Original Article

Observation of Arteria Thyroidea Ima in Bangladeshi People: A Postmortem Study

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Received: April 16, 2016 Accepted: December 31, 2017
doi: http://dx.doi.org/10.3329/jemc.v8i1.35432

Abstract

Background*: The thyroid is a brownish red, earliest endocrine gland in mammals. The blood flow to the thyroid gland is very high. The thyroid derives its arterial blood supply from three vessels; of these, the superior and inferior thyroid arteries are fairly constant. The third artery, the thyroidea ima, is an inconstant vessel. Diseases of thyroid may need surgical intervention.This study aims to find out the presence of the arteria thyroidea ima and its origin in Bangladeshi people.* ***Objective****: The present study was carried out on considering the day-to-day growing clinical importance, and insufficient morphological data and arterial supply by thyroidea ima artery of thyroid gland and possible geographical variations in Bangladeshi people. This study will also help in minimizing complications of thyroid surgery and tracheostomy.* ***Materials and Methods****: This descriptive cross-sectional study was carried out on 54 postmortem human thyroid glands collected from individuals aged 5 to 65 years. Thyroid glands were collected from unclaimed dead bodies autopsied in the morgue of Sylhet M. A. G. Osmani Medical College, Sylhet. The collected specimens were examined by careful gross dissection method.* ***Results****: Thyroidea ima artery was present in 3.70% cases, which originated equally from brachiocephalic trunk and arch of aorta.* ***Conclusion****: Presence of this artery must be searched out during thyroid surgery and tracheostomy.*

Key words*: Arteria thyroidea ima; Observation; Postmortem*

J Enam Med Col 2018; 8(1): 25−28

Introduction

The thyroid gland is a brownish-red, highly vascular earliest endocrine gland in mammals and is placed in the lower neck at the level of the fifth cervical to the first thoracic vertebrae.[1, 2]

The immediate coverings of the thyroid gland are – (a) a fibrous capsule and (b) a sheath (the so-called false capsule) derived from the pretracheal layer of deep cervical fascia.[3] The whole gland is enclosed in a thin fibrous capsule and it is divided into lobules of various sizes by septa extending inwards from the capsule.[4] The pretracheal fascia enters the thorax and blends with the apex of the fibrous pericardium. The false capsule is thickened to form the ligament of berry which connects medial surface of the lateral lobe of the gland with cricoid cartilage. The space between the true and false capsules is occupied by the following structures − (a) usually parathyroid glands along the posterior border of the lateral lobes (b) trunks of blood vessels; the venous plexus.[5]

The blood flow to the thyroid gland is very high, averaging 5 to 7 mL/minute per gram of tissue.[6] The thyroid derives its arterial blood supply from three vessels; of these, the superior and inferior thyroid arteries are fairly constant. The third artery, the thyroidea ima, is an inconstant vessel which may replace the inferior thyroid artery as one of the principal vessels supplying the gland.[7] This artery arises most commonly on the right side and ascends in front of the trachea. Its location in front of trachea makes it of great importance in tracheostomy. [8]

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The thyroidea ima artery is an anomalous vessel supplying the thyroid gland and also the enlarged parathyroid glands.[9] It may arise from the brachiocephalic trunk, right common carotid, subclavian or internal thoracic arteries. This small artery ascends on the anterior surface of the trachea, which it supplies and continues to the isthmus of the thyroid gland, where it divides into branches that supply it.[10] It has been said that if there were no such operation as tracheostomy, the thyroidea ima artery would never have been named; it would simply be a variation of the inferior thyroid artery.[11]

Materials and Methods

This descriptive cross-sectional study was conducted in the Department of Anatomy, Sylhet M. A. G. Osmani Medical College (SOMC) from July 2006 to June 2007. The research work was approved by the Ethical Review Committee of Sylhet M. A. G. Osmani Medical College, Sylhet.

This study was done on 54 postmortem human thyroid glands collected from individuals of both sexes (male 43 and female 11) aged from 5 to 65 years at the autopsy laboratory of Department of Forensic Medicine, SOMC. Age and sex of cadavers were collected from records in the register book. All the specimens were collected from medicolegal cases excluding hanging, poisoning, any cutting or crushing injury to the thyroid gland and known case of thyroid disease. Specimens of thyroid gland with related structures were collected by using following procedure.

After placing the dead body on the table in supine position, whole neck of body was closely observed for any scar mark to know whether any type of neck surgery was previously performed or not. The exposure was done by a midline incision from chin to symphysis pubis. In the neck region, the skin and platysma were retracted laterally and the thyroid gland and related structures, e.g., the carotid arteries, internal jugular veins and vagus nerves were identified. After cutting middle of the sternocleidomastoid muscle, it was retracted to its attachments and the thyroid gland was better exposed. In the chest, the skin, superficial fascia and deep fascia were retracted laterally in one flap. Then the pectoralis muscle was cut at its origin and retracted laterally. The costal cartilages of right and left sides were cut vertically along the margins of sternum. Then the clavicle was cut at the junction between medial third and lateral two-thirds. Thus, the piece consisting of sternum, costal cartilages and the medial portion of clavicles was removed as enmass by severing the external intercostal membrane, internal intercostal muscle, transversus thoracis muscle, endothoracic fascia, parietal pleura and the sternopericardial ligament. Then the whole neck and the superior and anterior mediastinum were exposed. Then, an incision was made along the base and the inner aspect of the mandible extending from the chin to its angle, cutting through the attachments of platysma and superficial fascia, anterior belly of digastric, mylohyoid, geniohyoid and genioglossus muscles. The mucous membrane of the floor of the mouth was also cut. Tongue came out from the anterior aspect of the oral cavity. Then other attachments of the tongue and pharynx with the base of the skull and other related structures just below the base of the skull in front of the prevertebral space were cut. Thus the structures were separated from the body as enmass extending from the base of the skull up to the mediastinum which include the thyroid and parathyroid glands, tongue, parts of pharynx, oesophagus, larynx, trachea, thymus, fibrous pericardium, great vessels of the neck, arch of the aorta and its branches, hyoid bone, part of right and left bronchus.[12,13] The collected specimens were fixed in 10% formal saline solution. Dissection was carried out to expose the thyroid glands. During cleaning of inferior pole of each lobe and inferior border of isthmus in front of trachea, arteria thyroidae ima was searched for its presence or absence. When found, its origin was traced and noted.

Results

In this study the arteria thyroidea ima was found in two (3.7%) cases out of 54 cadavers. All of them were found in male cadavers (Tables I, II).

Table I: Observation of arteria thyroidea ima

Arteria thyroidea ima	Male	Female	Total (%)
Present	2	0	2 (3.70)
Absent	41	11	52 (96.30)
Total	43	11	54 (100)

Table II: Observation of origin of arteria thyroidea ima

Origin	Number	Percentage
Arch of Aorta	1	50
Brachiocephalic trunk	1	50
Total	2	100

Disscussion

In the present study thyroidea ima artery was found in 3.7% cases of which 50% originated from brachiocephalic trunk and 50% from arch of the aorta.

Rimi[13] studied with arterial pattern of thyroid gland on 57 cadavers and observed 6 (10.5%) had thyroidea ima artery. Regarding the origin of the artery 50% had originated from brachiocephalic trunk followed by 33.3% from arch of aorta and 16.7% from right common carotid artery. Hamilton[14] described that in a small proportion of cases (2–12%) an additional artery, the thyroidea ima, supplies the lower part of the gland and arises from either the brachiocephalic artery, the right common carotid artery or the arch of the aorta. Fallen & Scharer[15] described that in 1.5–12.2% of cases a thyroid ima artery may be present. Findings of the present study are conformed with the above descriptions.

Toni et al[16] had 50 studies of which 40 cadaveric, others surgical or injection/corrosion studies. Mostly the studies were in vivo angiographic reports using either conventional or digital subtraction techniques and one was a radiographic investigation of cadaver vessel. Besides, by dissection of the lowest accessory thyroid artery (ATI), they found a higher prevalence in Asians than in Caucasians (10% vs 6%, $P<0.05$). In contrast, no differences were found between the two groups by in vivo angiography. In both groups, a higher frequencies of thyroidea ima were found on the right side than on the left side ($P<0.05$ in both groups). Both in Caucasians and Asians origin from brachiocephalic trunk was the most frequent, followed by that from the internal mammary artery, aortic arch and common carotid artery.

The observation and result of the present study will help to increase the information pool on the artery supply of thyroid gland in Bangladeshi people. This study will also help in minimizing complications of thyroid surgery and tracheostomy. We would like to recommend further studies with larger samples and high technical support from different zones including goitre endemic zones of the country with multivariant analysis to correlate different types of anatomical variations with age, sex and metabolic state of the subjects.

Acknowledgement

We are thankful to the teaching and nonteaching staff of departments of Anatomy and Forensic Medicine, Sylhet M. A. G. Osmani Medical College, Sylhet for their great help during collection of specimens, finding age and sex from registers and also for giving time and space during dissection and observing specimens.

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