An Aberrant Abductor Digiti Minimi Muscle Crossing Guyon's Canal

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Abstract

Keywords

- Guyon's canal
- aberrant
- abductor digiti minimi muscle
- ulnar nerve compression

Anomalous hypothenar muscles in the wrist are relatively common with 47% prevalence, and their possible consequences associated with Guyon's canal are well known. The accessory of the abductor digiti minimi muscle (ADM) is known to be one of the causes of ulnar tunnel syndrome or ulnar artery thrombosis. A unique ADM was found in the volar wrist region of an 87-year-old male cadaver passing through Guyon's canal.

Anomalous hypothenar muscles in the wrist are relatively common, and their possible consequences associated with Guyon's canal are well known. During routine cadaveric dissections in the volar wrist region, we discovered the unique abductor digiti minimi muscle (ADM). The accessory of ADM has a double origin that passes through Guyon's canal that can push the ulnar artery and ulnar nerve. This knowledge is useful to hand surgeons in diagnosing and surgically treating problems associated with Guyon's canal neuropathy.

Anatomical Dissection

The accessory of the ADM was observed in the right hand during a routine anatomical dissection of the cadaver of an 87-year-old male (–Fig. 1). This accessory muscle was found to have a double origin with the lack of the palmaris longus tendon. The superficial origin was attached to the antebrachial fascia, which extended to the lateral side of the flexor carpi radialis tendon. The deep origin was attached to the intertendinous connective tissue in the space between the tendon of the flexor carpi radialis and the flexor pollicis longus and also connected proximally to the contacting side of the pronator quadratus muscle. This accessory muscle

originated from a point 34 mm proximal to the radial styloid process in the forearm. In addition, the accessory muscle passed obliquely at approximately 50 degrees medially and was also found to be fused with the proximal one-fourth of the lateral side at the ADM. The muscle was measured at 71 mm length, 8 mm width, and 2 mm thickness, and the central area was covered by Guyon's canal.

Within Guyon's canal, the accessory muscle passed under the ulnar artery and above the ulnar nerve. The diameter of the right ulnar artery was found to be smaller when compared with the left ulnar artery: 1.4 mm on the right and 2.4 mm on the left. This ulnar artery was divided into superficial and deep branches after passing Guyon's canal. There was no difference between the left and right radial artery in the external diameter: 2.6 mm on the right and 2.4 mm on the left.

Discussion

Among the variant hypothenar muscles, the ADM is the most frequent and variable, followed by the flexor digiti minimi and opponens digiti minimi muscles.¹ Since its first report in 1868, the accessory of the ADM is known to be one of the causes of ulnar tunnel syndrome or ulnar artery thrombosis.^{1,2} Although

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Fig. 1 The accessory muscle of the abductor digiti minimi muscle occurs in the forearm to pass through Guyon's canal. (A) Superficial origin. (B) Deep origin. (C) Illustration. a, ulnar artery; ADM, Abductor digiti minimi muscle; asterisk, accessory muscle; FCR, flexor carpi radialis muscle; n, ulnar nerve.

many studies have derived from cadaveric dissections, Harvie et al noted a prevalence as high as 47% of an accessory ADM in volunteers' asymptomatic ultrasound examinations.³

Variations of ADM are the most frequently described, with different origins and shapes.^{4,5} Anomalous ADMs have been reported in various origins from fascia of the forearm,⁶ palmaris longus,⁷ volar carpal ligament,⁸ and flexor carpi ulnaris muscle, and flexor retinaculum.⁹ Variations in the origin and course of this muscle are important for hand surgeons to exclude other causes of neuropathies. Regarding the position of the ulnar neurovascular bundles within Guyon's canal, Dodds et al⁴ and Chaluvadi et al⁸ reported that both ulnar artery and nerve ran under the accessory muscle, whereas Sañudo et al⁹ described the aberrant muscle passing volar to the ulnar nerve, and between the ulnar nerve and the ulnar artery within Guyon's canal, which is similarly noted in our case. This relation of the aberrant muscle to the ulnar nerve might affect the expression of the ulnar nerve compression syndrome.

In this report, the aberrant ADM had some characteristics compared with those reported previously. First, it has double origins of the antebrachial fascia and the intertendinous

connective tissue in the space between the flexor carpi radialis and the flexor pollicis longus muscle. Second, within Guyon's canal, it lies deeper than the ulnar artery and passes superficial to the ulnar nerve. Hand surgeons should be aware that the accessory of the ADM in Guyon's canal can cause ulnar nerve compression or ulnar artery thrombosis.

Note

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Conflict of Interest

None.

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References

- 1 Claassen H, Schmitt O, Schulze M, Wree A. Variation in the hypothenar muscles and its impact on ulnar tunnel syndrome. *Surg Radiol Anat* 2013;35(10):893–899
- 2 Turner MS, Caird DM. Anomalous muscles and ulnar nerve compression at the wrist. *Hand* 1977;9(2):140–142
- 3 Harvie P, Patel N, Ostlere SJ. Prevalence and epidemiological variation of anomalous muscles at Guyon's canal. *J Hand Surg Br* 2004;29(1):26–29
- 4 Dodds GA III, Hale D, Jackson WT. Incidence of anatomic variants in Guyon's canal. *J Hand Surg Am* 1990;15(2):352–355
- 5 Lahey MD, Aulicino PL. Anomalous muscles associated with compression neuropathies. *Orthop Rev* 1986;15(4):199–208
- 6 Jeffery AK. Compression of the deep palmar branch of the ulnar nerve by an anomalous muscle. Case report and review. *J Bone Joint Surg Br* 1971;53(4):718–723
- 7 Jackson DW, Harkins PD. An aberrant muscle belly of the abductor digiti quinti associated with median nerve paresthesias. *Bull Hosp Jt Dis* 1972;33(2):111–115
- 8 Chaluvadi JK, Nakka SR, Velichety SD. Unusual origin of abductor digiti minimi – a case report. *Int J Res Dev Health* 2013;1:149–151
- 9 Sañudo JR, Mirapeix RM, Ferreira B. A rare anomaly of abductor digiti minimi. *J Anat* 1993;182(Pt 3):439–442