

# Aggenesis of isthmus of thyroid gland - a case study

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## Abstract

This paper presents and describes a case of aggenesis of isthmus of thyroid gland. It was found in an old aged male cadaver during routine dissection in the department of anatomy. There was no glandular tissue in the region of isthmus of thyroid gland. There was levator glandulae thyroideae extending from right lobe up to the lower border of hyoid bone.

**Key words:** Aggenesis of isthmus, levator glandulae thyroideae, pyramidal lobe, thyroglossal duct anomalies.

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## INTRODUCTION

The thyroid gland is brownish red & highly vascular endocrine gland placed anteriorly in the neck. It is extending from the fifth cervical to the first thoracic vertebra. It is ensheathed by the pretracheal layer of deep cervical fascia. The gland consists of two lateral lobes connected by a narrow median isthmus.<sup>1</sup> Various studies were carried out on morphology of the thyroid gland. Aggenesis of thyroid isthmus is defined by postor et al<sup>2</sup> as complete and congenital absence of thyroid isthmus. Marshall<sup>3</sup> documented variation in the gross structure of the thyroid gland in 60 children, absence of isthmus was reported to be 10% in few week of gestation to 10yrs of age. The incidence in Northwest Indians was reported to be 7.9%.<sup>4</sup> In study of Daksha Dixit<sup>5</sup> it was reported as 14.6%. Persistence of pyramidal lobe and thyroglossal

duct cyst are the commonest anomalies of thyroid gland while rare anomalies are aggenesis of thyroid gland either partial or total, aberrant thyroid glands and aggenesis of isthmus.<sup>6</sup> Kumar GP et al reported a male cadaver with aggenesis of isthmus and pyramidal lobe, and levator glandulae thyroideae was arising from right lobe.<sup>7</sup>

## CASE REPORT

During routine dissection in the department of Anatomy at R.C.S.M. Govt. Medical College, an old aged male cadaver showed absence of glandular tissue in the region of the isthmus of thyroid gland. Grossly the right and left lobes of the thyroid gland were observed. (Figure-1). The two lobes were connected by the pretracheal fascia. Each lobe was pyramidal in shape having apex and base. The right lobe was 4cm in length, 3.7cm in breadth and 2 cm in thickness. The left lobe was 4 cm in length, 3 cm in breadth and 1.5 cm in thickness.

The location of thyroid gland was normal. The lobes were separated from each other by 2.8cm. Each lobe was supplied by superior and inferior thyroid arteries. There was no anastomosis between right and left superior thyroid arteries. The inferior thyroid veins were seen at the bases of both lobes. Levator glandulae thyroideae was observed extending from right lobe up to the lower border of hyoid bone. (Figure 2) The pyramidal lobe was absent. Ectopic thyroid tissue was absent in the vicinity of thyroid gland.



Figure 1



Figure 2

## Legend

Figure 1: black arrow shows right and left lobes with absence of isthmus.

Figure 2: shows levator glandulae thyroideae arising from right lobe

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## DISCUSSION

Agenesis of isthmus of thyroid gland is a developmental anomaly reported earlier by anatomists and embryologists.<sup>3,6</sup> Usually isthmus agenesis is difficult to determine unless the patients refer for other diseases. Absence of isthmus can be explained as an anomaly of embryological development. The thyroid gland is first endocrine gland to develop in the embryo. It begins to form about 24 days after fertilization from a median endodermal thickening in the floor of the primordial pharynx. This thickening soon forms a small outpouching, the thyroid diverticulum. As the embryo and tongue grows, the developing thyroid gland descends in the neck, passing ventral to the developing hyoid bone and laryngeal cartilages. For a short time the developing thyroid gland is connected to the tongue by a narrow tube, the thyroglossal duct. At first the thyroid diverticulum is hollow but it soon becomes solid and divides into right and left lobes which are connected by the isthmus of the thyroid gland which lies anterior to the developing second and third tracheal rings. By seven weeks the thyroid gland has usually reached its final destination in the neck.<sup>8</sup> The absence of isthmus can be associated with other types of dysorganogenesis, such as the absence of a lobe or the presence of ectopic thyroid tissue.<sup>9</sup> High separation of thyroglossal duct can provoke two independent thyroid lobes with or without pyramidal lobes with the absence of isthmus.<sup>10</sup> Genetically the developmental agenesis is due to the result from mutations in one of three thyroid developmental genes (TITF1, PAX8, FOXE1/TITF2), especially TITF2, because these genes are more essential for the normal development of palate and thyroid gland.<sup>11,12</sup> Agenesis of isthmus can be diagnosed via scintigraphy, ultrasonography, CT, and MRI. When absence of isthmus is suspected, the individual may be directed for a differential pathological diagnosis such as autonomous thyroid nodule, thyroiditis, primary carcinoma, neoplastic metastases, and infiltrative diseases such as amyloidosis.<sup>2</sup> Because of absence of isthmus, there were no anastomosis of superior and inferior thyroid arteries of right and left sides. This type of variations should be kept in mind during transthyroid tracheostomy procedures.<sup>6</sup> Isthmus may be missing in amphibians, birds and among mammals. In rhesus

monkey, the thyroid glands are normal in position but there is no isthmus.<sup>2</sup>

## CONCLUSION

In our case, the agenesis of isthmus of thyroid gland may be due to high separation of thyroglossal duct giving rise to two independent thyroid lobes with absence of isthmus. It was not associated with other anomalies of gland and it indicates that it was congenital. Thorough knowledge of anatomy of thyroid and its associated variation is very essential for surgeons planning for thyroid surgeries and tracheostomy operation.

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