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.


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of the larynx as well.8,10-12 Palsy of the EBSLN or an iatro-

domination of type 1 was obvious. The topographical re-

clearly be classified as type 2.

In type 3, the EBSLN crosses the STA while cov-

ers were subsequently decapitated at the atlanto-occipital
articulation, with the neck’s visceras staying with the head.
After this additional examination, the course and topo-

eral variations of the EBSLN is possible. Since this

can be classified as type 2.

In type 3, the EBSLN crosses the STA while covered
by the upper pole of the thyroid gland (total of 7
preparations [14%] in our study).

Type 4 refers to cases in which the EBSLN does not
cross the trunk of the STA at all, but runs dorsal to the
artery until it has ramified. In our material, we found 7
hemilarynges of that type (14%). Although the EBSLN
does not cross the STA in these cases, it can easily be
found, since it runs parallel to the artery slightly more
profound and dorsal to it.

Within the 52 hemilarynges we dissected, the pre-
dominance of type 1 was obvious. The topographical
relationship of the EBSLN on one side of the neck does not
predict the course of the nerve on the other side. The types
we defined occurred independently on the 2 sides. How-
ever, no other course of the EBSLN except the 4 types
described above could be found.

To obtain quantitative data about the relationship of
the SLN to the common carotid artery, the distance between
the separation of the SLN from the vagal nerve and the
bifurcation of the common carotid artery was measured
(Figure 2). The distance between these 2 well-
defined anatomical landmarks ranges between 2.9 and
5.6 cm, with a mean value of 4.1 cm on the right side
and 4.27 cm on the left side.

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 iatro-
genic lesion of the nerve might cause dysphonia and aspira-
tion.16,17 The sensory deficit in the hypopharynx and supra-
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 deterio-
rates functional rehabilitation. Exact knowledge of the to-

calyngae of that type (14%). Although the EBSLN
does not cross the STA in these cases, it can easily be
covered by the inferior pharyngeal constrictor muscle.2,3,11,15Therefore, it seems easier to identify the EBSLN
further cranially. Cernea et al20,21 tried to categorize the dif-
frent courses of the EBSLN to facilitate identification of
the nerve during surgery. Our results are similar to those of
Cernea et al20,21; however, we believe that our slightly dif-
ferent 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 prepara-
tions. 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 investiga-
tors2,11,15,18,20-24 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 com-
plicated by previous operations or by preoperative radio-
therapy. We attempted to describe additional landmarks that
guide the surgeon to the SLN, which in turn facilates the
identification of the EBSLN. Once the bifurcation of the com-
mon 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 bi-
furcation and the vagal nerve are easily accessible even un-
der 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 dif-
ficult 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 clas-
ification. 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.

Accepted for publication December 4, 1997.

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REFERENCES