Management of the Recurrent Laryngeal Nerve at the Ligament of Berry: Implications for the patient, endocrinologist and surgeon

Nathan Hales, MD, FACS
Associate Professor
Uniformed Services University of Health Sciences, Civilian
San Antonio Head and Neck
Otolaryngology, Head and Neck Surgery
San Antonio, Texas
I have nothing to disclose
Please note that this version of the presentations has been submitted largely without visuals as the space allowed for submission by the deadline does not accommodate the surgical photos. This represents a skeleton outline of the presentation.
Recurrent Laryngeal Nerve: Embryology

- **Thyroid**: fusion of the medial thyroid anlage (derived from the primitive pharynx) and the lateral thyroid anlage (derived from the neural crest)

- **The tubercle of Zuckerkandl**: represents this fusion site, a posterior lateral projection from the thyroid \(^1,2\)

- **Superior parathyroid gland**: originates from the fourth branchial pouch of the primitive pharynx \(^3\)

- **RLN**: arises from the vagus nerve and carries motor, sensory, and parasympathetic fibers
Recurrent Laryngeal Nerve: Anatomy

Recurrent Laryngeal Nerve: Anatomy
Recurrent Laryngeal Nerve: Anatomy

Randolph, 2016
Recurrent Laryngeal Nerve: Anatomy

Randolph GW, 2016

Left RLN

Right RLN
Non Recurrent Recurrent Laryngeal Nerve: Anatomy

Illustration Netter
Photo courtesy of Nathan Hales
Recurrent Laryngeal Nerve: Branching

Left RLN

Courtesy of Jon Serpell
Recurrent Laryngeal Nerve: Branching

Left RLN

Courtesy of Nathan Hales
Recurrent Laryngeal Nerve: Approaches

[Diagram of the larynx showing the recurrent laryngeal nerve (RLN) and its relationship with the thyroid gland and ligament of Berry.]

Randolph et al. 2013
Recurrent Laryngeal Nerve: Approaches

Recurrent Laryngeal Nerve

Inferior constrictor m.

Cricothyroid m.

Medial Suspensory Ligament

Recurrent Laryngeal Nerve

Recurrent Laryngeal Nerve

Courtesy of Dave Aten, Illustrator and Mark Zafereo, MD
Ligament of Berry: Anatomy

Randolph, 2016
Recurrent Laryngeal Nerve: Risk of Injury

- Subjective post-thyroidectomy voice complaints occur in 30-87%.
- Traditionally quoted rates of RLN injury (3-5%) significantly underestimate the true incidence, which is likely closer to 10%.9-10
- EBSLN injury remains unknown, it may be as high as 58%.11-12
Recurrent Laryngeal Nerve: Inconsistencies?

- Lack of standardization of postoperative laryngeal examination practices
- Reporting biases from large thyroid centers where complication rates are low
- Subtlety and variability of nerve paralysis symptoms. 13-16
Recurrent Laryngeal Nerve Injury: Symptoms

Unilateral
- dyspnea from air escape
- dysphonia (hoarseness, vocal fatigue, breathy voice)
- dysphagia with potential aspiration.

Bilateral
- Stridor
- respiratory distress
- airway compromise due to obstruction

EBSLN injury
- voice fatigue
- changes in vocal range
- pitch changes
ATA Guidelines 2015: **RECOMMENDATION 40**

All patients undergoing thyroid surgery should have preoperative voice assessment as part of their preoperative physical examination. This should include the patient’s description of vocal changes, as well as the physician’s assessment of voice.
ATAGuidelines2015:RECOMMENDATION41

Preoperative laryngeal exam should be performed in all patients with:
(A) Preoperative voice abnormalities
(B) History of cervical or upper chest surgery, which places the RLN or vagus nerve at risk
(C) Known thyroid cancer with posterior extrathyroidal, extension or extensive central nodal metastases
“I have noticed in operations of this kind, which I have seen performed by others upon the living, and in a number of excisions, which I have myself performed on the dead body, that most of the difficulty in the separation of the tumor has occurred in the region of these ligaments....This difficulty, I believe, to be a very frequent source of that accident which so commonly occurs in removal of goiter, I mean division of the recurrent laryngeal nerve.” Berry (1887)
Types of nerve injury

1. Three primary mechanisms of RLN injury are: 1\textsuperscript{st} and most common, traction (neuropraxia) at points of relative nerve fixation; 2\textsuperscript{nd}, compression from a ligature, clip, surgical instrument or crossing taut blood vessel; and 3\textsuperscript{rd}, direct sharp or thermal trauma\textsuperscript{13,43}. Generally, only the latter remains as potentially a permanent RLN injury.
Risk of Injury: Does Surgeon Volume Matter?
Risk of Injury: Does Surgeon Volume Matter?
RECOMMENDATION 42:

(A) Visual identification of the RLN during dissection is required in all cases.
RLN monitoring
Why is this important to the endocrinologist?

The incidence and location of residual ds
Discuss the BRAF positive ds and I131 resistance
Never been so important for endo to chose the right surgeon, a complete surgery increased risk of revision surgery.
confirmed incomplete surgical thyroidectomy, management should be based on the patient’s risk with options including: observation, TSH suppressive therapy, revision surgery, or radioactive iodine ablation of the remnant tissue.
Identifiable areas of uptake as seen on single photon emission computerized tomography-computed tomography (SPECT-CT) post total thyroidectomy.


8. Medial approach to the recurrent laryngeal nerve. Courtesy of Dave Aten, Illustrator and Mark Zafereo


