Closure of the Axillary Artery Puncture Site with StarClose System after Endovascular Interventions

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ABSTRACT

The use of the StarClose vascular closure device for puncture site hemostasis after therapeutic endovascular interventions performed through the axillary artery under anticoagulant therapy in six patients is reported. Three minor complications, including hematoma, prolonged hemostasis, and pain, occurred in three patients. Based on this limited experience, this method can be used safely for axillary artery puncture site hemostasis after endovascular procedures without significant complications.

ABBREVIATIONS

CCA = common carotid artery, CFA = common femoral artery, ICA = internal carotid artery, US = ultrasonography, VCD = vascular closure device

Diagnostic and therapeutic endovascular procedures are mainly performed via common femoral artery (CFA). These procedures can also be performed via axillary artery when femoral arteries are unavailable (1,2). Femoral arterial puncture site hemostasis is achieved by manual or mechanical compression. The most important advantages of vascular closure devices (VCDs) compared with manual compression are short hemostasis time and reduced time to mobilization (3,4). Severe coagulopathy; continuous high-dose antiplatelet, antithrombotic, and anticoagulant drug treatment; restlessness; increased risk of recurrent bleeding; confusion; inability to lie flat; and closure of large femoral access site after percutaneous endovascular aortic aneurysm repair are major indications for VCD implementation (4). There are limited experiences with VCD placement in arteries of the upper extremities (5–9). The present report describes the use of StarClose VCDs (Abbott Vascular, Redwood City, California) for closing axillary artery puncture sites in therapeutic endovascular interventions.

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CASE REPORTS

Our institution does not require institutional review board approval for retrospective case reports such as this. In this retrospective case series, medical records of six patients who underwent transaxillary therapeutic intervention and vascular closure with a StarClose VCD from October 2009 to December 2010 were reviewed. All procedures were planned to be performed via CFA access but CFAs had been bilaterally occluded. Occlusion was confirmed by Doppler ultrasonography (US) and the use of a biplane flat-panel fluoroscopy system (AXIOM Artis; Siemens, Erlangen, Germany) after administration of contrast media. The operators had more than 3 years of clinical experience with StarClose VCD use and 5 years of clinical experience with transaxillary endovascular interventions. Vital functions were monitored during all procedures. Under local anesthesia (lidocaine 1%, without epinephrine), axillary artery puncture was performed via Seldinger technique with US guidance. With lidocaine injection, as well as anesthesia, enough space for a nitinol clip between the artery wall and skin was provided. During the process, 0.035-inch guide wires (Terumo, Tokyo, Japan) and 4-F and 5-F diagnostic catheters (Terumo) were used. For three days before stent implantation, oral clopidogrel 75 mg/d and aspirin 300 mg/d were administered. An intraarterial bolus of 5,000 IU heparin was given immediately after insertion of the arterial sheath, and 1,000 IU heparin per hour was administered during the procedure to maintain an activated clotting time longer than 250 seconds. After the procedure, in peripheral stents, heparin (4 × 5,000 IU), enoxaparin sodium (2 ×

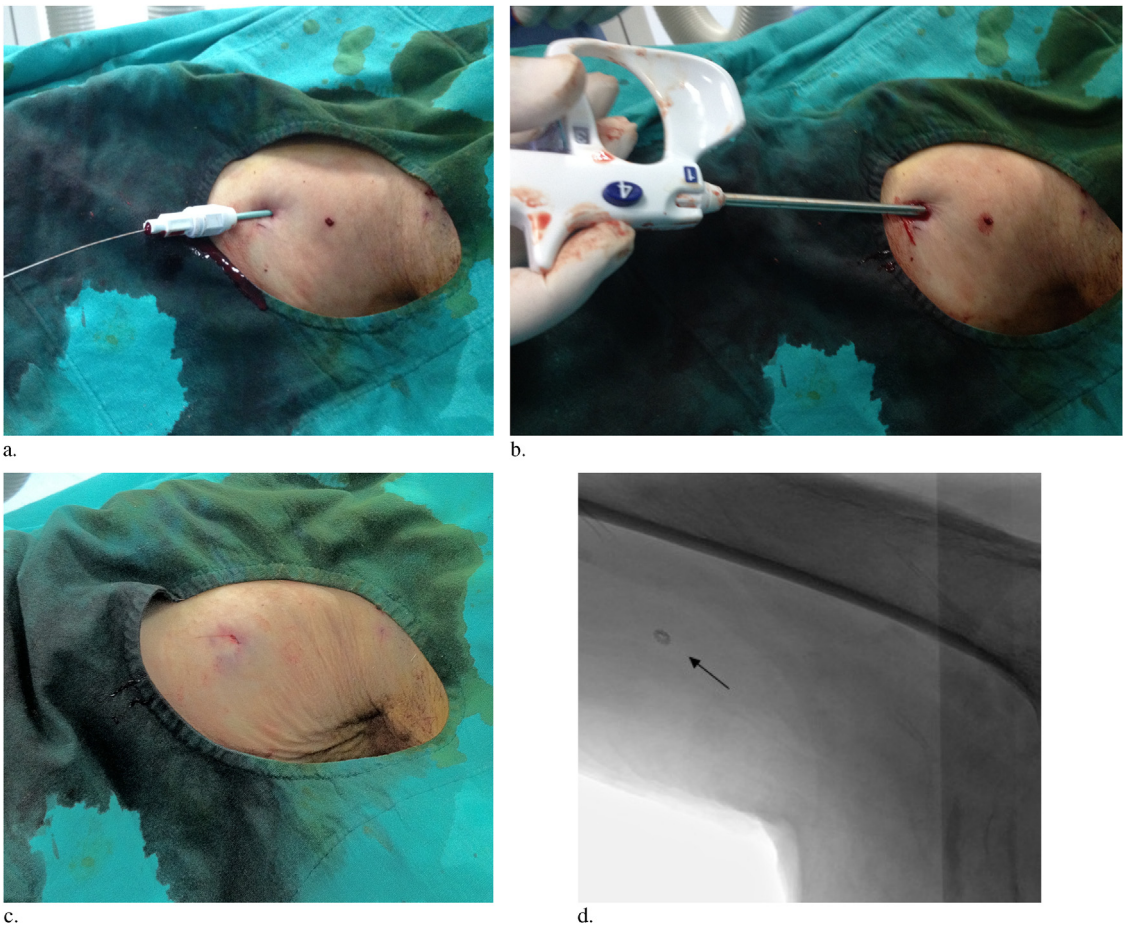

Figure. StarClose VCD implementation technique. **(a)** The endovascular procedure sheath was replaced with a 6-F dedicated exchange sheath. **(b)** The device was passed through the sheath. **(c,d)** After deployment of the nitinol clip, the StarClose device was withdrawn and hemostasis was achieved (arrow indicates the nitinol clip).

0.6 mL), and aspirin (1 × 300 mg) were maintained for 24 hours, 10 days, and lifetime, respectively; in carotid stents, heparin (1 × 1,000 IU), enoxaparin sodium (2 × 0.4 mL), clopidogrel (1 × 75 mg), and aspirin (1 × 300 mg) were maintained for 12 hours, 5 days, 6 months, and lifetime, respectively. Because of the long-term use of high-dose anticoagulant/antiplatelet therapy and the desire to provide rapid mobilization, puncture sites were closed with StarClose VCDs (4). The main contraindications for StarClose device implementation were absent radial pulse, ischemia or severe pain and hand function impairment, arterial wall plaques and diffuse calcification, known hypersensitivity to nickel/titanium alloy, and multiple arterial puncture attempts (9). Selective angiography of the axillary artery was performed before device implementation. No significant stenosis, plaque, or calcifications were observed in any patients. The procedure sheath was replaced with a 6-F dedicated exchange sheath (**Fig, a**). The device was passed through the sheath. The vessel locator was then opened and the sheath was cleaved while maintaining the position of the device perpendicular to the skin (**Fig, b**). After deployment of the clip, the StarClose device was withdrawn and hemostasis was achieved (**Fig, c, d**). No procedure-related complication was observed in any patient during StarClose VCD implantation. Manual compression was applied for 2 minutes until local hemostasis was achieved. Prolonged hemostasis time was defined as when manual compression time exceeded 2 minutes. Complications were classified according to Society of Interventional Radiology guidelines (10). Control examinations of patients who underwent stent implantation were performed at 1 day, 1 week, 1 month, and between 3 and 12 months. Patient demographics and procedure data are presented in the **Table**.

Case 1

A 70-year-old male patient with a history of hypertension, coronary artery disease, and smoking (> 60 cigarettes per day) presented to our clinic describing dysphasia and upper-extremity weakness. High-grade stenosis was observed in both internal carotid arteries (ICAs) by Doppler US and computed tomographic angiography, and stent implantation was planned. The right axillary artery puncture was performed and a 6-F