

## Case Report

### Thyroidea-Ima Artery: A case report

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#### Abstract

Thyroidea ima artery is a rare anatomical entity that may present in 3-10% of the general population as an embryonic remaining. It is an accessory vesicle for the blood supply thyroid's gland isthmus and lower lobe. The artery may also supply the trachea and the parathyroid gland. The artery may origin from the brachiocephalic trunk, the arch of aorta or even from the left common carotid artery. The knowledge of this vascular anatomic anomaly is important for tracheal, thyroid and parathyroid surgeries. We present a rare case of a thyroidea-ima artery (TIA) that was discovered during thyroid surgery.

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#### Introduction

An extend part of the thyroid gland (TG), the inferior part and the isthmus, is supplied from the inferior thyroid artery (ITA). The upper part (36%) of the gland is supplied from the superior thyroid artery (STA). Occasionally, a small auxiliary artery is present and provides with blood the thymus gland, the thyroid gland and the parathyroid glands. This artery is called as Thyroid IMA Artery (TIA), or lowest thyroid artery. The artery first described from Neubauer in 1772 as an artery that marches along the anterior surface of trachea and can also been found as Neubauer artery. The origin of TIA varies from the brachiocephalic artery 74%, the aortic arch 7.7%, the left common carotid artery 1.9%, the left internal thoracic artery 1.9%, the right common carotid artery 9.6%, the right internal thoracic artery 4.8%, the subclavian artery and the vertebral artery. TIA provides with blood the isthmus and the inferior poles of the thyroid gland and may follow various courses. It is also usual for TIA to coexist with a brachiocephalic-

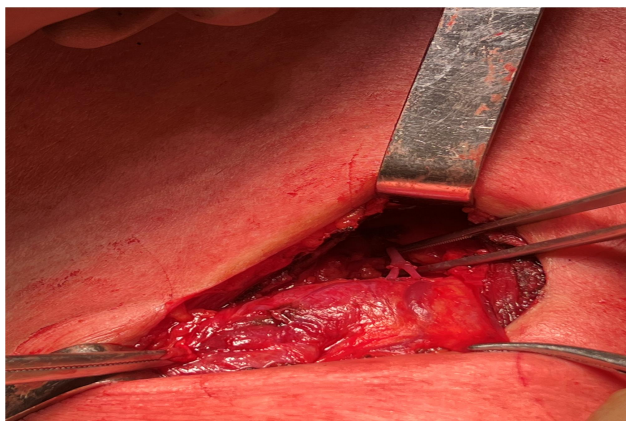
carotid trunk, a devious right subclavian artery of retroesophageal course, a variable march of the inferior laryngeal nerve (non-recurrent and recurrent) and the bilateral absence of the inferior thyroid artery. It is high yield for surgeons to have awareness of the IMA and its variabilities in order to avoid massive intraoperative hemorrhages during tracheotomy and cricothyroidotomy.

We present a rare case of thyroid IMA artery that was identified during a thyroidectomy performed to a male patient.

#### Case report

A 59-year-old Caucasian male underwent total thyroidectomy for thyroid cancer. He had not undergone any other previous surgeries in the thyroid gland. During the operation, the TIA was found arising from left common carotid artery (Figure 1). The superior and inferior thyroid artery and vein recognized, ligated and dissected. During the dissection of the tissues above trachea we found thyroid IMA over the trachea entering the

inferior surface of the gland in the region of isthmus. This is carefully separated from the trachea with a blunt-nosed hemostat and ligated in the usual fashion.



**Figure 1:** The thyroidea-ima artery, during thyroidectomy.

We routinely dissect and expose the common carotid artery before mobilizing the thyroid gland (lateral to medial approach). By this approach, a good vascular control is achieved and inadvertent injury to blood vessels is avoided even if the thyroid gland is large and extending retrosternal. The three structures of significance between common carotid and trachea are the recurrent laryngeal nerve, inferior thyroid artery and middle thyroid vein. Any anomalous vessel in this location can be easily identified and dissected to its origin thereby avoiding injury.

In the present case TIA was found arising from the left common carotid artery and it was dissected and ligated carefully, without injuring it and avoiding any possible bleeding.

### Discussion

Embryologically, the thyroid gland has a rich vascular supply, as it consists one of the most important endocrine glands in the human body. The main arteries that supply blood to

the thyroid gland are the superior thyroid artery, inferior thyroid artery, and sometimes the thyroidea-ima artery (1). Specifically, superior thyroid artery is typically the first branch of the external carotid artery (2). It supplies blood to the upper part of the thyroid gland and gives off branches that provide blood to surrounding muscles and structures in the neck. As regards the inferior thyroid artery arises from the thyrocervical trunk, which is a branch of the subclavian artery. This artery supplies blood to the lower part of the thyroid gland. It usually has two branches: a superior branch and an inferior branch, both of which contribute to the blood supply of the thyroid gland. The TIA is not present in everyone, and when it is present, it can be a variation in the blood supply of the thyroid gland. This artery is relatively small and inconsistent in its occurrence (3,4).

*Developmental anatomy of IMA.* The aortic arch and the thyroid gland format during the 3rd and 7th gestational week. The thyroid gland has an extensive arterial supply, and most of the arteries regress. The remaining arteries that supply the thyroid gland after the birth are the superior and the inferior thyroid arteries. The excessive vascularization of the arteries may lead to the morphogenesis of the thyroid gland. Thyroid defects, cardiovascular variants and also the TIA variation occur from disruptions between thyroid gland morphogenesis and angiogenesis (5).

The thyroid-IMA artery or Arteria thyroidea-ima or thyroid artery of Neubauer, firstly described by the German Neubauer in 1772, is an anatomical anomaly that commonly functions as an accessory blood supply for the isthmus and inferior aspect for the thyroid (6). The artery also supplies the trachea, the parathyroid gland and the thymus gland in rare

cases. The IMA artery occurs in 3-10% of the population as a persistent embryonic remaining (3).

Although thyroid-IMA arises mainly from the brachiocephalic trunk, it may also originate from the aortic arch, the right common carotid artery, the subclavian artery, the cardio phrenic artery, the thyrocervical trunk or the internal mammary artery (7,8). The thyroid-IMA is located on the right side, crosses the trachea to the bottom of thyroid gland and its size varies in 3-5mm in diameter (2). Some studies suggest that ethnic and anthropological factors may affect the incidence of the thyroid-IMA artery concerning people of Asia (10%), compared to the Europeans (6%) (2,8-10). A branch of the superior thyroid arteries or the inferior artery replaces the opposite inferior thyroid artery, when it is absent (1).

*Clinical significance.* Due to its small size and its scarce presence, thyroidea-ima artery can easily be injured during surgical operations. Therefore, an accurate knowledge of the vessels of the thyroid gland, of the parathyroid gland and more specific of the variations and the anomalies of their vessels, is important in order to avoid injury or fatal hemorrhage during thyroid, parathyroid, tracheal, mediastinal surgeries and tracheostomy. However, to our knowledge, there is no specific method for surgeons in order to exclude this possible bleeding, except for their aware of arteries variations and their careful and fine movements (6,7).

Tracheostomy is required in emerge situations where the airway is not open. It can be done either percutaneously or surgically. In the percutaneous tracheostomy, the preferred site of entry is between the first and second or second and third tracheal rings. It is of high

importance that surgeons identify the anatomical landmarks of the cricoid cartilage and the sternal notch. The surgical tracheostomy can be done in the area between the second and third or third and fourth tracheal rings. Thyroid-IMA artery mostly originates from the right side and therefore, the endotracheal tube should be inserted on the left side of the midline. In both cases the thyroid-IMA artery can easily be injured and cause fatal hemorrhage and only the urgent sternotomy can finally control the bleeding and save the patient's life (7).

Therefore, on scheduled surgeries, thyroid-IMA artery is important to have been detected under ultra sound sonography. In all cases, thyroid vessels must be preserved during surgeries, as they supply the endocrine gland (5).

### **Conclusion**

Thyroid-IMA artery may be present with numerous variants. The ignorance of this anatomical variation may lead to massive hemorrhages during surgeries in the trachea, the thyroid and the parathyroid glands. It is of great importance for surgeons to have an adequate knowledge of the regional anatomy and the vascular variabilities so as to avoid fatal complications. It is also of great significance for surgeons to be prepared for the upcoming surgery with multiple scans in order to have a good awareness of the vascular anatomy of the specific incident.

### **Conflicts of interest**

All authors have no conflicts of interest to disclose.

### **Funding Policy**

There is no source of funding for this research.

### Ethical approval

This is a case report for which the patient provided written informed consent. Ethical approval has also been provided by the ethical committee of the General & Anticancer Hospital of Kifissia.

### Consent Form

Written consent for the publication of this case report and accompanying images was obtained from the patient. The consent can be provided to the Editor if he asks so. The written approval of the Ethical Committee of our Institution is also available on request.

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