

# Unilateral accessory muscles of forearm-and its clinical implications



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## ABSTRACT

An accessory or aberrant musculature may stimulate a ganglion or a soft tissue tumour or if in close proximity to a nerve, it may cause pressure neuritis. Identification of these variations is important in defining the anatomical features for clinical diagnosis and surgical procedures. During routine cadaveric dissection of the forearm in the department of anatomy, we observed an accessory muscle in the flexor compartment and additional extensor carpi radialis longus muscle in the extensor compartment of the forearm in left upper limb of a middle aged female cadaver. The accessory muscle belly has taken its tendinous origin from the medial surface of the ulna deep to the flexor digitorum superficialis and crossed the median nerve from medial to lateral, when traced below in the carpal tunnel it merged with the tendon of the index finger of flexor digitorum superficialis. An additional extensor carpi radialis longus muscle with unusual course of radial nerve in the extensor compartment of the forearm was found on the medial side of brachioradialis and superficial to extensor carpi radialis longus and its tendon ended by getting inserted into the base of the dorsal surface of the second metacarpal bone. Although many anatomical variations of flexor digitorum superficialis and extensor carpi radialis longus muscle were reported in the past, we describe a rare case, first of its kind, which to our knowledge has not been mentioned in the literature till date. Such variations are clinically significant in the anatomical, surgical and radiological procedures.

**Key words:** Accessory muscle, Additional extensor carpi radialis longus, Carpal tunnel, Compressive neuropathies

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## INTRODUCTION

Digits of hand perform many fine movements which are essential for our daily life therefore proper anatomical and surgical knowledge of muscular variations of flexor and extensor muscles of forearm are essential to avoid errors in diagnosis and treatment. Flexor digitorum superficialis (FDS) forms an intermediate layer of flexor compartment of the forearm and it flexes the middle phalanges of the fingers at the proximal interphalangeal joints, it also flexes the metacarpophalangeal joints and wrist joint. It has humeroulnar and radial heads both heads converge and unite to form a muscle belly near the wrist the muscle belly splits into 4 tendons and travel through the carpal tunnel and insert to the sides of the middle phalange of the four fingers.

The extensor carpi radialis longus (ECRL) is one of the superficial muscles of the extensor compartment

of the forearm and is chief extensor and abductor of wrist. It originates from the lateral epicondyle, lateral supracondylar ridge of the humerus and lateral intermuscular septum, the fibers end at the upper third of the forearm in a flat tendon and attached to the base of the second metacarpal bone.

We report a rare case of unilateral accessory muscle in the flexor compartment (in relation to the carpal tunnel and median nerve) and additional extensor carpi radialis longus muscle in the extensor compartment of forearm.

## CASE REPORT

During a routine cadaveric dissection of superior extremities for the undergraduate students in the Department of Anatomy, I noted the following unusual unilateral accessory

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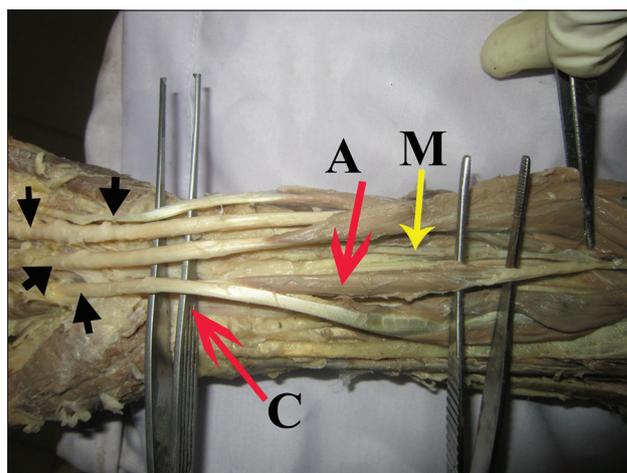
Dr. Kosuri Kalyan Chakravarthi, Associate Professor, Department of Anatomy, Varun Arjun Medical College, Banthra-Shajahanpur - 242 307 - Uttar Pradesh, India. **E-mail:** kalyankosuric@gmail.com, **Phone:** 91-07388083301. © Copyright AJMS

muscles of flexor and extensor compartment of forearm of left upper limb, in a middle - aged female cadaver.

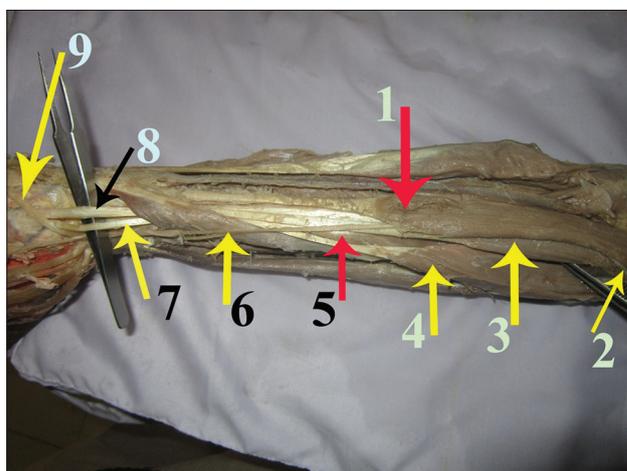
- An unusual accessory muscle noted in the flexor compartment of the forearm deep to the flexor digitorum superficialis. The accessory muscle originated as a tendinous origin from the middle of the medial surface of the ulna, when traced distally in the lower part of the forearm it crossed the median nerve from medial to lateral and deep to the flexor retinaculum in the carpal tunnel merged with the tendon of the index finger of flexor digitorum superficialis. The additional muscle was supplied by the trunk of the median nerve (Figure 1).
- An additional extensor carpi radialis longus muscle in the extensor compartment of the forearm was found on the medial side of brachioradialis and superficial to extensor carpi radialis longus. The additional muscle had a common origin with the extensor carpi radialis longus, at the upper third of the forearm had a thick flat long tendon and in the lower part of the forearm was crossed by the abductor pollicis longus and extensor pollicis brevis and ended by getting inserted into the base of the dorsal surface of the second metacarpal bone (Figure 2).
- The photographs of the accessory muscular variations were taken for proper documentation.

## DISCUSSION

Accessory muscles or tendons in the forearm may lead to confusion during surgical procedures which results in errors in both diagnosis and treatment.<sup>1</sup> Gantzer's muscle an accessory muscle of forearm arises as small belly from forearm flexors and is inserted either into flexor digitorum profundus of flexor pollicis longus. Anatomical variations of Gantzer's muscle have been reported in the literature.<sup>2,3</sup> The accessory muscle in the flexor compartment of forearm noted in this case was originated from the medial surface of the ulna where it crossed the median nerve ventrally and passed deep to the flexor retinaculum and in the carpal tunnel ended by merging with the tendon of the index finger of flexor digitorum superficialis. Such variations may alter or interfere the biomechanics of tendon of the flexor digitorum superficialis muscle. Accessory muscle belly in relation with the median nerve and its appearance in the carpal tunnel are clinically important because it may compress the median nerve at the site of crossing the nerve or in the carpal tunnel which results in entrapment neuropathy of the median nerve. An accessory or aberrant musculature may stimulate a ganglion or a soft tissue tumour or if in close proximity to a nerve, it may cause pressure neuritis.<sup>3</sup> Entin et al classified causes of carpal tunnel syndrome into three categories: those reducing the capacity of the carpal tunnel; those increasing



**Figure 1:** Showing an accessory muscle in the flexor compartment of the forearm in left upper limb. Black Arrows - Four tendons of flexor digitorum superficialis muscle; A- Accessory muscle; M- Median nerve; C- Forceps indicating the position of carpal tunnel



**Figure 2:** Showing an additional (accessory) extensor carpi radialis longus muscle in the extensor compartment of the forearm in left upper limb. 1 - Brachioradialis muscle; 2- Radial nerve; 3- Additional extensor carpi radialis longus muscle; 4- Extensor carpi radialis brevis muscle; 5- Extensor carpi radialis longus muscle; 6- Superficial branch of radial nerve; 7- Tendon of additional extensor carpi radialis longus muscle; 8- Tendon of extensor carpi radialis longus muscle; 9- Tendon of extensor carpi radialis brevis

the volume of its contents; and those that form part of a systemic condition.<sup>4</sup> Thus the accessory muscle and its tendon noted in this case may reduce the capacity of the carpal tunnel and may cause carpal tunnel syndrome. To the best of our knowledge, such accessory muscle in relation to the median nerve and carpal tunnel has not been cited in the recent medical literature. Knowledge of the existence of such muscle anomalies as well as the location of compression is useful in determining the pathology and appropriate treatment for compressive neuropathies.<sup>5</sup>

Marked variations from the normal are rarely seen in superficial group of extensors of the forearm. Additional

muscle bellies and tendons can lead to error in both diagnosis and treatment. The accessory head,<sup>6</sup> additional belly,<sup>7</sup> aberrant muscle slips<sup>8</sup> and two tendons of extensor carpi radialis longus muscle<sup>9</sup> have been reported in the literature. Kosuri Kalyan chakravarthi et al reported an additional extensor carpi radialis longus with a thick flat long tendon and pierced by the radial nerve in a middle - aged male cadaver.<sup>10</sup> Where as in our case in a middle - aged female cadaver we noted an additional extensor carpi radialis longus with a thick flat long tendon and radial nerve plastered between the additional extensor carpi radialis longus posteriorly and brachioradialis muscle anteriorly. Such additional muscle may compress the radial nerve which may manifest as wrist drop or radial tunnel syndrome or it may compress posterior interosseous nerve directly or indirectly which may manifested by chronic dorsal wrist pain.<sup>11</sup> Accessory muscular variations noted in this case are primarily due to genetic composition or errors of embryologic developmental timing or persistence of an embryologic condition or inheritance carried over from ancient origins. Knowledge of such muscular variations helps in surgical rehabilitation of patients with paralytic disorders or tendon transfer or surgeons dealing with brachioradialis muscle flap.

## CONCLUSION

Accessory muscular variations noted in this case are primarily due to genetic composition or errors of embryologic developmental timing or persistence of an embryologic condition or inheritance carried over from ancient origins. Such accessory muscles of forearm in relation to the median and radial nerve noted in this case should be kept in mind in preoperative diagnosis and in the

hand during surgery to prevent errors in both diagnosis and treatment for compressive neuropathies and rehabilitation Physicians.

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### Authors Contribution:

**KKC** - Designed the case study, analysed the data, reviewed & drafted the manuscript.

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