

Non Recurrent Laryngeal Nerve: A Rare Anomaly

Ameya Bihani¹, Jaini Lodha², Arpit Sharma³, Jyoti Dabholkar⁴

Abstract: *Non recurrent laryngeal nerve is a rare anatomical variation which should be carefully identified during thyroid surgery to prevent post operative morbidity. We present a case of 19 year old female with follicular variant of papillary carcinoma of thyroid, where non recurrent laryngeal nerve was identified on the right side and CT angiography showed an aberrant right sided subclavian artery. Comprehensive knowledge of anatomy and defining every landmark during the surgery to identify the nerve is indispensable.*

Keywords: non recurrent laryngeal nerve, papillary carcinoma thyroid, aberrant right subclavian artery

1. Introduction

Preservation of recurrent laryngeal nerve and parathyroids is the essence of a thyroid surgery. Presence of right non-recurrent laryngeal nerve is a very rare anomaly with average incidence of 0.3 to 1.0% [1]. It is only found on the right side except in rare cases of situs invertus where it may be present on the left side, its incidence being 0.004% [2]. Presence of complaints of dysphagia and x ray suggestive of situs invertus may hint towards encountering a non recurrent laryngeal nerve during the surgery. In absence of these evidences, it is very difficult to predict the existence of non recurrent laryngeal nerve preoperatively. Hence, detailed anatomical knowledge and meticulous surgical dissection is absolutely imperative to preserve functioning of non recurrent laryngeal nerve and identification of its variation.

2. Case Report

A 19 year old female presented with a gradually progressive swelling on the right side of the midline in the anterior region of the neck. On clinical examination, it was suggestive of right side solitary thyroid nodule with no palpable neck lymph nodes. There were no complaints of difficulty in swallowing, change in voice or any features suggestive of hypothyroidism or hyperthyroidism.

USG showed enlarged right lobe of thyroid with a well defined heterogeneous nodule in the right lobe measuring average 2.3x 2.8x 2.2 cms with increased peripheral vascularity. Resisitivity index was 0.8 and Pulsatility index was 2.2. Peripheral halo was present. No calcification or lymph node enlargement was present and great vessels were normal. Serum T3, T4, TSH was within normal limit. FNAC was suggestive of Follicular variant of Papillary Carcinoma of thyroid. Considering age, unmarried status, gender, size of nodule and FNAC report, risk stratification was done and patient underwent right hemithyroidectomy.

Intra operatively Kocher's incision was taken. Subplatysmal flaps were elevated and strap muscles were retracted. Superior thyroidal vessels were identified and ligated.

Following this Baehr's triangle was explored in search of recurrent laryngeal nerve but to our surprise there was no nerve present in the trachea-oesophageal groove. Hence, we explored in the area posterior to cricothyroid joint (the area of entry of the nerve in larynx- the most constant surgical landmark). Here we identified a nerve resembling structure which when traced back went medial to right

sternocleidomastoid arising directly from vagus superior to inferior thyroidal artery.(FIGURE 1) Preserving this, the right lobe of thyroid was removed. Post operatively, bilateral vocal cords were mobile.

Post operatively CT angiography was done which showed a right sided aberrant subclavian artery which was traversing behind the esophagus originating directly from arch of aorta.(FIGURE 2)

3. Discussion

Recurrent laryngeal nerve is the nerve of the sixth pharyngeal arch. During embryological development, disappearance of part of sixth arch artery on the right side results in cranial migration of the nerve resulting in close proximity with artery of fourth branchial arch (subclavian artery). The nerve hooks around the artery to reach larynx. On the left side, it retains its relationship with part of sixth arch vessel which forms ductus arteriosus. With development of neck and descent of the heart during development, these nerves are dragged downwards and have to follow the recurrent course back to larynx.

In few cases, anomalous development of the right subclavian artery (which may arise as the last branch of aortic arch) results in its course behind the oesophagus. Along with aorta, this artery forms an arterial ring enclosing trachea and oesophagus. This can press upon oesophagus causing difficulty in swallowing known as Dysphagia Lusoria and the aberrant artery is called Arteria Lusoria. Hence the nerve does not hook around the subclavian artery and passes directly to larynx and is called as Non Recurrent laryngeal nerve. On the left side, such scenario can only occur in cases of situs invertus.[3,5]. Non recurrent laryngeal nerve (NRLN) has been classified as[3]

Type 1-arises directly from vagus and travels along with the superior thyroidal vessels

Type 2- NRLN follows a horizontal path in connection with the inferior thyroid artery

In our case, the nerve was running transversely parallel to inferior thyroid artery and hence was type 2.

In our experience of 343 thyroidectomies in last 5 years, we have seen only 1 case of non recurrent laryngeal nerve which amounts to 0.29%.

This incidence is similar to Li X et al[4] which showed 5 NRLN in 821cases (0.61%). In case series of Henry JF[5], 31 NRLN were seen in 4921 specimen of right sided neck

dissection (0.63%) and 2 in 4673 specimen of left sided neck dissection (0.04%).

Certain guidelines should be followed during thyroidectomies to prevent the catastrophe of damaging the recurrent laryngeal nerve which can have an anomalous presentation like in this case. Firstly, the nerve should be searched in the trachea-esophageal groove where it forms the third boundary of the Baehr's triangle. The dissection should proceed longitudinally in the same plane. Its entry point in the larynx posterior to the crico thyroid joint is also a constant landmark. According to study conducted by Elham Asgharpour et al, mostly, RLN is located anterior to the tracheoesophageal sulcus (41.6%), posterior to the inferior thyroid artery (35.8%), lateral to Berry's ligament (88.1%), below the inferior rim of the inferior constrictor muscle (90.4%), and entering the larynx before its terminal division (54.6%). [6]

Liu *et al.*, suggested that any transverse band should not be cut between vascular and laryngeal plane except middle thyroid vein, unless the recurrent laryngeal nerve is identified [7]. In recent trends, the role of intraoperative nerve monitoring as an adjunct to the gold standard of visual nerve identification has also been explored [8]. Patients with thyroid swellings complaining of dysphagia, preoperative CT angiography should be done to rule out vascular anomaly. Lee *et al.* reviewed the CT scans of 20 patients with NRLN retrospectively and revealed that vascular anomalies could be identified on the scans of all patients [9].

4. Conclusion

Non recurrent laryngeal nerve is a rare anomaly which should always be kept in mind during thyroid dissection. A comprehensive anatomical understanding and meticulous surgical dissection following anatomical landmarks should be done in order to preserve the nerve and its functioning.

References

- [1] Neil Weir.1996. Anatomy of larynx and tracheobroncheal tree; Scott Brown textbook of Otorhinolaryngology, 6 Ed ,vol 1, Oxford: Buttrworth Heinemann. 1/12/1 – 1/2/28.
- [2] Uludag M, Isgor A , Yetkin G , Citgez B. Anatomical variations of the non-recurrent inferior laryngeal nerve. BMJ Case Reports 2009.
- [3] Toniato A, Mazzarotto R, Piotto A, et al. Identification of the nonrecurrent laryngeal nerve during thyroid surgery: 20-year experience. World J Surg 2004; 659–61
- [4] Li X, Wang Z, Lu X, Li J, Huang Y, Huang J, Long X. Non-recurrent laryngeal nerve related to thyroid surgery: a report of 5 cases and literature review. 2010 Jun;16(6):CS71-5.
- [5] Henry JF, Audiffret J, Denizot A, et al. The nonrecurrent inferior laryngeal nerve: review of 33 cases, including two on the left side. Surgery 1988; : 977–84.
- [6] Asgharpour, E., Marañillo, E., Sañudo, J., Pascual-Font, A., Rodríguez-Niedenführ, M., Valderrama, F. J., Viejo, F., Parkin, I. G. and Vázquez, T. (2012), Recurrent laryngeal nerve landmarks revisited. Head Neck, 34: 1240–1246.
- [7] Liu LX, Wu LF, Xue DB, Meng XZ, Zhang WH, Jiang HC. The importance of nonrecurrent laryngeal nerve in thyroid surgery. Zhonghua Wai Ke Za Zhi 2006;44:904-6.
- [8] Dralle H, Sekulla C, Lorenz K, Brauckhoff M, Machens A; German IONM Study Group.
- [9] World J Surg. 2008 Jul;32(7):1358-66
- [10] Lee YS, Son EJ, Chang HS, Chung WY, Nam KH, Park CS. Computed tomography is useful for preoperative identification of nonrecurrent laryngeal nerve in thyroid cancer patients. Otolaryngol Head Neck Surg 2011;145:204-7.

Figure Legends

Figure 1: Non recurrent laryngeal nerve arising directly from the vagus trunk

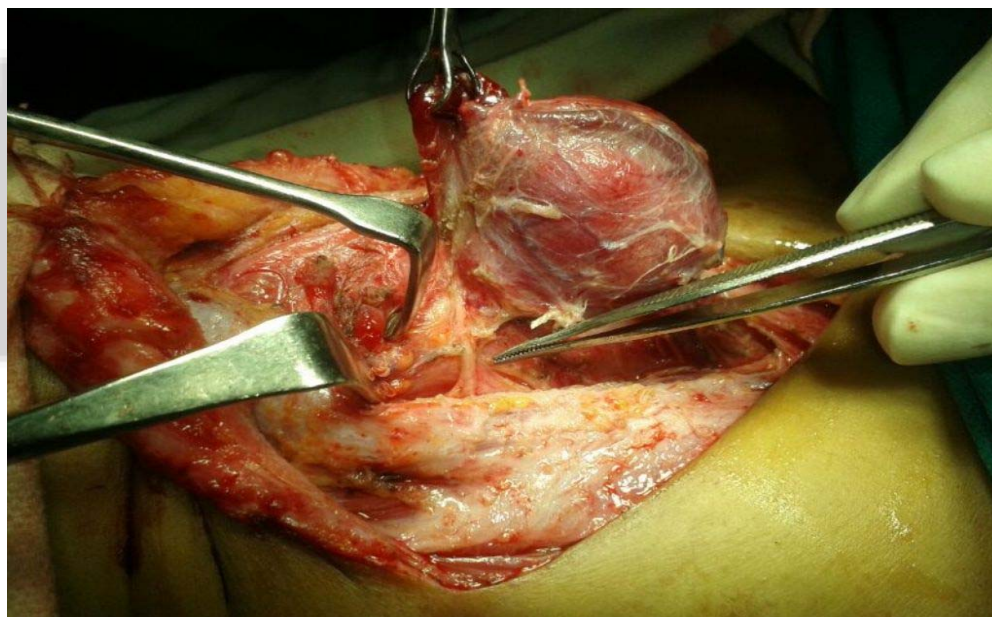
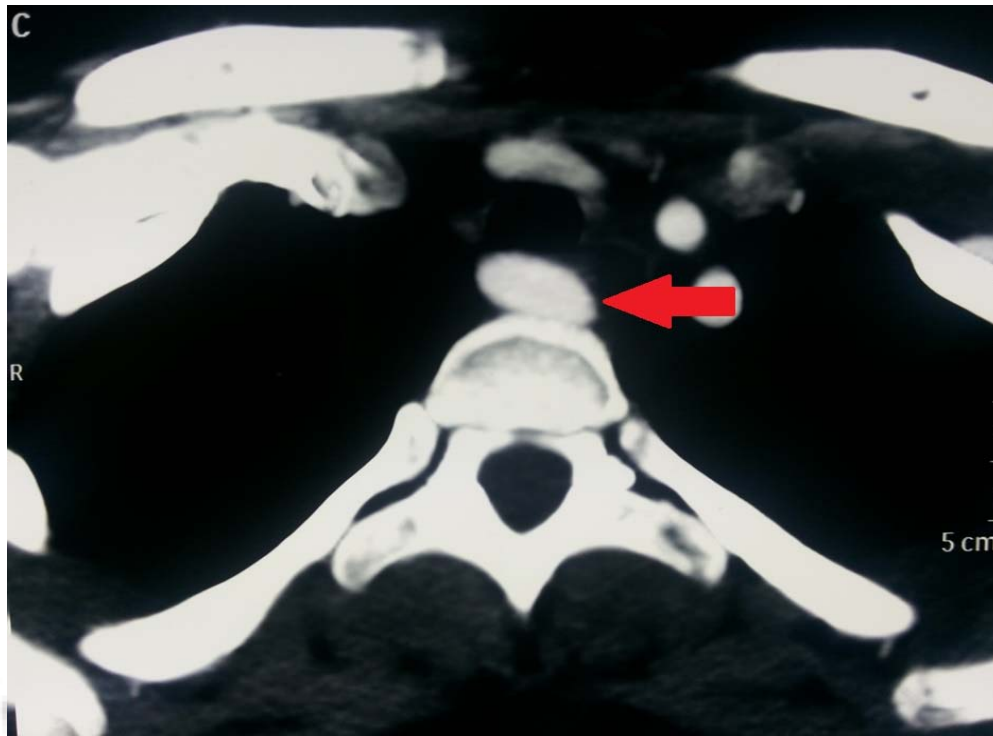


Figure 2: CT Angiogram showing right aberrant subclavian artery



Author Profile

Bihani Ameya is Post Graduate Resident, Department of E.N.T and Head and Neck Surgery, Seth G.S. Medical College and K.E.M. Hospital, Parel, Mumbai, India

Lodha Jaini V is M.S., DNB, E.N.T, Senior Resident at the Department of E.N.T and Head and Neck Surgery, Seth G.S. Medical College and K.E.M. Hospital, Parel, Mumbai, India

Sharma Arpit, M.S , DNB E.N.T is Assistant Professor, Department of E.N.T and Head and Neck Surgery, Seth G.S. Medical College and K.E.M. Hospital, Parel, Mumbai, India

Dabholkar Jyoti P, M.S. E.N.T, DLO, Professor and Head of the Department, Department of E.N.T and Head and Neck Surgery, Seth G.S. Medical College and K.E.M. Hospital, Parel, Mumbai, India

IJSR