

Study of thyrocervical trunk in adult cadavers

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Abstract

Aims and Objectives; Branches of Subclavian artery gain importance as it is closely associated with many neurovascular structures and it is involved in so many clinical instances. Thyrocervical trunk is one among its branches which gain importance. so the study of Thyrocervical Trunk including its mode of origin and its branching pattern were studied in forty Adult cadavers. **Materials and Methods:** In Forty adult cadavers of unknown sex subclavian artery was exposed using conventional dissection method. Origin and the branching pattern of Thyrocervical trunk was studied.

Results and Conclusion; In all the specimens Thyrocervical trunk arose from First part of Subclavian artery. The number of branches varied from one to four, in both sides in adult. In all the specimens branches of Thyrocervical trunk passes in front of Scalenus Anterior muscle. As so many neurovascular structures are closely related to thyrocervical trunk and its branches this study will be useful clinically both for diagnostic and treatment purposes

Key Word: AC-Ascending cervical artery, DS-Dorsal scapular, IT-Inferior thyroid artery. SCA-Subclavian artery. SC-Superficial cervical. SS-Supra scapular artery. TCT-Thyrocervical trunk.

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INTRODUCTION

Thyrocervical trunk(TCT) usually arises from superior portion of First part of Subclavian Artery, distal to Vertebral artery close to medial border of sternocleidomastoid muscle. THYROCERVICAL TRUNK(THYROID AXIS). Thyrocervical trunk is called as truncus thyrocervicalis in Latin, which is a short wide branch supplying Thyroid gland and other structures in Neck. Of all the branches of subclavian Artery Thyrocervical trunk has more number of variation in its branching pattern³ Henry W.Gray⁹ stated that thyrocervical trunk arises from the front of the subclavian's first part near the medial border of scalenus

anterior divides almost at once into the inferior thyroid, superficial cervical and suprascapular arteries. About a third of the superficial cervical and dorsal scapular arteries arise in common from the thyrocervical trunk as a transverse cervical artery with a superficial (Superficial cervical artery) and a deep branch (dorsal scapular artery).

MATERIALS AND METHODS

In Forty adult cadavers of unknown sex Subclavian artery was exposed on both sides using onventional dissection method. Origin and the branching pattern of Thyrocervical trunk was studied

OBSERVATION

Origin Of Thyrocervical Trunk And Its Pattern Of Branching Origin of Thyrocervical Trunk; both sides in all the 40 cases on both side the thyrocervical trunk was derived from 1st part of Subclavian artery

Branching Pattern of Thyrocervical trunk.

Right Side

3 branches from Thyrocervical trunk

Inferior Thyroid, transverse cervical and suprascapular arteries- 14/40 (35%) (FIG-1)

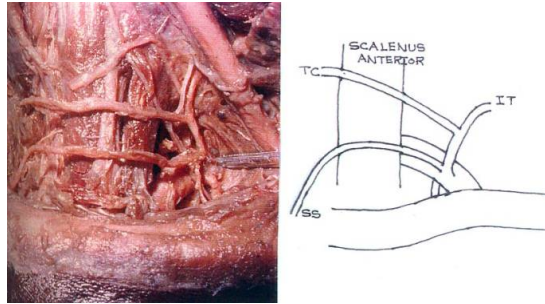


Figure 1: 3 Branches-Inferior Thyroid, Transverse Cervical, Suprascapular Artery (Fig-1)

2) 4 Branches -In two cases ascending cervical artery arose directly from Thyrocervical trunk IT,AC,TC,SS(4 branches) - 2/40 (5%) (FIG-2)

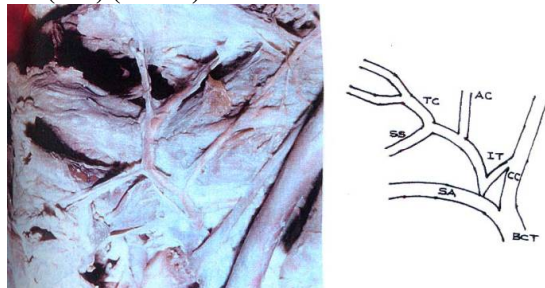


Figure 2: 4 Branches-Inferior Thyroid, Ascending Cervical Transverse Cervical, Suprascapular Artery(Fig-2)

3) 3 branches from Thyrocervical trunk Inferior thyroid, superficial cervical, a common stem for Suprascapular and Dorsal scapular arteries - 20/40 (50%) (FIG-3)

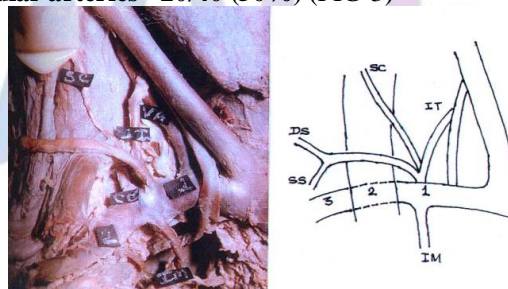


Figure 3: 3 Branches-Inferior Thyroid, Superficialcervical,Common Stem Dividing Into Dorsal Scapular And Suprascapular(Fig-3)

4) 2 branches from Thyrocervical trunk Inferior thyroid and a common stem for Supra scapular and Dorsal scapular arteries - 2/40 (5%) (FIG-4)

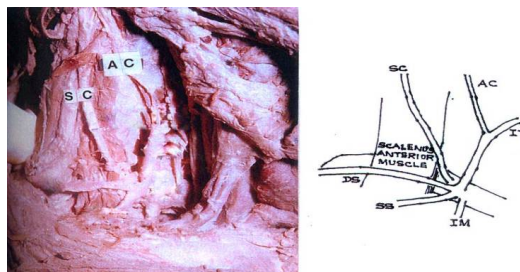


Figure 5: 2 Branches-Inferior Thyroid, Common Stem Dividing Into Dorsal Scapular, Suprascapular Artery (Fig-4)

5) 1 Branch- Inferior Thyroid Alone Representing The Thyroid Axis-2/40 (5%) (Fig-5)

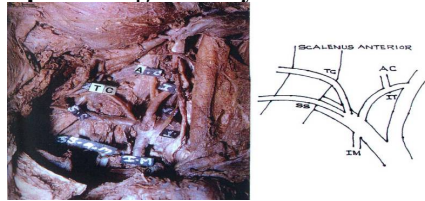


Figure 6:1 branch-inferior thyroid alone representing the thyroid axis (fig-5)

Left Thyrocervical Trunk

Origin; From 1st part of Subclavian artery in all 40 specimens

1) 3 Branches-Inferior Thyroid,Transverse Cervical, Suprascapular Artery-33/40,(82.5%)(Fig-6)

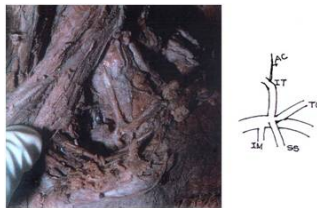


Figure 6: Left TCT-3 Branches-IT,TC,SS(FIG-6)

2) 4 Branches including inferior thyroid, ascending cervical transverse cervical and Supra scapular Artery Ascending cervical sharing a common origin with inferior thyroid artery- 2/40 (5%) (FIG-7)

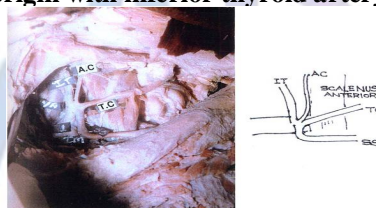


Figure 7: Left Tct-4 Branches-It,Ac,Tc,Ss(Fig-7)

3) 3 branches-Inferior thyroid, superficial cervical and a common stem for Dorsalscapular, Supra scapular 3/40 (7.5%) (FIG-8)

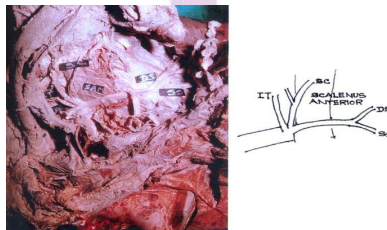


Figure 8: Left TCT-3 Branches-IT,SC, Common stem dividing into DS,SS(FIG-8)

4) 1 Branch -Inferior Thyroid alone representing the Thyroid axis Ascending cervical sharing a common origin with inferior thyroid artery-2/40 (5%) (FIG-9)

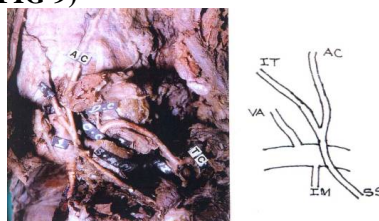


Figure 9: Common stem dividing into IT,AC(FIG-9)

Overall Branching pattern of Thyrocervical Trunk on both sides is given in in [Table-1]

Table 1: Branching Pattern Of Thyrocervical Trunk In Adults [Table-1]

| Side | N | No. of Branches | | | | | | | | | |
|-------|----|-----------------|---|------------|-------|---------------|-------|--------|------|----|---|
| | | 4 | | 3 | | 3 | | 2 | | 1 | |
| | | IT, AC, TC, SS | | IT, TC, SS | | IT, SC, SS/DS | | IT, SS | | IT | |
| | N | % | N | % | N | % | N | % | N | % | |
| Right | 40 | 2 | 5 | 14 | 35 | 20 | 50 | 2 | 5 | 2 | 5 |
| Left | 40 | 2 | 5 | 33 | 82.5 | 3 | 7.5 | - | - | 2 | 5 |
| Total | 80 | 4 | 5 | 47 | 58.75 | 23 | 28.75 | 2 | 2.50 | 4 | 5 |

DISCUSSION

Thyrocervical Trunk

Henry W Gray⁹1858, states that Thyrocervical trunk usually springs from 1st part of subclavian artery and divides into inferior thyroid, suprascapular and superficial cervical arteries. About a third of the superficial cervical and dorsal scapular arteries arise in common as Transverse cervical artery from the thyrocervical trunk.

In the study done by Mathur, Shamer Singh and Singh (1974)¹⁵ Thyrocervical trunk was found to arise from 1st part in 98.0% of cases and from 2nd part in 1.9% of cases.

- **In the present study, in all the adult cadavers the origin of thyrocervical trunk is from 1st part of Subclavian artery.**
- Branching pattern of TCA
- Branching pattern of thyrocervical trunk was compared with

J.J. Long (1891)¹¹ study, Daseler and Anson (1959)⁴ Study, Mathur, Shamer Singh and Singh (1974)¹⁵, study **J.J. Long and A.Thomson (1891)¹¹** studied the formation of Thyroid axis. Thomson 1891 found the typical pattern of branching of thyrocervical trunk was found to occur in 29 percent of 544 bodies in a British Series. The inferior thyroid artery is the most constant branch in its origin from thyrocervical trunk yet it has been missing in 6 percent of cases. Either the supra scapular or transverse cervical artery or both may arise directly from subclavian artery. Also these arteries may arise by a common stem either from thyrocervical trunk or subclavian artery directly or one branch may arise from thyrocervical and other may arise from subclavian. J.J. Long 1891¹¹ found 4 primary modes in which branches of thyroid axis were distributed. These variation are tended to be same on both sides of body. Of these inferior thyroid arose from the axis with only one exception. The suprascapular artery was also found to be very constant branch of thyroid axis there being only 4 exceptions, vide groups 4 variation. The Dorsal Scapular artery in 42 cases of 75 arose from the third part of out subclavian artery. In 22 instances as separate trunk 20 being conjoined with superficial cervical artery as transverse cervical artery. Branches from thyrocervical Trunk Variation: 3 branches: Inferior thyroid, Transverse Cervical, Suprascapular Artery J.J. Long:44%(33/75).In present

Adult study 35% (14/40) on right side, 82.5 % (33/40) on left side Variation 2:3 branches : Inferior thyroid, Superficial Cervical, Suprascapular Artery J.J. Lon :29.3% (22/75) In present study, 3 branches inferior thyroid, superficial cervical, suprascapular and dorsal scapular arose together from Thyrocervical trunk on right side in 50% (20/40), 7.5% (3/40) on left side Variation 3:2 branches : Inferior thyroid and Suprascapular Artery J.J. Long 28% (21/75) In present Study, on right side, inferior thyroid and a common stem dividing into transverse cervical and suprascapular in 5% (2/40) cases no such pattern seen on left side Variation 4:1 branch: Inferior thyroid only J.J. Long:5.3% (4/75).

Table 2: In present study in 5% (2/40) of the specimens on both side, Inferior thyroid artery alone represented thyrocervical trunk [Table-2]

| Author | Variation in Percentage | | | |
|-----------------|-------------------------|-------|-----|-----|
| | 1 | 2 | 3 | 4 |
| J.J.Long (1891) | 44 | 29.3 | 28 | 5.3 |
| Present Study) | | | | |
| Adults | 58.75 | 28.75 | 2.5 | 5 |

Bean R.B. 1905² made a composite study of the subclavian artery in man and classified the branches of the subclavian artery on the basis of variation occurring in the derivation of branches of the thyrocervical trunk. Gould 1909⁷ reported a case having branches from thyroid axis from the first part as Inferior thyroid, transverse cervical and Dorsal scapular from 3rd part De Garis C.F. 1924⁵ described the patterns of branching of subclavian artery in white and negro stocks. De Garis found that Dorsal scapular artery arose from transverse cervical artery of the thyrocervical trunk, in approximately one half of the series; in the other 50% of the material the dorsal Scapular artery arose from 3rd part. Daselar E.H and B.J. Anson 1959⁴ found no thyro cervical trunk in 17% of sides its place usually being taken by inferior thyroid artery. In his 770 specimens branching pattern of thyrocervical as 3 branches namely inferior thyroid, superficial cervical, suprascapular is seen in 46.75% of cases. In present study, in 5% of specimens on both sides, Thyrocervical trunk is represented by the Inferior thyroid artery. In the study done by Mathur, Shamer Singh and Singh (1974),¹⁶ Branching pattern of Thyrocervical trunk into inferior thyroid, superficial cervical, suprascapular was seen in in 50.3% of cases.

Tokafuj T.Soto Y 1991[19] studied the branches of subclavian artery in Japanese adults in 72 Japanese adults i.e in 144, Subclavian arteries. The most common type of transverse cervical artery which formed from common trunk consisting of superficial and deep branch was observed with the highest incidence 61.8%. In the present study Branching pattern of Thyrocervical trunk into Inferior thyroid, Transverse cervical and Suprascapular is seen in 35% on right side, 82.5% on left side of specimens. Of total 58.75% on both sides. Yucel AH 1999²⁰ observed a variation in a singular cadaver in which thyrocervical trunk was absent on right side. The two branches which normally originate from the thyro cervical trunk had a different origin the transverse cervical artery arose directly from the subclavian artery and suprascapular artery from the internal mammary artery thereby providing a short route for posterior scapular anastomosis. Read and trotter¹⁶ 1941 found that transverse cervical artery arose from thyro cervical trunk 70.8%, from Dorsal scapular in 28.9% of cases. In the present study transverse cervical artery arose from Thyrocervical trunk 35% on right side, 82.5% on left side. Literature search revealed only six cases in which the thyrocervical trunk or some of its branches pierced the anterior scalene muscle, all six being unilateral cases, three on the right side and three on the left. Quain and Maclise¹⁸ described one case in which the left inferior thyroid artery branched directly from the first part of the subclavian artery. The remaining components of the left “thyrocervical” artery arose as a common trunk from the second part of the subclavian artery, passed through the anterior scalene muscle and then trifurcated into the internal thoracic, transverse cervical and suprascapular branches. There was no mention of an ascending cervical artery. In the present study in 5% of cases Inferior Thyroid alone arise from Thyrocervical trunk. Gruber⁸ reported one case in which the left thyrocervical trunk arose from the third part of the subclavian artery, passed posterior to the anterior scalene and then pierced the muscle anteriorly. The trunk immediately gave off three branches, the internal thoracic, suprascapular and superficial cervical, that coursed inferiorly and laterally. The remaining component coursed superiorly and divided into two arteries, the inferior thyroid and the ascending cervical. No such observation in present study. Delitzin⁶ described one case on the right side of the body in which the thyrocervical trunk passed through the anterior scalene muscle and its branches coursed anterior to the muscle. A common trunk divided to form the inferior thyroid, transverse cervical and suprascapular arteries with the ascending cervical artery then branching from the inferior thyroid. The diameters of the inferior thyroid and transverse cervical arteries were notably enlarged. The phrenic nerve was diverted in its course over the

belly of the anterior scalene muscle due to the position of the thyrocervical trunk piercing the muscle. Röhlich¹⁷ described one case in which the right “thyrocervical” trunk arose from the second part of the subclavian artery. The branches pierced the anterior scalene muscle in two places, the common stem of the transverse cervical and ascending cervical superiorly and the suprascapular and internal thoracic inferiorly. The inferior thyroid artery, which was referred to as a thyroidea ima by Röhlich, arose at the bifurcation of the brachiocephalic trunk. The path of the phrenic nerve was displaced laterally, passing inferior to the suprascapular artery. Configuration and variability of thyrocervical trunk was explained by Lischka MF *et al*¹² Lischka *et al*.¹² described two cases where arteries passed through the anterior scalene muscle, one on the left side and one on the right. The opening in the anterior scalene muscle in both cases was a tendinous arch through which the thyrocervical trunk or its branches passed. The internal thoracic artery originates from the thyrocervical trunk in approximately 10% of cases^{3,12,13} When this occurs on the left side, it makes the use of the internal thoracic artery in coronary artery bypass surgery risky in that severe blood flow diversion could occur that can result in a symptomatic coronary steal phenomenon leading to pain, limitation of shoulder movements, and ultimately, even additional surgery. Maria Bartanuszova, *et al*¹⁴ found a rare case of the thyrocervical trunk passing through the anterior scalene muscle bilaterally was found during dissection of a cadaver Lopez *et al*¹³ stated that most frequent type of branching pattern of Thyrocervical trunk is two. In their study Ascending cervical arose from Transverse cervical or from Thyrocervical trunk In 88,47 % (23 sides) of the specimens the inferior thyroid artery is a constituent of the thyrocervical trunk, In 88,47 % (23 sides) of the specimens the inferior thyroid artery is a constituent of the thyrocervical trunk, Humberto Ferreira¹⁰ observed that Inferior thyroid artery takes origin from Thyrocervical trunk in 88.47% (23 sides) of specimens, in 11.53% (3 sides) originated directly from Subclavian artery. During an Aortic angiographic study anomalous origin of left internal artery from left Thyrocervical trunk was observed by Abdulelah Nuqali¹

CONCLUSION

Origin; From first part of SCA in all specimens in both sides. In all specimens, Thyrocervical trunk and its branches passes in front of Scalenus Anterior muscle. Branching pattern of TCA Commonest branching pattern of Thyrocervical trunk is 3 branches namely IT, TC, SS Right side: Three branches-IT, TC, SS –in 35% (14/40) of specimens Left side; Three branches-IT, TC, SC-82.5% (33/40) of specimens. As Inferior Thyroid artery is one of the important source of blood supply to Thyroid gland,

related to recurrent laryngeal nerve Knowledge about origin, and any accessory branches of INFERIOR THYROID ARTERY will be definitely helpful to surgeons while performing thyroid surgeries. Orthopaedic surgeons while removing the cervical rib care should be taken to avoid damage to subclavian artery and its branches like transverse cervical artery. So that they can prevent undue postoperative haemorrhage. The Plastic surgeons while they are undertaking Head and neck reconstructive surgeries they have to take trapezius (Musculo cutaneous) flap which is supplied by dorsal scapular artery and at that time they must be aware of the origin and variant pattern of the above said Dorsal scapular artery so that rejection of the graft will not take place in the post operative period Like this way, in each and every branch of medicine especially surgery a thorough Anatomical knowledge about the Thyrocervical trunk and its branches will be of immense value. In this aspect my study regarding the Branches of Thyrocervical Trunk one of the branch of subclavian artery on both sides, will be of definite use to the respective operating surgeons. knowledge about normal anatomy and variations of Thyrocervical trunk is necessary for various diagnostic and therapeutic interventions

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