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Two anatomic variations in the arm related to the median nerve

Burak Bilecenoglu, *MD,* ***Aysun Uz,*** *MD*
Nazim Karalezli, *MD,* ***Sinan Issi,*** *MD.*

Disorders of the peripheral nervous system are quite common; of these disorders entrapment neuropathies are frequently encountered by the clinician. The term entrapment neuropathy implies that the nerve is compressed by adjacent anatomic structures.[1-2] Distribution of the median nerve in the arm is rarely subjected to variation, but there are numerous report regarding median nerve compression. Variations of the nerve and the adjacent structures may be seen clinically or observed during surgery, autopsy or cadaveric dissection. We recently encountered 2 anatomic variations that can possibly cause entrapment neuropathy of the median nerve during our routine cadaver dissections. Typically, the median nerve receives fibers from C6, C7, C8 and T1 spinal nerves and supplies motor, sensory and sympathetic nerve fibers to the upper limb. In the arm, its course is closely related to the brachial artery. Along with the brachial artery, it travels between the brachialis (Br) and the medial intermuscular septum in the arm until it reaches the nerve and the cubital fossa, which has no branches. Sometimes a small branch to the brachial artery can be seen. At the distal humerus, both nerve and artery pass through the antecubital fossa underneath a fibrous sheath and the bicipital aponeurosis, which takes origin from the biceps tendon and the fascia of the flexor-pronator mass. It then passes between the 2 heads of the pronator teres. In this muscle, the largest branch can be found, the anterior interosseus nerve. The nerve continues in the forearm between the flexor digitorum profundus and flexor digitorum superficialis.[2]

We encountered 2 anatomic variations that can cause entrapment neuropathy of the median nerve during our routine student dissections. In one of our dissections, we encountered a variation of the median nerve at the level of the Br. The cadaver was a 47-year-old male and has no visible scars or wounds on both upper extremities. Normally, the median nerve courses in the groove between the biceps brachii (BB) and Br.[2] The median nerve can be compressed above the elbow due to an accessory tendon, which arises form the Br in 10% of the cases. According to some authors, the muscle fibers arise form the Br connect to some of the fibers of BB and end in bicipital aponeurosis and compress. In this case, which is located in the arm, at 9 cm proximal to the medial epicondyle, the nerve leaves the brachial artery and passed through the antecubital fossa piercing the Br (**Figure 1a**). The course of the median nerve on the other arm was normal. In another dissection, we encountered an abnormal pattern of the accessory head of flexor pollicis longus (FPL) (Gantzer's muscle). The cadaver was a male with unknown age with no visible scars or wounds on both upper extremities.

Gantzer's muscle is the accessory head of the FPL, which usually originates from medial epicondyle or processus coronoideus and lies on the ulnar side of the FPL. It has been implicated as one of the causes of the anterior interosseous nerve (AIN) compression in the proximal forearm.[1,3-5] The anterior interosseous nerve is the largest branch of the median nerve is the forearm and has no sensory fibers.[2] The incidence of the Gantzer's muscle was reported between 45-74%.[3-5] The difference of these ratios might be due to the fact that the muscle can be fused with some of the superficial flexor group and can be overlooked during dissection. The muscle usually passes between the superficial branch of the median nerve and the anterior interosseous nerve; but rarely passes superficially to both of the nerves.[2]

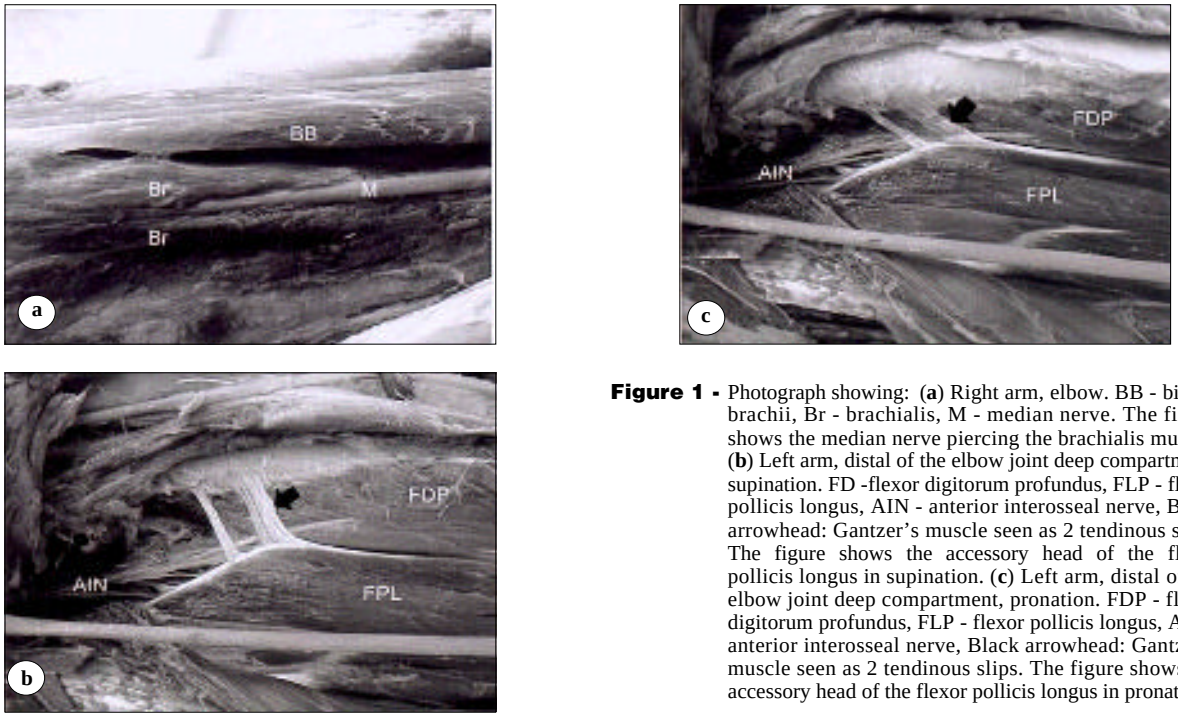

Figure 1 - Photograph showing: (**a**) Right arm, elbow. BB - biceps brachii, Br - brachialis, M - median nerve. The figure shows the median nerve piercing the brachialis muscle. (**b**) Left arm, distal of the elbow joint deep compartment, supination. FD -flexor digitorum profundus, FLP - flexor pollicis longus, AIN - anterior interosseal nerve, Black arrowhead: Gantzer's muscle seen as 2 tendinous slips. The figure shows the accessory head of the flexor pollicis longus in supination. (**c**) Left arm, distal of the elbow joint deep compartment, pronation. FDP - flexor digitorum profundus, FLP - flexor pollicis longus, AIN - anterior interosseal nerve, Black arrowhead: Gantzer's muscle seen as 2 tendinous slips. The figure shows the accessory head of the flexor pollicis longus in pronation.

The most frequent site of origin of the muscle has been reported to be the medial epicondyle of humerus, a well-developed connecting fascia made up of the intermuscular septa among the pronator teres and flexor muscles in the proximal forearm, flexor digitorum superficialis and both the medial epicondyle and coronoid process.[3-5] However, the most frequent site of the origin of the muscle has also been reported to be the coronoid process in 87.5%. In the forearm the muscle ends in the ulnar part of the FPL or ends in 2 tendinous slips, one of which connects to FPL, whereas the other coursed to join the tendon of the flexor digitorum profundus (FDP) to the index finger.[3-5] Although the accessory head of the FPL is not a rare variation,[3-5] in our dissection the accessory head was seen as 2 tendinous slips clearly different that have been reported and course of these slips were extremely different from the cases in the literature. It turns to the radial side and fuses to the FPL immediately after its origin, and it seemed to compress the anterior interosseous nerve strongly especially when the forearm is in supination (**Figure 1b**). When the forearm is in pronation there is no significant effect on the nerve (**Figure 1c**).

In this study, we report 2 anatomic variations that are responsible for entrapment neuropathies of the median nerve. These variations must be kept in mind by orthopaedic surgeons dealing with the surgical interventions and release operations related to the entrapment neuropathies of the upper extremity.

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From the Department of Anatomy (Bilecenoglu, Uz), Ankara University School of Medicine, Department of Orthopedic Surgery (Karalezli), Municipality of Health, Ankara Training and Research Hospital, Ankara, and the Department of Anatomy (Issi), Kirikkale University School of Medicine, Kirikkale, Turkey. Address correspondence and reprint requests to Dr. Burak Bilecenoglu, Research Assistant, Ankara University, School of Medicine, Sihhiye 06100 Ankara, Turkey. Tel. +90 (312) 3105001. Fax. +90 (312) 3105001. E-mail: bbilecenoglu@yahoo.com

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