CASE REPORTS

Anesthesia
78:587-589, 1993
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Ischemic Complications of Radial Artery Cannulation: An Association with a Calcification, Raynaud’s Phenomenon, Esophageal Dysmotility, Sclerodercty, and Telangiectasia Variant of Scleroderma

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RADIAL artery cannulation is a common procedure with an established low risk of complications. Nonetheless, ischemic complications can occur and have been associated with catheter related factors, medical predisposition, cardiopulmonary bypass, and administration of vasopressor or inotropic agents. The case of a patient with calcinosis, Raynaud’s phenomenon, esophageal dysmotility, sclerodercty, and telangiectasia (CREST) variant of scleroderma is described in which ischemia to the thumb, index finger, and long finger followed radial artery cannulation. This was severe enough to require partial digital amputation.

Case Report

A 72-year-old white woman was referred from a nearby hospital to the Vascular Medical Service at our institution with a diagnosis of ischemia of the thumb, index finger, and long finger of the left hand secondary to radial artery occlusion. Approximately 6 weeks earlier, she had a displaced subcapital femoral neck fracture. Her significant medical history included recurrent major depression, hypertension, and anemia. The fracture was managed by placement of an Austin-Moore endoprosthesis.

Anesthesia for the surgical procedure was induced with fentanyl and sodium thiopental and maintained with isoflurane and nitrous oxide. A 20-gauge Arrow Teflon arterial cannula (Reading, PA) was inserted in the left radial artery preoperatively, and a central venous catheter was inserted via the right internal jugular vein. No clinical tests of collateral circulation to her hands before radial artery cannulation were recorded. Surgery was performed with the patient in the standard left lateral decubitus position. Whether an axillary roll was used was not mentioned. The surgical procedure and anesthetic course were uncomplicated. No intraoperative hypotension occurred. The peak blood pressure was 200/100 mmHg just before anesthetic induction. The lowest blood pressure was 135/55 mmHg near the end of the procedure. No vasoactive drugs were administered. The estimated blood loss was 250 ml; no blood was transfused. The arterial cannula was removed in the recovery room, and a left radial pulse was palpable thereafter. Her recovery was uneventful, except for minor postoperative renal insufficiency (creatinine concentration, 1.7 mg/dl). However, within 48 hours after surgery, the patient began to complain of pain in her left hand, and her left index and long fingers were cyanotic. A tentative diagnosis of Raynaud’s disease was considered, and oral nifedipine was given without apparent improvement. Then an electromyogram was obtained; the results were consistent with carpal tunnel syndrome. No further treatment was suggested, and the patient was transferred from the hospital to a long-term care facility 12 days postoperatively. She continued to complain of left hand pain, and noninvasive vascular laboratory studies were performed, which included a normal Allen’s test and the presence of left ulnar, radial, and brachial blood flow by Doppler examination. She also had a positive antinuclear antibody test result (1:280, speckled pattern) and an elevated erythrocyte sedimentation rate (77 mm/h). Total complement, C3, and C4 concentrations were normal. After no improvement in symptoms for another 2 weeks, an angiogram was performed. It revealed left radial artery occlusion "about 7-8 cm proximal to the wrist." In addition, the ulnar artery was found to split into several small branches at the distal forearm with “no good ulnar artery descending into the hand.” "Reconstruction" of the distal left radial artery was reported via collateral flow from the deep palmar arch to a point at the wrist that approximated the site of cannulation. No superficial palmar arch was visualized. At this point, the patient was transferred to the Mayo Clinic for further evaluation and treatment, including consideration of vascular bypass or thrombolytic therapy.

On admission, a history of bilateral Raynaud’s phenomenon was found (with the right hand more severely affected than the left). She described symptoms consistent with esophageal dysphagia and had an elevated erythrocyte sedimentation rate. Tests for antinuclear and anticientromere antibodies gave positive results. During the physical

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Received from the Department of Anesthesiology, Mayo Clinic, Rochester, Minnesota. Accepted for publication November 5, 1992.

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Key words: Complications, arterial cannulation; ischemia.
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In summary, a case of hand ischemia requiring partial digital amputation after radial artery cannulation in a patient with a CREST variant of scleroderma is reported. The cause of the ischemia may have been multifactorial. Thrombus and/or embolus that occurred secondary to the radial artery cannulation may have caused digital ischemia and necrosis because of the compromised distal vasculature associated with the CREST syndrome. Although ischemia can occur from CREST syndrome alone, the finding that Raynaud’s phenomenon was more severe on the right than the left and that noninvasive vascular studies indicated more severe vascular disease on the right implied that left radial artery cannulation was a contributing factor. It seems prudent to consider carefully the risk–benefit ratio of radial arterial cannulation in patients with Raynaud’s phenomenon, recognizing that the risk of ischemic complications caused by radial artery cannulation in these patients is probably very low. However, if it is known that the patient has CREST syndrome, cannulation of a larger artery (such as the femoral) should be considered if direct arterial pressure monitoring is indicated.

The author acknowledges the invaluable assistance of Duane K. Rorick, M.D., Ph.D., in the preparation of this manuscript and the expert and patient secretarial assistance of Ann E. Brumm.

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Anesthesiology, V 78, No 3, Mar 1993