

Case Report

Unusual Branching Pattern of Axillary and Brachial Arteries in the Right Upper Limb – A Case Report

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Abstract

Variations of the vascular pattern of proximal part of the upper arm are very common. Knowledge of anomalies in the origin and course of principal arteries is important for the vascular radiologists and surgeons. Several variations of the axillary artery, brachial artery and their branches have been reported. We found a common trunk (about 3cm long) of lateral thoracic and subscapular arteries from the axillary artery and a common trunk (about 4cm long) of posterior circumflex humeral and profunda brachii arteries from brachial artery. The profunda brachii artery ran downwards along with radial nerve and entered the radial groove. The posterior circumflex humeral artery hooked around the aponeurosis of latissimus dorsi muscle and supplied its usual area around the glenohumeral joint.

Keywords: Axillary artery, brachial artery, profunda brachii artery, posterior circumflex humeral artery, variation

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Introduction

Variations of the arterial pattern in the upper limb have been the subject of many anatomical studies due to their high incidence. Axillary artery is a direct continuation of subclavian artery. It starts from the outer border of the first rib, and ends at the lower border of teres major muscle. The course of the axillary artery is anatomically divided into three parts by the pectoralis minor muscle. First part of the axillary artery gives superior thoracic artery. The second part of the artery gives lateral thoracic and thoracoacromial arteries. The third part of the artery gives subscapular, anterior and posterior circumflex humeral arteries (1). Brachial artery is the main artery of the arm. It is a continuation of axillary artery at the lower border of teres major muscle. It generally terminates at the level of neck of the radius in the

cubital fossa by dividing into radial and ulnar arteries. The brachial artery gives origin to the following branches: profunda brachii, superior and inferior ulnar collateral, nutrient, muscular, radial and ulnar arteries. The profunda brachii artery is one of the main branches of the brachial artery, arises distal to the teres major. It accompanies the radial nerve closely between the long and medial heads of triceps and then in the radial groove. The profunda brachii artery gives two terminal branches called radial and middle collateral arteries (1). Although, this is a common and normal description of the axillary artery, many studies have shown that there is no fixed pattern for the axillary artery (2). Axillary artery may give rise to some unusual branches like thoracodorso-subscapular trunk, which may give rise to the posterior circumflex humeral artery. This atypical vascular pattern can also be associated with several nervous anomalies. This

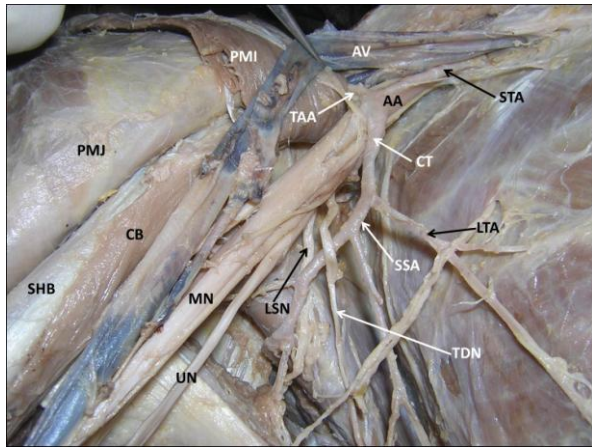


Figure 1: Dissection of the right axilla showing the variant common arterial trunk (CT) from axillary artery (AA – axillary artery; AV – axillary vein; STA – superior thoracic artery; TAA – thoracoacromial artery; PMJ – pectoralis major; PMI – pectoralis minor; SHB – short head of biceps; CB – coracobrachialis; MN – median nerve; UN – ulnar nerve; LSN – lower subscapular nerve; TDN – thoracodorsal nerve; SSA – subscapular artery; LTA – lateral thoracic artery).

indicates the segmental origin of the axillary artery and its pattern of branching may determine the arrangement of the brachial plexus during foetal development (3).

According to the compendium of human anatomic variation, major variations were present in about 25% of the subjects studied for the brachial artery (4). General surgeons and orthopaedic surgeons need to have a thorough knowledge of possible variations of the arteries of the upper limb. We believe that the knowledge of variations being presented in the current report might contribute to the success of surgeries of arm.

Case Report

During the dissection classes for medical students at Melaka Manipal Medical College (Manipal campus), we found some vascular variations in the right upper limb of an adult male cadaver aged approximately 50 years. This variation was noted in the right upper limb. A common arterial trunk arose from the second part of the axillary artery, which in turn, divided into lateral thoracic and subscapular arteries after a course of about 3cm (Fig. 1). Superior thoracic artery and thoracoacromial arteries were normal in their origin, course and distribution. Third part of the axillary artery gave only anterior circumflex humeral artery. Posterior circumflex humeral and profunda brachii

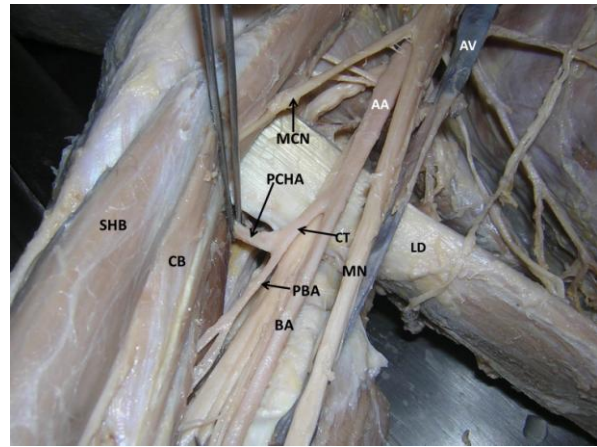


Figure 2: Dissection of the right axilla and proximal part of the arm showing the common trunk (CT) of profunda brachii artery (PBA) and posterior circumflex humeral artery (PCHA) (AA – axillary artery; AV – axillary vein; MCN – musculocutaneous nerve; MN – median nerve; LD – latissimus dorsi; CB – coracobrachialis; SHB – short head of biceps; BA – brachial artery).

arteries arose as a common trunk (about 4cm long) from the brachial artery (Fig. 2). The profunda brachii artery ran down wards along with radial nerve and entered the radial groove. The posterior circumflex humeral artery hooked around the lower border of the aponeurosis of latissimus dorsi muscle and supplied its usual area around the glenohumeral joint. Branching pattern and course of the left axillary and brachial arteries were normal.

Discussion

Variations in the branching pattern of the arteries of the limbs have clinical and surgical significance (5). Accurate knowledge of the normal and variant arterial pattern of the human upper extremities is important both for reparative surgery and for angiography (6). Variations in the arterial anatomy of the upper extremities are quite common. The branches of axillary and brachial arteries often show a variant pattern. Anomalous origin or absence of some of the branches, presence of additional common trunks has been reported (7). Uglietta and Kadir have reported variations in the major arteries of the upper extremities to occur in 11-24%. The large percentage of variations makes worthwhile to take any anomaly of the axillary artery into consideration (8). Reports have also shown the axillary artery giving rise to all of its common branches (except superior thoracic and anterior circumflex humeral) from a single trunk (9). Occasionally, subscapular artery, circumflex humeral artery and profunda brachii artery arise as a common trunk (10).

Saeed and his co-workers have explained similar variation, where a common trunk from 2nd part of the axillary artery gave rise to lateral thoracic, circumflex humeral, thoracodorsal and subscapular arteries (11). In present case lateral thoracic and subscapular arteries took origin from a common trunk, which arose from the second part of the axillary artery. De Garis and Swartley (12) found the subscapular artery to be present in almost all cases. In their study the subscapular artery almost always (94.1%) originated from the third part of the axillary artery and only rarely from the second part (5.1%). A common trunk from the second part of the axillary artery, giving rise to lateral thoracic, thoracodorsal, posterior circumflex humeral and subscapular arteries has been reported (13). Ramesh et al. (14) reported unusual origin of a common trunk from the third part of the left axillary artery, which gave origin to subscapular, anterior circumflex humeral, posterior circumflex humeral, profunda brachii, and ulnar collateral arteries. Translocation of branches in third part of axillary artery has also been reported (11). In another case, the posterior circumflex humeral artery arose from the subscapular artery (15). Some cases of anastomotic branches between axillary artery and brachial arteries or between axillary and forearm arteries have been reported (16). In our case posterior circumflex humeral and profunda brachii arteries arose as a common trunk from the brachial artery.

George et al. (17) reported the origin of a common trunk from axillary artery and giving rise to common circumflex humeral-subscapular trunk and then continuing as profunda brachii artery. Daimi et al. (18) found two trunks of posterior circumflex humeral arteries arising from the third part of the axillary artery: one artery continued laterally together with axillary nerve and appeared in the quadrangular space; the other one passed medially piercing teres minor muscle and appeared on the dorsal surface of scapula. Origin of profunda brachii artery is quite variable. It can arise as a common trunk with superior ulnar collateral artery in 22.3% cases (19), with posterior circumflex humeral artery (20), either before entry of posterior circumflex humeral artery in quadrangular space or after its entry in to quadrangular space.

A rare case of origin of subscapular, anterior and posterior circumflex humeral, profunda brachii artery and ulnar collateral arteries from a common trunk from the third part of the axillary artery has been reported (21). Profunda brachii artery arising from posterior circumflex humeral artery associated with high division of brachial artery has also been reported (22). However, in the present case, both the branches of profunda brachii and posterior circumflex humeral

arteries were arising from a common trunk from the initial part of the brachial artery. The posterior circumflex humeral artery also had anomalous course to reach the surgical neck of the humerus to accompany the axillary nerve. Such finding has not been reported earlier. The arterial anomalies in the upper limb are due to defects in embryonic development of the vascular plexus in the upper limb buds. This may be due to arrest at any stage of development of the vascular plexus showing regression, retention or reappearance and may lead to variations in the arterial origins and courses of the major upper limb vessels (23). Normally, during the development of the embryos, the 7th cervical intersegmental artery enlarges to become the dominant vessel of axilla. C6, C7 and T1 segmental arteries and most of the longitudinal anastomoses that link up the intersegmental arteries degenerate slowly. Many alternatives that exist during the formation of upper limb vessels seem to be responsible for anomalous arterial branching patterns (7). Awareness of these variations may serve as a useful guide for both vascular surgeons and radiologists. It might help in preventing diagnostic errors, influence interventional procedures and surgical tactics and avoid complications during surgeries.

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