Case Report

Traumatic injury of the third palmar interosseous muscle in a patient with dementia: A case report

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Abstract

An 81-year-old man with dementia presented with a third palmar interosseous injury. A fourth flexor digitorum superficialis tendon transfer surgery was performed the following day. The patient achieved adduction of the little finger; however, flexion contracture that began 2 months after the surgery progressed until completion because of issues related to postoperative rehabilitation and home exercise. An injury of the third palmar interosseous muscle is extremely rare and is even more uncommon in older adults. Therefore, careful consideration must be given to determine whether surgery is the best choice, especially if the patient has dementia.

Introduction

The third palmar interosseous muscle is the only muscle that contributes to the adduction of the little finger, and the loss of this ability can create problems when putting the hand into a pocket or while scooping up water to wash the face [1–3]. Although several cases of difficulty in adduction due to ulnar nerve palsy have been reported [2,4,5], it is rarely caused by traumatic rupture [1,6,7]. Moreover, such injuries among older adults are rare.

Herein, we report the progress in an 81-year-old patient with dementia who was surgically treated for a third palmar interosseous muscle injury.

Statement of informed consent

This study was approved by the appropriate institutional review board (IRB no. 2021-269). Written informed consent was obtained from the patient’s spouse, who had the power of attorney, for the publication of this case report and accompanying images.

Case report

An 81-year-old man with Alzheimer’s disease presented to our emergency room with a laceration between the ring finger and little finger of the right hand. His dominant hand was the right. He had difficulty in adduction and flexion of the little finger (Fig. 1). He neither had any memory of how the injury occurred nor were there any witnesses. The little finger was in the abduction position; however, the wound was not contaminated, and there were no signs of neuropathy. The issue of tetanus prophylaxis in this patient with
dementia and a neglected wound was addressed by providing adequate irrigation of the wound in the emergency room. While extension was possible, automatic flexion was difficult. The hand radiograph did not reveal fractures or dislocations. Based on the condition of the wound and the difficulty in adduction of the little finger, a third palmar interosseous muscle injury was diagnosed and surgery was performed on the following day.

Surgical technique

The median nerve was selectively blocked, and additional local anesthesia was administered. Starting from the wound, a 6-cm zigzag skin incision was made on the palmar surface. The fifth flexor digitorum superficialis (5-FDS) was retracted ulnarly. An injury to the third palmar interosseous muscle in the proximal muscle component and a lax tendon distally were observed. Considering the tear was in the muscle component and not in the tendon component, primary repair was deemed difficult. The finger nerve and 4-FDS were identified. The 4-FDS was resected distal to the A1 pulley, passed through it, and pulled out proximally to the ulna. After repairing the torn ulnar-side metacarpo-phalangeal joint (MPJ) capsule with 4-0 nylon thread, the 4-FDS tendon and third palmar muscle tendon were sutured with 4-0 nylon thread using the interlacing suture technique (Fig. 2). Improvement in the abduction position of the little finger and recovery of intraoperative auto-flexion were confirmed.

Rehabilitation

Initially, we planned to perform rigid immobilization of the MPJ at 70° for 3 weeks after surgery, followed by buddy taping for 2 weeks. However, progress with rehabilitation and home exercise was poor; therefore, we terminated immobilization with the finger splint after 1 week to prevent flexion contracture. Subsequently, soft fixation with bulky dressing and buddy taping were performed until week 3. Full adduction was confirmed at 2 months, and the difference in grip strength between the left and right hands disappeared at 3 months. However, flexion contracture began 2 months after surgery and gradually progressed till completion.

Clinical outcomes

Five months postoperatively, there was no rerupture, and ultrasonography confirmed continuity of the tendon. Although the patient achieved automatic adduction, there was residual flexion contracture of 20° and 40° at the distal and proximal interphalangeal joints, respectively (Fig. 3). Nevertheless, no difference was found in the grip strength between the right and left hands. The patient had no complaints and did not request surgery to repair the flexion contracture. Subsequently, the patient's wife, who was his caretaker,

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**Fig. 1.** Preoperative image of the right hand.
Patient is unable to adduct his little finger.
Discussion

Herein, we describe our experience in treating a third palmar interosseous muscle injury in a patient with Alzheimer's disease. Although we performed tendon transfer surgery, rehabilitation was not successful because of the patient's severe dementia, which resulted in residual flexion contracture.

Injury to the third palmar interosseous muscle injury can be caused by hyperabduction of the little finger, although very few such cases have been reported. Freeland et al. reported the case of a 19-year-old American football player who was injured when he tackled a ball carrier [6], and Morisaki et al. reported such an injury in a 35-year-old woman who tried to carry a heavy object [1]. The largest number of cases was reported in a series comprising six cases, with patients aged 8–16 years [7].

There are even fewer reports of conservative treatment for traumatic abduction deformities of the little finger without fractures. Lourie et al. reported that three of six patients responded well to conservative treatment [7]. One of the patients became accustomed to the deformity, whereas the other two regained normal hand movement and function within 8 weeks of injury occurrence. In the 2 years
of follow-up, the deformity did not recur. Nevertheless, the inability to adduct the little finger due to hyperabduction in these six cases was not considered caused by third palmar interosseous muscle injuries but by collateral ligament injuries. Moreover, magnetic resonance imaging, ultrasonography, or other imaging examinations that can help evaluate the injuries of the muscles, tendons, and ligaments were not performed. It is possible that the remaining three cases in which conservative treatment failed might have been associated with third palmar interosseous muscle injuries.

The outcomes of surgical treatment are generally favorable. Freeland et al. performed tendon transfer of the ulnar tendon belonging to the extensor digiti minimi, and Morisaki et al. reported successful results with transfer of the fourth dorsal interosseous muscle. In our case, we used a palmar approach to transfer the 4-FDS tendon in accordance with the method of Blacker et al. [2] because the wound was located on the palmar side, and it was desirable to confirm the tear.

Our patient was unable to perform rehabilitation and home exercises because of his dementia that resulted in flexion contracture 2 months after the surgery. However, the patient had no complaints regarding this condition or subjective symptoms, such as pain. Considering that the patient had dementia, conservative treatment might have been a better option that could also have satisfied him. The present surgical treatment might have also been an over-indication in terms of cost. Nevertheless, it is difficult to judge whether difficulty in adduction of the little finger or flexion contracture is more disadvantageous for patients with dementia.

In conclusion, indications for surgery in patients with dementia should be carefully considered, especially in cases like the present one, wherein postoperative rehabilitation is crucial to the outcome.

**Declaration of competing interest**

None.

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