A 74-year-old female with history of coronary artery disease, peripheral arterial disease including carotid stenosis treated with carotid endarterectomy, and chronic obstructive pulmonary disease presented with complaints of shortness of breath and episodic neck and jaw discomfort. Her symptoms were of sudden onset while at rest, initially occurring several days prior to admission. Laboratory findings revealed mild respiratory acidosis, elevated D-dimer, mild renal insufficiency, and moderate hyperglycemia. Cardiac enzymes and complete blood counts were within normal limits. Initial electrocardiogram showed sinus tachycardia, left axis deviation, and nonspecific ST-segment and T-wave abnormalities in the inferior limb leads. Chest radiograph showed cardiomegaly with mild interstitial edema and upper-lobe emphysema. A lung perfusion scan reported intermediate
The patient was treated initially for exacerbation of chronic obstructive pulmonary disease by BiPAP ventilation, nebulized bronchodilators, intravenous steroids, and broad-spectrum antibiotics and her symptoms improved. However, repeat cardiac enzymes revealed elevated biomarkers (creatine phosphokinase 245, troponin I 4.04) with recurrence of neck and jaw discomfort. Standard medical therapy for acute coronary syndrome was initiated, and the patient was referred for cardiac catheterization and coronary angiography.

Urgent cardiac catheterization was performed via a right femoral arterial approach. The access wire could not be advanced beyond the right external iliac artery and selective angiogram revealed complete occlusion of the right common iliac artery (CIA) (Figure 1A). Access was then obtained in the left common femoral artery (CFA) with similar results confirming complete occlusion of the left CIA (Figure 1B).

Right radial arterial access was then obtained for coronary angiography. Left ventriculogram showed mild hypokinesis of the anterolateral wall and apex and severe hypokinesis of the inferior and posterobasal walls, with estimated ejection fraction of 40%. Mild disease was present in the left main and left anterior descending (LAD) arteries. The left circumflex artery was 100% occluded at the ostium, with mid to distal vessel reconstitution via collaterals from the LAD. The right coronary artery (RCA) was dominant with 90% calcified stenosis in the proximal segment.

Multiple guides were used to engage the RCA via radial approach but with inadequate support to advance a balloon across the lesion, despite the use of a Guide-liner (Vascular Solutions) as a guide extension and an
Emerge balloon (Boston Scientific) as an anchor balloon in the conus branch artery. After prolonged attempts that ultimately failed, PCI of the RCA via radial approach was aborted. Descending aortogram revealed an ulcerated eccentric lesion below the renal arteries with 100% distal occlusion (Figure 2). Extensive collaterals from the lumbar and mesenteric arteries were noted to reconstitute bilateral external iliac arteries. At this point, due to failed revascularization of the RCA from radial approach, endovascular revascularization of the aortoiliac occlusion was planned to allow PCI with better guide support from the femoral approach. An interim computed tomography angiography of the descending aorta and lower extremity runoff confirmed the findings on the aortogram with no suggestion of a thrombosed abdominal aortic aneurysm.

A primary retrograde revascularization approach was selected as the primary strategy due to minimized risk of extravasation with perforation compared to an antegrade perforation. Access was obtained in the left brachial artery for positioning of a pigtail catheter within the distal aorta to delineate the true lumen. This access was also available as an option for a retrograde intra-aortic balloon pump placement if the patient became hemodynamically unstable in the setting of unrevascularized coronary artery disease.

An Ocelot catheter (Avinger) was advanced from the right CFA to cross the chronic total occlusion (CTO) in the CIA (Figure 3A) with optical coherence tomography (OCT) imaging (Figure 3B) to allow direct visualization during crossing and to maintain intraluminal position. Although the catheter maintained this position up to the aortoiliac bifurcation, it entered into a subintimal plane in the distal aorta due to heavy distal calcifications despite multiple attempts to maneuver the catheter within the lumen. A Grand Slam guidewire (Abbott Vascular) was maintained in this position in the subintimal plane from the right femoral access. The same steps were then performed from the left CFA to wire the subintimal plane in the distal aorta and another Grand Slam guidewire maintained in this position from the left femoral access. A Pioneer Plus re-entry catheter (Volcano Corporation) was then advanced over the Grand Slam wire from the right-sided access (Figure 4A) to re-enter the true lumen of the aorta with intravascular ultrasound (IVUS) guidance (Figure 4B), allowing the re-entry wire to advance into the proximal descending aorta. The same technique was then repeated from the left-sided access to maintain a guidewire in the proximal descending aorta. Simultaneous balloon angioplasty was performed of the reentry site with two 6 x 40 mm
Sterling balloons (Boston Scientific). A single iCAST 10 mm x 38 mm balloon-expandable covered stent (Maquet) was deployed as a distal aortic cuff in the infrarenal position (Figure 5A). Two iCAST 7 mm x 59 mm covered stents were then simultaneously deployed to extend from within the initial aortic cuff stent into the bilateral CIAs (Figure 5B). Two additional iCAST 7 mm x 59 mm stents were then deployed in bilateral CIAs to cover the entire occluded segment. Final aortogram from the left radial artery access site confirmed patent aortic stents with bilateral limb extensions with brisk flow (Figure 6). Both internal iliac arteries were noted to be patent. Hemostasis was achieved in bilateral femoral access sites via manual compression upon normalization of activated clotting time.

The staged PCI of the proximal RCA was successfully performed during the same hospitalization via right femoral arterial access with the use of a larger supportive guide, buddy wires, and Guideliner allowing deployment of a 2.75 mm x 14 mm Integrity bare-metal stent (Medtronic). There were no periprocedure or postprocedure complications and the patient’s symptoms completely resolved with subsequent discharge to a rehabilitation facility.

**DISCUSSION**

It is well known that patients with PAD also have concomitant CAD, with 20% to 60% increased risk of myocardial infarction (MI). The coexistence of AIOD commonly referred to as Leriche syndrome, in the setting of acute MI represents an interesting therapeutic dilemma in PCI. The advent of radial artery access for PCI has proven effective as a safer approach of treatment for obstructive CAD owing to a decreased risk of bleed-
ing; however, when radial artery access is not an option, other access points must be considered. Conventional TASC II treatment guidelines recommend Type C and D lesions be treated surgically. However, considering that the patient population is aging, comorbidities are increasing, and there have been significant technical advancements in endovascular treatment, an endovascular approach to treating AIOD may offer lower perioperative risk with comparable outcomes.

Leriche syndrome, or CTO of the infrarenal aorta and bilateral CIAs, is classified as a TASC II Type D lesion. Conventional recommendations advise using an open surgical repair over endovascular treatments. Although 5-year patency rates after aortobifemoral bypass are higher than 5-year patency rates after endovascular treatment, recent data suggest early clinical success rates of 93% with primary stenting and comparable secondary patency rates. Advancements in endovascular technology and technique as well as growing operator experience have allowed for greater success rates in AIOD, making an initial endovascular approach a feasible and safe option.

Various techniques have been described for successful endovascular revascularization of AIOD. In this case, we performed retrograde subintimal angioplasty of a chronically occluded distal abdominal aorta and bilateral iliac arteries utilizing the Ocelot system and Pioneer Plus re-entry catheter. Our initial approach with the Ocelot system, which uses OCT for visual guidance of the catheter tip to traverse the CTO, was successful in crossing the majority of the occlusion in the CIA but was unable to enter the true lumen in the proximal cap of the distal aorta. The Ocelot device has been proven to be safe and effective in crossing CTOs.

Figure 4. Pioneer catheter (arrow) positioning in distal aorta (A) for re-entry utilizing IVUS imaging (B) to direct the needle from the subintimal plane (*) into the true lumen (arrow).
of the superficial femoral and popliteal arteries, with a
reported success rate of 97% when used alone, with an
assist device, or with a re-entry device.\textsuperscript{10} The Pioneer
Plus re-entry device has been shown to improve success
rates of CTO subintimal angioplasty from 74% to 87%
at minimum to 95% to 100% at maximum.\textsuperscript{11} While the
use of adjunctive devices increases the cost of perform-
ing the procedure, their use theoretically increases the
technical success of the procedure by providing direct
visualization and decreases potential complications.

The Covered Endovascular Reconstruction of the
Aortic Bifurcation (CERAB) technique, recently de-
scribed by Goverde and Grimm et al, involves 3 PT-
FE-covered balloon-expandable stents. Angioplasty of
the distal aortic stenosis with a large-diameter stent is
performed followed by kissing stents of bilateral CIAs
with placement of the proximal portions within the
distal aortic stent.\textsuperscript{12-14} In vitro models suggest that the
CERAB technique minimizes radial mismatch of the
kissing stents within the distal aorta.\textsuperscript{7,14} Furthermore,
several studies indicate that covered stents outperform
bare metal stents in angioplasty of TASC C and D
lesions.\textsuperscript{15-17} Long-term follow-up of successful AIOD
revascularization utilizing the CERAB technique is
needed to determine procedural durability. Mean-
while, the technologic advances, operator experience,
safety, and feasibility of treating AIOD by an endovas-
cular approach have led to a recent consensus statement
for utilizing an endovascular-first strategy in patients
with TASC D AIOD.\textsuperscript{18}

We report a case of PCI of RCA in the setting of
NSTEMI and AIOD and failed initial attempt at PCI
via right radial artery access requiring urgent endovas-
cular revascularization of AIOD for need of femoral

\textbf{Figure 5.} Distal aortic covered stent (arrow)
placement (A) followed by bilateral kissing (arrows)
CIA stents (B).
artery access for PCI. The aortoiliac occlusion was crossed using the Ocelot system with OCT imaging, and re-entry was performed using the Pioneer Plus system with IVUS imaging. To our knowledge, there is no prior reported use of the Ocelot system in crossing aortoiliac CTOs. The CERAB technique was employed to reconstruct the infrarenal aorta and bilateral iliac arteries, which allowed for successful PCI of the RCA by femoral artery access.

Editor’s note: Disclosure: The authors have completed and returned the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr. George reports consultancy to Covidien and Gore. The remaining authors report no disclosures related to the content herein.

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