

# World Journal of *Clinical Cases*

*World J Clin Cases* 2023 May 6; 11(13): 2855-3113



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Thrice Monthly Volume 11 Number 13 May 6, 2023

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**ABOUT COVER**

Editorial Board Member of *World Journal of Clinical Cases*, Jina Yun, MD, PhD, Assistant Professor, Division of Hematology-Oncology, Department of Internal Medicine, Soonchunhyang University Bucheon Hospital, Soonchunhyang University School of Medicine, Bucheon 14584, South Korea. 19983233@schmc.ac.kr

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**RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: Si Zhao; Production Department Director: Xiang Li; Editorial Office Director: Jin-Lei Wang.

**NAME OF JOURNAL**

*World Journal of Clinical Cases*

**ISSN**

ISSN 2307-8960 (online)

**LAUNCH DATE**

April 16, 2013

**FREQUENCY**

Thrice Monthly

**EDITORS-IN-CHIEF**

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

**EDITORIAL BOARD MEMBERS**

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

**PUBLICATION DATE**

May 6, 2023

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**ARTICLE PROCESSING CHARGE**

<https://www.wjgnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjgnet.com/bpg/GerInfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>



## Multiple flexor tendon ruptures due to osteochondroma of the hamate: A case report

Tae Young Kwon, Young-Keun Lee

**Specialty type:** Medicine, research and experimental

**Provenance and peer review:** Unsolicited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's scientific quality classification**

Grade A (Excellent): 0  
Grade B (Very good): 0  
Grade C (Good): 0  
Grade D (Fair): 0  
Grade E (Poor): 0

**P-Reviewer:** Modi N, India

**Received:** November 16, 2022

**Peer-review started:** November 16, 2022

**First decision:** February 14, 2023

**Revised:** February 19, 2023

**Accepted:** April 4, 2023

**Article in press:** April 4, 2023

**Published online:** May 6, 2023



**Tae Young Kwon**, Department of Orthopedics, Jeonbuk National University Hospital, Jeonju-si 54907, South Korea

**Young-Keun Lee**, Department of Orthopedic Surgery, Research Institute of Clinical Medicine of Jeonbuk National University – Biomedical Research Institute of Jeonbuk National University Hospital, Jeonju 54896, South Korea

**Corresponding author:** Young-Keun Lee, MD, PhD, Associate Professor, Doctor, Department of Orthopedic Surgery, Research Institute of Clinical Medicine of Jeonbuk National University – Biomedical Research Institute of Jeonbuk National University Hospital, No. 567 Baekje-daero, Deokjin-gu, Republic of Korea, Jeonju 54896, South Korea. [trueykleee@naver.com](mailto:trueykleee@naver.com)

### Abstract

#### BACKGROUND

Closed rupture of the little and ring finger flexor tendons caused by the hamate is mostly associated with a fracture or nonunion of the hamate hook. Only one case of a closed rupture of the finger flexor tendon caused by osteochondroma in the hamate has been reported. Here, we present a case study to highlight the possibility of hamate osteochondroma as a rare cause of finger closed flexor tendon rupture based on our clinical experience and literature review.

#### CASE SUMMARY

A 48-year-old man who had been a rice-field farmer for 7–8 h a day for the past 30 years visited our clinic due to the loss of right little finger and ring finger flexion involving both the proximal and distal interphalangeal joints. The patient was diagnosed with a complete rupture of the ring and little finger flexors because of the hamate and was pathologically diagnosed with an osteochondroma. Exploratory surgery was performed, and a complete rupture of the ring and little finger flexors due to an osteophyte-like lesion of the hamate was observed, which was pathologically diagnosed as an osteochondroma.

#### CONCLUSION

One should consider that osteochondroma in the hamate may be the cause of closed tendon ruptures.

**Key Words:** Flexor tendon; Finger; Closed tendon rupture; Hamate; Osteochondroma; Case report

**Core Tip:** It is not easy to diagnose osteochondroma in the hamate. Therefore, osteochondroma in the hamate should be considered as a cause when dealing with patients with closed ruptures of the finger flexor tendon. Based on our experience, we also suggest that the surgical treatment of these patients requires careful pre-operative planning and preparation.

**Citation:** Kwon TY, Lee YK. Multiple flexor tendon ruptures due to osteochondroma of the hamate: A case report. *World J Clin Cases* 2023; 11(13): 3038-3044

**URL:** <https://www.wjgnet.com/2307-8960/full/v11/i13/3038.htm>

**DOI:** <https://dx.doi.org/10.12998/wjcc.v11.i13.3038>

## INTRODUCTION

Closed ruptures of the flexor tendons other than in nonrheumatic patients are uncommon. These ruptures are frequently caused by intrinsic tendon pathology or structural deformities[1]. Closed rupture of the finger flexor tendons caused by the hamate is mostly associated with a fracture or nonunion of the hamate hook[2,3]. Only one case of a closed rupture of the finger flexor tendon caused by osteochondroma in the hamate has been reported[4]. An osteochondroma is a tumor that arises mainly from the metaphyses of long bones and is the most common form of primary benign bone tumor. However, it is rarely found in carpal bones[5-8]. In this report, we present a case study to highlight the possibility of hamate osteochondroma as a rare cause of finger closed flexor tendon rupture based on our clinical experience and literature review.

## CASE PRESENTATION

### Chief complaints

A 48-year-old man complained of the inability to flex his right ring finger (RRF) and right small finger (RSF).

### History of present illness

The patient was unable to perform active flexion of the RSF for about 2 wk and active flexion of the RRF for about one week. The condition occurred without pain or a definite episode of trauma.

### History of past illness

He had been a rice-field farmer for 7–8 h a day for the past 30 years.

### Personal and family history

There was no history or evidence of rheumatoid or other inflammatory arthritis conditions.

### Physical examination

Physical examination revealed no swelling or tenderness of the palm. However, he could not actively flex either the proximal or distal interphalangeal joint of the RRF and RSF (Figure 1A and B).

### Laboratory examinations

The patient's rheumatoid serology results were normal.

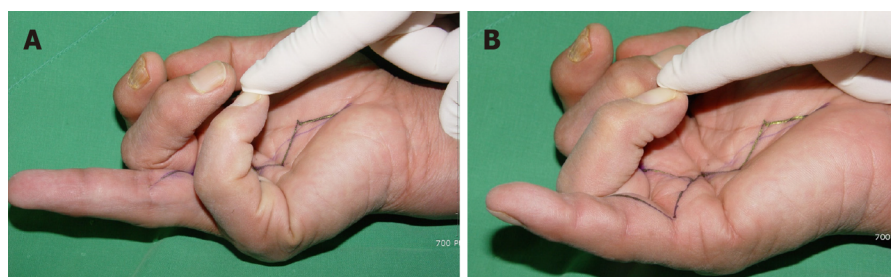
### Imaging examinations

The radiologist reported no specific findings on preoperative magnetic resonance imaging (MRI) other than ring finger and small finger flexor tendon ruptures (Figure 2).

### Further diagnostic work-up

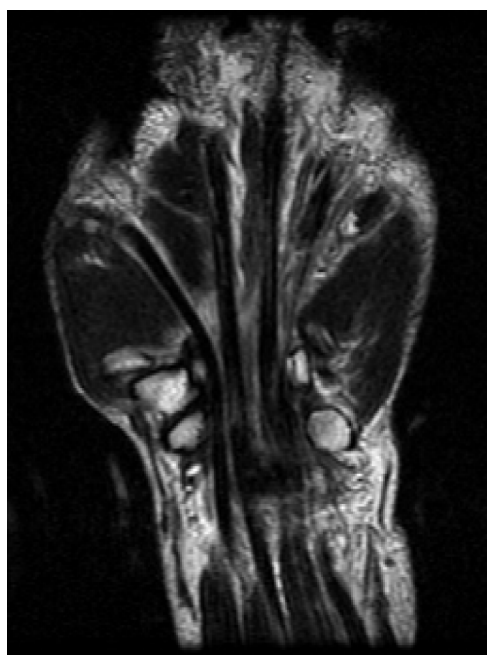
The flexor tendons were explored under regional anesthesia through a volar zig-zag incision. During surgery, the flexor digitorum profundus (FDP) and flexor digitorum superficialis (FDS) tendons of the RRF and RSF were found to be completely ruptured (Figure 3A and B). Additionally, the flexor tendons of the long finger were attenuated and frayed. On the side of the hamate in the carpal tunnel, a protruding bony structure like an osteophyte was identified, which was covered by cartilage





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**Figure 1 Preoperative physical examination.** A: The loss of the ring finger flexion involving both proximal and distal interphalangeal joints; B: The loss of the little finger flexion involving both proximal and distal interphalangeal joints.



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**Figure 2 Flexor tendon continuity of the ring finger and the small finger is not visible in the carpal tunnel on T1 coronal magnetic resonance imaging.**

(Figure 3C). The flexor tendons were determined to be worn and ruptured by this structure. We used a C-arm image intensifier to identify this area during surgery (Figure 3D). It was excised and sent for histological examination (Figure 3E). Although we knew that primary reconstruction through tendon transfer or a free tendon graft was the best treatment for ruptured flexor tendons, we decided to perform staged tendon reconstruction after considering various factors. The ruptured flexor tendons were debrided, and Hunter rods (Wright Medical Technology, Inc., Arlington, TN, USA) were inserted (Figure 3F).

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## FINAL DIAGNOSIS

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The final diagnosis was multiple flexor tendon ruptures due to osteochondroma of the hamate

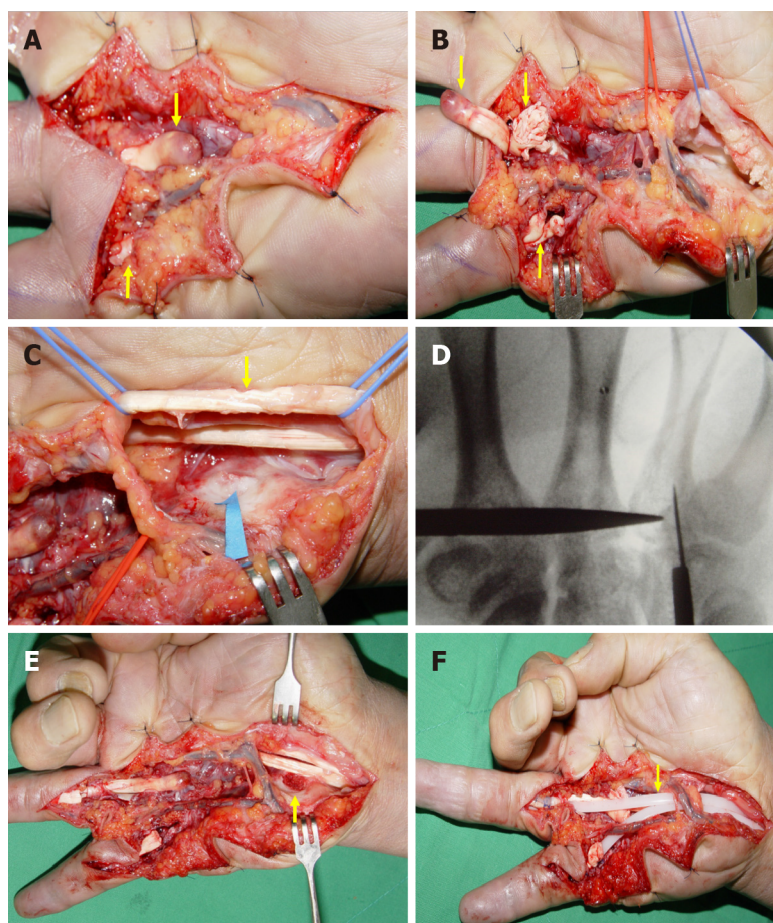
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## TREATMENT

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Postoperatively, the wrist was immobilized with dorsal block short arm splint for 2 wk.





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**Figure 3 Intraoperative photographs.** A and B: Complete rupture of the right ring finger and right small finger flexor tendons (yellow arrows); C: A protruding bony structure like an osteophyte is identified on the side of the hamate in the carpal tunnel, and is covered by cartilage (blue arrow). There is a partial rupture of the right long finger flexor tendon (yellow arrow); D: The intra operative C-arm image shows a bony lesion protruding into the carpal tunnel; E: Excisional biopsy was performed for the bony lesion (yellow arrow); F: Hunter rods were inserted (yellow arrow).

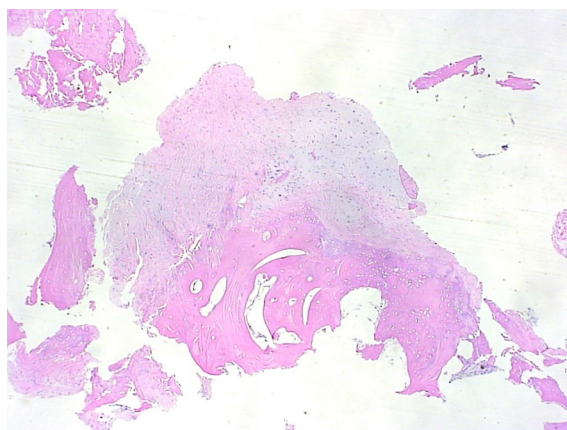
## OUTCOME AND FOLLOW-UP

The histopathological examination revealed osteochondroma of the hamate with no malignant changes (Figure 4). However, tendon reconstruction could not be performed because the patient did not return to the hospital as he was busy with work.

## DISCUSSION

An osteochondroma is a common tumor that accounts for 30% of benign bone tumors and 10%–15% of all bone tumors[9]. Since most cases are asymptomatic, they are often detected incidentally on radiographs and are commonly found around the knee area. Carpal osteochondroma is very rare and only three cases involving the hamate have been reported[4,6,8]. Only one case of carpal osteochondroma associated with a partial rupture of the finger flexor tendon has been reported[4]. The low incidence of osteochondromas in carpal bones might be related to the total area of the periosteal surface, which is small in carpal bones compared to long bones or larger tarsal bones[5]. In most cases of isolated osteochondromas, conservative treatment with regular follow-up monitoring is conducted[9]. However, surgical excision is performed if the tumor size presents an aesthetic problem, pathological fractures or symptoms of nerve or vascular compression appear, limitations in joint movement occur, or tumor exacerbation is suspected[10]. Our case involved closed tendon rupture due to a hamate osteochondroma. However, the occurrence of osteochondroma in carpal bones is very rare, and the diagnosis can be very difficult because of its usual occurrence in a long bone and other atypical radiological findings. Similarly, in our case, the size was too small to be detected even on MRI before surgery, but it was found during surgery.

Closed injuries to the flexor tendon are rare and, therefore, can be easily missed initially. The causes of closed rupture of the flexor tendons reported in previous papers were distal radius fractures,



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**Figure 4** Histopathologic analysis of the hamate bony lesion shows thick cartilaginous tissue, such as the typical cartilaginous cap seen in the common osteochondroma with no malignant changes (hematoxylin-eosin stain, original magnification x 100).

nonunions of the scaphoid, tendolipomatosis, dislocations of the lunate, Kienböck's disease, osteoarthritis of the pisotriquetral joint, and fractures or nonunions of the hamate hook[2,3,11-15]. Sometimes, closed ruptures of the flexor tendon occur without any underlying pathological conditions. Although the etiology of closed ruptures is unclear, these injuries likely depend on the interplay of several factors, including vascular alterations, repetitive microtrauma, local anatomic features, tendon anomalies, and genetic or other endogenous influences[16].

Closed ruptures of the flexor tendons are usually treated with primary reconstruction through tendon graft interposition or tendon transfer[17]. In addition, since osteochondroma is a benign and slow-growing tumor, it has been reported that there is no problem with primary treatment has been reported, even if accompanied by tendon rupture[7]. However, we have limited hand surgery experience at the time of this case. Initially, we planned primary tendon reconstruction *via* tendon transfer from the third FDS. However, since the third FDS tendon was also frayed and attenuated, tendon transfer could not be performed. As an alternative treatment method, we considered reconstruction using free tendon graft interposition. Two palmaris longus tendons should be harvested to ensure the success of this treatment, but we found this option unsuitable since surgery on this patient was not performed under general anesthesia. Moreover, if the grafted tendon passes through the osteochondroma removal site, there is a possibility of re-rupture due to wear of the tendon. Thus, we performed a Hunter rod insertion instead. However, this was done because of our lack of both experience and thorough preoperative preparation, which would have discovered the osteochondroma before surgery. In this regard, we suggest that careful planning and preparation are needed before surgery for patients with closed ruptures of the flexor tendon.

Rice-field farmers frequently work in small-scale agricultural settings using hand hoes and small sickles. Repetitive movements of the wrist are required to use these tools, and there is full wrist flexion with ulnar deviation. Thus, the FDP tendons of the ulnar digits deviate to an acute angle at the hamate in the carpal tunnel. Moreover, repetition of these movements can produce friction between the flexor tendon and the surface of the hamate, leading to attrition of both the tendon and the surface of the hamate[18]. Our patient had been a rice-field farmer for the past 30 years. Long-term repeated movements led to the attrition of both the tendon and the surface of the hamate. Moreover, microtrauma of the hamate because of its irregularity due to an osteochondroma was the main cause of flexor tendon rupture.

One limitation of this case report is that secondary tendon reconstruction could not be performed because the patient did not return to the hospital as he was busy with work. Therefore, we could not show the final result of his reconstructed fingers, and there was no final follow-up to determine whether the hamate osteochondroma recurred.

## CONCLUSION

In the present case, repetitive friction between the flexor tendons and osteochondroma of the hamate may have caused tendon rupture. However, given that it is not easy to diagnose osteochondroma in the hamate, osteochondroma in the hamate should be considered as the cause when dealing with patients with closed ruptures of the finger flexor tendon. Based on our experience, we also suggest that surgical treatment requires careful pre-operative planning and preparation.

## FOOTNOTES

**Author contributions:** Kwon TY and Lee YK were the patient's orthopedic surgeons; Kwon TY and Lee YK contributed to manuscript writing, editing, data collection, data analysis, conceptualization and supervision; All authors have read and approved the final manuscript.

**Informed consent statement:** Written informed consent was obtained from the patient for the publication of this case report.

**Conflict-of-interest statement:** All the authors report no relevant conflicts of interest for this article.

**CARE Checklist (2016) statement:** The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

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**Country/Territory of origin:** South Korea

**ORCID number:** Tae Young Kwon 0000-0002-3532-7156; Young-Keun Lee 0000-0001-8749-4135.

**S-Editor:** Liu GL

**L-Editor:** A

**P-Editor:** Liu GL

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