Case Report

Contralateral approach to iliac artery recanalization with kissing nitinol stents present in the aortic bifurcation

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A B S T R A C T
A 69-year-old man, who had earlier undergone reconstruction of the aortic bifurcation with kissing nitinol stents, presented with occlusion of the left external iliac artery. The occlusion was successfully and safely recanalized using contralateral femoral approach with passage of interventional hardware through the struts of the stents in the aortic bifurcation. Presence of contemporary flexible nitinol stents with open-cell design in the aortic bifurcation is not a contraindication to the use of the contralateral femoral approach.

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1. Introduction
An important prerequisite for successful endovascular treatment of peripheral vascular disease is the availability of vascular access that will allow unhindered approach to the target lesion. Use of contralateral retrograde femoral access is an advantageous way to approach external iliac artery occlusions, as it combines the benefits of retrograde femoral access with that of anterograde approach to the iliac artery occlusion without the risks of the brachial approach. A contralateral approach is generally not considered possible in the presence of kissing bilateral common iliac artery stents that extend into the distal aorta, as the stent struts at the aortic bifurcation would obstruct cross-over of interventional hardware, and such efforts could lead to distortion of the stents; this view needs to be revisited, given the development of contemporary flexible self-expanding nitinol stents with open-cell design and the demonstrated feasibility of side-branch interventional procedures through the struts of stents in peripheral vessels. We present a case where an external iliac artery occlusion could be successfully recanalized and stented using contralateral approach in a patient with previously deployed kissing nitinol stents in the aortic bifurcation.

2. Case report
A 69-year-old male, diabetic, hypertensive, and smoker with prior coronary bypass surgery presented with bilateral lower
limb claudication (Fontaine stage IIb) and feeble femoral pulses. Angiography revealed atherosclerotic disease extending from the distal abdominal aorta to the proximal external iliac arteries (EIA) bilaterally, with systolic pressure gradients of 105 and 68 mmHg between the upper abdominal aorta and right and left common femoral arteries (CFA), respectively (Fig. 1A); the left superficial femoral artery (SFA) also revealed diffuse atherosclerotic obstructive disease with occlusion lower down (Fig. 1C,D). Using contralateral retrograde femoral approach, the left SFA occlusion was recanalized and a 7 × 150 mm self-expanding nitinol stent was deployed (Fig. 1E,F). Next, the aorto-iliac diseased segment was treated

Fig. 1 – (A) Angiogram in antero-posterior view showing extensive ulcerated obstructive atherosclerotic disease in the infra-renal aorta and iliac arteries bilaterally. (B) Post-intervention angiogram showing widely patent stents in infra-renal aorta and common iliac arteries bilaterally, with minor residual stenosis in the proximal left external iliac artery (arrow). (C,D) Selective left superficial femoral arteriograms, in the upper and mid-thigh respectively, showing extensive obstructive atherosclerotic disease with a short segment of occlusion. (E,F) Post-intervention angiograms in the corresponding regions showing good outcome with widely patent stent.

Fig. 2 – (A) Angiogram in antero-posterior view showing occlusion (arrow) of the stented segment of left external iliac artery and beyond. (B) Hydrophilic 7F sheath being advanced over a stiff guidewire through the struts of kissing nitinol stents in the aortic bifurcation. (C) Angiogram done through the contralateral sheath showing patency of the distal left external iliac artery and beyond. (D) Post-intervention angiogram showing wide patency of the left common and external iliac arteries and aortic bifurcation region.
using bilateral retrograde femoral approach; a Palmaz balloon-expandable stent (PS014, Cordis) was crimped on a 14 × 40 mm balloon (Maxi-LD, Cordis) and deployed in the terminal aorta; kissing self-expanding nitinol stents (Epic, Boston Scientific; 10 × 80 mm right, 9 × 99 mm left) were deployed covering the diseased segments in both iliac arteries and overlapping the aortic stent equally by 2 cm (Fig. 1B). A good result was obtained except for mild residual stenosis in the left EIA, with complete relief of claudication bilaterally.

The patient returned 2 months later with left lower limb claudication of 4 weeks duration and absent pulses in this limb. Angiography done by retrograde right femoral approach revealed occlusion of the left EIA (Fig. 2A) extending beyond the stent; the left SFA stent was widely patent. We decided to recanalize the left EIA occlusion using the contralateral approach as retrograde right femoral access was already available and an anterograde (non-brachial) approach to the left EIA occlusion was desirable. A 0.035-in. angled hydrophilic guidewire (Gldewire, Terumo), supported by a 6F Judkins Right catheter (Cordis), was gently torqued from right to left CIA through the two apposed layers of nitinol stent at the aortic bifurcation; the supporting catheter was then advanced by torquing over the wire into the left CIA. Next, the hydrophilic guidewire was manipulated through the occluded left EIA into the distal left SFA followed by the catheter; the guidewire was changed to a 0.035-in. Amplatz SuperStiff guidewire (Boston Scientific), after which a 7F 55-cm-long hydrophilic braided sheath (Ansel, Cook) was advanced from the right femoral artery through the struts of the stent in the aortic bifurcation (Fig. 2B), and then across the occlusion in the left EIA (Fig. 2C). After balloon-dilatation of the occluded segment, an 8 × 57 mm balloon-expandable stent (Express LD, Boston Scientific) and a 10 × 60 mm self-expanding stent (Complete SE, Medtronic) were deployed in an overlapping manner, covering the entire diseased segment. A good final angiographic result (Fig. 2D) was achieved with no residual gradient obtained by catheter pull-back across the left EIA and CIA. There were no complications. The patient was discharged from hospital the next day with systolic blood pressures 130 mmHg in both lower limbs and 140 mmHg in both upper limbs. At 3-month follow-up the patient was free of claudication and had well-felt left lower limb pulses.

3. Discussion

The contralateral retrograde femoral approach offers several advantages when treating EIA occlusions. An obvious advantage is the use of the CFA itself. Features of the CFA that make it suitable for vascular access in general are its consistent anatomy, superficial location, large caliber, and the ease of achieving hemostasis at the puncture site by compression against the femoral head. Contralateral femoral access presents the ability to approach EIA occlusions anterograde, which scores over the ipsilateral femoral approach. When dealing with EIA occlusions, retrogradely approaching guidewires from the ipsilateral femoral approach tend to dissect rather easily, and find reentry at the proximal end of the lesion difficult because of the thicker intima at this end of the lesion; if the distal end of the occlusion is close to the ipsilateral femoral access site, the limited space available makes sheath insertion and catheter/wire manipulation difficult; an anterograde approach to EIA occlusions largely overcomes both these problems. Occasionally, operators may elect to access an ipsilateral popliteal or tibial artery retrogradely to have a greater distance from the access site to the distal end of an external iliac occlusion to work with; however, not all operators are comfortable using these special access sites, each of which have unique limitations and risks.

Avoiding the use of brachial access to approach an EIA occlusion in an anterograde manner is perhaps the greatest advantage of the contralateral femoral approach. The brachial artery is significantly smaller in diameter than the CFA, and its use was associated with an access site-related complication rate of 6.5% in a large study; it is also associated with a risk of embolic stroke due to dislodgement of atheroma or thrombus from the aortic arch or its branches during catheter manipulations in this region. Left brachial access is preferred to the right as it involves traversing a shorter distance of the arch, but requires working from the left side of the patient. Catheter manipulations from remote access can be difficult and interventional hardware must have sufficient length to reach the target zone. Presence of a type 2 or 3 aortic arch or acute angle origin of the left subclavian artery may increase the technical difficulty when using left brachial access.

The contralateral femoral approach can be difficult or even impossible in the presence of bilateral aorto-iliac stents, previous aorto-bifemoral surgical reconstruction or heavy concentric calcification with a narrow aortic bifurcation angle. Kissing CIA stents that project symmetrically upward into the terminal aorta for a variable distance are commonly used to treat obstructive aortic bifurcation lesions; such stents, especially those with small cell size, are likely to obstruct the passage of interventional hardware from one CIA to the other through the two apposed layers of metal at the aortic bifurcation; there is also the possibility of these stents getting permanently deformed during such maneuvers, which could lead to obstruction to blood flow and stent thrombosis. The situation is different when using contemporary self-expanding nitinol stents with open-cell design to reconstruct the aortic bifurcation; the Epic stent used in our patient is especially suited to the passage of interventional hardware through its struts since it has large cells except at its ends, and exceptional flexibility and conformability, properties which makes it resistant to distortion. Apart from the nature of the stent used, appropriate selection of hardware used in the procedure also contributed to its success. The Ansel sheath, which is hydrophilic and has a smooth transition from dilator to sheath, could be advanced through the stent struts without much friction; the braiding in the sheath and placement of an indwelling stiff guidewire helped prevent kinking of the sheath and allowed easy delivery of balloons and stents through the aortic bifurcation into the treatment zone.

4. Conclusion

Passage of interventional hardware from one CIA to the other through the struts of contemporary open-cell design flexible nitinol stents deployed in kissing fashion in the aortic...
bifurcation is feasible and safe using the technique described; this enables anterograde access to the iliac arteries and beyond in this situation, without having to resort to brachial artery access with its associated risks.

**Conflicts of interest**

The authors have none to declare.

**REFERENCES**