

# A Late Presentation of Hand Pain with Skin Changes

Fady P. Marji, Grant M. Kleiber<sup>1</sup>

Department of Plastic and Reconstructive Surgery, University of Pittsburgh, Pittsburgh, Pennsylvania, <sup>1</sup>Department of Plastic and Reconstructive Surgery, MedStar Georgetown University Hospital, Washington, DC, USA

## Abstract

A middle-aged homeless man presented with ongoing left-hand pain and worsening cutaneous phalangeal color changes. On examination, digital ischemia was observed with associated dry gangrene. Doppler examination showed impaired distal arterial flow. Angiography showed irregular digital perfusion. The patient later provided vital information to secure the diagnosis without further clinical workup. This quiz discusses the presentation, differential diagnosis, and treatment of a rare clinical scenario.

**Keywords:** Cutaneous infarction, digital gangrene, hand ischemia, intra-arterial drug injection (IADI), microembolization

## CASE PRESENTATION

A 60-year-old homeless man with a history of hypertension, hyperlipidemia, chronic back pain, and intravenous drug abuse presented with worsening left-hand pain for 2 months, endorsing gradual digital color changes. Clinical examination showed ischemia-related cutaneous changes to phalanges II–V, with associated dry gangrene and ulcerations distally involving the nailbeds [Figures 1 and 2]. There were no signs of sepsis. Doppler examination showed biphasic signals of the radial and ulnar arteries at the wrist, however, limited signal at the palmar arch and digital arteries. Findings of echocardiogram were normal. Angiography showed patent radial and ulnar arteries, yet multiple occlusions of the palmar arch and attenuated digital vessel flow [Figure 3]. The patient was anticoagulated, topical nitroglycerin and hydrocortisone were applied to his fingers, a chemical sympathectomy of the hand was performed with botulinum toxin, and he underwent five sessions of hyperbaric oxygen treatment. Finger perfusion ultimately improved, with only limited tissue loss at the hyponychia of the phalanges.

## What is your diagnosis?

*Diagnosis:* Cutaneous embolic infarction due to intra-arterial drug injection (IADI).

## DISCUSSION

Late in the clinical evaluation, the patient subsequently endorsed crushing hydromorphone tablets, diluting the powder created, and injecting the solution purposefully into his left brachial artery. This resulted in the embolization of particulate matter and effective partial occlusion to the palmar, digital, and cutaneous arteries of the hand. The consequential ischemia-related tissue changes described were the result of cutaneous infarction.

The underlying etiology of cutaneous embolic infarction to the fingers may involve infection, autoimmune connective tissue disorders and vasculitides, metabolic and coagulation disorders, or malignancies, all of which may require substantial clinical workup.<sup>[1]</sup> However, with a cooperative and forthcoming patient, the diagnosis of IADI may be made by thorough history and physical examination alone. Patients will typically complain of severe pain that began immediately after injection; however, late presentation may occur due to patient reluctance to seek medical care or lack of access. Paresthesia, weakness, and swelling of the hand and digits are also common symptoms. Examination may show track marks or old

**Address for correspondence:** Dr. Fady P. Marji,  
Department of Plastic and Reconstructive Surgery,  
University of Pittsburgh, One Children's Hospital Drive,  
4401 Penn Avenue Floor 3, Pittsburgh PA 15224, USA.  
E-mail: marjfp@pitt.edu

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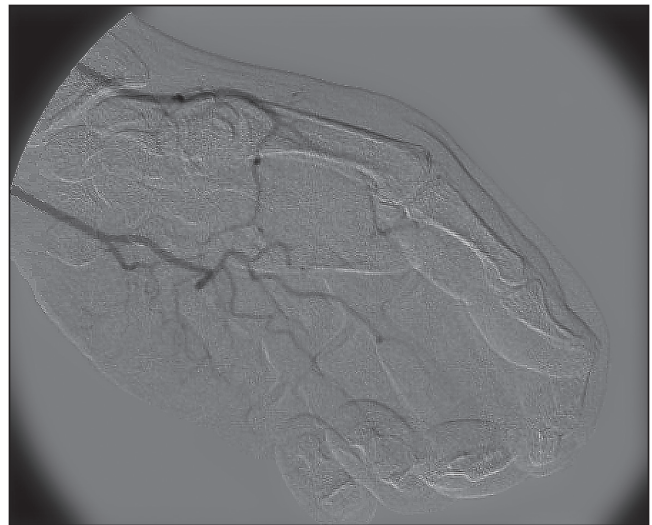


**Figure 1:** Volar view of patient's hand depicting ischemic skin changes. Note the distal cyanosis and edema of phalanges II–IV, as well as the appearance of dry gangrene indicating cutaneous infarction



**Figure 2:** Dorsal view of patient's hand depicting cyanosis and edema of the digits, as well as necrosis of tissue at the nailbeds. Peripheral ulceration is noted circumscribing the areas of infarcted skin, as well as a punctate ulcer on phalanx II

injection wounds along the extremity in the habitual drug user, as well as distal ischemic skin changes to the hand and fingers in association with coolness, edema, motor and sensory deficits, and an altered distal pulse examination.



**Figure 3:** Angiogram showing patent radial and ulnar artery flow at the wrist, with attenuated palmar and digital perfusion

This may be differentiated from Nicolau syndrome, which occurs iatrogenically after intramuscular, intraarticular, or subcutaneous injections, and results in ischemic necrosis at the injection site.<sup>[2]</sup> The role of arteriography in the diagnosis of IADI remains controversial.<sup>[3]</sup>

After its recognition, the complex management of an acute or chronic vaso-occlusive disorder of the hand requires a multidisciplinary approach to treat ischemic pain, topically address developing wounds, and improve perfusion to limit the threat of digital gangrene and potential tissue loss.<sup>[4]</sup> The development of tissue necrosis in the setting of IADI is multifactorial, likely secondary to direct toxicity to vascular endothelium, vaso-occlusion by particulate emboli, crystallization of the injected substance with microthrombosis, and increased sympathetic discharge with resultant vasospasm.<sup>[3]</sup> Protocols implemented to manage IADI typically involve therapeutic anticoagulation, corticosteroids, dextrans, judicious use of opioids, elevation, and early mobilization.<sup>[2]</sup> Topical nitroglycerin has been shown to increase perfusion to digits with diseased or injured vessels and may be used as an adjunctive ointment in this setting.<sup>[5]</sup> The effectiveness of hyperbaric oxygen treatment and chemical or surgical sympathectomy in limiting tissue loss due to IADI remain to be elucidated. In a case report from India, prolonged digital tissue ischemia after iatrogenic arterial injection of diclofenac resulted in the need for distal finger amputation,<sup>[6]</sup> which may be appropriate in cases of severe gangrene. Finally, screening for illicit substance dependence and comorbid psychiatric disorders must be conducted, with appropriate referral for psychiatric and pain management consultation.

## FIVE LEARNING POINTS

1. IADI to the brachial artery may occur iatrogenically or purposefully because of illicit drug use and may

lead to serious ischemic complications with subsequent phalangeal tissue loss.

2. After IADI, patients typically present immediately due to exquisite pain, paresthesia, weakness, and swelling to the extremity; however, delayed presentation may occur.
3. Ultimately, skin necrosis in the setting of IADI occurs due to direct toxicity of the injected substance to the vascular endothelium and a resultant embolic cascade.
4. Typical protocols for the management of IADI use elevation of the extremity, therapeutic anticoagulation, dextran, steroids, opioids for pain, and early physical therapy.
5. Topical nitroglycerin may be applied as adjunctive therapy to maximize distal perfusion. Hyperbaric oxygen therapy and chemical sympathectomy may also improve outcomes.

#### **Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will

not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

#### **Conflicts of interest**

There are no conflicts of interest.

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