Anomalous Functional Lumbrical Muscle Causing Carpal Tunnel Syndrome: A Case Report

Kiron Koshy and Rajive Jose

ABSTRACT

Anatomical variations within the carhpal tunnel can contribute to compression of the median nerve. This can include abnormal flexor digitorum superficialis or palmaris profundus muscle bellies underneath the transverse carpal ligament.

We report a rare case of an accessory lumbrical muscle found within the carpal tunnel in a patient with clinical carpal tunnel syndrome (CTS). This was found to be a functional lumbrical muscle to the middle finger. On division of the transverse carpal ligament without resection of this muscle, the patient had clinical resolution of their symptoms.

This case is the first to show high-quality images of these lumbrical muscles actively functioning in a patient with carpal tunnel syndrome. This highlights the importance of considering anatomical variations in patients with CTS. Careful intraoperative inspection is essential to identify and address these anomalies, ensuring resolution of symptoms, without impairing function.

Keywords: Accessory lumbrical muscle, Anatomical variation of carpal tunnel, Carpal tunnel decompression, Intracarpal lumbrical origin, Median nerve compression, Nerve surgery

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Cite this as: Koshy K, Jose R. Anomalous Functional Lumbrical Muscle Causing Carpal Tunnel Syndrome: A Case Report. Premier Journal of Case Reports 2026;7:100014

DOI: https://doi.org/10.70389/PJCR.100014

Peer Review:

Received: 26 December 2025

Last revised: 29 March 2026

Accepted: 03 April 2026

Version accepted: 3

Published: 11 April 2026

Ethical approval: N/a

Consent: Consent given for clinical photographs

Funding: N/a

Conflicts of interest: N/a

Author contribution: Kiron Koshy: Writing – original draft. Rajive Jose: Supervision

Guarantor: Kiron Koshy

Provenance and peer-review: Unsolicited and externally peer-reviewed

Data availability statement: N/a

Introduction

Carpal tunnel syndrome (CTS) is the most common compressive neuropathy of the upper limb, caused by increased pressure within the carpal tunnel. Although certain risk factors have been linked, such as systemic disease, trauma and space-occupying lesions, anatomical variations within the tunnel can also contribute to nerve compression.[1] This can include abnormal flexor digitorum superficialis, palmaris profundus muscle bellies underneath the transverse carpal ligament (TCL)[2] or a persistent median artery.[3] We report a rare case of an accessory functional lumbrical muscle found within the carpal tunnel in a patient with clinically and electrophysiologically confirmed CTS.

Case Presentation

A 58-year-old patient presented with classical symptoms of carpal tunnel syndrome, with pain, pins and needles and numbness of the radial three digits. She also complained of pain at the base of her thumb carpometacarpal joint.

On examination, loss of sensation of the radial three digits was confirmed, with a positive Durkan's test and Tinel's sign at the carpal tunnel. In addition to this, the patient had a positive grind test of the thumb carpometacarpophalangeal joint (CMCJ). X-ray confirmed thumb arthritis isolated to the CMCJ (Figure 1). Nerve conduction studies confirmed moderate compression of the median nerve at the level of the carpal tunnel.

Fig 1 | Radiograph demonstrating thumb carpometacarpophalangeal joint (CMCJ) arthritis

The decision was made to proceed with a carpal tunnel decompression and ipsilateral trapeziectomy and abductor pollicis longus (APL) ligament reconstruction under regional block. The patient provided consent for photography and publication of this case.

Standard incision was made for open carpal tunnel release, along the fourth ray from the distal wrist crease to Kaplan's cardinal line. Intraoperatively, on incising the TCL, a muscle was found within the carpal tunnel on the ulnar aspect of the median nerve (Figure 2).

Retracting the muscle (Figure 3) caused middle finger flexion at the metacarpophalangeal joint and extension at the proximal interphalangeal and distal interphalangeal joints. This confirmed that this accessory muscle was a lumbrical muscle to the middle finger.

After full release of the TCL and neurolysis of the median nerve, it was deemed that the muscle was no

Fig 2 | Accessory lumbrical within carpal tunnel (1) visualised next to the median nerve (2)

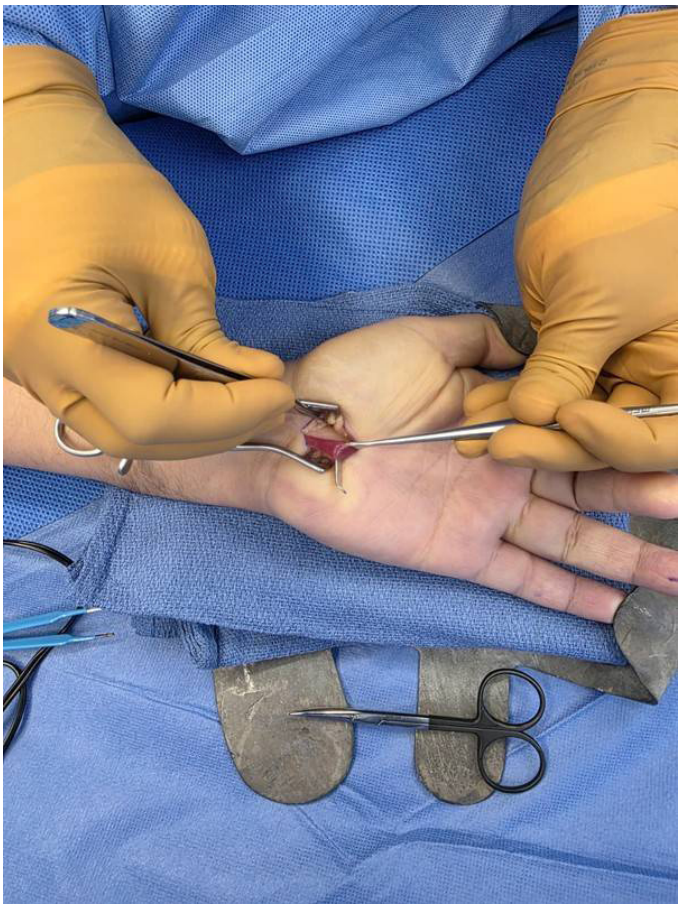

Fig 3 | Retracted muscle demonstrating lumbrical function of middle finger (1) adjacent to median nerve (2)

longer significantly compressing the median nerve, so this was not excised. The trapeziectomy and APL suspensionplasty was carried out as planned. The patient had an uneventful recovery and full resolution of their symptoms when assessed on follow-up at 3 months.

Anatomical anomalies are an important but often overlooked cause of CTS.[4] The lumbricals normally originate from the radial sides of the flexor digitorum profundus tendons outside the carpal tunnel. However, in some cases, their origin or accessory slips may extend proximally into the tunnel, increasing pressure on the median nerve. This has been reported recently in a cadaveric study, present bilaterally.[5,6] One study has found that the incidence of the variations are more common in the dominant hand and vary with age.[7] However, to our knowledge this has not yet been reported in intra-operative findings for a patient with carpal tunnel syndrome.

In some patients, even when the lumbrical is not directly within the carpal tunnel, it may exert pressure on the median nerve. Incursion of especially the second and third lumbricals has been seen in dynamic cadaveric studies to cause pressure on the median nerve[8] and can also be used with nerve conduction studies in detection of carpal tunnel syndrome.[9] Imaging modalities such as high-resolution ultrasound and MRI may occasionally detect these anomalies preoperatively.[10,11]

Surgical awareness is critical. In cases of refractory CTS or intraoperative recurrence, the presence of accessory muscles should be considered, as they can cause pressure on the median nerve. Excision of these muscles isn't necessarily required, as in this case, as division of the TCL can be sufficient for the resolution of symptoms.[12] This decision should therefore be made regarding the risk of further compression vs the potential loss of function from excision of this muscle, as this was functional in our patient.

In conclusion, we report a rare case of CTS caused by an accessory lumbrical muscle within the carpal tunnel with the first clear intra-operative pictures illustrating function. This case highlights the importance of considering anatomical variations, especially in patients with unexplained or resistant CTS. Careful intraoperative inspection is essential to identify and address these anomalies, ensuring resolution of symptoms without impairing function.

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