Anatomic variations

Symptomatic palmaris longus muscle variation with MRI and surgical correlation report of a single case

P. Bencteux[1], J. Simonet[1], L. El Ayoubi[2], M. Renard[1], I. Attignon[1], J.N. Dacher[1] and J. Thiebot[1]

[1] Department of Radiology, [2] Department of Orthopaedic and Plastic Surgery, University Hospital-Charles Nicolle, 1, Rue de Germont, F-76031 Rouen cedex, France

Received December 01, 2000 / Accepted in final form March 28, 2001

Key words: Palmaris longus muscle - Muscle variant - Forearm - MRI - Surgery

Correspondence to: P. Bencteux, E-Mail :Michel.Benozio@chu-rouen.fr

---

Abstract

Abstract A young woman presented with a painful soft tissue swelling of the anterior aspect of the distal forearm. MRI revealed a hypertrophied reversed palmaris longus muscle confirmed by surgery, which also showed a second insertion to the flexor carpi radialis tendon. Variants of the palmaris longus muscle are discussed.

The variability of palmaris longus (PL) has been described by Reimann et al [8]. Its variations and characteristics can be explored by magnetic resonance imaging (MRI). A rare case of a symptomatic PL variant, revealed by a painful soft tissue swelling of the anterior aspect of the distal forearm, is reported. A review of the literature regarding PL variants and MRI diagnosis is also presented.

Case report

A nineteen-year-old woman was referred after a 4-year history of pain in the right anterior aspect of the wrist and distal forearm. There was no previous medical history of trauma or unusual upper limb activity. The patient complained of pain associated with wrist flexion simultaneously a soft tissue mass appeared at the anterior aspect of the distal forearm. Tinel's sign (paresthesia in the distribution area of the median n. cohile percussing it at wrist) and Phalen's test (paresthesia in the distribution area of the median n. while wrist flexion) were both negative.

MRI of both wrists and forearms was performed with a 1.0 Tesla system. A high-resolution surface coil, 20 cm field of view and 256 x 256 matrix were used, with the patient supine and the arm above the head. Axial spin-echo (SE) T1-weighted images (TR 500/TE 20, 4 mm slices, 1 mm skip) and axial SE T2-weighted images (TR 1800/TE 25-90, 5 mm slices, 0.6 mm skip) were obtained. Following gadolinium injection axial and sagittal SE T1-weighted images were also obtained.

The mass remained iso-intense to the muscles on both the T1 and T2 weighted images, as well as after gadolinium injection, being located medial to the tendon of flexor carpi radialis (FCR) (Fig. 1). Thinning of the superficial fascia and subcutaneous fat was also observed. Sagittal plane images showed the longitudinal fusiform extent of the mass, which reached the upper margin of the flexor retinaculum at its distal extent (Fig. 2).

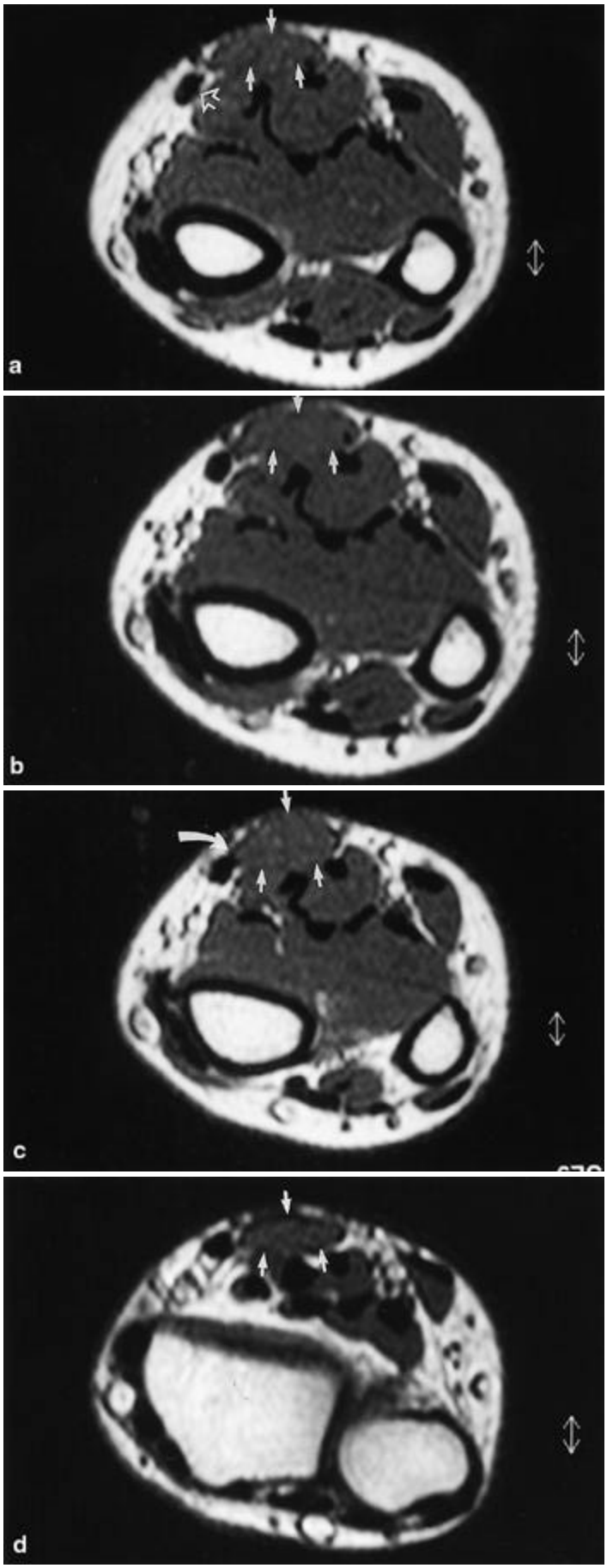
a
b
c
d

Fig. 1a-d Axial T1-weighted MR images of the right forearm, showing hypertrophied palmaris longus (*arrows*), medial to the flexor carpi radialis tendon (*open arrow*). **a,** PL muscle belly; **b, c,** muscle fibres from PL to FCR tendon (*curved arrow*); **d,** very low musculotendinous junction

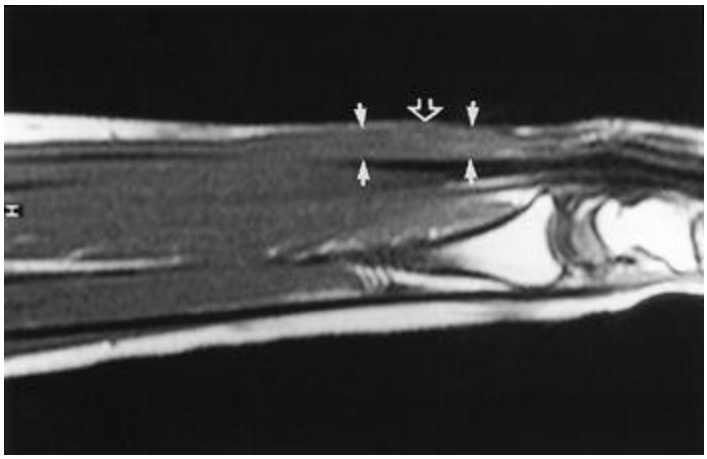

Fig. 2 Sagittal T1-weighted images showing hypertrophied reversed PL (*arrows*) and thinning of the superficial fascia and subcutaneous fat (*open arrow*)

Because of disabling pain surgical exploration was undertaken. Surgery confirmed the thinning of superficialis fascia and subcutaneous fat, as well as confirming a large hypertrophy and inversion of PL with a distal musculotendinous junction. However, some of the muscle fibres inserted by a separate tendon into the tendon of FCR (Fig. 3), consequently it was then concluded that PL was hypertrophied, reversed and bifid. No sign of compression of the median nerve was observed. Resection of ectopic hypertrophied muscle fibres was performed, the insertions transected and PL sutured to the muscle belly of FCR.

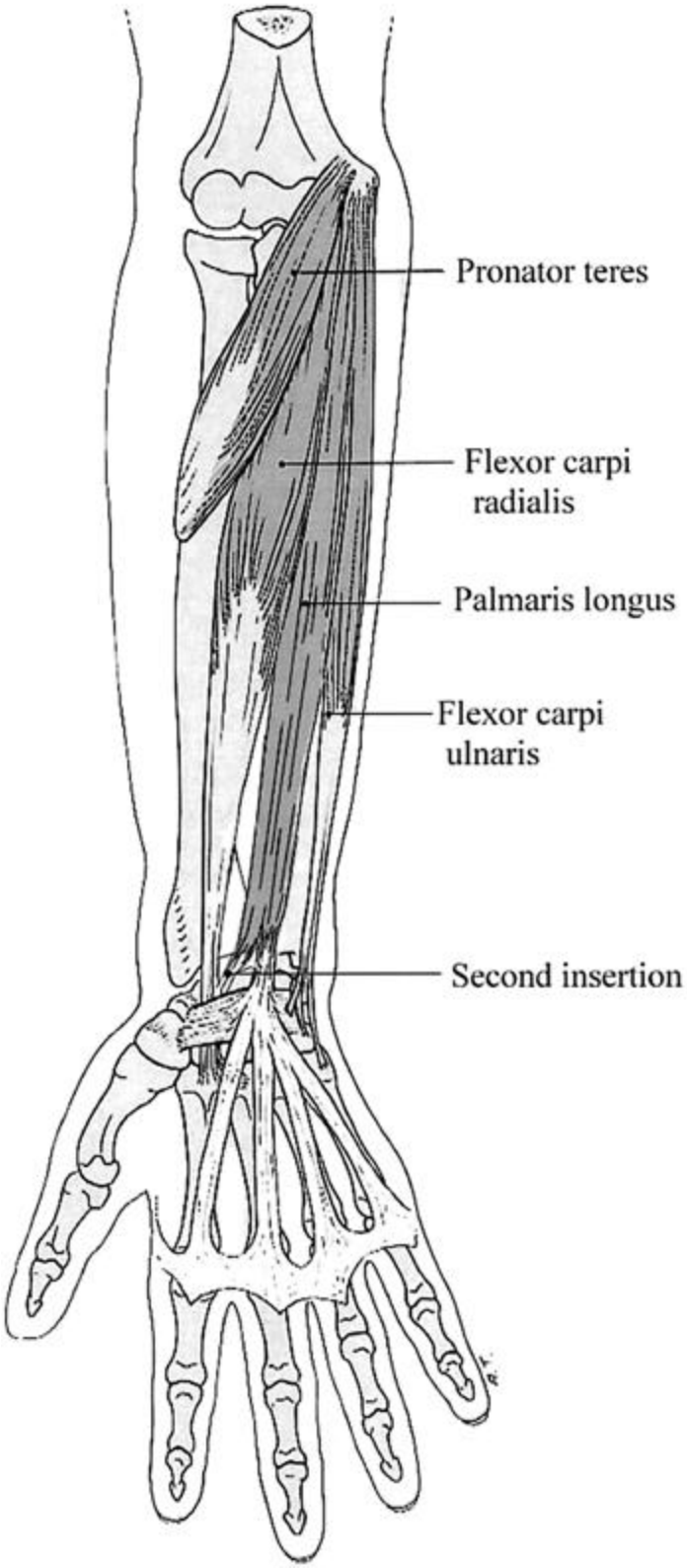

Fig. 3 Anatomic variation bifid, reversed palmaris longus with a second insertion on the flexor carpi radialis tendon

Two years after surgery the pain has not recurred and there is no functional loss of the hand or forearm.

Discussion

Palmaris longus originates from the medial epicondyle of the humerus and adjacent muscle aponeurosis. The muscle belly is usually short and continues by a long tendon and then into the palm as the palmar aponeurosis. The median nerve follows the medial edge of the tendon. PL flexes the hand on the forearm, being evaluated by opposing this action in a supine position, when two bulges appear corresponding to the FCR tendon laterally and the PL tendon medially. Absence or swelling of PL can be clinically demonstrated.

There are many anatomic variations [8, 13] of PL, which are well known to surgeons due to its wide use in reconstructive and plastic surgery PL agenesis [3] is the most frequent variation (13%). PL can originate from the aponeurosis of an adjacent muscle, for example from FCR, biceps brachii, flexor carpi ulnaris or flexor digitorum superficialis. The muscle belly can be between proximal and distal tendons or reversed. Its insertion can be to the middle third of the antebrachial fascia, the thenar fascia, or to the carpal bones as separate partitions. PL can be bifid with a double tendinous insertion [3, 15] or reversed with a distal bifid muscle belly as in the present case (Fig. 3). This latter variation is rare and, to our knowledge, no case of a second insertion into the FCR tendon has been previously reported usually the second tendon inserts in the hypothenar region. Occasionally, an accessory muscle [9] can be found originating from the PL tendon, inserting into the hypothenar region. A duplicated (2 origins, 2 insertions) PL has also been reported [16].

With repetitive work a reversed PL can lead to hypertrophy of the muscle belly. Limited by a relatively non-compliant fascia pressure in the anterior compartment can markedly increase during muscle activity and may compromise capillary blood flow and the metabolic demands of the tissues. When active a reversed PL can manifest as an effort-related compartment syndrome [5], with a painful swelling of the distal forearm [1-2, 7, 15]. Effort-related compartment syndrome is more commonly encountered in the calf. Reversed PL can also elicit pain due to local pressure on the median or ulnar nerves carpal or Guyon's tunnel-like syndromes appear [2-7, 9-10, 12, 15]. The occurrence of pain is also diurnal being activity related.

In the present case nerve conduction investigations were not undertaken because the symptomatology was not nervous. The clinical findings were evocative of an effort-related compartment syndrome, whereas no repetitive work of this muscle was reported.

MRI is a useful diagnostic tool and can be used to eliminate other conditions or diseases [6, 12, 14]. Accurate anatomic resolution is obtained with SE T1-weighted sequences, while gadolinium injection may reveal the presence of a tumour. There are few publications on wrist MR and anomalous PL, with fewer being confirmed by surgery [2, 11]. MRI has been shown to be useful in the diagnosis of only 50% of previously reported cases, and only specified the insertion of PL in one case [15]. In the present case, with a second evaluation, insertions could have been diagnosed some muscular fibres separating to join the tendon of FCR were visible (Fig. 1). Symptomatic hypertrophied PL does not require surgery in all cases, rest and elimination of the repetitive work causing the condition may be sufficient to relieve the pain. MRI investigation can obviate surgical exploration [7, 15], or at least limit the size of the skin incision. In the present case the severe and intractable pain necessitated surgery even though the diagnosis had been made.

References

1. Baumeister RG, Wilhelm K (1979) Differential diagnosis of tumors of the soft tissue of the forearm an atypical palmaris longus muscle. Handchir 11 39-41

2. Depuydt KH, Schuurman AH, Kon M (1998) Reversed palmaris longus muscle causing effort-related median nerve compression. J Hand Surg 23 117-119

3. Dorin D, Mann RJ (1984) Carpal tunnel syndrome associated with abnormal palmaris longus muscle. South Med J 77 1210-1211

4. Floyd T, Burger RS, Sciaroni CA (1992) Bilateral palmaris profundus causing bilateral carpal tunnel syndrome. J Hand Surg 15 364-366

5. Guler MM, Celikoz B (1998) Anomalous palmaris longus muscle causing carpal tunnel-like syndrome. Arch Orthop Trauma Surg 117 296-297

6. Mesgarzadeh M, Schneck CD, Bonakdarpour A, Mitra A, Conaway D (1989) Carpal tunnel MR imaging. Part II. Carpal tunnel syndrome. Radiology 171 749-754

7. Polesuk BS, Helms CA (1998) Hypertrophied palmaris longus muscle, a pseudomass of the forearm MR appearance-Case

report and review of the literature. Radiology 207 361-362

8. Reimann AF, Daseler EH, Anson BJ, Beaton LE (1946) The palmaris longus muscle and tendon a study of 1600 extremities. Anat Rec 89 495-505

9. Sanchez Lorenzo J, Canada M, Diaz L, Sarasua G (1996) Compression of the median nerve by an anomalous palmaris longus tendon a case report. J Hand Surg 21 858-860

10. Schuhl JF (1991) Compression of the median nerve in the carpal tunnel due to an intra-canal palmar muscle. Ann Chir Main Memb Sup 10 171-173

11. Schuurman AH, van Gils APG (2000) Reversed palmaris longus muscle on MRI report of four cases. Eur Radiol 10 1242-1244

12. Seyfert S, Boegner F, Hamm B, Kleindienst A, Klatt C (1994) The value of magnetic resonance imaging in carpal tunnel syndrome. J Neurol 242 41-46

13. Verdan C (1981) Anomalies of muscles and tendons in hand and wrist. Rev Chir Orthop 67 221-230

14. Zeiss J, Guilliam-Haidet L (1996) MR demonstration of anomalous muscles about the volar aspect of the wrist and forearm. Clin Imaging 20 219-221

15. Zeiss J, Jakab E (1995) MR demonstration of an anomalous muscle in a patient with coexistent carpal and ulnar tunnel syndrome. Case report and literature summary. Clin Imaging 19 102-105

16. Zeybek A, Gurunluoglu R, Cavdar S, Bayramicli M (1998) A clinical reminder a palmaris longus muscle variation . Ann Plast Surg 41 224-225

Surg Radiol Anat 23: 273-275