

Extensor Pollicis Longus Tendon Rupture with Concomitant Rupture of the Extensor Digitorum Communis II Tendon and Extensor Indicis Proprius after Volar Plating for Distal Radius Fracture

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Extensor tendon rupture is well known complication following distal radius fracture after either conservative treatment or volar plating. However, there are not many reports in literature about concomitant ruptures of other extensor tendons. We report a case of delayed rupture of extensor pollicis longus (EPL), second extensor digitorum communis (EDC II), and extensor indicis proprius (EIP) tendons 4 weeks after volar plating for distal radius fracture. Due to the absence of EIP, EIP transfer was discouraged for EPL reconstruction. Thumb and index finger extension was restored by palmaris longus tendon graft for EPL and EDC II.

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INTRODUCTION

Extensor pollicis longus tendon (EPL) rupture is a known and well-described complication of distal radius fracture, with the incidence ranging from 0.2% to 4%^{1,2}. Causes

hypothesized for the rupture include sharp bony spike, protruded screw, or local lengthening of extensor tendon compartment^{1,3,4}. Common extensor rupture has also been described as a complication of distal radius fracture, after either surgical or conservative treatment³⁻⁶.

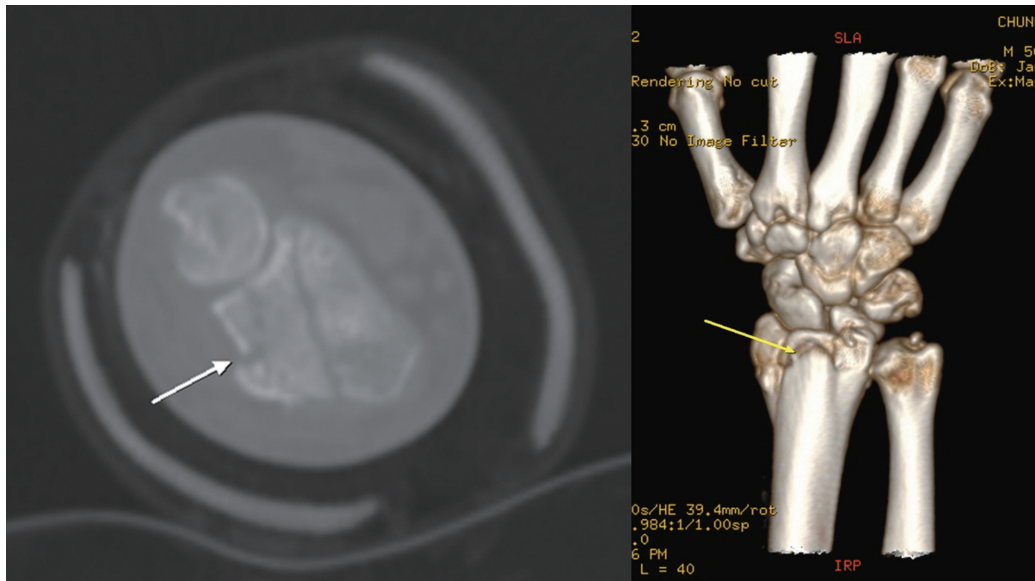


Fig. 1. Axial and three-dimensional computed tomography images demonstrating a fracture of Lister's tubercle on the right side (arrows). A bony spur created a the gap between the fragment and the main radius part and might be the cause for tear of the tendon.

However, reports on concomitant rupture of other extensor tendons are rare^{3,5,6}. We report a case of delayed rupture of EPL, second extensor digitorum communis (EDC II), and extensor indicis proprius (EIP) tendons due to impingement between the bony cleft, 4 weeks after volar plating for distal radius fracture.

CASE REPORT

A 50-year-old man admitted to our emergency department following a motorcycle accident and intraarticular fractures in both distal radii (23-B2, AO/OTA classification) were detected. The computed tomography (CT) scan of right hand showed extension of the fracture line to the Lister's tubercle (Fig. 1). Open reduction and internal fixation using a variable-angle locking compression plate distal radius plate (DePuy Synthes, Zuchwil, Switzerland) was performed using the volar Henry approach, 1 week after the trauma (Fig. 2).

However, 4 weeks after surgery, the patient visited the outpatient clinic and complained of extension limitation of the right thumb and index finger (Fig. 3). The passive range of movement of the thumb and index finger was not affected. On ultrasonography, complete disruptions



Fig. 2. Preoperative and postoperative plain radiography showed that the fracture gap of the Lister's tubercle persisted.

of the EPL and second extensor tendons were observed with a 7-cm defect (Fig. 4). Though, EIP showed continuity on ultrasonography, the patient could not extend his index finger independently. Therefore, EIP transfer was discouraged, and a palmaris longus (PL) graft was more recommended. The right PL appeared intact during the thumb-little finger opposition test, but the left PL was not



Fig. 3. In the physical examination, limitations in thumb interphalangeal and index metacarpophalangeal joint extensions were observed when compared with those on the normal side.

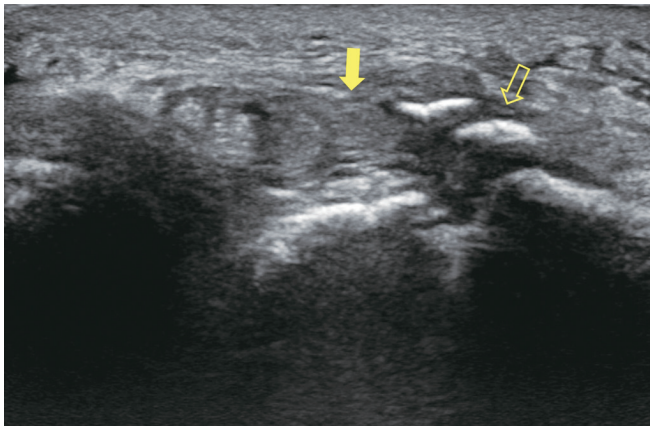


Fig. 4. Axial image of ultrasonography showed complete disruptions of the extensor pollicis longus, (solid arrow) and fracture gap of Lister's tubercle (vacant arrow).

prominent and covered with a scar from a previous suicide attempt.

A curvilinear incision was made on the original course of the EPL tendon, centering the Lister's tubercle and damage of the extensor retinaculum around the third and fourth extensor compartments was confirmed. On examination of The EPL and index extensors, attritional rupture of the EIP and EDC II was confirmed at the fourth extensor compartment on the dorsum of the wrist, with a defect of about 7-cm. Granulation tissue and tear were observed around the ruptured margin. The EPL tendon was also impaired and almost ruptured, but attached with a string-like fibrotic tissue. The proximal part of the ruptured EPL was displaced to the radial side from the third compartment and was held in place by peripheral

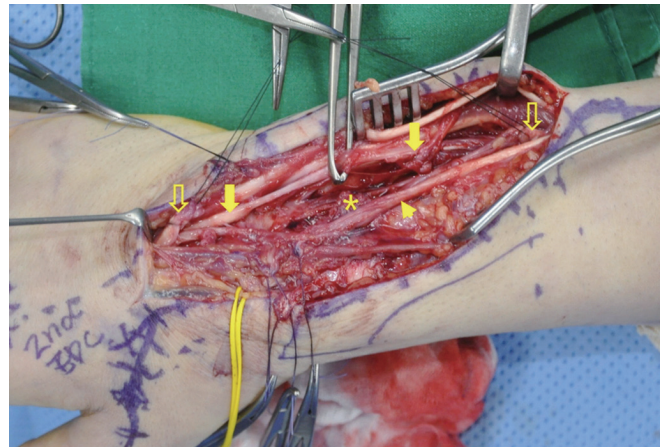


Fig. 5. The ruptures of the extensor pollicis longus (arrowhead), extensor indicis proprius (solid arrow), and extensor digitorum communis II (vacant arrow). The asterisk shows a bony spur near Lister's tubercle.

fibrotic tissue. The cause of the tendon rupture was investigated. No screw protrusion was found, but a prominent Lister's tubercle and a fracture gap on the ulnar side of the tubercle were observed. A portion of the damaged tendon remnant was located between the bony cleft (Fig. 5). After removal of the protruding bone spur, it was necessary to cover the fracture site on the Lister's tubercle, to prevent tendon injuries. Hence, the tendon sheath and periosteum around the second compartment were pulled to the ulnar side and sutured to the remaining tendon sheath and periosteum of the third compartment (Fig. 6). Subsequently, PL tendons were harvested from both sides of the wrist. After adequate preparation of the PL tendon, EPL and EDC II were reconstructed from using

the PL tendons using the Pulvertaft technique (Fig. 7). A short-arm cast with the wrist and thumb extended, was applied for 5 weeks and following which, active flexion and extension increased progressively. Ten months later, the interphalangeal joint of the thumb and the metacar-

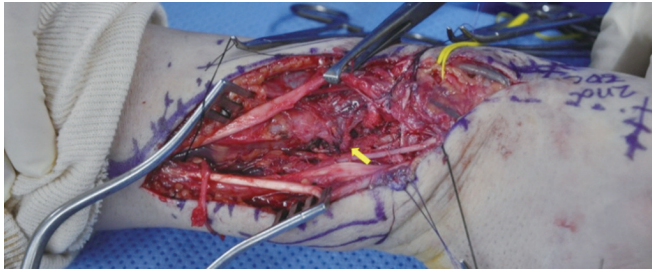


Fig. 6. After removing the bony protrusion, the surrounding soft tissue was pulled to the ulnar side and sutured to the remaining tendon sheath and periosteum of the 3rd compartment to prevent further tendon tear (solid arrow).

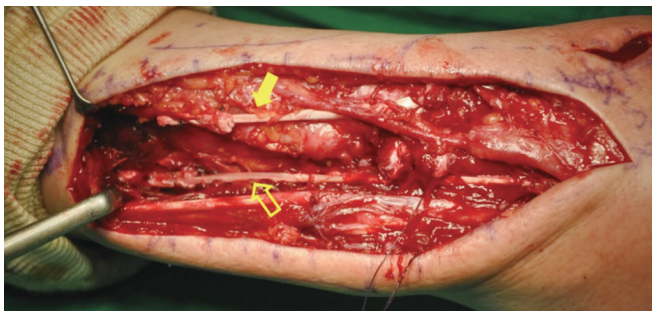


Fig. 7. EPL (solid arrow), and EDC II (vacant arrow) were reconstructed with the PL tendons using the Pulvertaft technique. EPL, extensor pollicis longus; EDC II, extensor digitorum communis; PL, palmaris longus.

pophalangeal joint of the index finger had no limitation of flexion, while an extension lag of 20° remained (Fig. 8).

DISCUSSION

De Boer et al.⁵ reported case of EPL rupture with EDC II tendon rupture occurred following a distal radius fracture, treated with a cast. However, rupture of three tendons after volar plate fixation of a distal radius fracture has been rarely reported in the literature^{3,6}. The cause of rupture in our case was thought to have been caused by the friction and impingement of the tendon in the third and fourth extensor compartments in the bone cleft, which had a fragment of the Lister's tubercle and the main fragment rather than the volar plating itself. Although EIP transfer is the most commonly used technique for reconstructing the ruptured EPL, with concomitant index extensor rupture like in our case. PL, or other tendon free grafts might be the first choice to restore the joint function. In case with multiple-tendon rupture, in which conventional tendon transfer cannot be performed, various options should be considered before performing surgery. Alternative transfers to EPL include extensor pollicis brevis, extensor carpi radialis and a slip of abductor pollicis longus⁷. Tendon grafting requires two tendon repair sites and it is difficult to overcome the myostatic contracture for appropriate tensioning⁸. Tendon grafting also permits one to perform at least three



Fig. 8. After 10 months, the interphalangeal joint of the thumb and the metacarpophalangeal joint of the index finger showed a persistent 20° of extension lag (the flexion photograph was not taken).

weaves with the stump of the EPL tendon by using the Pulvertaft technique, thus, diminishing the chance of a spontaneous dehiscence at the tendon juncture. However, Pulvertaft technique is not applicable to the extensor carpi radialis longus or another possible transfer due to its shorter reach⁹.

Hence, tendon transfer had to be considered as a secondary options. Chung et al.¹⁰ also reported that both tendon grafting and tendon transfer are reliable reconstruction methods for ruptured finger extensor tendons in rheumatoid hands. Furthermore, the patient refused to sacrifice the normal functional tendons; hence, we decided to perform tendon graft using PL.

For patients with distal radius fracture and extensor tendon rupture, multiple tendon injury should be considered and thorough preoperative examination that includes imaging studies must be performed. This information will help in the decision-making process regarding the appropriate reconstruction method and surgical planning.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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원위요골골절의 배측 금속판 고정술 시행 후 발생한 장무지신근건의 파열과 동반된 총수지신근 및 시지신근의 파열

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신전건의 파열은 원위 요골 골절의 보존적 치료나 수장 측 금속판 고정 후에 발생할 수 있는 합병증으로 잘 알려져 있다. 그러나 신전건의 다발성 파열은 보고된 사례는 많지 않아 원위 요골 골절로 수장 측 금속판 고정술을 시행한 뒤 4주 후에 발생한 장무지신근, 총수지신근 II, 시지신근의 지연성 파열 증례에 대해 보고하고자 한다. 시지신근의 파열로 장무지신근의 재건술은 불가능하여, 장무지신근과 총수지신근 II 각각을 양측 장장근을 이용한 이식술로 복원하였다.

색인단어: 원위요골골절, 수장측 금속판 고정, 장무지신근, 총수지신근 II, 시지신근, 건파열

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