for ISLF. This uses minimal and avoids a pre-stenting procedure. This benchtop model demonstrates early feasibility, but further research should be conducted to evaluate the efficacy of IOPS guidance in a fEVAR procedure using a human model.

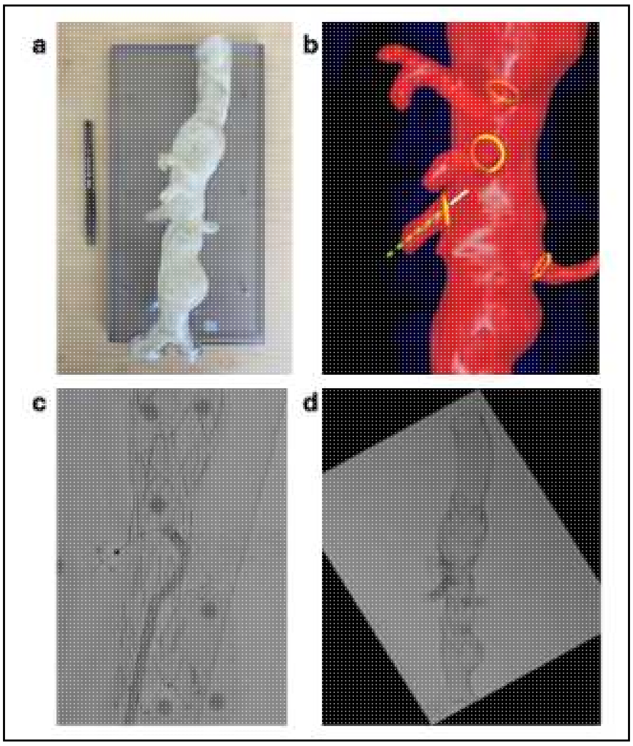

Fig 1 Fig. a) Silicone phantom developed based on patient CTA b) IOPS guidewire advanced into right renal artery c) Angiogram confirming IOPS guidewire position in right renal artery d) Single-shot X-ray demonstrating visceral vessel stent deployments