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Case Report

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Bilateral Variation of Radial Artery: Two Case Reports and Literature Review

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Abstract

The radial artery is useful in interventional treatment, and its variation is important for the clinician consideration. During the dissection of Sudanese adult 83-old-male cadaver, multiple upper limbs, a rare vascular variation, was observed in cases 1 & 2. The axillary arteries in both limbs showed a pattern of many variations, the radial arteries have been arising directly from their second part in the axilla. They were run through the arm superficially, along with their courses, they were separated from the brachial artery. In the right limb, a communicated artery was seen connecting the radial and brachial arteries at the region of the cubital fossa. However, their courses of the radial artery in the forearm and hand were found normal. Knowledge of anatomical variation of the radial artery is essential in performing the transradial coronary procedure.

Keywords: Radial Artery, Axillary Artery, Variation, Cadaver

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Introduction

The axillary artery enters the apex of the axilla by passing over the first digitation of serratus anterior. The pectoralis minor, which divided the artery into three parts while crossing it, the axillary artery was given many branches in the axillary fossa. The first part has one branch, the superior thoracic artery, named as the highest thoracic artery. The second part of the axillary artery lies behind the pectoralis minor muscle and gives rise to two arteries: thoracoacromial and lateral thoracic. Finally, the third part was giving two circumflex humeral arteries besides the subscapular artery (1). In some cases, the radial artery arises from the axillary or the brachial arteries (2). The brachial artery was bifurcated just distal to the teres major muscle (3). The second part of the axillary artery was noted with a variant branch, the accessory brachial artery (4). The radial artery was found to have a high origin in 9.2%, nine of these subjects from the brachial artery, while two subjects were originated abnormally from the axillary artery (5).

Case 1:

During the routine dissection of a formaldehyde 83 old male cadaver at the Department of Anatomy at Riyadh International College, Khartoum City, Sudan,

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for the purpose of teaching undergraduate students, the radial artery was encountered originated from the axillary region on the right side. The radial artery was observed arising from the second part of the axillary artery, just proximal to the median nerve formation. Another observable variation, a common trunk, arises from the third part divided directly into posterior humeral circumflex artery and subscapular arteries. After the upper limb was completely dissected, the radial and brachial arteries were cleaned from fascias and evaluated along their courses. Concerning the course radial artery, it firstly passes lower down on the medial aspect of the arm, when it reaches the lower part of the arm which crosses superficial to the median nerve and biceps brachii muscle to the lateral side of the arm under the deep fascia, in its way to the roof of the cubital fossa distally. At this level, a communicating artery of about 1.40 cm connecting the radial limb was completely dissected. However, the brachial artery courses normally after that through the cubital fossa, and then continues as the ulnar artery. The radial artery runs superficially in the forearm, close to the medial side of the brachioradialis muscle on its way to the anatomical snuffbox and hand, with no pattern of variation.

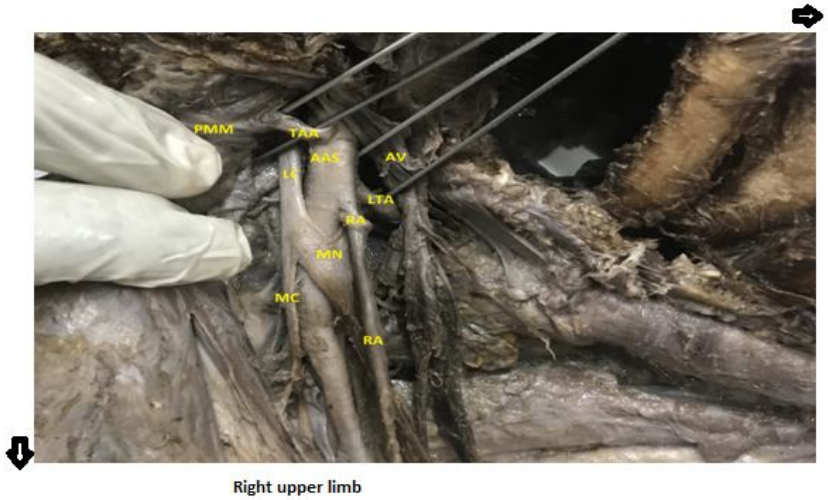

Fig 1. Demonstrating the; radial artery (RA), second part of axillary artery (AAS), lateral thoracic artery (LTA), thoracoacromial artery (TAA), axillary vein (AV), pectoralis minor muscle (PMM), lateral cord(LC), musculocutaneous nerve (MC), and median nerve formation (MN).

Fig 2. Demonstrating the; radial artery (RA), brachial artery (BA), ulnar artery (UA), communicating artery (CA), pronator teres muscle (PTM), biceps brachii muscle (BBM) and median nerve (MN).

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Fig 3. Showing the right axillary artery was giving a common trunk (CT) dividing into posterior circumflex humeral (PCHA) and subscapular (SSA) arteries.

Case 2:

Another anatomical variation was encountered on the left upper limb of the same 80-year-old male cadaver, in which, the axillary region was dissected and the structures were properly identified. The second part of the axillary artery gives rise to the left radial artery, just proximal to the median nerve formation and behind the pectoralis minor muscle, in addition to the thoracoacromial and lateral thoracic arteries. However, other branches of the left axillary were normally organized with no patterns of variation. After the left upper limb was fully dissected, the radial and brachial arteries were traced and followed along with their courses. The further course of the radial artery, along the medial aspect of the arm first which was crossed to the lateral side, was superficial to the median nerve. Finally, it enters the cubital fossa close to the biceps brachii muscle tendon and then passes to some extent under the deep fascia to reach the roof of the cubital fossa. No communication had been noted with the brachial artery in this area. The left brachial artery crosses the cubital fossa and passes as an ulnar artery to the lower part of the upper limb. No vascular variation was observed in the forearm and hand regions.

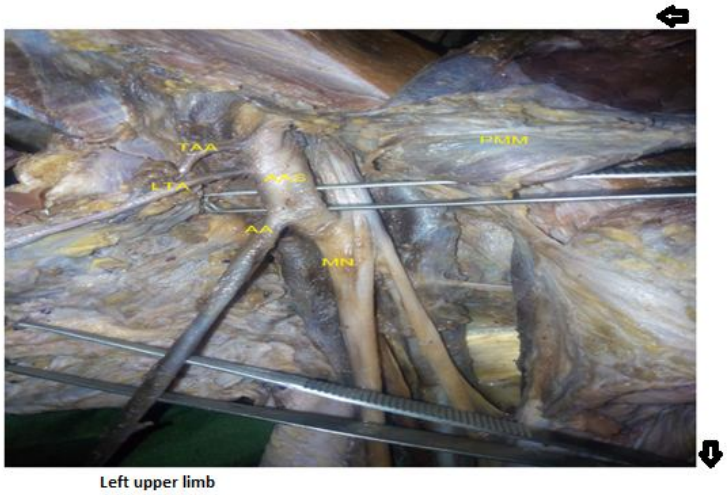

Fig 4: Demonstrating the; axillary artery (AAS), radial artery (RA), thoracoacromial artery (TAA), lateral thoracic artery (LTA), pectoralis minor muscle (PMM), and median nerve formation (MN).

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Discussion

Anatomical variations of the limb arteries have been mentioned in many anatomical studies. The axillary artery shows many variations in the literature. In these current two cases and during the dissection of a Sudanese adult 83-year-old male cadaver, both upper limbs showed patterns of vascular variations. The radial arteries arise bilaterally directly from the second part of the axillary arteries. Normally, the brachial artery is divided into the radial and ulnar arteries beneath the bicipital aponeurosis at the level opposite to the neck of the radius bone (2). In a case reported by Rashmi et al. in a 72-year-old male cadaver, they described that the radial artery arises from the upper level of the right arm (6). In the study of Naoyuki et al (2000), in 2.66% (75 cases), the radial artery was reported as a branch from the medial side of the brachial artery, and from the axillary artery with the same percentage (7). In one out of every 100 cases, the radial artery was a branch of the axillary artery (8). Dissection of 120 upper limbs showed that the brachioradial artery in one case took origin from the first part, and in another case from the second part of the axillary artery. A connection between the brachioradial and brachial arteries was present in three patterns of crossover (9). The radial artery was found to originate from the left axillary artery of a sixty-five-year-old female cadaver just below the humeral anterior circumflex artery (10). On the basis of the current case's 1 and 2 findings, the radial artery was detected arising abnormally from the second part of the axillary artery inside the axilla, just proximal to the joining of the median nerve roots. Regarding case 1, a communicating artery crossing over the roof of the cubital fossa was observed which joined to the radial and brachial arteries as shown in figure 2. In a rare Korean male case, the right thoracoacromial artery gives rise to the radial artery (11). In another rare anatomical variation, the second part of the axillary artery gave origin to the subscapular and thoracoacromial arteries on the right side upper extremity of a 55-year-old male cadaver (12). In the present case, the second part of the left axillary artery provided a radial artery alongside the lateral thoracic and thracacromial arteries. In addition to that, a short common trunk from the third part of the axillary artery was divided into posterior humeral circumflex and subscapular. ″Embryologically, the radial artery arises from two buds from the lateral side of the brachial artery. Finally, these two arterials were united together. A new connection was started with the brachial artery. Most of the proximal part of the radial artery disappeared. If this had not happened, it could have led to superior origin (8). Knowledge of the upper limb vascular variations has great clinical importance as they can interrupt the access of the coronary arteries for management planning of cardiovascular disease. Many authors have described the significance of the frequency of these vascular variations. Transradial coronary techniques may fail in the case of radial arterial variations (13). In the study of Nie et al. (2009) it has been shown that the transradial procedure in 44 out of 2899 subjects was changed to the other upper limb side because of the incidence of variations in the radial arteries. In 57 cases, other arteries like femoral and brachial arteries were selected because the procedure was failed (14). Proper evaluation of arteriographic images requires knowledge of the anatomical variants of the vessels (15).

Conclusion

Bilateral radial arising from the axillary arteries was present in this current two cases reports. Knowledge of the radial artery variation was useful in performing the trans radial coronary procedure. Descriptions and reporting of these variations will help to avoid mistakes during radiological and surgical procedures. Moreover, any surgical exposure to the axillary region structures and anatomical variation should be considered.

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Conflict of interest

Nil

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