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Original Research Article

Middle Thyroid Vein is an Important Landmark During Thyroid Surgery

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Abstract

Introduction: Thyroid surgeries are common surgeries are done in this Hospital. The most trained surgeons are required as the organ is most vital and surrounded by major vessels and nerves. Finding out and guiding some vital structures like Middle Thyroid Vein though this vein is rarely found in patients during surgery. But without identifying the vessel and injury or cutting may lead to fatal complication like haemorrhage and tracheal compression. A protean range of pathologies such as goiter, nodules, thyroiditis and malignancy distort or alter the location and course of these structures and planes. Surgeons attempting thyroydectomy need to have thorough knowledge of embryology and surgical anatomy of the thyroid gland. Aim is to evaluate the prevalence of middle thyroid vein and its consequences.

Method: 72 cases of thyroid swelling are operated after proper diagnosis in M.K.C.G. Medical College & Hospital, Brahmapur, Odisha from 2019 to 2021. A prospective study was done after ethical clearance from the ethical committee of M.K.C.G. Medical College & Hospital, Brahmapur.

Observation: The incidence of middle thyroid vein per lobe was 14%. In all cases MTV was originated from middle part of gland and inserted in internal jugular vein. In 72% cases middle thyroid vein diameter >2mm and in 67% cases its length found to be >1cm. There was a considerably higher frequency of middle thyroid vein in hyperthyroidism (50%) and goitres (30.7%).

Conclusion: Unsuccessful identification or accidental dissection of middle thyroid vein can give rise to intraoperative and postoperative considerable haemorrhage. The study needs to be expanded to verify the incidence of middle thyroid vein. There also is a need for studies designed to inform about the venous vascularization in lobes that do not show any presence of middle thyroid vein.

Keywords: Middle Thyroid Vein (MTV), Thyroidectomy, Goitre, Hyperthyroidism.

Background

The thyroid gland as most important organ situated in the neck which is most important for metabolism in the human body. The thyroid gland normally extends from the level of the 5th cervical vertebra to the body of the 1st thoracic vertebra. The normal thyroid gland weighs about 20 to 25gm in the adult. It has two lobes and a connecting isthmus and an ascending pyramidal lobe. During the fourth week of development, the foramen caecum develops as an endodermal thickening in the floor of the primitive phyarynx at the junction between the first and second pharyngeal pouches, immediately dorsal to the aortic sac. The thyroid gland supplied by two arteries which carry sympathetic fibres with them and is drained by three veins. From a venous plexus on the surface of the gland the superior thyroid vein follows superior thyroid artery and runs along the outer border of omohyoid to terminate in internal jugular vein. The middle thyroid vein is a short channel, which leaves the gland at its middle, crosses the common carotid artery to enter into internal jugular vein. It bleeds torrentially if torn during surgery due to its shortness. The inferior thyroid vein leaves the isthmus at its lower border [1]. Krausen found the pattern given in treatises for the anatomy of the Thyroid veins in only three out of ten dissections, and reports confirm the surgical accidents caused by variations [2]. The earliest account of Thyroidectomy is probably that given by Roger Frugardi of Salerno in 1170 [3]. Thyroidectomy should be an extremely safe and uneventful procedure when performed by a trained endocrine surgeon. The most frequent indications for surgery are uncerainty about the nature of a thyroid mass, or treatment of a large Goitre causing compressive symptoms, thyroid cancer, or Thyrotoxicosis refractory to medical management [4]. Middle thyroid vein is short and stout and also is a fragile structure unsupported by any artery unlike superior and inferior pedicle, Chevrel *et. al* [5]. While Shima *et.al*. the frequency is 55.2%. The diameter is 2±0.8mm and length is 46±18.6mm [6]. The termination of the internal jugular vein was single and the distance in relation to the medial sagittal plane was within 3 cm in 44.4% and more than 3cm away in 55.6% on the right in 81.5% or associated with other veins in 18.5%. Oszukowski and Kosinski found this termination in one case (1.7%) at the vertebral vein [7]. Microscopically, the thyroid is divided into lobules that contain 20 to 40 follicles. There are about $3* 10^6$ follicles in the adult male thyroid gland. Each follicle is lined by cuboidal epithelium cells and contains a central store of colloid secreted from the epithelial cells under the influence of the pituitary hormone TSH [8]. The normal thyroid gland is impalpable. The thyroid gland may be enlarge due to Physiological, Toxic, Neoplastic inflammatory[9]. Different thyroid surgeries such as Hemithyroidectomy, Subtotal Thyroidectomy, near total thyrodiectomy are done for the different causes. There may be complication of thyroidectomy like Haemorrhage, Recurrent laryngeal nerve paralysis, Thyroid insufficiency, Parathyroid insufficiency and Thyroid storm [10].

Aim and Objective

To evaluate the presence of middle thyroid vein and its consequence.

Materials and Methods

Source of Data

72 cases of Thyroid surgery done and study at M.K.C.G. Medical College & Hospital, Brahmapur, Odisha from August 2019 to July 2021.

Methods

Observation during various thyroid surgery. Measurement of length and external diameter of middle thyroid vein, carried out by placing a stainless-steel Divider calliper along each vascular section

and comparing the distance with calibration of a measuring scale.

Length: The horizontal distance from its origin at outer capsule of thyroid to its termination.

Breadth: A segment of vessel cut, open it length wise, measure its circumference and finally, external diameter calculated from it.

Position of vessel carried out by a Divider calliper and measuring scale, using following reference the vertical distance between the termination of middle thyroid vein and the transverse plane passing the upper margin of hyoid bone. The horizontal distance between the sagittal plane passing the termination of Middle Thyroid Vein and its intersection with the mid-sagittal line.

Inclusion Criteria

- All age group.
- Patient of either sex.
- Patient underwent total and near total thyroidectomy.
- Subtotal thyroidectomy.
- Hemi Thyroidectomy and Lobectomy.

Exclusion Criteria

- Patient underwent previous Thyroid and Parathyroid surgery.
- Various Thyroiditis.

Study Design

- Prospective study

All the details of patients, their examination findings and diagnosis and investigation reports were also maintained as per the following proforma given below.

Statistical Analysis

Descriptive statistics were used for analysing the data using SPSS version 20 and results were presented in percentage and simple frequency

Observation

Following observations were noted according to different parameters.

Table 1: Overall incidence of middle thyroid vein

MTV	No. of Cases	Percentage
Present	14	19.44
Absent	58	80.56

The MTV was found in 14 patients, out of 72 patients, underwent various thyroid surgery.

Table 2: Incidence of middle thyroid vein per each thyroid lobe

MTV	No. of Cases	Percentage
Present	18	14
Absent	110	86

The above table show 18 (14%) cases middle thyroid vein was present and 110 (86%) cases it was absent.

Table 3: Side wise distribution of middle thyroid vein

Side	Present	Absent	Percentage
Left	11	55	16.6
Right	7	55	11.2

In the present scenario incidence of MTV is more in left than right. Out of 66 cases on left lobe. MTV present in 11 cases, and out of 62 cases on right lobe, MTV present in 7 cases.

Table 4: Length of middle thyroid vein

Length	No. of Cases	Percentage
< 1 cm	7	38.9
> 1 cm	11	61.1

The table show that the middle thyroid vein was varied length. Out of 18 cases. 7 cases (38.9%) were length <1cm, 11 cases (61.1%) were length >1cm.

Table 5: Diameter of middle thyroid vein

Diameter	No. of Cases	Percentage
< 2 mm	5	27.8
> 2 mm	13	72.2

The above table shows that middle thyroid vein were varied diameter. Out of 18 cases, 13 cases (72.2%) were diameter >2mm and 5 cases (27.8%) were diameter <2mm.

Table 6: Incidence of MTV as per histopathology report

HP report	Present	Absent	Percentage
Goiter	8	18	30.7%
Hyperthyroidism	4	4	50%
Neoplasia & other	2	38	0.05%

The above table show that, presence of middle thyroid vein more frequent with hyperthyroidism (50%) and Goiter (30.7%)

Discussion

Table 7: Comparison of presence of middle thyroid veins observed in present and previous studies

Author	Incidence per lobe (%)
Waface *et. al* [11]	43.3
Shima *et. al* [12]	55.2
Dionigi *et. al* [13]	38
Present study	14.06

Conclusion

The description of the variable course of the middle thyroid vein, together with its categorization, may help minimize the risk of intraoperative and postoperative bleeding during surgery. In fact, unsuccessful identification or accidental dissection of middle thyroid vein can give rise to intraoperative and postoperative considerable haemorrhage. Finally, the study needs to be expanded to verify the incidence of middle thyroid vein. However, it is important to point out that it would be a mistake to conclude anything about normal middle thyroid vein anatomy, because the data arise from preselected patients who require thyroid surgery for disease. It would be interesting to correlate these data with vascular casts, venography, or cadaver dissection as well. There also is a need for studies designed to inform about the venous vascularisation in lobes that do not show any presence of middle thyroid vein.

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