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Case Report

Progression of Buerger's Disease in the Absence of Conventional Tobacco Exposure: A Case of Vape Associated Disease

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Abstract

Thromboangiitis Obliterans (TAO), or Buerger's disease, is a nonatherosclerotic, inflammatory vasculopathy primarily affecting small and medium-sized vessels, most often in the distal extremities and is strongly associated with tobacco use. We present the case of a 29-year-old male with minimal prior cigarette smoking history who developed clinically apparent Buerger's disease only following exclusive and heavy use of e-cigarette vaping. While cigarette, tobacco smoke is a well-established trigger, it is unclear what role nicotine or e-cigarette vape antigens may play in the role of Buerger's disease. This case supports growing evidence that nicotine delivery systems, including e-cigarettes, may contribute to the pathogenesis or progression of Buerger's disease. Clinicians should be aware of vaping as a potential risk factor and counsel patients with Buerger's disease on the importance of complete smoking cessation, regardless of delivery method.

Keywords: Thromboangiitis Obliterans; Tobacco; Buerger's Disease; Smoking

Introduction

Thromboangiitis Obliterans (TAO), also known as Buerger's Disease, is characterized as a nonatherosclerotic, inflammatory vascular disease with a predisposition for small and medium-sized arteries and veins classically of the distal extremities. Although the condition is associated with inflammatory intraluminal occlusion with sparing of the vessel wall, the pathogenesis of these findings is not well understood. Tobacco smoking is highly associated with the development of Buerger's disease with some suggesting a toxic inflammatory pathogenesis of disease. In multiple previous studies, smoking cessation and discontinuation of tobacco products demonstrate significant regression in symptoms and are significantly associated with improved outcomes with interventional procedures [1,2]. We present the case of a patient with minimal tobacco cigarette exposure who only developed clinically evident Buerger's disease after cigarette cessation while heavily utilizing e-cigarette vape products.

Case Report

A 29-year-old male with no significant atherosclerotic or hypercoagulable medical history was referred to our clinic for the evaluation of painful left hand first, second and third digit in July 2023 (Fig. 1). The patient reported a history of conventional tobacco cigarette smoking of 1-3 cigarettes daily (<1/4th pack per day) for approximately 10 years, but with complete cigarette and tobacco cessation for the previous 10 months (since September 2022). He reported initiation and heavy e-cigarette vape use three months prior to presentation, consistently using a 50-mg nicotine pod (BC5000 vape cartridges, assorted flavors, manufactured by EBCREATE) weekly. He denied use of any other tobacco producing including chewing tobacco.

Figure 1: Clinical image of patient's left first through fourth digits on presentation in July 2023.

Prior to approximately November 2022, the patient denied any past medical history of superficial thrombophlebitis, cold sensitivity or Raynaud's phenomenon, digital or organ ischemia, or any joint complaints. From November 2022 onwards until presentation in July 2023, the patient reports he began to experience cold sensitivity and pain of his bilateral distal hands, worst in the left hand. In the weeks leading to presentation, he began to have progression of pain in his left hand 1st-3rd digits with discoloration and ultimately development of ulcerations, unresponsive to NSAIDs. On physical exam in clinic, the patient was noted to have 2^+ peripheral pulses to the bilateral posterior tibial and dorsalis pedis pulses, reduced 1^+ left radial pulse and 2^+ on the right radial pulse. His left hand demonstrated ischemic changes with mottled skin changes, nail clubbing and ulcerations of the left 1st, 2nd and 3rd distal digits. Arterial duplex ultrasonography demonstrated a moderate-severe reduction in perfusion to the distal left upper extremity vessels. Autoimmune markers including ANA, RF and ANCA antibodies were negative.

He was counseled on complete smoking cessation (including the use of e-cigarettes) and was prescribed nifedipine extended-release 30 mg daily and nicotine replacement therapy. Within two weeks of his visit, he successfully eliminated his e-cigarette use and reported markedly improved pain, healing wounds and decreased cold sensitivity of his distal hands. Follow-up at 6 months and 1 year demonstrated continued improvement of symptoms and no further distal extremity ulceration, pain, or Raynaud's with continued smoking abstinence.

Discussion

In this case, we present a unique case of e-cigarette induced progression of Buerger's disease. Although our patient endorsed a mild approximately 3 pack-year history of tobacco cigarette smoking, he only developed clinical symptoms and progression of disease with heavy e-cigarette vaping exposure. While the pathogenesis of Buerger's disease, or thromboangiitis obliterans, is not well understood, there are clear links between tobacoo smoking and its development. It is hypothesized that tobacco smoking induces a localized inflammatory reaction to endothelial injury in small and medium sized arteries and veins. Multiple immunohistochemical analyses have identified cellular infiltrates and increased production of cytokines in the development of this disease suggesting an immune mediated vasculitis [3,4]. While certain tobacco-specific antigens have been implicated in the pathogenesis of Buerger's disease, it is unclear how other antigens found in nicotine and vape-cartridges alone without nicotine contribute to the development of Buerger's. Nicotine is known to induce vasoconstriction, endothelial dysfunction and promotes a pro-thrombotic state by increasing platelet aggregation and impairing nitric oxide-mediated vasodilation [5]. Additionally, it may contribute to immune dysregulation by activating inflammatory pathways in genetically susceptible individuals. These mechanisms can lead to segmental inflammation and thrombosis of small and medium-sized vessels, characteristic of thromboangiitis obliterans. Interestingly, our patient reported dramatic improvement in symptoms with vaping cessation-consistent with results seen in those who implement tobacco smoking cessation. Previous reports have suggested the development and/or progression of Buerger's without conventional tobacco smoking. For instance, Lawrence, et al., reported progression of disease requiring limb amputation in a patient who had substituted tobacco cigarette smoking with smokeless chewing tobacco, also suggesting that complete abstinence for all use of tobacco was advisable [6]. There are also rare case reports

of Buerger's disease in patients without tobacco exposure, suggesting possible other causes of endothelial damage including cannabis or autoimmune induced [7,8]. To our knowledge, there are no previous reports of vape-associated development or progression of Buerger's Disease reported in the literature. Our patient's development, progression and resolution of symptoms associated with Buerger's disease parallel those that have been observed in tobacco-associated disease, suggesting potentially similar pathogenesis. Our report provides a case of evidence between the association of e-cigarette vape use and the progression of Buerger's disease and supports previous literature regarding the effects of nicotine on vascular disease. This report highlights that clinicians should be aware of this potential association and counsel Buerger's disease patients on complete smoking cessation, including the use of e-cigarettes, as patient's may progress in their clinical disease with vaping alone.

Conclusion

This case highlights the potential for e-cigarette use to induce or exacerbate Buerger's disease, even in the absence of significant traditional tobacco exposure. Clinicians should recognize vaping as a possible risk factor and counsel patients on the importance of complete nicotine cessation-including e-cigarettes to prevent disease progression and optimize vascular outcomes.

Conflicts of Interest

The authors declare no conflict of interest in this paper.

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None

Patient Consent

Informed consent was obtained from the patient for publication of this case report and any accompanying images.

Ethical Approval

This case study was determined to be institutional review board exempt from further review.

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