Multiple Fractures With Pseudoaneurysm Formation in a Subclavian Artery Stent

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A 50-year-old right-handed man (ex-smoker) with a history of left upper limb claudication for the previous 6 years underwent successful left subclavian artery (LSA) angioplasty with stent implantation (8×59 Genesis Stent [Cordis, Warren, NJ]) for 99% ostial and proximal stenosis of the LSA with use of a combined anterograde and retrograde approach (Figure 1A through 1D). The erythrocyte sedimentation rate and the C-reactive protein were normal. No other vascular system was affected. After an asymptomatic period of 4 months, the patient presented with a history of high-grade fever for 7 days, pain and swelling of the left hand, bluish discoloration of finger tips and palms, and restriction of movements of the fingers of left hand (Figure 2A). All left upper limb pulses were well felt. A Doppler arterial study of the left upper limb was also normal. At the diagnostic angiogram, fluoroscopy revealed that the LSA stent had transected at multiple levels (4 levels) (Figure 3A and Movie I of the online-only Data Supplement). The angiogram revealed the presence of 2 pseudoaneurysms, one at the origin of the LSA and another within the distal portion of the stent (Figure 3B and Movie II of the online-only Data Supplement). Flow within the stent and in the distal portion of the LSA and the brachial artery was normal. The stent fracture at multiple levels had led to pseudoaneurysm formation, throm-
basis, and microembolization, thereby explaining the symptoms of the left hand. Three blood cultures taken from the left upper limb were reported as sterile. A 64-slice contrast-enhanced computed tomography of the chest ruled out stent compression by the thoracic structures (Figure 4A through 4D). It also revealed that there were 2 pseudoaneurysms (not 1, as earlier thought) at the origin of the LSA (Figure 4D). A 8×59 ADVANTA V12 covered stent (Atrium Medical Corp, Hudson, NH) was deployed across the previous LSA stent to cover the stent fractures and exclude the proximal and distal pseudoaneurysms. A repeat angiogram revealed that the distal pseudoaneurysm was successfully excluded, but flow in the proximal pseudoaneurysms was still present (Figure 5A). Flaring of the proximal end of the stent graft with a 9×10 ATB balloon at 12 atm to achieve a more optimal apposition did not exclude the flow. Finally, using a 6F right Judkins diagnostic catheter, 3 coils (two 0.038×8×8 Cook Embolization coils and one 0.038×5×4 Cook detachable coil; Cook Medical, Bloomington, IN) were deployed in the more anterior of the 2 proximal pseudoaneurysms, and 1 coil was deployed in the more posterior one (0.038×8×8 Cook Embolization coil) (Figure 5C and 5D), achieving complete occlusion. The pain, swelling, and discoloration improved dramatically (Figure 2B). Following a 2-week antibiotic course, the patient was discharged on dual antiplatelet (aspirin and clopidogrel) therapy. A check angiogram after 6 weeks (Movie III of the online-only Data Supplement) and a computed tomography angiogram after 12 weeks (Figure 6) confirmed stent-graft patency without evidence of fracture or pseudoaneurysm formation. At 9 months follow-up, the patient remains asymptomatic, and has regained full power in his left hand.

Subclavian artery angioplasty with or without stenting is a well accepted, less invasive alternative to surgical revascularization for symptomatic proximal subclavian artery stenosis. Reports of stent fracture involving the brachiocephalic...
vessels are rare, because this is a relatively immobile region; thereby, it is protected against the biomechanical stress related to arm movements.\(^2\)\(^-\)\(^4\) Stent fracture (transection) at multiple levels in the proximal subclavian artery has not been previously reported. Our patient specifically denied any history of trauma or hyperextension injury. The length of the stented segment is a well known risk factor for stent fracture. Another factor could be the continuous mechanical stress within the pulsatile subclavian artery, leading to metal fatigue and stent fracture. A third factor that needs to be considered is the stent design. Periard et al\(^2\) reported a similar case of stent transaction within the right brachiocephalic trunk. They postulated that the stainless steel stent could have had mechanical properties that may explain the stent fracture.

**Disclosures**

None.

**References**


*Figure 5. A and B, Angiogram after placement of 8×59 ADVANTA V12 covered stent demonstrating successful exclusion of distal aneurysm and persistent flow in the proximal pseudoaneurysms. C, Placement of coils in the proximal pseudoaneurysms. D, Successful occlusion of proximal pseudoaneurysms.*

*Figure 6. Contrast-enhanced computed tomography after 12 weeks. Three-dimensional volume rendered image demonstrating a patent stent graft and absence of pseudoaneurysms.*
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