

A case of intra-arterial thrombolysis with alteplase in a patient with hypothenar hammer syndrome but without underlying aneurysm

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Abstract

Hypothenar hammer syndrome is a cause of symptomatic ischemia of the hand secondary to the formation of aneurysm or thrombosis of the ulnar artery in the setting of a complete or incomplete palmar arch. Acute occlusive thrombus or embolus of the hand represents a complex problem that often may require immediate surgical intervention. We report a case of acute unilateral arterial hand ischemia requiring catheter-directed thrombolysis with Alteplase therapy in a patient with acute occlusive arterial thrombosis of the left ulnar artery. A catheter-directed thrombolytic regimen consisted of Alteplase 1 mg/h for 24h, and heparin was infused through the sheath side arm at a rate of 500 units per hour for resolution of the thrombus and improvement in symptoms. A former truck driver presented with worsening pain and subsequent development of significant cyanosis with early gangrenous changes of the left second and third fingertips. He had significant callous of the hypothenar eminence and reported that his left hand was not only his “driving” hand but also a cane has been used in his left hand to ambulate. Initial angiogram revealed only ulnar artery occlusion at the wrist with reconstitution just distal to the hypothenar eminence. After 24h of the initiation of thrombolysis, repeat angiography revealed resolution with a widely patent ulnar artery. His symptoms and the color of his digits immediately improved, and within a few months, his hand had normalized. The patient had no clinical sequelae of thrombolytic therapy. Catheter-directed thrombolytic therapy in situations of acute occlusive thrombus of the hand may provide a therapeutic option for patients with suspected hypothenar hammer syndrome. However, thrombolytic therapy carries risk of significant hemorrhagic complications. Before initiating therapy, careful judgment about the possibility for bleeding risk is required. This provides for a minimally invasive alternative to open surgical revascularization especially in the absence of underlying correctable anatomic defect such as aneurysm.

Keywords

Surgery, cardiovascular, critical care/emergency medicine

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Introduction

Vascular occlusive syndromes of the upper extremity are rare and often secondary to repetitive trauma, atherosclerosis, embolic events and hypercoagulable states. The symptoms can include pain, paresthesias and cold intolerance.¹ Hypothenar hammer syndrome occurs when repetitive impact to the palmar aspect of the wrist and hand at the hypothenar eminence causes damage to the underlying ulnar artery.² This damage may manifest clinically as in situ thrombosis or distal embolization with or without underlying aneurysm. This results in acute ischemia of the digits. Typically, this occurs in the setting of an incomplete palmar arch and therefore an inability of the radial artery to compensate for the ischemia.

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Hypothenar hammer syndrome may occur in sports and occupations where the heel of the hand is used as a hammer or is subject to repeated force. Besides cases of acute trauma, it may occur in the dominant hand of players of racquet, stick, club sports, volleyball and practitioners of the martial arts. Other occupations such as auto mechanics, metal workers, miners, machinists, butchers, bakers, carpenters and brick layers are also at risk.³ It typically occurs in middle-aged men who present with unilateral symptoms which upon physical exam are suggestive of vascular pathology. Angiography is diagnostic. Conservative approaches such as cessation of offending activity, calcium channel blockers, antiplatelet therapy or anticoagulants are appropriate in most patients, whereas surgical options and thrombolytic therapy are reserved for patients with severe or refractory symptoms.⁴

We report a case of acute unilateral hand arterial ischemia requiring catheter-directed thrombolysis with Alteplase therapy in a patient with acute occlusive thrombus of left distal ulnar artery likely secondary to use of a cane and truck driving.

Case

A 57-year-old gentleman presented to the emergency department with a 1.5-week history of progressively worsening pain and swelling that began in left hand and progressed to second to fifth distal interphalangeal joints (DIP). Initially, he felt that his fingers started to feel numb, which went away as the day progressed. However, several days prior to presentation, he noted persistent numbness with new discoloration of his fingertips that began to worsen as well. Upon presentation to the hospital, his left ulnar pulse was not palpable, and his left second to fifth fingertips appeared deeply cyanotic with early gangrenous changes. He denied any other symptoms.

He had a past medical history significant for anxiety, depression, alcohol abuse and chronic back pain. He was an active smoker of about 16 pack-years. He also had a remote history of heroin and cocaine use, and his last relapse was documented over 10 years ago. He was a former truck driver who drove mostly with his left hand despite being right-hand dominant.

On examination, his left second to fifth fingertips appeared profoundly cyanotic with early gangrenous changes. His fingers were cool to the touch. He had decreased sensation in left hand and was unable to make a fist. His left radial pulse was palpable but the ulnar pulse was not. His physical exam including contralateral arm neurovascular exam was otherwise unremarkable. He had a Doppler signal in the distal ulnar artery and in the palmar arch. Duplex examination of the upper extremity revealed an acute occlusive thrombus of the left distal ulnar artery suggestive of hypothenar hammer syndrome. He was taken for angiographic assessment.

Angiography from a right femoral retrograde approach revealed normal left upper extremity arterial tree with the exception of an ulnar occlusion at the wrist. The wire crossed



Figure 1. Initial angiogram revealing occlusion of the ulnar artery distally at the wrist.



Figure 2. Angiogram after 20 h of thrombolytic infusion revealing complete recanalization with filling of the digital arteries distally.

the occlusion easily consistent with acute thrombosis. The deep arch and digital vessels reconstituted distally. Aspiration with a glide catheter yielded thrombus. Thrombolysis was therefore initiated with a 4-F UniFuse catheter with an infusion length of 20 cm. It was placed in the ulnar artery distally with about 5 cm hanging into the brachial artery across the bifurcation proximally (Figure 1).

The catheter-directed thrombolytic regimen consisted of Alteplase 1 mg/h and intravenous heparin. Heparin was infused through the sheath side arm at a rate of 500 units/h. He was admitted to the intensive care unit where all patients undergoing thrombolytic infusions are observed per protocol. Repeat angiography was conducted after about 20 h of infusion (about 20 mg of Alteplase). This revealed a widely patent ulnar artery and resolution of the thrombus with antegrade filling of the deep palmar arch (Figure 2). The digital

vessels were seen now to continue from the arch to the digits. The ulnar artery appeared overall normal without corkscrew appearance. This confirmed the diagnosis of hypothenar hammer syndrome with ulnar artery occlusion but without underlying aneurysm. The thrombolytic infusion was discontinued but therapeutic anticoagulation was subsequently continued, and the patient was discharged on rivaroxaban therapy. The patient was initially given rivaroxaban therapy of 15 mg twice daily for 21 days followed by 20 mg once daily and continues on that dose.

Discussion

Hypothenar hammer syndrome is a rare cause of symptomatic ischemia of the hand secondary to trauma. It manifests clinically in many ways including thrombosis or distal embolization of the ulnar artery with or without underlying aneurysm. Acute occlusive thrombus of the hand represents a complex problem that often may require immediate surgical intervention. Catheter-directed thrombolytic therapy with Alteplase can be a therapeutic option for these patients. Overall, favorable outcomes have been shown when thrombolysis is performed in the acute setting with angiographic or clinical improvement nearly 80% of the time.⁵ This is particularly advantageous given that angiographic endovascular intervention can obviate the need for open surgery. Open surgical treatment involving thrombectomy can result in a longer post-intervention recovery due to the surgical incision, especially if this involves the dominant hand. Additionally, in situations of distal embolization, it may be difficult to fully evacuate the embolic material due to its small nature and distal position, within the small digital arteries. Alteplase infusion is an alternative that is not vulnerable to these concerns. While open surgery may still be required to treat any underlying aneurysm, angiography as a first step allows for additional treatment options.

Despite the significant benefit, thrombolytic therapy carries risk of significant hemorrhagic complications. The most feared of these is debilitating hemorrhagic stroke. Before initiating therapy, careful judgment and discussion with the patient about the possibility for bleeding risk are required. The overall complication rates for upper extremity thrombolytic therapy can reportedly range from 0% to 75% of patients treated. Nearly half of the reported cases have no complications but the remaining series report a pooled complication rate of about 18%. The incidence of amputations appears to be less than 10%.⁵

Conclusion

Catheter-directed thrombolytic therapy is a useful and important tool in the armamentarium for the treatment of acute limb-threatening events. While off-label, discussion of the potential complications and thorough risk-benefit analysis with the patient may provide for an excellent alternative to open surgical revascularization. Alteplase infusion for acute limb-threatening ischemia, even in the upper extremity, can provide an excellent option to treat hypothenar hammer syndrome especially without underlying correctable anatomic defect such as aneurysm.

Declaration of conflicting interests

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Ethical approval

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Informed consent

The patient described herein had given consent to the use of de-identified patient data for use in research and education.

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