Minimally Invasive Treatment of Raynaud Phenomenon
The Role of Botulinum Type A

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KEYWORDS

• Minimally invasive • Botulinum type A • Raynaud phenomenon • Treatment

KEY POINTS

- Although the mechanism is unknown, botulinum toxin type A injection may be an effective, localized, nonsurgical treatment option without addictive properties or systemic side effects for the treatment of ischemic digits.
- Clinical research supports the safety and efficacy of injection of botulinum toxin type A for the treatment of Raynaud phenomenon.

RAYNAUD PHENOMENON

Approximately 3% of the US population (9.15 million people) is affected by Raynaud phenomenon.[1] This vasospastic disorder is 9 times more common in females and typically occurs between 15 and 40 years of age.[2,3] Patients with Raynaud have an exaggerated vasoconstriction of their digital arteries in response to certain environmental triggers, which leads to pale, cold, numb, and sometimes painful, ulcerated digits (**Fig. 1**). Vasospastic episodes may be triggered by emotion, stress, coldness, trauma, moisture, smoking, or mild changes in ambient temperature.[4] These episodic attacks can last minutes to hours and may reoccur several times throughout the day. For most patients, these symptoms are simply bothersome; but for 1 out of 5 patients, the symptoms are so severe that they seek medical attention, most commonly for severe ischemic pain or fingertip ulcerations. The resultant digit ischemia may be associated with considerable morbidity: pain, ulcerations, loss of function, disability, and depression.[5–10]

Raynaud phenomenon can be classified into primary and secondary conditions.[5] Primary Raynaud is an idiopathic condition with no known associated comorbidity. Secondary Raynaud, however, is associated with other autoimmune or connective tissue disorders, such as scleroderma, mixed connective tissue disease, lupus, or Sjögren syndrome.[11] The pathophysiology of Raynaud phenomenon is still poorly understood. Primary vascular dysfunction, however, has been implicated as the essential physiologic abnormality in Raynaud phenomenon characterized by an imbalance between vasodilation and vasoconstriction. The vasospastic episodes are hypothesized as being under both sympathetic neural and chemical imbalances.[5]

Avoidance of exacerbating factors, especially cold and stress, are paramount to the management of Raynaud. If the condition is secondary to autoimmune or connective tissue disorders, these conditions should be medically managed and optimized through the patients' rheumatologists. The pharmacologic treatment of the ischemic digits has included such options as calcium channel blockers, nitric oxide, angiotensin-converting enzyme inhibitors, selective-serotonin receptor inhibitors, alpha-adrenergic blockers, anticoagulants, oral prostanoids, antithrombotics, phosphodiesterase type 5 inhibitors, endoltheial-1 receptor

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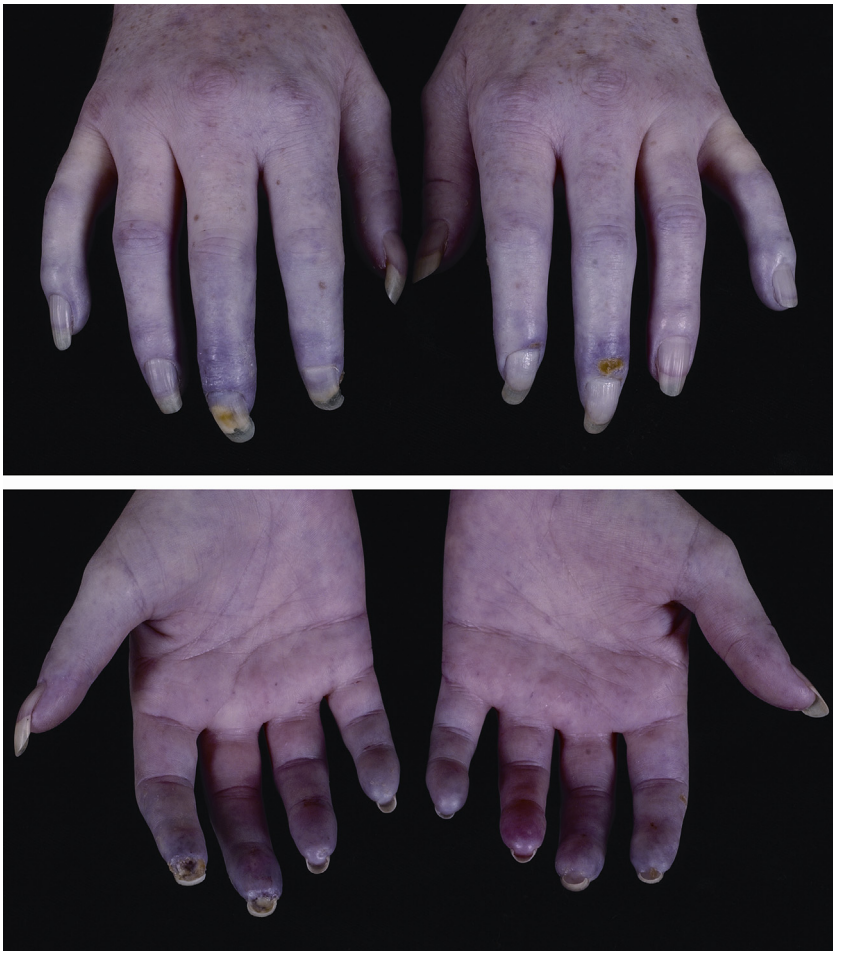

Fig. 1. Patients with Raynaud phenomenon are subject to extreme episodes of vasoconstriction of the digital arteries that results in discoloration, pain, stiffness, and ulcerations. (*From* Neumeister M. Botulinum toxin type A in the treatment of Raynaud's phenomenon. J Hand Surg 2010;35A:2086; with permission.)

antagonists, topical glyceryl trinitrate, and antioxidants.[5–7,11–18] Patients with severe pain and digit ulceration who have failed conservative managements are often referred to hand surgeons for further evaluation and treatment. Cervical sympathectomy was a surgical treatment option that has now fallen out of favor because of potential complications and poor long-term results.[4] Adrian Flatt[19] introduced digital sympathectomies for chronic ischemia whereby the vessels are surgically stripped of the adventitia and sympathetic innervation. The intent is to deny the digital artery of its potential to vasoconstrict. More aggressive peripheral artery and digital artery sympathectomies are more expansive and involve stripping the adventitia from the arteries at the level of the digital artery, palmar common digital artery, palmar arch, and/or radial and ulnar arteries. These sympathectomies, however, provide inconsistent or temporary relief and may be associated with surgical morbidity, such as contractures, stiffness, nerve injury, or vascular disruption.[7,19–21] Partial or full amputations may be necessary to relieve recalcitrant pain and ulcerations with exposed phalanges.

Over the last 10 years, many hand surgeons have demonstrated pain relief and ulcer healing with injection of botulinum toxin type A (Btx-A) around the neurovascular bundles of affected digits.[22] Btx-A injection is a much less invasive and less expensive option compared with surgical interventions, such as sympathectomies, and may provide immediate and long-term results.

INDICATIONS AND CONTRAINDICATIONS

The indications for the use of Btx-A in digital ischemia include Raynaud phenomenon and vascular insufficiencies not amenable to surgical bypass. The contraindications are listed in **Box 1**.