Original Article

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Variations in Axillary Artery and its Branching Pattern

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Abstract

Variation in the branching pattern of axillary artery is commonly seen. Knowledge of these variations is of anatomical, surgical and radiological importance. In present study 50 upper limb of 25 cadavers were dissected to see branching of axillary artery andits course.

We found variations as posterior circumflex humeral artery coming from subscapular instead of third part of axillary artery; unilateral superficial brachial artery; bend and tortuous axillary artery.

Thus variation pattern of axillary artery is important as it is used in different vascular surgeries. Also it helps to determine the brachial plexus relation as cords of brachial plexus are labelled after their relation to second part of axillary artery.

Keywords: Angiography; Axillary Artery; Brachial Plexus; Median Nerve; Vascularsurgery; Variations.

Introduction

Axillary artery; axis artery of upper limb, divided into three parts by Pectoralis minor. Out of six major branches; first branch is Superior thorasic artery from first part that lies upon first slip of origin of the serratus anterior, Thracooacromial and Lateral thoracic arteries from second part, Subscapular artery and anterior and posterior circum flex humeral arteries from third part. Although thisis the classical description of the axillary artery, variations are very common in branching pattern of axillary artery. As indicated by studies there is no fixed pattern for branches of axillary artery [5].

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Material and Methods

The axillary arteries belonging to 50 upper limbs of 25 cadavers of Maharashtrian origin (19 males and 6 females) were selected to dissect for routine dissection purposes. Exposure of the axillary artery and its branches were achieved following classical incisions and dissection procedures as provided by Cunningham's manual of practical Anatomy [3], sacrificing venae commitantes and resecting the muscles that come in their way. The axillary artery was studied under the following headings: origin of all branches, their courses and variations if present, and photographs were taken for recording.

Observations

The variations are categorised as follows.

- *Superficial brachial artery*

1. All cords of brachial plexus were posterior to axillary artery.
2. Profunda brachi is arising from 3rd part of axillary.
3. Unilateral superficial stem of axillary artery continues as brachial artery and divided into ulnar and radial artery.

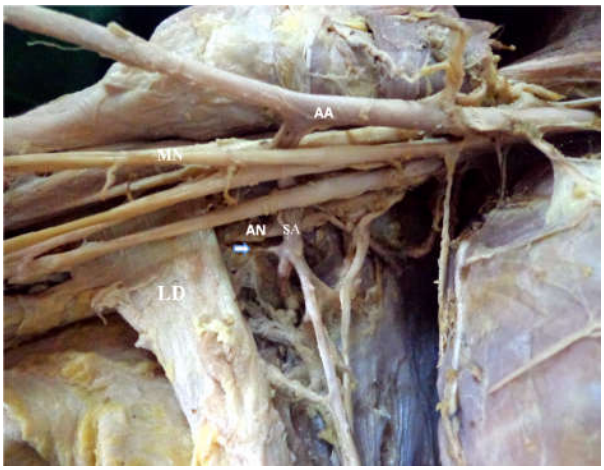

Fig. 1: AA: Axillary artery, MN: median nerve, AN: Axillary nerve, SA: Subscapular artery, LD: Lattissimusdorsi, arrow: Posterior circumflex humoral artery.

Case 1 (fig. 1)

1. Deep stem continued as Profunda artery dividing into anterior circumflex humeral and subscapular artery (4%).

• *Posterior circumflex humeral was coming from subscapular artery.*

(These represent intermediate developmental stages between normal-superficial brachial artery giving rise to the radial and ulnar in the forearm,while deep stem gave rise to subscapular and humeral circumflex vessels and to Profunda brachii artery).

Case 2 (fig. 2)

1. Branches of 3rd part of axillary arising from Profunda or deep stem of axillary artery as it was going between two roots of median nerve and giving branches-anterior and posterior circumflex humeral artery and subscapular artery and then continuing as Profunda along with radial nerve [1].
2. Superior thoracic artery is branch of 2nd part of axillary artery.
3. Posterior circumflex humeral coming from subscapular artery.

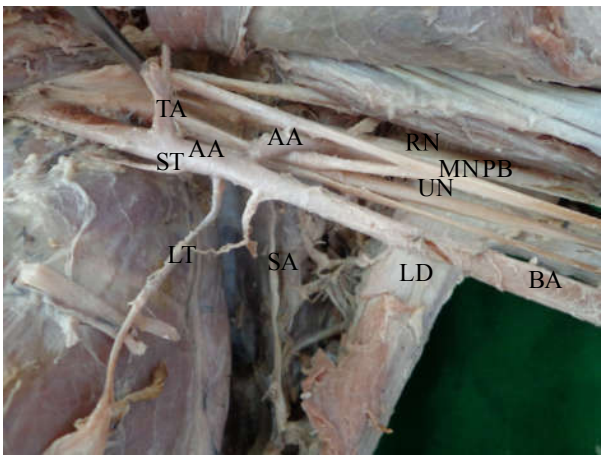

Fig. 2: TA:Thoracoacromial, AA:Axillary artery, ST: Superior Thorasic, RN:Radial nerve, PB: Profunda MN:Median nerve,UN: Ulnar nerve, BA: Brachial artery, LD:Lattissimus Dorsi, LT: Lateral Thoracic,SA:Subscapular artery

Case 3

Posterior circumflex humeral coming from subscapular (fig. 3).

Fig. 3: Posterior circumflex humeral running with axillary nerve coming from subscapular artery.SA-Subscapular artery,arrow-posterior circumflex humeral artery

Case 4 (fig. 4)

At the level of lower margin of Teres major brachial artery gives 5 branches-

Fig. 4: AA: Axillary artery, RN:Radial Nerve, MN: Median nerve, LD: Lattissimus Dorsi, 1-Muscular artery, 2- Profunda Brachi, 3-Muscular artery, 4- smaller deep Brachial, 5- Superficial Brachial artery.

1. Muscular artery 2. Profunda brachi 3. Muscular artery 4. Deep brachial artery 5. Superficial brachial artery. Large superficial brachial artery and smaller deep brachial artery. Superficial was crossing median nerve from medial to lateral and deep was on lateral side; again these two join at elbow and then divide into radial and ulnar artery, further course was normal.

• *Variation in course of axillary artery and its branching pattern*

Bilateral bend of axillary artery in female cadaver before it goes between two roots of median nerve.

Case 5 (fig. 5)

In addition to bend of the artery on left side lateral thorasic artery was branch of subscapular

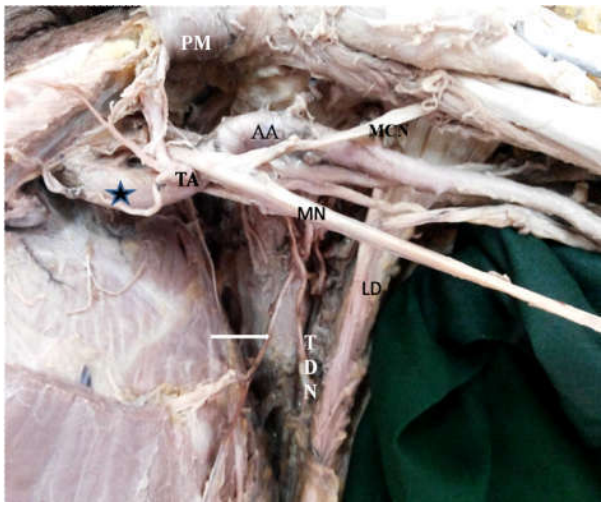

Fig. 5: PM-Pectoralis Minor,TA: Thoracoacromial, AA:Axillaery artery, MN:Median nerve, MCN-Musculocutaneos nerve,LD-Lattissimus Dorsi, TDN –Thoracodorsal nerve. *-Tortuous axillary artey.

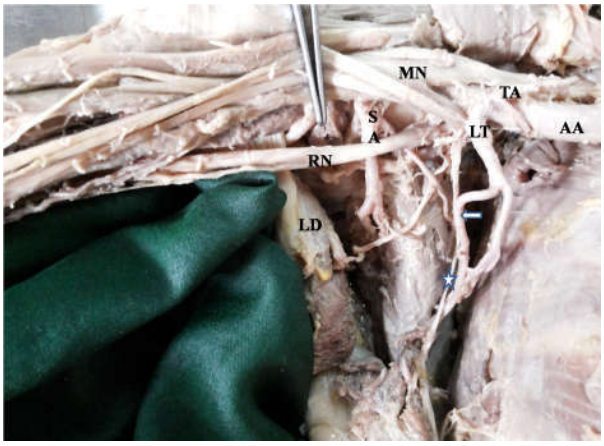

Fig. 5a: AA:Axillary artery MN: Median nerve, RN- Radial nerve,LD: Lattissimus Dorsi, LT: Lateral Thoracic, TA: Thoracoacromial artery.

arteryand Posterior circumflex humeral artery was branch of subscapular artery and rest all branches were following normal course.

Case 6 (fig. 6)

On right side lateral thoracic artery was branch of second part of axillary artery but gave an extra branch running with nerve to lattismus dorsi and posterior circumflex humeral artery was branch of subscapular artery.

Fig. 6: AA: Axillary artery, BA:Brachail artery

Case 7 (fig. 7)

unilateral highly tortuous axillary and brachial artery throughout its course and posterior circumflex humeral artery was coming from subscapular artery.

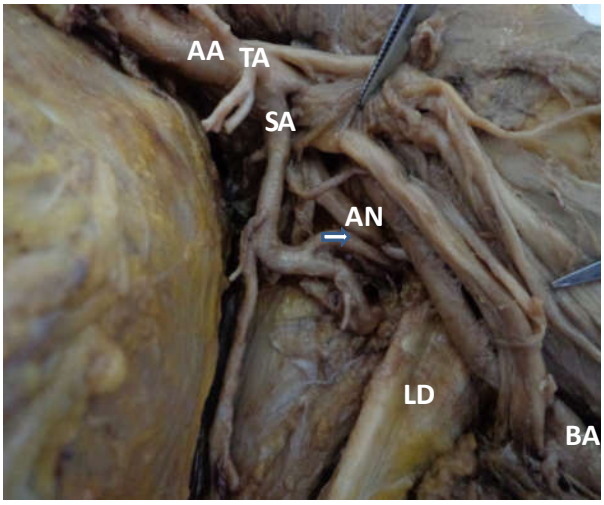

Fig. 7: AA: Axillary artery,TA: Thoracoacromial artery, SA: Subscapular artery, AN:Axillary nerve,LD: Lattissimus Dorsi, BA: Brachial artery

Results

Out of 50 limbs-

Normal pattern-44=88%

Variation-6=12%

Variations in 1st part-0

2nd part-1=2%

3rd part-6=12%

Discussion

Variations in branches of axillary artery are frequently found. Branches may arise together or their subbranches may total anywhere from 5-11 [5]. A Rare but striking anamoly arises when instead of continuing as a single brachial artery, the axillary artery divides in the axilla in two branches. On entering the arm, one of the branches usually run more superficially and may represent the radial or ulnar arteries, the deeper branch usually corresponds to the brachial artery proper [2].

Gaur S et al. [11] reported such variations in 28% cases. It was more common in 3rdpart (8%).

Study by Parveen Ojha et al. [9] found variation in 40% cases. They also found absence of profundabrachii and its replacement by descending branches of posterior circumflex bilaterally.

Same findings were shown by K.G. Rao et al. [6] along with posterior circumflex artery showing hair pin bend like course.

Rajesh Astik et al. [4] found Variation in branching pattern of the axillary artery in 62.5% limbs with 4-8 branches from axillary artery.

Swamy R.S. et al. [7] found 2nd part of axillary artery giving common trunk to divide into lateral thoracic and subscapular artery.

RS Swamy et al. [8] found Unusual Branching Pattern of Axillary Artery Associated with the high origin of Ulnar artery from 3rd part of axillary artery at lower border of teres major.

Yan Ortiz- Pomales et al. [10] found Tortuous Axillary artery aneurysm causing median nerve compression

Present study shows-

1. Arterial variations was present in 12% cases.
2. Posterior circumflex humeral was coming from subscapular artery in 10% cases.This was the commenest finding.
3. Other than branching pattern i.e. bend and tortuosity was present in 6% cases.
4. Variations of 3rd part was the commonest.

Conclusion

Variation in branching pattern of Axillary artery is seen in many studies (12%) in present study. Most of the variations are in 3rd part while no variation 1st part. This variation must be known in orthopedic and vascular surgeries to avoid complications.

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