Isolated compartment syndrome of the extensor digitorum communis: a case report

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Introduction

Anatomically, the forearm has been shown to have a superficial and deep volar compartment, a pronator quadratus compartment [3], a dorsal compartment, and a compartment containing the mobile wad [1]. There are no reports in the literature of the EDC presenting with an isolated compartment syndrome without involving the other muscles in the dorsal compartment.

Case Report

A 47-year-old right-handed female presented to the emergency department with right forearm swelling, erythema, and severe pain. Five days prior to presentation, she had performed significant physical activities, specifically mucking horse stalls. She had no trauma to the area; no skin breakage occurred. She had no symptoms for the 3 days following this. Two days prior to presentation, she noted onset of pain in the dorsal radial aspect of her forearm. The pain increased in intensity over the next 24 h. Her pain was worse with movement, specifically with finger extension. She developed an extensor lag of her long finger MCP joint at the time of presentation (Fig. 1). She did not describe any

sensory loss. She did not describe a history of discrete trauma, infection, insect bite, or other etiology for her symptoms. Her past medical history was significant for seronegative lupus.

On initial examination, the patient was in significant pain. The dorsal compartment her forearm was firm and was not compressible; the firmness seemed to be isolated to the EDC only. No firmness was noted over her extensor carpi ulnaris (ECU) or extensor carpi radialis brevis or longus (ECRB/L). The volar forearm was soft and compressible. She had a 40° extensor lag of the metacarpophalangeal joint of her long finger. She was able to fully extend her other fingers, thumb, and wrist. She had pain with passive flexion of her fingers. The remaining motor function in her forearm and hand was intact. She had intact sensation to light touch in all nerve distributions in the forearm. She had a strong and palpable 2+ radial and ulnar pulse. Her skin was intact without evidence of trauma and was erythematous over her dorsal forearm.

Because of the atypical presentation, with the presence of erythema overlying the affected musculature, and with the patient's symptoms isolated solely to her extensor digitorum, with no evidence of involvement of her wrist extensors, we elected to obtain an emergent MRI of her forearm to evaluate for abscess. This revealed increased signal specific to her EDC muscle, with the greatest signal enhancement at the myotendinous junction (Fig. 2). There was no evidence of an abscess.

These findings, as well as the patients' physical exam, led us to suspect an isolated compartment syndrome. A Stryker monitor was used to determine her compartment pressure. This was introduced in the dorsal compartment centered in the location of the EDC. This measured 90 mm Hg, with a diastolic blood pressure of 80 mm Hg, indicating a compartment syndrome.

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Fig. 1 Extensor lag of long finger at MCP joint

The patient was taken emergently to the OR for fasciotomy, muscle debridement, and muscle biopsy. This was done through a dorsal incision directly over the EDC, and the fascia over this muscle was released. The muscle immediately bulged from the fascia (Fig. 3). The muscle was contractile and had a pink color at that time, and was felt to be viable. A small amount was debrided and sent for biopsy and culture. The remainder of the forearm musculature was unremarkable, with no evidence of increased intracompartmental pressure. The surrounding fascia was healthy appearing, with no evidence of infection or fasciitis.

The next day the patient's pain had improved, but by post-operative day 2, her pain and swelling had increased in severity, and she reported increased pain with finger motion. The patient was returned to the OR for repeat debridement. At this time, about 50% of the proximal muscle of her EDC was not viable and was debrided. Muscle biopsy and culture was obtained. The rest of the EDC muscle was healthy and contractile, as was the ECU and ECRB/L. Her forearm was soft and compressible at the

Fig. 2 MRI showing enhanced signal in EDC

Fig. 3 Dorsal incision directly over the EDC

conclusion of the case. There was no evidence of infection or purulence.

Post-operatively the patient recovered well, and at 2 weeks post-operation she had a 10° extensor lag at the metacarpophalangeal joint of the long finger, and otherwise full function of her hand and fingers.

Pathologic and microbiologic evaluation of the EDC tissue did not give any indication as to the etiology of the increased intracompartmental pressure. Intra-operative cultures were negative, and her muscle biopsies from both the first and second surgery showed only necrotic tissue. Laboratory workup, including CBC, infection markers, electrolytes, and a hypercoagulable workup, was unremarkable. Multiple markers for autoimmune disease were negative. The patient did develop some nonspecific folliculitis of her legs 1 month post-operatively, without evidence of infection.

Discussion

Compartment syndrome develops when swelling and pressure increases to such a degree that tissue cannot perfuse and tissue viability is at risk. Isolated compartment syndrome affecting a single muscle in the forearm is only sporadically reported in the literature. We could not find a description of an isolated compartment syndrome that only affected the EDC muscle. We did find reports of isolated exercise induced compartment syndrome of the anconeus [4] and flexor carpi ulnaris [5]. We also found a report of isolated traumatic pronator quadratus compartment syndrome [3].

Many causes of compartment syndrome are described, including trauma, post-operative swelling, tight external wraps, vascular reperfusion, infection, exertion, hypercoagulable state leading to thrombocytopenia [2], neuroleptic malignant syndrome, DVT, mass, reflex sympathetic dystrophy vasospasm, and thermal injury, to name a few. The etiology of compartment syndrome and muscle necrosis in

our patient is unknown. Our patient does have a history of seronegative lupus, and we were concerned that this may have contributed to a hypercoagulable state that could have caused her symptoms. However, extensive studies were negative for any coagulation abnormality. There is a report in the literature of a patient who developed compartment syndrome of the hand that was felt to be due to vasculitis secondary to lupus [6]. This patient was treated effectively with fasciotomy and steroids. Our patient showed no evidence of vasculitis on pathologic evaluation, or on examination.

Compartment syndrome in the forearm is an uncommon condition and is exceedingly rare in an isolated muscle in the forearm. This case highlights an unusual example of this in the EDC and should serve to increase awareness of this condition and thus improve patient outcome with prompt and effective treatment.

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