

Case Report
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Bilateral Tortuous Upper Limb Arterial Tree and Their Clinical Significance

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ABSTRACT

The detailed knowledge about the possible anatomical variations of upper limb arteries is vital for the reparative surgery of the region. Brachial artery is the main artery of upper limb; it is a continuation of axillary artery from the lower border of teres major muscle. During routine cadaveric dissection, we found bilateral tortuous brachial artery which was superficial as well as tortuous throughout its course. It is called superficial as it was superficial to the median nerve. At the neck of radius, it was divided into two terminal branches radial and ulnar arteries which were also tortuous. Tortuosity of the radial artery was more near the flexor retinaculum. When observed, the continuation of ulnar artery as superficial palmar arch also showed tortuosity throughout, including its branches. Being superficial such brachial artery can be more prone to trauma. Tortuous radial artery is one of the causes of access failure in trans-radial approach of coronary interventions. To the best of our knowledge, this is the first case where entire post axillary upper limb arterial system is tortuous bilaterally. So knowledge of such tortuous upper limb arterial tree is important for cardiologist, radiologist, plastic surgeons and orthopedic surgeons.

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Introduction

The arterial tree of upper limb consists of axillary artery which is the continuation of subclavian artery at the outer border of first rib and continues as brachial artery at the lower border of teres major. Brachial artery is the main artery of the upper limb. It gives profunda brachii and muscular branches in the upper part of arm. In the lower part of the arm, it gives superior and inferior ulnar collateral artery which contributes to the anastomosis around cubital fossa. At the level of neck of radius, the brachial artery divides into radial and ulnar artery. Radial artery is superficial branch of brachial and passes along with superficial branch of radial nerve underneath brachioradialis. In the lower part of arm, this artery is very superficial and can be palpated against styloid process of radius. Ulnar artery is deep and divides into anterior and posterior ulnar recurrent arteries which participate in the anastomosis around cubital fossa. Ulnar artery gives another branch, the common interosseous artery which further divides into anterior and posterior interosseous artery and supply anterior and posterior compartments of forearm respectively. Further continuation of ulnar artery in the palm is in the form of superficial palmar arch [1, 2, 3]. The detailed knowledge about arterial variations gain the importance as they are applied in various clinical procedures by cardiologists, plastic surgeons, orthopedic surgeons and radiologists.

Case Report

During routine cadaveric dissection, in an adult male cadaver, aged 57 years, we found tortuosity in the post axillary arterial system bilaterally.

Brachial Artery

The brachial artery commenced from the axillary artery at the lower border of teres major muscle. It runs superficial to the median nerve and remained superficial throughout its course in the arm. The superficial brachial artery gave one branch – profunda brachii which runs posterior to the artery. It also gave many muscular branches which supplied adjoining muscles in the arm. All these branches were tortuous (Fig 1). When observed anterior descending and posterior descending arteries arising from the profunda brachii were also tortuous (Fig 2). Throughout its course in the arm, the brachial artery was highly tortuous. The brachial artery was superficial to the median nerve in cubital fossa also. At the neck of radius, this artery was divided into the terminal branches –superficial branch, radial artery and the deep branch – ulnar artery which also exhibited tortuosity.



Figure 1: Superficial tortuous brachial artery



Figure 2: Tortuous brachial artery and its branches

Radial Artery

It was very superficial throughout its course. We found that radial artery was more tortuous in the lower one third portions, near the flexor retinaculum (Fig 3).



Figure 3: Tortuous radial artery

Ulnar Artery

It was found to be more tortuous than radial artery. It gave common interosseous branch which further divided into anterior and posterior interosseous branches. When traced all these branches were tortuous.

Superficial Palmar Arch

The further continuation of ulnar artery in the palm as superficial palmar arch also showed tortuous course. The common digital and palmar digital branches arising from the superficial palmar arch were also tortuous (Fig 4).

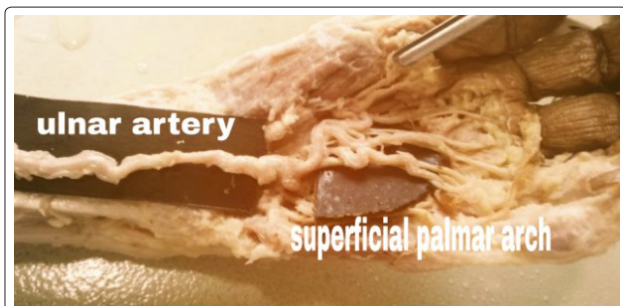


Figure 4: Tortuous ulnar artery with superficial palmar arch

Deep Palmar Arch

The further continuation of radial artery in the palm as deep palmar arch was also tortuous with its palmar metacarpal branches.

Discussion

Tortuosity can be defined as the presence of bend or angulation of more than 45 to 90 degrees [4]. In our case, not only the brachial artery was highly tortuous but the tortuosity of arteries continued in the all arteries of forearm and palm. When reviewed in literature, abnormal elastogenesis is one of the main factors responsible for such tortuosity. Arterial tortuosity syndrome is a rare connective tissue disorder due to mutation in SLC2A10 which encodes for GLUT10. In this disorder all the major vessels are tortuous and elongated. This is attributed to the disorganization of elastic fibres in the vessel wall [5]. Loeys-Dietz Syndrome is another recently defined syndrome associated with arterial tortuosity. This syndrome is considered to be due to mutation in TGF beta receptor which leads to arterial aneurysm and tortuosity. In the present case, though tortuosity was observed there was no indication of aneurysm in any of the arteries.

When traced, we found the brachial artery passed superficial to the median nerve [6]. Such superficial brachial artery was reported in 12.3% of cases by Keen [7, 8]. Vare and bansal had reported superficial brachial artery but rest of the branches radial and ulnar

were not superficial and reported as interosseous complex where as in the case reported by Rashmi Malhotra not only brachial but radial and ulnar arteries also had superficial course [7 & 9]. In the present case, we found brachial artery which was superficial and tortuous throughout its course. Saha et al in his case report on superficial brachial artery mentioned that presence of such superficial brachial artery is not erroneous variation [6]. As per him it is an important vessel in foetal life for replacing or supporting definitive brachial artery and it emerges from the axillary artery during stage IV of upper limb development. Rodriguez – Baeza et al suggested that hemodynamic predominance of certain arterial segments during development determines whether the superficial brachial artery will remain or not [10]. As the brachial artery was very superficial, such an artery is more prone to trauma [6]. As this is the main artery of arm, occlusion of this artery can lead to gangrene.

Blood pressure and pulsed Doppler ultrasonographic measurements are routinely assessed through the brachial artery [6]. Tortuous radial artery is one of the causes of access failure in transradial approach of coronary interventions [7]. Hence the knowledge of tortuosity of vessels is very essential particularly in cardiac interventions involving upper limb vessels to avoid further complications. Radiologists should be aware of such tortuosity for diagnostic and therapeutic interventions. This information is also essential in orthopedic and vascular re-constructive procedures [11].

Such a tortuous brachial artery gives very prominent pulsation [6]. It is called as Locomotar brachialis or Locomotar brachii. This is one of the finding in severe aortic regurgitation. Because of its very prominent pulsation such brachial artery is also called sometimes as dancing brachial artery [12, 13]. Tortuous arteries can also cause focal peripheral neuropathy [4].

Conclusion

Tortuous brachial artery is a rare and significant variation in the upper limb angio-architecture. When tortuosity is seen in the whole upper limb arterial tree then it becomes more significant. To the best of our knowledge, this is the first case where entire post axillary upper limb arterial system is tortuous bilaterally. So the knowledge of such variation is essential for cardiologist, radiologist, plastic surgeons and orthopedic surgeons for any diagnostic and therapeutic interventions involving these arteries to avoid accidental haemorrhage and post procedural complications [14, 15, 16].

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