From the Midwestern Vascular Surgical Society

Transradial-based thoracic branch endograft repair for thoracic aortic aneurysms experience at a suburban community hospital

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ABSTRACT

We present two cases where a transradial-based approach was used to implant thoracic branch aortic endografts to repair aortic aneurysms totally percutaneously. Both procedures were performed electively at a 330-bed suburban community hospital. No complications were associated with either procedure with both patients only requiring overnight observation and being discharged home the next day. With careful patient selection, the transradial through-and-through approach for thoracic endovascular aortic repair using the Gore Thoracic Branch Endoprosthesis provides a totally percutaneous option that can be performed feasibly and safely within a community hospital setting. (J Vasc Surg Cases Innov Tech 2025;11:101677.)

Keywords: Aneurysm; Thoracic aorta; Subclavian artery; Endovascular repair; Transradial

Thoracic aortic aneurysms originating close to the origin of the left subclavian artery require a proximal landing zone of an aortic endoprosthesis in Ishimaru zone 2. In these cases, the Gore Thoracic Branch Endoprosthesis (TBE) (W. L. Gore & Associates, Flagstaff, AZ) can be implanted during thoracic endovascular aortic repair (TEVAR) using a through-and-through guidewire technique extending from the femoral artery to one of the left upper extremity arteries, typically the axillary or brachial artery. There have been increasing reports of percutaneous radial artery access being used as an alternative.[1,2] Here, we provide a detailed description of our method and experience at a suburban community hospital with a transradial-based approach where a through-and-through guidewire was established entirely percutaneously between the radial and femoral arteries in two patients. Both patients presented provided written informed consent for the report of their case details and imaging studies.

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CASE REPORT

Case 1. A 57-year-old man with no prior medical history initially presented to the emergency department complaining of a 4-day history of back pain that occasionally radiated to his chest, abdomen, and lower extremities. Upon presentation he was found to be severely hypertensive with a systolic blood pressure (BP) of >200 mm Hg and a diastolic BP of >100 mm Hg. Computed tomography angiography (CTA) revealed a Stanford type B aortic dissection with the anterior tear starting in the proximal-to-mid descending thoracic aorta with retrograde dissection that extended to the origin of the left subclavian artery. The patient was immediately treated with intravenous infusion of esmolol and nicardipine and dosed to target goals of a heart rate of <60 bpm and systolic BP of <120. His symptoms resolved with medical therapy and he was transitioned from intravenous to oral medications. Repeat CTA 48 hours after presentation demonstrated interval growth of the aorta from 3.8 to 4.18 cm. The false lumen was thrombosed partially and the dissection extended down to the left common iliac artery. At this point, the decision was made to proceed with interval endovascular repair of the aorta given that the patient's symptoms had resolved and there was no evidence of end organ ischemia. The patient underwent TEVAR with the Gore TBE 30 days after his initial presentation.

Case 2. A 63-year-old man with a history of poorly controlled hypertension, dilated cardiomyopathy, and ischemic stroke was diagnosed initially with a 4.7-cm descending thoracic aortic aneurysm that was incidentally found on a CTA during a stroke workup. The patient was discharged to a skilled nursing facility with plans for close outpatient follow-up. The aneurysm was stable at the 3-month follow-up, but at 9 months the aneurysm grew to 5.1 cm with a saccular morphology. During this interval, the patient experienced a hemorrhagic stroke, which further

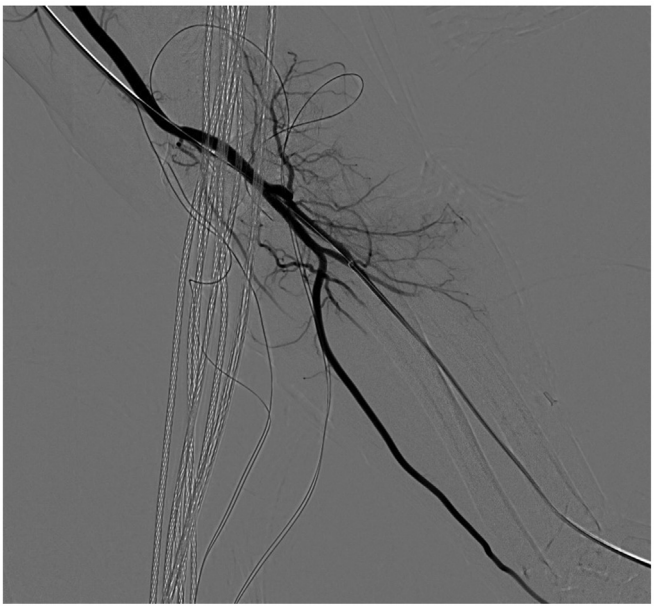

Fig 1. Left transradial artery access.

delayed intervention. At 13 months after presentation, the patient underwent another CTA study that again demonstrated that the saccular aneurysm was stable at 5.1 cm in size. At 14 months after presentation the patient underwent TEVAR with the Gore TBE.

Procedure and postoperative management. Similar techniques were used for both patients. The Allen test was used to verify a complete palmar arch and ultrasound examination was used to verify that radial artery diameter measured ≥3 mm along its length. Both patients underwent general endotracheal anesthesia and were prepared and draped in standard sterile fashion. Right common femoral artery access was obtained using ultrasound-guidance with placement of a short 6F sheath. Two Perclose devices were deployed and the 6F sheath was exchanged for a 10F short sheath. A J-wire was advanced up to the ascending aorta and then exchanged over a long catheter for a Lunderquist wire. The 10F short sheath was then exchanged for a long 22F to 24F sheath after sequential dilation.

The left radial artery was then accessed under ultrasound guidance with a micropuncture kit and a 4/5F, 16-cm Glidesheath Slender sheath was placed (Terumo Medical Corp., Somerset, NJ). To minimize arterial spasm, a cocktail injection of heparin 2500 U, verapamil 2.5 mg, and nitroglycerin 200 μg was given through the radial sheath. A 450-cm Jagwire (Boston Scientific Corp, Marlborough, MA) was advanced from the left radial artery into the descending thoracic aorta and passed into the femoral sheath for through-and-through access (Fig 1). The radial sheath was then exchanged with a 5F, 90-cm Flexor Shuttle-SL sheath (Cook Medical LLC, Bloomington, IN) and advanced up to the subclavian artery. At this point the Gore Thoracic Aortic Graft was advanced from the right femoral access and guided into position under fluoroscopic guidance (Fig 2, *A*).

After the device was deployed, the radial sheath was advanced in to the subclavian portal and the branch piece was advanced from the femoral access up to the radial sheath (Fig 2, *B*). The radial sheath and the branch piece were moved together into the left subclavian artery. Once deployed the branch piece and aortic endograft were balloon dilated for adequate approximation. For both patients, the 34 × 150 mm main body with a 12 × 8 × 60 mm branch was used. The grafts were post-dilated with a 10 × 37 mm molding and occlusion balloon with a maximum pressure of 5 atm. After performing a final confirmatory angiogram demonstrating adequate flow into the left common carotid and left subclavian arteries with no endoleaks, the through-and-through wire and all sheaths were removed. A Vasc Band Hemostat (Teleflex Inc., Wayne, PA) was used for hemostasis of the radial artery (Fig 2, *C* and *D*).

The total procedure time was 66 minutes for case 1 and 78 minutes for case 2. Fluoroscopy time was 18.2 minutes for case 1 and 16.4 minutes for case 2. Estimated blood loss (EBL) was 40 mL for case 1 and 50 mL for case 2 (Table). There were no complications during either procedure and both patients tolerated the procedure well. The patients were admitted to an observation unit overnight and were discharged home the next day without postoperative complications.

DISCUSSION

Highlighted are our experiences using a transradial-based approach to implant thoracic branch aortic endografts to repair aortic aneurysms totally percutaneously in a suburban community hospital setting. The Gore TBE device can be fully implanted transfemorally with a recent study reporting using a femoral cutdown in 67.7% of its cases.[3] A through-and-through guidewire provides greater wire stability during the positioning and deployment of the branch piece and also removes the technical challenge of cannulating the left subclavian artery in anterograde fashion.[4] Typically, the upper extremity access is placed in the axillary or brachial artery using a cutdown exposure technique. A transradial approach can provide a totally percutaneous alternative that spares patients the morbidity of an upper extremity incision. A totally percutaneous approach may also help to decrease overall EBL and operative time. Our two cases had an average EBL of 45 mL vs the reported average of 316 mL, and an average procedure time of 72 minutes vs the 154.5 minutes reported in the Gore TBE clinical studies.[3]

The transradial approach is associated with easy accessibility and a low incidence of bleeding complications.[5] Recent advancements in the development of thinner-walled sheaths with smaller outer diameters have made the use of radial access more feasible. The radial artery should be assessed by ultrasonography to confirm that the vessel lumen is ≥3 mm with minimal tortuosity to decrease the risk of dissection during passage of the transradial sheath. The radial access cocktail of heparin, verapamil, and nitroglycerin can help to decrease radial

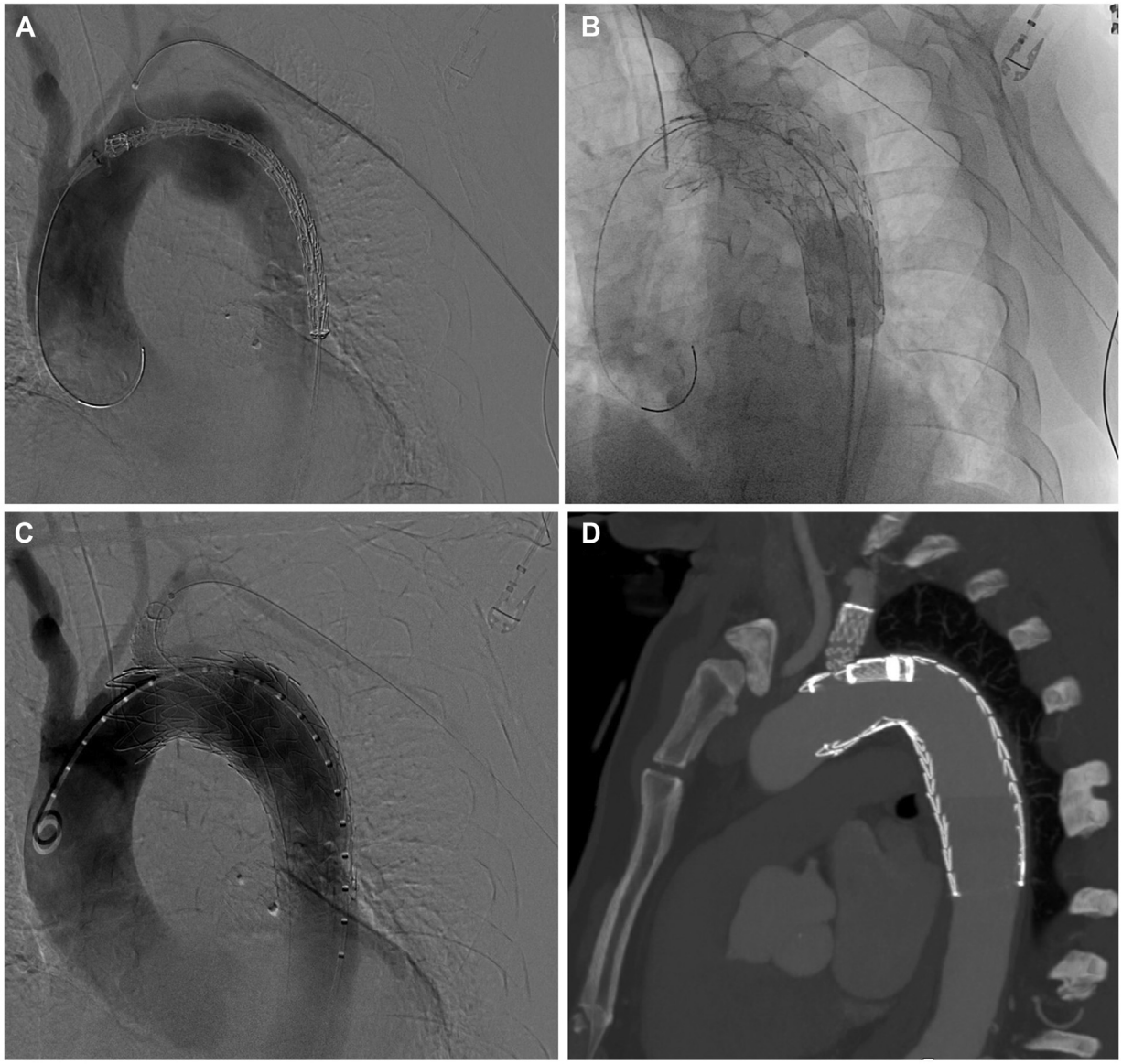

Fig 2. Advancement of thoracic aortic graft and subclavian branch graft. (**A**) The thoracic aortic graft is advanced to its final position and deployed, (**B**) followed by positioning and deployment of the subclavian branch graft. (**C**) Completion angiography demonstrates patent filling throughout the implanted thoracic branch endograft. (**D**) Computed tomography angiography (*CTA*) also demonstrated patent filling throughout following thoracic branch endograft placement.

Table. Summary of case variables

Case #	Age, years	Sex	Aortic graft size, mm	Subclavian branch graft size, mm	Time to intervention from presentation, days	Total procedure time, minutes	Total fluoroscopy time, minutes	EBL, mL	POD discharge
1	57	Male	31 × 150	12 × 60	30	48	18.2	40	1
2	63	Male	34 × 150	12 × 60	426	66	16.4	50	1
Mean ± SD	60 ± 4.2				228 ± 280	57 ± 12.7	17.3 ± 1.3	45 ± 7.07	1

EBL, Estimated blood loss; *POD*, postoperative day; *SD*, standard deviation.

artery spasm during the procedure. The most common complication associated with transradial access is radial artery occlusion. It has a reported incidence of 1% to 10%, although the majority of patients remain asymptomatic so long as the palmar arch is intact.[6,7] With careful patient selection, the transradial through-and-through approach for TEVAR using the Gore TBE provides a totally percutaneous option that can be feasibly and safely performed within a community hospital setting.

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DISCLOSURES
None.

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