The External Branch of the Superior Laryngeal Nerve
Its Topographical Anatomy as Related to Surgery of the Neck
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Objective: To determine the possible courses of the external branch of the superior laryngeal nerve (EBSLN) and its relationship to the superior thyroid artery (STA) to improve the chances of identifying and saving the nerve during head and neck surgery.

Design: Anatomical analysis of the exact topography of the EBSLN.

Subjects: Thirty-one perfusion-fixed human cadavers (ie, 62 preparations) of both sexes ranging in age from 50 to 94 years (mean, 78 years) with neither enlarged thyroid glands nor any other signs of abnormality in this region.

Results: Four types of relationship between the EBSLN, the upper pole of the thyroid gland, and the STA were found. In 23 preparations (42%), the EBSLN crossed the STA more than 1 cm above the upper pole of the thyroid gland (type 1). In 15 preparations (30%), the EBSLN crossed the STA less than 1 cm above the upper pole of the thyroid gland (type 2). In 7 preparations (14%), the EBSLN crossed the STA under cover of the upper pole of the thyroid gland (type 3). In 7 preparations (14%), the EBSLN descended dorsal to the artery and only crossed the branches of the STA immediately above the upper pole of the thyroid gland (type 4).

Conclusion: The description of the variable course of the EBSLN and its categorization may help minimize the risk of iatrogenic lesions of the nerve during surgery.

COMMENT

The EBSLN innervates parts of the intralaryngeal mucous membrane and sends some motor fibers to intrinsic muscles of the larynx as well.8,10-12 Palsy of the EBSLN or an iatrogenic lesion of the nerve might cause dysphonia and aspiration.16,17 The sensory deficit in the hypopharynx and supraglottic larynx interferes with the patient’s ability to sense secretion and food particles in those areas. Especially in cases of tumor resection in which surgery of the anterior triangle of the neck is combined with partial laryngectomy or enlarged hypopharyngeal resections, jeopardizing the SLN deteriorates functional rehabilitation. Exact knowledge of the topographical anatomy of the SLN and its branches clearly helps identify and preserve this nerve during neck surgery.

The course of the EBSLN has been described by many authors.1,2,3,6,11,15,18,19,22-24 Most of the previous studies emphasized identification of the EBSLN at the upper pole of the thyroid gland, where the topography of the nerve shows much more variability in its relationship to the STA or may even be covered by the inferior pharyngeal constrictor muscle.5,11,15 Therefore, it seems easier to identify the EBSLN further cranially. Cernea et al20,21 tried to categorize the different courses of the EBSLN to facilitate identification of the nerve during surgery. Our results are similar to those of Cernea et al19,21; however, we believe that our slightly different typing better reflects the possible courses of the nerve. In agreement with Cernea et al, we found type 1 to be the most common type. However, instead of the 62% type 1 they reported, type 1 was present in only 42% of our preparations. Our types 2 and 3 correspond to types 2a and 2b of Cernea et al, respectively. Whereas the number of type 2 cases (27% in our material and 11% in the examinations by Cernea et al) are quite different, type 3 was consistent between the studies (13% and 14%, respectively).

In addition, we introduce a new category, which we call type 4. This type was found in 13% of our dissection material. The question arises why previous investigators2,11,13,15,20-24 did not describe that course of the EBSLN. Since in these cases the nerve descends more dorsally than one would expect, its identification is more difficult. This may be one of the reasons why Cernea et al20,21 could not identify the EBSLN in 7% of their cases. The difference in number of each type between our material and that of Cernea et al might have resulted from the fact that we examined almost twice as many specimens. However, the exact circumstances regarding the different distribution still remain to be determined.

Identification of the EBSLN during surgery can be complicated by previous operations or by preoperative radiotherapy. We attempted to describe additional landmarks that guide the surgeon to the SLN, which in turn facilitates the identification of the EBSLN. Once the bifurcation of the common carotid artery has been identified, the branching of the SLN from the vagal nerve can be found an average of 4.18 cm in the cranial direction (Figure 2). Since the carotid bifurcation and the vagal nerve are easily accessible even under difficult conditions, identifying the nerve should pose no problem in any case. Measuring the distance to the base of the skull (jugular foramen, basion) might provide more exact data.3 However, these landmarks are comparably difficult to use in neck surgery and therefore not advisable.

Our results strongly suggest that categorization of the topographical variations of the EBSLN is possible. Since this study included 62 specimens, it is unlikely that the nerve will take a course different from those covered by our classification. Therefore, we believe that exact knowledge of
the relationship between the EBSLN, the STA, and the upper pole of the thyroid gland as presented herein may help identify the nerve during neck surgery.

Figure 1. Classification of the possible courses of the external branch of the superior laryngeal nerve (EBSLN). In type 1, the nerve crosses the superior thyroid artery (STA) more than 1 cm above the upper pole of the thyroid gland (TG). In type 2, the nerve crosses the STA less than 1 cm above the upper pole of the TG. In type 3, the nerve crosses the STA under cover of the superior pole of the TG. In type 4, the nerve descends dorsal to the STA, crossing its branches immediately above the upper pole of the TG. CCA indicates common carotid artery.

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REFERENCES