Thyroid Lobectomy

Trenton Foster and Travis McKenzie

Thyroid lobectomy may be utilized for benign thyroid nodules, indeterminate thyroid nodules, or low-risk malignant thyroid nodules less than 4 cm in size, as recommended by the 2015 American Thyroid Association guidelines [1]. Thyroid preservation is desirable in appropriate settings to reduce the surgical risks of recurrent laryngeal nerve injury and postoperative hypoparathyroidism and can allow many patients to avoid the need for life-long thyroid replacement hormones.

Procedure

A 52-year-old gentleman presents for surgical management of a 2-cm indeterminate thyroid nodule (Hurthle cell neoplasm) located within the left thyroid lobe. He is euthyroid and without concerning nodules in the contralateral lobe. Diagnostic left thyroid lobectomy is pursued.

The patient is placed under general anesthesia using an endotracheal tube. The authors prefer the routine use of an endotracheal tube capable of intraoperative nerve monitoring to aid in the dissection of the recurrent laryngeal nerve in all thyroid operations. The patient is then positioned supine with an inflatable cushion under the scapulae. The cushion is inflated to maximize cervical extension while maintaining appropriate support of the occiput. Bean bags are placed laterally to the left and right of the head to ensure stability and avoid rotation. The bed is placed in a beach chair position with a slight reverse Trendelenburg (Fig. 3.1). The surgical field is widely prepared with clear ChloraPrep from the lower lip to the mid sternum laterally to the shoulders and allowed to dry. The field is then sterilely draped from chin to clavicles (Fig. 3.2). If a lateral neck dissection is planned, a wider field is draped. In the case of a substernal goiter, the anterior chest is also prepped into the field. Once draped, the

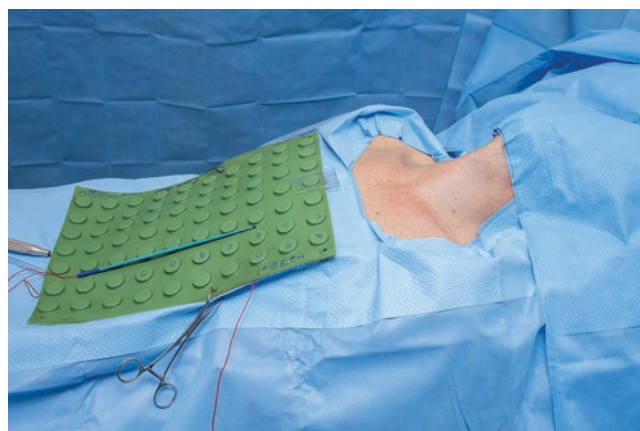**Fig. 3.1** Patient positioning with neck extended and head supported

Fig. 3.2 Patient draping with adequate exposure from clavicles to chin

necessary instruments are opened (Fig. 3.3) and a confirmatory pause is performed. Preincisional antibiotics are generally not utilized unless the patient is immunosuppressed.

The incision is positioned over the thyroid isthmus, which is reliably located 1–2 cm caudal to the cricoid cartilage. This will be approximately two fingerbreadths above the

T. Foster (✉) · T. McKenzie
Department of Surgery, Mayo Clinic, Rochester, MN, USA
e-mail: Foster.Trenton@mayo.edu

Fig. 3.3 Surgical instruments for retraction and fine dissection; ties, clips, and hemostatic energy devices are prepared

sternal notch in most patients, although this distance may vary in those with exceptionally short or long necks. If there is a skin crease present within this vicinity, the skin crease is utilized as the incisional site to enhance the cosmetic outcome. The incision length is guided by the underlying pathology, generally kept at 6 cm or less. The incision is marked and measured to ensure symmetry (Fig. 3.4). The incision is made with a 15-blade scalpel through the epidermis and dermis. The electrocautery of the dermis is avoided to prevent hypertrophic scarring. The platysma is divided with the use of electrocautery. The upper cut border of the platysma is grasped with Allis clamps and lifted. Counter traction is placed on the upper neck. The superior flap is developed with electrocautery in the subplatysmal plane. The subcutaneous fat and platysma muscle is elevated, while the fascia of the strap muscles and associated anterior jugular veins remain down. If injury to an anterior jugular vein occurs, the vein is ligated with a 3-0 Vicryl suture. The superior flap is developed to the level of the thyroid cartilage notch and laterally beyond the anterior border of the sternocleidomastoid muscles (Fig. 3.5). An inferior subplatysmal flap is similarly developed extending to the level of the clavicles and sternal notch (Fig. 3.6). Insulated band retractors are utilized to retract the flaps, and the midline is opened at the median raphe between the right and left sternohyoid muscles. This plane is typically avascular, although a small venous branch between anterior jugular veins can be encountered, especially near the sternal notch. The median raphe can be opened with electrocautery or LigaSure™ (Fig. 3.7). The sternothyroid muscles are bluntly swept off the midline to expose the isthmus. Prelaryngeal and pretracheal tissues are dissected to expose the larynx and trachea above and below the isthmus,

Fig. 3.4 Anatomic landmarks, including the sternal notch and cricoid cartilage, are identified. A symmetric midline skin incision is planned following the contours of the skin

respectively (Fig. 3.8). If a pyramidal lobe is encountered, it is dissected to remain with the thyroid. In the setting of suspected or confirmed malignancy, the Delphian lymph node is evaluated and resected if suspicious. Superior and inferior thyroid veins may be encountered anterior to the larynx and trachea and are divided with clips and LigaSure™. With the larynx and trachea exposed, a tunnel is created bluntly beneath the thyroid isthmus (Fig. 3.9). The thyroid isthmus is divided with LigaSure™ along its junction with the contralateral (right) lobe of the thyroid gland (Fig. 3.10). The isthmus is grasped with an Allis clamp and pulled to the right. The sternohyoid and sternothyroid muscles are dissected off the left thyroid lobe with a combination of electrocautery and blunt dissection. As the thyroid is pulled to the right, the middle thyroid vein, if present, will come into view (Fig. 3.11). The middle thyroid vein is clipped and then
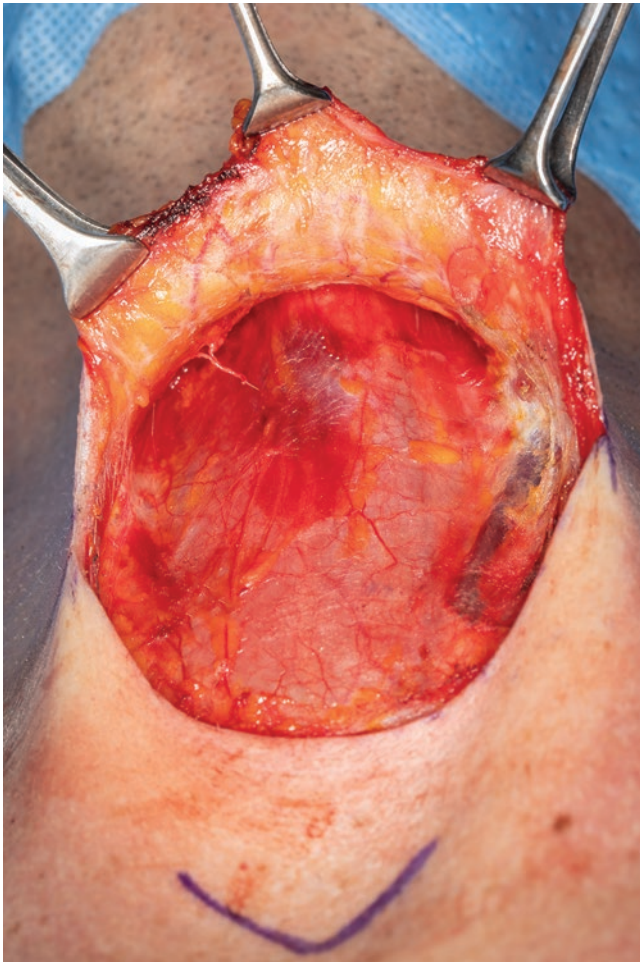
Fig. 3.5 Superior subplatysmal flap is developed to the level of the thyroid cartilage

Fig. 3.6 Inferior subplatysmal flap is developed to the level of the sternal notch and clavicles

divided on the specimen side with LigaSure™ in a plane anterior to the carotid artery. Dissection over the anterior surface of the common carotid artery continues until the anterior adventitia of the carotid artery is fully exposed. Exposure of the common carotid artery allows all tissues between the carotid artery and thyroid lobe to fall away, thereby deepening the field of dissection to the level of the vertebral body. Care is taken to keep the dissection directly ventral to the carotid artery as the only structure that crosses ventral to the carotid artery in this region of the neck is the middle thyroid vein, which can be sacrificed. The recurrent laryngeal nerve will not cross ventral to the carotid artery, even in nonrecurrent situations. The vagus nerve is stimulated lateral and deep to the common carotid artery to confirm that the neurologic circuit is intact and the nerve monitoring device is functioning appropriately.
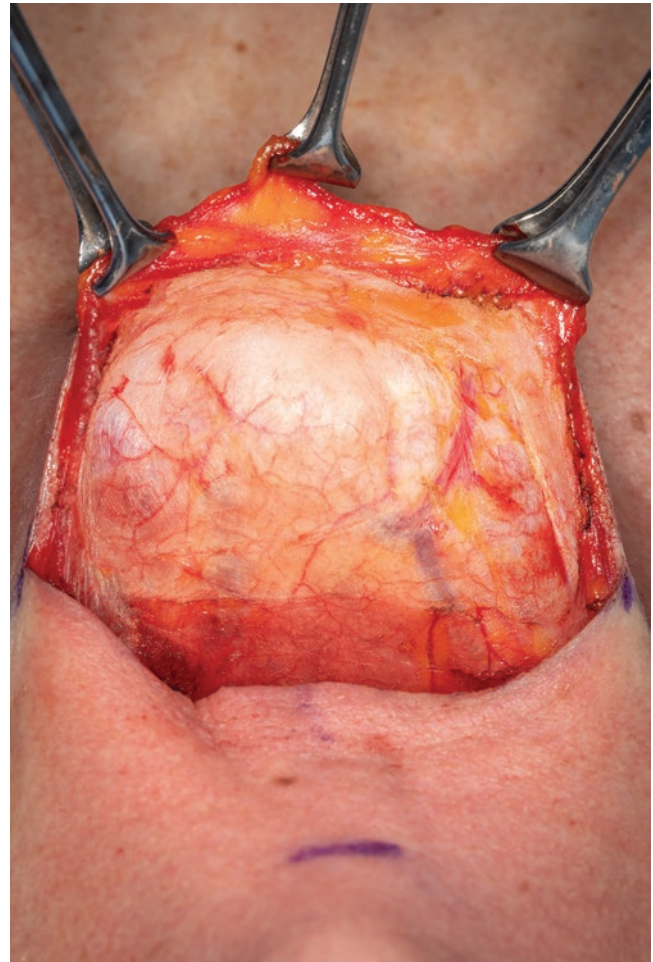
An Allis clamp is placed on the upper thyroid lobe, and the upper pole is retracted laterally (Fig. 3.12). This pulls the superior thyroid vessels away from the cricothyroid muscle, allowing the surgeon to fully open the avascular space of Joll with a straight Jacobson Schnidt (Fig. 3.13). Once the thyroid vessels are pulled away from the cricothyroid muscle, the surgeon examines the upper pole for the presence of a low external branch of the superior laryngeal nerve, which can be as low as the superior pole thyroid parenchyma. If identified, the nerve is dissected away from the superior pole of the thyroid. Once the surgeon is confident the external branch of the superior laryngeal nerve is protected, the upper pole vessels are ligated and divided using LigaSure™ along the superior most extent of the thyroid capsule (Fig. 3.14).

The thyroid can now be fully rotated medially and to the right with gentle traction (Fig. 3.15). With this field of view,
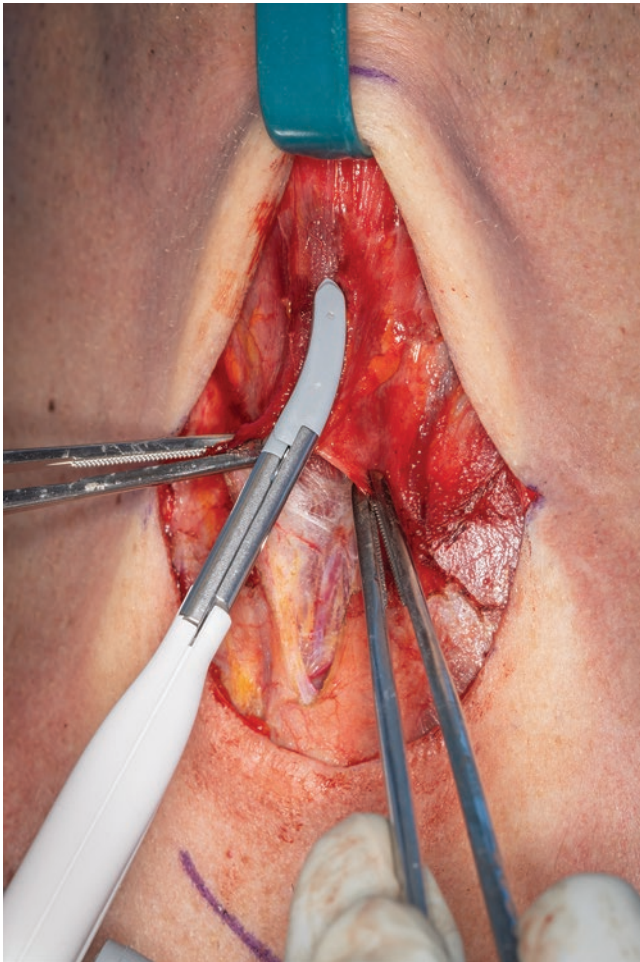
Fig. 3.7 The median raphe between strap muscles is opened using cautery or LigaSure™
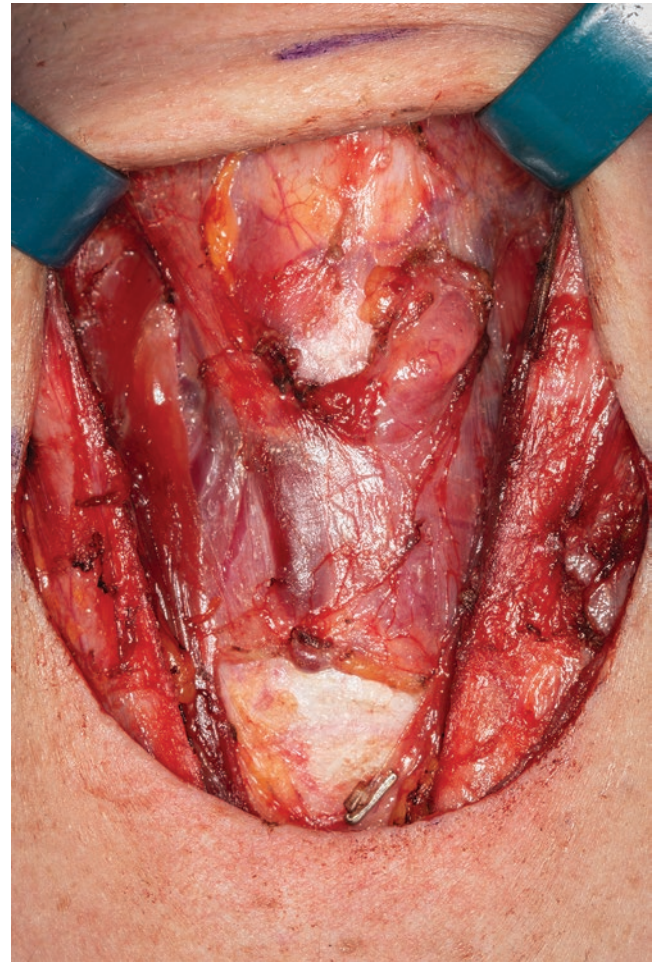

Fig. 3.8 The prelaryngeal space is developed along the superior aspect of the thyroid isthmus, and a pretracheal space is developed along the inferior aspect of the thyroid isthmus

the surgeon can identify the carotid artery, jugular vein, and inferior thyroid artery and should begin to identify the location of the left recurrent laryngeal nerve and superior and inferior parathyroid glands. The recurrent laryngeal nerve on the left is identified in the tracheoesophageal groove immediately caudal to where the inferior thyroid artery traverses the thyroid bed to insert on the thyroid capsule. The nerve is gently but fully exposed in this region. Intraoperative nerve monitoring can be utilized to assist with this portion of the procedure as needed. Once the recurrent laryngeal nerve is identified, the anterior surface of the nerve is carefully dissected from caudal to cranial while dividing tissue anterior to the nerve. This maneuver continues to fully expose the recurrent laryngeal nerve along its course. It should be noted that the blood supply to the recurrent laryn-

geal nerve is through the vasa nervorum running along the nerve and that there is no vessel that runs external to internal. Therefore, the nerve can be dissected anteriorly, and all tissues ventral to the nerve can be divided with the jewelers bipolar forceps. The inferior thyroid artery can have a variable relationship to the recurrent nerve, but the nerve most commonly runs deep to the artery. The artery is dissected away from the nerve and preserved. If the artery is divided proximally, the surgeon risks the devascularization of the parathyroid glands. At this point, the surgeon identifies the inferior and superior parathyroid glands and plans the final portion of dissection. With the recurrent laryngeal nerve and parathyroid glands directly in view, the inferior pedicle is ligated and divided along the thyroid capsule with
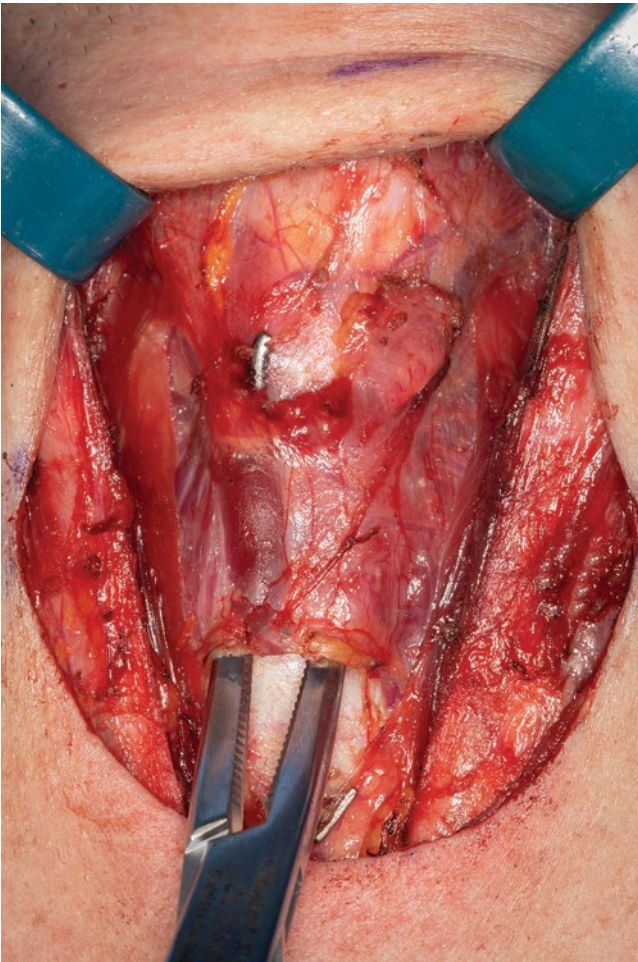
Fig. 3.9 The thyroid isthmus is mobilized off the anterior surface of the trachea with blunt dissection
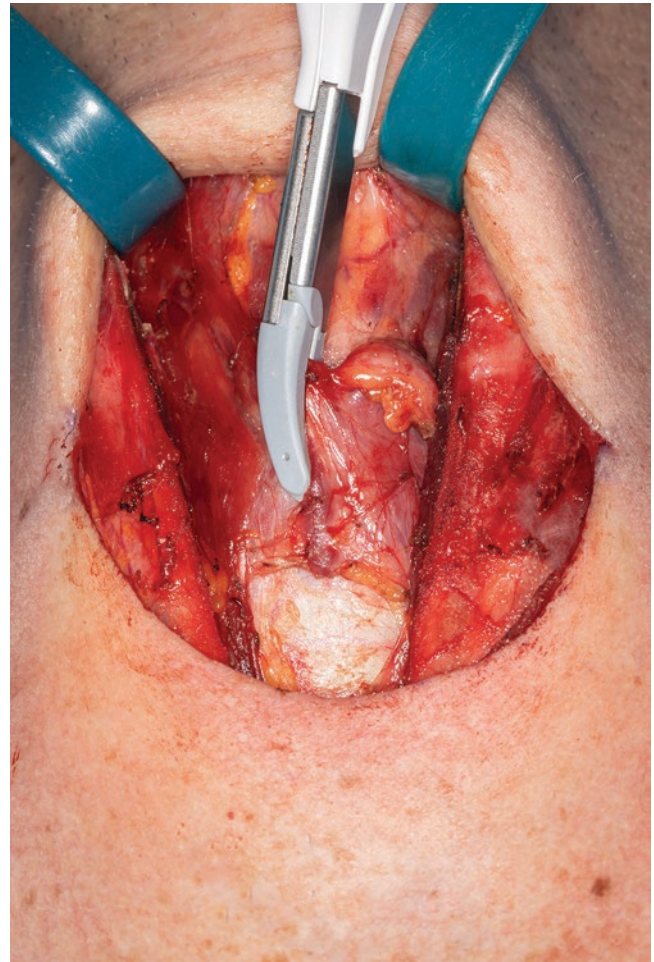

Fig. 3.10 The thyroid isthmus is divided at its junction with the contralateral lobe of the thyroid gland using LigaSure™

LigaSure™ (Fig. 3.16). Capsular dissection then ensues with the use of clips and bipolar in order to drop the inferior and superior parathyroid glands off the thyroid capsule while preserving their native vascular supply (Fig. 3.17). The thyroid is then carefully mobilized off the trachea at the ligament of Berry with the use of clips and bipolar parallel to the recurrent laryngeal nerve while keeping the nerve directly in view (Fig. 3.18). If necessary, near total thyroidectomy can be performed by placing clips on the thyroid parenchyma and dividing the thyroid tissue with the use of bipolar or LigaSure™. The specimen is oriented for pathological review. The operative field is then inspected (Fig. 3.19), and complete hemostasis is confirmed with a Valsalva maneuver while the operative bed is submerged in sterile water. Topical hemostatic may be placed in the operative bed as desired. The strap muscles are closed in the midline with 3-0 Vicryl in an interrupted fashion. Care is taken to leave an approximately 1-cm opening at the inferior aspect of the closure to serve as a "blowhole," allowing blood to decompress into the superficial compartment in the event of cervical hematoma (Fig. 3.20). The platysma is closed with interrupted 3-0 Vicryl. The dermis is infiltrated with 10 mL of 0.25% bupivacaine. The skin is closed with running 4-0 Monocryl in a subcuticular fashion. A Steri-Strip™ is placed horizontally over the incision (Fig. 3.21). The patient is then extubated and discharged home after a period of observation.
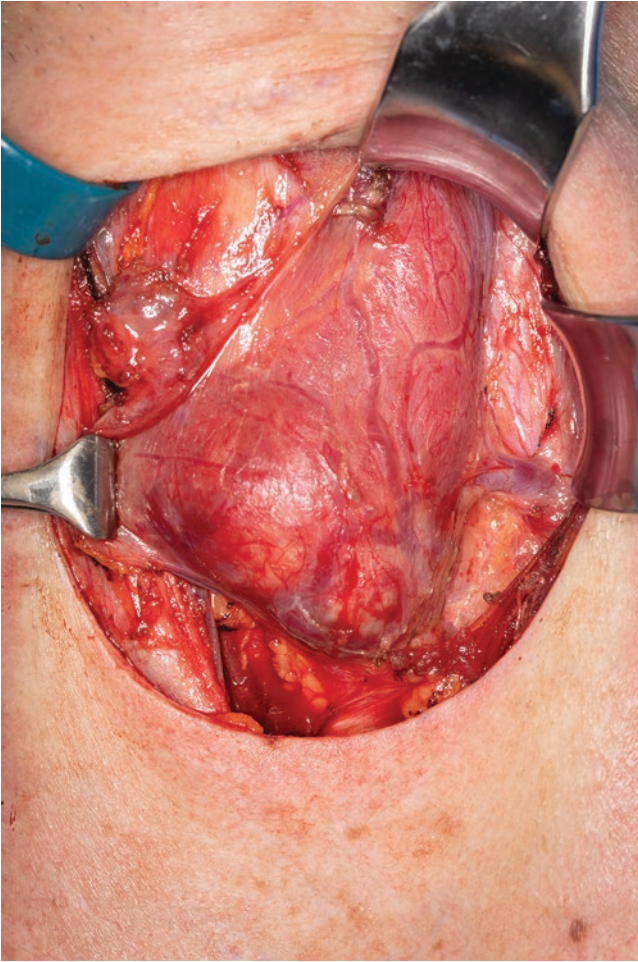
Fig. 3.11 The thyroid gland is pulled medially with an Allis clamp to expose the middle thyroid vein
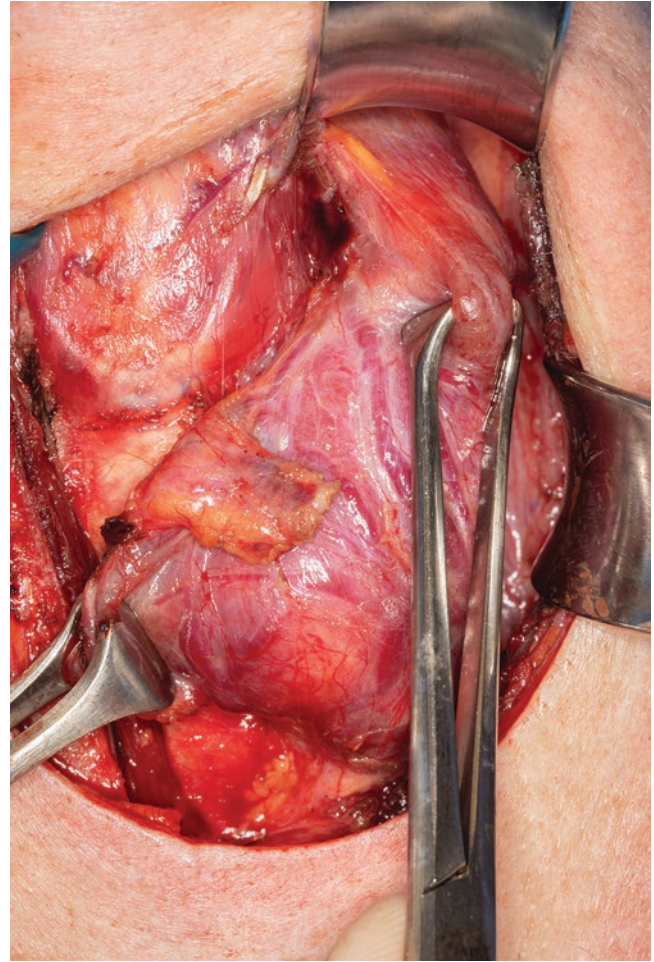

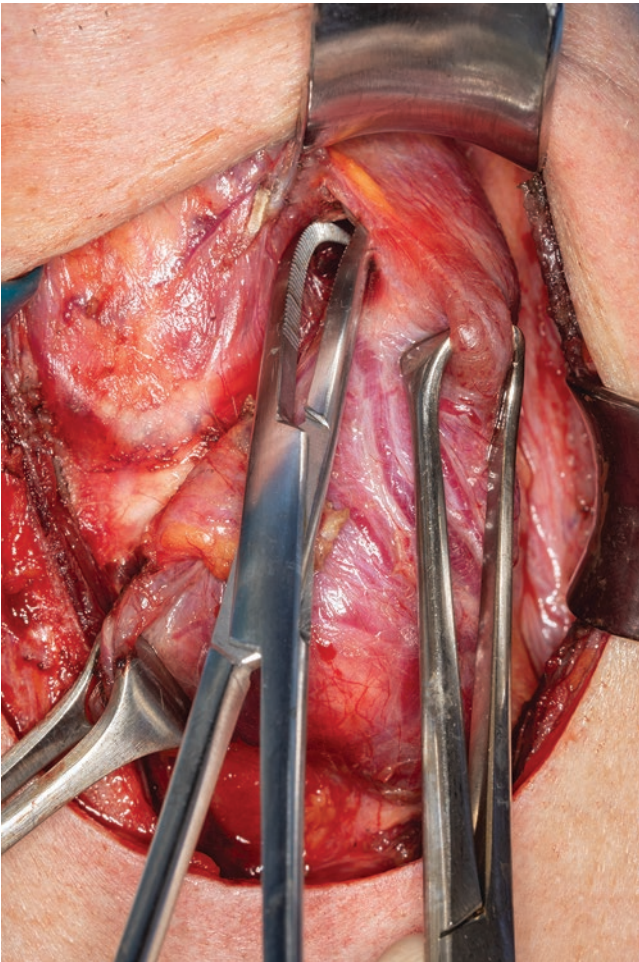**Fig. 3.12** The upper pole of the thyroid is grasped and pulled laterally

Fig. 3.13 The avascular space of Joll is opened, taking care to protect the external branch of the superior laryngeal nerve
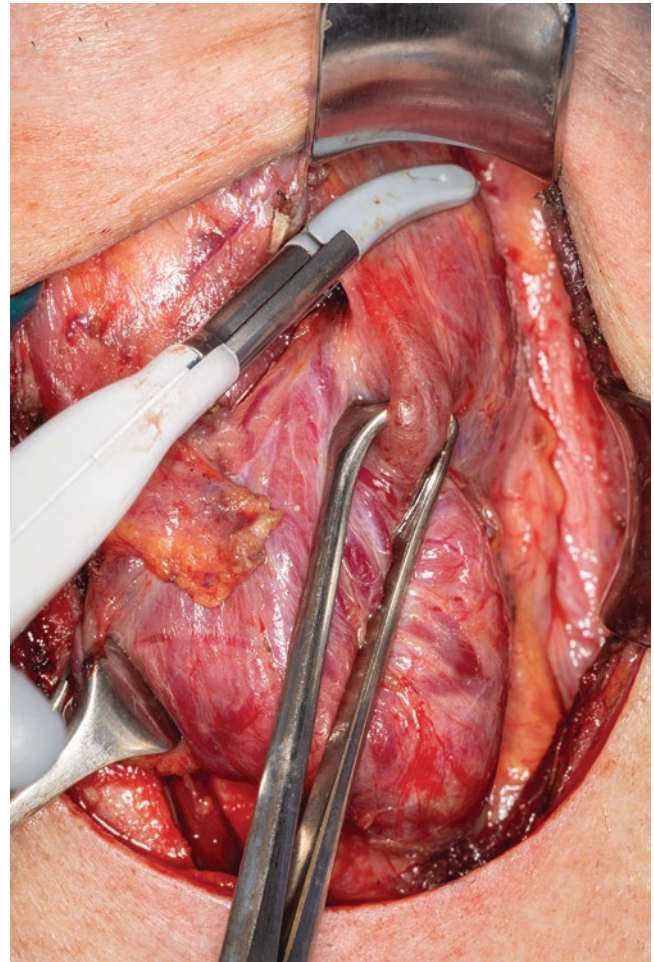

Fig. 3.14 The upper pole vessels are ligated with LigaSure™ along the superior most extent of the thyroid capsule
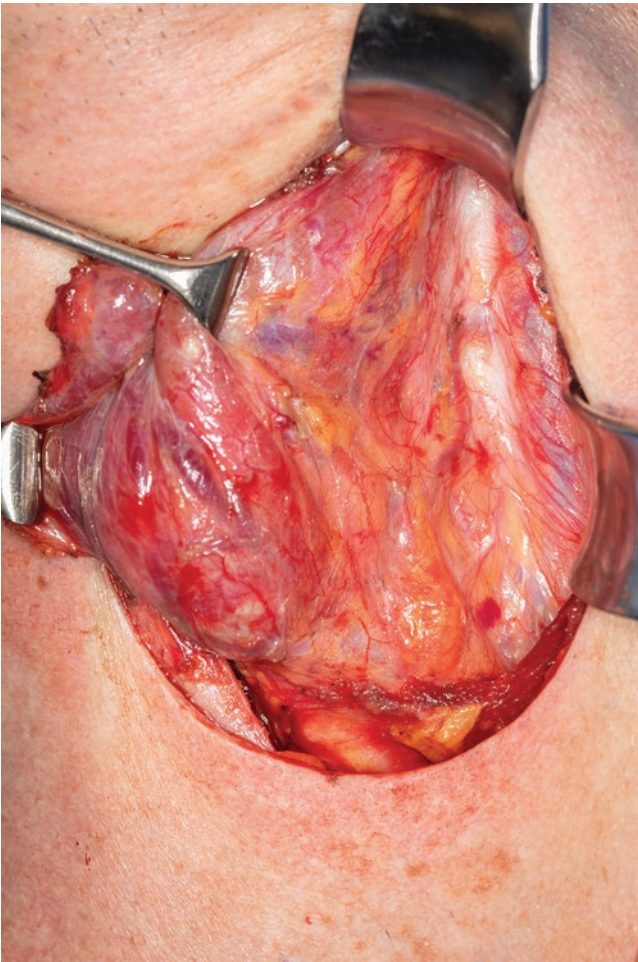
Fig. 3.15 The thyroid gland is pulled medially to reveal the carotid artery, jugular vein, and expected regions of the inferior thyroid artery, superior and inferior parathyroid glands, and recurrent laryngeal nerve
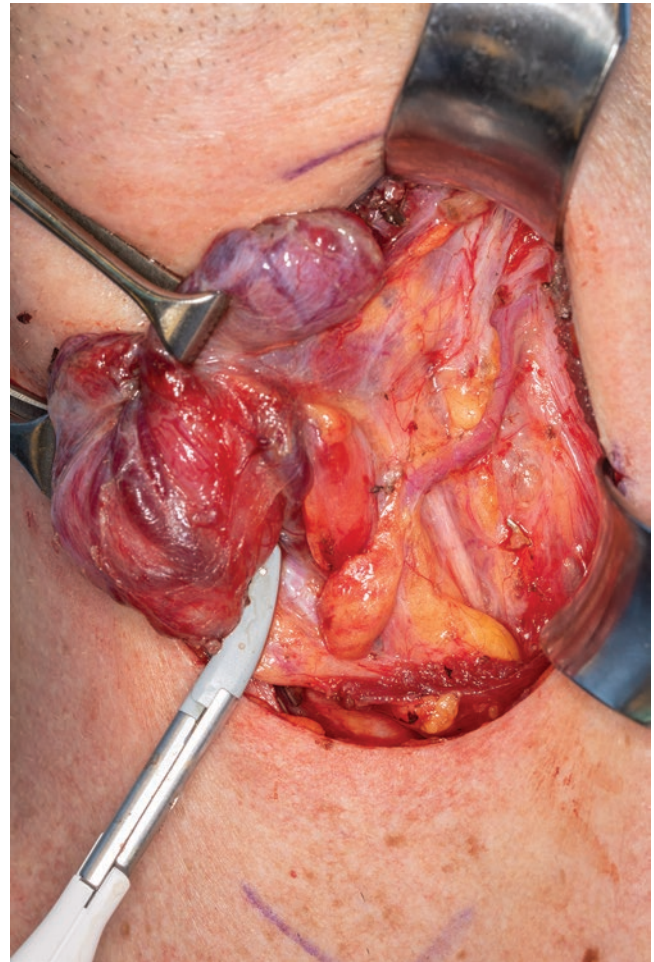

Fig. 3.16 The inferior vascular pedicle is divided using LigaSure™ while keeping the recurrent laryngeal nerve in view and the parathyroid glands protected
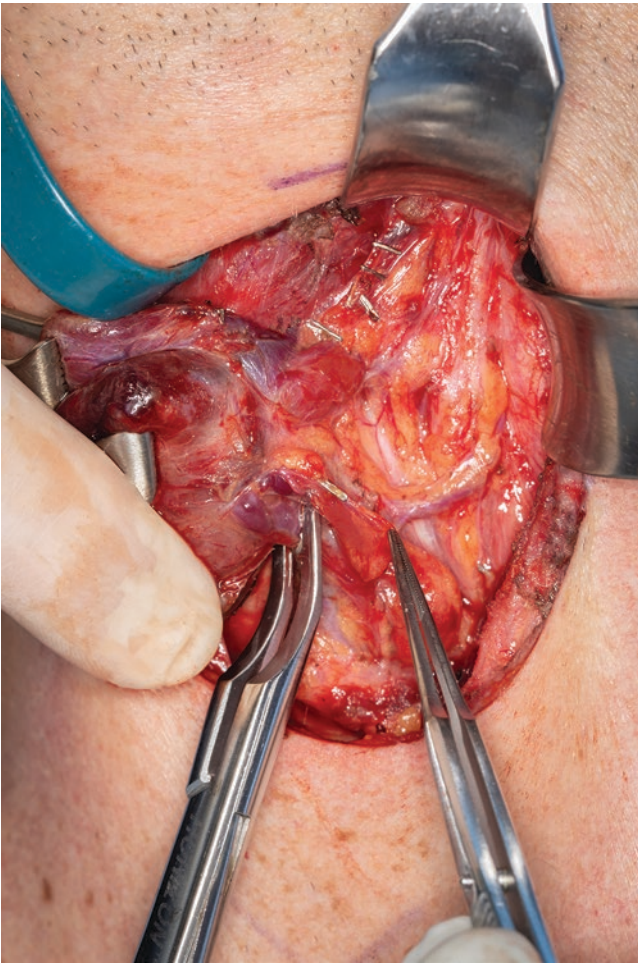
Fig. 3.17 The superior and inferior parathyroid glands are dissected away from the thyroid gland while taking care to preserve their vascular supply
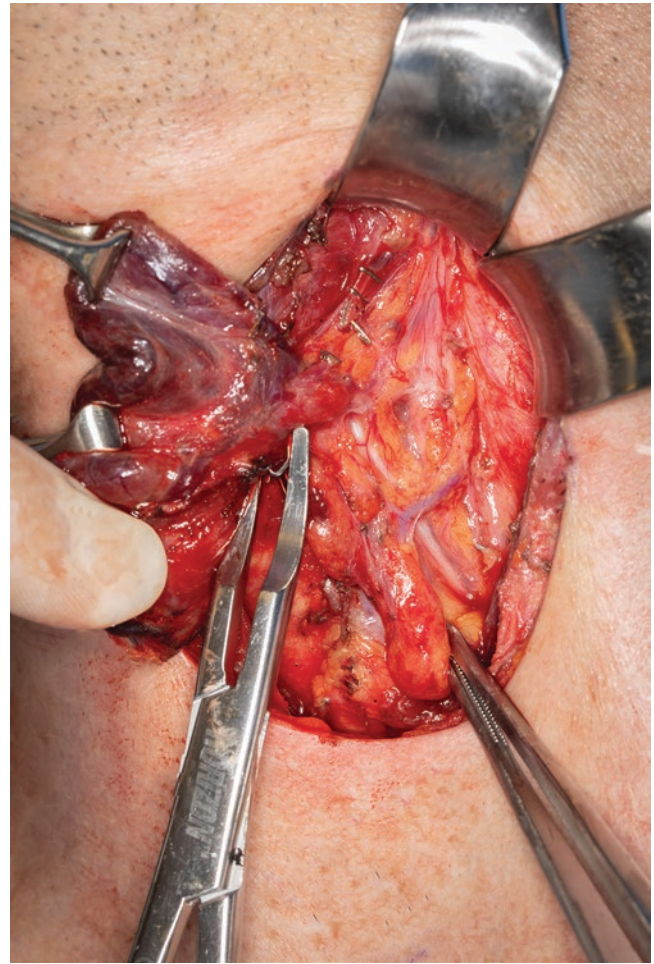

Fig. 3.18 The thyroid is dissected off the trachea while working parallel to the recurrent laryngeal nerve using clips and bipolar cautery
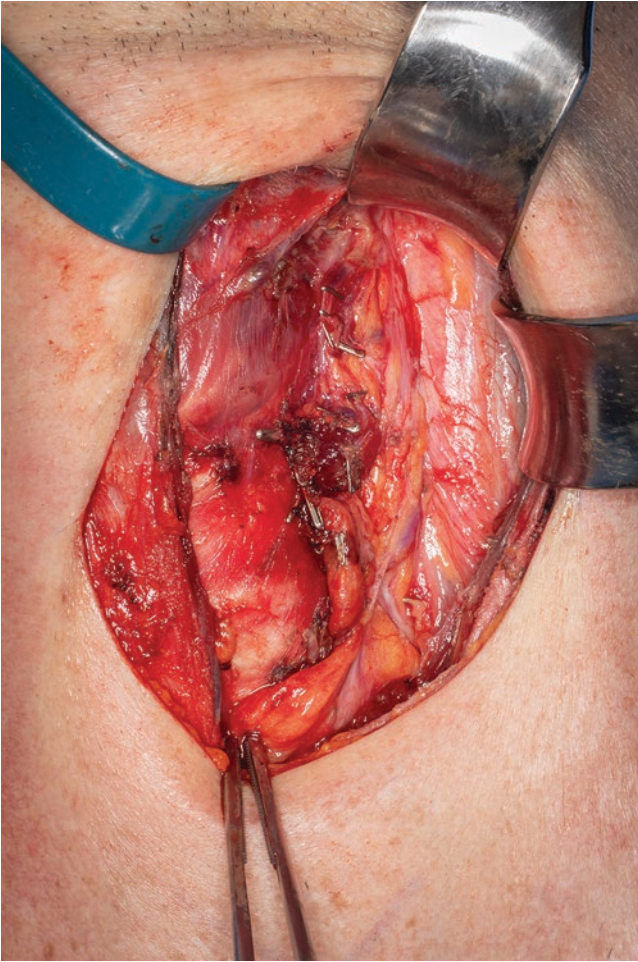
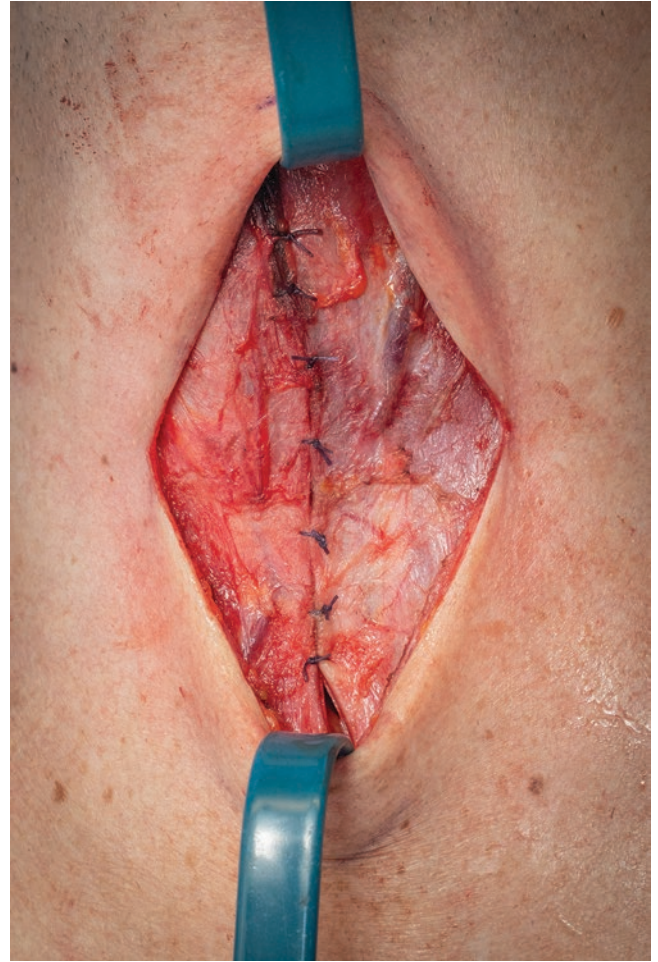**Fig. 3.19** The operative field is inspected for hemostasis

Fig. 3.20 The midline between strap muscles is closed with suture, leaving a small opening at the inferior most aspect

Fig. 3.21 The platysma and skin layers are closed, and the surgical site is then covered with Steri-Strip™

Reference

1. Haugen BR, Alexander EK, Bible KC, Doherty GM, Mandel SJ, Nikiforov YE, et al. 2015 American Thyroid Association Management Guidelines for adult patients with thyroid nodules and differentiated thyroid cancer: the American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. 2016;26(1):1–133.