

# Radial Access in Patients on Anticoagulation

Is transradial access safe in anticoagulated or coagulopathic patients undergoing noncoronary endovascular interventions?

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**T**ransradial access (TRA) has been proven safe and effective for both percutaneous coronary interventions (PCIs) and noncoronary endovascular interventions in recent years, with lower morbidity, mortality, and bleeding complications compared to transfemoral access (TFA).<sup>1-5</sup> Currently, TRA is largely underutilized in interventional radiology (IR), and the brachial artery continues to be the more common upper extremity access for noncoronary interventions. However, there has been a growing interest in TRA within the IR community in recent years. Patient interest exists as well for reasons related to improved outcomes, decreased pain, immediate mobility, and expedited postprocedure discharge.<sup>6-9</sup> TRA is an intuitively attractive option for fully anticoagulated patients (international normalized ratio [INR] > 2) due to the decreased risk of bleeding at the access site. Unfortunately, there is a dearth of data to support the efficacy and safety of TRA in this patient population for noncoronary interventions.

## CURRENT DATA AND EXPERIENCE

The Society of Interventional Radiology standards of practice guidelines recommend that anticoagulation be held prior to procedures that carry a moderate or high bleeding risk,<sup>10</sup> which include angiographic interventions utilizing TFA. Although some operators perform TFA in such patients and use closure devices, there are no data to suggest that it is safe. There is an increased risk of bleeding complications associated with discontinuing warfarin, monitoring the INR, and initiating bridge therapy with a low-molecular-weight heparin when the INR is < 2.<sup>11</sup> Additionally, the risk of thrombosis and stroke may be increased due to rebound hypercoagulability from disproportionate suppression of natural anticoagulants proteins C and S with discontinuation of warfarin.<sup>3,12-14</sup>

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Periprocedural antithrombotic recommendations vary based on the oral anticoagulant type, laboratory parameters, and the balance between the risks of thromboembolism and bleeding. In addition, the monitoring and education required for periprocedural antithrombotic therapy can be cumbersome for both health care professionals and patients and may extend hospital length of stay. TRA may allow for uninterrupted long-term anticoagulation, mitigating the risks associated with discontinuing therapy.

## Survey of Existing Literature

A retrospective study conducted at Penn State's Heart and Vascular Institute included 60 patients on uninterrupted warfarin and 148 patients not taking warfarin undergoing radial artery catheterization for PCI.<sup>3</sup> The authors saw no statistically significant difference between the adequacy of hemostasis or complications in patients. They noted no difference in duration of radial artery compression with addition of antiplatelet agents. Although not statistically significant, the authors noted a trend toward prolonged compression for patients who received clopidogrel, which was attributed to its potent antiplatelet activity when compared to aspirin.

## RADIAL ACCESS: HOW WE DO IT

The patient is positioned supine on the table. The arm is positioned at the patient's side, simulating TFA. This allows for catheters/wires to be positioned over the patient's draped body similar to TFA. Arm positioning boards can be used.

The wrist should be slightly hyperextended; a towel roll may be used to support the wrist. The pulse oximeter is placed on the thumb or forefinger of the wrist being accessed. A small amount of 1% lidocaine is used for local anesthesia. Access is obtained into the radial artery with a 21-gauge needle with an echogenic tip under ultrasound guidance.

A 0.021-inch wire is advanced into the radial artery. If there is any resistance, the wire is pulled back and readjusted. If the wire cannot be advanced, fluoroscopy and direct visualization with contrast is performed. A hydrophilic-coated radial access sheath is advanced into the radial artery over the guidewire.

After sheath placement, a medication "cocktail" is administered intra-arterially. Nitrates, calcium channel blockers,

and heparin are utilized to prevent arterial spasm and reduce vascular tone. We use 3,000 units of heparin, 200 µg of nitroglycerin, and 2.5 mg of verapamil. Hemodilution and slow injection of the cocktail is recommended to avoid a burning sensation upon injection of verapamil. Catheter lengths ranging from 100 to 125 cm are typically used in our lab to perform peripheral interventions. A common shape for hepatic interventions is the Sarah Radial or Jacky Radial (Terumo Interventional Systems) or Ultimate (Merit Medical Systems). The working catheter is often used with a 0.035-inch guidewire to navigate the subclavian region and engage the descending aorta. Other catheter shapes that may be used are the JR4, Cobra, and Vertebral.

Radial artery hemostasis is achieved using the "patient" hemostasis technique, which is typically performed using a wristband device such as the TR Band (Terumo Interventional Systems). A distal radial artery pulse should palpate during the hemostasis period, which ranges from 30 to 90 minutes. Patients can ambulate immediately after the procedure, even during the hemostasis period.

Hamon et al evaluated the access site used for PCI to treat acute coronary syndromes in patients on anticoagulation (subcutaneous fondaparinux or enoxaparin).<sup>2</sup> Major bleeding was significantly lower in TRA group compared to the TFA group at day 9, irrespective of the anticoagulant used. Hildick-Smith et al studied over 600 radial coronary angiograms, with 66 cases specifically performed via TRA because of anticoagulation status (INR > 2).<sup>15</sup> All 66 patients had an INR > 2 but < 4.5. The access approach used was the left radial in 39% and right radial in the remainder; the sheath sizes used were 4 F (6%), 5 F (20%), and 6 F (74%). The success rate was 97%, with no failures due to access, and only one minor postprocedural hemorrhage. Failures were caused by radial artery atherosclerosis and subclavian artery tortuosity.<sup>1</sup> The authors concluded that the radial approach to coronary angiography is safe in the fully anticoagulated patient.<sup>15</sup>

Similar to anticoagulated patients, those with a preexisting coagulopathy pose a challenge to the interventionists when choosing access site. A radial-first approach may be considered in patients with liver-related coagulopathy or patients with thrombocytopenia. Titano et al reviewed outcomes in patients undergoing transarterial chemoembolization (TACE) procedures

with a platelet count of < 50,000 U/L. The study included 126 patients, with 65 patients undergoing TRA and 61 patients undergoing TFA. The study concluded that TRA is noninferior compared to TFA for TACE in terms of bleeding complications and other access site complications, and there was a trend toward fewer transfusions in the TRA TACE group.<sup>8</sup>

## CONCLUSION

Data are limited in the peripheral space evaluating outcomes comparing TRA versus TFA, specifically related to bleeding complications in coagulopathic patients and patients on anticoagulation. A prospective trial studying the safety and efficacy of TRA in patients with uninterrupted warfarin, with or without an antiplatelet regimen (including some of the newer agents such as rivaroxaban or apixiban), would have tremendous impact on management of these patients pre- and postprocedure. Similarly, robust data suggesting the safety and efficacy of TRA versus TFA in patients with liver-related coagulopathy or thrombocytopenia may favor a radial-first approach for liver-directed therapy. Such data are eagerly awaited in the IR community. ■

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