

Introduction

- The superior laryngeal, a branch of the vagus nerve, descends along the side of the pharynx and branches distally into two nerves: the external laryngeal nerve and the internal laryngeal nerve, each with a unique function and anatomic course.¹
- The external laryngeal nerve descends to the pharynx while accompanying the superior thyroid artery, the first branch of the external carotid artery, and provides motor innervation to the cricothyroid muscle.
- The internal laryngeal nerve provides sensory innervation to the supraglottic mucosa of the larynx. The internal laryngeal nerve accompanies the superior laryngeal artery, a branch of the superior thyroid artery.
- Both branches can potentially be severed, compressed, or stretched during surgical procedures of the neck, specifically during thyroidectomy.
- Injury to the external laryngeal nerve results in a reduction of the highest attainable frequency of the voice.² Injury to the internal laryngeal nerve results in a loss of sensation in the laryngeal vestibule, increasing the risk of aspiration pneumonia.
- Isolation and identification of the superior pole and superior laryngeal vessels, which are intimately related to the external and internal laryngeal nerves, respectively, is clinically important.

Aims and Objectives

The specific objectives of the study are to:

- Investigate the location and course of the branches of the superior laryngeal nerve and their relationship with their respective arteries
- Identify any anatomical variation of the superior laryngeal nerve and its vulnerability during surgical procedures of the neck
- Identify landmarks that will assist the surgeon to locate the superior laryngeal nerve during surgical procedures of the neck

Methods

- The study investigated n=35 formalin-fixed cadavers at Oakland University William Beaumont School of Medicine in 2018-2019.
- Following critical observation and careful dissection, photographs were taken and data was analyzed quantitatively and in a descriptive manner.
- The relationships between the external and internal branches of the superior laryngeal nerve with the superior thyroid and superior laryngeal artery, respectively, were documented.

Results

The investigation found that out of twenty-one cadavers, 52.4% of the external laryngeal branches are related posteromedial to the superior thyroid artery, while 47.6% are related anteromedial to it (Figure 1). On the other hand, our findings indicate that out of fourteen cadavers, 64.3% of the internal laryngeal branches are related superoposterior to the superior laryngeal artery, while 35.7% are inferoposterior to it (Figure 2). In addition, in most cases, the superior laryngeal artery crosses above the external laryngeal branch while traveling to pierce the thyrohyoid membrane to reach the larynx (Figures 3,4,5).

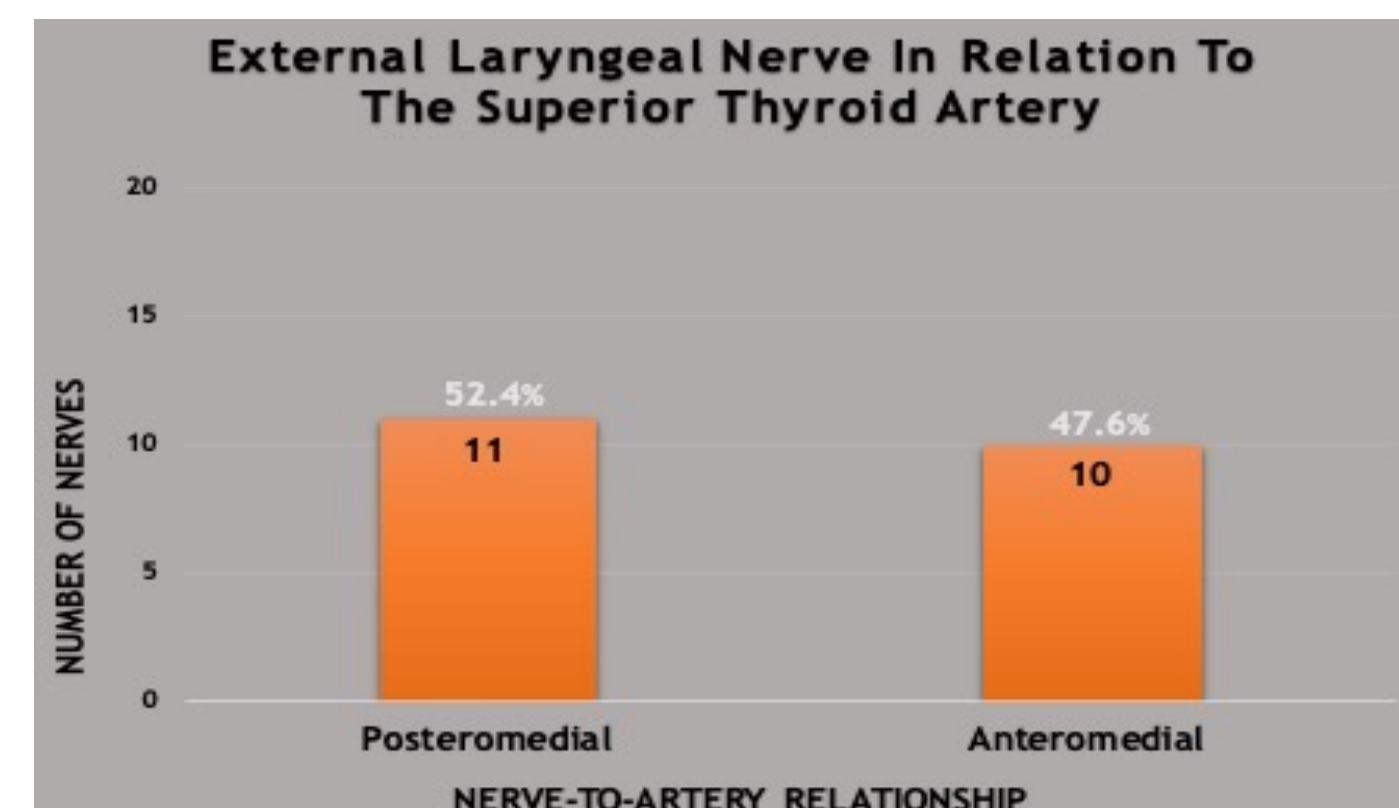


Figure 1. This graph demonstrates the frequency of the relationship of the external laryngeal nerve with the superior thyroid artery. 52.4% of the external laryngeal nerves are posteromedial to the superior thyroid artery while 47.6% of the external laryngeal nerves are anteromedial to superior thyroid artery.

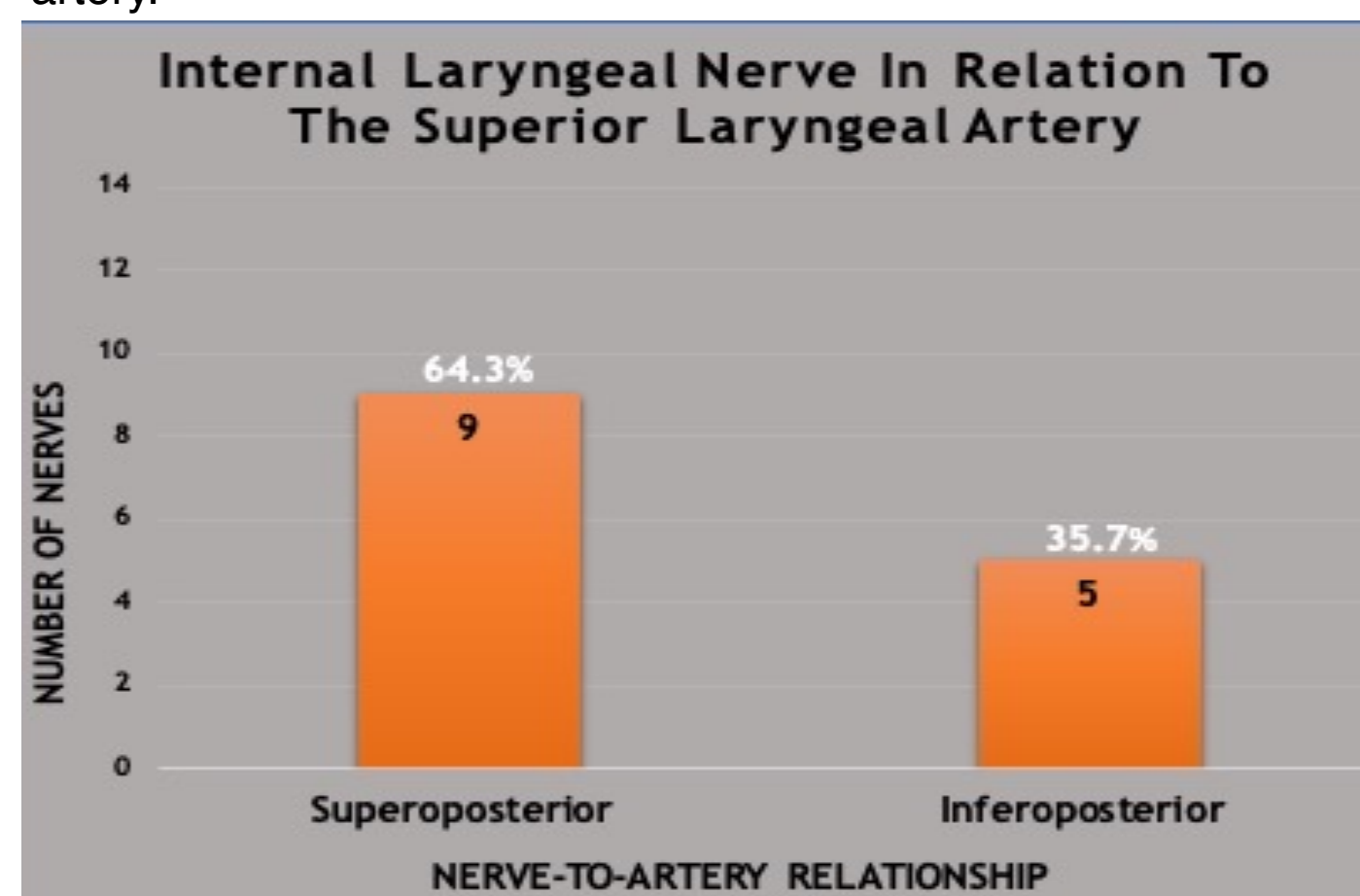


Figure 2. This table demonstrates the frequency of the relationship of the internal laryngeal nerve with the superior laryngeal artery. 64.3% of the internal laryngeal nerves are superoposterior to the superior laryngeal artery while 35.7% of the internal laryngeal nerves are inferoposterior to superior laryngeal artery.



Figure 3. External laryngeal nerve posteromedial relative to the superior thyroid artery; Internal laryngeal nerve not depicted. Abbreviations: ebSLN, external laryngeal nerve; ibSLN, internal laryngeal nerve; CCA, common carotid artery; ECA, external carotid artery; STA, superior thyroid artery; SLA, superior laryngeal artery.



Figure 4. Unique course of the external laryngeal nerve in which it travels anterior to the superior thyroid artery and inserts posteriorly. The internal laryngeal nerve superoposterior relative to the superior laryngeal artery. Abbreviations: ebSLN, external laryngeal nerve; ibSLN, internal laryngeal nerve; CCA, common carotid artery; ECA, external carotid artery; STA, superior thyroid artery; SLA, superior laryngeal artery.



Figure 5. External laryngeal nerve anteromedial relative to the superior thyroid artery; Internal laryngeal nerve inferoposterior relative to the superior laryngeal artery. Abbreviations: ebSLN, external laryngeal nerve; ibSLN, internal laryngeal nerve; CCA, common carotid artery; ECA, external carotid artery; STA, superior thyroid artery; SLA, superior laryngeal artery.

Conclusions

- The data portrays that both the external and internal laryngeal branches display a variation in their relationship with the superior thyroid artery and the superior laryngeal artery, respectively.
- The information gained in this study emphasizes the need of special considerations during procedures of the neck in order to preserve the external and internal branches of the superior laryngeal nerve, especially the posteromedial and superoposterior relationships, which exposes the nerves during ligation of their respective vessels.
- Awareness of these variable relationships is critical for identification and isolation of the neurovascular structures in order to preserve the nerve, prevent a reduction in the highest attainable frequency of the voice, and minimize the risk of aspiration pneumonia during surgical procedures of the neck.
- We would recommend being mindful of the variations and proximity of the branches of the superior laryngeal nerve to the thyroid capsule and ensure proper isolation and identification of the superior pole and superior laryngeal vessels to minimize iatrogenic injury.

References

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