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Third Head of Biceps Brachii

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The anterior compartment — biceps brachii muscle is very variable one. In about 12% of arms, a humeral head is found in addition to those usually found arising from the coracoid process (medial or short head) and the glenoid lip of the scapula (lateral or long head). A biceps with more than two heads is found in 10% of white Europeans. In our case we reveal an additional third head of this muscle. The origin of this head is not unusual and it is one of the most common cases of this accessory slip arising from the humerus at the insertion of coracobrachialis, extending between it and the brachialis muscle. Some other varieties are discussed from the available literature. Finally the knowledge of the existence of the third head of the biceps brachii may become significant in preoperative diagnosis and during surgery of the upper limbs.

Key words: anatomical variants, biceps brachii, progressive muscular varieties.

Introduction

The biceps brachii is one of the muscles of the anterior compartment of the upper arm. It is characteristically described as a two-headed muscle that originates proximally by a long head and a short head (Williams, [10]). Distally, these two heads join to form a common tendon which inserts into the radial tuberosity, and some aponeurotic fibres form the bicipital aponeurosis which merges with the deep fascia of the forearm. This muscle mainly contributes to flexion and supination of the forearm (Williams, 1995). Testut has described the biceps brachii muscle as one of the muscles with most frequent anatomical variations [9]. These variations may present as a group of accessory fascicles arising from the coracoid process, the pectoralis major tendon, head of the humerus, articular capsule of the humerus or from the shaft of the humerus itself (Sargon, [8]). This last variation is also known as the humeral head of the biceps brachii muscle. Several authors have reported the presence of this anomaly with a varying frequency (Asvat, 1993; Bergman, 1988; Kopuz, 1999). A biceps with more than two heads is found in about 8% of Chinese, 10% of white Europeans, 12% of black Africans, and about 18% of Japanese (Bergman, 1988). A biceps may be composed of 1 to 5 heads. The most common accessory slip is one arising from the humerus at the insertion of coracobrachialis, extending between it and the brachialis muscle. It joins the short head, but most of its fibers

join the bicipital or semilunar fascia. It may be isolated and terminate entirely in the fascia. Mori described various origins of the third or accessory head as follows: In 50 arms there were 10 (20%) arms with a third head of the biceps. The origins of these additional heads were:

1. The distal portion of the deltoid tuberosity, 4 arms, 8%.
2. Near the point of the humeral insertion of coracobrachialis, 3 arms, 6% and
3. The terminal tendon of pectoralis major, 2 arms, 4% (Mori, 1964).

Description

During routine student dissection of a left upper limb from an adult male cadaver a third head of biceps brachii muscle was found. This additional head was observed deeper to the other two standard heads. The origin of the variable muscle is from the anterior surface of the humerus between the insertion of coracobrachialis and the origin of brachialis muscles. The third head is inserted medially on the most distal part of the common muscle body and ends on the usual place for biceps brachi with its tendon and apponeurosis. The length of the third head, which is strip-like, is 157 mm and its width is 19 mm almost along its whole course. The nerve supply for this structure is from the musculocutaneous nerve and the brachial artery is sending several arterial branches to it. The other two heads has its usual course, size and nerve and blood supply (Figs 1, 2).

Discussion and Conclusion

The muscles are usually variable structures. A reduction and even a total agenesis of muscles are observed as well as appearance of additional heads, attachment to adjacent muscles and expansion or reduction of their origin or insertion. These

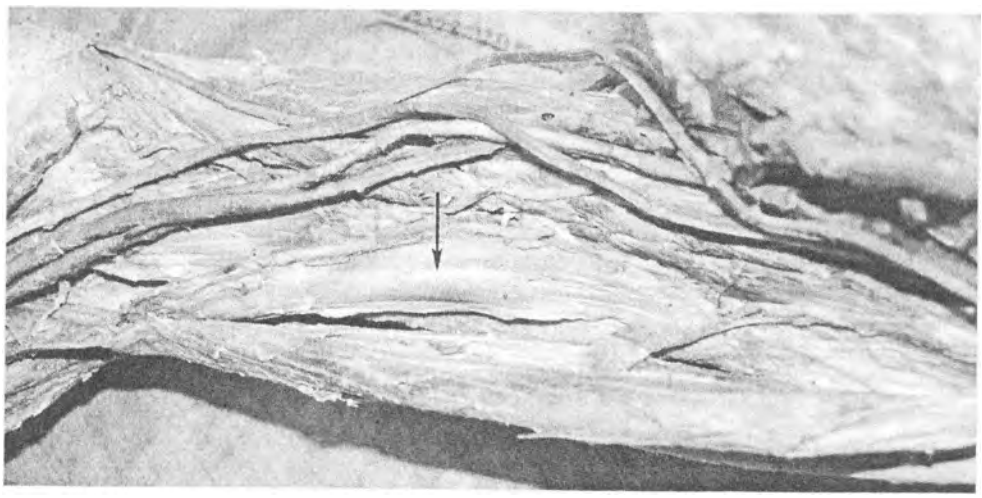

Fig. 1

Fig. 2

varieties are usually congenital and could be regressive and progressive type. The former are closer to more primitive forms like sternalis m., the third head of biceps brachii m., functional auricular mm., peroneus quartus muscle, etc. (Койчев,1995). The incidence of the third head of the biceps brachii muscle has been reported in several articles. Gray's Anatomy reported the incidence of this variation to be as much as 10% (Williams, 1995), which concurs with the observations of Bergman et al. in white Europeans (Bergman, 1988). Asvat et al. reported an incidence of 21.5% in their study group consisting of blacks (Asvat, 1993). It appears that the incidence varies among ethnic groups. Kopuz et al. attributed the appearance of these variants to evolutionary or racial trends (Kopuz, 1999). Santo Neto et al reported an incidence of 9% among blacks, which was significantly lower than the reported incidence for whites in his series (Santo Neto, 1998). Khaledpour contradicted Santo Neto et al.'s results by comparing his series to the results from other authors. He reported that the third head of biceps brachii was rare in whites and relatively high among blacks (Khaledpour, 1985). Given its innervation and relationships, the third head of biceps brachii in humans is probably derived from the muscles of the anterior compartment of the arm. Notably, humans, in contrast to other primates, lack the long head of coracobrachialis [1]. In those cases in which the third head arises from the insertion area of coracobrachialis, it is possible that it represents a remnant of the long head of coracobrachialis, the ancestral hominoid condition [1]. As Dobson (1881) found in Cercopithecus, the long head of coracobrachialis may find an insertion onto the radial tuberosity in common with biceps brachii. Embryological observations by Testut described this variation of the third head of biceps brachii as a portion of the brachialis muscle supplied by the musculocutaneous nerve, in which its distal insertion has been translocated from the ulna to the radius (Testut, 1902). Knowledge of the existence of the third head of the biceps brachii may become significant in preoperative diagnosis and during surgery of the upper limbs. Because of the association of the third head with unusual bone displacement subsequent to fracture, such variation has relevance in surgical procedures. Therefore, surgeons, in particular orthopedic surgeons, should be aware of this anatomical variation when dealing with some of the clinical syndromes.

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