



Case Report

Acute hand pain resulting in spontaneous thenar compartment syndrome

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ABSTRACT

Compartment syndrome is a potentially limb-threatening disease process, leading to decreased tissue perfusion and cellular death [1]. The following presentation is believed to be the first reported case of thenar compartment syndrome, which occurred without an identifiable cause. A 67-year-old male presented with 12 h of left-hand pain, located at the base of the thumb and worsened with movement. Firmness of the thenar eminence, along with pallor, poikilothermia, and paresthesias of the first and second digits lead to the increased suspicion for compartment syndrome. The diagnosis was confirmed and successfully managed in the operating room. While relatively uncommon, clinicians should consider the diagnosis of compartment syndrome of the hand when patients present with acute hand pain. A missed or delayed diagnosis can lead to severe morbidity, which can profoundly affect patients' functional outcomes and quality of life.

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1. Introduction

Compartment syndrome is a potentially limb-threatening disease process occurring when intracompartmental pressures exceed capillary filling pressures, ultimately leading to decreased tissue perfusion and cellular death [1]. Many causes of compartment syndrome have been identified, which can be classified by decreased compartmental volume (e.g., application of excessive traction), increased compartmental content (e.g., bleeding, infection, soft tissue trauma), and application of external pressure (e.g., casting, lying on an extremity) [2].

Compartment syndrome involving the thenar eminence is relatively uncommon, with previous reports citing causes including blunt trauma, envenomation, infection, arterial injury, intravenous fluid extravasation, and crush injury [3–10]. The following presentation is believed to be the first reported case of acute thenar compartment syndrome, which occurred spontaneously.

2. Case report

A 67-year-old left-handed male with a history of diabetes mellitus and chronic kidney disease presented to the emergency department with a complaint of left-hand pain. He reported the pain began approximately 12 h earlier and had progressively worsened throughout the day. The pain was located primarily at the base of the thumb and worsened with movement. Associated symptoms included swelling at the

base of the thumb with decreased range of motion and a tingling sensation in his hand. The patient denied any trauma, bite, burn, fever, or erythema.

Initial vital signs included: temperature of 97.5 °F, blood pressure of 129/89 mm Hg, heart rate of 93 beats per minute, and a SpO₂ of 99% on room air. Inspection showed intact skin with pallor of the first and second digits, with severe tenderness to palpation and firmness of the thenar eminence. Neuromuscular examination showed exacerbation of pain with thumb extension and paresthesias of the first and second digits. Doppler confirmed intact radial and ulnar pulses at the wrist and palmar arch.

Initial workup included a left hand and left wrist x-ray which showed no evidence of acute injury, white blood cell count of $10.9 \times 10^3/\mu\text{L}$ ($10.9 \times 10^9/\text{L}$), and a creatine kinase of 177 U/L (2.96 $\mu\text{kat}/\text{L}$). Coagulation studies were within normal limits.

The patient received multiple rounds of intravenous pain medication with minimal improvement in pain. Due to concern for possible thenar compartment syndrome, orthopedic surgery was consulted. Initial thenar compartment pressures measured with a Stryker intracompartmental pressure monitor (Stryker Corporation, Kalamazoo, MI) exceeded 45 mm Hg. The patient was subsequently taken emergently to the operating room for fasciotomy with compartment release. Per the operating room report, a linear incision made through the ulnar border of the thumb along the thenar eminence, resulted in an immediate bulging of the muscle noted after fascial incision. There was no evidence of necrotic tissue, purulence, or hematoma identified upon exploration. The patient had significant improvement in his symptoms without complication and was discharged home the following day on oral pain medication.

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3. Discussion

The above presents a case of spontaneous thenar compartment syndrome in a 67-year-old man who presented to an emergency department with 12 h of left-hand pain. Several cases of thenar compartment syndrome have been described in the literature, though this appears to be the first reported case, which occurred spontaneously [3–10]. The thenar compartment is one of ten compartments of the hand, with innervation supplied by the recurrent median and ulnar nerve [1].

No consensus definition for the diagnosis of compartment syndrome exists, further stressing the importance of performing a thorough history and examination to aid clinician gestalt [11,12]. The classic “five P’s” (i.e., pain, pallor, pulselessness, paresthesias and paralysis) are often not always present at the time of diagnosis and are thought to represent late findings, with the most sensitive findings being pain with passive stretch and pain out of proportion [12–14].

Objective measurement of intracompartmental pressures with commercially available devices or arterial line manometers are used to aid in the diagnosis, particularly when history is limited (e.g., multisystem trauma, intoxication) [12]. Indications for fasciotomy based off of absolute pressure is controversial, though an intracompartmental pressure greater than 30–40 mm Hg, or a pressure of less than 30 mm Hg of the diastolic blood pressure usually distinguish acceptable indications for operative intervention [3,12].

Common causes of acute hand pain include fracture, dislocation, soft tissue injury, tendon/ligament injury, laceration, infection, arthritis, and vascular occlusion. The patient above exhibited no evidence of infection, laceration, or bite wound, and had intact pulses. History and imaging ruled out a potential traumatic injury as the cause of pain. Given intact dopplerable pulses, the diagnosis of arterial embolic disease was thought less likely. The firmness of the thenar eminence, along with pallor, poikilothermia, and paresthesias to the first and second digits lead to the increased suspicion for compartment syndrome, which was definitively diagnosed in the operating room.

Though relatively uncommon, clinicians should consider the diagnosis of hand compartment syndrome when evaluating patients with acute hand pain. A missed or delayed diagnosis can lead to profound morbidity, which can significantly affect patients' functional outcomes and quality of life.

Conflicts of interest

None.

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