

Case Report

MULTIPLE MORPHOLOGICAL VARIATIONS IN THE THYROID GLAND: REPORT OF TWO CASES

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ABSTRACT

The variety of multiple morphological variations in the thyroid gland is found as a result of disturbed organogenesis in humans as agenesis, hypoplasia, accessory, ectopy and hemigenesis.

In the routine undergraduate dissection of the thyroid gland, multiple anomalies of the thyroid gland were encountered in 50 and 60 years old female and male cadaver respectively. These were in form of absent isthmus with accessory thyroid lobe in between two lateral lobes, pyramidal lobe arising from left lobe of thyroid with levator glandulae thyroideae in first case. Second case showed narrow isthmus related to first tracheal ring and levator glandulae thyroideae arising from left lobe.

In these case studies, we highlight various developmental anomalies of the thyroid gland as absent isthmus, pyramidal lobe and accessory lobe with levator glandulae thyroideae. Hence a thorough knowledge of such morphological variations of thyroid gland helps the surgeons in better planning of safe, effective and uncomplicated operative procedures in resection of thyroid and tracheotomy procedures.

KEY WORDS: Thyroid gland, Pyramidal lobe, Isthmus, Accessory thyroid lobe, Levator glandulae thyroideae, Variations.

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INTRODUCTION

Developmentally, the first endocrine gland in the embryo is the thyroid gland [1]. It is highly vascular endocrine gland composed of two lateral lobes connected by a narrow median isthmus giving an 'H' shaped appearance to the gland [2]. A wide range of multiple morphological variations and developmental anomalies of the thyroid gland have been reported in the literature [3].

Thyroid gland surgery is one of the most common surgeries in head and neck region [3]. The thorough knowledge of anatomical variations of the thyroid gland is important as it is relevant in different types of thyroidectomy and tracheotomy [3]. The risk of damage to parathyroid gland, recurrent laryngeal nerve and hematoma due to vascular damage can be minimized by the knowledge of anatomical variation of the thyroid gland [3]. The anomalies of the development

of thyroid gland distort the morphology of the gland and cause chemical functional disorders and various thyroid illnesses [1,4].

In our case studies, we found multiple morphological variations of the thyroid gland in cadavers as absent isthmus, presence of pyramidal lobe and accessory thyroid lobe, narrow isthmus with levator glandulae thyroidea.

In the present case, we highlight on important rare anatomical variations of the thyroid gland that will help the surgeons in better planning of safe and effective surgeries without complications.

CASE REPORT

Case 1: During the routine dissection of the thyroid gland in a 50 years, averagely built female cadaver in the department of Anatomy, KIMSU, Karad, India, we found multiple

Fig. 1: In situ photograph showed absent isthmus and accessory thyroid lobe (arrow) in between the two lateral lobes of thyroid gland.

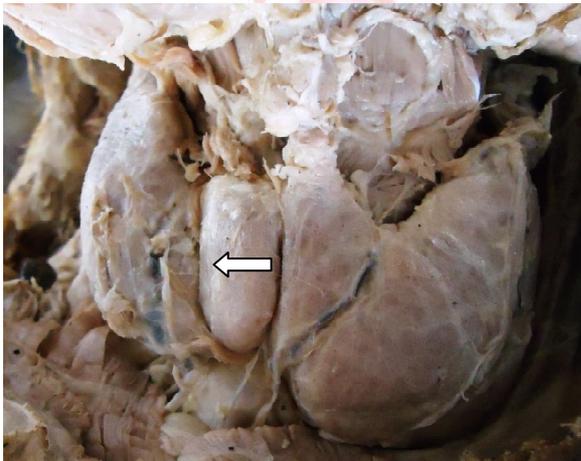
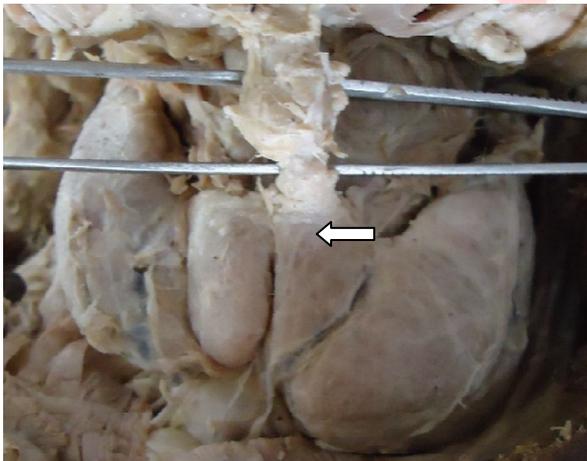


Fig. 2: Pyramidal lobe arising from left thyroid lobe (arrow) with levator glandulae thyroidea.



morphological variations of the thyroid gland as follows:

- Absence of the thyroid isthmus
- Presence of the accessory thyroid lobe in between two lateral lobes (figure 1)
- Presence of left pyramidal lobe (figure 2)
- Presence of levator glandulae thyroidea on the left side.

Case 2: 60 years old poorly build male cadaver, while routine dissection the department of Anatomy, KIMSU, Karad, India we encountered following anatomical variations—

- Presence of narrow isthmus related to the first tracheal ring (figure 3)
- Presence of levator glandulae thyroidea arising from left lobe of thyroid (figure 4)

Fig. 3: Photograph showed narrow isthmus (arrow) related to first tracheal ring.

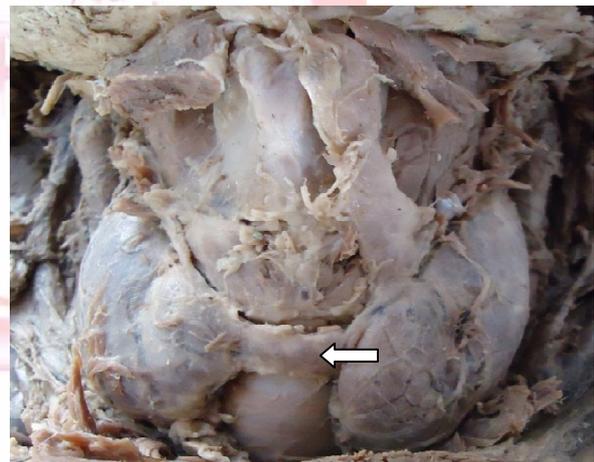
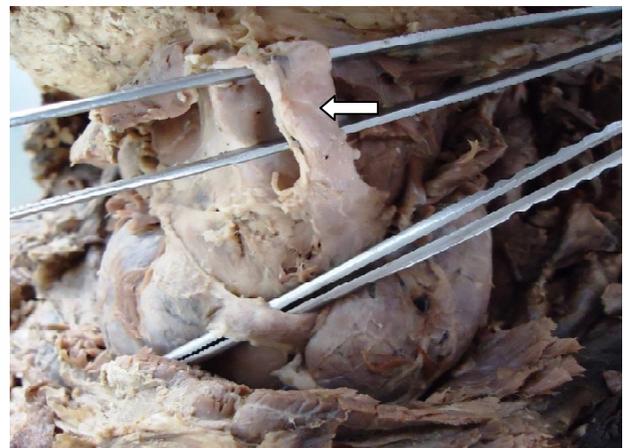


Fig. 4: Levator glandulae thyroidea arising from left lobe of thyroid (arrow) with narrow isthmus.



OBSERVATIONS

In the first case, while dissection the left lobe of the thyroid gland was found to be bigger than right lobe. The isthmus was not found at its

normal site that is 2nd to 4th tracheal rings suggestive of agenesis or absent isthmus. The pyramidal lobe was seen arising from left lobe of the thyroid gland with attached levator glandulae thyroideae. The interesting finding was noted as accessory lobe measuring 2.5x2cms in between two lateral lobes. It was attached to the right lobe and separate from left lobe. The levator glandulae thyroideae connects the apex of pyramidal lobe to the hyoid bone. On further dissection, vascular supply of the thyroid gland was within normal limits. There was no scar mark of post operative measures on the neck. There was no ectopic thyroid tissue between the root of the tongue and the gland.

In the second case, characteristic narrow isthmus measuring 0.6 cms related to the first tracheal ring was noted. The presence of levator glandulae thyroideae from the left lobe measuring 2.5x0.4cms was observed. There was no evidence of post operative mark on neck or ectopic thyroid on further dissection.

DISCUSSION

Historically, a thyroid surgery has been fraught with complications. Injury to the thyroid, parathyroid and laryngeal nerve may result in profound lifelong consequences for the patient [5]. To minimize the morbidity of the operation, a surgeon must have in depth understanding of the anatomy and its variation of thyroid to perform a safe and effective operation [5].

Most of the variations of the thyroid gland are due to a partial persistence of the median or thyroglossal duct [6]. Failure of the development of the entire gland or part of the gland results in agenesis or hemiagenesis, which may be unilateral or isthmic [7]. Many researchers claim that the absence of isthmus is quite rare in humans [8].

Agenesis or absent isthmus(AI) is defined as the complete and congenital absence of the thyroid isthmus as per Pastor et al 2006 [9]. The AI can be explained as an anomaly of embryological development [2]. Thyroid gland begins to develop as a median thickening of endoderm on the floor of the pharynx between the 1st and 2nd pharyngeal pouches. This area later invaginates to form the median diverticulum, which appears in the latter half of the 4th week. This thyroid

diverticulum grows in allometric proliferation becoming a solid cellular cord called as the thyroglossal duct. The duct grows caudally and bifurcates to give rise to thyroid lobes and the isthmus. At the same time that its caudal growth is taking place, the cephalic end of the thyroglossal duct degenerates [2]. A high division of the thyroglossal duct can generate two independent thyroid lobes with the absence of isthmus [2]. The AI can be associated with other types of disorganogenesis, such as the absence of a lobe or the presence of ectopic thyroid tissue.² Aggenesis of isthmus is rare in humans, the incidence varies between 3% to 33% as reported by various authors as cited by Gupta R and Singla RK [10] in Table no.1.

Table 1: Showing incidence of agenesis or absent isthmus (AI) [10].

S.No.	Author and Year	Incidence
1	Won and Chang, 2002	3%
2	Pastor et al, 2006 [9]	1 case
3	Braun et al, 2007	6.90%
4	Ranade et al, 2008 [11]	33%
5	Dixit et al, 2009 [2]	14.60%
6	Joshi SD et al, 2010 [13]	16.60%

In the present case, we found agenesis/absent isthmus with left pyramidal lobe and accessory lobe in between two lateral lobes (Figure 1) with levator glandulae thyroideae.

The accessory thyroid tissue with absent isthmus was noted in 1 case on male cadaver by Ranade et al [11]. In our case same findings were noted as absent isthmus and accessory thyroid lobe.

The pyramidal lobe (PL) should be looked, while thyroidectomy and removed, as failure of its identification can result in incomplete resection of thyroid gland [3]. All thyroid diseases described in the PL, which are formed from normal thyroid tissue [3]. The PL isn't prominent feature of the thyroid gland and it develops from the distal part of the thyroglossal duct [10]. It course can be from the isthmus, the left or right lobe, upwards in the form of a short stump or a long process that can reach the upper border of the thyroid cartilage or even the hyoid bone [12]. Since Laloutte gave this entity its name in 1789, also called as Laloutte's lobe [12]. The findings about the variations and frequencies of the pyramidal lobe in the literature has been

described. The incidence of the PL varies between 7% to 77% as cited by Gupta R and Singla RK [10].

Table 2: Showing incidence of the pyramidal lobe (PL) [10].

S.No.	Author and Year	Incidence
1	Won and Chang, 2002	76.80%
2	Braun et al, 2007	55%
3	Ranade et al, 2008 [11]	58%
4	Dixit et al, 2009 [2]	7.31%
5	Joshi SD et al, 2010 [13]	33.70%

The PL forms a long pyramid which is attached by its base to the superior border of the isthmus, usually at its junction with the left lobe. Its apex is attached to the body of the hyoid bone by a fibrous band which is sometimes contains muscular fibers, known as the levator glandulae thyroidae (LGT) [12]. It is seldom in the midline in position also called as 'levator glandulae thyroidae of Soommerring' as per literature [13].

The LGT was present in 30% of cases as per Joshi SD et al [13]. LGT was attached to the hyoid bone in 66.66% as per Joshi SD et al. [13] Same finding was seen in our case (LGT arises from left lobe of thyroid and attached to hyoid bone in both cases). In the second case, LGT from left lobe and narrow isthmus related to the first ring was noted. The isthmus is normally related to 2nd to 4th tracheal ring. Joshi SD et al [13] summarized their findings as narrow isthmus related to 2nd tracheal ring in 3 cases. The position of the isthmus was found to be higher to the cricoid cartilage in 3 cases and lower up to 5th tracheal ring in one instance [13].

Clinical significance: The diagnosis of the agenesis of isthmus and accessory lobe of the thyroid can be made with scientigraphy, ultrasonography, computerized tomography, magnetic resonance imaging or during a surgical procedure. When absent isthmus was observed, a differential diagnosis against thyroid nodule, thyroiditis, primary carcinoma, neoplastic or metastatic and infiltrative diseases such as amyloidosis should be considered [9].

Pyramidal lobe is an accessory lobe and is normal component of the thyroid gland, in various positions and sizes and with pathological changes in benign and malignant diseases should be examined during surgery and

always removed in total and subtotal thyroidectomies to prevent local recurrence of benign and malignant diseases [13].

CONCLUSION

Through training and knowledge of the thyroid anomaly and its associated anatomical variations are very much essential, so that these anomalies may not be overlooked in the differential diagnosis. Therefore, such case studies highlight the multiple morphological variations in the thyroid gland, which forms a counter stone for safe, uncomplicated and effective surgical procedures.

Conflicts of Interests: None

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