

## **Infusion Therapy in the Arm with Radial Artery Harvesting**

### **Question:**

We have a new physician who is using the radial artery for coronary artery bypass grafts (CABG). The nurses have been told that we can continue to use the same arm for delivering IV therapy. What is the standard of practice in these patients?

### **Answer:**

Radial artery harvesting is becoming a common practice after some unsuccessful attempts in the early 1970s. Although the left internal mammary and saphenous arteries are preferred, they may not be available because of previous CABG procedures, scarring from trauma, or adhesions from previous surgery. Improvements in harvesting techniques and use of calcium channel blockers have decreased the incidence of vasospasm and occlusion when the radial artery is grafted.<sup>1</sup>

Candidates for use of the radial artery are assessed for their medical history, occupation, and lifestyle. Most candidates are men between the ages of 40 and 60; however, men and women under age 70 may be considered. Patients with a history of Raynaud's disease, carpal tunnel syndrome, peripheral vascular disease, or other circulatory problems typically are excluded. Handedness is not a consideration, as some patients may have bilateral radial arteries harvested. Patients with occupations such as artists, musicians, or dentists are not candidates because of the fine dexterity needed in those jobs. Arterial circulation to the hand is carefully evaluated by using the Allen's test and other noninvasive procedures, such as Doppler ultrasound.<sup>2</sup>

The harvesting procedure is performed immediately before the cardiac procedure and requires meticulous surgical technique. The incision could extend from below the wrist to above the antecubital fossa. This extremity should not be used for infusion therapy in the immediate post-operative period. Skin staples, drains or pressure dressings are also to be avoided as they could compromise the post-operative vascular assessment.

Associated complications include infection, numbness and tingling, and hand ischemia. Infusion therapy in a surgical extremity can cause more impairment of the circulation to the hand. If a complication occurs from the infusion therapy, surgically created changes in the circulation could slow its healing, leading to greater risk to the hand circulation.

Long-term effects of radial artery harvesting are unknown. One study evaluated patients for hemodynamic changes in the upper extremity. The average number of post-operative days was 66. Changes in arterial pressures in several locations of the arm, hand, and digits were measured. There were statistical differences in the velocity of blood flow and arterial resistance in the extremity with the harvested radial artery when compared to the opposite extremity, however no patients complained of claudication or pain—although, eight of the 27 patients in this study complained of numbness and tingling.<sup>3</sup>

Another study used ultrasonography to document changes in hand circulation in patients with and without radial artery harvesting. Blood pressure and blood flow of the index finger of the donor hand was lower in the immediate post-operative period, but had returned to normal within a year after the procedure.<sup>4</sup>

Post-operative complications from harvesting the radial artery are primarily neurological problems resulting from damage to the radial nerve during the harvesting procedure. This can lead to numbness and paresthesia of the lateral side of the hand. Although the incidence ranges 6% to 67% in large studies, patients did report preference of the forearm site to others such as harvesting the saphenous artery. 5-8 Additional case reports include reflex sympathetic dystrophy, chronic regional pain syndrome, and even one report of a deep vein thrombosis in the axillary vein. 6, 9, 10

No standards of practice have been established for use of these extremities for placement of PICC, midline, or peripheral catheters after the incision has healed and collateral circulation has compensated for the artery removal. This decision should be based on a careful assessment of the patient's complaints of discomfort and their circulatory status in that extremity. If bilateral harvesting has been done, choose the extremity with the least alteration in circulation and sensation.

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