Study of a Unique ‘Inverted U’ Shaped Thyroid Gland and Its Clinical Importance

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Abstract Thyroid anomalies are not uncommon. Two lobes are usually connected by isthmus at the level of 2–4 tracheal rings. We encountered a unique variation in which thyroid lobes were connected near upper pole by an isthmus at the level above the cricoid cartilage giving an ‘inverted U’ shape to the thyroid gland. Such unusual variation in thyroid gland has not been reported earlier in the literature. The sound knowledge of such variation should be important to the surgeon while operating on thyroid.

Keywords Thyroid gland · Anomalies · Isthmus · Variations

Introduction

Thyroid is a ductless, endocrine gland, enclosed in a facial sheath formed by pretracheal layer of deep cervical fascia. The two lobes are connected by an isthmus. Isthmus usually located against 2nd to 4th tracheal rings [1, 2]. Isthmus may be more or less fused with one of the lobes Marshall [3], isthmus may be abnormally large or very narrow or entirely absent [4, 5]. Depending upon the variations, there could be advantages or disadvantages. Each variation has its own

uniqueness. In present case uniqueness of a variant of thyroid gland and its clinical importance is being discussed.

Case Report

During routine dissection of neck region of 85 year old male cadaver a new variant of thyroid was observed. The strap muscles sternohyoid, sternothyroid & superior belly of omohyoid were cut and reflected. Isthmus was not seen at its usual position. The two lobes were seen connected by an isthmus above the cricoid cartilage giving a shape of ‘inverted U’ to the thyroid gland (Fig. 1). Superior thyroid pedicle was identified. Superior thyroid artery and external branch of superior laryngeal nerve were identified both were seen running close to each other till nerve enters the cricothyroid muscle. Middle thyroid veins were absent. Inferior thyroid veins are seen at the lower poles of each lobe. Whole of the trachea below the cricoid cartilage was bare. No isthmus or vessels observed crossing the trachea anteriorly.

Discussion

It is the first endocrine gland to develop. Thyroid gland primordial is usually identifiable in fourth week of gestation. It begins as an endodermal invagination from the foramina caecum at the base of the tongue. During descent it remains connected by thyroglossal duct which disappears later on. It reaches up to the level of cricoid cartilage. Lower end bifurcates to form two lobes which attain definitive position by seventh week and two lobes remains connected by an isthmus [2, 6–8].

In present case isthmus was found at much higher level connecting upper poles of the two lobes. The diverticulum

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Fig. 1 Illustration showing inverted U shaped thyroid gland. STA superior thyroid artery, ITV inferior thyroid vein

Fig. 2 Illustration showing development of inverted U shaped thyroid gland. TD Thyroglossal duct, L Lobes

bifurcates to form two lobes. The descent of primordium is arrested at cricoid (Fig. 2). The persistence of this could be responsible for the formation of the isthmus at this level. Won and Chung [9] described six forms of thyroid glands, but this variant doesn't fit in this classification. Marshall [3] described variations in the form of the thyroid gland from 60 cases but none matches with this form.

This type of variant of thyroid gland is clinically important, because high isthmus can be missed while operating on thyroid. Mobilization of upper pole could be difficult as superior thyroid vessels and external branch of superior laryngeal nerve lie very close throughout their course, which make their isolation difficult. External branch is likely to get damaged in such situation. Younes

and Badran [10] suggested thyroidectomy through a cricothyroid space by creating a window between superior pole of thyroid and cricothyroid muscle. In this situation, care should be taken while creating a window as isthmus lies over it.

As compared to the superior pole, mobilization of lower pole is easy as it could be approached medio-laterally. Recurrent laryngeal nerve can be protected in this situation. Inferior thyroid veins usually seen below the isthmus but in this case they are seen at lower pole of each lobe where these can be identified and ligated easily. Also the anterior surface of the trachea is almost bare. No structure crossing it. This advantage should be taken by the surgeon of this ideal thyroid for tracheostomy.

Conclusion

Good thyroid surgery requires sound knowledge of normal anatomy of thyroid region and its variations together with technical ability, and if we are to avoid complications, teaching proper surgical technique is essential. Surgeon must keep in mind the advantages and difficulties to be faced in such situations. Care should also be taken that no tissue should be left during total thyroidectomy in such variants.

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