3 Incisions; Thyroid Exposure

3.1 Skin and Platysma → Fig. 3.1

The Kocher incision (1 in Fig. 3.1) is centered over the isthmus of the thyroid, which lies just caudal to the cricoid cartilage. This placement is preferred to a more caudal one.215

If the neck is hyperextended the incision will lie more caudally once the patient is in the erect position.

The level of the suprasternal notch should be avoided because of the risk of unfavorable scar formation since the platysma is lacking in the midline at that level. Symmetry of length and height of the slightly curved incision, placed in a normal neck line or skin fold, is important. The length depends on neck configuration, goiter size, and planned surgical procedure. The planned incision line is marked preoperatively with the patient in the erect position, and on the operating table with the neck hyperextended. The laryngotracheal axis, the anterior border of the sternocleidomastoid muscles (SCM), and the sternal notch are also outlined with a marking pen.

In selected patients an additional vertical midline (T-)incision of the skin (and of the SF and MF) extending down to the manubrium (2 in Fig. 3.1) may be essential for mobilization of large mediastinal and thoracic inlet goiters. There is a risk of scar enlargement or contraction, which may later necessitate a Z-plastic correction.

The Kocher incision may be extended laterally to the posterior margin of the SCM (McFee incision) or to the trapezius muscle (3 in Fig. 3.1) if excisions of large goiters or lateral nodal dissection are planned. For these indications a longitudinal incision along the anterior border of the SCM may also be used (4 in Fig. 3.1), with or without a simultaneous Kocher incision.

Hemostasis of these incisions is effected for the most part by pressure on a gauze for a short time.

3.2 Transverse Division of the Superficial Fascia and Middle Fascia → Fig. 3.2

Superficial fascia (SF). No mobilization of skin platysma flaps is carried out. After transection of the platysma a very shallow scalpel incision will denude the superficial veins, which may turn out to be rather large. They are not dissected free, but simply cut between perpendicularly placed clamps and ligated or secured with suture ligatures (a later sudden flooding bleeding may originate from a reopened superficial vein). The SF encompasses the SCM and may be incised on its medial border, freeing the muscle for lateral retraction (Fig. 3.2a, b).

Middle fascia (MF, strap muscles). The underlying sternohyoid muscles, incorporated in a thin fascia, are cut transversely with a scalpel or with blunt scissors from the midline laterally; the fine fascia encompassing the margin of the SCM; 4, longitudinal incision along the anterior border of the SCM.

Fig. 3.1 a,b  Incisions of skin and platysma. 1, Kocher incision; 2, midline incision extending to the manubrium; 3, Kocher incision extended laterally to the posterior margin of the SCM; 4, longitudinal incision along the anterior border of the SCM.
**Fig. 3.2 a–g** Transverse division of the superficial fascia (SF) and middle fascia (MF).

**a, b** Superficial fascia divided, MF exposed. The sheath of the sternocleidomastoid muscle (SCM) is opened on the left side.

**c** Sternohyoid muscle divided. The thin fascia of the more laterally situated sternothyroid muscles is exposed.

**d** Strap muscles (MF) divided.

**e, f** MF transected. Exposure of the capsula propria with enlarged vessels beneath.

**g** Incision of the MF at the lateral edge.
Fig. 4.6a, b  Capsular dissection (multinodular colloid goiter).
The fascia of the visceral compartment (VF) is put under tension and exposed by traction and countertraction (→ **Case** Cases 1, 2). Its separation from the thyroid capsule is achieved by dissection and division of the numerous branches of the inferior thyroid artery on the capsula propria (arrows). In both patients total lobectomy is indispensable for complete excision of all nodules. The capsular dissection is yet incomplete posteriorly for a total extracapsular removal of the lobe.
Fig. 4.7 a, b  Capsular dissection (left side), pursued posteriorly toward the trachea.

a  The thin fascia of the visceral compartment ("Grenzlamelle") remains intact and will be dissected away from the nodules (arrows). X: a more lateral dissection through the fascia is avoided. The visceral compartment is not entered. ▲ Upper parathyroid lying on the visceral fascia.  

b  Two of the rare illustrations of the visceral fascia in the literature: b1 Represents a part ("just the cranial part") of the cervical visceral fascia as shown in the Textbook of Operative Surgery by Theodor Kocher. He was the first surgeon to describe the technique of capsular dissection. b2 According to the German surgeon E. Enderlen (1863–1940), the thin visceral fascial layer becomes visible when the goiter is retracted medially. The inferior thyroid artery pierces the fascia; note, however, that the recurrent nerve is incorrectly depicted as running on top of the fascia instead of dorsally underneath the fascia. The resemblance to fascial structure shown in Fig. 4.6 a, b is obvious.

(Published with permission. Figure b2 was published in Der Chirurg, Vol. 4, Enderlen E., Zur Technik der Operation des Kropfes, pp. 293–300. Copyright Springer [1932].)
Fig. 4.11 a–j  Total completion lobectomy for a retrovisceral and upper mediastinal recurrent goiter; lateral approach and capsular dissection (see also Fig. 4.9 c, d).

a  Cervicomedial and goiter with deviation of trachea and venous stasis. Kocher incision along with an extensive longitudinal incision.

b  Incision of the transverse anterior scar and of the SF (arrows) along the SCM (sheath of the SCM).

c, d  Transection of the strap muscles down to the goiter capsule; longitudinal lateral transection of the MF (C).

e–j  Meticulous capsular dissection of numerous colloid nodules. They are successively freed and mobilized anteriorly as they emerge from their retrovisceral and upper mediastinal location. No postoperative adhesions or scar formation are encountered in this area. Following total lobectomy the layers (MF, SF, platysma) are closed longitudinally and transversely. The skin is reapproximated with intracutaneous stitches and SteriStrips.
ular tissue behind.\textsuperscript{76,217} On the basis of its inherent, persistent growth advantage\textsuperscript{45,254} it may grow to a clinical "recurrent" goiter.

- The rational procedure consists of a complete extra-capsular excision of the goitrous thyroid remnant. This can usually be done safely by capsular dissection, with the same low morbidity as in primary surgery, because scar formation is encountered in the anterior but not in the delicate posterior area. The difficulty of the operation is determined rather by the extent of the goiter. Recurrent goiters selected for surgery are larger, grow more rapidly and lead to retrovisceral extension and compressive and functional (autonomy) symptoms. With posterior thorax inlet goiters the recurrent laryngeal nerve may be displaced anteriorly (see section 5.2). Meticulous dissection close to the capsula propria will protect the nerve (running be-
Fig. 5.2 a–f  Capsular dissection at the level of the posterior tubercle of Zuckerkandl (lateral view in a, c, d, e; transection in b, f).

a, b  The branches of the inferior thyroid artery for the tuberculum. Ultraligation of the upper PT and individual ligation and division of the lateral, inferior, medial branches of the inferior artery are performed on the capsula propria of the tubercle. The tubercle lies anterior to the visceral fascia that covers the inferior laryngeal nerve.

c–f  Capsular dissection of the tubercle in progress.
The **suspensory ligament of Berry** (named also the ligament of Gruber) contains terminal branches of the inferior thyroid artery (see Fig. 4.3), which are divided during total lobectomy (→ DVD Cases 2, 3). With the thyroid retracted anteriorly, these short peritracheal vessels are successively clamped with curved mosquito clamps on the tracheal surface from posterior to anterior and sharply divided (Fig. 5.2 e, f). The minute arterial branches must be ligated or suture-ligated; they may be the source of a severe, rapidly developing bleeding with compression (see postoperative hemorrhage, p. 50). When a short bleeding stump retracts beneath the recurrent nerve, bleeding must be controlled with fine stick tie-ligatures, with the nerve being carefully protected.

For the posterior capsular dissection, the use of magnifying glasses or of a surgical loupe is recommended (see Fig. 22.2). For minute bleeders, bipolar electrocoagulation is briefly applied. **Note:** Modern technologies and devices that produce heat should not be used for dissection of the tubercle and suspensory ligament or for sealing the vessels encountered.

The suspensory ligament may contain minute amounts of residual thyroid tissue surrounding the vessel stumps and fixed on the tracheal wall (see Figs. 6.4 c, 6.5 c). Though appearing on scans with postthyroidectomy nuclear imaging in some patients, this kind of remnant clearly differs from that of “near total” excision (see section 11.2.1; Fig. 5.15). Excision of the **tuberculum of Zuckerkandl** and transection of the suspensory ligament of Berry represent steps of capsular dissection (→ DVD Cases 2, 3).79 Berry visited Kocher in Berne 142; Kocher called James Berry an intelligent learner (“ein so intelligenter Schüler”) who adopted Kocher’s technique [see ref. 142: p. 1644].

In his description of total lobectomy from 1919, Dunhill mentions the attachment of the thyroid gland to the trachea not as the ligament of Berry but as the “three penny patch” of Professor Watson.53a He notes that the dissection may be extraordinarily difficult when dealing with the very short, fragile, newly-formed vessels in exophthalmic goiter (see also 6.1).

5.2 **The Nerve at Risk**

The surgeon must be aware of the inferior laryngeal nerve being at high risk of injury in the following situations and **anatomical variations:**

- During reoperative surgery when the visceral compartment and its fascia have been severed (in most patients with recurrent benign goiter this is not the case) (see Fig. 4.11).217
- The nerve may be drawn or may run anteriorly in relation to the tracheoesophageal groove at the level of the inferior thyroid pole, where the inferior thyroid veins ought to be divided, keeping close to the capsule propria.
- The nerve may split in two (or several) branches at some distance from the larynx (Figs. 4.2 b, 5.3).33,133,149a A ventral branch with motor function for the vocalis muscle or a posterior branch innervating the posticus muscle may both lead to vocal cord paresis when inadvertently injured.
- In a few patients with a posterior tubercle, the nerve (or a branch of it) courses on the lateral aspect of the tubercle instead of its medial side,23,60 though still behind the visceral fascia (Figs. 5.3, 5.4). Such a deviating nerve is at high risk when the tubercle is involved in goitrous enlargement and when a goiter of the tubercle is lifted from the thoracic inlet and posterior mediastinum (see also Fig. 5.19).
- A nonrecurrent inferior laryngeal nerve runs either together with the peduncle of the superior thyroid vessels, or transversely at any level through the visceral compartment.264 The nerve runs always behind the visceral fascia and is thus anatomically protected on strict capsular dissection.

![Fig. 5.3 a,b](image)

**Fig. 5.3 a,b** Extralaryngeal division of the recurrent inferior laryngeal nerve into two branches (lateral view; cross-section at the level of the thyroid hilus). In this case the branches course under and over the tubercle, respectively. Arrows indicate capsular dissection.
6
Further Case Records with Demonstrations of the Technique of Capsular Dissection
— Figs. 6.1–6.5

In Fig. 6.1, a left-sided lobectomy in the course of a total thyroidectomy for PTC is demonstrated. The 64-year-old woman patient noticed a solitary, rather firm nodule in the upper pole of her left thyroid. TSH and calcitonin were normal. FNAB cytology revealed a PTC.

Fig. 6.1 a–j  Total thyroidectomy for PTC; capsular dissection, left side. Macroscopic appearance of PTC (nonencapsulated mass; intrathyroidal PTC upper pole). The patient was a 64-year-old woman. View from cephalad; firm nodule in the upper pole (x). Traction sutures avoiding the nodule.
No suspicious lymph nodes were found on clinical, preoperative sonographic, and intraoperative macroscopic examinations (stage clinical (c) N0).

**Comment**

- PTC can often be diagnosed with confidence by FNAB. Clinically, a MTC must also be considered when a suspicious nodule is located in the upper pole (see Fig. 21.3).
- The surgeon can recognize a characteristic **macroscopic appearance of a PTC** on section of the specimen; the tumor appears hypercellular, has no capsule and infiltrates the thyroid parenchyma (→ DVD Case 3) (for various patterns of macroscopic appearance of PTC, see section 19.4.2).
- **Staging and risk-group assignment** (see section 19.5): this is a pT2 cN0, TNM low-risk stage II tumor\(^{269}\) (former stage pT2a, unifocal)\(^{268}\)
- Prophylactic central node dissection is judged facultative, and use of prophylactic RAI (remnant ablation) is not recommended in this patient\(^{83,110,112,111b}\) (see section 19.4.1). Thyroid hormone substitution should induce subsuppression of TSH (sections 19.4.3, 19.10).
- The prognosis after total thyroidectomy is excellent. There is a small risk (~3%) of subsequent (metachronous) lymph node involvement during the early post-