

A modified approach for totally endoscopic, touchless radial artery harvesting



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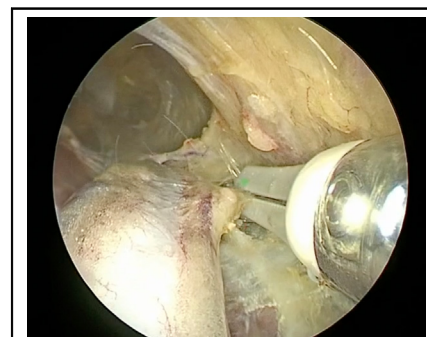
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Intraoperative image showing endoscopic radial artery harvesting.

CENTRAL MESSAGE

Endoscopic radial artery harvesting using a modified touchless technique can be safely and effectively performed without jeopardizing conduit quality.

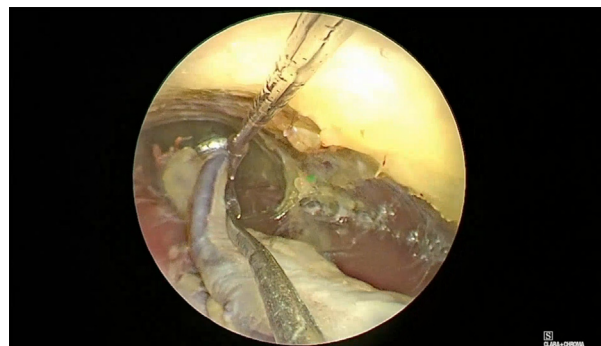
▶ Video clip is available online.

Since the inception of endoscopic vessel harvesting, the procedure has been criticized for having excessive contact with the conduit, thus potentially causing endothelial damage and decreasing patency rates.^{1,2} Despite the criticism, the very same method has been adopted to harvesting the radial artery. We attempted to create a touchless technique by eliminating several points of contact to the vessel and making the procedure as atraumatic and as standardized as possible.

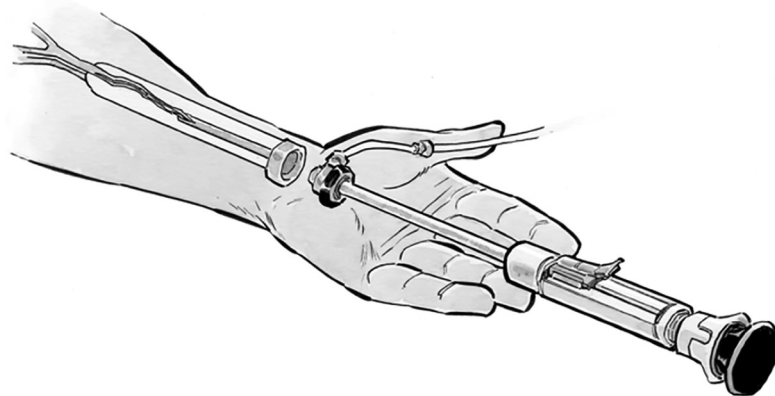
The standard technique for vessel harvesting, which has been taught since 1995, comprises blunt cone dissection of 4 planes (ie, anterior, posterior, right lateral, and left lateral planes). The device is then switched over to the separate electrocautery device to divide the branches. The scope is advanced to the proximal tunnel, and the c-ring is extended and engages the vessel. The scope and c-ring are then withdrawn in a retrograde fashion until the c-ring encounters a branch, much like vein stripping, at which time the branch is divided. This is done for the entire length of the vessel, and the c-ring manipulates the vessel the entire course. This seemed to be too much manipulation to be used on radial arteries, where the branches and vessel are much more delicate than the saphenous vein.

In 2013, we therefore sought out to perfect a modified, touchless technique that entailed a reduction in the number

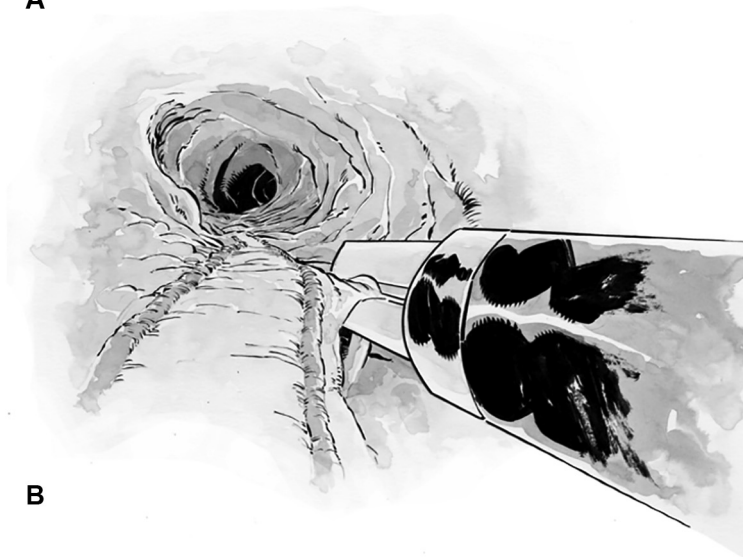
of dissection planes needed, thus limiting the use of the c-shaped ring, decreasing contact to the vessel, minimizing the potential hazard of vessel injury, as well as developing a reproducible and highly efficient procedure (Figure 1) (Video 1). Since then, 111 harvests have been performed using this method.



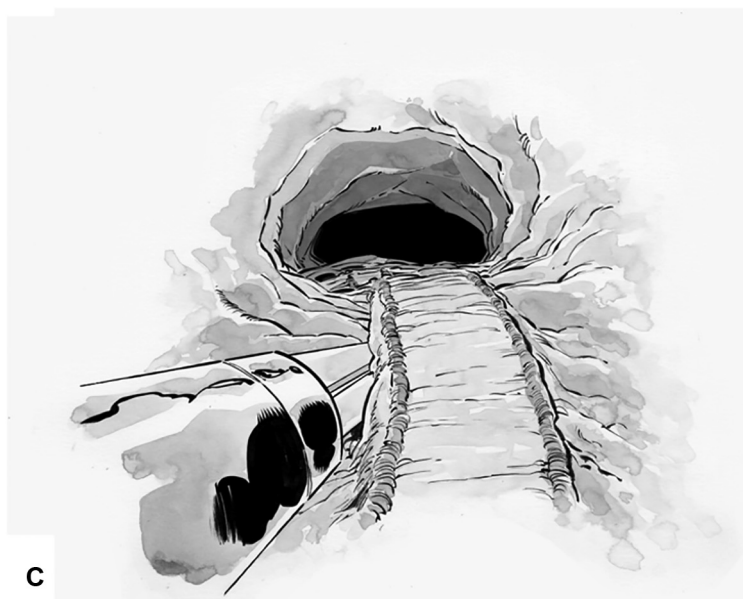
VIDEO 1. Totally endoscopic, touchless radial artery harvesting. Video available at: [https://www.jtcvs.org/article/S2666-2507\(22\)00475-8/fulltext](https://www.jtcvs.org/article/S2666-2507(22)00475-8/fulltext).



A



B



C

FIGURE 1. Illustrations depicting operative technique including (A) endoscopic vessel harvesting (EVH) system and view of the tunnel created; (B) endoscopic bisector first pass on *right* side of tunnel dividing arterial branch in antegrade direction; and (C) endoscopic bisector second pass on *left* side of tunnel dividing branch and tissue in antegrade direction.

Preoperatively, we routinely evaluate all patients with duplex ultrasound to assess the perfusion status of the palmar arch. Before incision, a pulse oximetry probe is placed on the patient's finger in the radial artery distribution and an Allen test is performed. Following release of the ulnar artery, we expect return of waveform in less than 6 seconds. If patency of collateral palmar arch circulation is confirmed, the procedure commences. A tourniquet is placed on the bicep and is inflated to a pressure of 200 mm Hg just before cone dissection, thus ensuring a bloodless endoscopic field.

The technique we developed for the modified touchless endoscopic technique eliminated many passes and unnecessary contact with the vessel. It is composed of only one blunt cone dissection, anterior to the radial artery, which creates a dilated tunnel that allows the Getinge Vasoview Hemopro device to enter with little contact to the vessel. The anterior fasciotomy is then performed, widening the tunnel and further decreasing the chance of the device contacting the vessel as well as decreasing the postoperative risk of compartment syndrome. Following the fasciotomy, we eliminated the use of the c-ring to manipulate the vessel and potentially pull-on delicate branches. Instead, our technique only employs the electrocautery, and we divide the branches in an antegrade fashion, not manipulating the vessel. The device is brought back to the port in the distal arm, where it is then rotated to the lateral side. Branches are subsequently divided in an antegrade fashion. Once lateral branch division is complete, the device is returned to the port in the distal arm, rotated medially, and branch division is again completed in an antegrade fashion. This method limits the use of the c-shaped ring, and the subsequent hazard of avulsed

branches. Once all visible branch division is complete, the c-shaped ring is extended, and the vessel is inspected for any remaining branches. Typically, there are a few posterior branches that can only be exposed using the c-ring, and this must be properly checked before considering the harvest complete. A small incision is made 3 cm below the antecubital fossa, and the pedicle is exteriorized through the incision and transected. The radial artery stump is ligated. The tourniquet is deflated, and proper hemostasis is ensured. The pedicle is then fully exteriorized through the distal incision. At this time, while still connected to its distal blood supply, the pedicle is prepared by branch ligation with Ethicon LIGACLIPS. Finally, the pedicle is ligated distally and transected at the wrist.

In summary, our technique entails a significantly lower degree of manipulation and contact to the vessel than the standard approach. This is as close to a touchless harvest as possible. It has also been a reproducible technique among our providers, and has decreased the harvest time to an average of 25 ± 5 minutes. With the standard technique, the average harvesting time was 50 ± 10 minutes in our experience. To further support this technique, a study to evaluate radial artery conduit quality and long-term patency needs to be conducted.

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