

IMAGES IN INTERVENTION

Laser-Assisted Transcaval Access for Transcatheter Aortic Valve Replacement



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Trascaval access enables delivery of large-caliber devices to the aorta in patients with small or diseased iliofemoral arteries (1,2). The technique has been described in detail elsewhere (3) and requires pre-procedural computed tomography planning to identify a calcium-free 7.6 mm × 9.3 mm target window in the aorta through which transcaval access can be established (Figures 1A to 1C, Online Video 1) (4).

An energized 0.014" guidewire was advanced from cava into aorta. Telescoping catheters comprising a 145-cm 0.014"/0.035" Piggyback wire convertor (Vascular Solutions, Minneapolis, Minnesota) inside a 90-cm 0.035" Navicross microcatheter (Terumo, Tokyo, Japan) would not cross the calcified wall of the aorta. Dilatation of the aortic wall revealed a tight focal waist on a 2.5-mm noncompliant balloon inflated to 28 atm (Figure 1D), and the microcatheter still would not cross. Further preparation of the aortic wall was performed using a 0.9-mm X-80 Excimer Laser Coronary Atherectomy catheter (Spectranetics, Colorado Springs, Colorado) with 6 passes at high power (80 mJ/mm²) and high repletion rate (80 Hz) (Figure 1E, Online Video 2), following which the telescoping catheter system was successfully

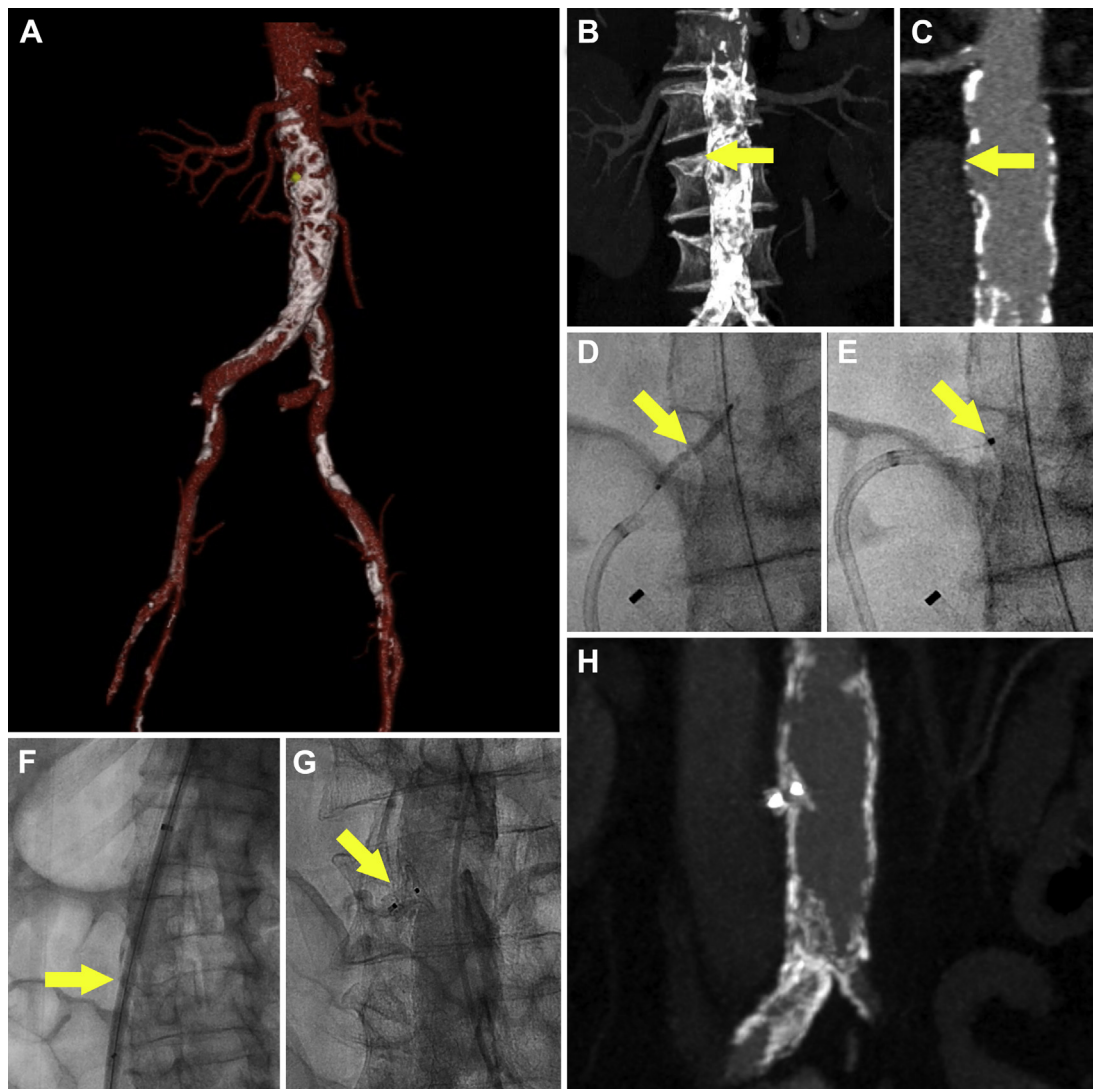
advanced into the aorta. After exchanging to a stiff 0.035-inch guidewire and pre-dilating with a 12-F sheath, a 16-F eSheath (Edwards Lifesciences, Irvine, California) was advanced into the aorta (Figure 1F, Online Videos 3 and 4) and a 29 mm Edwards SAPIEN 3 transcatheter valve (Edwards Lifesciences) was deployed without complication.

Protamine was administered before closure of the transcaval tract with a 10/8 mm Amplatzer Duct Occluder I (St. Jude Medical, St. Paul, Minnesota) (Figure 1G, Online Video 5). Final angiography revealed type II closure, defined as patent aortocaval fistula with "cruciform" contrast flow around the neck of the occluder but with return to the cava (3). This is the most common immediate closure pattern, seen in over 40% of cases. Post-operative day 2 contrast-enhanced computed tomography confirmed complete closure without retroperitoneal hematoma (Figure 1H). In summary, laser enables transcaval access in heavily calcified aorta.

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FIGURE 1 Laser-Assisted Transcaval Access

(A) Three-dimensional reconstruction of the abdominal aorta in right anterior oblique projection showing calcium in the aortic wall (Online Video 1). (B, C) Thick- and thin-slice coronal images of the abdominal aorta showing distribution of calcium and intended crossing target (arrow). (D) Balloon angioplasty demonstrated a tight focal waist (arrow) at the aortic wall. (E) Laser atherectomy catheter positioned against the aortic wall (arrow) (Online Video 2). (F) Wide-bore access sheath advanced into the aorta from the inferior vena cava. The aortic wall entry point is marked by the arrow (Online Videos 3 and 4). (G) Closure of the transcaval tract with a nitinol closure device (arrow) (Online Video 5). (H) Pre-discharge computed tomography confirmed complete closure of the tract.

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APPENDIX For supplemental videos, please see the online version of this paper.