

1. Curr Opin Otolaryngol Head Neck Surg. 2014 Dec;22(6):439-43. doi: 10.1097/MOO.000000000000097.

**Superior laryngeal nerve injury: effects, clinical findings, prognosis, and management options.**

Orestes MI<sup>1</sup>, Chhetri DK.

**Abstract**

**PURPOSE OF REVIEW:**

The superior laryngeal nerve (SLN) provides motor innervation to the cricothyroid muscle. However, the functions of this muscle and the anatomic variations of the nerve that supplies it are not fully understood. SLN paresis and paralysis (SLNp) is difficult to diagnose because of a lack of consistent laryngeal findings, and its effects on the voice likely go beyond simple pitch elevation control.

**RECENT FINDINGS:**

Although SLNp has traditionally been thought to lead to voice pitch limitation, recent research findings reveal multiple roles for this nerve in voice and speech. Cricothyroid muscles are the primary controls of fundamental frequency of voice. SLNp can lead to significant contraction of pitch range, vocal fold vibratory phase asymmetry, and acoustic aperiodicity, thus leading to an overall poor vocal quality. In addition, cricothyroid muscles may also play a role in pitch lowering and shifting from voiced to unvoiced sounds during speech.

**SUMMARY:**

Subtle signs, symptoms, and diagnostic findings associated with SLNp make this disorder difficult to characterize clinically. Lack of treatment methodologies to restore the dynamic action of the cricothyroid muscles poses difficulties in treating patients with this condition. A more thorough understanding of the effects of SLNp will improve diagnosis and treatment.

2. In Vivo. 2016 May-Jun;30(3):171-9.

**Postsurgical Hypoparathyroidism: A Systematic Review.**

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**Abstract**

This article reviews epidemiology, risk factors and treatment modalities of postsurgical hypoparathyroidism (PHypo). PHypo occurs after total thyroidectomy due to injury of parathyroid glands and/or their blood supply or after parathyroidectomy.

PHypo results in hypocalcemia because parathyroid hormone (PTH) secretion is impaired and cannot mobilize calcium from bone, reabsorb calcium from the distal nephron and stimulate renal  $1\alpha$ -hydroxylase activity. It usually appears in the first days after surgery and it can be symptomatic or asymptomatic. Risk factors are low level of intraoperative PTH and presence of parathyroid gland in the pathological specimen. Patients usually present with paresthesia, cramps or tetany, but the disorder may also manifest acutely with seizures, bronchospasm, laryngospasm or cardiac rhythm disturbances. Standard treatment is vitamin D analogues and calcium supplementation.

3. Updates Surg. 2017 Jun;69(2):211-215. doi: 10.1007/s13304-017-0475-3. Epub 2017 Jun 23.

**How to avoid and to manage post-operative complications in thyroid surgery.**

Cannizzaro MA<sup>1</sup>, Lo Bianco S<sup>2</sup>, Picardo MC<sup>2</sup>, Provenzano D<sup>2</sup>, Buffone A<sup>2</sup>.

**Abstract**

Complications of thyroidectomy are hypoparathyroidism, recurrent laryngeal nerve palsy, and hemorrhage. These complications have a low incidence. Hypoparathyroidism is the most frequent complication of total thyroidectomy. Its incidence varies between 0.5 and 65%. This complication is also visible after reoperation for recurrent disease and in patients previously treated with radioiodine. Damage to the recurrent laryngeal nerve can be temporary or permanent, unilateral or bilateral. The bilateral lesion, associated with severe episodes of breathlessness, is a rare complication (0.4%). Intraoperative control of nerves is crucial to prevent damage. The hematoma creates an obstacle to venous and lymphatic flow and consequently breathing difficulties. The preventive hemostasis during surgery is important. Therapeutic treatment is described.

4. Can J Surg. 2018 Aug;61(4):278-282.

**A method to repair the recurrent laryngeal nerve during thyroidectomy.**

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Surgery, Department of Surgical Sciences, Radiology and Dentistry, Santa Maria Hospital of Terni, University of Perugia, Perugia, Italy (Avenia).

#### Abstract

Vocal cord palsy (VCP) is one of the most frequent complications following thyroidectomy. We evaluated the outcomes of intraoperative reconstruction of the recurrent laryngeal nerve (RLN). Of 917 patients who underwent thyroid surgery in a single high-volume general surgery ward between 2000 and 2015, 12 (1.3%) were diagnosed with RLN injury and were retrospectively categorized into 2 groups: group A ( $n = 5$ ), with intraoperative evidence of iatrogenic transection or cancer invasion of the RLN, and group B ( $n = 7$ ), with postoperative confirmation of VCP. In group A, immediate microsurgical primary repair of the RLN was performed. Postoperative assessment included subjective ratings (aspiration and voice quality improvement) and objective ratings (perceptual voice quality according to the grade, roughness, breathiness, asthenia and strain [GRBAS] scale, and direct laryngoscopy). In group A, roughness, breathiness and strain were significantly lower at 9 months than at 3 months ( $p < 0.05$ ). Although larger, multicentre studies are needed, the results suggest potentially excellent postoperative phonatory function after immediate RLN reconstruction.

5. Head Neck. 2017 Jul;39(7):1470-1478. doi: 10.1002/hed.24772. Epub 2017 Apr 3.

#### **Management of unilateral recurrent laryngeal nerve injury after thyroid surgery: A review.**

Lynch J<sup>1</sup>, Parameswaran R<sup>2</sup>.

#### Abstract

#### **BACKGROUND:**

Recurrent laryngeal nerve (RLN) damage because of thyroid and parathyroid surgery has been recognized for over a century. Injury rates have been slowly decreasing in this period while effective treatment strategies have been increasing.

#### **METHODS:**

Recent literature was evaluated on the topics of anatomy, pathophysiology, avoidance, and conservative and surgical treatment of RLN injury. Data for this literature review were identified by PubMed and references from relevant articles using the search terms "thyroid," "laryngeal nerve," and "injury." Only articles published in English between 1990 and 2015 were included.

#### **RESULTS:**

Advances in technique and equipment have made injury less likely. The evidence and role for neuromonitoring is discussed. Treatment strategies may include speech therapy, vocal cord augmentation using injection, laryngeal framework surgery techniques (including laryngoplasty and arytenoid adduction), and reinnervation.

## **CONCLUSION:**

Injury rates in specialist centers are very low. Good to excellent results may be obtained in most cases.

6. Thyroid. 2018 Jul;28(7):830-841. doi: 10.1089/thy.2017.0309. Epub 2018 Jun 29.

### **American Thyroid Association Statement on Postoperative Hypoparathyroidism: Diagnosis, Prevention, and Management in Adults.**

Orloff LA<sup>1</sup>, Wiseman SM<sup>2</sup>, Bernet VJ<sup>3</sup>, Fahey TJ 3rd<sup>4</sup>, Shaha AR<sup>5</sup>, Shindo ML<sup>6</sup>, Snyder SK<sup>7</sup>, Stack BC Jr<sup>8</sup>, Sunwoo JB<sup>1</sup>, Wang MB<sup>9</sup>.

#### **Abstract**

#### **BACKGROUND:**

Hypoparathyroidism (hypoPT) is the most common complication following bilateral thyroid operations. Thyroid surgeons must employ strategies for minimizing and preventing post-thyroidectomy hypoPT. The objective of this American Thyroid Association Surgical Affairs Committee Statement is to provide an overview of its diagnosis, prevention, and treatment.

#### **SUMMARY:**

HypoPT occurs when a low intact parathyroid hormone (PTH) level is accompanied by hypocalcemia. Risk factors for post-thyroidectomy hypoPT include bilateral thyroid operations, autoimmune thyroid disease, central neck dissection, substernal goiter, surgeon inexperience, and malabsorptive conditions. Medical and surgical strategies to minimize perioperative hypoPT include optimizing vitamin D levels, preserving parathyroid blood supply, and autotransplanting ischemic parathyroid glands. Measurement of intraoperative or early postoperative intact PTH levels following thyroidectomy can help guide patient management. In general, a postoperative PTH level <15 pg/mL indicates increased risk for acute hypoPT. Effective management of mild to moderate potential or actual postoperative hypoPT can be achieved by administering either empiric/prophylactic oral calcium and vitamin D, selective oral calcium, and vitamin D based on rapid postoperative PTH level(s), or serial serum calcium levels as a guide. Monitoring for rebound hypercalcemia is necessary to avoid metabolic and renal complications. For more severe hypocalcemia, inpatient management may be necessary. Permanent hypoPT has long-term consequences for

both objective and subjective well-being, and should be prevented whenever possible.

7. Thyroid. 2018 May;28(5):624-638. doi: 10.1089/thy.2017.0543.

**Systematic Review and Meta-Analysis of Unplanned Reoperations, Emergency Department Visits and Hospital Readmission After Thyroidectomy.**

Margolick J<sup>1</sup>, Chen W<sup>2</sup>, Wiseman SM<sup>1</sup>.

**Abstract**

**BACKGROUND:**

Unplanned reoperation, emergency department (ED) visits, and hospital readmission following thyroid operations usually arise due to complications and are a source of frustration for both surgeons and patients. With the aim of providing insight important for the development of patient quality care improvement initiatives, the primary objective of this review was to evaluate the available literature systematically in order to determine the contemporary rates of reoperation, readmission, and ED visits following thyroid operations. A secondary study objective was to determine if there were any practices that showed promise in reducing the occurrence of these undesirable postoperative events.

**METHODS:**

This systematic review was conducted in accordance with the Preferred Reporting of Items for Systematic Reviews and Meta-Analyses protocols. Twenty-two studies were included in the systematic review. Meta-analysis was performed to obtain the weighted-pooled summary estimates of rates of reoperations, ED visits, and unplanned hospital readmission. Jackknife sensitivity analyses were performed for each data set. Finally, in order to detect the risk of publication bias and the small-study effect, funnel plot analysis was performed.

**RESULTS:**

The pooled rate estimate for reoperation was very low (0.6% [confidence interval (CI) 0.3-1.1%]). This was subject to publication bias because smaller studies tended to report lower rates of reoperation. The pooled rate of ED visits was 8.1% [CI 6.5-9.8%], while the pooled rate of hospital readmission from 19 studies was 2.7% [CI 2.1-3.4%]. Neck hematoma was the most common reason for reoperation, while postoperative hypocalcemia was the most common reason for hospital readmission.

**CONCLUSIONS:**

ED visits and hospital readmission after thyroidectomy are common, and there are several practices that can reduce their occurrence. Routine postoperative calcium and

vitamin D supplementation may reduce rates of postoperative hypocalcemia, and avoiding postoperative hypertension may decrease the risk of neck hematoma development and the need for reoperation. Older age, thyroid cancer, dependent functional status, higher ASA score, diabetes, chronic obstructive pulmonary disease, steroid use, hemodialysis, and recent weight loss increase the risk of hospital readmission after thyroid surgery. By further identifying risk factors for reoperation, ED visits, and readmission, this review may assist practitioners in optimizing perioperative care and therefore reducing patient morbidity and mortality after thyroid operations.

8. Int J Surg. 2017 May;41 Suppl 1:S94-S102. doi: 10.1016/j.ijso.2017.03.078.

**Swallowing disorders after thyroidectomy: What we know and where we are. A systematic review.**

Scerrino G<sup>1</sup>, Tudisca C<sup>2</sup>, Bonventre S<sup>3</sup>, Raspanti C<sup>4</sup>, Picone D<sup>5</sup>, Porrello C<sup>6</sup>, Paladino NC<sup>7</sup>, Vernuccio F<sup>8</sup>, Cupido F<sup>9</sup>, Cocorullo G<sup>10</sup>, Lo Re G<sup>11</sup>, Gulotta G<sup>12</sup>.

**Abstract**

**INTRODUCTION:**

Dysphagia and hoarseness are possible complications that can be observed in patients undergoing thyroidectomy or other neck surgery procedures. These complaints are usually related to superior and inferior laryngeal nerves dysfunction, but these can appear even after uncomplicated surgical procedure.

**METHODS:**

We reviewed the current literature available on MEDLINE database, concerning the swallowing disorders appearing after the thyroidectomy. The articles included in the review reported pathophysiology and diagnostic concerns.

**RESULTS:**

Twenty articles were selected for inclusion in the review. Depends on the possible causes of the difficulty swallowing (related to nerve damage or appearing after uncomplicated thyroidectomy), different types of diagnostic procedures could be used to study patient discomfort, as well as intraoperative nerve monitoring, fiber optic laryngoscopy, endoscopy, pH monitoring, esophageal manometry and videofluorography. Among all these procedures, videofluorography is considered the gold standard to evaluate the entire swallowing process, since that allows a real-time study of all the three phases of swallowing: oral phase, pharyngeal phase and esophageal phase.

**CONCLUSION:**

The diagnostic procedures described can help to identify the mechanisms involved in swallowing disorders, with the aim to choose the best therapeutic option. More studies are needed for understanding the causes of the dysphagia appearing after thyroidectomy.