Carpometacarpal boss: an unusual cause of extensor tendon ruptures

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Introduction

Ruptures of tendons are rare and usually result from attritional wear caused by chronic inflammation or mechanical attrition against bony prominences. The classically described Vaughn-Jackson and Mannerfelt lesions result when a tendon ruptures from attritional wear on a dorsally subluxated ulna [15] or scaphoid osteophyte, respectively [9]. Rare reports exist of carpal bosses and intratendinous ganglions resulting in extensor tendon ruptures [3, 7, 16].

We describe a patient with a rupture of the extensor indicis proprius (EIP) and extensor digitorum communis (EDC) tendons to the index finger secondary to attritional wear against a carpometacarpal (CMC) boss of the index and middle fingers. The utility of ultrasound (US) in the diagnosis is described, as well as its treatment, and outcome of surgery.

Case Report

A 68-year-old man presented to the clinic with symptoms of bilateral carpal tunnel syndrome. His symptoms were more

severe on the right and included persistent paresthesias involving mainly the index and middle fingers. He also noted that his right index finger “did not straighten completely” but recalled no preceding trauma. He mentioned a vague distant history of a dorsal ganglion cyst, which ruptured after a direct blow.

On the dorsum of his right hand, he had a large, painless, CMC boss overlying the second and third CMC joints. There was a 30-degree extensor lag at the metacarpophalangeal joint of the index finger (Fig. 1). Extension of the thumb and other digits was normal. He had a normal range of motion in the wrist. Discontinuity of extensor tendons to the index finger (as opposed to a posterior interosseous nerve palsy) was confirmed by absent extension with tenodesis. There was marked thenar atrophy and weakness of the abductor pollicis brevis. Two-point discrimination was >15 mm in the median nerve distribution, and he had classic exam findings for carpal tunnel syndrome.

Radiographs of the right hand demonstrated an 8.5-mm carpal boss overlying the second and third CMC joints, as well as scattered degenerative arthritis of the wrist (Fig. 2). US identified complete rupture of the index EDC and EIP tendons with approximately 3.5 cm of proximal retraction (Fig. 3). EMG revealed severe median neuropathy localized to the level of the wrist.

The patient underwent a standard open carpal tunnel release and reconstruction of the extensor tendons to the index finger using a palmaris longus tendon graft. After the carpal tunnel release, a dorsal incision centered over the carpal boss was made, and a radially based retinacular flap was created. The carpal boss was removed using an osteotome and smoothed with a burr from both the second and third CMC joints (Fig. 4). There was no ganglion evident in the region. The distal ruptured tendon ends were found (Fig. 4), encased in scar, synovitis, and a pseudotendon. The proximal ends of the EDC and EIP tendons were retracted to the extensor

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Fig. 1 Preoperative photographs showing an extensor lag of approximately 30° (a). The dorsal carpal boss can be seen over the dorsal aspects of the second and third CMC joints (a and b). The blue markings on the proximal wrist indicate the locations of the proximal EIP and EDC to index tendons (a)

retinaculum. The distal ends of the EDC and EIP tendons were too short to achieve a 3-weave Pulvertaft repair to the adjacent EDC of the middle finger; thus, a palmaris longus tendon graft was woven into the index EDC tendon distally and into the middle finger EDC tendon proximally (Fig. 5). The retinacular

Fig. 2 Radiographs of the right wrist and hand. Scattered degenerative arthritis is present in the wrist and joints of the thumb and digits (a). A dorsal carpal boss overlying the CMC joint can be seen on the lateral view measuring approximately 8.5 mm (b) Arrow = dorsal carpal boss

Fig. 3 Dorsal longitudinal ultrasound scan of the patient's right wrist demonstrating the dorsal osseous margins of the lunate (LUN), capitate (CAP), and a portion of the third metacarpal (MC3). The index finger extensor tendons (extensor digitorum communis and extensor indicis proprius) are torn and retracted proximal to the carpal boss (CB). Yellow arrow = retracted tendon edges; asterisk = small subcutaneous cyst; left = proximal; right = distal; top = superficial/dorsal; bottom = deep/palmar

flap was then sutured between the bony surfaces of the metacarpal and carpus, and the tendon repair. TenoGlide® (Integra™) was also interposed between the bony and tendinous surfaces to act as an anti-adhesive barrier.

The patient was immobilized for 6 weeks in finger extension and started an active range of motion protocol. At 2 months after surgery, he had active extension of the index finger with a 5-degree extensor lag. Due to the nature of the reconstruction, he did not have independent extension of the index finger. Both the index and middle

Fig. 4 The incision was planned over the dorsal carpal boss and an incision was made to the level of the overlying retinaculum (**a**). The distal ends of the ruptured extensor tendons were identified just distal to the carpal boss, encased in scar, and a pseudosheath (**b**). The carpal boss was then isolated and removed using an osteotome and burr. Following this, a radially based retinacular flap and TenoGlide® (Integra™) were interposed between the bony surface and the overlying tendons (**c**). *Black arrow* = carpal boss; *asterisk* = retinacular flap

fingers had normal flexion. Additionally, he had significant improvement in his preoperative carpal tunnel symptoms and signs.

Discussion

We present a patient with an asymptomatic carpal boss resulting in rupture of the EIP and index EDC tendons. This is only the third report in the literature documenting the association of a carpal boss and extensor tendon rupture [7, 16]. Chen et al. reported the association of an intratendinous ganglion with a dorsal carpal boss as a potential mechanism of tendon weakness and eventual rupture [3]. In this report, the extensor tendons with the intratendinous ganglions were intact but had significant intratendinous attenuation. It is interesting that our patient had a distant history of a ganglion cyst.

While the diagnosis of a CMC boss is largely clinical, differentiating tendon from nerve pathology in a patient with an extensor tendon lag is imperative. Plain films demonstrate the bony abnormality, and the use of MRI has long been used to evaluate tendon pathology [5, 14]; however, with recent advancements in US, it is becoming more frequently used for evaluating upper extremity tendon pathology [13]. US affords the benefits of high-resolution tendon imaging and localization of ruptured tendon ends while being readily available and cost effective when compared to MRI [10, 12]. The use of US in this case allowed for timely diagnosis as well as an accurate estimation of tendon separation for surgical planning.

Treatment of patients with a symptomatic carpometacarpal boss is generally conservative with NSAIDs, splinting and corticosteroid injections [2, 8]. Most patients respond to conservative management. In patients with persistent symptoms, surgical management is indicated and includes either simple excision of the carpal boss or CMC joint arthrodesis [4, 11]. A study by Artz et al. found correlation between traumatic etiology and the requirement of surgical management, where traumatic etiologies of carpal boss more frequently required surgery [1]. Studies have demonstrated good outcomes with simple excision of the carpal boss, with one study reporting complete symptomatic relief in 94 % of patients at a mean follow-up of 42 months [6].

Common to the reports of tendon pathology in the setting of a carpal boss are the presence of inflammation, synovitis, and evidence of attritional wear. With improved imaging resolution, it may be possible to detect this wear and intervene prior to tendon rupture. However, this phenomenon remains a relatively rare occurrence, which should be recognized as a potential complication when evaluating patients with a dorsal carpal boss.

Fig. 5 A palmaris longus tendon graft was sutured to the distal end of the EDC to index finger (**a**). Following proper tensioning, the graft was woven into the EDC of the middle finger. The final appearance and

position of the extensor tendon repair (**b**). PL = palmaris longus tendon; I = EDC of index finger; M = EDC of middle finger

Conflict of Interest Adil Ladak has no conflicts of interest to disclose. Alexander Y. Shin has no conflicts of interest to disclose. Jay Smith has no conflicts of interest to disclose. Robert J. Spinner has no conflicts of interest to disclose.

Statement of Human and Animal Rights All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent Informed consent was obtained from all patients for being included in the study.

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