Ureteral complications after open aortoiliac reconstruction for aneurysmal and occlusive disease have been reported previously. However, ureteral complications from endovascular interventions for iliac artery disease are relatively rare. We describe a case of left ureteral stenosis resulting in hydronephrosis after multiple endovascular interventions involving the left common and external iliac arteries. The intraoperative findings during robotic ureterolysis revealed significant peri-iliac fibrosis and scarring in the area of the iliac stents. This case illustrates that, although uncommon, ureteral stenosis may occur after iliac stenting owing to persistent fibrosis. (J Vasc Surg Cases and Innovative Techniques 2020;6:469-72.)

Ureteral complications after open aortoiliac reconstruction for aneurysmal and occlusive disease have been previously reported1,2; however, ureteral stenosis after iliac stenting is a relatively rare occurrence.3 We describe a case of ureteral stenosis resulting in hydronephrosis treated by robotic ureterolysis and omental wrap 7 years after placement of a covered stent for symptomatic left common iliac artery (CIA) occlusion. The patient agreed to publish his case details and images as validated by a signed consent form.

CASE
A 61-year-old man presented with left calf and thigh pain on walking 50 yards and immediate relief with rest. He also complained of numbness and tingling in the left foot. Medical comorbidities included controlled hypertension and chronic nicotine abuse. On examination, the left femoral, popliteal, posterior tibial, and dorsalis pedis pulses were absent, although all pulses were palpable in the right lower extremity. A noninvasive Doppler arterial study showed an ankle-brachial index (ABI) of 1.0 on the right and 0.4 on the left. The patient returned to IR for an angiography with runoff via right common femoral artery puncture. There was complete occlusion of the left CIA with a 4- to 5-mm stump (Fig 1). Ipsilateral retrograde access was obtained via left CFA using micropuncture technique and a 5F sheath was placed. Digital subtraction angiography through this sheath revealed the extent of the left CIA occlusion to involve the proximal external iliac artery (EIA) (Fig 1). A 180-cm, 0.035-inch angled stiff Glide wire (Terumo, Tokyo, Japan) was passed through the lesion with the help of a Kumpe catheter (Cook Medical, Bloomington, Ind). Initial entry was in the subintimal plane, but ultimately the wire was successfully placed in the lumen of the abdominal aorta. After preangioplasty with a 6 mm × 8 cm long Armada balloon (Abbott, Abbott Park, Ill), an 8F sheath was placed in the left CFA and an 8 mm × 10 cm long self-expanding Viabahn stent graft (W. L. Gore & Associates, Newark, Del) was chosen based on computed tomography angiography measurement of the CIA.

Postangioplasty was performed with an 8 mm × 8 cm long Armada balloon. Completion arteriography showed a filling defect (probable thrombus or atheromatous plaque) within the left CIA stent graft (Fig 2). A 10-cm UniFuse (AngioDynamics, Latham, NY) infusion catheter was positioned within the stent in the left CIA through which 4 mg of tissue plasminogen activator was administered followed by continuous infusion of 0.5 mg/hour for 16 hours. Repeat arteriography did not show any resolution of the thrombus. Thus, the patient was then taken to the operating room for left iliac thrombectomy via left femoral artery cutdown. An organized plaque (6 mm diameter × 1 cm long) with thrombus was retrieved with the help of a #5 Fogarty balloon catheter. The femoral arteriotomy was closed with a bovine pericardial patch and the patient recovered signals in the foot albeit no palpable pulse, perhaps owing to residual iliac artery stenosis.

In June 2013, the patient presented with symptoms of recurrent intermittent claudication and a decrease in ABI in the left lower extremity from the post-stenting value of 0.94 to 0.7. He returned to IR for an angiography that demonstrated stenosis of the left EIA (Fig 3), which was likely a result of stent foreshortening at the time of
original intervention. This was treated with angioplasty and an 8 mm × 4 cm long self-expanding Absolute Pro stent (Abbott. Fig 3). In September 2017, surveillance arterial Doppler imaging revealed a decreased left ABI so the patient returned to IR and underwent successful balloon angioplasty for left iliac in-stent stenosis, after which his ABI increased to 0.96.

Nearly 2 years had passed since his last endovascular intervention when he developed worsening left flank discomfort. Workup by a urologist included a computed tomography urogram, which showed moderate left ureterohydronephrosis in close proximity to the left CIA stent (Fig 4). The right kidney and ureter were normal. In November 2019, the patient underwent robotic left ureterolysis for symptomatic relief. Operative findings included dense scar tissue forming an inflammatory rind around the ureter which was adherent to the left CIA. The left ureter was circumferentially dissected and mobilized proximally. The greater omentum was mobilized and wrapped around the ureter. This omental wrap was then secured to the psoas muscle and surrounding scar tissue using 2-0 Vicryl as a tacking suture. The patient underwent follow-up computed tomography urogram 3 months later that showed significant improvement in the degree of left hydroureteronephrosis. He was last seen in office May 2020 and had palpable dorsalis pedis pulses.

DISCUSSION

Ureteral complications after open aortoiliac reconstruction have been previously described in a large series by Wright et al.1 and Blasco et al.2 Left hydronephrosis after iliac stenting was first described by Koda and Takeda3 in 2014. Their patient developed left hydronephrosis two months following placement of a Wallstent (Boston Scientific, Marlborough, Mass) in the left CIA. Metcalfe et al.4 also described a case in which a hypogastric artery aneurysm was coiled with delay in placement of a covered stent by two months. This resulted in continuous inflow contributing to an increase in size of the hypogastric aneurysm resulting in compression of the ureter and hydronephrosis. Although infection may also cause an inflammatory reaction around the artery, it is usually in the setting of a ureteral stent or fistula, none of which were evident in our patient.
Over a span of 5 years, the patient in this report underwent initial percutaneous entry into a subintimal plane of the left CIA with subsequent angioplasty and stent graft, catheter-directed thrombolysis for in-stent thrombosis, left EIA stent, and subsequent angioplasty for in-stent stenosis. After angioplasty or stent placement, the local vessel reacts to the mechanical injury with an inflammatory response, which may lead to restenosis. The pathogenesis of persistent fibrosis is less clear and infrequent; however, it may involve these same inflammatory pathways and impinge on surrounding structures, such as the ureter as in our case of ureteral stenosis after percutaneous iliac artery interventions.

CONCLUSIONS

Although ureteral complications during open aortoiliac reconstruction for aneurysmal and occlusive disease have been previously reported, ureteral complications after endovascular intervention of the iliac artery are relatively rare. This case report illustrates that, although it is uncommon, ureteral stenosis may occur following iliac stenting owing to periarterial or persistent fibrosis.

REFERENCES

1. Wright DJ, Ernst CB, Evans JR, Smith RF, Reddy DJ, Shepard AD, et al. Ureteral complications and aortoiliac reconstruction. J Vasc Surg 1990;11:29-37.
2. Blasco FJ, Saladie JM. Ureteral obstruction and ureteral fistulas after aortofemoral or aortoiliac bypass surgery. J Urol 1991;145:237-42.
3. Koda R, Takeda T. Hydronephrosis after endovascular stenting in the common iliac artery. Intern Med 2014;53:813.

4. Metcalfe MJ, Hanna MS, Gill S, Burfitt NJ, Mitchell AW, Franklin IJ. Hydronephrosis after embolization of internal iliac aneurysm. J Vasc Inter Radiol 2010;21:571-3.

5. Welt FG, Rogers C. Inflammation and restenosis in the stent era. Arterioscl Thromb Vasc Biol 2002;22:1769-76.