

## Additional Muscle (Middle Layer) in the Anterior Compartment of the Forearm

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Received: July 22, 2019; Published: August 14, 2019

### Abstract

Although there are various reports of variations in the musculature of the upper limb, such variation has not previously been reported in this population. An accessory belly of the flexor digitorum superficialis which originated from the midway of the muscle and inserted into the flexor pollicis longus was observed during routine dissection. Awareness of this variation is necessary to examining neurovascular entrapment and to avoid complications during radiological diagnosis or surgical procedures in the forearm. Muscular variations of the flexor compartment of forearm are usual and can result in multiple clinical conditions limiting the functions of forearm and hand. The variations of the muscles, especially accessory muscles may simulate soft tissue tumors and can result in nerve compressions.

**Keywords:** Upper Limb; Flexor Digitorum Superficialis; Flexor Pollicis Longus; Gantzer's Muscle

### Introduction

Numerous variations in muscles of the upper limb have been reported, more especially in the arm. In the flexor compartment of forearm not many variations are noted and occurrence of an additional muscle is very uncommon. The commonly reported variations in the forearm includes the Gantzer's muscle [1,2]. Normally, the anterior compartment of the forearm has five (5) superficial and three (3) deep muscles.

The flexor digitorum superficialis (largest superficial muscle in the forearm) originate from the common flexor origin, cross the elbow. Near the wrist the FDS divide into four tendons where each insert into the middle phalanges of the medial four fingers. FDS flexes the middle phalanges of the medial four fingers at the proximal interphalangeal joints, flexes the proximal phalanges at the metacarpophalangeal joints as well as the wrist joint [3]. We are reporting a rare case where an additional muscle slip was found in the anterior compartment of the forearm in addition to the above-mentioned muscles.

### Case Presentation

During routine dissection in Anatomy department, SRM University, Chennai, India, we encountered an unusual variation in the anterior compartment of the forearm. One muscle slip took origin from deeper aspect of flexor digitorum superficialis (FDS) muscle, which was merged to the tendon of the flexor pollicis longus (FPL) at the middle one third of the forearm (Plate 1). The muscle slip was medial to the median nerve throughout its extent. It is being innervated by a muscular branch of median nerve.

Plate I

## Plate I

The picture above shows the additional muscle slip (AMS) with two tendons in the exposed anterior compartment of the forearm. Indicated also, is a tendon of origin (TO) and tendon of insertion (TI). Tendon of origin from flexor digitorum superficialis (FDS) lifted with hand and merged to the tendon flexor pollicis longus (FPL), median nerve (MN), flexor digitorum profundus (FDP), flexor carpi ulnaris (FCU).

## Discussion

Accessory muscles in the forearm may lead to confusion during surgical procedures. To avoid clinical complications, during radiodiagnostic procedures (e.g. CT, MR imaging) or surgical approach of these regions, awareness of such variations must be borne in mind. This type of variation is interesting not only to anatomists, but also to orthopedic surgeons, physiotherapists and radiologists [2].

Presence of the Additional muscles in the flexor compartment of the forearm is not very common. In most cases, these muscles go unnoticed as they do not produce any symptoms in the individual. However, it may cause functional deficits by compressing neurovascular structures or cause pressure neuritis resulting in symptoms such as a carpal tunnel syndrome [4,5].

Previous studies show the incidence of the accessory head of FDP to range from 2.9% to 35.2% [6,7]. These accessory muscles have been observed to arise from the coronoid process, the medial epicondyle via fibres of the FDS, or a combination.

The accessory heads of the flexor muscles have been described in primates and other mammals (pigs, foxes and marmots) as a muscle belly that connects the medial epicondyle origin of the FDS with the more or less differentiated deep flexor muscles [8].

The flexor muscles of the forearm develop from the flexor mass which subsequently divides into two layers, superficial and deep. The deep layer gives rise to the FDS, FDP and FPL [9].

The existence of accessory muscles which connect the flexor muscles could be explained by the incomplete cleavage of the flexor mass during development.

## Conclusions

The observation made by us in the present case will supplement our knowledge of variation of the muscles in this region which could be useful during radiological examination and surgical approaches.

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**Volume 3 Issue 9 September 2019**

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