

Study of Coexistence of Both Superficial Radial and Superficial Ulnar Artery in the Same Limb



Medical Science

KEYWORDS : Superficial Ulnar Artery, Median Nerve, Axillary Artery, Incomplete Superficial Palmar Arch, Superficial Radial Artery

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ABSTRACT

A study was carried out to find out the prevalence of coexistence of both superficial radial and superficial ulnar artery in the same limb. Out of 30 upper limbs dissected, in one upper limb, a coexistence of both superficial radial and superficial ulnar artery in the same limb had been identified. Its course, relationships with neighbouring structures and termination were studied. As this variation is concerned with various surgical procedures, this case was studied and reported.

Introduction

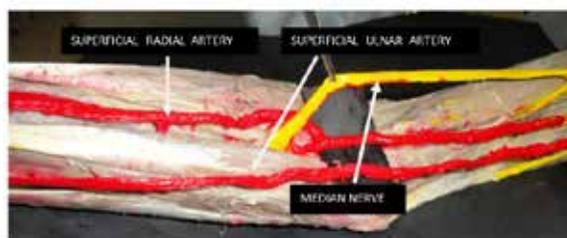
Variations in the branching pattern of main arteries in the upper limb are quite frequent and rather distinct from each other [1]. Although most of the variations in the upper limb vasculature cause no functional consequences, some variations are of clinically important to surgeons as well as to vascular radiologists. Normally the subclavian artery becomes the axillary artery as it crosses the first rib and at the inferior border of the teres major muscle it continues as the brachial artery, which in the cubital fossa at the level of neck of radius ends up dividing into the radial and the ulnar arteries [2]. The arterial pattern of the upper limb extremity may vary at different levels from the axillary artery, proximal to the origin of the median nerve, as far as the level of the palmar arches [3]. Although the presence of variations of arterial pattern of upper limb are common, the presence of both superficial radial artery (arising from axillary artery) and ulnar artery is a rare entity.

Materials and Methods

The study was conducted in the Department of Anatomy, Tagore Medical College and Research Institute, Rathinamangalam, Chennai. 30 upper limbs, belonging to 10 embalmed cadavers and 10 free upper limbs were used for the study. Out of 10 embalmed cadavers, 7 were males and 3 were females. The dissection been done on full upper limb of both sides. After the dissection of the arm and forearm, the region was surveyed for the existence of superficial radial and superficial ulnar artery. Data been recorded and the specimens with superficial radial and superficial ulnar artery were photographed.

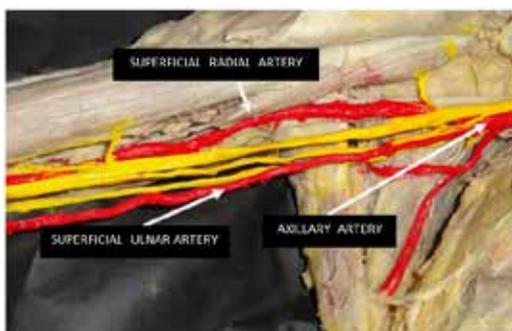
Observations

Out of 30 upper limbs studied, only one free upper limb showed the presence of superficial radial and superficial ulnar artery (Fig. 1). The observation was found on a right free upper limb. An abnormal high origin of superficial ulnar artery was noted from the second part of axillary artery in upper part of arm. The ulnar artery was found to be superficial throughout forearm passing over the superficial flexor muscles and terminates in the palm by forming incomplete superficial palmar arch. The axillary artery continues as brachial artery in the arm and enters cubital fossa superficial to the bicipital aponeurosis. In the cubital fossa just below the neck of radius it gives off common interosseous branch and then continues as superficial radial artery running superficial to the antebrachial fascia and to all the flexor muscles of the forearm. The superficial radial artery then leaves the forearm by winding around the lateral aspect of the wrist to reach the anatomical snuff box and enters the palm by passing between the two heads of first dorsal interosseous muscle where it terminates by forming deep palmar arch.



Discussion

The variation in the arterial pattern of upper limb has been well documented by many authors [4,5] but the earliest studies of anomalies in the arterial system have been reported by Senior [6] and Singer [7]. In 2001 Rodriguez-Niedenfuhr studied and classified the morphology of upper limb arterial variations [4]. Variations from the normal arterial pattern of the upper limb are considered quite common and they have an incidence of up to 20% in human adult limbs [8]. Among them the relatively rare variation is the division of axillary artery into two main stems that are continued down the arm. One of the stems is usually called the superficial brachial artery and other the deep brachial artery [9]. In our case similar pattern was noted in which



one stem continued as superficial ulnar artery which arise as a branch from the axillary artery and the other stem continued as brachial artery in the arm and as superficial radial artery in the forearm. Incidence of such a superficial arterial system of the upper limb may be of different types depending on the arteries involved which may include brachial, ulnar and radial arteries. This type of arterial pattern was termed as superficial brachio- ulno-radial (SBUR) by Moncayo-Marques[10]. But in our case unlike the pattern described by Moncayo-Marques the superficial arterial pattern involved only the radial and ulnar artery and the brachial artery was found to be deep. The superficial course of the ulnar artery over the forearm flexors has been described in two ways: 1. Under the antebrachial fascia [13,14]. 2. Infrequently over the antebrachial fascia in a subcutaneous position [14,15]. In our case it was over the antebrachial fascia running subcutaneously throughout the forearm as described by Hazlett[14] and Quain[15].

Manners- Smith[11] classified the radial artery course variations in two classes according to its relation to the tendons forming the anatomical snuff box. In the first class, the radial artery is single and is entirely superficial to the tendons of the anatomical snuff box, also known as the superficial dorsal artery of the forearm as described by Morris et al[12]. In the second class, the radial artery divides into superficial and deep branches, also documented as partial duplication of the radial artery by Mc Cormack et al [13]. But in our case the radial artery is single and it passes deep to the tendons of the anatomical snuff box.

Embryological Significance

The seventh inter segmental artery forms the main (axis) artery of the upper limb. The axis artery gives rise to the subclavian, axillary, brachial and the interosseous arteries. Other arteries develop as sprouts of the axis artery[16]. This sprouting theory is greatly challenged by Rodriguez et al 2001. They suggest that the arterial pattern of the upper limb bud develops from an initial capillary plexus by a proximal and distal differentiation, due to maintenance, enlargement and differentiation of certain capillary vessels, and the regression of others [17]. The embryological basis of arterial variations could be described by modification of normal capillary maintenance and regression [17]. The embryological reason for superficial ulnar artery in this case may be due to the ulnar artery establishing a connection with axis artery in the axilla. The bifurcation of the brachial artery into radial artery and common interosseous artery may be explained due to the origin of posterior interosseous artery from the axis artery just distal to the radial artery connection with the axis artery at the level of cubital fossa and the continuation of the axis artery between radial and posterior interosseous artery being the common interosseous artery.

Conclusion

It is essential to owe knowledge on the presence of superficial radial and superficial ulnar artery since the presence of them may often associate with neurovascular disturbances in the corresponding upper extremity. The knowledge of this type of variation is important to vascular and plastic surgeons and also in diagnostic purposes like cardiac catheterization, arterial grafting and other angiographic procedures. The presence of both superficial ulnar artery and superficial radial artery along with variation in branches of brachial plexus in the same case, to our knowledge, has not been described in the available literature.

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