Transient and Regional Ischemia Related to Continuous Saline Solution Infusion during Radial Artery Access

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ABSTRACT

This case series illustrates a radial access complication seen in 7 of 9 consecutive patients (age range, 44–53 y) undergoing uterine artery embolization in May and June 2017. Demonstrative images and videos identify a transient and clinically consequential skin ischemia caused by intraprocedural saline solution infusion through the occlusive radial artery sheath. All complications documented were classified as mild adverse events (class A) according to Society of Interventional Radiology criteria. Complication severity ranged from transient blanching to ischemic necrosis of the skin. Operator cognizance of this phenomenon with appropriate adjustment of saline solution infusion rates will prevent tissue ischemia and necrosis in radial access cases.

ABBREVIATION

UAE = uterine artery embolization

Radial artery access for endovascular procedures is commonly used because of the benefits of reduced access-site complications, hospitalizations, and overall costs, as well as earlier patient mobilization (1–3). The present case series of 7 patients illustrates a reproducible complication related to radial artery access. One of these patients presented with a lesion on the accessed forearm—a site of apparent skin necrosis. The cause of this mild adverse event (Society of Interventional Radiology [SIR] class A) (4) was investigated further and is detailed in 5 cases here. Operators recognized a blanching phenomenon that occurred in 7 of 9 consecutive cases with radial artery access in the locality of the area of previously observed skin necrosis.

A reproducible radial artery site finding is described here that has clinical consequences ranging from transient blanching to skin breakdown and regional necrosis. The present report aims to characterize the pathophysiology of this phenomenon and illustrates its potential sequelae as an important cautionary note to operators who use radial artery access.

CASE SERIES

In the present case series, 7 patients underwent uterine artery embolization (UAE) for uterine leiomyomas via a radial approach in May and June 2017 under the supervision of a single operator with 35 years' experience. Five of these cases are described here. The accessed forearm was actively observed during and after the procedure.

The Flexor Check-Flo Introducer Set–Micropuncture Radial Artery Access with AQ Hydrophilic Coating (Cook, Bloomington, Indiana) was used for radial access in these five case reports. Two subsequent cases were performed with the use of the Glidesheath Slender Hydrophilic Coated Introducer Sheath (Terumo, Somerset, New Jersey). Before the procedure, a Barbeau test was performed to confirm dual circulation, and measurement of the radial artery confirmed vessel diameter of at least 2.0 mm.

Case 1

A 48-year-old woman with leiomyoma-related menorrhagia was referred for UAE. Magnetic resonance imaging of the pelvis showed numerous intramural leiomyomata, with the largest measuring 5.7 cm × 5 cm × 4 cm. The procedure was performed from a left radial approach under ultrasound

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Figure 1. Left volar forearm of a 48-year-old woman following radial artery catheterization for UAE. **(a)** Blanched skin lesion (asterisk) at the the time of completion of the procedure. **(b)** Resolution of the lesion (asterisk) at 24 hours after the procedure.

guidance. One percent lidocaine was used for local anesthesia. A short 5-F sheath was inserted, and a vasodilator solution containing 4,000 U heparin, 200 μg nitroglycerin, and 2.5 mg verapamil was administered intraarterially. Room-temperature saline solution was infused through the vascular sheath. A 125-cm, 4-F Berenstein catheter (Merit Medical, South Jordan, Utah) and a 0.035-inch, 1.5-mm-diameter J wire (Cook) were advanced into the internal iliac arteries, and the uterine arteries were superselectively catheterized with a microcatheter and embolized with 500–700-μm Embosphere particles (Merit Medical). Hemostasis was achieved in the left wrist with a SafeGuard device (Merit Medical).

After hemostasis was achieved and the sheath was removed, physical examination of the wrist revealed a single well-circumscribed, nontender, nonfluctuant 2.0-cm × 3.0-cm elevated area with a geographic erythematous border and a pale center on the volar aspect of the forearm just proximal to the left radial artery access site (Fig 1a). The radial and ulnar pulses were intact. The remainder of the physical examination findings were unremarkable. At the time of discharge, nearly 24 hours after the procedure, the lesion at the access site had largely resolved, with the degree and area of blanching greatly reduced (Fig 1b).

Case 2

A 47-year-old woman underwent UAE as in case 1. Approximately 5 minutes after radial artery catheterization and following infusion of room-temperature saline solution, a lesion like that described in case 1 was noted on the volar forearm just proximal to the leading end of the introducer sheath. Ischemic or inflammatory etiology was suspected, and an additional 200 μg nitroglycerin was administered via the radial access sheath before the sheath was removed and 125 mg solumedrol was given intravenously.

The patient's lesion abated in the recovery bay. However, at 2 weeks' follow-up, a skin check revealed skin necrosis at the exact same location as the blanching lesion that appeared during the procedure (Fig 2). This lesion persisted for several weeks and healed uneventfully.

Case 3

In a subsequent case of a 44-year-old patient undergoing UAE, the vasodilator solution was altered to assess whether a component of the mixture was the causative agent for the appearance of the lesion. The case proceeded as described in case 1; however, heparin was withheld from the intraarterial vasodilator solution. Verapamil and nitroglycerin were injected intraarterially. Within minutes after radial artery