

# Endovascular Intervention of Critical Limb-Threatening Ischemia of the Upper Extremity with Gangrene: A Case Study

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## BACKGROUND

Critical limb ischemia (CLI) is a complication of peripheral artery disease that is clinically diagnosed by severe ischemic pain and skin lesions, subsequently leading to ulceration and gangrene.<sup>1</sup> It can form in any artery including the upper extremity as demonstrated in this case report. Diagnosis remains a real challenge and consequently evaluation of etiologies and determination of therapeutic strategies has proved difficult. The incidence of upper extremity CLI is about 2 cases per 100,000 persons per year. The frequency of symptomatic upper extremity CLI is forty times less than the frequency of lower limb ischemia.<sup>2</sup>

In the United States, 12% of the population is annually diagnosed with CLI and rates are predicted to increase with the global rise of risk factors like diabetes, tobacco use and metabolic syndrome. Patients are at a high risk for major amputation and cardiovascular morbidity when diagnosed with CLI, as mortality risk is 20% within 6 months and 60% within 5 years.<sup>3</sup>

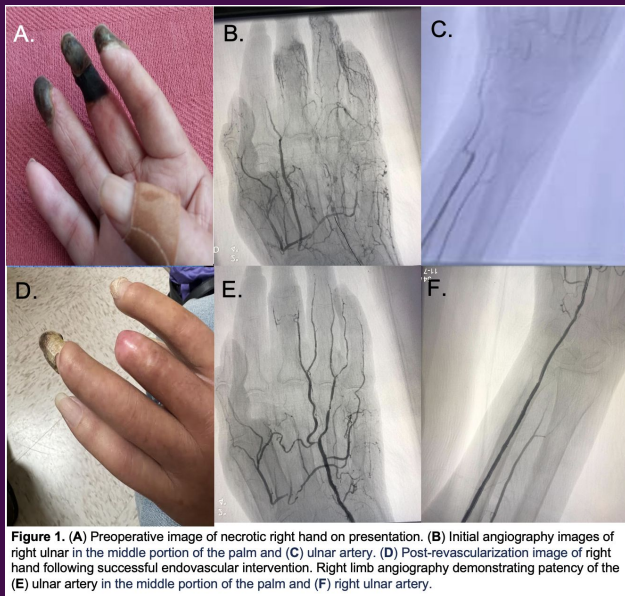
There is a current paucity of data describing successful upper extremity CLI intervention and, in particular, ischemic artery disease below the elbow.<sup>4,5</sup> Proper diagnosis of CLI and revascularization strategies are of utmost importance to decrease amputation rates in this unique patient population.<sup>6,7,8</sup> In this case report we highlight the importance of a multidisciplinary approach to avoid amputation and successfully treating upper extremity CLI through endovascular intervention.

## METHODS

Peripheral interventional procedure performed, a 4-FR JR4 catheter was advanced through the femoral sheath into the subclavian artery then advanced into the brachial artery. Next, the JR4 was exchanged with a 6-FR multipurpose guide advancing into the brachial artery.

Angiogram of the right upper extremity was performed, it showed right brachial artery was patent distally and the large ulnar artery was total occluded proximal to the wrist. The radial artery was completely occluded and not visible. The patient's only blood supply comes from one single collateral artery to the palmar arch. There is reconstitution of the ulnar artery in the middle portion of the palm (Figure 1: A-C).

## FIGURES



**Figure 1.** (A) Preoperative image of necrotic right hand on presentation. (B) Initial angiography images of right ulnar in the middle portion of the palm and (C) ulnar artery. (D) Post-revascularization image of right hand following successful endovascular intervention. Right limb angiography demonstrating patency of the (E) ulnar artery in the middle portion of the palm and (F) right ulnar artery.



**Figure 2.** Intra-operative images of successful access of the ulnar artery in the palm.

## METHODS (cont.)

Next, 0.14 angled TrailBlazer along with 0.014 Advantage wire was advanced into the occlusion of the ulnar artery, but unable to go through it. Under ultrasound access was obtained at the reconstituted ulnar artery in the palm, a 0.18 wire was advanced successfully retrogradely crossing the occluded ulnar artery; continuing up to the reconstituted ulnar artery (Figure 2).

Then through this access PTA was performed with a coronary balloon, but was unable to get antegrade wire following tract. A snare was advanced through the micropuncture sheath from the hand and the antegrade wire was snared and brought into the palmar sheath. Then the wire was advanced through the palmar sheath and removed. The antegrade wire was advanced down into the digital branches and a balloon was advanced crossing all the occlusion and puncture site; and inflated for 15 then 10 minutes

## RESULTS

There was recanalization of the ulnar artery with extensive great flow to the digits. No evidence of further bleeding or perforation. The patient is free of pain and discomfort immediately after the procedure (Figure 1: D-F).

## CONCLUSION

Critical limb-threatening ischemia of the upper extremity although less common than lower extremity ischemia it is just as threatening and deadly. The endovascular approach has many offerings and challenges to revascularization. With the cases in upper extremity critical limb ischemia rising the new and novel techniques and devices in these procedures are imperative in saving both upper and lower extremities and saving lives.

## DISCLOSURE INFORMATION

None of the authors has any relevant disclosures.

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