

AGENESIS OF ISTHMUS OF THYROID GLAND

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ABSTRACT

The Thyroid gland, a highly vascular endocrine gland is composed of two lateral lobes, connected by a narrow median isthmus which gives H shaped appearance to the gland. A wide range of morphological and developmental variations of thyroid gland like hypoplasia, ectopic thyroid tissue, hemiagenesis or agenesis of thyroid gland has been reported. During routine midline dissection of neck in the department of anatomy, Agenesis of isthmus of thyroid gland was noted.

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INTRODUCTION

The thyroid gland is a vascular gland placed anteriorly in the lower neck, extending from 5th cervical to 2nd thoracic vertebra. It is covered by pretracheal layer of deep cervical fascia. It has two lobes, right and left, connected by a narrow median isthmus. The isthmus measures 1.25cm in width, positioned anterior to the 2nd and 3rd tracheal ring. A conical pyramidal lobe ascends towards the hyoid bone from the isthmus. Levator glandulae thyroidea descends from the body of the hyoid bone to the isthmus.

The thyroid gland is the first endocrine gland to start developing in the embryo on the 24th day of gestation. So various developmental anomalies distorting the morphology of the gland, thereby causing clinical and functional disorders and various thyroid illnesses is quite common. Persistence of pyramidal lobe and thyroglossal duct cyst are common anomalies whereas agenesis of thyroid gland, aberrant thyroid gland and agenesis of isthmus are rare anomalies. The thyroid gland develops from the thyroglossal duct, endodermal derivative of primitive pharynx, at the level of 2nd and 3rd pharyngeal arch. It descends downwards and its caudal end bifurcates and gives rise to thyroid lobes with isthmus. Here we report a case with absence of isthmus, pyramidal lobe and levator glandulae thyroidea and the clinical implications are discussed.

CASE REPORT

During routine midline dissection of neck in cadavers for undergraduate students, the thyroid gland was explored for any anomalies. Agenesis of Isthmus of thyroid gland was observed in one cadaver. The pyramidal lobe and Levator glandulae thyroidea was found to be absent. Ectopic thyroid tissue was also found to be absent.

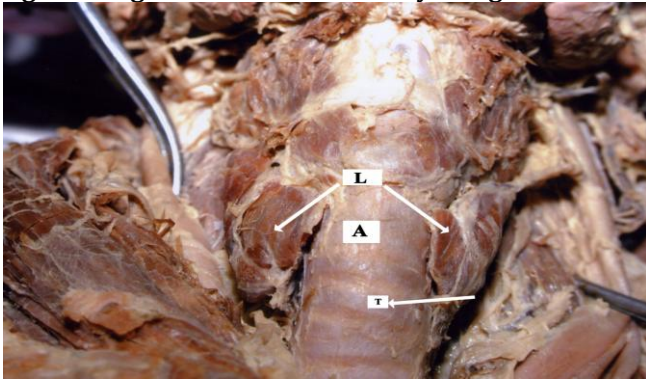
DISCUSSION AND CONCLUSION

Agenesis of isthmus of thyroid gland is a developmental anomaly. Phylogenetically isthmus was absent in amphibians, birds and some mammals like

monotremes, certain marsupials carnivores and rodents. In rhesus monkeys thyroid gland is normal in position with absence of isthmus. Usually agenesis of isthmus is difficult to determine unless the patient reports for other thyroid illness. Agenesis of isthmus does not cause clinical symptoms by itself and diagnosis is secondary due to the existence of other thyroid pathologies. This may be due to mutation of genes associated with thyroid gland. High separation of thyroglossal duct can provoke two independent lateral lobes with or without pyramidal lobes with absence of isthmus. Anson (1996) reported absence of Isthmus in 6 to 8% of cases in his study (1). Defelice M et al (2004) and Dumont JE et al (2005) have reported that genetically developmental agenesis results from mutations in one of these developmental genes [TITF1, PAX8, FOXE1/TITF2], especially TITF2 because, these genes are more essential for the normal development of palate and thyroid gland (2, 3). Ranade et al (2008) reported absence of isthmus in 35 out of 105 cases [33%] of which 8 were in females (4). Devi Shankar K et al (2009) has explained in his studies that the thyroglossal duct arises from the endodermic epithelium of primitive pharynx at the level of 2nd and 3rd pharyngeal arch as it descends downwards, its caudal end bifurcates and gives origin to thyroid lobes (5). So in our case Agenesis of Isthmus is a developmental anomaly, possibly due to high separation of thyroglossal duct resulting in two independent thyroid lobes. Kumar et al (2010) has reported that due to its rare nature Isthmus agenesis should be kept in mind for safe surgery to avoid complications during neck operations (6). Omer Faruk Ozkan et al have reported a case of Agenesis of Isthmus associated with Graves Basedows disease with solitary nodule (7). Clinically the diagnosis of agenesis of isthmus can be done with scintigraphy. It can also be diagnosed with the aid of USG, CT, MRI or during a surgical procedure. When an image of the absence of isthmus is observed, a differential diagnosis against autonomous thyroid nodule, Thyroiditis, Primary carcinoma, Neoplastic

metastasis and infiltrative diseases like Amyloidosis should be considered. Agenesis of isthmus can be associated with dysorganogenesis related to developmental anomalies of thyroid gland such as absence of either lobe or presence of ectopic thyroid tissue. But in the present case there were no other associated anomalies of thyroid gland. The knowledge of this variation is important for surgeons for surgical intervention, physicians and radiologists for further course of diagnosis and therapeutic use. Understanding of thyroid anatomy and associated anatomical variations are very important so that these variations are not overlooked in the differential diagnosis.

Figure 1: Agenesis of isthmus of thyroid gland.



L-Lateral lobes of thyroid gland, A-Absence of isthmus, T-Trachea.

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