

Radial PCI

The advantages and limitations of 4- to 5-F guide catheters.

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Using a “minimally invasive approach” is not new to the field of interventional cardiology. In the last 5 decades, brachial cutdown, percutaneous transfemoral approach, and the transradial approach have seen a reduction in the guide catheter size from 10 to 4 F, leading to the creation of much smaller holes in the arterial system to invade the coronary lesions. With a growing evidence base in the literature, there is an increasing global trend toward the performance of transradial intervention (TRI).¹⁻⁴

The Slender Club of Japan and Slender Club of Europe have focused on maximum miniaturization of TRI.⁵ Developing and manufacturing slender products requires higher-quality materials and specifications than conventional products, making the development of such equipment more challenging in today’s health care environment. The smallest available TRI guide catheters are 4 F. Smaller guides require smaller bal-

loons, stents, and wires, which are in the nascent stages of development. A 0.01-inch guidewire with torque capabilities similar to conventional guidewires has been developed and is available in countries such as Japan. Wire-mounted stent platforms and other advances in technology will enhance the feasibility of “slender” procedures. Europe is beginning to see the introduction of these more slender interventional products.

BENEFITS OF SMALLER GUIDE CATHETERS

There are considerable data to support the premise that the use of smaller guide catheters results in enhanced clinical outcomes in patients undergoing percutaneous coronary intervention (PCI).¹⁻⁸ Benefits include improved patient safety and comfort, as well as cost savings.^{1-3,5,8} Early ambulation means greater rates of same-day discharge and a higher patient turnover rate. For an operator, traversing radial and brachial

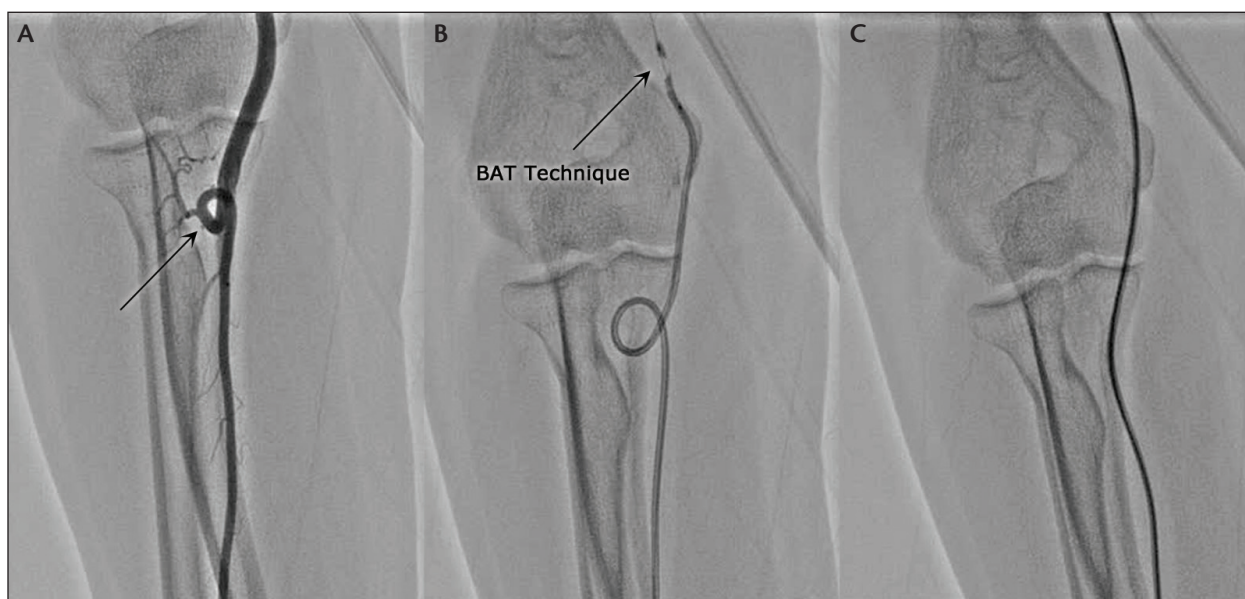


Figure 1. An example of a complex 360° loop (arrow) (A). A 5-F extra backup Launcher coronary guide catheter (Medtronic) was negotiated through the loop using a balloon-assisted tracking technique (B). The loop was unfolded, and the catheter was negotiated further for left anterior descending intervention (C).

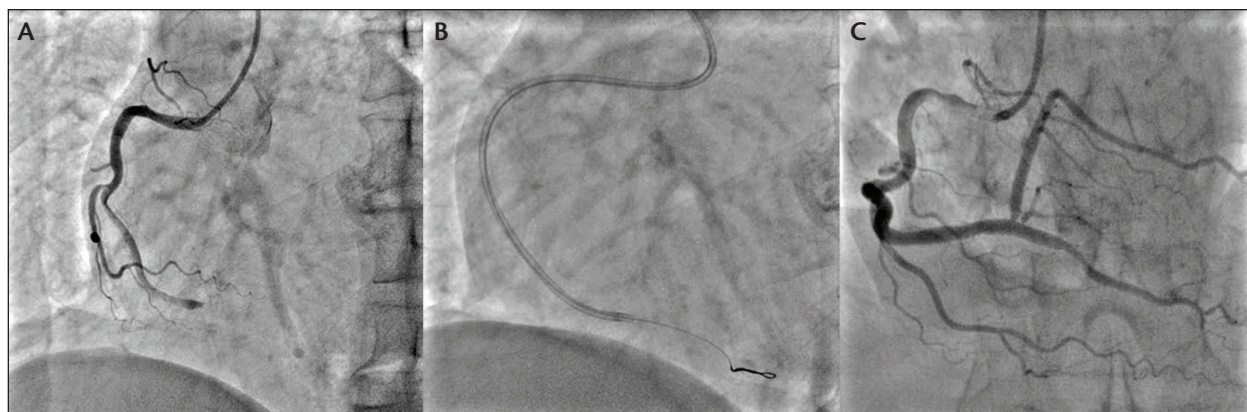


Figure 2. Coronary angiography reveals a mid-right coronary artery total occlusion with significant thrombus burden in the setting of acute inferior wall myocardial infarction (A). Deep intubation was done using a 5-F JR 4 Launcher coronary guide catheter (Medtronic), and thrombosuction was completed (B). The satisfactory end result after stenting (C).

tortuosities, loops, and other anomalies is technically easier and faster when using a 4- or 5-F guide catheter⁹ (Figure 1), and deep intubation of coronary lumen is easier and less traumatic (Figure 2). In patients with very small-caliber radial arteries, sheathless insertion of a 4- or 5-F guide catheter may improve procedural success by allowing successful catheter placement and transit. Although this may theoretically lead to a smaller arteriotomy, the friction-related trauma caused by the sheathless insertion may offset the benefit of a smaller arteriotomy. The “slender” introducers may provide a very attractive platform that reduces puncture size and limits friction, allowing the operator to enjoy the best of both worlds.

A difficult anatomic substrate could also be navigated using techniques such as balloon-assisted tracking which, by eliminating transitions between telescoped hardware, allows a low-resistance passage of catheters. A smaller catheter size also can create some other limitations.^{1-3,6-8} Smaller and thin-walled catheters are typically less robust, more kink-prone, and more difficult to visualize, manipulate, and position, especially while going through the learning curve; poor backup support may result in procedural difficulties.

Several important but bulky interventional devices, such as the Rotablator system’s diamond-tipped burrs (Boston Scientific Corporation), aspiration catheters, distal protection devices, and bioresorbable scaffolds are not compatible with 5-F guide catheters. There are higher chances of air trapping and air embolism in coronary systems while advancing or removing hardware from the smaller lumen of the guide catheter. The probability of air embolism could be lowered by decreasing the speed of the catheter transit and allowing generous back bleed through the Y-connector to remove trapped air bubbles.

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Managing complications, such as coronary perforations or large spiral dissections, can also be more challenging. PCI using 4- and 5-F guide catheters is possible, even through the transulnar route; the benefits and limitations are the same as in transradial slender PCI. However, the transulnar route should be kept as a reserved route due to the increased chance of local hematoma and ulnar nerve injury.¹⁰ Despite the implication of the benefit of using a slender approach, very little supportive evidence exists in the literature to justify its routine use.

In view of these facts, operators embarking upon transradial access should use traditional-sized catheters during the early phase of their learning curve, with gradual introduction of “slender” catheters, once they have reasonably sharpened their skillset. Ultrasonography of the radial artery may be used to identify patients with especially small-diameter radial arteries who would likely benefit the most from slender techniques, and the benefit may offset the above-mentioned drawbacks of going slender.

CONCLUSION

Having discussed both the advantages and limitations of 4- and 5-F guide catheters for TRI, it is also important to keep in mind that 10 years ago, the use of 6-F guide

catheters was considered “down-sizing” and is currently the accepted standard of care. Miniaturization of products dedicated to TRI may result in increased patient value by improving outcome, reducing hospital stays, and reducing costs. Nelson Mandela said, “It always seems impossible until it’s done,” which holds true for the future of slender TRI. ■

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