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Recanalization of Chronic Peripheral Artery Occlusions:

Moving Forward by Looking Sideways

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Chronic peripheral artery occlusions can be challenging to recanalize. Two general strategies are prevalent, and neither is necessarily under the direct control of the operator. In the classic (and in my opinion favored) “centriluminal” technique, the operator attempts to direct guidewires in tandem with controlling catheters to traverse the occlusive atheroma while remaining within the confines of the arterial media. The second technique, inaptly called the “subintimal” approach [1,2], in some ways resembles a controlled perforation in both ease and (in my opinion) attractiveness. The guidewire traverses the occlusion by entering a shallow subadventitial plane using a large guidewire “knuckle” and afterwards can reenter the patent distal arterial lumen. In both techniques, conventional imaging usually provides few robust cues about the true course of the guidewire within the occlusion.

In this issue, Kawasaki and colleagues [10] report their experience assuring an intraluminal guidewire trajectory using adjunctive intravascular ultrasound (IVUS) imaging. They take advantage of a new low-profile hydrophilic 0.018*Prime; guidewire (not available in the United States) and generous tolerances apparently afforded by a 0.014*Prime;-rated commercial phased-array IVUS catheter. They use the IVUS catheter as their support device. In the Kawasaki centriluminal approach, the side-looking IVUS device is advanced over the guide-wire step-by-step to assure an appropriate intraluminal position. When the position appears subadventitial, both the IVUS and the guidewire are retracted and redirected before advancing again. Unfortunately, this technique identifies an unsuitable position only in retrospect, since the IVUS device is oriented not forwards but sideways, and the ultrasound transducer is positioned at least 10–15 mm proximal to the guidewire tip.

Such retrospective image guidance is analogous to driving through a tunnel watching only the side windows, hoping the front of the car passes or crumples safely. Fortunately in the Kawasaki experience, peripheral artery occlusions were fairly forgiving, in that short distances of unfavorable subadventitial axial advancement of the devices appeared well-tolerated. The authors report a significantly improved success rate and reduced iodinated radiocontrast exposure, although not procedure time or radiation exposure.

Other adjuncts are available to enhance conventional radiographic guidance of iliofemoral CTO recanalization, including optical interferometry [3], ultrasound-guided needle lumen reentry [4], wholly external Duplex ultrasound guidance [5] for infrainguinal procedures, and fusion of tomographic and fluoroscopy imaging [6].

More promising future technologies might include forward-looking intravascular ultrasound [7,8] or perhaps better, conducting the entire recanalization procedure under real-time MRI guidance [9] to assure wholly intraluminal guidewire traversal.

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That said, Kawasaki and colleagues enhance our toolbox for safe guidewire traversal of chronic peripheral artery occlusions. This requires little or no capital outlay for most laboratories and a small incremental procedure cost. We still await better solutions to assure long-term patency once peripheral revascularization is complete.

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