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Identification of the External Branch of Superior Laryngeal Nerve during Thyroid Surgery – an Observational Study

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ABSTRACT
Background: Thyroid swelling is a condition commonly encountered by General Surgeons. Some patients need only Medical Management, whereas others need Surgical management in the form of Hemi or Total Thyroidectomy. Compared to RLN the EBSLN is less studied in terms of course and relation to thyroid gland intraoperatively. In our study we observed the course and relation of EBSLN with respect to the thyroid gland during surgery.
Materials and Methods: A prospective analysis of 60 patients who underwent thyroidectomy in General Surgery department in Rajah Muthiah Medical College was done. Intraoperatively, the EBSLN was visually identified and preserved before proceeding to ligate the superior thyroid vessels. The nerve was classified according to the Cernea classification.
Results: In 60 patients, 95 nerves were planned to be identified. The nerve was type 1 in 28/95 (29.5%), Type 2a in 46/95 (48.5%), and Type 2b in 11/95 (11.5%) patients. The nerve could not be identified in 10/95 (10.5%) patients.
Conclusion: The course and relation of EBSLN with respect to thyroid gland varies in different thyroid pathologies.
Keywords: Cernea classification, ESBLN, laryngeal nerve, thyroidectomy

INTRODUCTION

Laryngeal nerve injuries are a commonly encountered complication of thyroidectomy causing long term morbidity. This can be significant especially for people using their voice professionally. The incidence of injury to EBSLN in patients undergoing thyroid surgeries is reported to be up to 58%. Different authors have tried to describe the course of the EBSLN and its relation to the superior thyroid vessels and there are various surgical and anatomical classifications mentioned in literature for EBSLN.However, the most widely accepted method was proposed by Cernea et al.[1,2]
The nerve is at a higher risk of injury, when it runs close to the gland, as in Cernea's Type 2a and 2b. [3,4]

MATERIAL AND METHODS

This prospective observational study was done on patients undergoing thyroidectomy from May 2018 to June 2020 in Rajah Muthiah Medical College, Chidambaram, Tamilnadu, India.

Inclusion Criteria

- Patient age 18-60 years
- Both sexes

Exclusion Criteria

- Patients with previous thyroid and neck surgeries

All patients were subjected to complete clinical examination, thyroid function studies (free T3, T4 and thyroid-stimulating hormone), ultrasound examination (US), and aspiration cytology of the nodules.
The EBSLN was identified by direct vision during surgery in the cricothyroid space on both sides, and the relation of nerve to the upper pole of thyroid gland and superior thyroid vessels was noted separately on either side. The relation of EBSLN to superior pole was defined based on the classification proposed by Cernea et al. as follows.

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Type	Description
Type 1	EBSLN crosses the artery more than 1 cm from the superior pole
Type 2a	EBSLN crosses the artery <1 cm and above the superior pole
Type 2b	EBSLN crosses the artery below the superior pole

Statistical analysis

The results were compiled and statistical data was analysed using SPSS software.

RESULTS

Table-1: Sex of Patient

Male	Female
16	44

Graph-1: Sex of Patient

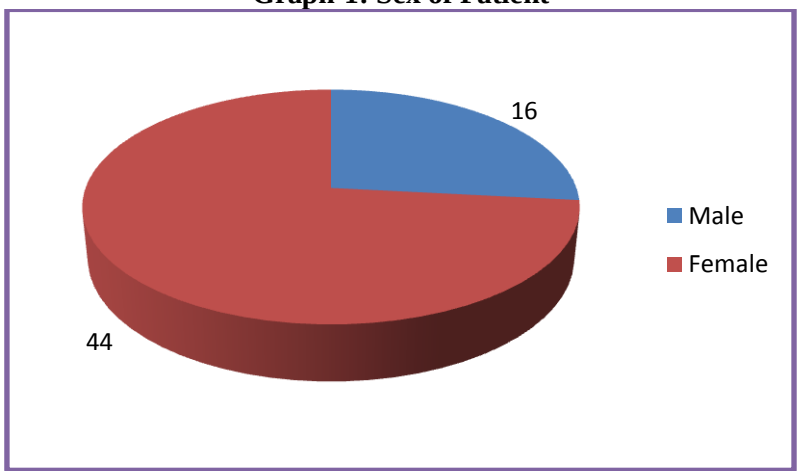

Table-2: Incidence as per CERNEA Classification

	Patients	Nerves	0	1	2A	2B
SNG	25	25	1	2	20	2
MNG	26	52	2	22	24	4
MALIGNANCY	9	18	7	4	2	5
	60	**95**	10	28	46	11

Graph-2: Incidence as per CERNEA Classification

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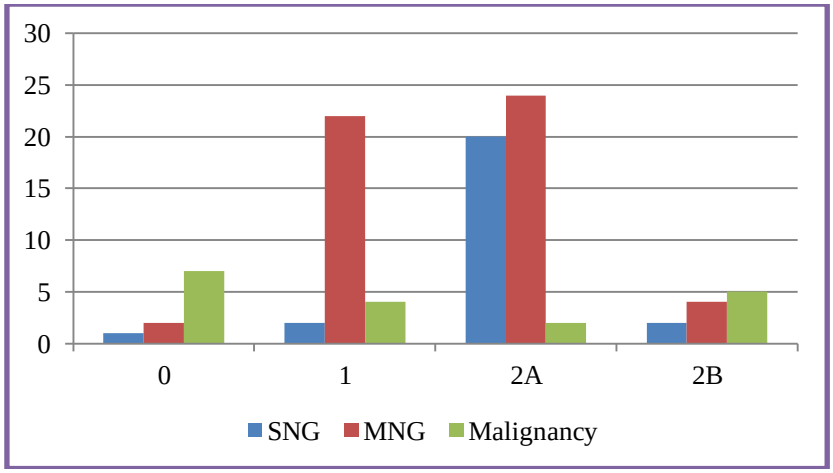

DISCUSSION

The superior laryngeal nerve arises from the vagus nerve at the base of the skull and descends toward the superior pole of the thyroid along the course of the internal carotid artery. About 2–3 cm above the superior pole of the thyroid gland, at the level of the superior cornu of the hyoid bone it divides into its two branches – the internal laryngeal nerve and the EBSLN. [5,6]

The EBSLN is often an overlooked nerve during thyroid surgery as the symptoms of its injury in the postoperative period are comparatively very less. Injury to this nerve results in difficulty to attain a high pitch to the voice, which is often overlooked. [7] EBSLN crosses the superior thyroid artery at the region of the superior pole, about 1 cm from the point of entry of the artery into the thyroid.

Intraoperatively, the EBSLN can be visually identified in the space of Reeves in the Sternothyroid laryngeal triangle, which is bounded anteriorly by the sternothyroid muscle, laterally by the superior pole of the thyroid gland and medially by the inferior constrictor muscle and cricothyroid. After retracting the superior pole of the thyroid gland, the EBSLN and the superior thyroid vessels can be identified in this region.[8] After identifying the EBSLN, it can be classified as per the Cernea classification into Type 1 and Type 2 (a or b).

Although there are other named systems used classification of the EBSLN, Cernea classification is the most widely accepted.

In recent studies, many authors have used electromyographic intraoperative nerve monitoring during thyroid surgery. When available, it can be used to exactly identify and assess the functional integrity of the EBSLN nerve and hence useful in avoiding complications and improving the outcome of surgery. [9,10]

In our study, the incidence of Type 2a nerve is the most common, followed by Type 1 and Type 2b. This result is similar to few of the previously studies. [11,12]

Limitations

In our study, all the nerves were identified by visual identification, by virtue of which 89.5% of the nerves were identified but 10/95 nerves (10.5%) could not be identified. Intraoperative electromyographic nerve monitoring, which is the current recommendation was not available at our institution. It may have helped in better identification those nerves.

CONCLUSION

As the data suggest, there is an increase in the incidence of Type 2b nerve in Malignancy, thereby making it more prone to injury during surgery. Hence, dissection of a malignancy should be more meticulous, especially in the space of Reeves. The EBSLN should be identified and preserved before ligating the vessels at the superior pole. Care must also be taken to avoid undue stretch of the vascular structures, and energy devices should be used carefully during dissection near the superior thyroid pole, in order to avoid iatrogenic injury

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Conflicts of interest
There are no conflicts of interest.

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