

The semi-compliant balloon bounce technique for total femoral approach during fenestrated-branched endovascular aortic aneurysm repair

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ABSTRACT

A total femoral approach for fenestrated-branched endovascular aortic aneurysm repair has been increasingly favored to minimize risks of aortic arch manipulation. We describe a novel technique to support the advancement of endovascular devices into a target vessel. Following catheterization of the intended target artery and deployment of the diameter-reducing ties, a Coda semi-compliant balloon (Cook Medical) is advanced and inflated immediately above the target artery. It is used as a support as the wire, catheter, or sheath “bounces” on the balloon, stabilizing the support wire to advance stent grafts, balloons, or sheaths into the downward renal or mesenteric vessels. (J Vasc Surg Cases Innov Tech 2024;10:101429.)

Keywords: Semi-compliant balloon; Thoracoabdominal aortic aneurysm; Total femoral endovascular aortic repair; Total femoral fenestrated and branched endovascular aortic repair

Fenestrated-branched endovascular aortic aneurysm repair (FB-EVAR) is a well-established strategy for complex aortic aneurysm repair with outcomes rivaling, or even surpassing, traditional open repair.^{1,2} It is a complex procedure often involving aortic arch manipulation with upper extremity access for target vessel catheterization, which can lead to neurologically adverse events. The use of a total femoral approach with steerable sheaths and technical maneuvers to minimize aortic arch manipulation has been an increasing tendency among experienced surgeons.³ The caveat of this approach is the challenging advancement of bridging stent grafts and angioplasty balloons into the renal and mesenteric arteries due to the tortuosity and acute angle created from the femoral access. We describe and illustrate a technique to support the advancement of endovascular devices into the target vessels using a total femoral approach.⁴ The patients provided written informed consent for the report of their images.

Our current strategy for FB-EVAR without upper extremity access includes insertion and advancement of the fenestrated-branched stent graft over a Lunderquist wire (Cook Medical) from one of the femoral

arteries, with deployment using on-lay fusion as a reference. Before the release of the diameter-reducing ties, we cannulate all the target vessels through a large, 16F to 22F, DrySeal sheath (W.L. Gore & Associates) inserted in the contralateral femoral artery. Typically, one or two target vessels are secured with a Rosen wire and the remaining vessels with a wire and a 6F or 7F sheath. In the case of difficulty advancing the Rosen wire, sheath, or stent, following target vessel catheterization and deployment of the diameter-reducing ties, a Coda semi-compliant balloon (Cook Medical) is advanced through the same femoral access used for fenestrated-branched stent graft advancement. The balloon is temporarily inflated immediately above the intended target vessel and is used as support as the wire, catheter, or sheath “bounces” on the balloon. Importantly, this maneuver is performed before deployment of any of the target vessel stents to avoid compression and loss of patency, unless there is significant space in the aortic stent graft. This can be the case in branched devices. Alternatively, when using a patient-specific company-manufactured device, the top cap and fabric of the device can be used to assist with advancement of the catheter, sheath, balloon, or stent in very caudally oriented vessels; however, this maneuver is usually not as successful in the case of physician-modified endovascular grafts, depending on the platform that is used.⁵

The semi-compliant balloon bounce technique provides stabilization of the support wire and is a useful technique for the advancement of stent grafts, balloons, or sheaths into renal and mesenteric vessels. We have successfully used this technique in several cases, and we created a video with details of the maneuver in four patients with somewhat distinct anatomies (Supplementary Video). This technique is useful for

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Additional material for this article may be found online at www.jvscit.org.

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The editors and reviewers of this article have no relevant financial relationships to disclose per the JVS policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

2468-4287

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<https://doi.org/10.1016/j.jvscit.2024.101429>

patients undergoing complex FB-EVAR through a total femoral approach, particularly in the presence of significantly caudally oriented renal and mesenteric vessels.

DISCLOSURES

B.C.M. has received consulting fees and grants from Cook Medical, W.L. Gore & Associates, and Medtronic (all paid to Mayo Clinic). G.B.L., N.C.C.-P., J.C., and R.R.D. have no conflicts of interest.

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Submitted Nov 13, 2023; accepted Dec 28, 2023.