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Management of Hypothenar Hammer Syndrome A Case Report

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Patient: Male, 33
Final Diagnosis: Hypothenar hammer syndrome
Symptoms: Right hand pain • parethesias • weakness • mottling
Medication: —
Clinical Procedure: —
Specialty: General and Internal Medicine

Objective: Rare disease

Background: Hypothenar hammer syndrome is a relatively rare disease process caused by repetitive stress or injury to the hypothenar eminence leading to chronic injury to the ulnar artery. This chronic stress (usually as a result of occupational or sport activities) may result in arterial constriction or thickening, which may lead to thrombosis or aneurysm formation. A review of current literature revealed that reports related to management of hypothenar hammer syndrome are limited.

Case Report: A 33-year-old male without significant past medical history presented with left hand/digit pain, skin discoloration, and coolness of the hand/digits after a mechanical accident experienced 12 hours prior to presentation. Angiography confirmed reduced flow in the ulnar and radial artery with significant spasm of the ulnar artery. Treatment consisted of heparin, nitroglycerin, and papaverine with rapid resolution of symptoms. The patient was discharged on anticoagulation and a calcium channel blocker, with scheduled follow-up.

Conclusions: Hypothenar hammer syndrome is a rare disease process which manifests in certain occupations and activities that put undue stress on the hypothenar area. The use of angiography for definitive diagnosis and the use of anticoagulation and calcium channel blockers for treatment should continue to be studied to determine a standard treatment regimen.

MeSH Keywords: Anticoagulants • Calcium Channel Blockers • Ulnar Artery

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Background

Upper extremity digital ischemia is a relatively rare occurrence and one with a wide differential including Raynaud's disease, various connective tissue disorders, vasculitis, arterial emboli, and hypothenar hammer syndrome [1]. The term was first suggested in the 1970s by Conn et al., at which time it was proposed that repeated trauma to the hypothenar aspect of the hand could lead to ulnar artery damage [2]. This syndrome has been demonstrated in men, typically in their 40s, involving the dominant hand, and in an occupational setting that required utilization of the hypothenar portion of the hand in a striking manner similar to a hammer [1]. Current literature on the prevalence of this syndrome is limited, as it is often not reported. In one study of 330 factory workers, hypothenar hammer syndrome was demonstrated in 7% of the workers [3]. Additionally, it has been reported to occur in athletes who experience repetitive trauma to the palm, and has been reported in baseball, karate, mountain biking, and volleyball [4,5]. Occasionally a single episode of trauma may result in the syndrome, but it is usually the product of repetitive trauma; it is not uncommon for the initial injury to seem trivial and thus be ignored, leading to an underreported incidence. The pathogenesis of this disease process is related to the anatomy of the ulnar artery. As it passes through the Guyon's canal, the artery branches to form deep and superficial palmar arches. The superficial arch crosses the surface of the hypothenar muscles for ~2–3 cm before penetrating the palmar aponeurosis. When this area is exposed to trauma, the vascular segment can be compressed against the boney hook of the hamate. The superficial palmar branch provides the primary source of blood for the majority of the fingers, and in 31% of patients, the superficial arch arises entirely from the ulnar artery [6]. With repetitive trauma, the artery can develop intimal damage producing vasospasm. Further trauma encourages platelet aggregation and thrombus formation; if progressive damage continues to occur, this may promote aneurysm formation [7]. Symptoms at the time of presentation are dependent on the extent of arterial damage. Typically, patients will present with pain in the palmar aspect and evidence of ischemia (i.e., paresthesia, cold sensitivity, discoloration of the fingers) of the second to fifth digits. On physical examination, a hypothenar callus/tenderness may be present, or a pulsatile mass may be present in the case of aneurysm formation. Blanching/discoloration of the digits may occur. To diagnose hypothenar hammer syndrome, an Allen test may be utilized to assess the patency of the superficial palmar branch, and a Doppler scan can be used to quickly assess blood flow through the ulnar and radial arteries. The gold standard for establishing diagnosis is angiography [8]. Treatment is largely dependent on the extent of arterial damage. Non-surgical treatment includes avoidance of further trauma, calcium channel blockers (e.g., nifedipine, diltiazem), antiplatelet agents or anticoagulation, and pentoxifylline to reduce blood viscosity [4,7,9]. If more significant vascular damage is present, then surgical options include arterial ligation, resection of thrombosed arterial segment, and reconstruction with vein/artery graft [5,10–12]. The following case report provides a unique learning experience related to this rare disease process, and is informed by a review of the literature regarding hypothenar hammer syndrome.

Case Report

A 33-year-old male without significant past medical history presented with left hand/digit pain, skin discoloration, and coolness of the hand/digits after a mechanical accident experienced 12 hours prior to presentation. The patient stated that he works as a mechanic and was utilizing the palmar aspect of his left hand to advance an item into a hydraulic machine when he noted a sharp, stinging pain located on the proximal palmar aspect of his hand. He denies any initial numbness/paresthesia or skin discoloration. The pain subsided, and the patient continued his work. However, several hours later the patient noted worsening pain at the hypothenar eminence and noted paresthesia extending into the third to fifth digits. He took ibuprofen with mild alleviation of symptoms. He denied any additional systemic symptoms at the time. Of note, the patient related that he has had similar episodes in the past which were alleviated with ibuprofen and resolved with time. The following morning, he awoke with increased pain, increasing numbness/paresthesia, and blue discoloration of the third to fifth digits which prompted the patient to present to the emergency department.

At the time of presentation, mottling and cyanotic discoloration of the left hand were noted from the third to fifth digits extending into the palmar aspect of the left hand. Both the Vascular Surgery and Hand Surgery Departments were consulted due to

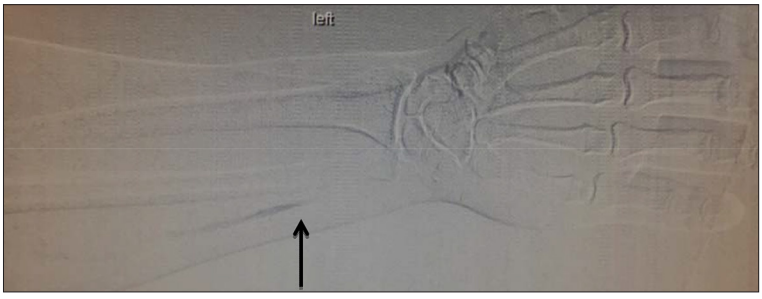

Figure 1. Angiogram of the left wrist depicting severely reduced flow in the ulnar artery at the point of vasospasm (arrow).

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the concern for arterial vasospasm. An angiogram (depicted in Figure 1) was performed which demonstrated severely decreased flow in the radial and ulnar arteries with a significant spasm of the ulnar artery without evidence of thrombosis. During the study, 1,000 mcg nitroglycerin, 60 mg papaverine, and 1,000 U heparin were administered with significant improvement in arterial patency noted. The patient noted immediate improvement in symptoms. He was placed on nicardipine and heparin drips and admitted to the ICU for further monitoring. The patient underwent hourly neuro checks and denied any pain/paresthesia, reported good movement related to flexion/extension of the hand/digits, palpable radial pulse, and there was Doppler evidence of ulnar artery pulse. The patient continued to improve and was deemed stable to discharge on anticoagulation and calcium channel blocker with arterial duplex of the hand and follow-up with hand surgery scheduled in four weeks.

Discussion

This case report describes the presentation, the diagnostic evaluation, and the treatment considerations for hypothenar hammer syndrome. While a rare occurrence, this syndrome should be included in the differential diagnosis when evaluating upper extremity digital ischemia. Obviously, a comprehensive and detailed history is the initial potential indicator in making this diagnosis. Vascular imaging confirms the diagnosis and delineates the severity and level of complicating trauma response (i.e., intima damage, vasospasm, presence of thrombus, or aneurysm formation). If adequate collateral circulation is present, conservative therapy, such as smoking cessation, avoidance of further trauma, and padded protective gloves, are recommended [4]. If vasospasm is present, as was demonstrated in this case, further treatment with calcium channel blockers and antiplatelet agents/anticoagulation is indicated. If more significant vascular damage or thrombus is present, interventional or surgical options of treatment exist [5,10–12]. Interventional procedures include catheter directed thrombolysis and embolectomy, which may be completed as a primary procedure or with aneurysmal repair [5,10–12]. Additionally, depending on the extent of injury, revascularization with surgical bypass and/or patch angioplasty may be performed [5,10–12]. The difficulty of management presented in this unique case was the fact that thrombosis was not present. After discussion with the Vascular Surgery and Hand Surgery Departments, conservative medical management was proposed, and the patient was initiated on diltiazem and rivaroxaban. However, upon review of the current literature, guidelines regarding the length of therapy of these two agents was limited. Therefore, the patient was placed on the aforementioned agents for one month with close follow-up and repeat imaging scheduled at the end of this time period. One study of 47 patients with hypothenar hammer syndrome demonstrated a relapse rate of 28% [4]. This finding adds further uncertainty regarding the recommended length of therapy of the aforementioned agents. This case provides an example of an uncommon disease process and demonstrates that further studies regarding management of hypothenar hammer syndrome are needed to delineate an effective standard treatment regimen.

Conclusions

This case demonstrated the importance of incorporating hypothenar hammer syndrome into the differential diagnosis for patients presenting in a similar clinical context to physicians in the fields of Emergency Medicine, Family Medicine, and Internal Medicine. Additionally, patients presenting in a similar clinical scenario may be treated with the same therapeutic agents noted in this case, and in a comparable fashion. Further evaluation of this disease process could result in advancement in diagnosis and therapy related to both anticoagulation and treatment of vasospasm with calcium channel blockers, keeping in mind that interventional or surgical treatment may additionally be needed depending on the clinical condition and angiographic findings.

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