EuroIntervention
2026;22:e326-e327
published online e-edition March 2026
DOI: 10.4244/EIJ-D-24-00661

Percutaneous access and closure in transcarotid aortic valve implantation using a collagen vascular plug

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This paper also includes supplementary data published online at: https://eurointervention.pcronline.com/doi/10.4244/EIJ-D-24-00661

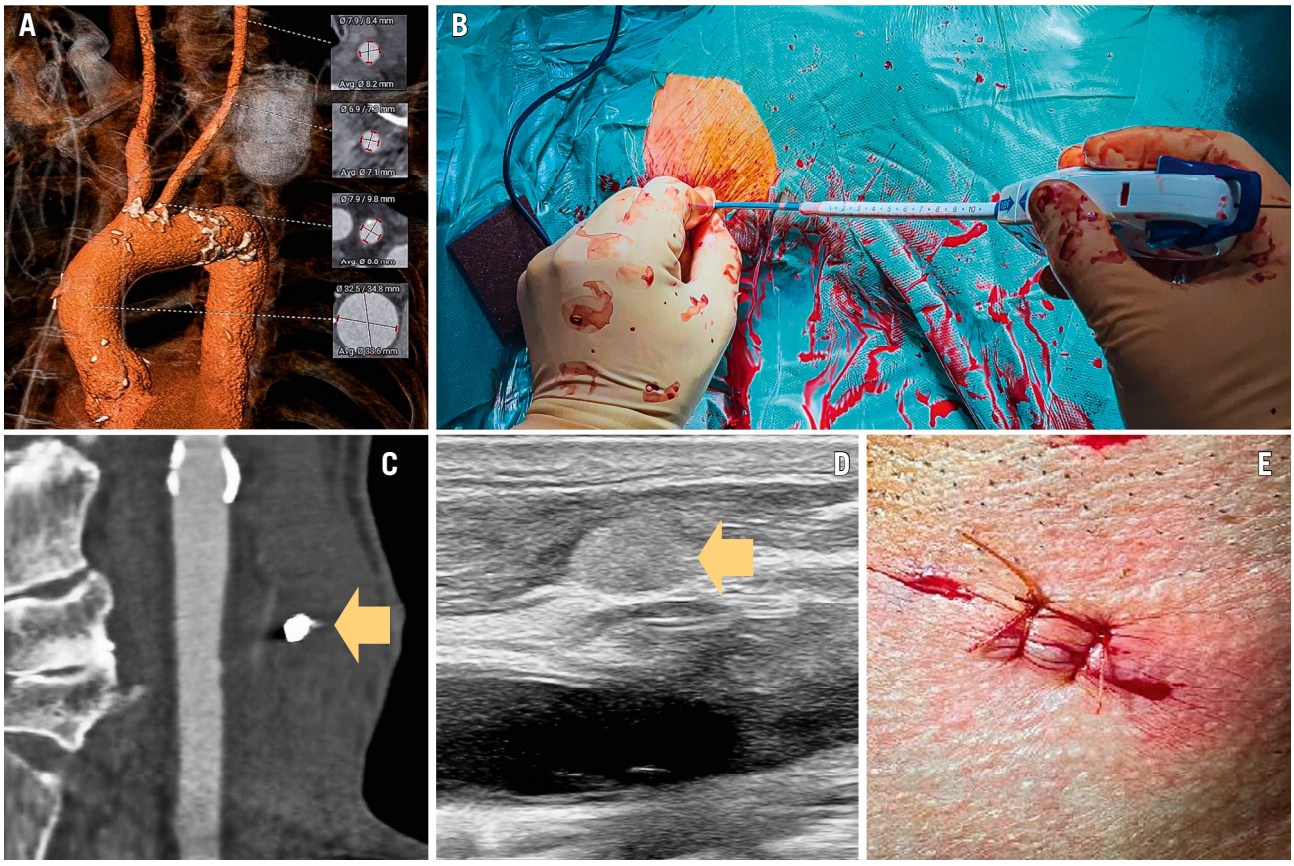

Figure 1. *Percutaneous transcarotid access and closure using a collagen-based vascular plug during TAVI. A) Preoperative computed tomography evaluation of the left carotid artery; (B) access site closure using a MANTA 18 Fr vascular collagen device; (C) computed tomography of the carotid artery after vascular closure (yellow arrow: device metal pin); (D) vascular ultrasound of the carotid artery (yellow arrow: device collagen plug); (E) skin sutures placed over the carotid access site. TAVI: transcatheter aortic valve implantation*

SUBMITTED ON 21/07/2024 - REVISION RECEIVED ON 1st 05/07/2025 / 2nd 11/08/2025 - ACCEPTED ON 27/08/2025

A 73-year-old male presented to our hospital with symptoms of severe heart failure. The history revealed chest radiotherapy for lymphoma, ischaemic stroke, atrial fibrillation, and implantable cardioverter-defibrillator implantation for primary prevention. Echocardiography confirmed severe, bicuspid Sievers type 1 aortic valve stenosis. Computed tomography (CT) and vascular ultrasound revealed bilateral severe stenoses of the iliac arteries with patent carotid access without wall calcifications or jugular vein overlap **(Figure 1A)**. After the Heart Team assessed the optimal vascular access, the patient was qualified for a transcarotid transcatheter aortic valve implantation (TAVI) using the SAPIEN 3 Ultra and Commander delivery system (Edwards Lifesciences).

The left common carotid artery was punctured under general anaesthesia and vascular ultrasound monitoring. The MANTA vascular closure device depth locator (Teleflex) was used to determine the skin-to-carotid artery distance for subsequent insertion of a 14 Fr eSheath. The SAPIEN 3 Ultra 26 mm valve was implanted with left ventricular pacing using a cusp-overlap fluoroscopy view to ensure full bioprosthesis expansion. Following protamine administration and removal of the TAVI system, the operator inserted the MANTA delivery sheath into the carotid artery, connected it to the device handle, and withdrew it to a position 1 cm below the measured arterial depth. The polymer anchor was then deployed and pulled into contact with the vessel wall. The operator advanced the collagen plug and metal pin by pushing the advancement tube towards the carotid artery wall, effectively sealing the puncture site **(Figure 1B, Moving image 1).** Haemostasis occurred within 30 seconds. Skin sutures were placed, and the patient was extubated in the hybrid room. Postprocedural ultrasound detected a minor carotid artery pseudoaneurysm at the access site, which resolved by the second day following ultrasound probe compression. The patient's 1-year follow-up was uneventful, with complete restoration of carotid arterial wall integrity on CT examination **(Figure 1C, Moving image 2)**.

The carotid arteries represent an attractive alternative for large-bore access in TAVI procedures. Traditionally, surgical cutdown and purse-string sutures have been the mainstay method for safe access and closure with this approach[1-3]. This report describes the first fully percutaneous transcarotid TAVI technique utilising a large-bore, collagen-based closure device, demonstrating its feasibility.

Compared with suture-based systems, collagen-based closure eliminates the need for repeated needle passes and presuturing, thereby reducing the risk of interference with surrounding structures. In case of incomplete closure or vascular compromise, bailout strategies such as carotid artery balloon angioplasty can effectively manage stenosis or obstruction caused by the closure device. Positioning a safety 0.014" guidewire distal to the carotid puncture site may facilitate such interventions if needed. The MANTA device sutures should remain uncut until the procedure is fully completed, to reduce the risk of anchor displacement. If persistent bleeding occurs, conversion to surgical repair should be considered. Alternative bailout options include manual compression with prolonged haemostasis or placement of a covered stent.

Further comparative studies between surgical and percutaneous carotid artery closure are warranted to evaluate the feasibility, safety, and long-term outcomes of these approaches.

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Conflict of interest statement

R. Parma reports receiving travel and speaker fee support from Edwards Lifesciences. The other authors have no conflicts of interest to declare.

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Supplementary data

Moving image 1. Percutaneous transcarotid TAVI performed using an 18 Fr MANTA vascular closure device.

Moving image 2. Computed tomography angiography of the left common carotid artery following closure with an 18 Fr MANTA plug-based device. A radiopaque metal pin is visible adjacent to the external carotid artery wall, indicating the position of the vascular plug.

The supplementary data are published online at: https://eurointervention.pcronline.com/doi/10.4244/EIJ-D-24-00661