

# Negotiating Transcatheter Aortic Valve Replacement in Severe Peripheral Arterial Disease

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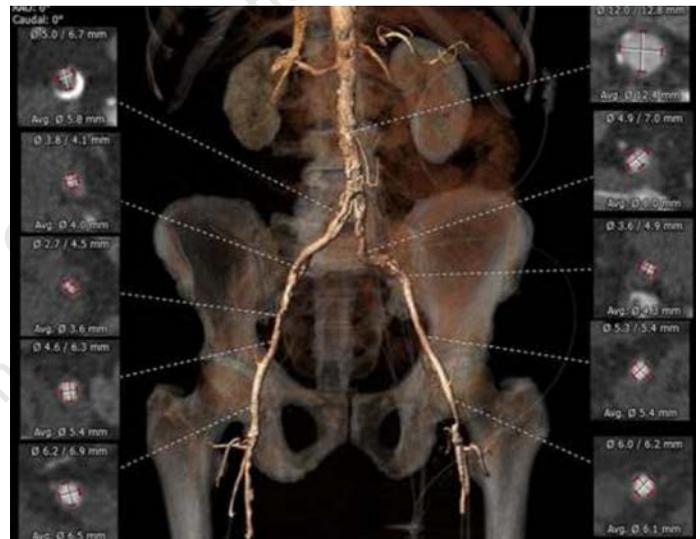
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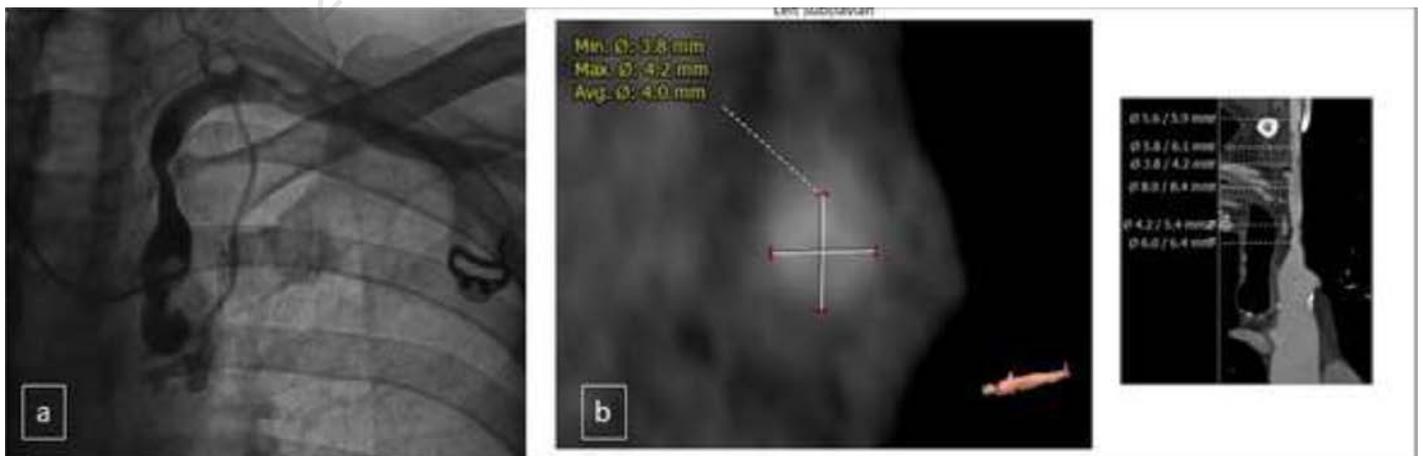
**Key words:** peripheral arterial disease, TAVR, transcatheter aortic valve replacement

A 73-year-old man, a former smoker with chronic obstructive pulmonary disease, presented with progressive angina for 1 month and 2 episodes of syncope. He was previously treated for coronary artery disease with a drug-eluting stent in the left anterior descending artery. He had a harsh ejection systolic murmur in the aortic area and decreased bilateral lower limb and left upper limb pulses. His electrocardiogram showed sinus rhythm with left ventricular hypertrophy. Two-dimensional echocardiography showed a degenerated calcific aortic valve; mean gradient of 64 mm Hg; aortic valve area of 0.84 cm<sup>2</sup>; and an ejection fraction of 45%. Coronary angiography showed a patent left anterior descending stent and nonobstructive plaques. With a EuroSCORE II of 12%, the patient was deemed a high-risk surgical candidate and was scheduled to have a transcatheter aortic valve replacement (TAVR).

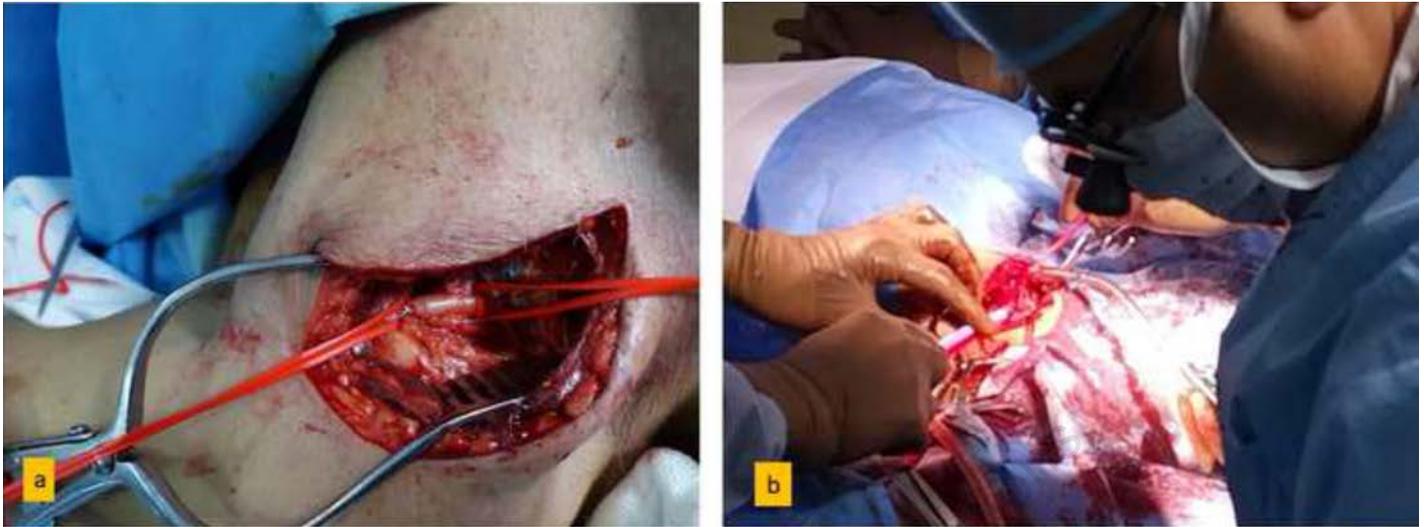
Computed tomography revealed peripheral arterial obstructive disease in his lower limb arteries. Minimal diameter of the right femoral artery was 6.2 mm; external iliac artery (EIA), 2.7 mm; and common iliac artery (CIA), 5 mm. Minimal diameter of the left femoral artery was 6 mm; EIA, 3.6 mm; and CIA,



**Figure 1.** Three-dimensional reconstructed computerized tomography image showing peripheral artery obstructive disease in the bilateral lower limbs.



**Figure 2.** Cineangiography showing focal stenosis of the left subclavian artery (a). Computed tomography images showing a minimal lumen of 3.8 mm (b).



**Figure 3.** Exposed left axillary artery (a). A 16 Fr sheath being placed in the axillary artery (b).



**Figure 4.** Balloon dilatation of the left subclavian artery (a). Cineangiography showing adequate dilatation (b). A 16 Fr sheath being placed in the axillary artery (c).

4.9 mm (**Figure 1**). There was 90% focal stenosis just at the origin of the left subclavian artery (**Figure 2a**) with a minimum diameter of 3.8 mm (**Figure 2b**).

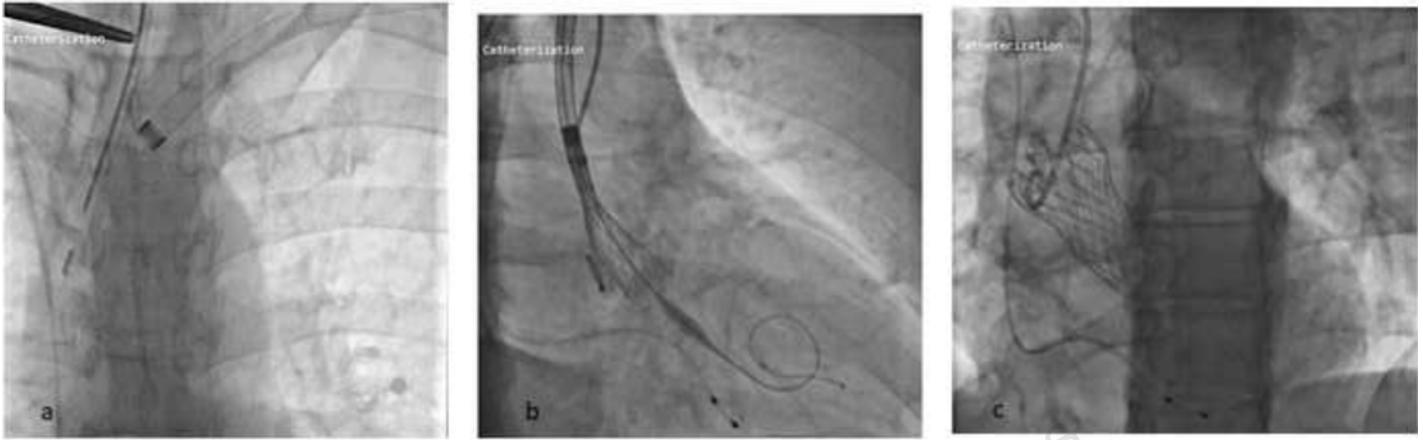
Our cardiology team decided to perform TAVR through the left subclavian artery, as the lower limb arteries were severely stenosed. A third part of the left axillary artery was exposed through infraclavicular incision, and a horizontal arteriotomy was performed (**Figure 3a**).

A 3.5 Fr Judkins right catheter with a Glidewire (Terumo) was passed from the left subclavian artery to the descending aorta. The Glidewire was replaced with an Amplatz Super Stiff guidewire (Boston Scientific), and the left subclavian ostium was dilated with a 6 mm x 40 mm balloon (**Figure 4a**). Cineangiography showed an adequately dilated subclavian artery (**Figure 4b**). A 16 Fr sheath was placed in the left axillary artery (**Figure 3b**, **Figure 4c**, and **Figure 5a**). After crossing the aortic valve, a 23 mm Evolut self-expanding valve (Medtronic) was deployed successfully under fluoroscopic guidance (**Figure 5b** and **Figure 5c**).

The arteriotomy site was closed with 6-0 Prolene sutures (Ethicon). Adequate hemostasis was achieved, and the postprocedure period was uneventful. The patient was discharged on the third postoperative day on dual antiplatelets.

### Potential to Use Intravascular Lithotripsy

Peripheral arterial disease (PAD) affects more than 200 million people worldwide.<sup>1</sup> The presence of calcium in these atherosclerotic lesions makes intervention cumbersome. Atherectomy, scoring, and cutting balloons have been used to modify these calcific lesions; however, these modalities fracture only the medial calcium (renal disease, older patients, diabetes) and are associated with an increased risk of procedure-related vascular complications, including dissection, perforation, and embolization.<sup>2</sup> Our patient had severe calcific PAD in the bilateral lower limbs, and it was difficult to negotiate the TAVR delivery system across the stenosed subclavian artery. After subclavian



**Figure 5.** A 16 Fr sheath in the subclavian artery (a). Successful deployment of a 23 mm Evolut (Medtronic) self-expanding valve (b, c).

angioplasty, we were successful in delivering the transcatheter aortic valve.

Among newer innovations and techniques developed to tackle calcific lesions, intravascular lithotripsy (IVL), which utilizes pulsatile sonic pressure waves to disrupt calcified plaques, has emerged as a promising tool. IVL is effective in modifying both intimal and medial calcium of vessel walls, improving vessel compliance and facilitating greater luminal gain during percutaneous interventions. The FDA approved IVL for severely calcified PAD in 2016 and for calcified coronary artery disease in February 2021. ■

**Disclosure:** The authors have completed and returned the ICMJE Form for Disclosure of Potential Conflicts of Interest. The authors report no conflicts of interest regarding the content herein.

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