



UNILATERAL KOCHER'S VEIN: A CASE REPORT

Anatomy

Mrinmayee Deb Barma*	MBBS, MD Anatomy, Assistant Professor, Department of Anatomy, Sri Lakshmi Narayana Institute of Medical Sciences (SLIMS), Pondicherry. *Corresponding Author
Harshvardhan Ahlawat	MBBS Intern, Jawaharlal Institute of Post Graduate Medical Education and Research (JIPMER), Pondicherry

ABSTRACT

Thyroid gland is highly vascular, extends from C5 to T1 Vertebrae. It measures 5cm in length, 3 cm in breadth and 2 cm in thickness. The average weight of the gland is 20 to 25 grams. Vascular knowledge of the gland carry immense importance as the gland is highly vascular and the close relationships of the vessels with the nerves. In the recent study, we have reported a case of Kocher's vein. This vein if present should be detected early to ligate as injury to this vein may lead to intraoperative profuse bleeding causing complicated surgery.

KEYWORDS

Kocher's Vein, thyroid gland, dilatational tracheostomy

INTRODUCTION:

Among the Sub Himalayan countries, India is the biggest Goiter belt (Muddebihal U et al, 2016)¹. The keystone for any surgery to be effective is the proper understanding of the surgical anatomy, pathology, and training simultaneously. Mortality rate of thyroid surgery is reduced from 20% to 1% by Theodor Kocher. Thyroid gland is highly vascular, extends from C5 to T1 Vertebrae. It measures 5cm in length, 3 cm in breadth and 2 cm in thickness. The average weight of the gland is 20 to 25 grams. The gland is butterfly shaped covered by a true capsule which is the condensation of the fibrous stroma itself and a false capsule derived from pretracheal layer of deep cervical fascia. This gland is butterfly shaped with 2 lateral lobes and one connecting isthmus. Sometimes a third pyramidal lobe may be present, from there an embryological remnant may be present named levator glandulae thyroideae. In the recent study, we have reported a case of Kocher's vein. Vascular knowledge of the gland carry immense importance as the gland is highly vascular and the close relationships of the vessels with the nerves. The arterial supply of the gland is provided by superior thyroid artery which penetrates the gland from its superficial surface. Superior thyroid artery is a branch from external carotid. From deep surface, another artery named inferior thyroid artery originates from thyrocervical trunk. Sometimes, there is an additional supply by some accessory thyroid arteries from the deep surface. These all arteries ramify inside the connective tissue stroma surrounded by the thyroid follicles in the form of capillaries. From the capillaries, number of lobar arteries originate and traverse through the interlobular septa. Talking about the venous drainage, they are not the accompanying veins. Veins are the superior thyroid vein, middle thyroid vein and inferior thyroid vein. These are found in the form of plexus present deep to the true capsule of the gland. Superior thyroid vein runs along the superior belly of omohyoid to drain into the internal jugular vein. Middle thyroid vein runs along the medial border of superior belly of omohyoid, drains into internal jugular vein. Inferior thyroid veins emerge through the inferior border of isthmus and drain into brachiocephalic veins commonly in the left side. Rarely, an additional vein may be present termed as fourth vein of thyroid which is named after Kocher as Kocher's vein. This vein if present, emerges through the lower pole and drains into the internal jugular vein. In the current study, we reported the presence of Kocher's vein in one cadaver among 20 dissected cadavers. This vein if present should be detected early to ligate as injury to this vein may lead to intraoperative profuse bleeding causing complicated surgery. The nerve supply of the gland is derived from parasympathetic and sympathetic nerves. Parasympathetic nerves are derived from Vagus and recurrent laryngeal nerve. Sympathetic postganglionic fibres are derived from superior, middle, and inferior cervical ganglion.

Findings:

Thyroid gland was studied in 20 formalin fixed cadavers, aged between 50 to 80 years. Dissection steps were followed by Cunninghams Manual of Practical Anatomy, volume 3. The strap muscles of superficial plane; sternohyoid medially and superior belly of omohyoid laterally were reflected. Then underlying deep muscles; sternothyroid and thyrohyoid muscles were also reflected. Now we

could see the lateral lobes of thyroid gland sandwiched between the sternothyroid superficially and inferior constrictor muscle of the pharynx deep to it. Then the reflection of sternothyroid makes the thyroid gland clearly visible. After proper study of the presenting parts of the gland, we could find the superior thyroid artery, inferior thyroid artery along with superior thyroid vein and inferior thyroid veins in their constant position. Veins are in the form of plexus underneath the true capsule. Inferior thyroid veins were present in bunch, more than four veins were emerging through the lower border of isthmus and lower pole of the gland and they further drained into the right brachiocephalic vein. Middle thyroid veins were absent in both the sides. In the lower pole of right lateral lobe an additional vein, KOCHER'S vein was found. The diameter and width of the vein was much more than the other veins. It was draining into the medial side of internal jugular vein, closely related to the recurrent laryngeal nerve and branches of Ansa cervicalis supplying the superior belly of omohyoid and sternohyoid, sternothyroid.



Figure 1:
Kocher's vein in the base of right lobe of thyroid gland.



Figure 2:
Ansa cervicalis supplying the sternohyoid and superior belly of omohyoid closely related to the vein

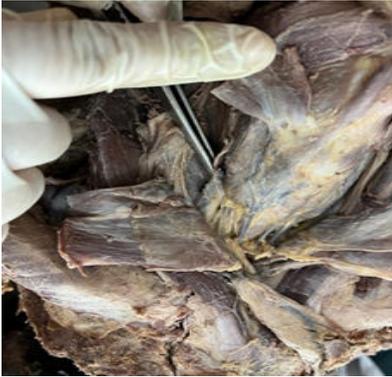


Figure 3:
Kocher's vein draining into the internal jugular vein.

DISCUSSION:

In a study of venous drainage of thyroid gland by Patel JP et al, 2014² conducted over 50 cadavers, they concluded that none of the cadaver showed Kocher's vein. They also reported absence of middle thyroid vein in 12 cases whereas superior and inferior thyroid veins are constant in all the cases. Variant morphological representation of inferior thyroid veins mentioned by AA Azzawi et al, 2021³. Singh R et al, 2023⁴ reviewed an article on veins of thyroid gland. They mentioned that the superior thyroid vein is constant in all cases, middle thyroid vein may be absent, inferior thyroid veins representation is different in many cases. Absence of middle thyroid vein in 29% cases reported by Chevrel JP et al⁵, 55.2% cases by Shima H et al⁶, variations in the number of inferior thyroid veins had been reported by Krausen A et al⁷, Wafae N et al⁸, Bell RH et al⁹. In most cases, middle thyroid veins if present, they are draining into internal jugular vein or may be vertebral vein. Alongside thyroid surgery, parathyroid surgery, laryngeal surgeries, tracheostomy, transposition of myocutaneous flaps for reconstructions are also commonly performed. Fatal cases are reported due the injury of inferior thyroid vein. Tracheostomy failure has also been reported caused due to injury to the vessels present there. Color Doppler Ultrasound prior to the dilatational tracheostomy improved the success rate of the surgeries as mentioned by Muhammad JK et al¹⁰.

In the current study, we have reported a case of Kocher's Vein present unilaterally, draining into the medial surface of internal jugular vein. The recurrent laryngeal nerve was closely related to it, nerve fibres from ansa cervicalis supplying the sternohyoid, superior belly of omohyoid and sternothyroid. We also report the absence of middle thyroid veins bilaterally, four inferior thyroid veins draining into the right brachiocephalic vein. The inferior thyroid veins formed a pretracheal venous plexus in front of the trachea.

CONCLUSION:

The findings of current study carry immense importance to avoid damage to the important structure. Approaching the thyroid gland, if Kocher's Vein is present should be done by ligating it to avoid profuse bleeding and keeping in mind its close relation to the laryngeal nerves. Thyroid surgeries fraught with complications. This current study should aid the surgeon in appropriate preservation of the structures. Alongside thyroid surgery, parathyroid surgery, laryngeal surgeries, tracheostomy, transposition of myocutaneous flaps for reconstructions are also commonly performed. Fatal cases are reported due the injury of inferior thyroid vein.

Acknowledgement:

We are grateful to the noble soul of the people and the family members for donating the bodies for medical education purposes and researches.

Conflict:

No conflict of study.

Funding:

No funding required. Study was conducted on cadavers for dissection.

REFERENCES:

1. Muddebihal U, Lakshmidivi M, Hanumanthaiah KS, Yasaswini H, Manjunath K, Akhila S. Surgical anatomy of thyroid and incidence of malignancy in solitary nodule of thyroid. *International Surgery Journal*. 2016 Dec 8;3(2):893-9.
2. Patel JP, Dave RV, Shah RK, Kanani SD, Nirvan AB. A study of superior thyroid artery in 50 cadavers. *International Journal of Biological Medicine Research*. 2013;4:2875-878.

3. Ahmed Shihab Al-Azzawi A, MA Al-Salami A, A Al-Khafaji M. Clinical Presentations and Management of Thyroglossal Duct Cyst and Sinuses. *Iraqi Postgraduate Medical Journal*. 2014 Sep 28;13(3):370-4.
4. Singh R. Variations of venous drainage of the thyroid gland and their surgical implications: a narrative review. *Jornal Vascular Brasileiro*. 2023 Apr 11;22:e20220163.
5. Chevrel JP, Hidden G, Lassau JP, Alexandre JH, Hureau J. Venous and lymphatic drainage of the thyroid gland. *Journal de chirurgie*. 1965 Nov;90(5):445-63.
6. Shima H, von Luedinghausen M, Ohno K, Michi KI. Anatomy of microvascular anastomosis in the neck. *Plastic and reconstructive surgery*. 1998 Jan 1;101(1):33-41.
7. Krausen AS. The inferior thyroid veins—the ultimate guardians of the trachea. *The Laryngoscope*. 1976 Dec;86(12):1849-55.
8. Wafae N, Hirose K, Franco C, Wafae GC, Ruiz CR, Daher L, Person OC. The anatomy of the human thyroid veins and its surgical application. *Folia Morphologica*. 2008;67(4):221-5.
9. Bell RH, Knapp BI, Anson BJ, Larson S. Form, size, blood-supply and relations of the adult thymus. *Quarterly Bulletin of the Northwestern University Medical School*. 1954;28(2):156.
10. Muhammad JK, Major E, Wood A, Patton DW. Percutaneous dilatational tracheostomy: haemorrhagic complications and the vascular anatomy of the anterior neck. A review based on 497 cases. *International journal of oral and maxillofacial surgery*. 2000 Jun 1;29(3):217-22.