Bulky accessory brachialis muscle with abnormal aponeurosis: A case report

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Abstract
The brachialis muscle is one of the chief flexors of the upper arm, and its variation can affect the movements of the elbow joint. This case report presents a rare case of a large accessory brachialis muscle in the right arm that comes with an abnormal aponeurosis. The aponeurosis from the distal part of the aberrant muscle arches over the radial artery and is attached to the deep fascia of the right forearm. While rare, the presence of an accessory brachialis muscle coupled with the unusual aponeurosis can lead to compression of the radial artery, causing radial artery entrapment syndrome and creating potential difficulties in the catheterisation of the radial artery.

Keywords
Brachialis muscle, accessory brachialis muscle, aponeurosis, radial artery

Introduction
The accessory brachialis muscle (ABM) typically originates from the lateral intermuscular septum, the fascia covering the triceps brachii muscle and deltoid muscle of the right arm. It extends to the medial side of the radius shaft, just below the radial tuberosity. The brachialis muscle originates from the anteromedial and anterolateral surfaces of the distal part of the humeral shaft, along the intermuscular septa of the arm. The muscle is inserted to the anterior surface of the coronoid process of the ulna and the tuberosity of the ulna. Blood is supplied to the muscle by the musculocutaneous nerve and proprioception is conveyed by the radial nerve.1

Even though the muscle presents different variations, an ABM slip to the radius is very rare. The ABM can affect the flexion of the elbow joint along with the pronation and supination of the forearm. An aberrant aponeurosis of the ABM (AABM) can compress the radial artery, leading to radial artery entrapment, causing complication in radial artery catheterisation.

Case report
During the dissection of a male cadaver (approximately 52 years old) for undergraduate medical students, we observed an abnormally large ABM in the right arm. This ABM was fused with the main brachialis muscle and originated from the lateral intermuscular septum at the fascia, covering the triceps brachii muscle and the lower part of the deltoid muscle near its insertion. The lateral intermuscular septum was thus distorted. As seen in Figure 1, the ABM partially originates from the posterior compartment of the arm, crossing from the lateral side of the arm to the anterior compartment. The ABM lies lateral to the biceps brachii muscle, with the lateral cutaneous nerve of the forearm emerging between them (Figure 2).

The ABM descends in front of the elbow joint to become part of the cubital fossa, while diverging from the brachialis muscle. The tendon of the ABM inserts to the medial face of the radial shaft just below the radial tuberosity. An AABM is seen to emerge from the distal part of the ABM, arching over the radial artery, and with the other end attached to the deep fascia of the forearm (Figure 3).

Discussion
The presence of an ABM has been reported numerous times in the recent literature. Mehta et al. reported an unusual brachialis muscle originating in the form of a tendon that was attached to the proximal humeral shaft near the lateral lip of the intertubercular sulcus.2 Sirasanagandla et al. Potu highlight the case of an ABM that blended with the medial aspect of

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the bicipital aponeurosis in the cubital fossa, entrapping the median nerve and brachial artery. Sanal et al. recorded a case of a variant brachialis muscle with two heads. The superficial head was attached to the ulnar tuberosity, while the deep head attachment was situated close to the superficial head attachment. Jayakumar et al. reported a case of an additional slip of the brachialis muscle that descended lateral to the biceps tendon, and diverged to enclose this tendon. The tendon of this additional muscle slip inserted below the radial tuberosity into the radial shaft. Loukas et al. observed an ABM that originated along the medial intermuscular septum mid-shaft on the medial side of the humerus, with the distal tendon of the muscle splitting to surround the median nerve. Krishnamurthy et al. described a case of an ABM that originated from the anterolateral surface of the humeral shaft and the medial supracondylar ridge on the lower end of the humerus. The ABM merged with the tendon of the pronator teres, and inserted into the lateral surface of the radial shaft. Muthu Kumar et al. reported the case of an ABM that blended with the main bulk of the brachialis muscle, resulting in both the brachialis muscle and the ABM being inserted into the radial tuberosity. Vadgaonkar et al. recorded an ABM that formed a fibromuscular tunnel containing the median nerve and the brachial artery. The study by Khandey of 115 specimens revealed that ABMs were present in only four cases and the insertion of the brachialis muscle into the bicipital aponeurosis were present in only two cases. At the same time, only one case of an ABM inserting into the radius just below the radial tuberosity could be found. This contrasts with the situation in our case, in which the ABM not only inserts at the radius just below the radial tuberosity, but also possesses an aponeurosis arching over to the radial artery. Among these cases of the presence of an ABM reported over the past few years, we found none with features exactly like those presented in this case. The AABM arching over the radial artery is a variation which has not been reported before.

As mentioned in earlier reports, the insertion of the ABM into the radial shaft below the radial tuberosity can compromise the ulnar component of the elbow flexion. This situation is compounded by the potential adverse effect on the supination and pronation of the forearm caused by an abnormal AABM. As seen in Figure 3, the abnormal AABM arching can compress the radial artery. This is verified by a study that showed decreased blood flow in the radial artery upon pronation caused by an aberrant brachioradialis tendon passing over the artery. The compression of the radial artery could also suppress the radial pulse, resulting in radial artery entrapment syndrome and complicating radial artery catheterisation. One possible solution for such a case is the removal of the ABM and its tendon for use in the reconstruction of the medial collateral ligament, or the annular ligament of the elbow joint. It can also be used for any tendon transfer.
Conclusion

Chiropractors, clinicians and surgeons should not ignore variations in the ABM and its aponeurosis. Such abnormalities can affect movement of the elbow joint and forearm, in turn causing potential complication in radial artery catheterisation.

Conflict of interest

None declared.

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