Open isolated extensor carpi radialis brevis avulsion injury: a case report

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Introduction

Isolated extensor carpi radialis brevis (ECRB) tendon rupture from the third metacarpal bone is a rare injury [3]. Because this injury is an avulsion injury, a fracture at the base of the third metacarpal always accompanies it. So far, nine cases of isolated ECRB tendon avulsion rupture have been reported in the medical literature. All of these cases reported that the injuries were closed injuries; therefore, there are no reports of open isolated ECRB tendon rupture in the medical literature [1, 3, 5, 8–13]. In this case report, an open isolated ECRB tendon avulsion rupture with third metacarpal base fracture after a spring injury is presented.

Case Report

A 36-year-old male patient was brought to the emergency room after suffering an injury from a spring while he was repairing his car. The spring popped out from his car, forced his right hand into hyperflexion at the wrist joint and cut the dorsal side of his right hand. Patient examination revealed that there was a 6-cm-diameter V-shaped complex laceration with no other exam findings other than tenderness on the wound. His direct X-ray films showed small bone chips around the intact base of the third metacarpal bone (Figs. 1 and 2). The patient was offered wound exploration and

possible local or pedicled flap coverage. The wound exploration revealed only dorsal aspect of the third metacarpal base fracture with intact joint surface and isolated ECRB tendon avulsion injury (Fig. 3). After local wound debridement, the ECRB tendon was reattached to the third metacarpal base using a 2-mm suture anchor (Mitek, DePuy). The skin was closed by performing a local rotational flap technique. A volar plaster forearm splint, immobilizing the wrist in 30° extension, was applied. Metacarpophalangeal and all interphalangeal articulations were encouraged.

Six weeks after the injury, the splint was removed and exercises to improve the wrist range of motion were initiated. No occupational therapy was recommended. Three months after the injury, the patient has achieved full range of motion of the right wrist joint and hand without pain (Figs. 4, 5 and 6). His final Jamar grip strength showed 55 lb of grip strength with the right hand versus 75 lb with the left hand. The patient also reported no pain and has returned to complete activities, including work in a manual labor profession. X-rays at 3-month follow-up show the implanted suture anchor to the third metacarpal bone (Figs. 7 and 8).

Discussion

Isolated ECRB tendon rupture is an infrequent injury for which most clinicians likely have little experience. Only nine isolated ECRB tendon ruptures have been reported in the medical literature (Table 1). Thus far, all of the reported injuries have been closed injuries [1, 3, 5, 8–13], and even though one direct single ECRB tendon cut was reported before, it was not an avulsion from the third metacarpal [7]. Current medical literature and this case report show that isolated ECRB avulsion ruptures are always accompanied with fracture of the base of the third metacarpal bone [1, 3, 5, 8–13]. As the reviewed articles mention, X-ray findings

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Fig. 1 Direct anterior-posterior X-ray view shows subtle fracture on the base of the third metacarpal bone

on the base of third metacarpal bone may be the only indication of the tendon rupture, and if a fracture at the base of the third metacarpal bone is seen, ECRB tendon rupture should be suspected. Diagnosing an isolated ECRB rupture may be difficult if the injury is a closed injury. If irregularity is seen on the X-ray at the third metacarpal base of a closed injury, careful surgical exploration is needed to investigate the instance of an isolated ECRB rupture.

Even though only surgical treatment was offered for the injury described in this case, advocating for a surgical

Fig. 2 Direct X-ray films showing small bone chips around the intact base of the third metacarpal bone

Fig. 3 Photo of the wound revealing the isolated ECRB tendon rupture

Fig. 4 Postoperative photo at 3 months shows healed wound

Fig. 5 Postoperative photo showing right wrist extension at 3 months

Fig. 6 Postoperative photo showing right wrist flexion at 3 months

Fig. 7 Direct anterior-posterior postoperative X-ray view

Fig. 8 Direct lateral postoperative X-ray view

Table 1 Cumulative table of articles reviewed describing ECRB tendon avulsion rupture

Author	Year	Side	Tendon	Mechanism of injury	Type of injury	Fracture of the 3rd metacarpal base	Treatment
Voigt, C [13]	1989	Left	ECRB	Fall	Closed	Yes / a bone fragment	ORIF tension band - K wires
Rotman and Pruitt [10]	1993	Left	ECRB	Fall	Closed	Yes / a bone fragment	ORIF tension band - K wires
Cobbs et al. [5]	1996	Right	ECRB	Punch injury	Closed	Yes / a bone fragment	ORIF tension band - K wires
Vandeputte and De Smet [12]	1999	Left	ECRB ECRL	Hyperflexion injury	Closed	Yes / a bone fragment	ORIF - K wires
Boles and Durbin [1]	1999	Left	ECRB ECRL	Fall	Closed	Yes / a bone fragment	ORIF screw fixation for bone. Suture anchor fixation for the tendon
Höcker and Spitz [8]	2000	Right	ECRB	Fall	Closed	Yes / a bone fragment	ORIF screw fixation
Tsiridis [11]	2001	Right	ECRB	Punch	Closed	Yes / a bone fragment	ORIF screw fixation for bone. Suture anchor fixation for the tendon
Johnson and Puttler [9]	2006	Right	ECRB	Hyperflexion injury	Closed	Yes / a bone fragment	ORIF screw fixation
Breeze et al. [3]	2009	?	ECRB	Punch	Closed	Yes / a bone fragment	ORIF
Current study	2012	Right	ECRB	Direct, a spring trauma	Open	Yes/ bone chips	Suture anchor fixation.

treatment option for a single ECRB rupture may be controversial. The study of Brand et al., however, clearly shows that even though extensor carpi radialis longus (ECRL) performs wrist extension, this wrist extension is a radial deviated extension; ECRL mainly helps elbow flexion, and it does so more than wrist extension [2]. Therefore, ECRB becomes the main wrist extensor. Cobbs, et al. also postulated that unrepaired avulsion ruptures may result with carpometacarpal boss [5]. In order to achieve wrist extension and avoid unrepaired avulsion ruptures, prompt diagnosis and repair of such ruptures should be initiated.

Different surgical techniques may be used for fixation of the third metacarpal base such as tension band and K-wire [5, 10, 12, 13], screw fixation [8, 9, 11] or suture anchors [1]. Because the bone fragments were too small to fix in this case, only ECRB tendon was reattached. Small bone fragments that were still attached to the tendon were kept on the tendon, and the tendon was reattached to the bone from which it was avulsed with one 2-mm suture anchor. Boles and Durbin fixed the third metacarpal base with a screw but they attached the ECRB tendon to the second metacarpal base with a suture anchor [1]. Tsiridis fixed the third metacarpal base with a screw and he fixed the tendon with a suture anchor to the third metacarpal base. Additionally, a similar injury to the ECRL tendon has also been described before, and the treatment of that type of injury is not different than the treatment of the injury that is described here [4, 6].

It seems that this injury heals mostly uneventfully. We and other authors did not encounter any complications; however, Johnson reported 5° extension lag [9], and Vandeputte reported some ROM limitation of the wrist joint and lack of grip strength of the hand [12]. By knowing to suspect isolated ECRB tendon rupture whenever there is a fracture at the base of the third metacarpal, whether the injury be closed or open, unrepaired tendon rupture may be avoided, and complete or almost-complete range of motion should be able to be recovered for the

patient if prompt repair and early range of motion exercises are initiated.

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