

IMAGES IN INTERVENTION

Occlusion of an Extremely Large Left Atrial Appendage Using the “Double-LAmbre Technique”



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A 71-year-old man with atrial fibrillation (CHADS₂-VASc = 5; HASBLED = 4) and history of mitral valve ring annuloplasty 10 years ago was referred for percutaneous left atrial appendage occlusion (LAAO) because of recurrent gastrointestinal bleeding on vitamin K antagonist and direct oral anticoagulants. Pre-operative computed tomography (Figures 1A and 1B) showed a huge bilobed left atrial appendage (LAA), with ostium diameter 47 × 32 mm. We performed in vitro pre-procedural LAAO device testing on a patient-specific 3-dimensional-printed LAA model derived from computed tomography data (Figure 1C). Simulated device testing using a tailored-made LAmB्रे 40/44 device (Lifetech Science, Shenzhen, China) resulted in a crescentic-shaped peridevice leak (Figure 1D). Test occlusion using a LAmB्रे 36/40 and a LAmB्रे 26/38 device, with their umbrella inserted into the 2 different lobes and the 40-mm cover overlying the 38-mm cover, showed optimal sealing of the huge LAA ostium without adverse device interaction (Figures 1E and 1F).

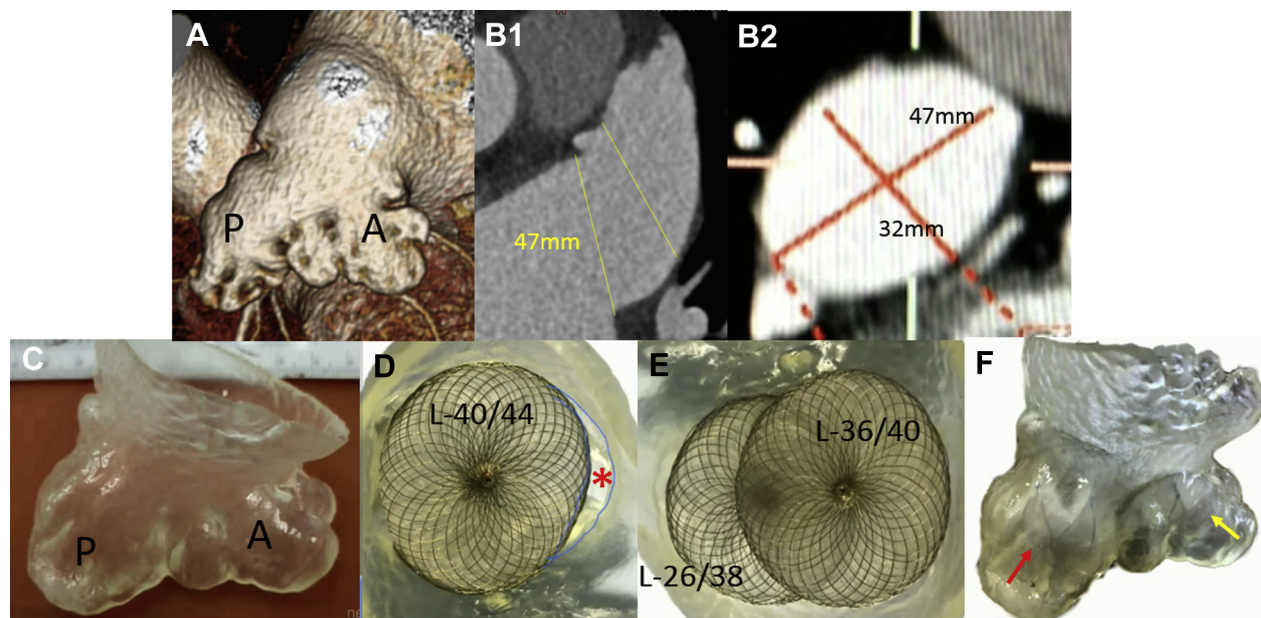
The LAAO procedure was performed under fluoroscopic and transesophageal echocardiographic

guidance. Two transseptal punctures were performed. To allow better device anchoring with the larger umbrella, the LAmB्रे 36/40 device was first implanted into the anterior lobe (Figures 2A and 2B, Online Video 1). A 5-F pigtail catheter was inserted into the LAA through the second transseptal sheath into the large residual leak (Figure 2C, Online Video 2). The straight end of an Amplatz Super Stiff wire (Boston Scientific, Natick, Massachusetts) was inserted inside the pigtail to support delivery of the second 10-F LAmB्रे delivery sheath into the LAA through the residual leak (Figure 2D). The second LAmB्रे 26/38 device was implanted with its umbrella inserted into the posterior lobe and its 38-mm cover intentionally pushed behind the 40-mm cover of the first device to reduce the risk of device embolization (Figures 2E and 2F, Online Videos 3 and 4). Angiogram showed no significant peridevice leak and the 2 devices were released after stable tug test (Figure 2G, Online Video 5).

LAA with ostium >40 mm cannot be occluded with currently available percutaneous LAAO devices. LAmB्रे is a novel device with increasing clinical experience (1,2). To the best of our knowledge, this is

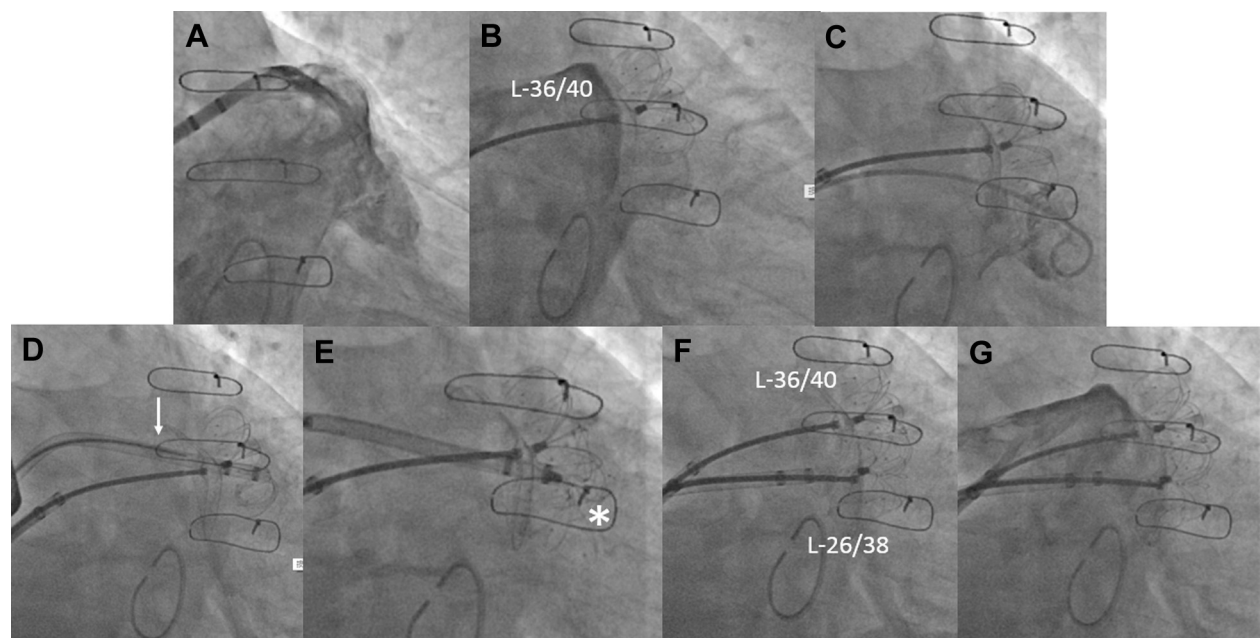
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FIGURE 1 Pre-Operative Planning

(A) Three-dimensional computed tomography reconstruction of the left atrial appendage showing the anterior (A) and posterior (P) lobes. (B1, B2) Ostium dimension of the left atrial appendage 47×32 mm on computed tomography. (C) Three-dimensional printed model. (D) Simulation using a tailor-made L-Ambre 40/44 device on the 3-dimensional printed model resulted in crescentic shaped residual leak (asterisk). (E) Simulation using a L-Ambre 36/40 (L-36/40) and a L-Ambre 26/38 device (L-26/38) resulted in optimal sealing of the left atrial appendage ostium. (F) Umbrella of the 2 devices shown inside the anterior (yellow arrow) and posterior lobe (red arrow), respectively.

FIGURE 2 Fluoroscopic Images at Right Anterior Oblique Caudal View Showing the Occlusion of the Extremely Large Left Atrial Appendage Using the “Double-Lambre” Technique



(A) Baseline left atrial appendage angiogram (Online Video 1). (B) Implantation of LAmbré 36/40 device (L-36/40) more into the anterior lobe (Online Video 1). (C) Pigtail inserted into the posterior lobe after a second transseptal puncture (Online Video 2). (D) The stiff end of an Amplatz Super Stiff wire (arrow) was inserted in a pigtail catheter and the 10-F delivery sheath was tracked into the posterior lobe under its support. (E) The umbrella (asterisk) of a LAmbré 26/38 device was deployed into the posterior lobe (Online Video 3). (F) LAmbré 36/40 was covering the LAmbré 26/38 device (Online Video 4). (G) Angiogram showed no significant peridevice leak (Online Video 5).

the first reported case of successful occlusion of a >40 mm LAA using the “double-Lambre” technique. Pre-operative device testing on patient-specific 3-dimensional-printed model can guide operators in the optimal implantation strategy and device choices in these challenging anatomies (3).

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