

# Important Complications of Thyroidectomy

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## **Abstract**

Thyroidectomy is the most frequent intervention in endocrine surgery. When performed in specialized centers, the operation is safe with low morbidity and a virtually 0% mortality. Thus, the cornerstones of safe and effective thyroid surgery are an adequate training, the understanding of the anatomy and pathology, as well as a meticulous dissection technique. The dissection must be based on a sound knowledge of three-dimensional topographic anatomy, typical landmarks, and possible anatomic variations. Various indications for thyroidectomy exist. One of the major indications is a diagnosis of thyroid cancer, usually biopsy-proven by fine-needle aspiration of a nodule. Postoperative complications are infrequent in experienced hands and best prevented by meticulous surgical technique.

**Keywords:** Thyroidectomy, Complications

## **Introduction**

Thyroidectomy is the most frequent intervention in endocrine surgery. When performed in specialized centers, the operation is safe with low morbidity and a virtually 0% mortality (1). Complications of thyroid surgery are directly correlated to the extent of resection and inversely proportional to the experience of the operating surgeon (2).

Thus, the cornerstones of safe and effective thyroid surgery are an adequate training, the understanding of the anatomy and pathology, as well as a meticulous dissection technique. The dissection must be based on a sound knowledge of three-dimensional topographic anatomy, typical landmarks, and possible anatomic variations (3).

The meticulous dissection technique is achieved by a proper exposure of all fine anatomic structures in a bloodless dry surgical field. The use of magnifying glasses (magnification 2.5–3.5×), bipolar coagulation, and fine titan clips or ligatures is highly recommended. Neuromonitoring has proved useful for identifying the recurrent laryngeal nerve (RLN), in particular if the anatomic situation is complicated by prior surgery (3).

## **Indications**

Various indications for thyroidectomy exist. One of the major indications is a diagnosis of thyroid cancer, usually biopsy-proven by fine-needle aspiration of a nodule (4).

Although the full range of thyroid nodule histology is beyond the scope of this chapter, the histology can have significant ramifications as to chosen operative management. In patients with all but the most minimal (low-risk) biopsy-proven papillary thyroid cancer, and all medullary thyroid cancer, a total thyroidectomy is indicated. Patients with a fine-needle aspiration showing follicular neoplasm require at least a thyroid lobectomy of the side ipsilateral to the nodule and possibly a total thyroidectomy if the permanent operative specimen shows signs of malignancy. In addition to these malignancies, anaplastic thyroid cancer can occasionally be an indication for thyroidectomy, if no significant extension and infiltration into the surrounding structures is found (5).

Beyond malignancies, thyroidectomy is also a viable option for patients with symptomatic thyroid masses or goiters. Patients who have compressive symptoms including dysphagia, dyspnea, shortness of breath, and/or hoarseness due to a large goiter should undergo a thyroidectomy.

Aesthetic concerns due to a goiter may be an indication for thyroidectomy. Another indication includes patients with medically refractory Graves' disease or hyperthyroidism (4).

## **Contraindications**

Uncontrolled severe hyperthyroidism (i.e. Graves' disease) is a relative contraindication to surgery due to concerns for intraoperative or postoperative thyroid storm. Although thyroidectomy can be performed during pregnancy for malignancy, many authors are postponing surgery until after delivery, if possible, secondary to risks to the fetus from the anesthesia. Indications for surgery during pregnancy include aggressive cancers or airway compromise. If elective thyroid surgery is undertaken during pregnancy, it should be performed during the second trimester if possible (6).

### **Important Complications of thyroidectomy**

Postoperative complications are infrequent in experienced hands and best prevented by meticulous surgical technique.

Early recognition and prompt initial management of complications are equally important to successful outcome. Apart from close supervision by the surgeon, this requires awareness and vigilance on the part of all members of the multidisciplinary team treating these patients. The most debilitating complications of thyroid surgery unquestionably are RLN injury and hypocalcemia. Other less frequent but significant complications include hematoma, seroma, ESLN injury, and wound infection (7).

#### **Hemorrhage and hematoma:**

Neck hematoma or bleeding after thyroid surgery is rare and reportedly occurs in less than 1% of the cases (8)

The time period for development of postoperative hematoma can vary from 5 minutes to 5 days after surgery, but most hematomas occur within 6 hours after surgery. Patients undergoing thyroid surgery, therefore, are believed to benefit from close monitoring for a minimal period of 6 hours after thyroid lobectomy and overnight after total thyroidectomy (7)

Hematoma is prevented best by appropriate identification and ligation of blood vessels during surgery and by meticulous wound irrigation and hemostasis before wound closure. To identify potential bleeding vessels before wound closure, the anesthesiologist should normalize the patient's blood pressure, because hypotension and vasoconstriction may obscure potential sources of bleeding that may become manifest only after extubation. A simulated Valsalva maneuver can help identify potential venous bleeders when the anesthesiologist raises and maintains the intrapulmonary pressure. Most delayed bleeding is of venous origin and a major source rarely is apparent at wound exploration in hematomas that have occurred slowly over the postoperative course (7).

Rapidly expanding hematoma, alternatively, occurs most commonly from a bleeding artery. This life-threatening condition should be identified and managed as early as possible. Failure to identify impending hematoma after surgery may occur if the strap muscles are sutured tightly in the midline, allowing the hematoma to cause an increase in the central compartmental pressure with impingement of the airway. The strap muscles, therefore, should be approximated only loosely in the midline, leaving free communication between the deep and superficial neck spaces. Other causes of post-thyroidectomy hematomas include slipping of ligature on major vessels and reopening of cauterized vessels. Factors, such as elevated postoperative blood pressure and use of anticoagulant therapy, may contribute to a higher risk. Increased blood pressure immediately after extubation may be related to Valsalva maneuvers caused by bucking or vomiting and from inappropriate management of hypertensive patients during the early postoperative period. All these situations are preventable by close cooperation with the anesthesiologist. Although small and stable seroma or hematoma can be monitored closely or evacuated by needle aspiration, significant or expanding hematoma of the neck should be managed surgically because of high risk for airway compromise. Symptoms, such as difficulty breathing, pressure in the neck, and voice changes with an obvious collection in the wound, require surgical intervention without delay (9).

Patients who do not have obvious airway compromise and who have a stable hematoma should be brought to the operating room for re-exploration as early as possible after they are hemodynamically stable.

In contrast, patients who have airway symptoms need emergency intervention at the bedside. The hematoma in such patients should be managed by opening the thyroidectomy wound at the bedside and evacuating the clotted blood. Release of central compartment tension by this maneuver usually ameliorates airway symptoms and ends the emergency (7).

In a small percentage of patients, however, airway compromise may persist even after evacuation of the hematoma. Immediate endotracheal intubation should be performed by an experienced clinician, because these patients may develop severe airway obstruction resulting from edema of the larynx as a result of the hematoma.

Emergency tracheostomy rarely may become necessary if an endotracheal airway cannot be secured. This is straightforward technically, because the trachea lies exposed in the thyroidectomy wound (9).

All patients should be brought back to the operating room for complete wound exploration after any urgent bedside procedure. After evacuation of the hematoma, the wound should be irrigated copiously and the bleeding vessels identified and ligated. Great care must be taken to avoid injury to the RLN and PT glands, and it is prudent to avoid the use of suction directly in the wound during this phase of the operation. If emergency tracheostomy is performed, closure of the wound becomes challenging, because the tracheotomy now lies within the otherwise clean thyroidectomy wound with the potential for sepsis (7).

The thyroidectomy wound in such instances can be closed over a Penrose drain and the tracheostomy is fashioned in the midline to isolate it from the thyroidectomy wound by suturing the edges of the tracheotomy to the cutaneous edges of the thyroidectomy wound.

The surgeon must be aware of the risk for pneumothorax and postobstructive pulmonary edema that can develop after acute airway obstruction.

A chest radiograph, therefore, should be performed after exploration of hematoma in the neck to identify and treat these conditions. Patients who require reexploration for neck hematoma should be monitored closely for at least 48 hours, because they have an increased risk for airway compromise from laryngeal edema or RLN palsy (9).

#### **Recurrent laryngeal nerve injury**

Temporary nerve palsy may occur in up to 5% of cases (10), whereas permanent RLN injury and vocal cord paralysis occurs in less than 2% to 3% of patients.

The causes of transient nerve palsy include significant manipulation and dissection along the RLN, thermal injury, and traction injury. Alternatively, most permanent RLN injuries occur because of transection of the nerve during surgery.

Bilateral RLN injury is rare and was reported in 1 of 1000 thyroid surgeries, this is an especially debilitating situation, as it creates the need for permanent tracheostomy (10)

The surgeon should be aware of a higher risk for bilateral RLN palsy when unilateral RLN paralysis is diagnosed preoperatively, if RLN is sacrificed during the operation, or in patients undergoing reoperative thyroid surgery.

If bilateral RLN injury goes unrecognized intraoperatively, patients generally require reintubation immediately after the operation. Rarely, bilateral injury may not present for up to several hours after extubation. Recurrent failure to extubate patients clearly suggests the possibility of bilateral vocal cord paralysis.

If the surgeon is confident that the RLNs are preserved during the operation, it is acceptable to treat the patient with systemic steroids and assisted endotracheal ventilation for several days.

The patient then can be weaned off the ventilator gradually and an attempted extubation performed in the operating room. If flexible fiberoptic evaluation of the larynx clearly demonstrates an adequate airway with functioning vocal cords, no further intervention is required (11).

If, however, patients fail extubation or laryngoscopy reveals bilaterally paralyzed vocal cords with or without airway compromise, tracheostomy is indicated. Most of these patients who require tracheostomy generally have temporary RLN palsy of at least one nerve.

In such cases, patients can be weaned from the tracheostomy 3 to 9 months after the operation, which is the time required for the RLNs to recover. Laryngeal electromyography may be used to assess the likelihood of future decannulation. Patients who have unilateral RLN palsy often suffer from hoarseness, although normal voice is not infrequent in this population. Symptomatic patients who have RLN injury also may suffer from dysphagia and aspiration. As discussed previously, recovery of a nerve that is paralyzed temporarily can take several months. Symptomatic patients and those who have permanent paralysis should be considered for vocal cord medialization to improve the quality of their voice and for prevention of aspiration (7).

#### **Hypocalcemia and hypoparathyroidism:**

Hypocalcemia secondary to iatrogenic injury to the PT glands occurs in 5% to 25% of patients after thyroid surgery (11).

Transient hypocalcemia is more common than permanent hypocalcemia and is believed caused by impaired vascularity of the PT glands after surgery.

Permanent hypocalcemia, alternatively, usually occurs because of unintentional compromise of all PT glands.

A recent study from the authors' institution found that the incidence of inadvertent excision of a PT gland is approximately 8%; however, removal of three or more PT glands is rare (12)

The risk for hypocalcemia increases in reoperative thyroid surgery or after paratracheal neck dissection.

The postoperative measured serum calcium level also may be reported low because of surgical stress caused by inappropriate antidiuretic hormone secretion, low serum albumin level, or laboratory error. In these cases, the free or ionized calcium remains unchanged and this condition does not need correction with calcium supplementation (7).

Most patients who have transient hypocalcemia usually are asymptomatic. Symptomatic patients usually complain of perioral numbness, tingling, abdominal cramps, paraesthesias, or muscle spasm, especially in their upper extremities.

Bedside evaluation of symptomatic patients may include tapping on the facial nerve trunk at the preauricular area, producing muscle twitches (Chvostek's sign), or occlusion of the brachial artery for 3 minutes, producing carpopedal spasm (Trousseau's sign) (7).

Failure to recognize and treat severe hypocalcemia may lead to cardiac arrhythmia and seizures. Calcium levels are drawn routinely between 8 and 12 hours after the operation and then at 20 to 22 hours, immediately before discharge from hospital. Subsequent management is based not only on actual serum levels but also on the trend in the levels over time (7).

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