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Case Report

Double Gantzer's Muscles by Four Muscle Bellies and Its Clinical Significance: A Case Report

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Abstract : The Gantzer's muscle (GM) is an additional muscle in the forearm as the accessory head of the flexor pollicis longus (FPL) and accessory head of the flexor digitorum profundus (FDP). We reported a rare case of double GM formed by four muscle bellies. From the dorsal part of flexor digitorum superficialis, small four bellies formed two muscles merging to FDP and FPL, as GMs. These accessory heads of FDP and FPL crossed the ulnar artery and the median nerve, respectively. These additional muscles in the forearm flexor compartment are rare and its clinical and embryological significances should be considered.

Keywords : Gantzer's muscle, Flexor digitorum profundus, Flexor pollicis longus, Variation

Introduction

Among the anatomical variations of the muscles in the forearm, the Gantzer's muscle (GM) have been described its prevalence and morphological variation in the previous studies [1-4]. This additional muscle was found as the accessory head of flexor pollicis longus (FPL) and accessory head of flexor digitorum profundus (FDP). Although the prevalence of GM was described variously, it is persistently found in about 50% of Asian [3,4]. The various origin of the GM has been shown from medial humeral epicondyle, coronoid process or dual origin from medial epicondyle and coronoid process [1-5]. Its insertion was constantly reported to attach to the ulnar border of the FPL and to the wrist level tendon of the FDP, respectively.

Although controversial, the presence of this muscle confers to be an important source of compression of the nerves with potential clinical significance, such as anterior interosseous nerve (AIN) syndrome or pronator teres syndrome [2-6]. Variable anatomical and topographical relationships between the GM and the median nerve or AIN have been studied, however, the variation pattern of the GM was also extremely different [7,8]. Here, we reported a rare case with double GM in Korean cadaver for the first time and discussed its clinical significance.

Case Report

Variation in the muscular structure was observed in the right upper limb of the cadaver of a 81-years-old Korean female during educational dissection. The dissection was performed through a midline incision on the forearm, and skin, subcutaneous tissues, and fascia were exposed. The flexor digitorum superficialis muscle (FDS) was identi-

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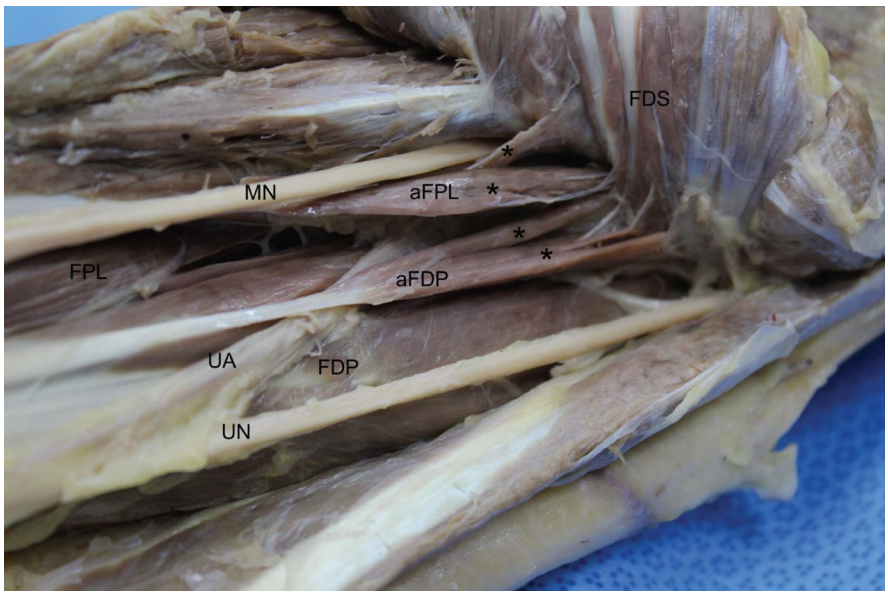

Fig. 1. Under flexor digitorum superficialis (FDS), four muscle bellies (*) formed two Gantzer's muscles, as accessory heads of the flexor digitorum profundus (aFDP) and flexor pollcis longus (aFPL). FDP, flexor digitorum profundus; FPL, flexor pollcis longus; MN, median nerve; UA, ulnar artery; UN, ulnar nerve.

fied and then it was reflected to examine its deep layer. There were two additional muscles, originating from the proximal part of FDS (Fig. 1). One of them, medial one joined by two small bellies crossed the ulnar artery. And its tendon part merged into FDP as accessory head of FDP (aFDP). The lateral one also formed by two small bellies continued deep to the median nerve and merged into the FPL as accessory head of FPL (aFPL). These accessory muscles were innervated by AIN. The length of aFDP and aFPL were 8.2 cm and 7.7 cm, respectively. There was no evidence of any pathological involvement of the GM and nervous structures.

Discussion

Previous studies reported the incidence of the GM was found to be 45% to 66.7% and it was slightly more common bilaterally in cadavers with a prevalence of 52.1%, than unilaterally, which had a prevalence of 47.9% [2,4,8]. Roy J [8] also reported a prevalence rate of 50.5% in North America, 44.9% in Asia and 37.0% in Europe through meta-analysis. Although there is reports that aFPL showed a high prevalence rate of 89.9% in blacks descent [3] and a low prevalence of 33% in European Caucasians, Roy J [8] did not conclude any significant differences of aFPL prevalence between the races because most studies did not report the races of the population. Although there are reports that a prevalence of aFPL When present the GM mostly originated from the medial epicondyle of the humerus or the under surface of FDS muscle, as in the present case [8]. It has been reported that the insertion sites of the GM were the FDP or the FPL, and the more common form of the GM was aFPL [2,8-10].

Two or three GMs have been reported infrequently. Nayak SR [11] reported triple GMs, as accessory heads of FDS, FDP and FPL. Eid N and Otsuki Y [12] also demonstrated double GMs with different anatomical relation to the median and AIN. Unlike the previous case with two aFPL reported by Eid N and Otsuki Y [12], present case showed two GMs, as aFDP and aFPL. The prevalence of the GM was common, however, coexistence of aFDP and aFPL was rare. Interestingly, these two muscles were formed by four muscular bellies. And these additional muscles have a relationship to neurovascular structures. aFDP crossed superficial to the ulnar artery and aFPL continued deep to the median nerve. Because aFPL is a more common type, studies have been reported on neurological effects of it on MN or AIN [6,12]. Though the clinical effect of this anatomical arrangement has not been iden-

tified obviously, the presence of multiple GMs may result in restricted movement of forearm flexors and subsequent pain in lower forearm [5,6]. On the other hand, GM may be used in local transfers in peripheral neuropathy [11,12]. Therefore, awareness of this variation may be useful servant for many clinicians and be important to prevent complications during or after surgical interventions and diagnostic procedures.

In this report, we showed double GMs having four bellies and its association with neurovascular structures for a first time. The presence of additional muscles may be originated form the incomplete cleavage of the forearm flexor muscles during development as the deep layer of the flexor muscle mass gives rise to the FDS, FDP and FPL [1]. Based on the embryological implications of the GM, we recently examined the topology of the GM and its adjunct neurovascular structures and found that the diverging point of ulnar artery was more distal in the presence of the GM [13]. In addition to its effect on arterial variation, the effect of the GM on neurovascular structures should be studied by larger cases of cadavers further.

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네 개의 근육덩이로 이루어진 Gantzer근육 변이와 임상적 의의: 증례 보고

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간추림 : Gantzer근육은 아래팔에 있는 부수적인 근육으로, 긴엄지굽힘근과 깊은손가락굽힘근의 덧갈래 형태로 발견된다. 본 증례에서는 근육덩이 네 개로 이루어진 Gantzer근육 쌍을 보고하고자 한다. 본 증례의 Gantzer근육은 얕은손가락굽힘근의 등쪽에서부터 네 개의 근육덩이가 시작되어 두 개의 근육 쌍으로 합쳐지며 각각 긴엄지굽힘근과 깊은손가락굽힘근으로 닿는 양상이었다. 긴엄지굽힘근과 깊은손가락굽힘근의 덧갈래근육은 각각 정중신경과 자동맥을 교차했다. 이러한 형태의 아래팔근육변이는 드문 경우로서, 관련된 임상적, 발생학적 의의를 요약하였다.

찾아보기 낱말 : Gantzer근육, 깊은손가락굽힘근, 긴엄지굽힘근, 변이

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