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CLINICAL

Digital gangrene in a patient with primary Raynaud's phenomenon

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ABSTRACT Digital gangrene is not usually associated with primary Raynaud's phenomenon (RP). Its presence should therefore alert the healthcare provider to look for an alternative explanation. A 19-year-old female patient with primary RP developed digital gangrene following surgical management of acute paronychia. The possible mechanism in this patient appears to be the augmentation of the vasoconstrictive response due to the local infiltration of epinephrine mixed with lignocaine prior to the incision and drainage of her infected finger.

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CASE REPORT

In May 2010, a 19-year-old female college student presented with gangrene in her right index finger. Three weeks prior to this she had been treated for acute paronychia in this finger. She was given a course of an oral antibiotic (a combination of amoxicillin 500 mg and clavulanate 125 mg, three times a day). Four days later her finger was incised and drained under local anaesthesia by infiltration of a pre-mixed solution of 1% lignocaine with epinephrine in a 1:100,000 dilution. A tourniquet was not used during the surgery. Immediately after the procedure the area started to turn black and became necrotic, and the patient experienced intense pain. The patient was given a week's course of oral antibiotics, however the lesion was extremely slow in healing. No organisms were seen on gram staining the pus from the finger and the culture did not yield any growth. There was no evidence of a previous nail fold infarct. She described the six month onset of her symptoms in the classical triphasic pattern of Raynaud's phenomenon (RP) (pallor followed by cyanosis followed by erythema with throbbing pain of the fingers on exposure to cold). She had no history of similar problems. The patient was not on any medication (including the oral contraceptive pill). There was nothing to suggest a connective tissue disease (CTD) such as systemic sclerosis or vasculitis (such as pyrexia, weight loss, arthralgias, myalgias, dysphagia, rash, photosensitivity, sicca symptoms, venous or arterial thrombosis or skin changes etc.).

When the patient presented three weeks after her surgery, her fingers were not puffy. She had normal nail fold capillaries and there were no skin telangiectasias, sclerodactyly, calcinosis or any other skin changes indicating systemic sclerosis. All peripheral pulses were equal and normal. Dry gangrene was present on the lateral aspect of the right index finger with the line of demarcation extending (Figure 1), with nothing on the fingertip itself.

Investigations showed a normal complete blood count and normal liver and renal function tests. Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) levels were not elevated. Thyroid function was normal and a screen for hepatitis B and C viruses was negative. Immunological tests such as antinuclear antibody (ANA), extractable nuclear antigens (ENA), rheumatoid factor, anti-neutrophil cytoplasmic antibodies, anti-cardiolipin antibodies and lupus anticoagulant were negative. Cryoglobulins were not detected. She had normal levels of serum complements (C3 and C4) and serum electrophoresis was normal. An X-ray ruled out cervical rib and a Doppler arterial ultrasound was normal.

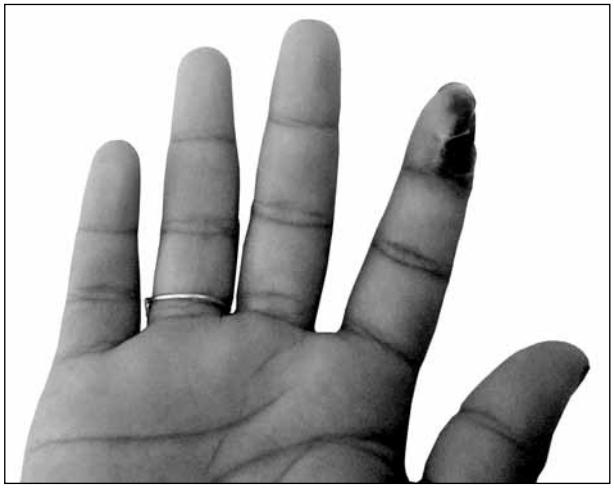

FIGURE 1 Gangrene on the lateral aspect of the right index finger.

Based on the results of these tests, a diagnosis of primary RP was made. The patient was managed conservatively and in six weeks the finger was healing (with some scarring). Subsequent follow-ups have found her to be in good health.

DISCUSSION

Acute paronychia is the inflammation of the tissue at nail folds resulting from an infection.[1] Within days of trauma there is a rapid onset of pain and swelling of the proximal and lateral nail folds (usually involving only one nail).[1,2] Oral antibiotics are initially prescribed. If an abscess has formed, a deep incision and drainage may be necessary. This procedure is usually carried out using a digital nerve block.[3] The use of epinephrine in the digital block anaesthesia remains controversial because of the risk of digital gangrene, however the current evidence favours its safety.[4,5] However in cases of pheochromocytoma and peripheral vascular disease, caution is advised in the use of epinephrine in the digital block. A pre-mixed solution of epinephrine and lignocaine was infiltrated around the paronychia in our patient's finger prior to the drainage instead of using a digital nerve block.

Various vascular, intravascular and neural factors are thought to play a role in RP.[6,7] The interplay of these factors results in an imbalance favouring vasoconstriction over vasodilatation. Vasodilation may also be impaired.[6,7] Raynaud's phenomenon occurs as a result of vasoconstriction of the digital arteries, pre-capillary arterioles, and cutaneous arterio-venous shunts.[9] Epinephrine, a potent vasoconstrictor, can potentially augment the pre-existing enhanced adrenergic response in primary RP and could therefore have caused local tissue necrosis in our patient. In primary RP, digital gangrene is very unusual and if it develops, it is usually superficial, unlike in our patient's case.[8]

In a patient presenting with digital gangrene, the differential diagnosis is broad (Table 1). Connective tissue diseases (CTD) such as scleroderma and lupus with or without RP are an important group of conditions associated with digital gangrene. The term primary RP indicates the absence of an underlying cause. Episodes are generally mild and symmetrical and do not result in tissue necrosis or gangrene. Nail fold capillaroscopy reveals normal nail fold capillaries and the ANA test is negative.[6,7,9] In secondary RP, episodes are severe and may lead to tissue necrosis, digital ulcers and gangrene. The capillaroscopy would also reveal abnormalities and specific auto-antibodies (ANA and ENA) would be present.[7–9] Only around 1% of RP cases are associated with a defined CTD. The rate of progression of primary RP to a well-defined CTD is very low but it is important to follow-up these patients long-term (for up to two to five years) with periodic nail fold capillaroscopies and autoimmune profiles.[8,10]

TABLE 1 Differential diagnosis of digital gangrene

Autoimmune diseases (with or without Raynaud's phenomenon
Antiphospholipid antibody syndrome
Systemic sclerosis
Lupus
Myositis
Mixed connective tissue diseases
Vasculitis
Vascular
Embolic
Cardiac (myxoma, infective endocarditis)
Thoracic outlet
Ascending aorta
Vessel occlusion (subclavian, brachial, forearm arteries)
Atherosclerosis
Thoracic outlet syndrome
Radial artery cannulation
Trauma
Vascular steal syndrome
Secondary to haemodialysis access
Occupational
Hypothenar hammer syndrome
Vibratory tools
Haematologic
Hypercoagulable states
Malignancy
Infection
Buerger's disease

CONCLUSION

This case emphasises the need to seek an alternative explanation for digital gangrene in patients with primary RP. In a small proportion of patients, the primary RP may be a prodrome of a CTD, therefore long-term follow-up is essential. Because of the risk of severe vasoconstriction, the use of epinephrine for digital surgical procedures should be avoided in patients with RP. A thorough history and clinical examination is therefore essential to identify pre-existing RP in all patients.

REFERENCES

1 Rigopoulos D, Larios G, Gregoriou S et al. Acute and chronic paronychia. *Am Fam Physician* 2008; 77:339–46.

2 Jebson PJ. Infections of the fingertip. Paronychias and felons. *Hand Clin* 1998; 14:547–55.

3 Keyser JJ, Littler JW, Eaton RG. Surgical treatment of infections and lesions of the perionychium. *Hand Clin* 1990; 6:137–53.

4 Denkler K. A comprehensive review of epinephrine in the finger: to do or not to do. *Plast Reconstr Surg* 2001; 108:111–24. http://dx.doi.org/10.1097/00006534-200107000-00017

5 Chowdhry S, Seidenstricker L, Cooney DS et al. Do not use epinephrine in digital blocks: myth or truth? Part II. A retrospective review of 1,111 cases. *Plast Reconstr Surg* 2010; 126:2031–4. http://dx.doi.org/10.1097/PRS.0b013e3181f44486

6 Cooke JP, Marshall JM. Mechanisms of Raynaud's disease. *Vasc Med* 2005; 10:293–307. http://dx.doi.org/10.1191/1358863x05vm639ra

7 Bakst R, Merola JE, Franks AG Jr et al. Raynaud's phenomenon: pathogenesis and management. *J Am Acad Dermatol* 2008; 59:633–53. http://dx.doi.org/10.1016/j.jaad.2008.06.004

8 Block JA, Sequeira W. Raynaud's phenomenon. *Lancet* 2001; 357: 2042–8. http://dx.doi.org/10.1016/S0140-6736(00)05118-7

9 Wigley FM. Clinical practice. Raynaud's phenomenon. *N Engl J Med* 2002; 347:1001–8. http://dx.doi.org/10.1056/NEJMcp013013

10 Spencer-Green G. Outcomes in primary Raynaud's phenomenon: a meta-analysis of frequency, rates, and predictors of transition to secondary diseases. *Arch Intern Med* 1998; 158:595–600. http://dx.doi.org/10.1001/archinte.158.6.595