Iatrogenic Flow Limiting Arterial Dissection

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Iatrogenic arterial dissection is an uncommon complication that usually occurs during guide wire passage through stenoses or occlusions. It is reported to occur in 0.42% of patients during arterial access of cardiac catheterization. In some cases, this may be a catastrophic complication requiring thrombolysis and/or surgical bypass.

CASE REPORT

A 28-year-old woman with a history of femoral neck osteosarcoma treated by radiation and resection was referred to our interventional radiology section with left leg claudication. She had previously undergone left femoral-to-popliteal bypass graft insertion and noninvasive imaging demonstrated high velocity within the bypass.

After prepping and draping both groins, the right common femoral artery was punctured using Seldinger technique and a 6F Balkan up and over sheath was inserted over a guide wire. Pelvic arteriography performed via a 5F pigtail catheter demonstrated normal pelvic vasculature (Fig. 1). The left common iliac artery was catheterized over the bifurcation and a 0.035-inch soft tipped non-hydrophilic large J wire was advanced down the left external iliac artery. Resistance was noted at the inguinal ligament so the guide wire was retracted and a left common iliac arteriogram was performed (Fig. 2A) showing complete absence of flow in the previously patent left external iliac artery. Delayed unsubtracted views showed a spiral dissection flap outlined by retained contrast (Fig. 2B).

Five thousand units of heparin were administered directly into the common iliac artery through the sheath. The left common femoral artery was punctured using a 21 gauge needle. Contrast injected through the needle under fluoroscopic monitoring demonstrated

normal distal blood flow indicating needle tip position within the true lumen. An 0.018-inch guide wire was advanced through the needle cephalad into the abdominal aorta (Fig. 3A). The guide wire was then captured using a snare inserted via the contralateral access (Fig. 3B). The wire was used to pull the snare through the dissected left external iliac artery into the left common femoral artery (Fig. 3C). Contrast into the snare catheter and demonstrated normal distal flow indicating true lumen-to-true lumen passage of the catheter (Fig. 3D).

Prolonged balloon angioplasty was performed in the external iliac artery using a 7 mm angioplasty balloon in an attempt to tack down the dissection. Repeat angiography after angioplasty showed sluggish flow. A 8 × 60 mm self-expanding nitinol stent (Sentinol; Boston Scientific, Natick, MA) was deployed across the dissection and repeat angiography (Fig. 4A) showed improved flow. A focal filling defect proximal to the stent was thought to represent acute thrombus or a portion of the dissection flap (Fig. 4B).

A short course of thrombolysis (20 minutes) using 2 mg of tissue plasminogen activator (TPA; Genentech, Inc., South San Francisco, CA) infused at the irregularity failed to resolve the abnormality. Therefore, a second stent was deployed across the irregularity to reestablish excellent antegrade flow (Fig. 5). The superficial femoral artery stenosis was then dilated and stented.

DISCUSSION

Iatrogenic arterial dissection typically occurs at the time of needle puncture, during dilation of an arterial stenosis, or during attempts to cross high grade stenoses or occlusions. Hydrophilic guide wires are notorious for causing this complication. The case

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Figure 1 Initial pelvic arteriogram. Pelvic arteriography shows normal appearing arteries in the pelvis.

above was unusual in that none of these causative factors was present. The patient's prior radiation therapy to the affected artery may have predisposed to dissection.

When iatrogenic dissection occurs during catheter passage in an *opposite* direction to blood flow (such as during retrograde catheterization of the common femoral artery), it is usually a trivial event because the blood flow tends to close the flap once the catheter or wire is removed from the false lumen. These injuries heal without further therapy in nearly all cases. In contrast, an iatrogenic dissection due to a catheter or wire traveling in the *same* direction as blood flow as occurred in this case may be flow limiting or completely occlude the affected artery because the flap acts as a windsock. Blood flow tends to hold the flap open and may even propagate the dissection distally in some cases.

In my experience, flow limiting dissections are best treated by tacking the entry site down with a stent as was done in this example. Heparin is mandatory if this complication occurs to preclude complete thrombosis of the affected artery. The critical step to fixing the problem is to have true lumen-to-true lumen through-and-through guide wire access.

Figure 2 Iatrogenic dissection. (A) Left common iliac angiogram shows long segment obstructive dissection of the left external iliac artery. (B) Delayed view of arteriogram shows contrast outlining the flap.

Figure 3 Rendez-vous procedure. (A) Fluoroscopic image shows micropuncture wire advanced from left common femoral artery puncture. (B) Fluoroscopic imager shows guide wire capture by snare. (C) Fluoroscopic image shows snare being pulled by guide wire into true lumen. (D) Common femoral arteriogram shows true lumen has been reentered.

Therefore, if possible, it is advisable to approach the dissection site with a guide wire coming from the direction opposing the blood flow (typically from the distal normal artery). This ensures passage through the dissection will occur from true lumen to true lumen. This could also be confirmed with intravascular ultrasound if available although use of this modality is typically superfluous. Continued probing of the dissection from the antegrade direction is *not* recommended as this may propagate the dis-

section further down the artery (Fig. 6). In the case presented, the contralateral common femoral artery was punctured and a guide wire easily passed from puncture site in the true lumen into the aorta. It is important to recognize that merely puncturing the common femoral artery does not ensure true lumen access because dissections can spiral down past this point in rare cases. After snaring the guide wire, balloon angioplasty and ultimately stent insertion allowed the occlusion to be treated.

Figure 4 Stent repair. Common iliac arteriogram shows stent deployed across dissection with residual filling defect proximal to stent. (A) Frontal view. (B) Oblique view.

Figure 5 Additional stent deployment. (A) Fluoroscopic image showing additional stent insertion. (B) Fluoroscopic image after second stent placement shows superior stent is slightly indented by dissection flap. (C) Digital subtraction common iliac angiogram showing rapid flow through deployed stents.

Figure 6 Propagation of dissection flap. Illustration shows iatrogenic guide wire dissection.

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