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A large LAA– too big for closure? LAA closure with the world's biggest percutaneous closure device

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Short title: Left atrial appendage closure of large LAA

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Conflicts of Interest: None.

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Commercially available left atrial appendage (LAA) closure devices allow closure of the left atrial appendage ostium up to a diameter of 32 mm. A 77year-old male patient with high stroke (CHA_2DS_2-Vasc score = 6) and bleeding (HASBLED score = 3) risk and a history of cerebral embolism on direct oral anticoagulant agents therapy was evaluated for LAA occlusion. Transesophageal echocardiography (TEE) and computer tomography (CT) imaging determined ostial diameters of 36 x 47 mm and 37 x 48 mm, respectively (Figure 1A-D, Suppl. Figure 1, Suppl. movie 1-2). Because of non-eligibility for long-term oral anticoagulation and high risk for stroke, a custom- made Lambre® device (50x44mm) (Lifetech Scientific) was produced. The device was delivered by a 10-F commercial sheet (Lifetech Scientific) to the LAA and successfully implanted (Suppl. video 3). The procedure and the handling of the device were unremarkable. Correct device position and complete sealing of the LAA was confirmed by angiography and TEE -Doppler as well as CT imaging (Figure 1E-H, Suppl. video 4). The Lambre® device was successfully and safely released. No further complications were detected. The 3-month follow-up determined the device well seated with complete sealing of the LAA, and no device-related thrombus was diagnosed by TEE and CT imaging.

This case outlines the feasibility and safety of large LAA closure by custom-designed devices. Even these anatomical challenging morphologies can be closed safely with commercially available sheets. Custom-designed percutaneous closure (maximum device size 52 x 44 mm) appears to be superior to other techniques such as double-device or minimally invasive surgical procedures to prevent an incomplete coverage of lobes, partial sealing of the LAA ostium or late leaks.

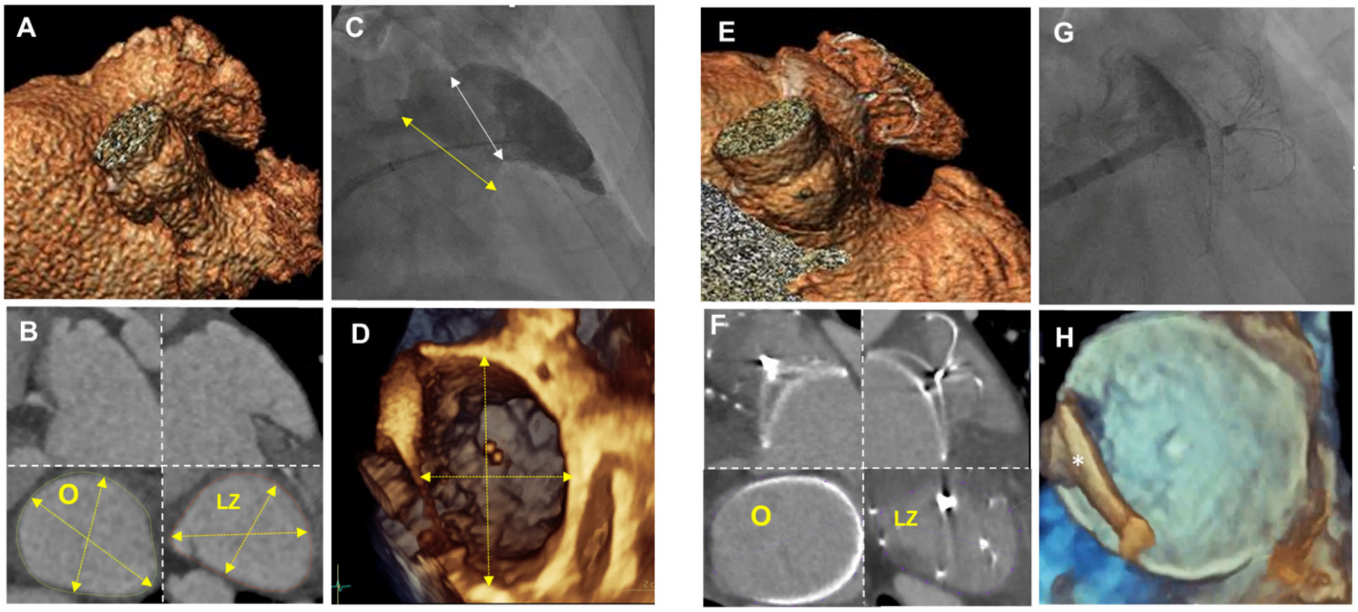

Figure1: (A) Pre-procedural computer tomography (CT), 3-dimensional (3D) reconstruction (3 Mensio) indicating Windsock anatomy of the left atrial appendage (LAA). (B) Pre-procedural CT images, coronal (left) and sagittal (right) planes were used to identify the ostium (O, 37 x 48 mm) and landing zone (LZ, 28 x 39 mm) (double oblique view, bottom). (C) Fluoroscopic image of the LAA: the ostium is indicated by the yellow arrow, landing zone by the white arrow. (D) 3D TEE image illustrating ostium of the LAA (yellow lines: 36 x 47 mm). (E) Post-procedural CT, 3D reconstruction (3 Mensio), device in situ. (F) Post-procedural CT images indicating device position in coronal (right) and sagittal (left) planes, oblique view showing ostium and landing zone (bottom). (G) Fluoroscopic image post-implantation: no leak. (H) 3D TEE post implantation indicating device location with complete closure of the LAA ostium (asterix: delivery system post-release in the left atrium).

Suppl. Figure 1: 3D-TEE image depicting mitral valve (MV) and LAA ostium (LAAO) size.

Suppl. Video 1: 3D- TOE comparing size of left atrial appendage ostium (LAA) to mitral valve area (MV).

Suppl. Video 2: Pre-procedural CT illustrating anatomy of the LAA.

Suppl. Video 3: Implantation of the device by 3D-MPR (multiple-plane reconstruction) imaging.

Suppl. Video 4: Tug-test following device implantation: A) Fluoroscopy. B) TOE (X-Plane).

Suppl. Video 5: Post-procedural CT indicating complete closure following device implantation.