Original Article

Agenesis Of Isthmus Of Thyroid Gland - A Case Report

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DOI: 10.47750/pnr.2023.14.02.77

Abstract

The thyroid gland is the largest of all endocrine glands and is placed anteriorly in the lower neck in level with fifth cervical and first thoracic vertebrae. It is "H" shaped with two large lateral lobes, connected by a narrow isthmus in the midline. The gland bears very important clinical significance; both physiologically and pathologically. We report a case of complete agenesis of thyroid isthmus found during routine cadaveric dissection for the purpose of teaching learning of medial undergraduates at our department. This anomaly is quite uncommon and bears important clinical importance in wide fields of surgical and medical specialties. The embryological basis of the anomaly is high separation of a thyroglossal duct, which can give rise to two independent thyroid lobes with no isthmus.

Keywords: Agenesis, isthmus, thyroid, endocrine, thyroidectomy, variation

INTRODUCTION

The gland is brownish-red and highly vascular and is placed anteriorly in the lower neck level with fifth cervical and first thoracic vertebrae.[1] The gland is bilobed, H shaped with two large lateral lobes, connected in front of the trachea by thyroid tissue called as the isthmus of the gland in the midline. The gland tissue is about 25g in weight and produces hormones triiodothyronine, tetraiodothyronine and calcitonin, which play important roles in normal metabolic activity of the human body. The gland bears very important clinical significance both physiologically and pathologically. Structural variations of the thyroid gland are especially important due to the fact that the gland is the most common site of endocrine tumours with exception of gonadal tumour alone.[2] Consequently it is also the most common endocrine gland that is surgically intervened.[3] We report a case of complete genesis of thyroid isthmus discovered during routine cadaveric dissection for the purpose of teaching learning of MBBS undergraduates at our department. This anomaly is quite uncommon and bears important clinical relevance in wide fields of surgical and medical specialities.

CASE REPORT

Complete absence of thyroid isthmus was found in an 80 years old male cadaver during routine dissection carried out in our department or the purpose of teaching medical undergraduates [Figure - 1]. The gland and the surrounding structures were further dissected carefully, and photographs were taken. Each lateral lobe was approximately 5cm in length, and their location was usual. The texture of the gland was normal with no evidence of growth or nodules. Superior thyroid artery arose from external carotid artery [Figure - 2] which is a usual finding.

No thyroid tissue was found between two lateral lobes, anastomosis between superior thyroid arteries was absent and inferior thyroid veins were also absent. Levator glandulae thyroidae and thyroglossal duct were not found. No skin scar or the fibrosed tissue could be detected ruling out any possibility of thyroid surgery. No other gross variations were found in the same cadaver.

The cadaver used for dissection was obtained through body donation program of our department and informed written consent was obtained from the next of kin for use of cadaver for the purpose of medical teaching and research.

DISCUSSION

Two kinds of endocrine cells are seen in adult thyroid gland, the follicular and the parafollicular cells, or “C” cells which originate from two different embryological cell families. The follicular cells originate from the endodermic cells of the primitive pharynx and the parafollicular cells originate from the neural crest.[4]

The primitive pharynx forms thyroglossal duct whose caudal end bifurcates and gives origin to the thyroid lobes and the isthmus. At the same time that its caudal growth is taking place, the cephalic end of the thyroglossal duct degenerates.[5] The thyroglossal duct dividing high up can give rise to two well separated thyroid lobes without any niche of thyroid tissue between them isthmus, hence such absence of connection can be traced back into its early embryological development.[6]

Morphological and developmental anomalies of thyroid gland have been reported in literature such as hypoplasia, ectopic thyroid, hemiagenesis or agenesis of gland which include one lobe and sometimes the isthmus. Among 71,500 patients who underwent thyroid investigation only ten of them had isthmus hemiagenesis.[7]
Agenesis of isthmus is a rare congenital anomaly and few cases were reported earlier. Isolated thyroid isthmus agenesis is difficult to estimate as it is asymptomatic and subjects usually have normal levels of thyroid hormones.[8]

Thyroid isthmus agenesis, though itself being asymptomatic, can be associated with various other types of dysorganogenesis, such as the absence of a lobe or the presence of ectopic thyroid tissue or familial syndromes and chromosomal aberrations and hence in clinical practice when such a condition is diagnosed, it is necessary to perform a thorough workup to rule out other differential diagnosis.[9,10]

Identification of such variation before surgery becomes vital. Radiologically, diagnosis can be done with scintigraphy, USG, CT, MRI or intraoperatively during surgical procedure.[11]

When the condition is suspected it is necessary to perform an in-depth interview addressing previous surgical procedures in the cervical region (isthmectomies due to neoplasms, decompressive techniques due to thyroiditis or due to transthyroid tracheotomies)[12]

Absence of isthmus can be associated with agenesis of a lobe or the presence of thyroid tissue elsewhere[13] and hence in clinical practice when such a condition is diagnosed; it is necessary to perform a differential diagnosis against other pathologies such as autonomous thyroid nodule, thyroiditis, and so on. While planning for thyroidectomy one should anticipate the variations like ectopic nodules around normally-located thyroid gland and dissection also has to be precise as important nerves and vessels lie in the vicinity of thyroid gland.[14]

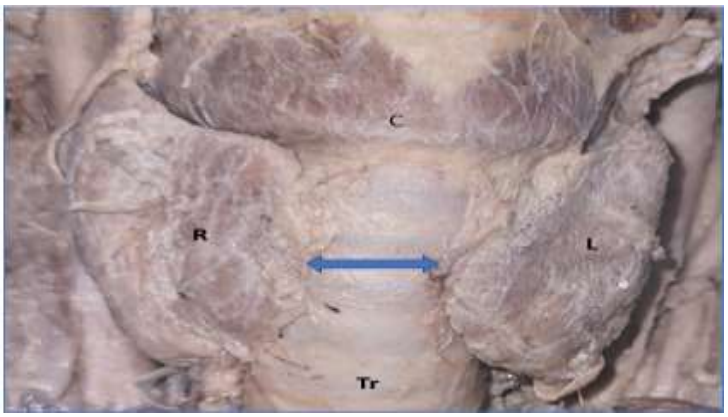

Figure 1: Front of neck showing two lateral lobes of thyroid gland and isthmus being absent

R- RIGHT LOBE
L- LEFT LOBE
C- CRICOID CARTILAGE
Tr- TRACHEA
Blue arrow showing- absence of isthmus

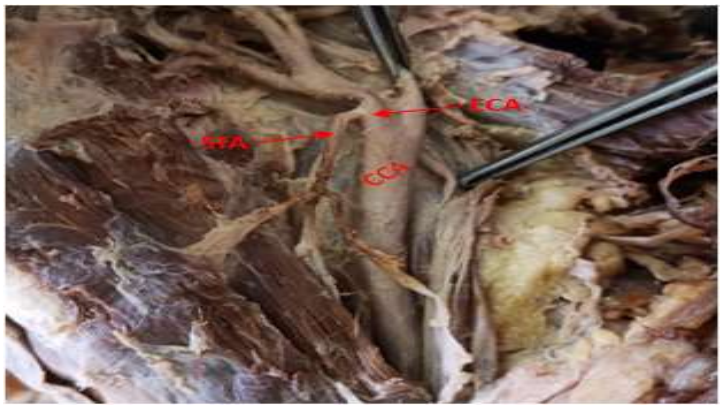

FIGURE 2: Picture showing vasculature around thyroid gland, CCA- Common carotid artery, ECA- External carotid artery, STA- Superior thyroid artery

CONCLUSION

An isolated isthmus agenesis is uncommon. It has an embryological basis, and its occurrence is significant both surgically and medically. The condition should be ruled out before any intervention in the region of neck. If this variation is found its possible cause should be sought after in the form of dysorganogenesis syndromes, chromosomal aberrations or familial conditions.

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