

CASE REPORT

An Anomalous Middle Thyroid Vein: a case report and a short review of the vascular anatomy of thyroid gland

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Abstract

The thyroid gland is an endocrine organ in the anterior neck having a complex vascular network comprising of paired arteries and veins. Variations in this anatomy are significant for surgical procedures involving the thyroid and parathyroid glands. A 40-year-old euthyroid female who underwent total thyroidectomy for a multinodular goiter, was found to have a rare anomalous middle thyroid vein which originated from the upper pole of the right lobe, separate yet alongside the superior pole vascular pedicle. This was in stark contrast to its normal anatomy where the vein arises from the middle portion of the lobe and traverse laterally in front of the common carotid artery to terminate in the internal jugular vein. Understanding such variations is critical in order to avoid complications during surgical interventions.

Keywords: Thyroid gland, middle thyroid vein, anomalous

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Introduction

The thyroid gland is an endocrine organ situated in the anterior neck having numerous physiological functions including regulation of metabolism, growth and calcium homeostasis (1,2). To cater to its high metabolic demand, it has a rich blood supply composed of interconnecting arterial cascades and veins. Two branched arteries; superior, inferior thyroid arteries and the occasional thyroid ima artery provide oxygenated blood to the gland. Venous outflow is by superior, middle and inferior thyroid veins which drain to internal jugular (IJV) and brachiocephalic veins (2,3). Of these, the superior and inferior veins are constants whereas the middle thyroid vein may be absent in some. Most anatomical variations in terms of termination and number occur in the inferior thyroid artery (1). Such variations and anomalies of these vessels are crucial to consider during thyroid and parathyroid surgeries.

Case presentation

A 40-year-old euthyroid female presented with a multinodular goitre (MNG) to surgery clinic. She did not exhibit symptoms or signs of obstruction or malignancy. Thyroid stimulating hormone (TSH) level was normal at 1.649 mIU/L. Ultrasonography showed a MNG with three nodules; two on the right lobe were radiologically benign and one Thyroid Imaging Reporting and Data Systems (TIRADS) 3 nodule on the left lobe. The TIRADS 3 nodule was subjected to fine needle aspiration (FNA) which revealed a follicular neoplasm. She was then offered total

thyroidectomy during which an anomalous right middle thyroid vein (MTV) was identified. Left sided vascular anatomy was unremarkable (Figure 1).

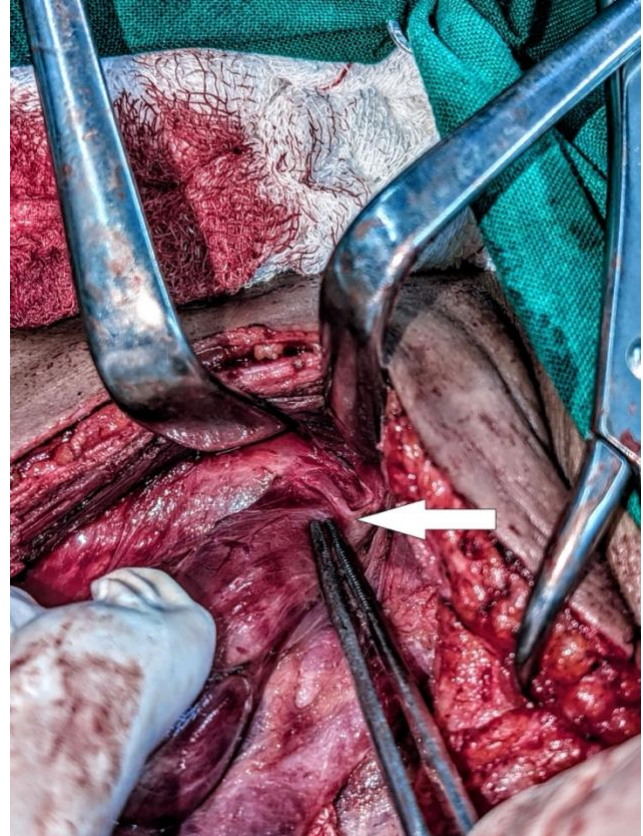


Figure 1: Middle thyroid vein (MTV) originating from upper pole shown by arrowhead

To visualize the vein during surgery, the gland was medially retracted while the strap muscles were retracted laterally. The right MTV was seen to arise as two veins from the upper pole and uniting 1.5cm lateral to the lateral border of the upper pole. This was alongside the superior vascular pedicle yet had a separate origin. The vein then followed its typical route laterally in front of the common carotid artery to terminate at the IJV. The two veins leaving the gland were ligated separately and divided, and the rest of the operation proceeded routinely (Figure 2).

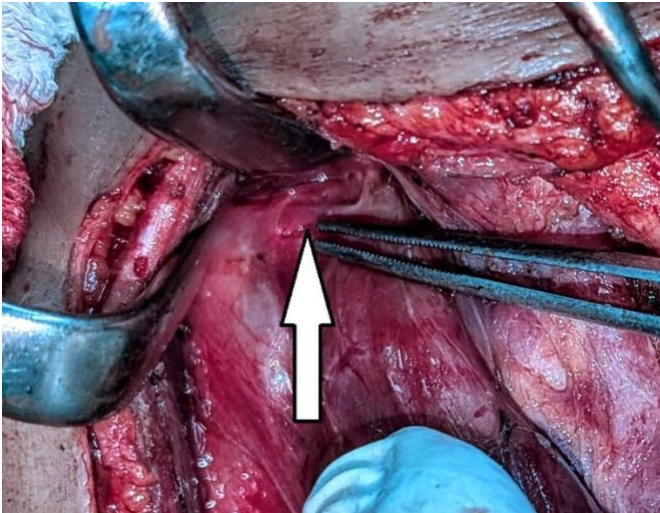


Figure 2: Arrow showing middle thyroid vein (MTV) traversing laterally towards the Internal Jugular Vein (IJV)

Discussion

Arterial Supply

The thyroid receives blood from superior and inferior thyroid arteries supplemented by the occasional thyroid ima artery (2,3). Superior thyroid artery (STA), the first branch of the external carotid artery enters the gland superiorly as a single entity and divides within the gland itself (2). This vessel may occasionally arise from the common carotid artery or its bifurcation (3). STA is closely related to the external branch of the superior laryngeal nerve which must be preserved during surgery (3). The inferior thyroid artery, a branch of the thyrocervical trunk (which itself is a branch of the subclavian artery) enters the mid portion of gland on its lateral aspect and is often branched before entry. This vessel crosses the recurrent laryngeal nerve near its termination and extreme caution needs to be exercised during ligation. These two

arteries form an extensive network of anastomoses within the gland so that the metabolic demands of the gland are met. In about 10% of the population, an additional artery, the thyroid ima with a variable origin enters the gland inferiorly and enter through the isthmus (2,3).

Venous drainage

The thyroid is drained by three main veins: superior, middle and inferior thyroid veins. The left lobe may additionally drain via the vein of Kocher (1). These veins arise from thyroid venous plexus within the true thyroid capsule. The superior thyroid vein emerges from the upper pole and accompanies the superior thyroid artery and drains into the internal jugular vein (IJV) or the common facial vein (1,2). The inferior thyroid veins emerge from the lower pole and traverses inferiorly, anterior to the right brachiocephalic artery and drain to the right or left brachiocephalic veins. These paired vessels may sometimes unite to form the thyroid ima vein and drain singly to either of the brachiocephalic veins (1).

The middle thyroid vein (MTV) is the shortest of the three and is not constant. Different studies have shown varied prevalence of the vein. A review on vascular variations of the thyroid depicted that the MTV was observed 29%, 43.3% and 55.2% among cases in 3 different studies (1). When present, it usually originates at the lateral aspect of the middle portion of the gland and crosses in front of the common carotid to enter directly to the IJV (4,5). This is in contrast to the present case where the vein originated as two twigs from

the anterior aspect of the upper pole. The clinical implication being that the anomalous vein is at risk of avulsion from the IJV during upper pole mobilization if not properly identified, potentially causing catastrophic hemorrhage. Reports and studies describing variations in anatomy is important so that they can be anticipated, and surgery can be tailored accordingly.

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Author contributions

All authors discussed the case. SMPV and MAAS compiled the initial draft. BS critically analyzed the case. All authors approved the final draft.

Declaration of conflicting interests

Authors declare no conflicting interests with respect to research, authorship or publication of the article

Consent to participate and publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images in her native tongue.

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