Case Report

Hypotenar hammer syndrome: Case report and literature review

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A B S T R A C T
Hypotenar hammer syndrome is a rare but serious cause of digital ischemia and morbidity. Presented here is a case of a manual laborer who had symptoms of digital ischemia after acute hyperextension injury to the ring finger. Magnetic resonance imaging revealed thrombosed ulnar artery aneurysm. Etiology, presentation, and current treatments are reviewed. © 2019 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (http://creativecommons.org/licenses/by-nc-nd/4.0/)

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MR imaging
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Introduction

Acute osseous and soft-tissue injuries to the hand are commonly encountered in the adult population. Acute arterial occlusion secondary to acute-on-chronic microtrauma, however, is a less frequent occurrence. An example is hypotenar hammer syndrome (HHS) where the ulnar artery is injured secondary to repetitive trauma to the hypotenar eminence of the hand. The ulnar artery is susceptible to mechanical injury along the hypotenar eminence as it exits Guyon’s canal and branches into the superficial and deep palmar arches (Fig. 1). This syndrome is rare but of clinical significance due to the risk of amputation following digital ischemia. We are reporting a case of HHS in a 47-year-old mechanic who presented after acute hyperextension injury of the left ring finger.

Case report

A 47-year-old engine mechanic presented to orthopedic hand surgery, 3 weeks after initial injury where his left ring finger was caught in a set of keys, resulting in traumatic hyperexten-
The patient heard a “pop” and felt immediate pain over the palm, with continued pain and swelling for 2 days. Numbness and coldness of the ring finger set in approximately 10 days after initial injury. A day later, the patient's little finger had also started to become cold to the touch. At work, the patient performed an infrared image of the left hand using a Forward-Looking Infrared camera, which is commonly used by mechanics to detect abnormal heat build-up in engine compartments, which showed decreased surface temperature of the ring finger relative to the other digits of the left hand (Fig. 2). The numbness resolved, but the coldness and pain persisted so the patient presented to the emergency department where physical exam revealed a cooler left ring finger tip compared to other digits. Radiographs of the left hand excluded acute osseous injury. There was a history of remote fracture of the right hand 2 years prior, but no injuries to the left hand. Given the concern for vascular injury the patient was referred to orthopedic hand surgery. On clinic review, the patient's left ring and small fingers were cooler to the touch, with normal color, but with slight delay in capillary refill. There was normal sensation and strength. A tender mass was noted on the ulnar aspect of the hook of the hamate. Allen's test suggested compromise of the ulnar arterial supply to the hand. The patient underwent MR Angiogram (MRA) of the left hand, given concern for HHS. This showed a 2.3 cm ulnar artery aneurysm with thrombus at the level of the hook of the hamate extending from the pisiform to the metacarpal base (Fig. 3). The patient was subsequently scheduled for aneurysm excision and ulnar artery bypass grafting. However, his symptoms significantly improved without medication or other treatment before surgery, and so he opted for continued nonoperative management. At the time of submission for publication, the patient has been asymptomatic for 8 months and decided not to pursue any follow-up unless his symptoms returned.

**Discussion**

HHS was first described by Von Rosen in 1934 in a factory worker who repetitively used his hand as a hammer, and then one day experienced acute pain and subsequently digital ischemia a few weeks later. On surgical exploration of the hand, a thrombosed ulnar artery was found overlying the hamate bone as it exited Guyon’s canal (a fibro-osseous tunnel at the volar ulnar aspect of the wrist) [1]. The terminal ulnar artery and its proximal superficial palmar branch are most susceptible to mechanical injury as they exit Guyon’s canal due to the superficial location when crossing over the hook of the hamate for approximately 2 cm before penetrating the ulnar aponeurosis [2-4]. Later, Conn et al [2] described 13 cases of injury to the ulnar artery and superficial palmar arch in the same anatomic location. They named this injury “hypothenar hammer syndrome” (HHS), as the patients would use the hypothenar aspect of the palm to repetitively hammer objects, causing damage to the ulnar artery. This repeated trauma to the ulnar artery causes intimal and medial wall degenera-
Fig. 3 – MR imaging and MRA of the hypothenar hammer syndrome. Axial (A) T1-weighted and (B) T2-weighted with fat saturation MR images of the left hand show a heterogeneous hypointense signal within the ulnar artery lumen consistent with thrombosis (arrows). (C) Sagittal and (D) coronal and post-contrast T1-weighted with fat saturation MR images show a 2.3 cm thomboosed ulnar artery aneurysm with a central non-enhancing thrombus (arrows) extending from the pisiform (asterisk) to the metacarpal bases (arrowhead). (E) Coronal MRA image shows discontinuity of the ulnar artery in the region of Guyon’s canal consistent with occlusion of the thrombosed aneurysm (curved arrow).

Conclusion

We present a case of HHS in a manual laborer who sustained acute hyperextension injury with subsequent ulnar artery aneurysm and thrombosis. The patient’s symptoms resolved spontaneously without any conservative treatment (ie, palmar padding, antiplatelet, or vasodilator therapy), which was likely the result of collateral circulation from the radial artery since the ulnar artery is not known to recanalize. The etiology of HHS is discussed, with chronic microtrauma to the ulnar artery being the main factor. The most feared sequela of HHS is amputation following digital ischemia. Symptoms mainly include pain, coldness, and numbness to the little and ring fingers. Diagnosis can easily be made with MRI/MRA. Conservative treatment is first-line, unless digital ischemia is severe enough to warrant surgical vascular grafting.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2019.04.015.
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