CLINICAL VIGNETTE

An Edematous Blue Digit

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Introduction

Discolored and edematous fingers are an important clinical observation with a differential diagnosis that encompasses a wide variety of vascular, hematologic, and autoimmune conditions.[1] The most frequently described cause is Raynaud's phenomenon, an arterial vasospasm with hallmark symptoms that include sequential pallor, cyanosis, and erythema in fingers exposed to the cold. Similar digital discoloration is also seen in many well-known autoimmune (scleroderma), substance-related (thromboangiitis obliterans/Buerger's disease), hematologic (acute limb ischemia), and other disorders. Discolored and swollen fingers can signal conditions that range from benign to life-threatening, making a careful history and physical exam especially important in determining the proper medical response. We describe a rare case of intermittent digital erythema and edema not associated with trauma or an underlying systemic disease.

Case Report

A 35-year-old female presented for evaluation of a digital bruising diathesis. She has history of fibromyalgia, benign thyroid nodules, elevated anti-thyroid peroxidase antibodies, gastroesophageal reflux disease, alpha-thalassemia minima (aa/a), and idiopathic infertility.

She reported that her finger swelled and became bluish-purple intermittently, recently noting her symptoms had increased in frequency to once per month from once every several months in the preceding year. These incidents usually occurred spontaneously the week before her menstrual period and were accompanied by heavy night sweating. Her menstrual bleeding was normal, lasting an average of 4 days. Neither she nor her family had a history of abnormal bleeding or bruising.

The patient's vitals were unremarkable, with blood pressure 119/73 mm Hg, pulse 86 beats per minute, and room air oxygen saturation of 99%. Her complete blood count with differential, comprehensive metabolic panel, and iron studies were unrevealing. Coagulation studies were normal, with an international normalized ratio of 1.0, activated partial thromboplastin time of 29.5 seconds, and D-dimer of <0.27 µg/mL. Platelet aggregometry found no signs of spontaneous aggregation and normal platelet morphology was observed on a peripheral blood smear. The patient's autoimmune studies were normal: anti-dsDNA Elisa <= 200 IU/mL, anti-thyroid peroxidase antibody < 9.0 IU/mL, anti-thyroglobulin antibody < 0.9 IU/mL, anti-nuclear antibody <1:40. There was no sign of inflammation, with erythrocyte sedimentation rate 12 mm/hr and C-reactive protein < 0.3 mg/dL. Additional labs including, serum immunoglobulin levels, the ratio of free kappa/lambda light chains, and serum protein electrophoresis were all unremarkable.

With most common and rare explanations excluded by the indicated comprehensive testing, the patient was diagnosed with Achenbach syndrome. No treatment was offered and the discoloration and swelling resolved spontaneously.

Discussion

Achenbach syndrome (AS), also known as paroxysmal finger hematoma, is a rare condition named for the German physician who first described it in 1958[2] and is characterized by spontaneous pain, edema, and ecchymosis on the volar aspect of the proximal phalanges. The bruising is usually cyanotic, affecting the middle (although it can affect any) finger of the dominant hand, and without a history of recent trauma or other inciting conditions.[3-4] While this clinical presentation mimics that of Raynaud's phenomenon and acute limb ischemia, among other conditions, it is a distinct entity in which diagnostic tests such as Doppler ultrasonography, angiography, complete blood count, and immunological profiling are typically normal.[4-6] In

fact, there is no known etiology, with the only established risk factors being age (median 49.5 years) and female gender.[5] Diagnosis is therefore made strictly on the basis of clinical data and the exclusion of other, similarly presenting disorders. Despite its sudden onset and stark visual appearance, AS is a benign condition with symptoms that resolve in a median of 4 days without permanent sequelae.[5]

AS is a diagnosis of exclusion, requiring clinicians to exclude several more likely causes before settling on the final diagnosis. Several etiologies could be excluded on the basis of our patient's history alone. For example, the patient's "bruises" did not correlate with cold exposure, suggesting that Raynaud's, acrocyanosis, chilblains, and other cold-triggered disorders were less likely. Similarly, the patient's lack of tobacco use and psychiatric disease make thromboangiitis obliterans and Gardner-Diamond syndrome unlikely. Finally, the patient's history of recurrent episodes without affecting digital function made acute limb ischemia very unlikely.

Other possible diagnoses were excluded on the basis of laboratory studies. Our patient's normal platelet aggregometry and coagulation studies allowed us to exclude thrombosis and/or platelet dysfunction from the differential diagnosis. Similarly, the unremarkable autoimmune panel, kappa/lambda free light chains, and serum protein electrophoresis were sufficient to remove autoimmune, inflammatory, and otherwise immunoglobulin-mediated etiologies from diagnostic consideration.

Achenbach stereotypically affects middle-aged adults, with one systematic review reporting a median age of 50 years.[6] The patient described in this report is remarkable for her being only 35 years old at the time of her diagnosis. While younger patients have been reported before,[7-9] AS's rarity makes deviations from the norm potentially important in understanding the clinical spectrum of the disease.

While AS often presents as a one-time event, it has also been described - including within Achenbach's original report - as presenting with recurrent attacks.[2,6,10,11] In Jiménez et al.'s review[6] of 46 patients diagnosed with AS, there were 23 that experienced recurrent symptoms, albeit at irregular intervals. Interestingly, this patient's bruising occurred at *regular* intervals that appeared to coincide with her menstrual cycle. To the authors' knowledge, this is the first case in which AS symptomatology has been reported to correlate with menses. In fact, there is only 1 AS case report that includes discussion of the menstrual cycle in the patient's history.[12] Given AS's strong female predominance (91.6% in one cohort[5]), one might speculate that there is a mechanism connecting the physiological networks regulating menstruation with the clinical presentation of AS. Previous literature, for instance, has shown that the rate of estrogen decline in the late luteal phase (when our patient reported bruising) is faster for women who experience menstrual migraine (MGM) compared to controls.[13-14] Animal models have connected this finding to CGRP-dependent vasodilation.[15] Human studies, similarly, have confirmed that female MGM patients experience elevated CGRP-dependent blood flow in response to fluctuations in ovarian steroid hormones.[16] Harnarayan et al.'s 2021 case report[17] described an AS patient with ectatic capillaries while Robertson et al.[18] used angiography to observe the improvement of reduced digital arterial perfusion by isosorbide dinitrate, thereby suggesting a vasospastic disorder. Taken together, it seems plausible that fluctuations in female sex hormones might contribute to AS pathology.

If this mechanism does exist, it leaves a rather unremarkable pathological fingerprint. While skin biopsies have not been included in most AS patients' evaluation, they have consistently shown erythrocyte extravasation without vasculitis or other vessel damage and hyperkeratosis of the epithelium.[9,17,19,20] Other findings have included parakeratosis of the epithelium and stromal eosinophilic deposits.[9,20] In a patient described by Frerix et al.,[21] capillaroscopy revealed severe hemorrhages of the right middle finger without other abnormalities in the other investigated fingers (second through fifth bilaterally). However, a systematic review of the literature from 1944 to 2015 determined that the evidence provided by skin biopsies, angiography, and other vascular imaging techniques to all be inconclusive.[5] Thus, the pathogenesis of AS remains elusive.

We have presented the rare and unique case of a 35-year-old woman with AS in which her bruising correlates with her menstrual cycle. With fewer than 100 cases described in the medical literature, physicians may not include AS in the differential diagnosis and thereby subject patients to unnecessary evaluation and/or intervention. It is therefore important to increase providers' awareness of AS to lessen patient anxiety and to reduce the potential waste of healthcare resources.

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