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CASE REPORT

Additional muscle fibers of brachioradialis with anomalous high origin and entrapment of radial nerve in an osseomuscular canal

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Abstract: Normally, brachioradialis originates from the upper part of the lateral supracondylar ridge of the humerus. Variations in its origin are very rare. We observed the presence of an additional set of fleshy muscle fibers in the lateral part of the anterior compartment of the arm in addition to the other normal muscles. This unusual case was observed at the Mookambika Institute of Medical Sciences, Kulashekara, Tamil Nadu, India, during routine dissection of the upper limb. The anomalous fleshy fibers were attached proximally to the middle part of the shaft of the humerus, close to the insertion of deltoid. Some of its fibers continued further up to the acromian process of scapula. These fibers passed downwards along with deltoid and joined the fibers from the humerus before getting merged with the brachioradialis distally. These additional muscle fibers were compared with the brachioradialis accessorius and the uniqueness, functional significance and the clinical relevance were discussed *(Fig. 2, Ref. 6)*. Full Text in PDF *www.elis.sk.*
Key words: brachioradialis, anomalous muscle fibers, muscular variations, brachioradialis accessorius, radial nerve.

Brachioradialis (BR) is a muscle of the posterior compartment of the forearm which is considered functionally as a key muscle as it is the flexor of the forearm in mid-prone position (working position). It normally takes its origin from the upper part of the lateral supracondylar ridge of the humerus then runs along the lateral edge of cubital fossa and finally gets inserted to the lower end of shaft of radius just proximal to its styloid process (1). The variations of this muscle are very rare and brachioradialis accessorius is the only reported variation so far. An unusual case of additional set of muscle fibers originating from the acromian process of scapula and humerus passing all the way downwards to get merged with the brachioradialis is reported here.

Case presentation

During routine dissection for the undergraduate medical students, we observed a presence of an additional set of fleshy muscle fibers in the lateral part of the anterior compartment of the arm in addition to the other muscles of arm which were normal. This unusual case was observed in the right upper limb of about 65 year old male cadaver during routine dissection at the Mookambika Institute of Medical Sciences, Kulashekara, Tamil Nadu, India. These additional set of fleshy fibers were attached proximally mainly to the humerus immediately below the insertion of the deltoid. However, some of the fibers were traceable proximally along the deltoid muscle to the acromian process of scapula. Distally, these fibers merged with the proximal part of the brachioradialis. These additional set of fleshy fibers were receiving their innervation from the radial nerve in the lower part of the arm (Figs 1 and 2).

It was also observed that the additional fleshy fibers crossed the radial nerve superficially in the lower part of the anterior compartment of the arm creating an osseomuscular tunnel between them and the biceps brachii muscle for the passage of the radial nerve (Fig 1 and 2).

Discussion

Presence of anomalous or additional muscle fibers in the arm and in relation with the BR is very rare. Generally, a separate supernumerary muscle in the lateral cubital fossa originating from the humerus or brachioradialis and inserting into the radius, pronator teres or supinator muscle is considered as a variation of the brachioradialis muscle (2, 3). One of the reported variations of the BR is occurrence of brachioradialis accessorius muscle. It is considered as a very rare muscular variation and has only been reported as a casual finding (2). Though the earlier workers have reported the incidents of brachioradialis accessorius as between 0.5 % and 1 %, a recent study by Rodriguez et al. has revealed that it is much higher than previous reports. They have found 5 cases of brachioradialis accessorius in their study of 176 upper limbs. That is incident rate of about 2.8 % (2). Brachioradialis accessorius has

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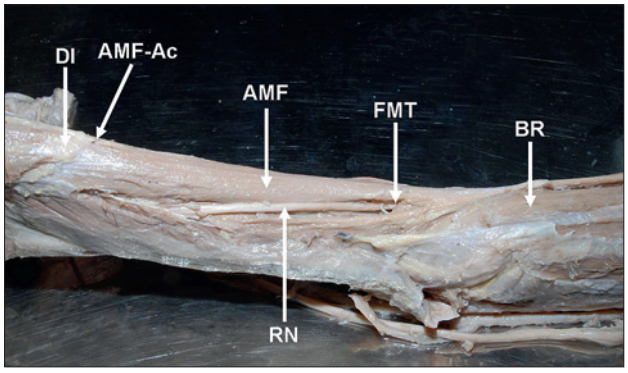

Fig. 1. Dissection of the lower part of the front of the arm and the upper part of the front of the forearm. The picture illustrates the additional muscle fibers (AMF) in the lower part of the anterior compartment of the arm which passes downwards to get merged with the brachioradialis (BR). It can be noted that proximal to the insertion of the deltoid (DI) these muscle fibers (AMF-Ac) extend upwards to get attached to the acromian process of scapula. Also seen is the radial nerve (RN) passing through a fibromuscular tunnel (FMT) deep to the additional muscle fibers (AMF).

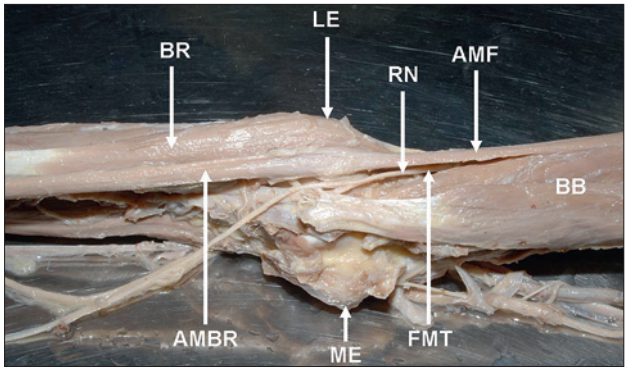

Fig. 2. Dissection of the lower part of the front of the arm and the upper part of the front of the forearm. The picture illustrates the additional muscle fibers (AMF) in the lower part of the anterior compartment of the arm which passes downwards to get merged (AMBR) with the brachioradialis (BR). It can be noted that the radial nerve (RN) is passing through a fibromuscular tunnel (FMT) between the additional muscle fibers (AMF) and biceps brachii muscle (BB). ME – Medial epicondyle, LE – Lateral epicondyle.

been described as originating proximal to the brachioradialis origin and occasionally as far proximally as the deltoid muscle insertion point (2). Also there are reports of this muscle arising from the humeral condylar ridge distal to the brachioradialis muscle origin, less frequently as part of the brachioradialis muscle, a case of double origin; one from humerus below the deltoid insertion and one from the condylar ridge (2). As far as insertion of brachioradialis accessorius is concerned, after passing distally and crossing the elbow joint, it gets inserted to the radial tuberosity together with the biceps brachii tendon or into the anterior surface of the radius or into the pronator teres tendon (2). Considering these reports, we can state that the muscle reported by us in the present case, can not be considered as a variety of brachioradialis accessorius. Its proximal attachment extended along the acromial fibers of deltoid to the acromian process and distally it blended with the otherwise normal brachioradialis. It can be noted here that these cross both the shoulder and elbow joints and these fibers could stabilize the shoulder joints during abduction of arm and may help to maintain the abducted position of the arm. In addition, since these acromioradial fibers are anterior to the axis of the elbow; they may assist in flexion of supinated forearm. Other significant point in the present case is the course of radial nerve in an ooseomuscular tunnel created by the anomalous muscle fibers and biceps brachii which could be a potential site of radial nerve compression.

The brachioradialis muscle is one of the preferred muscles used in tendon-transfer operations, carried out for a variety of purposes (4). During such procedures it is essential for the surgeons to be aware of such additional muscle slips for the smooth conduct of the operation. In some patients, after cervical spinal cord injury, when there is loss of lateral pinch function it is usually restored by the transfer of the tendon of the brachioradialis muscle to the tendon of the flexor pollicis longus. Similarly, restoration of key pinch and forearm pronation simultaneously even in the absence of other functional pronators can also be done by transferring the brachioradialis tendon to flexor pollicis longus tendon. This transfer is very useful in patients who lack functional pronation muscle groups (5, 6). During such tendon transfer procedures, if the surgeon is not aware of the possible variations of these (brachioradialis and flexor pollicis longus) the outcome of the procedure could be different and it may not give desired results.

Conclusion

To conclude, we would like to state that the unusually long set of additional muscle fibers of brachioradialis and their high origin, as high as acromian process is unique and has not been reported so far. Knowledge of such variations is essential not only for the anatomists but also for the surgeons for the proper diagnosis and planning of operative treatment.

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