

# Meandering Arteria Thyroidea Ima, an Anatomical Case Report

Mangala M. Pai<sup>1</sup>, Vandana Blossom<sup>1</sup>, Latha V. Prabhu<sup>1</sup>, B.V. Murlimanju<sup>1</sup>

<sup>1</sup>Department of Anatomy, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India-575001

**Disclose and conflicts of interest: none to be declared by all authors**

## ABSTRACT

**Introduction:** we report a case of arteria thyroidea ima, which originated as a branch from the brachiocephalic trunk. This variant artery was supplying the isthmus of thyroid gland and the inferior aspect of left lobe. The inferior thyroid artery was absent over the left side. It was also observed that, there was solitary inferior thyroid vein, which was arising from the left lower pole of thyroid and this was draining into the brachiocephalic vein of right side. Both the thyroidea ima artery and inferior thyroid vein had tortuous course, which were running anterior to the trachea, slightly towards the left side. The isthmus of thyroid gland was high located, obscuring the cricoid cartilage. We believe that, reporting of this case will enlighten the head and neck surgeon. The preoperative knowledge about the thyroidea ima artery and variation of inferior thyroid vein are essential to the operating surgeon to prevent the complications like catastrophic bleeding.

**Keywords:** Anatomic Variation; Arteries; Thyroid Gland.

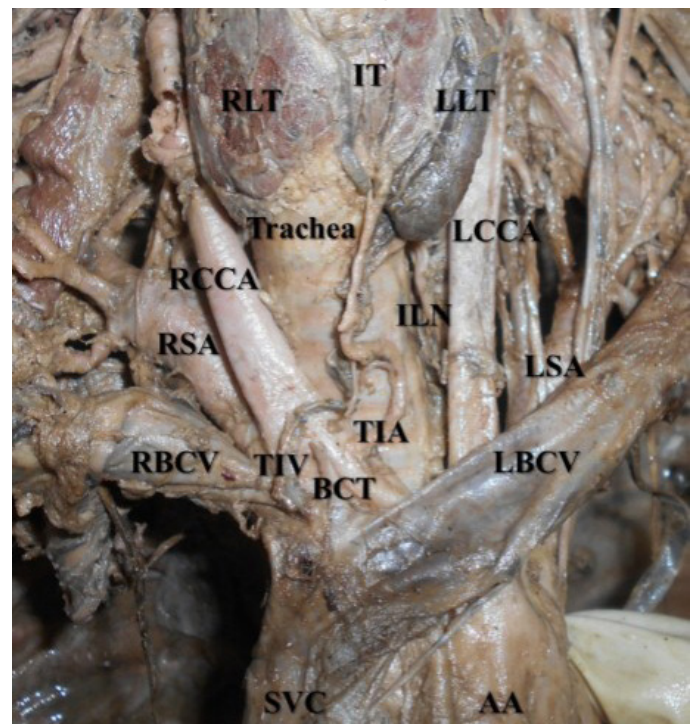
## Introduction

The success of thyroid surgery requires knowledge about thyroid gland anatomy and pathology.<sup>1</sup> Thyroidectomy is among the commonest surgeries being performed worldwide,<sup>2</sup> the postoperative complications, of which include hematoma formation with subsequent compression, injury to the recurrent laryngeal nerve and parathyroid deficiency. These account for the significant medico-legal problems.<sup>3</sup> Thyroid is an important endocrine gland, which is located at the middle of the neck. Each lobe of thyroid has a pair of arteries supply it, superior and inferior thyroid arteries. These are branches from the external carotid and subclavian arterial system respectively.<sup>2</sup> It was reported that, 4-10% of people will have another artery supplying the thyroid gland, which is given the name 'thyroidea ima artery'.<sup>4</sup> Thyroidea ima artery may arise as a branch from the arch of aorta, common carotid artery, subclavian artery and brachiocephalic trunk. The aim of the present study is to report a rare case of 'thyroidea ima artery', which originated from the brachiocephalic trunk.

## Case Report

During the dissection procedure of a male embalmed cadaver aged about 60 years, a variant artery (Fig. 1) was noticed at the anterior aspect of the neck. This artery was then identified as the "thyroidea ima artery", since it was supplying the thyroid gland. This "arteria thyroidea ima" was observed to be a branch arising from the brachiocephalic artery and this was providing nutrition to the isthmus and the lower pole of the left lobe. There was solitary inferior thyroid vein, which opened into the brachiocephalic vein over the right side. It was observed that the thyroidea ima artery and inferior thyroid vein were having the

tortuous course (Fig. 1). They were running anterior to the trachea, slightly towards the left side. The inferior thyroid artery was absent over the left side, however this was present over the right side. Both the superior thyroid arteries were observed at their usual location. We could also able to figure out that the thyroid gland was higher in position, the isthmus of which was found anterior to the cricoid cartilage.



**Figure 1.** Photograph showing the "thyroidea ima artery" (TIA), which originated as a branch of the brachiocephalic trunk (BCT). This TIA had a tortuous course and supplying the isthmus (IT) and the inferior pole of the left lobe of the thyroid gland (LLT) (RLT-right lobe of the thyroid gland; RCCA-right common carotid artery; LCCA-left common carotid artery; RSA-right subclavian artery; LSA-left subclavian artery; ILN-internal laryngeal nerve; RBCV-right brachiocephalic vein; LBCV-left brachiocephalic vein; TIV-inferior thyroid vein; SVC-superior venacava; AA-arch of aorta).

## Discussion

The preoperative knowledge about the thyroidea ima artery is essential to prevent the complications. It is good to have the knowledge about this rare and unusual arterial variation, for an operating thyroid and neck surgeon.<sup>5,6</sup> The dissection of substernal thyroid by using the fingers is commonly performed during the thyroidectomy. In this finger dissection, the index finger is pushed inferiorly upto the superior mediastinum and is swept until the glandular tissue is separated from the pleural adhesion. If there is a thyroidea ima artery in such cases, it will be ruptured causing catastrophic bleeding, which may require emergency sternotomy.<sup>5</sup> The preoperative knowledge about this artery is also essential during the percutaneous tracheostomy.<sup>7</sup>

It was described that, any variant artery originating from the innominate artery, subclavian and common carotid arteries, aortic arch and internal thoracic artery, which supplies the thyroid gland is considered as the thyroidea ima artery.<sup>8</sup> The knowledge about arterial variations in the neck may be of greater significance in the diagnosis and management of cervical pathologies.<sup>9</sup> The information of the usual and unusual arteries is important during the surgical procedures of the thyroid, parathyroid and the larynx.<sup>10</sup> The information about thyroidea ima artery is essential to perform angiogram prior to the thyroid and parathyroid surgeries. This artery will be missed if there is no knowledge and it will not be injected during an angiogram.<sup>11</sup>

Thyroidea ima artery is also known as 'the artery of Neubauer', since this was named after German anatomist, Neubauer in 18<sup>th</sup> century.<sup>12</sup> Thyroidea ima artery may arise from brachiocephalic trunk in 1.9-10.6% cases, right common carotid artery in 1.4-1.7% cases, arch of aorta in 0.36% cases.<sup>13</sup> It was reported that, thyroidea ima artery was observed in guinea pigs in 33% cases. This artery is almost always present in rabbits (99% cases) and is a branch of common carotid artery in them.<sup>14,15</sup> Thyroidea ima artery is also found in higher primates like gorillas, chimpanzees and gray langurs.<sup>16</sup> Arteria thyroidea ima can be self-differentiation of the artery and induced

differentiation of the unilateral vascular trunk.<sup>17</sup>

Kimmel<sup>18</sup> reported a case of thyrothymic trunk, which was observed at the anterior mediastinum. This trunk later divided into arteries supplying thyroid and the thymus gland. It was described that, during the intrauterine life, there exists a network of arteries around the lateral and medial aspects of the developing thyroid gland.<sup>19</sup> These network of arteries are branches coming from the brachiocephalic trunk, common carotid artery, external carotid artery, subclavian artery and arch of aorta. Usually, many of these arterial branches will regress, the only arteries that persist are the superior thyroid artery and inferior thyroid artery.<sup>19</sup> In the present case, the thyroidea ima artery was arising from the brachiocephalic trunk. We believe that, in the present case, the embryological thyroid artery that was arising from the brachiocephalic trunk might have persisted instead of regressing.

Mechanical instability may be the reason for the initiation and development of vessel tortuosity.<sup>20</sup> In the present case, it was interesting to see that the thyroidea ima artery and inferior thyroid vein, both were tortuous. The tortuosity of the veins are extremely rare. Here the inferior thyroid artery was absent over the left side. When thyroid ima artery is present, the inferior thyroid artery usually is absent and or may be very negligible in size on one side or both sides.<sup>12</sup> In the present case, the thyroidea ima artery was compensating for the left inferior thyroid artery, which is absent in the present case.

## Conclusion

We believe that this case report is enlightening to the operative surgeons and anaesthesiologists. Misinterpretation of the thyroidea ima artery and injury to it can cause severe bleeding. This is particularly important in procedures like tracheostomy, mediastinoscopy, thyroidectomy and other anterior neck surgeries. The preoperative or intraoperative identification of this artery and the variant vein as observed in the present case is of paramount importance.

## References

1. Clemente CD .Gray's anatomy. 30th American edition,1985;The Veins, Lea and Febiger, Philadelphia, 820- 821.
2. Moore KL, Dalley AF II .Clinically oriented anatomy. 5th ed. Lippincott Williams & Wilkins, Baltimore,2006; 748-749.
3. Susan Standring. Gray's Anatomy. 41st edition. Elsevier: 2016; 828-830.
4. LeDonne J . Percutaneous cephalic vein cannulation (in the deltopectoral groove), with ultrasound guidance. J Am Coll Surg,2005; 810-811.
5. Romans GJ .Cunningham's manual of practical anatomy. 15th edition (volume 1). Oxford university press, 1986; 22-28.
6. Povoski SP. A prospective analysis of the cephalic vein cutdown

- approach for chronic indwelling central venous access in 100 consecutive cancer patients. Ann Surg Oncol 2000; 7:496-502.
7. Kincaid EH, Davis PW, Chang MC, *et al.* Blind placement of long-term central venous access devices: report of 589 consecutive procedures. Am Surg 1999; 65:520-554.
8. Wu CF, Po PJ, Wu CY, *et al.* A single-center study of vascular access sites for intravenous ports. Surg Today 2014; 44:723-731.
9. Aitken DR, Minton JP. The pinch-off sign": a warning of impending problems with permanent subclavian catheters. Am J Surg 1984; 148:633-63.
10. Hinke DH, Zandt-Stastny DA, Goodman LR, *et al.* Pinch-off syndrome: a complication of implantable subclavian venous

access devices. *Radiology* 1990; 177:353–356.

11. Biswas S, Sidani M, Abrol S. Emergent median sternotomy for mediastinal hematoma: a rare complication following internal jugular vein catheterization for chemoport insertion—a case report and review of relevant literature. *Case Rep Anesthesiol* 2014; 190172.Epub.

12. Al-Mufarrej F, Martinez-Jorge J, Carlsen BT, *et al.* Use of the deltoid branch-based clavicular head of pectoralis major muscle flap in isolated sternoclavicular infections. *J Plast Reconstr Aesthet Surg* 2013; 66:1702–1711.

13. Okada M, Ikeda M, Uemura T, *et al.* A propeller flap based on the thoracoacromial artery for reconstruction of a skin defect in the cervical region: a case report. *J Plast Reconstr Aesthet Surg* 2013; 66:720–722.

14. Onoda S, Sakuraba M, Asano T, *et al.* Thoracoacromial vessels

as recipients for head and neck reconstruction and case of vascular complications. *Microsurgery* 2011; 31:628–631.

15. Nagaso T, Shimizu Y, Kasai S, *et al.* Extension of jejunum in the reconstruction of cervical oesophagus with free jejunum transfer using the thoracoacromial vessel as recipients. *J Plast Reconstr Aesthet Surg* 2012; 65:156–162.

16. Loukas M, Myers CS, Wartmann CT, *et al.* The clinical anatomy of the cephalic vein in the deltopectoral triangle. *Folia Morphol (Warsz)* 2008; 67:72–77.

17. Ta-Wei Su, Ching-Feng Wu, Jui-Ying Fu, Po-Jen Ko, Sheng-Yueh Yu, Tsung-Chi Kao, Hong-Chang Hsieh, and Ching-Yang Wu. Deltoid Branch of Thoracoacromial Vein: A Safe Alternative Entry Vessel for Intravenous Port Implantation. *Medicine (Baltimore)*. 2015; 94(17): e728.

Received: December 31, 2021

Accepted: January 24, 2022

Corresponding author

B.V. Murlimanju

E-mail: flutemist@gmail.com