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CADAVERIC STUDY OF THE BRANCHING PATTERN OF THE AXILLARY ARTERY.

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Abstract

Introduction: Deviations from the normal arterial pattern of the axillary artery is of immense in the medical science. Therefore, study is an attempt to know the normal and abnormal anatomy of the axillary artery.

Materials and methods: The present study was conducted in the department of Anatomy, GSL Medical College. The limbs were dissected retaining continuity with the trunk. Exposure of axillary artery and its branches were achieved as per standard procedures. The axillary artery was identified; the observations such as length of the artery, midpoint of the width of the artery were measured by keeping a thread along whole of its length, marked with India ink.

Results: Total 50 cadavers were dissected. The average length of axillary artery was found to be 10.17 cm, range 7 – 11 cm, number of branches ranged 2 – 9. In 38% of dissections, number of branches encountered was 5, followed by 6 branches in 36% and 4 branches in 10%. In 28% of cases (14 out of 50) the 6 name branches were found arising independently from axillary artery.

Conclusion: The knowledge of axially artery variations is of anatomical and surgical interest. This information is useful for the surgeons dealing with the axillary region especially in the case of reconstructive surgery.

Key words: Axillary, Artery, Branch, Distance

Introduction:

The axillary artery is the main arterial stem of the upper limb and is a continuation of the third part of the subclavian artery [1]. The direction of the axillary artery varies with the position of the upper limb [2]. Throughout its course, the artery is accompanied inferomedially by the axillary vein and is closely related to the cords of the brachial plexus and their branches [3].

Embryologically, the axillary artery is derived from the seventh cervical intersegmental artery, which is the axis artery of the upper limb [4]. The axillary artery along with the subclavian artery takes part in the scapular anastomosis, which becomes clinically significant during injury to the

axillary artery. The axillary artery is ruptured occasionally, during reduction of old dislocation of the shoulder joint.

Deviations from the normal arterial pattern of the axillary artery are of immense significance for anatomists, plastic, cardiovascular and orthopedic surgeons, vascular radiologists and interventional cardiologists. Moreover the injuries of the brachial plexus are quite common and require exploration and repair. During such repair surgeries, the abnormal arterial branch maybe a matter of definite concern, if its presence is not kept in mind.

Therefore, this study is an attempt to know the normal and abnormal anatomy of the axillary artery, which is having practical implications and which is useful in accurate diagnostic interpretation.

Materials and methods:

The present study was conducted in the department of Anatomy, GSL Medical College, Rajahmahendravaram, approved by the institutional ethics committee. The cadavers were embalmed immediately after death as per the standard protocol [5].

The limbs were dissected retaining continuity with the trunk. Exposure of axillary artery and its branches were achieved following classical incisions and dissection procedures as provided by Cunningham's manual of Practical Anatomy [4]; taking care to preserve all arteries, sacrificing venae commitantes and resecting the muscles that come in the way while effecting clean exposure of the arteries, though the major muscles of the area; Pectoralis major, Pectoralis minor, Teres major, Teres minor, Latissimus dorsi, Serratus anterior were revealed and required no further dissection. Fibro-fatty tissue and lymph nodes were carefully resected. The middle third of the clavicle had been removed so that the brachial plexus could be more easily visualized.

The axillary artery was identified and the observations such as length of the artery, midpoint of the width of the artery where it crosses the lower border of Teres major muscle were measured by keeping a thread along whole of its length, marked with India ink. It was then lifted from the dissection area and spread along a graduated metric scale to measure the length. Then the site of origin of each branch of axillary artery was noted. The distance between proximal points of main artery and point of origin of the branch was measured as suggested by Adachi (1928) [6] i.e. from the beginning of the trunk to the distal angle of the branch because the distal angle is more acute and offers a definite point while proximal angle is more open and not well defined.

Results:

In the present study the average length of axillary artery was found to be 10.17 cm (Range being 10 – 11 cm in 24 (48%); 9 – 10 cm in 9 (18%); 8 – 9 cm in 7 (14%); more than 11 cm in 7 (14%) & 7 – 8 cm in 3(6%) cases.

Considering every branch given off directly by axillary artery, which named, unnamed or common trunk, the number of branches ranged from 2 – 9 (5 branches in 19 limbs (38%); 6 in 18 (36%); 4 in 5 (10%); 3 & 8 in 2 (4%) each; 2 & 9 in 1 (2%) each).

In 38% of dissections, number of branches encountered was 5, followed by 6 branches in 36% and 4 branches in 10%. In 28% of cases (14 out of 50) the 6 name branches were found arising independently from axillary artery.

Discussion

In the present study the average length of axillary artery was found to be10 – 17 cm. When the branches part was considered, comparable work was conducted by De Garis and Swartley (1928) [7] reported 5 – 11 branches. As per Huelke et al. (1958) [8] report, the number of branches of axillary artery ranging from 2 – 7. The present study is in consonance with Huelke (1958) [9] who encountered 6 branches in 37.3 % (comparable to 36% in the present study).

The variations encountered with respect to branches of axillary artery are detailed as follows:

In this study, the mean distance of Superior Thoracic Artery from origin to outer of first rib was 1.46 cm. This is in consonance with Huelke (1958) [9] (86.6%) and De Garis & Swartley (1928)[10] – 96.9%. Adachi (1928)[11], Pellegrini, (1906)[12], Trotter et al (1930) [13] and Pan (1940) [14].

Thoraco-acromial artery, a constant branch was found in 98% dissections of the present series arising at an average distance of 2.86cm.However other authors Pellegrini (1906)[12], Adachi(1928), Trotter et al (1930)[13] and Pan (1940) [14] also opined similar view. The Lateral Thoracic Artery was seen arising at a mean distance of 3.15 cm from outer border of first rib and it was reported to be abscent in 2% of cases in this study. Whereas Pellegrini (1906)[12] found it to be absent in 5.8%.

Alar Thoracic Artery in 6% of limbs, was arised from the second part of axillary artery invariably, 2 – 3cm from the outer border of first rib. The mean distance of origin of Subscapular Artery from the outer border of first rib was 6.69cm in this study, but it was 7.3cm as reported by Keen,1961 [15]. Subscapular artery was arising in common with lateral thoracic artery in 10% dissections and it was 25% by Huelke et al. [9] and with posterior circumflex humeral in 22% dissections but 15.2% by Huelke [9] and 46.4% by Pan[14].

Posterior Circumflex Humeral Artery was arising at a mean distance of 7.77 cm from outer border of first rib. In 96% limbs, it was arising from 3rd part of axillary artery (Directly-58%; in common with subscapular 18%; with anterior circumflex humeral 16% & as branch of arteriaprofunda or brachial artery in 2% each). The Anterior Circumflex Humeral Artery was seen arising at a large distance of 7.9 cm from outer border of first rib [range being 8-10cm in 25(50%); 6-8 cm in 14 (28%); 4 – 6cm in 7 (14%) and more than 10cm in 2(4%).In 96% of limbs, it was arising from 3rd part of axillary artery either directly(80%) or in common with posterior circumflex humeral (12%).

The superior thoracic artery in 2.5% of the limbs, it arose from thoraco-acromial artery and 93.5% from the first part of arteryin 1.5%from the lateral thoracic artery. It was found to be absent in 2.5% of the limbs. The thoraco-acromial artery in 88.5% of limbs it was arising from 2nd part of axillary artery and in 10.5% from the first and 1% from the sub-scapular artery. In 88.5% of limbs all classical branches of thoracoacromial artery were arising from second part of axillary artery at a variable distance from the outer border of first rib.

The lateral thoracic artery was seen arising 85.7% of limbs from 2nd part of axillary artery, 80% directly from the first part, in 2.5% it was from the first part and in 5.5% it was from the third part.

The subscapular artery in 80% of the limbs it was emanating from 3rd part of axillary artery either directly or in common with posterior circumflex humeral, profundabranchi or deep division of brachial artery. Among other limbs, in 16% it was arising from the second part either directly or in common with lateral thoracic or with posterior circumflex humeral and among the other 4 limbs it was absent. In 4% of cases, subscapular artery was absent.

The posterior circumflex humeral artery was seen arising from the 3rd part of axillary artery in 95.5% limbs; it was arising while in rest of 2% it arose from the 2nd part. The anterior circumflex humeral artery was seen arising at an average distance of 7.9 cm from outer border of first rib. In 95% of the limb it arised from the third part of axillary artery either directly 74.5% or in common with posterior circumflex humeral (20.5%) and in 2% it arouse from the subscapular artery, directly 1.5% and commonly in 0.5% and the rest of the limbs 3% it aroused from the deep brachial artery, 1.2% directly and 1.8 % from common stem.

These variations in the branching pattern of axillary artery were a rule rather than the

exception. The knowledge of these variations is of anatomical and surgical interest. This information is useful for the surgeons dealing with the axillary region especially in the case of reconstructive surgery.

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