Discovering an Anatomic Variant of the Palmaris Profundus during Open Carpal Tunnel Release

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Summary: A 46-year-old female presented after 3 years of steadily increasing numbness in her hands bilaterally with worse symptoms in her right hand. She reported nighttime paresthesia and exacerbation of her symptoms while writing, typing, and driving. Tinel’s and carpal tunnel compression test were positive bilaterally. During the right hand carpal tunnel release, a layer of synovium was present deep to the carpal ligament with a tendinous portion running midline longitudinally along the median nerve. This layer was an anomalous palmaris profundus (PP) tendon within the carpal tunnel, which inserted distally in the palmar fascia. The PP tendon was freed and released. The PP is a rare muscle variation of the forearm and wrist, and although it has no function, it has been reported as a cause of median nerve compression at the wrist. More commonly, it is an incidental finding during carpal tunnel surgery. Because of its close association with the median nerve, it can cause confusion when encountered during carpal tunnel surgery. Clinicians should be aware of this rare finding, which may be present during carpal tunnel surgery. We present a case, with intraoperative photographs, of a PP tendon that was encountered during a carpal tunnel release. (Plast Reconstr Surg Glob Open 2018;6:e1867; doi: 10.1097/GOX.0000000000001867; Published online 3 August 2018.)

CASE REPORT

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy, with the prevalence in the general adult population ranging from 2.7% to 5.8%. The palmaris profundus (PP) is a rare anatomic variant of the forearm and wrist, which may cause CTS. Early reports described it as a variant of the palmaris longus, but several reports now confirm a normal palmaris longus can coincide with a palmaris profundus.

The palmaris profundus is enclosed with the median nerve in a common fascial sheath and can cause compression of the median nerve at the wrist. The presence of a palmaris profundus may present difficulties during endoscopic carpal tunnel release. We report a case of bilateral CTS with an anomalous palmaris profundus tendon in the right wrist with clinical photographs.

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Statement of Human and Animal Rights: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5). Statement of Informed Consent: Informed consent was obtained from all patients for being included in the study.

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A standard open right carpal tunnel release was done. The transverse carpal ligament was directly visualized and divided. The deep antebrachial fascia was visualized and divided proximal to distal. Distally the fat pouch was not well visualized. There appeared to be a layer of synovium with a tendinous portion running midline longitudinally along the median nerve (Fig. 1). This layer was an anomalous PP tendon within the carpal tunnel, which inserted distally in the palmar fascia. The PP tendon was freed by passing a Freer elevator through the synovial portion of this layer on the ulnar side and distally with the ulnarmost fibers of the PP tendon being released so there were no constriction bands remaining (Fig. 2). Deep to this layer, the median nerve and the flexor tendons were normal in appearance (Fig. 3). It was felt that the median nerve was completely decompressed. We did not proceed with any dissection into the distal forearm.

The patient had an uneventful postoperative course, with complete resolution of her nighttime paresthesias at her 2-day postoperative visit. Two months later, the patient’s left median nerve was decompressed. There was no sign of a palmaris profundus in the left wrist. The patient was seen 4 months following her right carpal tunnel release. At that time, she had normal sensation in both hands and complete relief of her bilateral hand symptoms.

DISCUSSION

First described by Froshe and Frankel, the palmaris profundus is a rare anatomic variant. The palmaris profundus is classified into 4 subtypes based on its origin (Fig. 4). In type 1 (left illustration in Fig. 4), the origin is the proximal or mid-third of the radius (flexor carpi radialis profundus muscle); in type 2 (middle 4 illustrations in Fig. 4), the origin is the fascia of the flexor digitorum superficialis (palmaris profundus longus muscle); in type 3, the origin is the palmaris profundus radiatus muscle of bicipital origin; and in type 4 (right illustration in Fig. 4), the origin is the anterior surface of the distal ulna (palmaris profundus ulnaris muscle). The anterior interosseous nerve innervates types 1, 2, and 3, whereas the ulnar nerve innervates type 4. In addition to these 4 common origins, other potential origins include the epimysium of the flexor pollicis longus the common flexor and the palmaris longus. In most cases described, including this one, the tendon of PP passes beneath the flexor retinaculum through the carpal tunnel and expands to insert into the deep surface of the flexor retinaculum and/or the palmar aponeurosis. PP may be unilateral or bilateral.

Following release of the PP, our patient had complete relief of her symptoms. Our patient had bilateral CTS but a unilateral PP tendon. The presence of bilateral CTS with a unilateral PP has been reported. Due to these findings, we cannot exclusively determine the PP tendon was the cause of our patient’s right CTS. When encountered during a carpal tunnel release, simple excision of the tendon over the median nerve is indicated. In some cases, a wide exposure with excision may be necessary to completely decompress the median nerve.

SUMMARY

The unexpected appearance of the PP tendon during CTR in our patient demonstrates the highly variable anatomy of the carpal tunnel. Based on our experience and the literature, simple decompression of the carpal canal with release of the PP tendon seems to be adequate treatment. There may be the indication to perform a more proximal dissection for decompression of the median nerve.
geons should be aware of possible anatomic variations in the carpal tunnel and be prepared to modify their surgical plan accordingly.

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**Fig. 4.** Artistic representation of the main subtypes of PP based on the muscle origin from the (I) radius (left illustration), (II) flexor digitorum superficialis fascia (middle 4 illustrations), and (III) ulna (right illustration).