Total Laryngectomy and Laryngopharyngectomy

By:

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HISTORIC DEVELOPMENT

- Although Patrick Watson of Edinburgh is often credited with performing the first total laryngectomy in 1866, no record exists to prove that the operation was actually done by him. Research into Watson's own article1 apparently answers this question: Watson stated he performed only a tracheotomy while the patient was alive and then did a postmortem laryn- gectomy of the syphilitic larynx. On December 31, 1873, Bill- roth of Vienna carried out the first total laryngectomy for a patient with laryngeal cancer.

Malignant Disease

- With the spectrum of organ-preservation surgery now available the need for total laryngectomy as the only surgical option for those with laryngeal cancer has decreased. Organ- preservation surgery includes specific procedures for supra- glottic and glottic cancer. Two major organ-preservation surgical strategies are the transoral (endoscopic) and open approaches. Transoral procedures range from the very limited endoscopic resections, which most head and neck surgeons can accomplish, to extensive laser procedures that require greater surgical experience and specialized instrumentation; these are covered in Chapter 108. Open procedures include the more conventional vertical partial laryngectomy procedures and the horizontal supraglottic partial laryngectomy procedures. In the early 1990s, a group of open operations called *supracricoid partial laryngectomies* became more popular.

INDICATIONS FOR TOTAL LARYNGECTOMY

- Total laryngectomy remains aviable option as the primary surgery for advanced cancer or as salvage surgery after RT and, finally, for a group of less common conditions. Overlap among these indications occurs. For example, a patient with radionecrosis of the larynx may be found to have residual tumor on permanent sections and, as such, the surgery was a salvage procedure in hindsight. Similarly, a tumor that fails RT may also be causing chronic aspiration and may be too large to allow for any sort of organ-preservation surgery.

At least three of the following indications for undergoing the procedure, maybe more:

1. Advanced tumors with cartilage destruction and anterior extralaryngeal spread, which often manifests initially with laryngeal dysfunction that includes vocal cord paralysis; airway obstruction; or severe aspiration. Such patients are not good candidates for organ preservation, because the organ already has been damaged and will not likely function even if it can be preserved anatomically.

2. Posterior commissure or bilateral arytenoid/cricoarytenoid joint tumor involvement, as is sometimes seen in advanced supraglottic tumors

- 3. Circumferential submucosal disease with or without bilateral vocal cord paralysis
- 4. Subglottic extension with extensive invasion of the cricoid cartilage
- 5. RT or chemoradiation failures, including those who have also had partial laryngectomy failure
- 6. Completion laryngectomy for failed conservation or extensive endoscopic surgery
- 7. Hypopharyngeal tumors that originate at or spread to the postcricoid mucosa and advanced piriform sinus cancers
- 8. Massive neck metastases and thyroid tumors (usually recurrent) that invade both sides of the larynx from outside the laryngeal skeleton

- 9. Advanced tumors of certain histologic types that are incurable by endoscopic resection, chemotherapy, or RT (e.g., adenocarcinoma, spindle cell carcinoma, soft tissue sarcomas, minor salivary gland tumors, large cell neuroendocrine tumors) and chondrosarcomas of the thyroid cartilage
- 10.Extensive pharyngeal or tongue-base resections in patients who are at high risk for aspiration problems
- 11. Radiation necrosis of the larynx, despite tumor control, that is unresponsive to adequate antibiotic and hyper- baric oxygen management (this condition can be painful and also predisposes patients to aspiration, and tumor is often found when total laryngectomy is performed)
- 12. Severe irreversible aspiration, with the laryngectomy used for complete separation of the air and food pas- sages (this indication should be rare, considering the variety of other separation or closure procedures available)

PATIENT SELECTION AND WORKUP

The following patient requirements should be met before a total laryngectomy is performed:

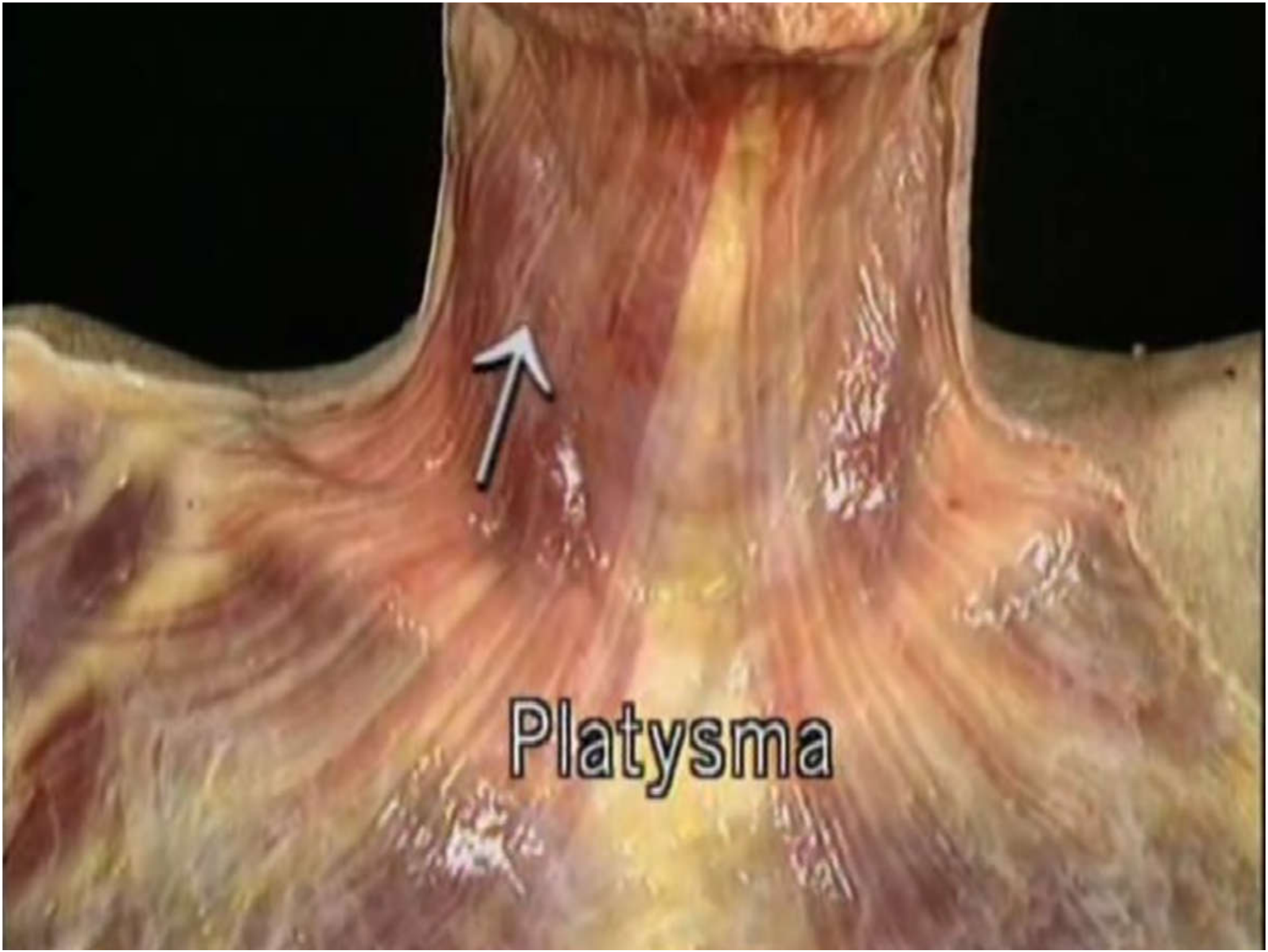
- 1. The patient should be a candidate for general anesthesia; consider severe comorbid conditions as a relative contraindication.
- 2. Informed consent includes realistic understanding of total laryngectomy state and lifestyle after surgery, includ- ing the risk of drowning, the need to avoid swimming and certain risky activities, and the lack of sense of smell in the event of fire, smoke, or toxic fume exposure.
- 3. Sufficient performance status, especially dexterity, to allow basic self-care of the stoma.

The workup required for a total laryngectomy includes :

- 1. History and physical examination should be performed, and details of any previous radiation are especially important.
- 2.A comprehensive head and neck examination should be done, but especially the neck, for detection of cervical metastasis.
- 3.Biopsy proof of malignancy and careful endoscopic assessment of tumor location; use of both microscopic and telescopic endoscopy can help determine the need for total laryngectomy and can also help determine which patients are likely to have extensive subglottic extension or submucosal extension in the hypopharynx.

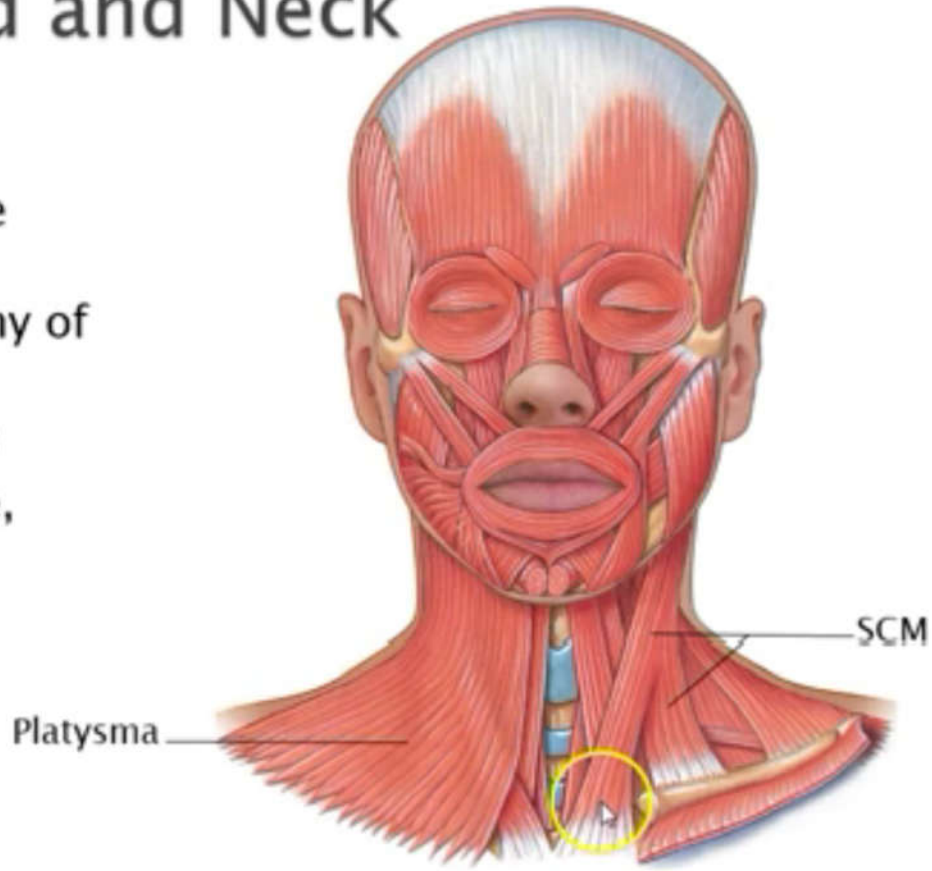
- 4.Synchronous primary tumor screening should include bronchoscopy, esophagoscopy, and/or barium swallow, chest radiography, and chest computed tomography in selected cases.
- 5. Metastatic screening should be done when indicated.
  6. Neck computed tomography should be done for assess- ment of cartilage or preepiglottic space invasion in those with advanced or radiation-recurrent lesions and for assessment of radiologically detectable neck metastasis. Positron emission tomography and magnetic resonance scans may also be useful.
  7. In the laboratory evaluation, diabetes and hypothyroid- ism should be evaluated and managed appropriately, because they increase the risk of complications. A nutri- tional screening is also indicated, and evaluation for the potential for postoperative alcohol withdrawal is also important.

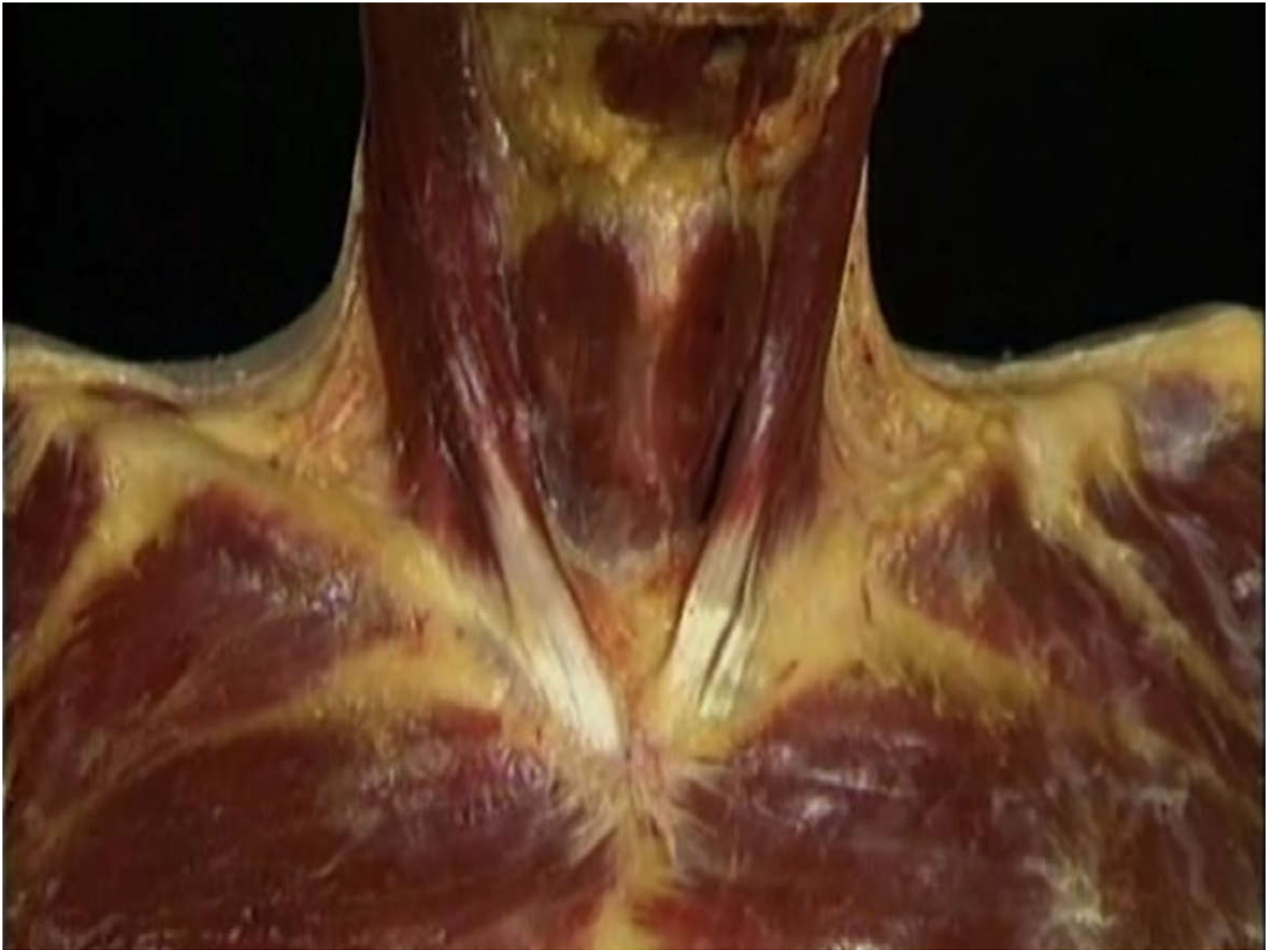
SURGICAL TECHNIQUE


Platysma

Muscles of the Head and Neck

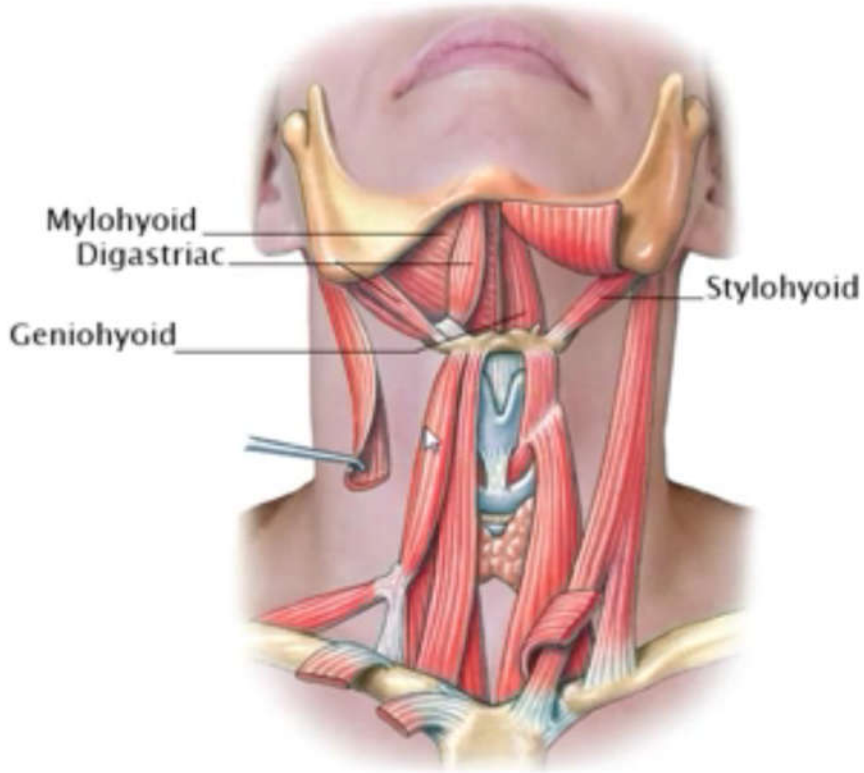
- Platysma
  - Broad, flat muscle covering the anterior surface of the neck
  - Needs to be removed to see any of the muscles underneath
- *Sternocleidomastoid (SCM)
  - Attachments: sternum, clavicle, mastoid process
  - Causes flexion of the neck





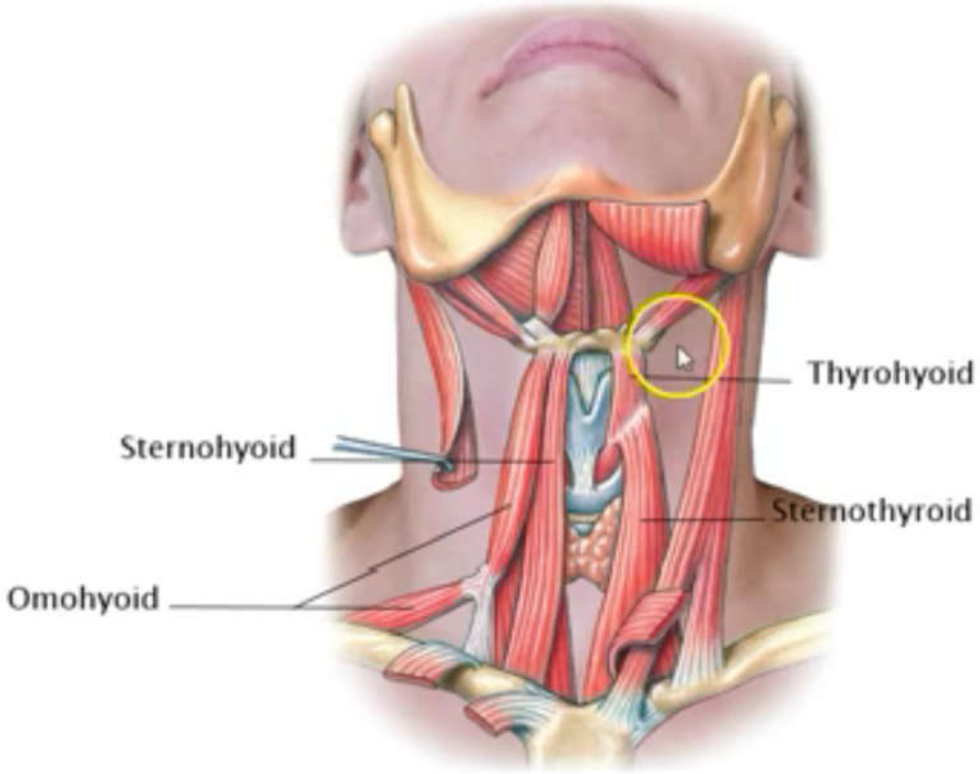
Muscles of the Head and Neck

- Suprahyoid muscles
  - Digastric
  - Mylohyoid
  - Geniohyoid
  - Stylohyoid



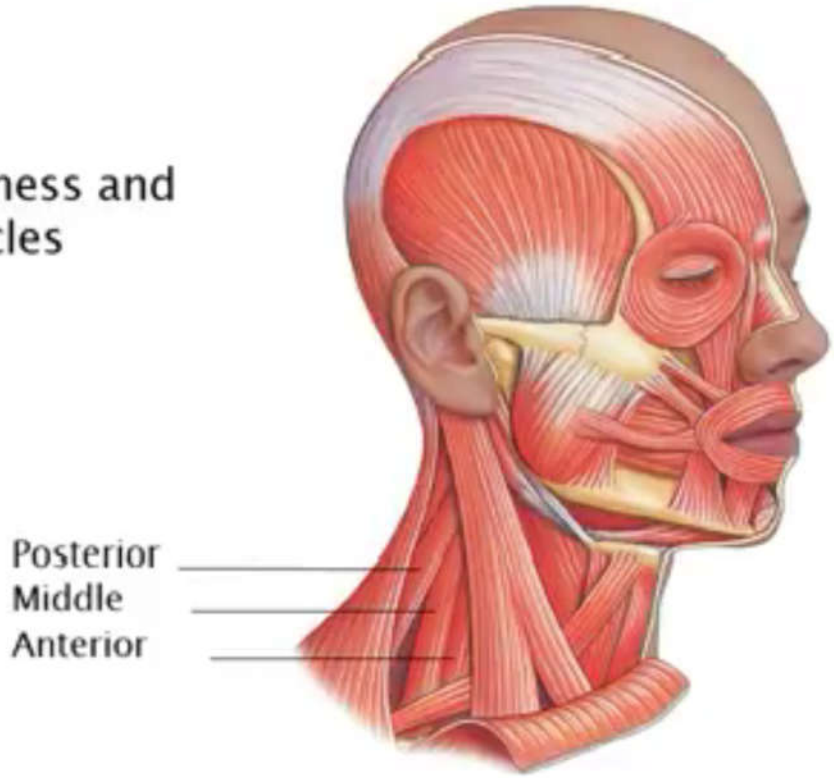
Muscles of the Head and Neck

- Infrahyoid muscles
  - Omohyoid
  - Sternohyoid
  - Sternothyroid
  - Thyrohyoid



Muscles of the Head and Neck

- Scalenes
  - Elevate the ribs, flex the neck
  - Many people experience tightness and referred pain from these muscles



1:Proper patient positioning

- **.** Proper patient positioning provides access to the anterior part of the neck for the surgeon and the assistant. Positioning is best achieved by placing the patient on a table fitted with a head holder that allows the head to be cantilevered out but well supported. This also assists bilateral neck dissection, which is often performed in continuity, and allows surgeons to position themselves all the way around the head. The table is turned 180 degrees from the anesthesiol- ogy team to further assist access to the patient.

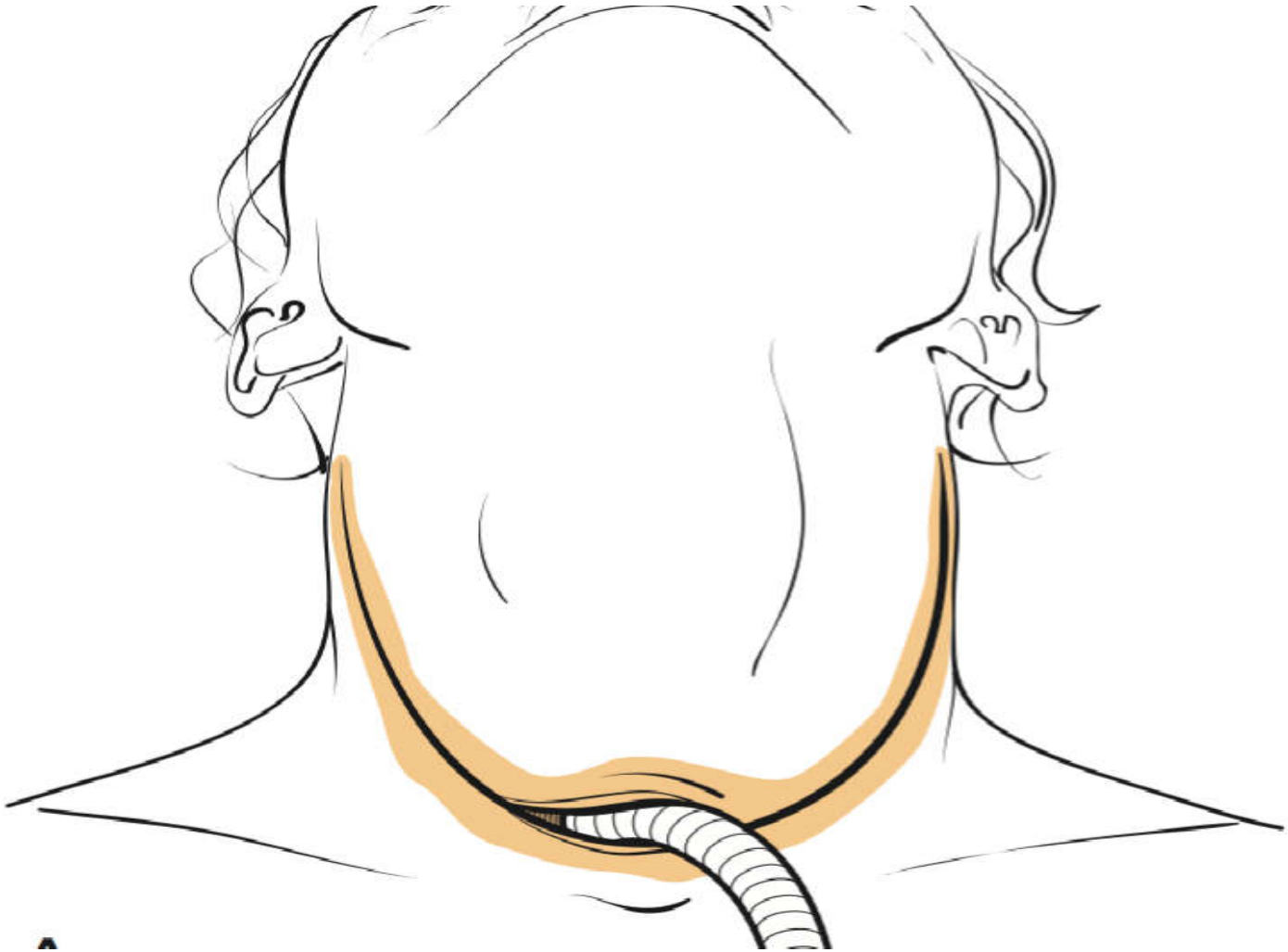
2: airway management

- Before the operation day, airway management is planned with the anesthesiologist so that an agreement is reached regarding timing of tracheotomy and intubation. In the unobstructed larynx, the anesthesiologist may pass an orotracheal tube with anesthetic induction; this tube may be removed at subsequent tracheotomy, or it may be left in situ until tracheal transection is performed at the end of the laryngectomy. With an obstructed airway or when intubation may displace malignant tissue into the lower airway, a preliminary tracheotomy with the patient under local anesthesia is performed. The tracheotomy skin incision is made at the intended site of the final stoma, which can be placed in the line of the incision (long flap) or 2 to 3 cm inferior to the incision

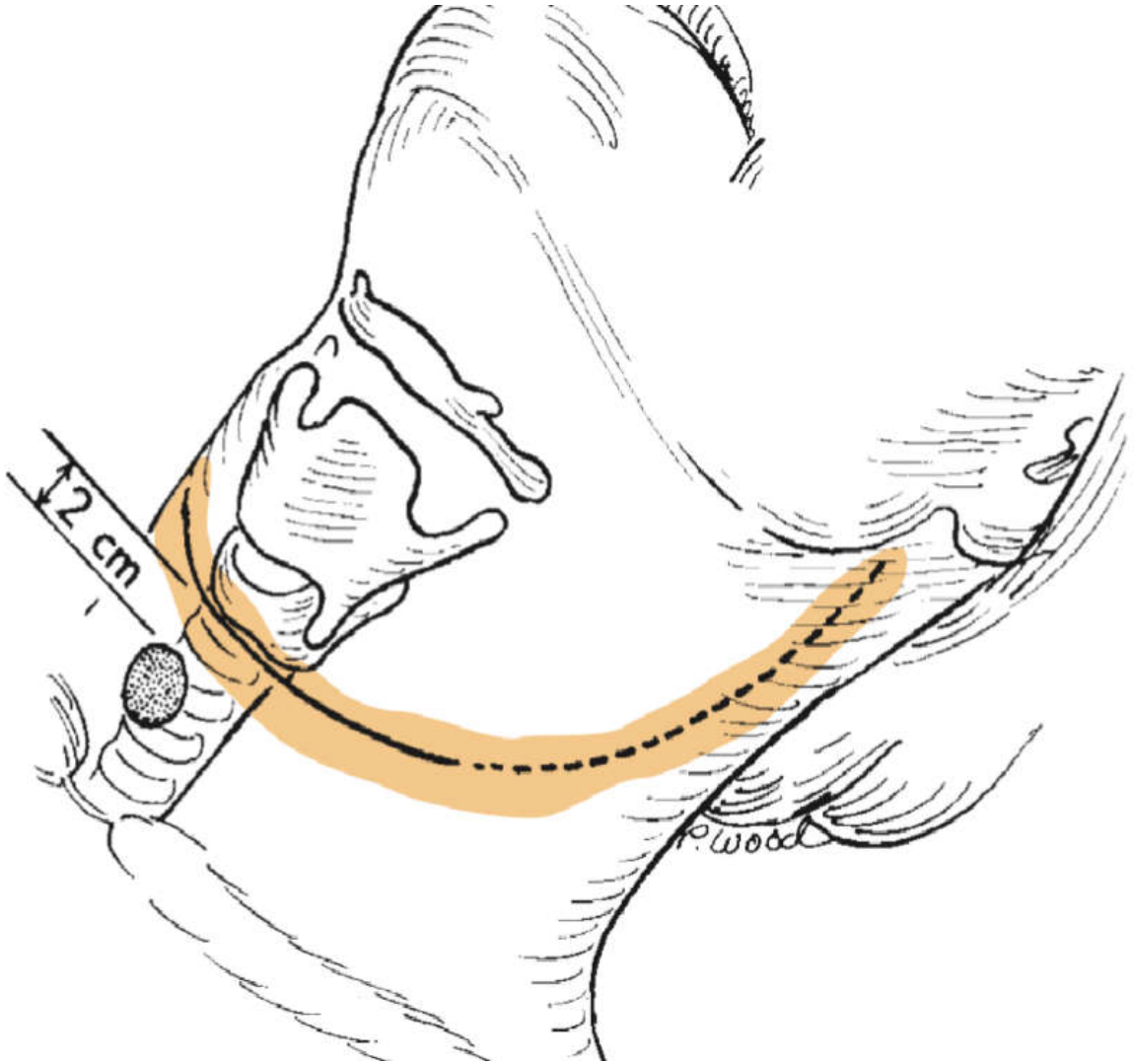
3: Incision options for total laryngectomy

- **A,** Long apron flap without separate incision for tracheostomy from mastoid tip to mastoid tip intersecting the midline at approximately the level of the cricoid cartilage, usually about 2 cm above the sternal notch in the midline. **B,** Short apron flap with separate tracheostome incision 2 to 3 cm inferior to the flap incision. A U-shaped incision (*not shown*) is rarely used but is feasible when neck dissection is not performed.

A, Long apron flap without separate incision for tracheostomy from mastoid tip to mastoid tip intersecting the midline at approximately the level of the cricoid cartilage,



B, Short apron flap with separate tracheostome incision 2 to 3 cm inferior to the flap incision



4.Elevated subplatysmal flap

- flaps are elevated superiorly and inferiorly in the subplatysmal plane, until exposure extends above to the upper border of the hyoid bone and below to the cervical trachea. The anterior jugular veins and the prelaryngeal delphian node are left undisturbed on the specimen, as are the strap muscles.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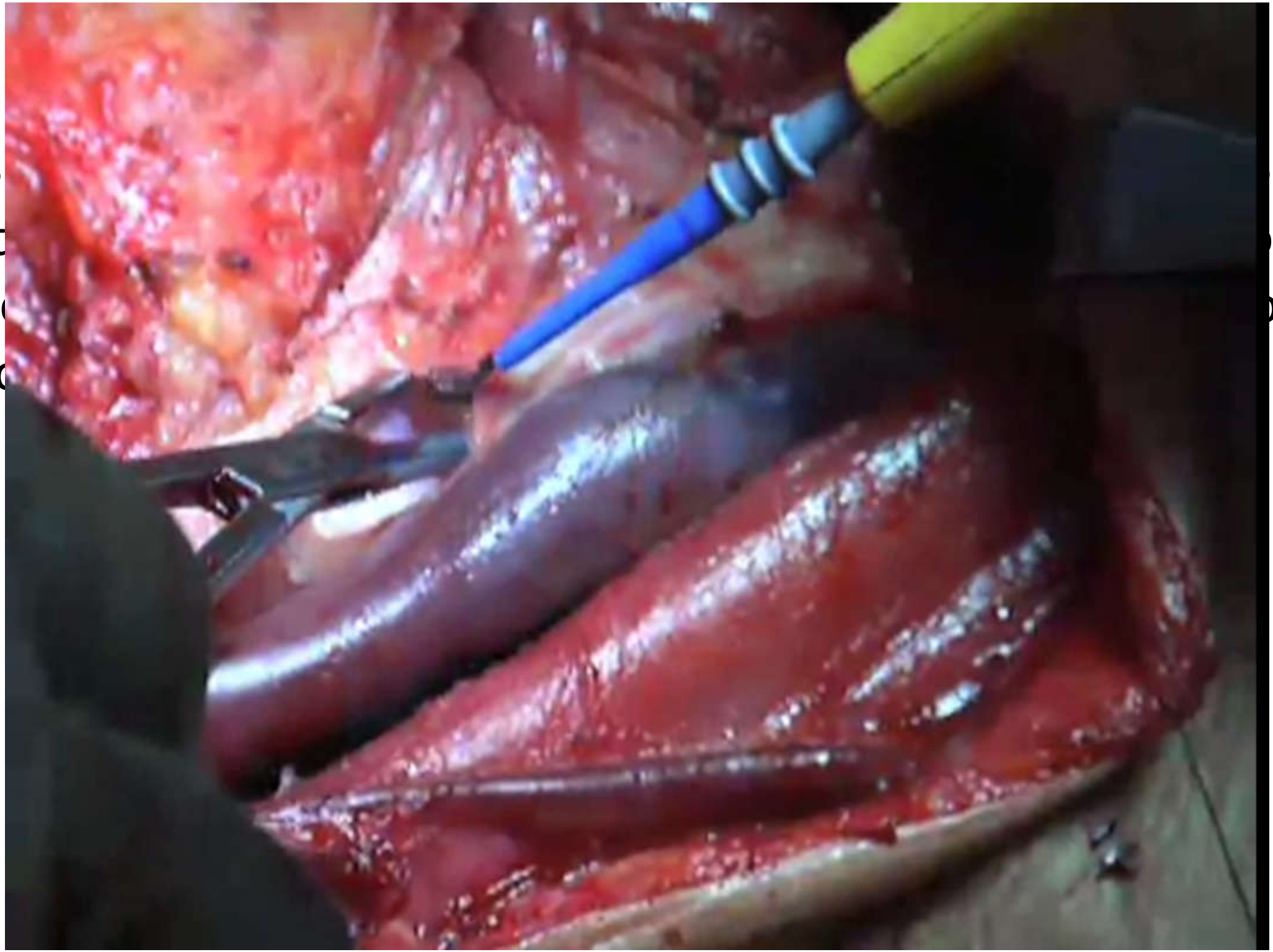
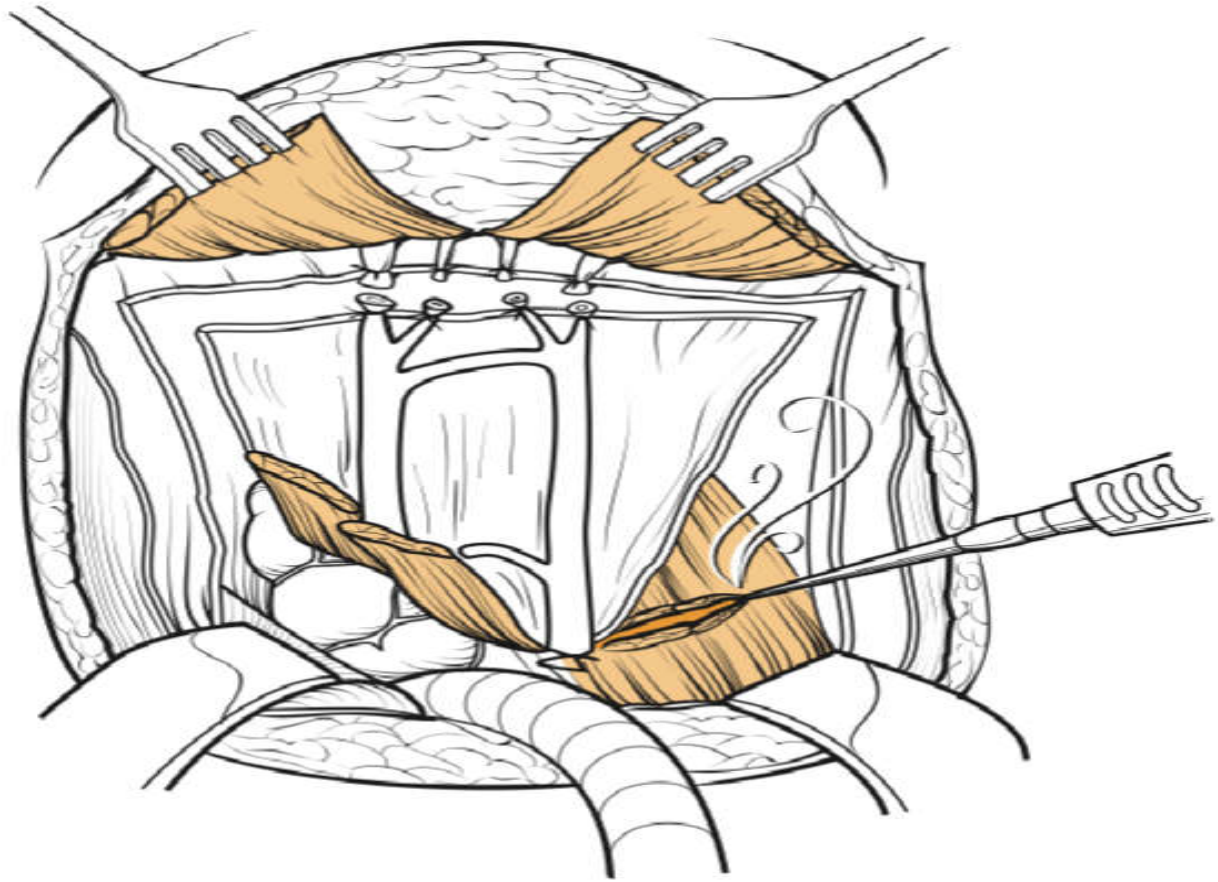
6.Neck dissection

- For supraglottic carcinoma, the minimal neck dissection to be performed is selective neck dissection, stations II and III bilaterally. It is extended to level IV and possibly IB and V if lymphadenopathy indicates the need. For advanced glottic carcinoma with supraglottic involvement, the same procedure is recommended. Unilateral (ipsilateral) neck dissection can be considered for T3 glottic carcinoma. For patients who have previously been irradiated, evidence still supports selective neck dissection. In general, both neck dissections can be pedicled at the thyrohyoid membrane area, and the resection can easily be done en bloc.




Strap muscles being cut inferiorly

A.The sternothyroid and sternohyoid muscles are divided inferiorly to expose the thyroid gland and trachea.

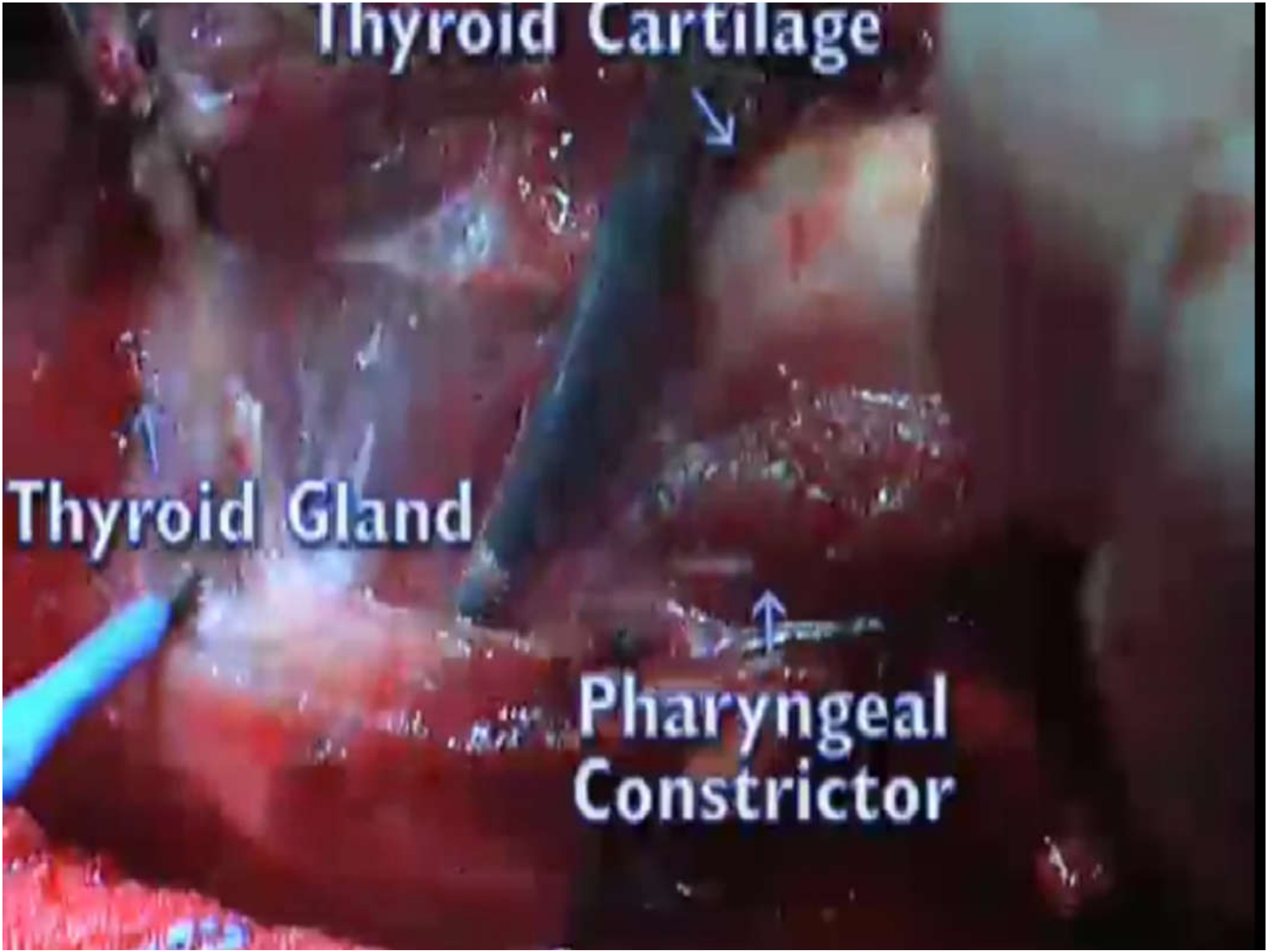


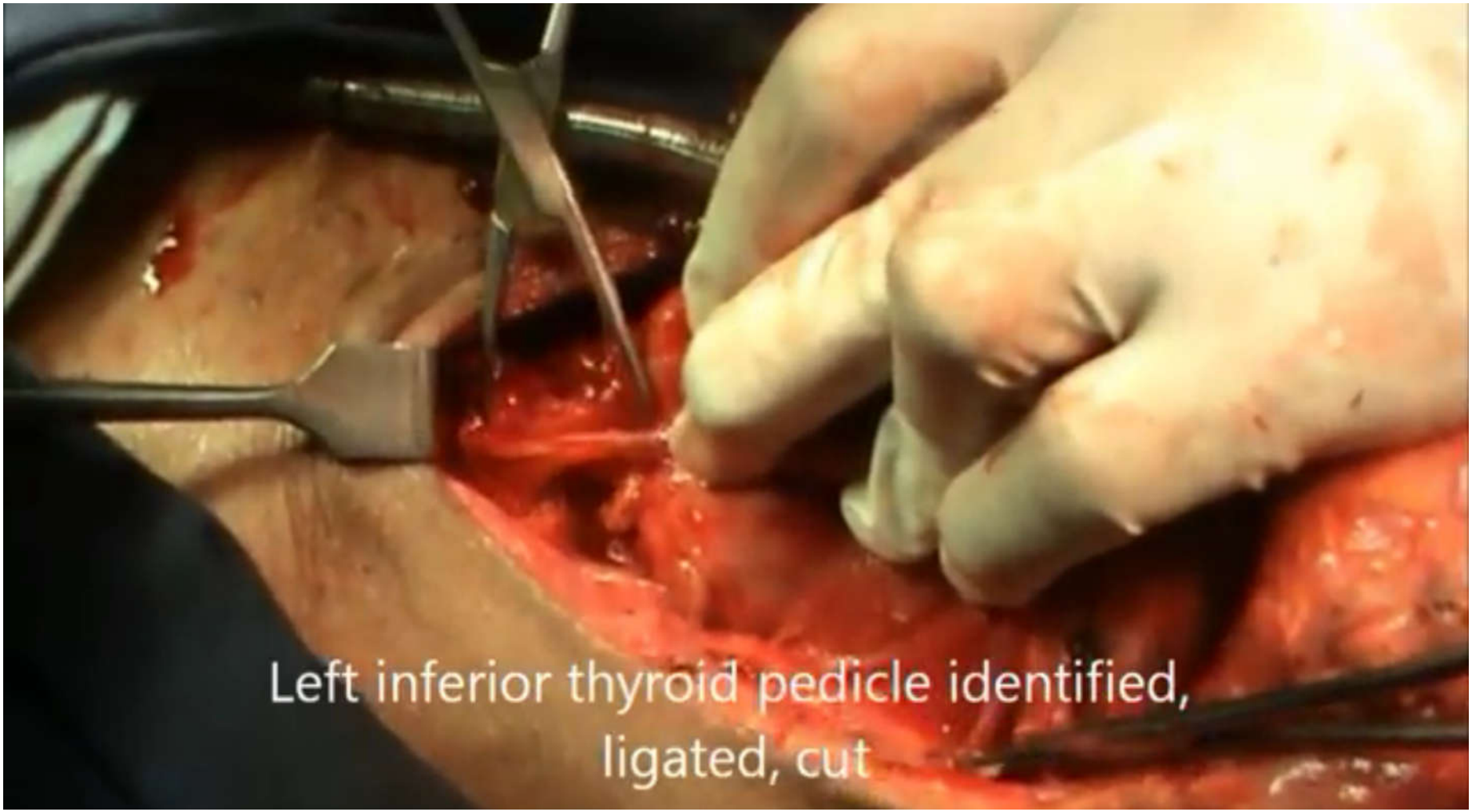
A

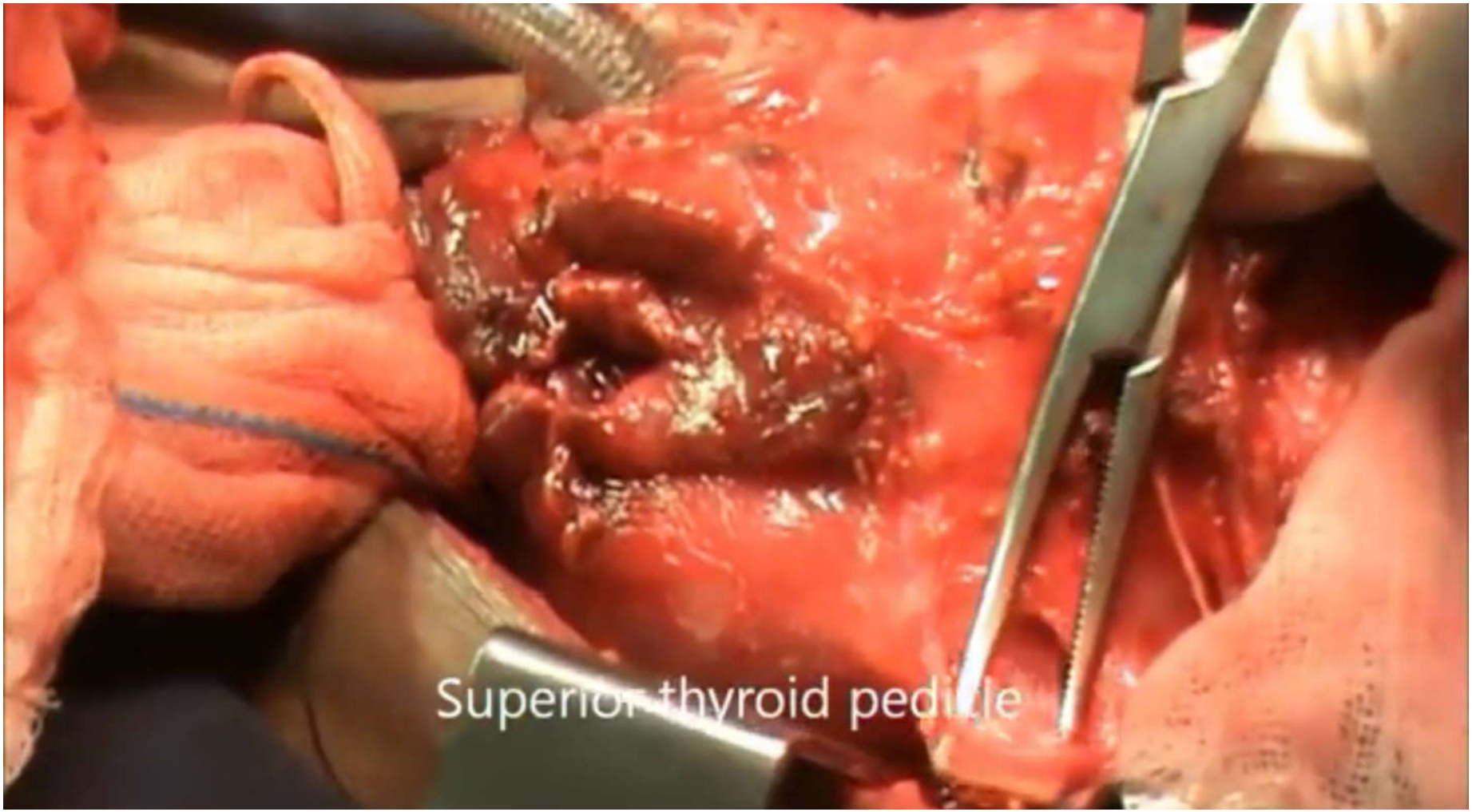
B

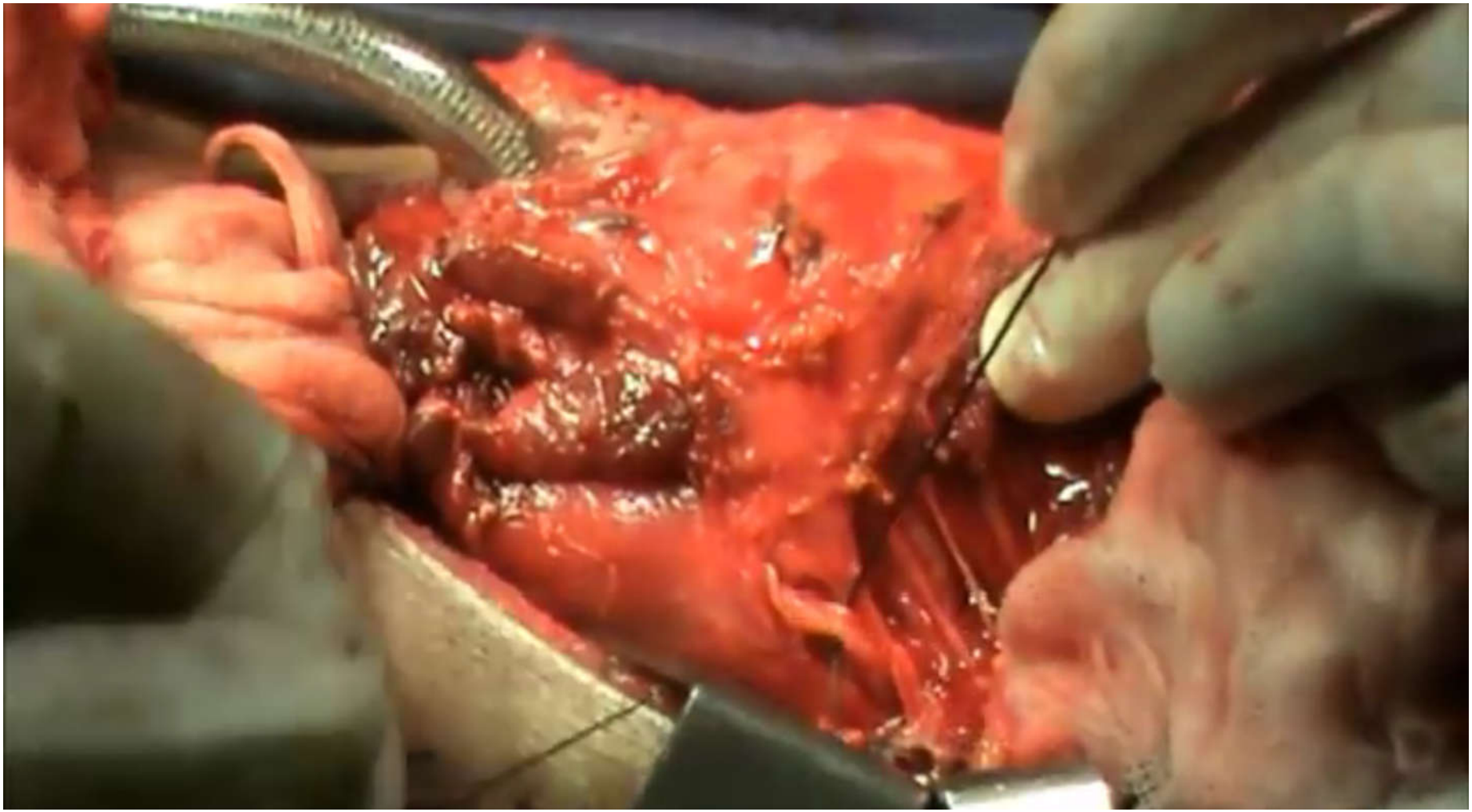
7.thyroidectomy

- When:
- 1. nodal disease is present in the jugular chain from glottic or subglottic cancer
- 2. invasion of the thyroid or cricoid cartilage
- 3. transglottic cancers that extend more than 1 cm below the glottis


Thyroid Cartilage
Thyroid Gland
Pharyngeal
Constrictor


Left inferior thyroid pedicle identified,
ligated, cut

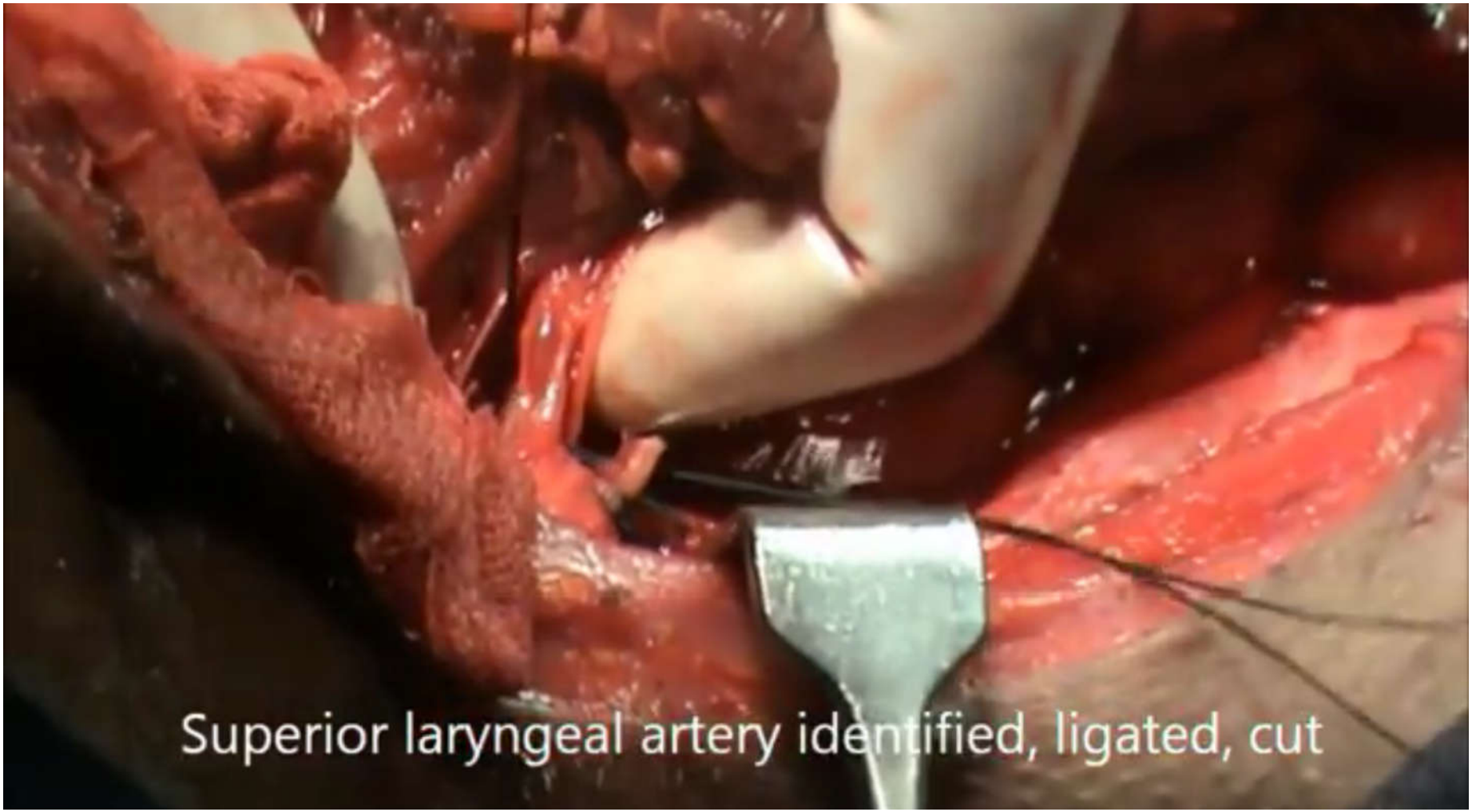

Superior thyroid pedicle



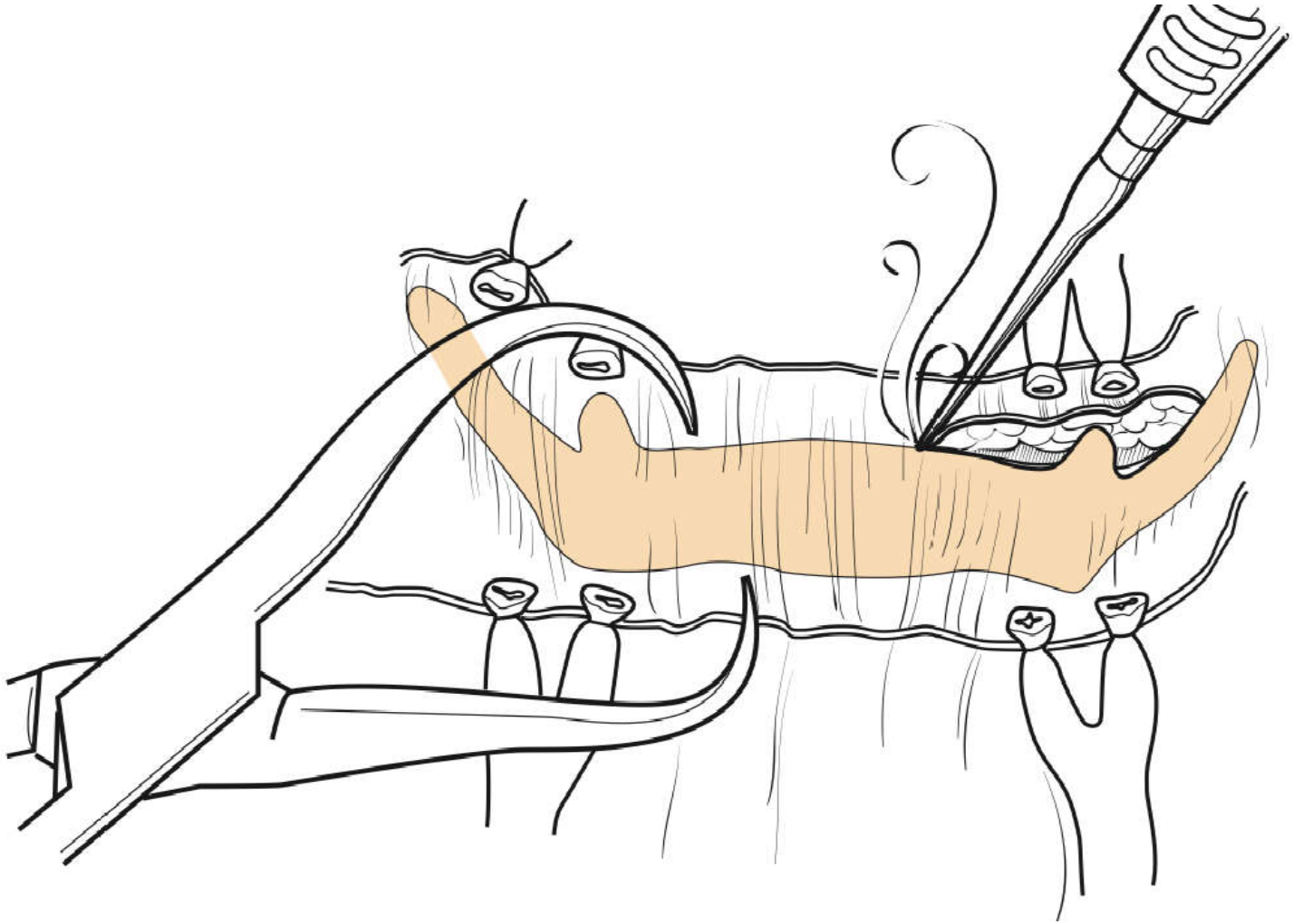
8.Skeletonization of the Laryngeal Framework

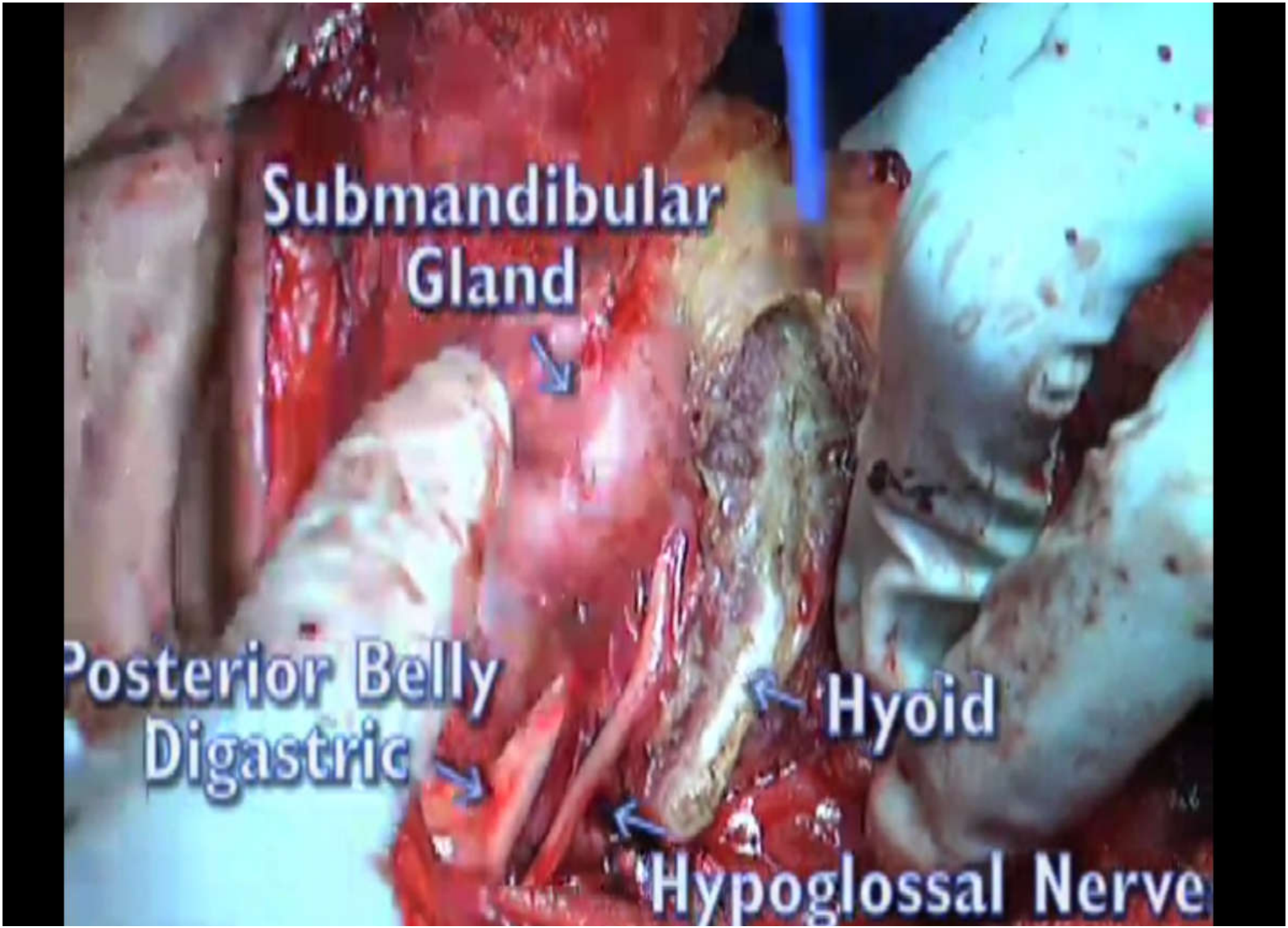
- A, Division of the strap musculature after elevation of a subplatysmal flap. The omohyoid is divided inferiorly, usually during the neck dissection. The sternothyroid and sternohyoid muscles are divided inferiorly to expose the thyroid gland and trachea. B, Division of suprahyoid musculature is performed, staying close to the superior aspect of the hyoid bone. Cautery is avoided lateral to the lesser cornu to avoid injury to the hypoglossal nerve. In this area, the hyoid is retracted in such a way as to distract the greater cornu inferiorly, and scissors are used to release the cornu, staying right on the bone. C, Division of constrictor musculature along the lateral aspect of the thyroid cartilage and dissection of the thyroid. If the thyroid is to be resected, it is elevated, and the dissection proceeds directly to the tracheoesophageal groove. If the thyroid is to be preserved, the lobe is dissected away from the tracheoesophageal groove after division of the isthmus; electrocautery dissection is useful to minimize bleeding. The degree of skeletonization depends on tumor extent. Once the thyroid cartilage is skeletonized, the superior laryngeal neurovascular bundle can be divided to decrease bleeding during the resection.

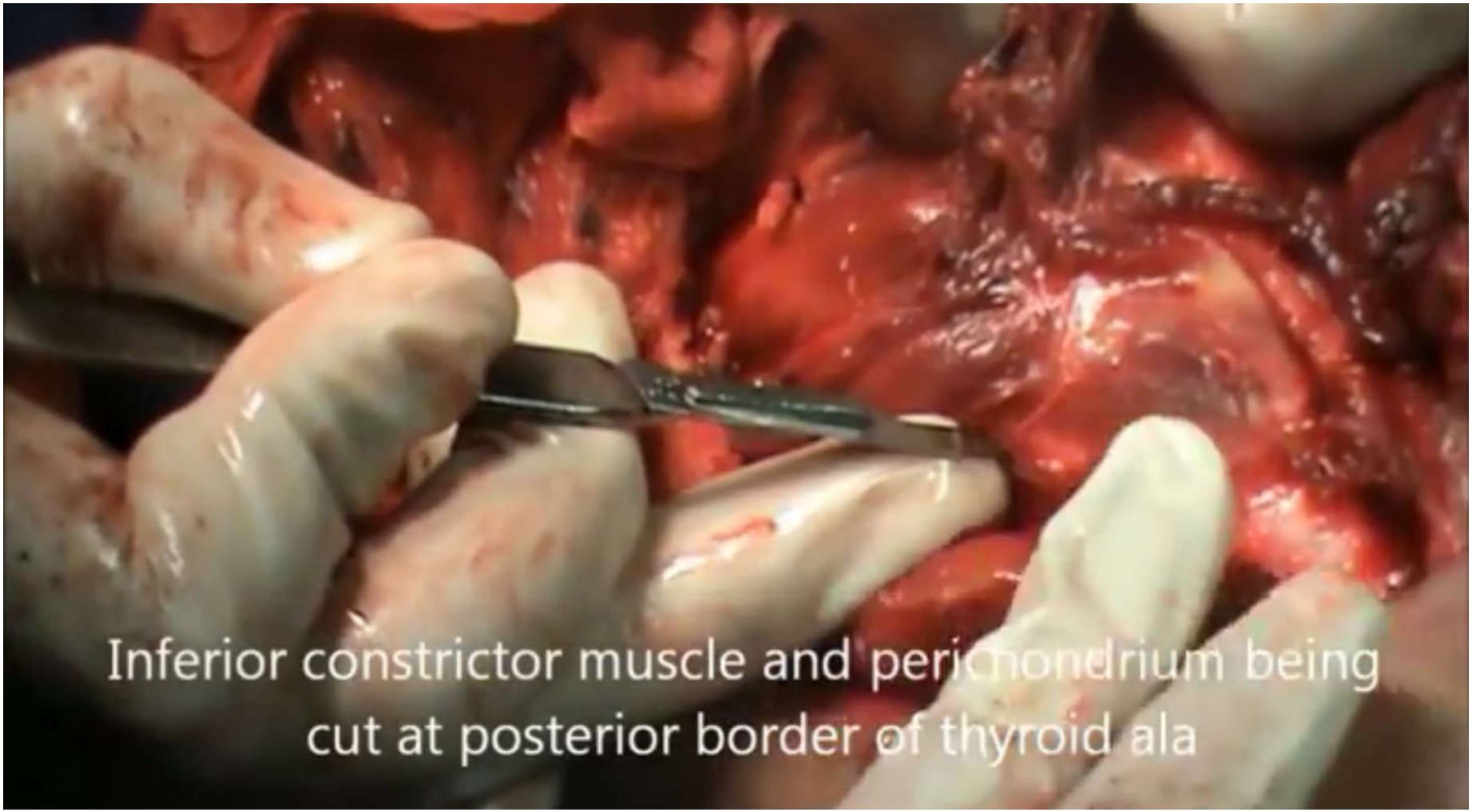

Suprahyoid release of strap muscles


Superior laryngeal artery identified, ligated, cut

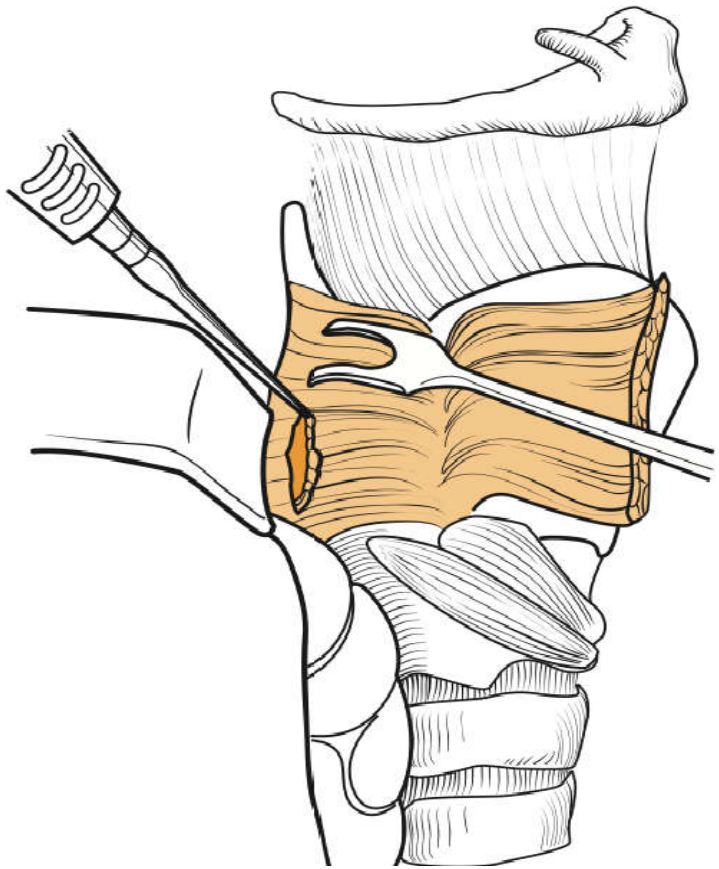
B, Division of suprahyoid musculature is performed, staying close to the superior aspect of the hyoid bone.

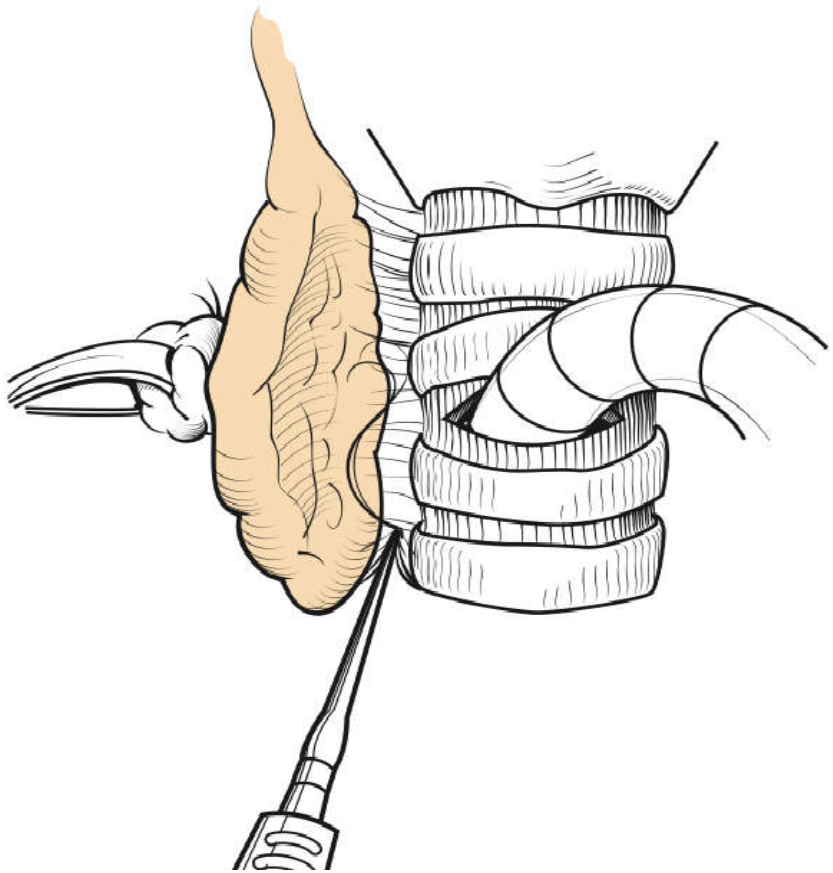



Submandibular
Gland
Posterior Belly
Digastric
Hyoid
Hypoglossal Nerve

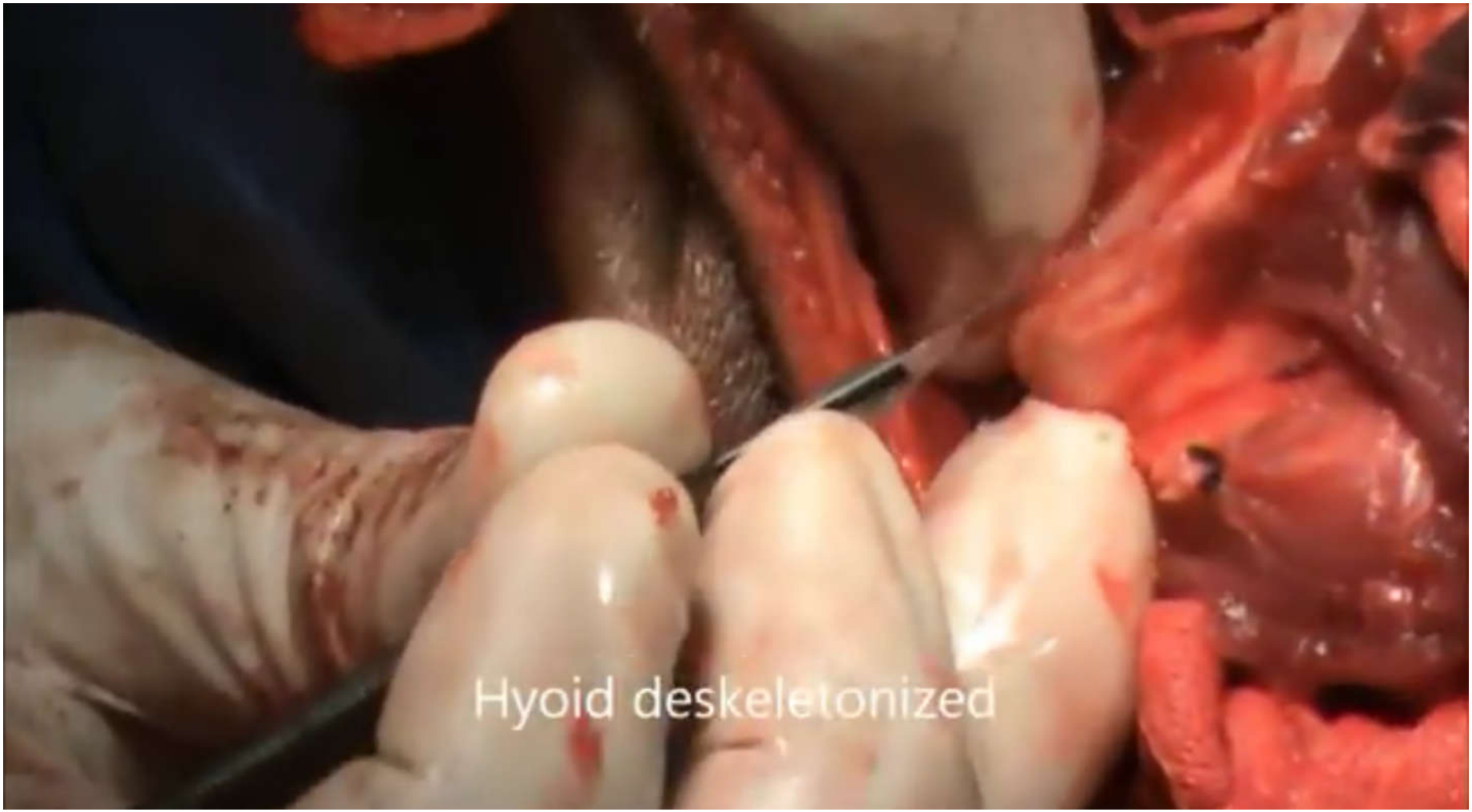

Inferior constrictor muscle and perichondrium being
cut at posterior border of thyroid ala

C, Division of constrictor musculature along the lateral aspect of the thyroid cartilage and dissection of the thyroid. If the thyroid is to be resected, it is elevated, and the dissection proceeds directly to the tracheoesophageal groove.

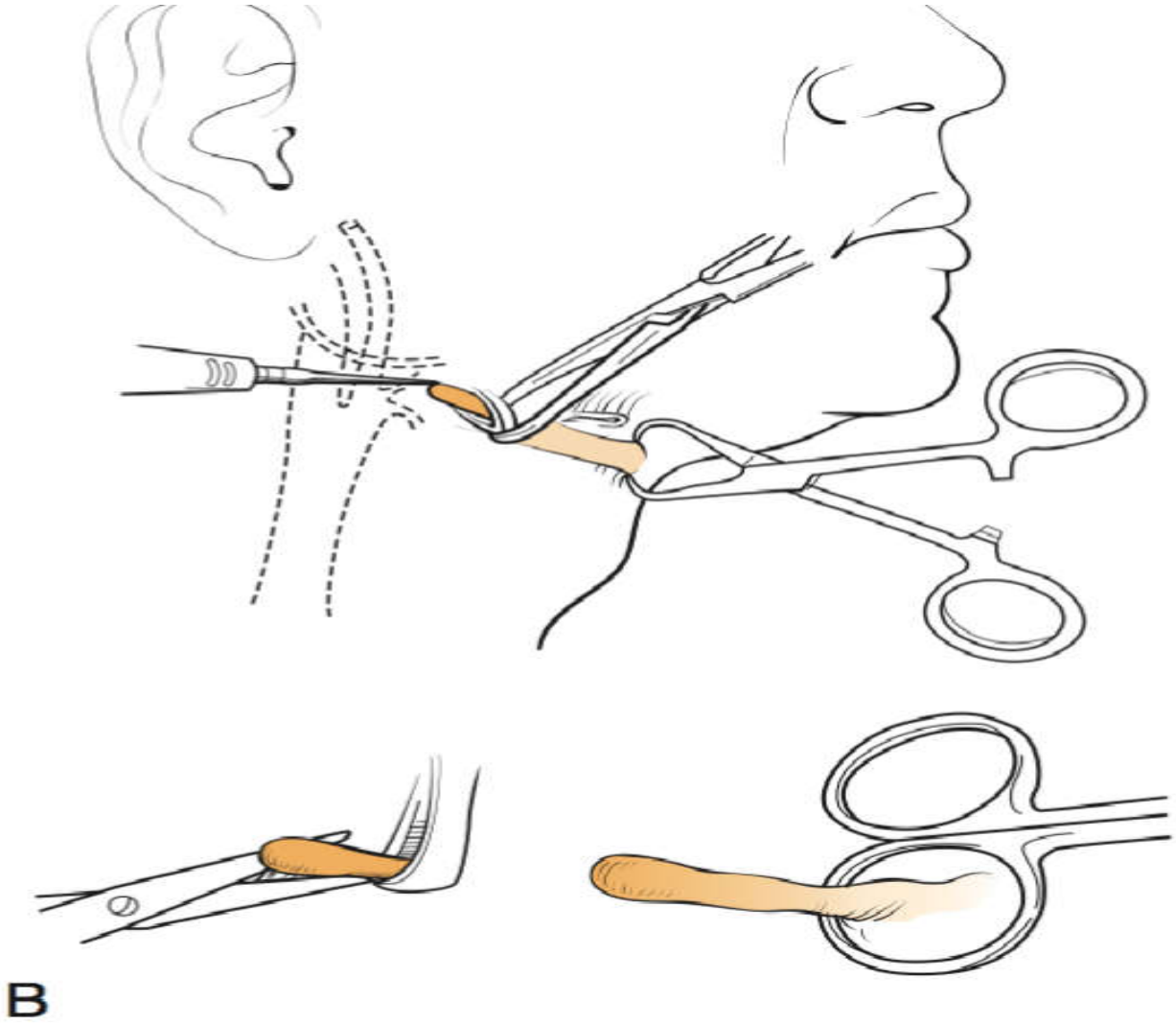




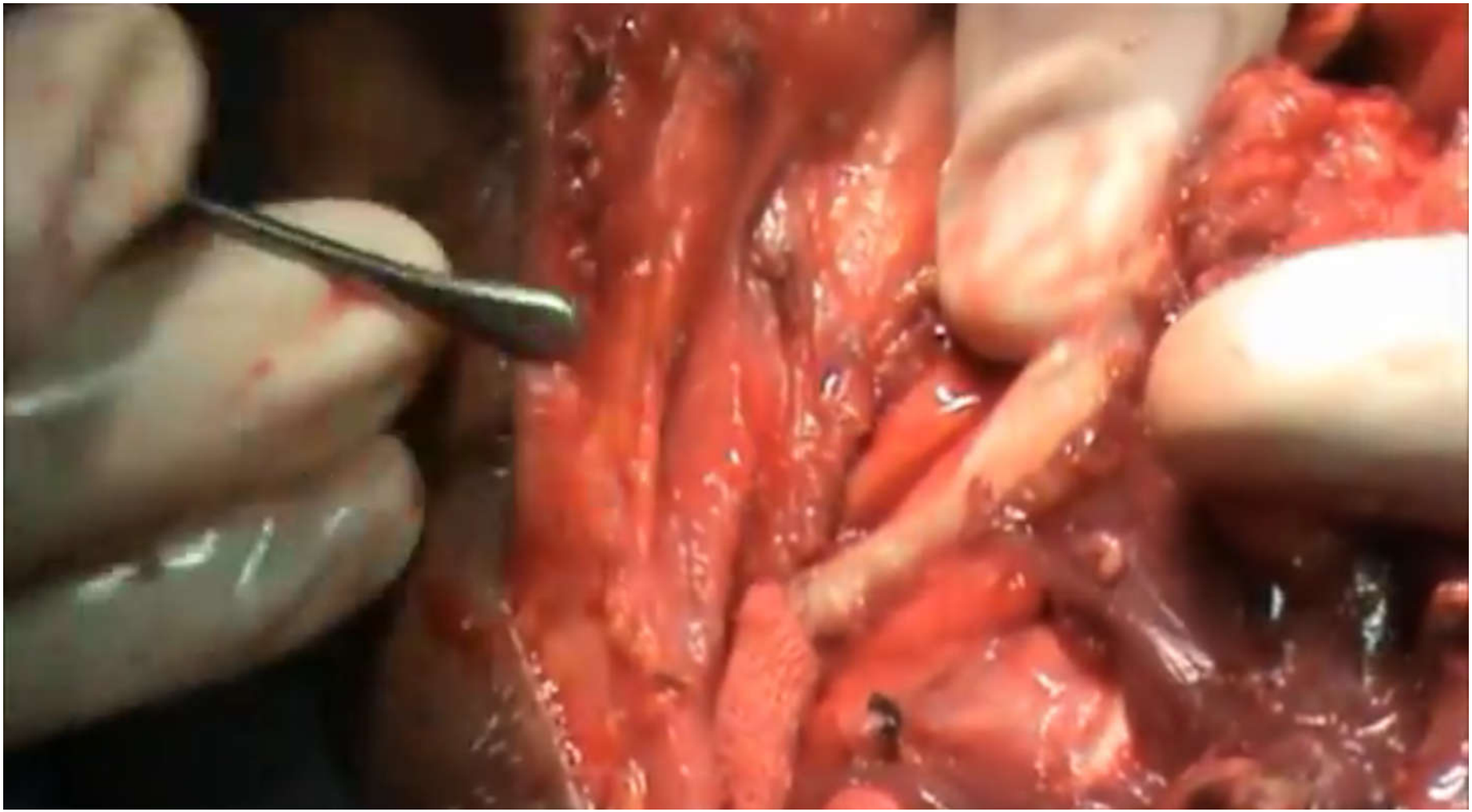

Perichondrium being lifted from thyroid
ala saving lateral wall of pyriform sinus


Hyoid deskeletonized

In this area, the hyoid is retracted in such a way as to distract the greater cornu inferiorly, and scissors are used to release the cornu, staying right on the bone.

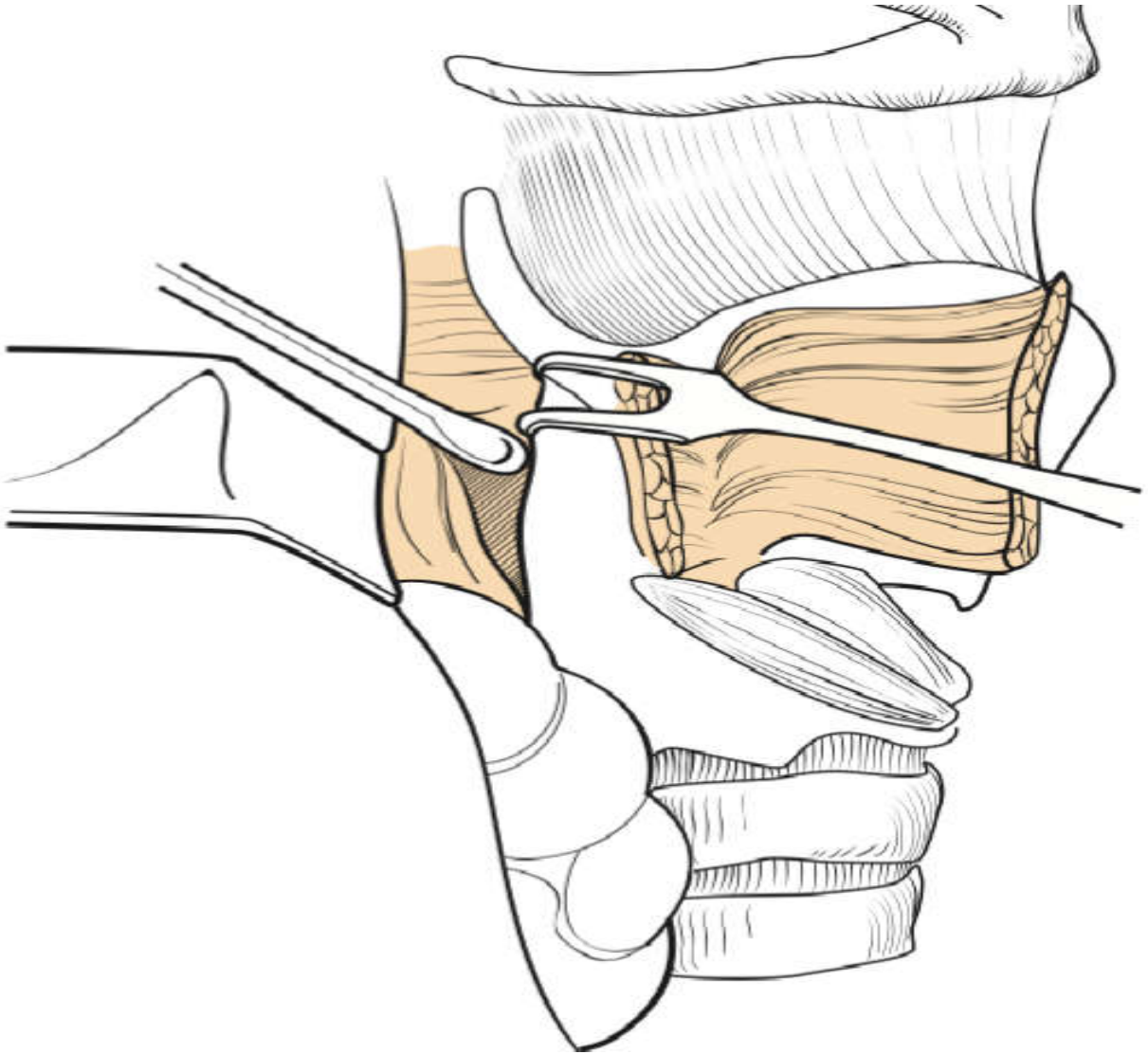


B

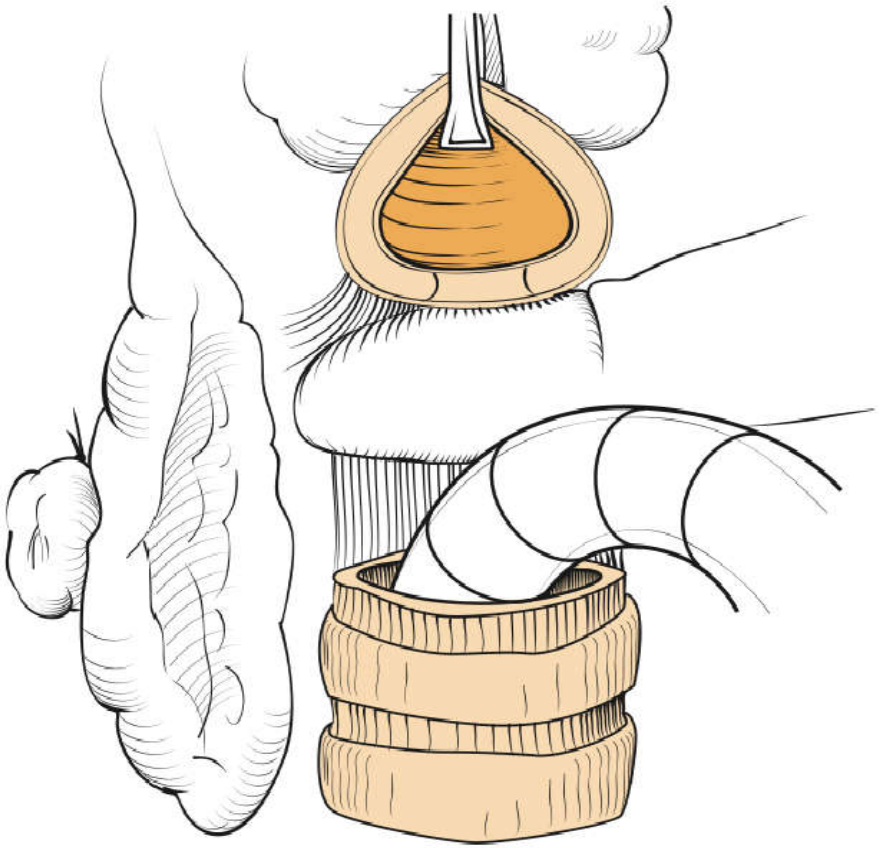


- **9.Entry into the Larynx and Initial Tumor Cuts.**

A, Use of a Freer elevator to mobilize the piriform sinus and internal perichondrium from the thyroid cartilage. This should not be performed if the piriform sinus is likely to be involved . tumor.

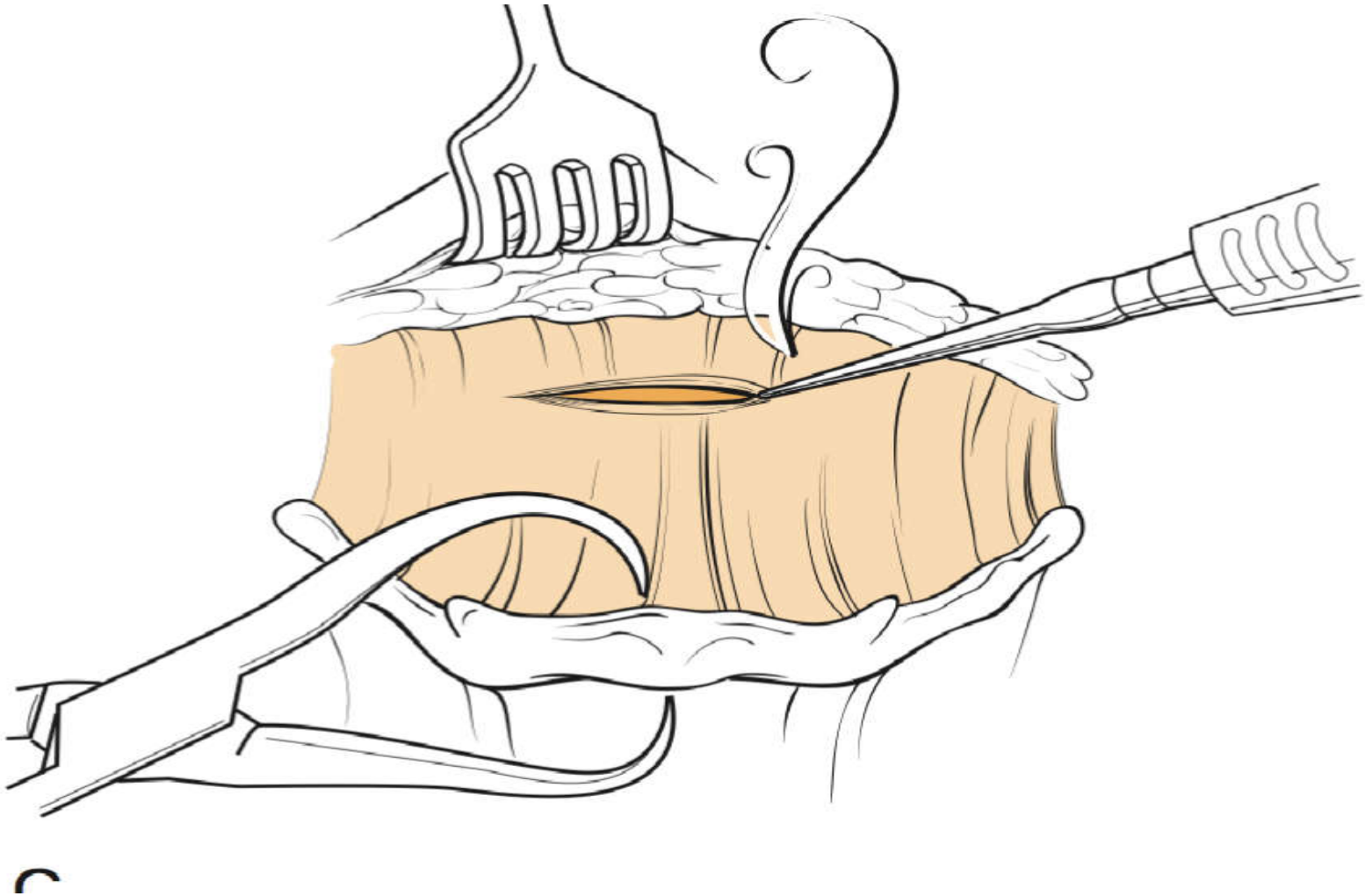


B, The trachea is transected, and the ligamentous attachments are divided to permit dissection of the trachea away from the upper esophagus up to the level of the posterior cricoarytenoid

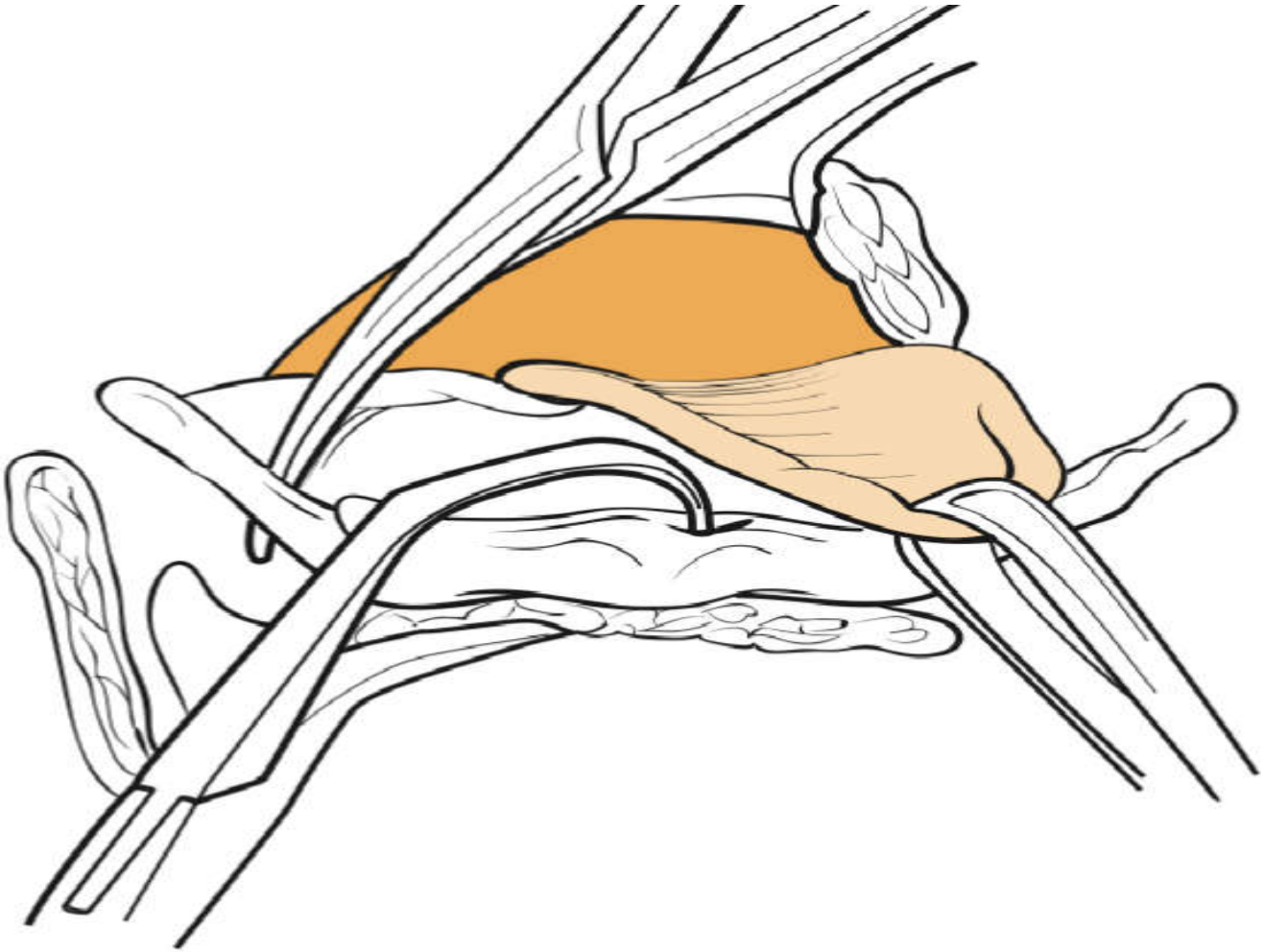


B

C, Dissection follows the hyoepiglottic ligament to the epiglottis and vallecula to avoid entry into the preepiglottic space.



D, If clinically uninvolved, the vallecula is entered on the nontumor side; and if the epiglottis is not involved, its tip is grasped.

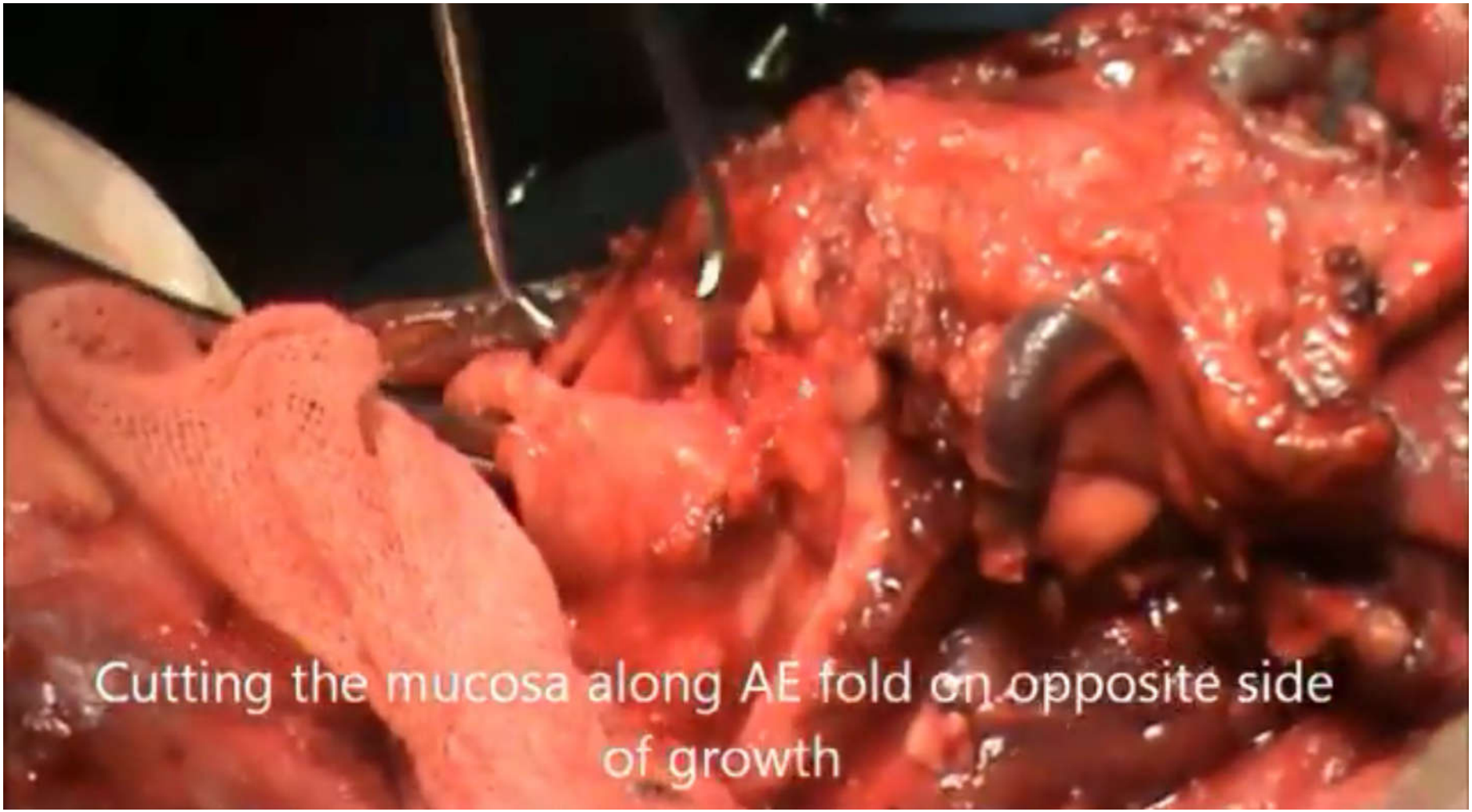


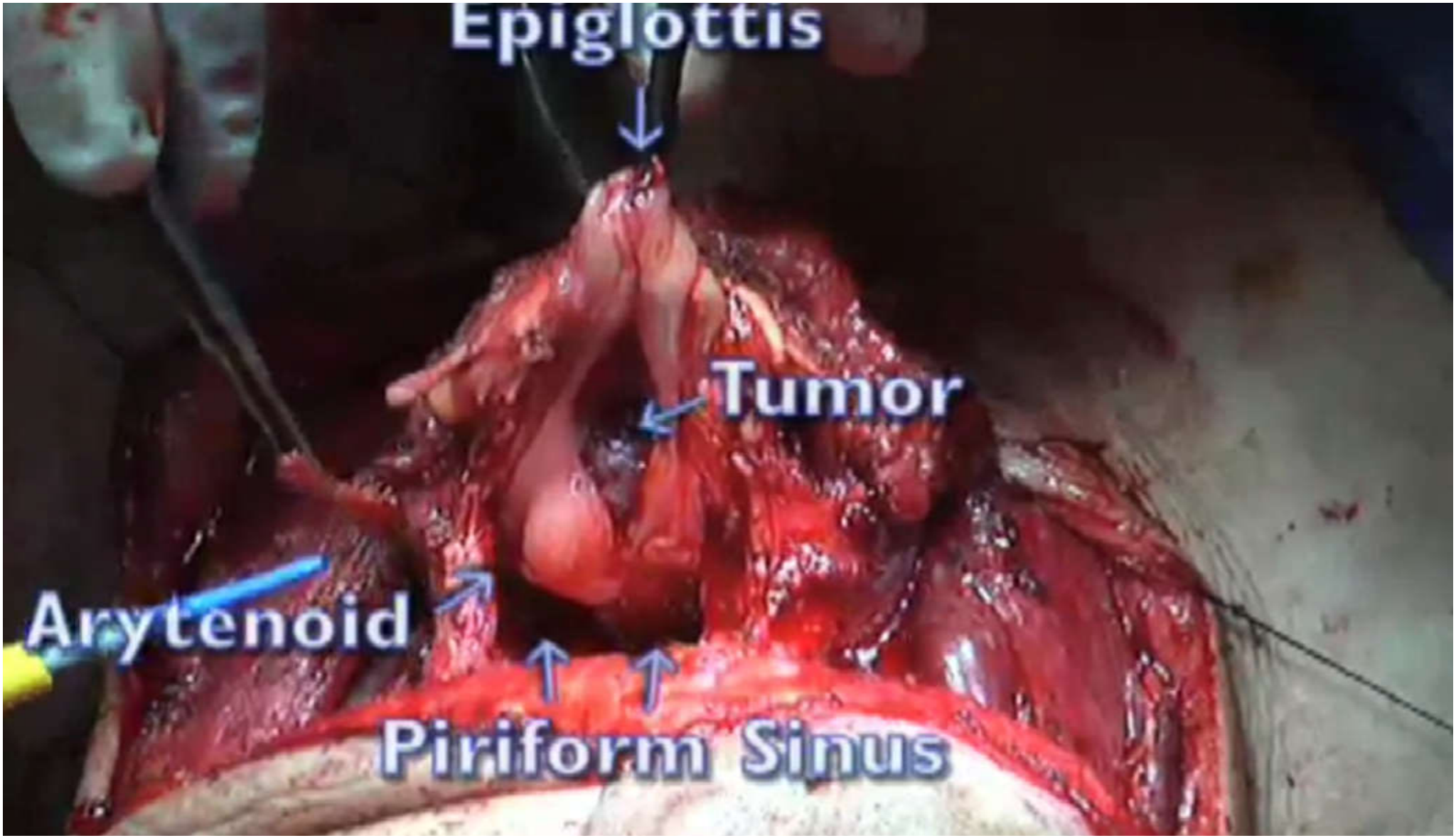
D

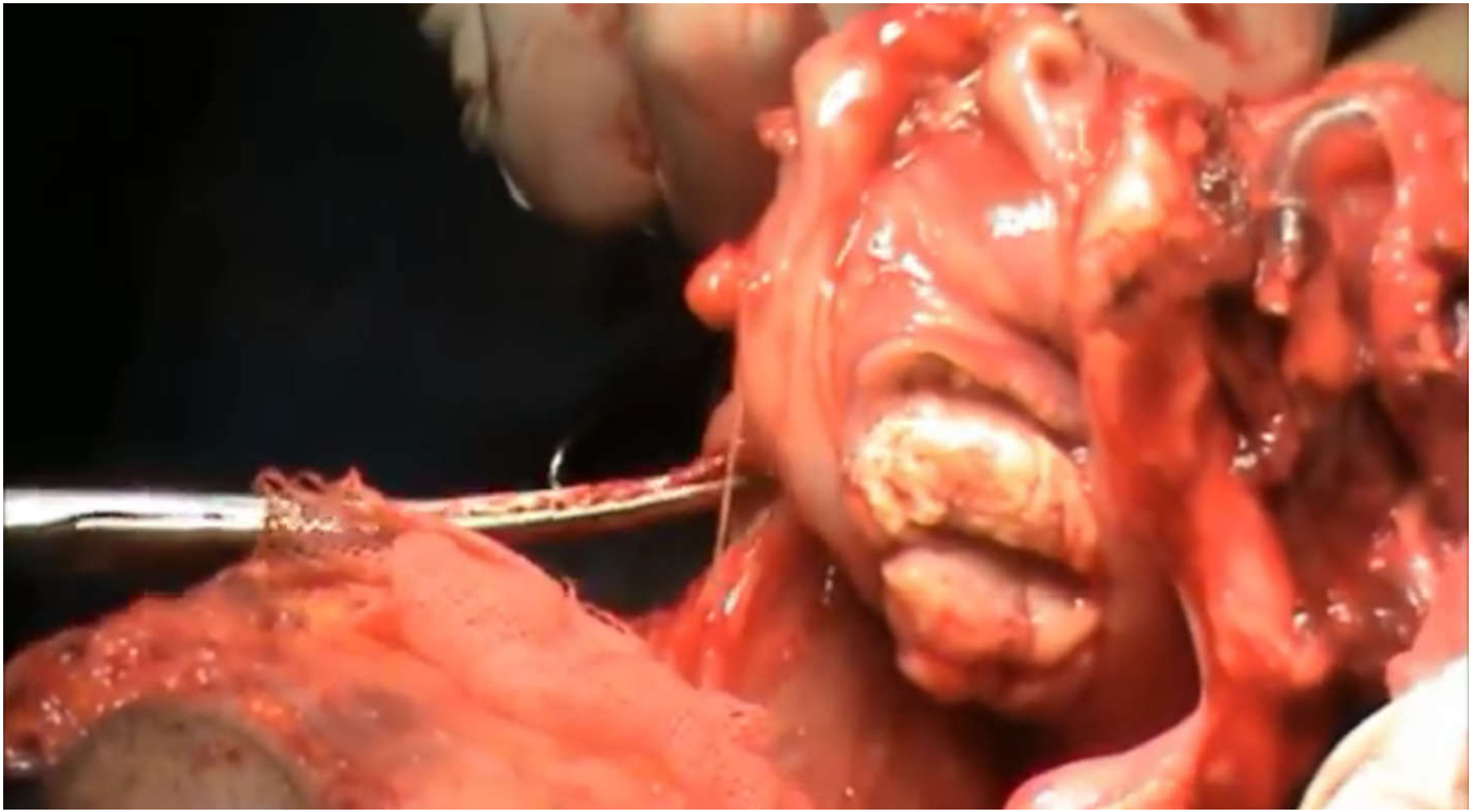

Delivering the epiglottis

10.Completion of Tumor Resection

- With a Mayo scissors, bilateral, inferiorly directed cuts are made to release the lateral pharynx from the larynx; the inside scissors blade is on mucosa, and the outside blade is on constrictor musculature. As these incisions are made from the vallecula to the piriform sinus, the larynx is further angled anteriorly out of the wound, until it is released to the apices of the piriform sinuses.


Cutting the mucosa along AE fold on opposite side
of growth


Epiglottis
Tumor
Arytenoid
Piriform Sinus

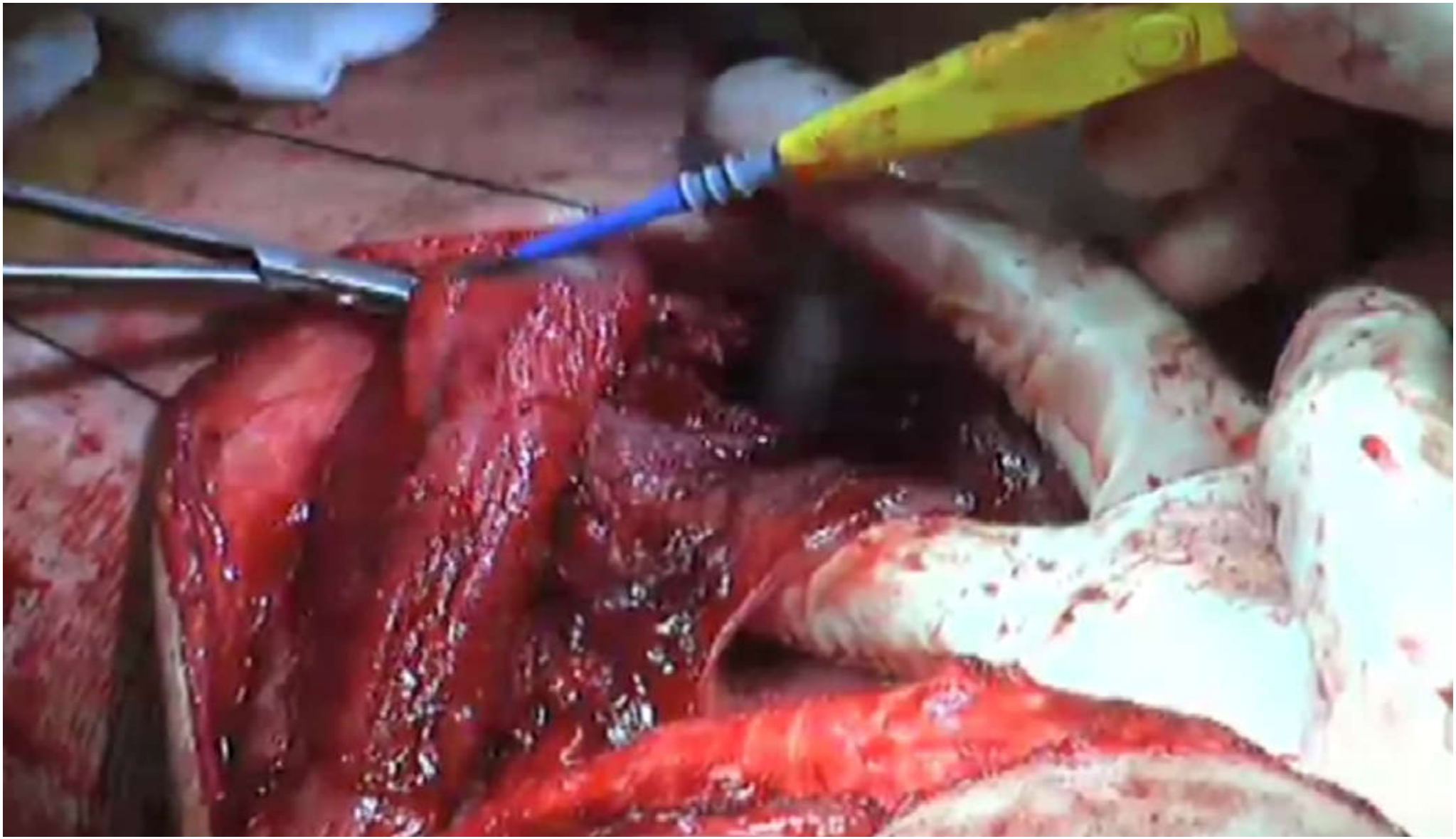



Post-cricoid mucosa being cut


Separating the trachea from esophagus


Incising the trachea below previous
tracheostomy


Trachea held with Alli's



سرالکترال 8cm ← بزرگ ← باعث بروز الئوما

استفاده از TEP راحت تر می‌شود.

سوبالزه کردن و سوچورزدن قابلیت دید و رشد که

کاروتید و قاعده clamp راحت تر می‌شود

ریسک فارنژ بالا است تا شنیدن

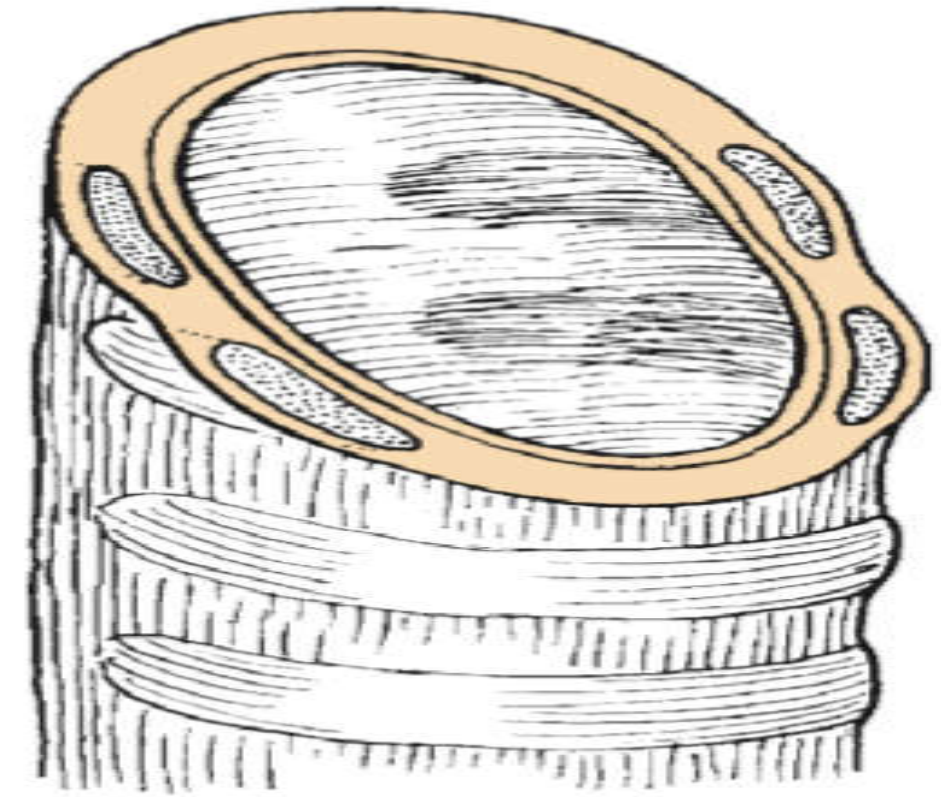
و حفظ عروق از تراق مصری که مسئول ایجاد شود


Reinforced endotracheal tube being
placed through new stoma

11.creation of tracheostoma

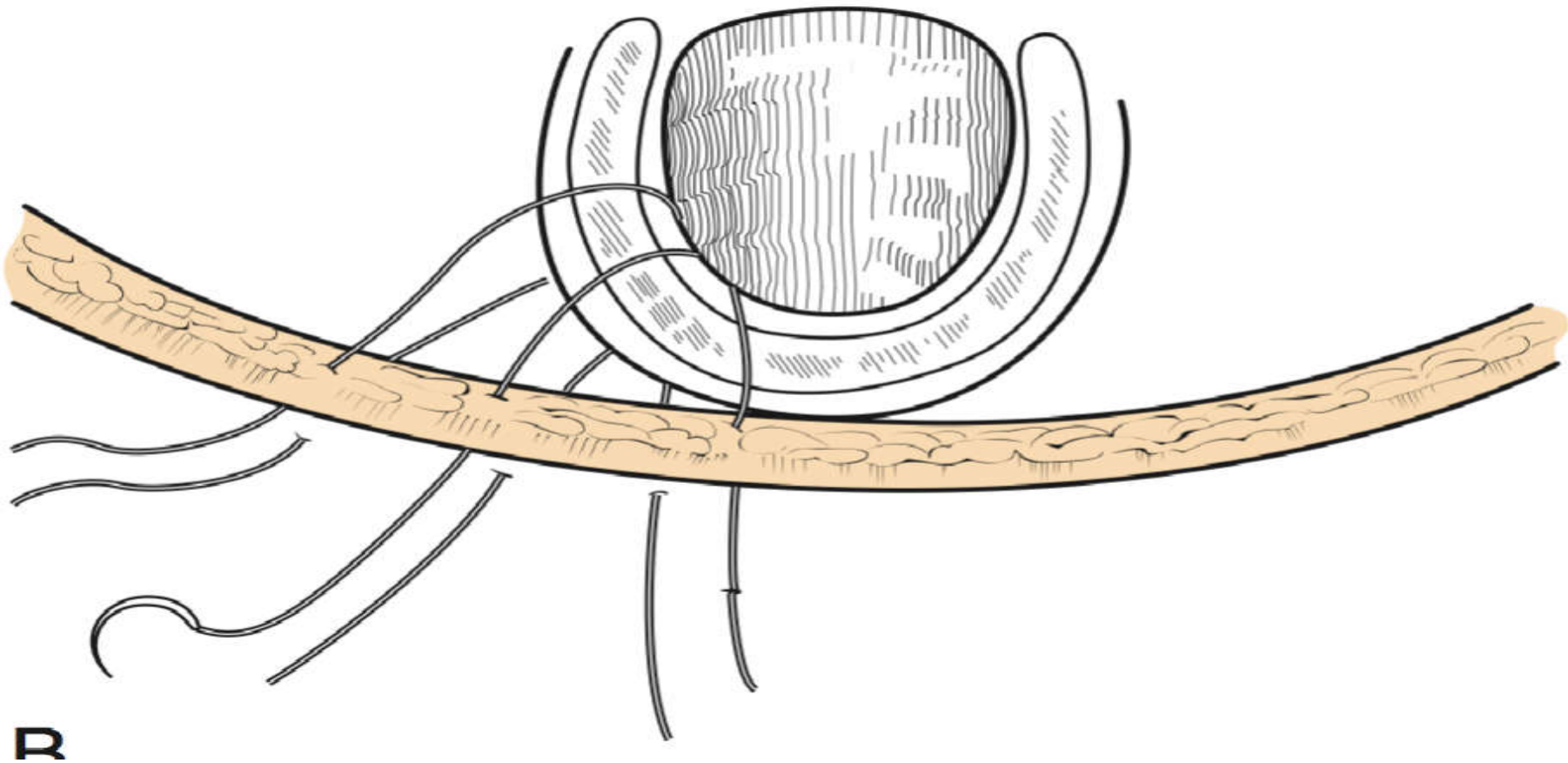
- Steps to avoid stenosis in creation of tracheostoma :

A, Bevel the tracheal cut such that more posterior wall is preserved by curving a scissors upward as the anterior tracheostomy is extended laterally. The posterior wall is transected with a V-shaped incision in the mucosa to

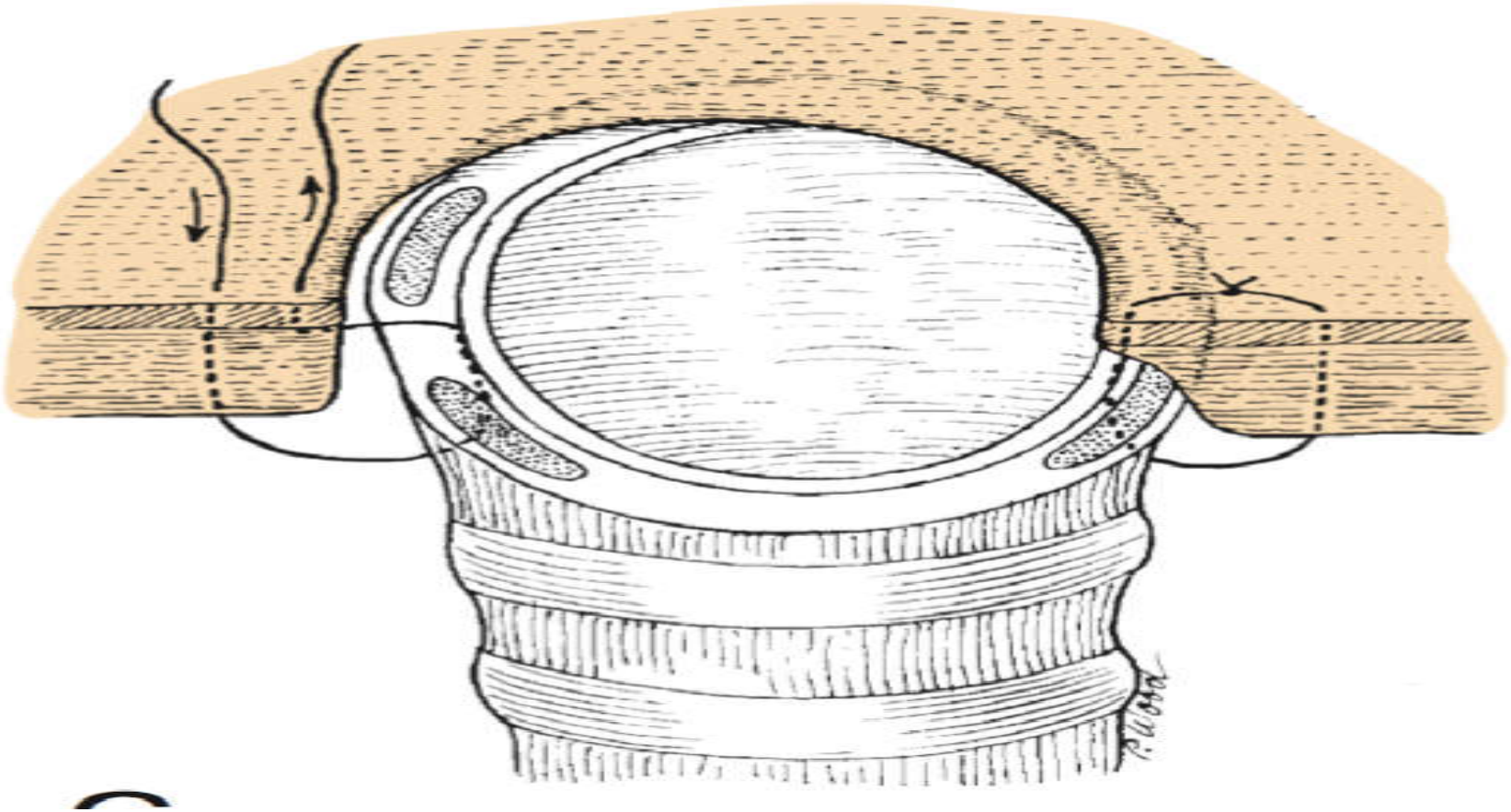


A

B, Elongate the anterior edge of the stoma by placing sutures from the midline outward, proceeding farther along the skin than the trachea and continuing this well onto the lateral portion of the trachea.



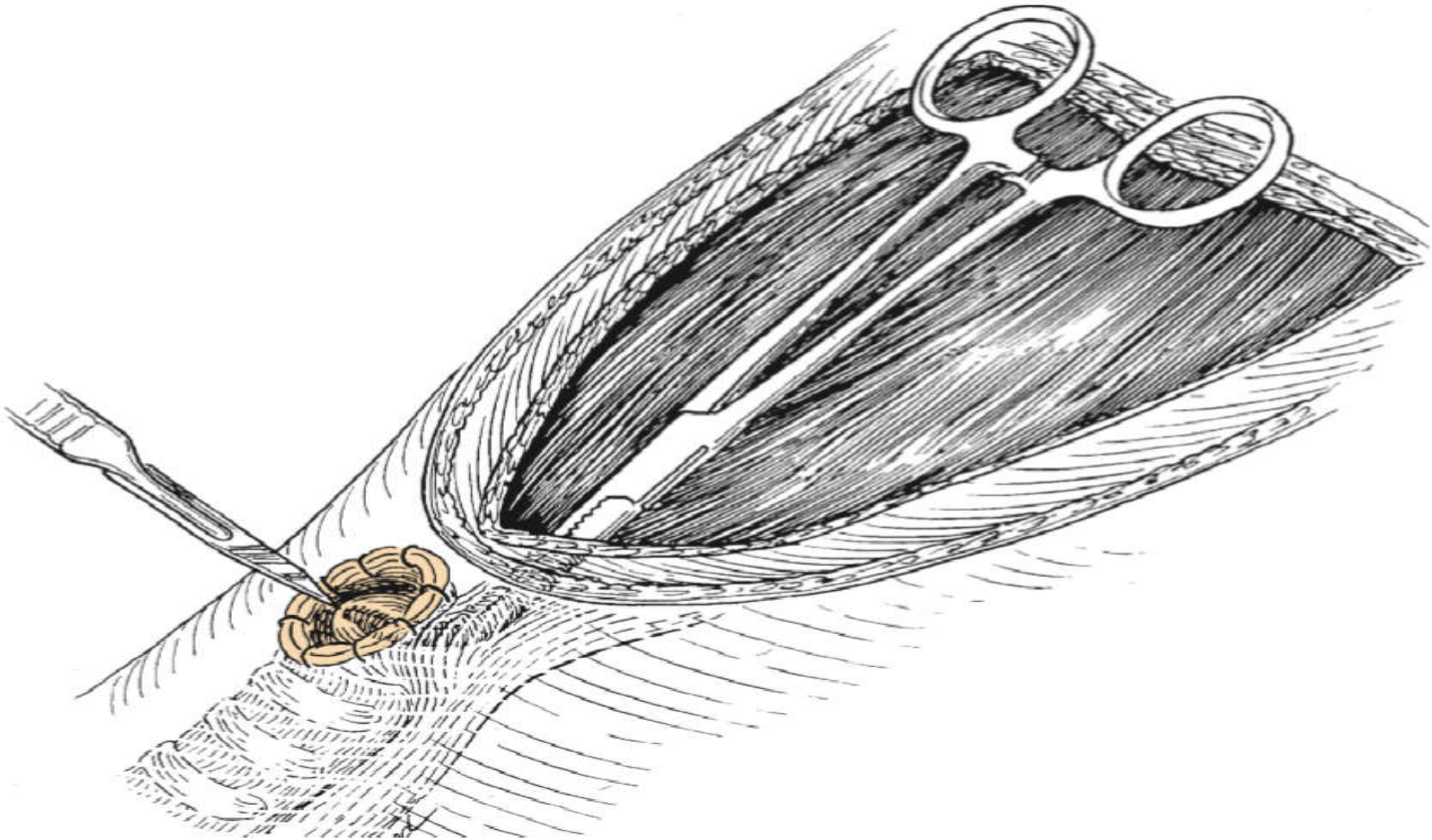
C, Bury the exposed tracheal cartilage with a half-buried vertical mattress suture from far on the skin around the tracheal cartilage and then back through the near edge of the skin, tying the suture on the skin. To minimize granulation tissue, sutures are placed submucosally, and absorbable sutures are preferred; a 2-0 Vicryl suture is advisable for the central suture, and 3-0 Vicryl is used for the remainder.




Tracheal end, permanent stoma sutured


Right thyroid tied with SCM

12.Primary Tracheoesophageal Puncture (Optional)



13.Pharyngoplasty.

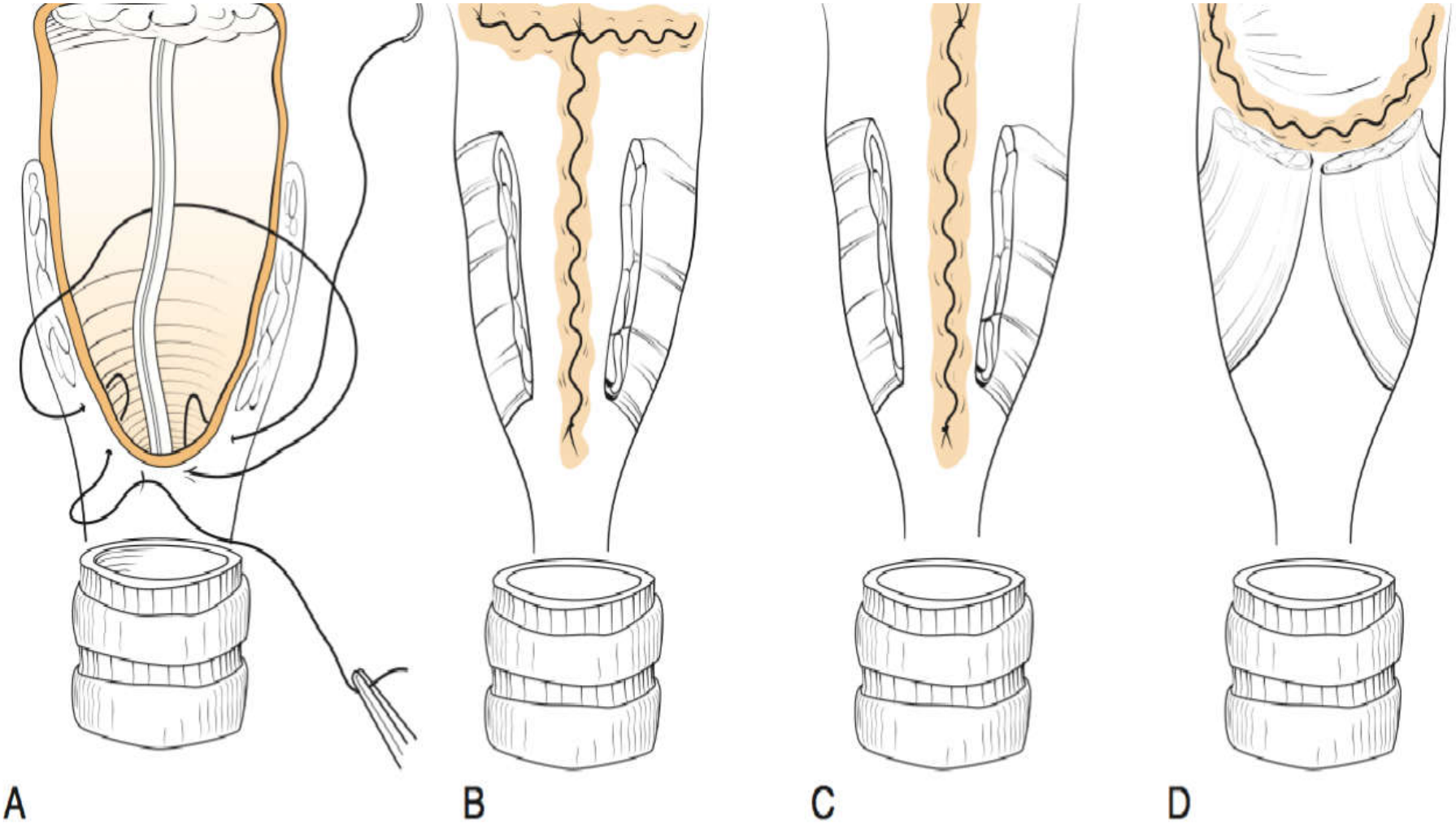
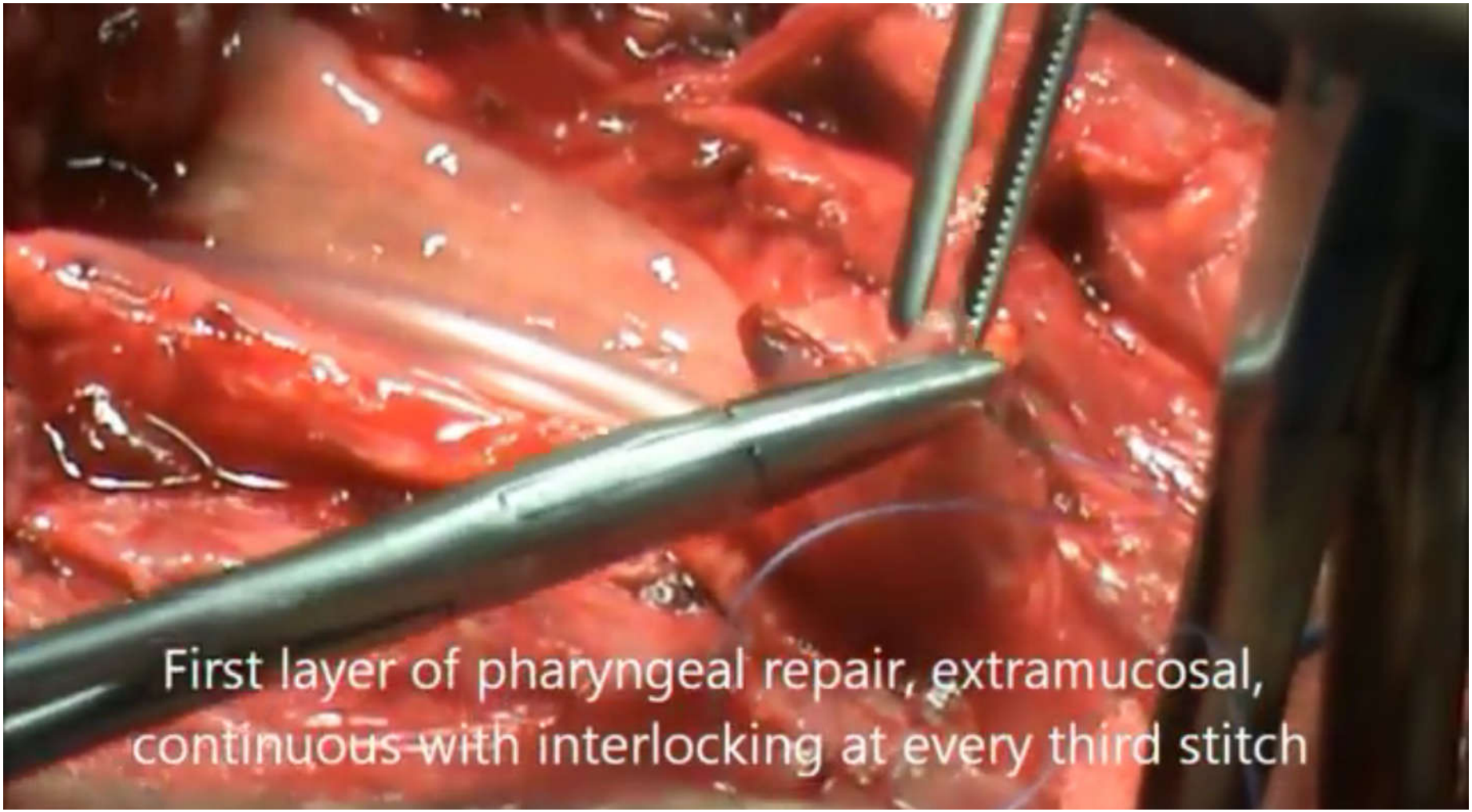
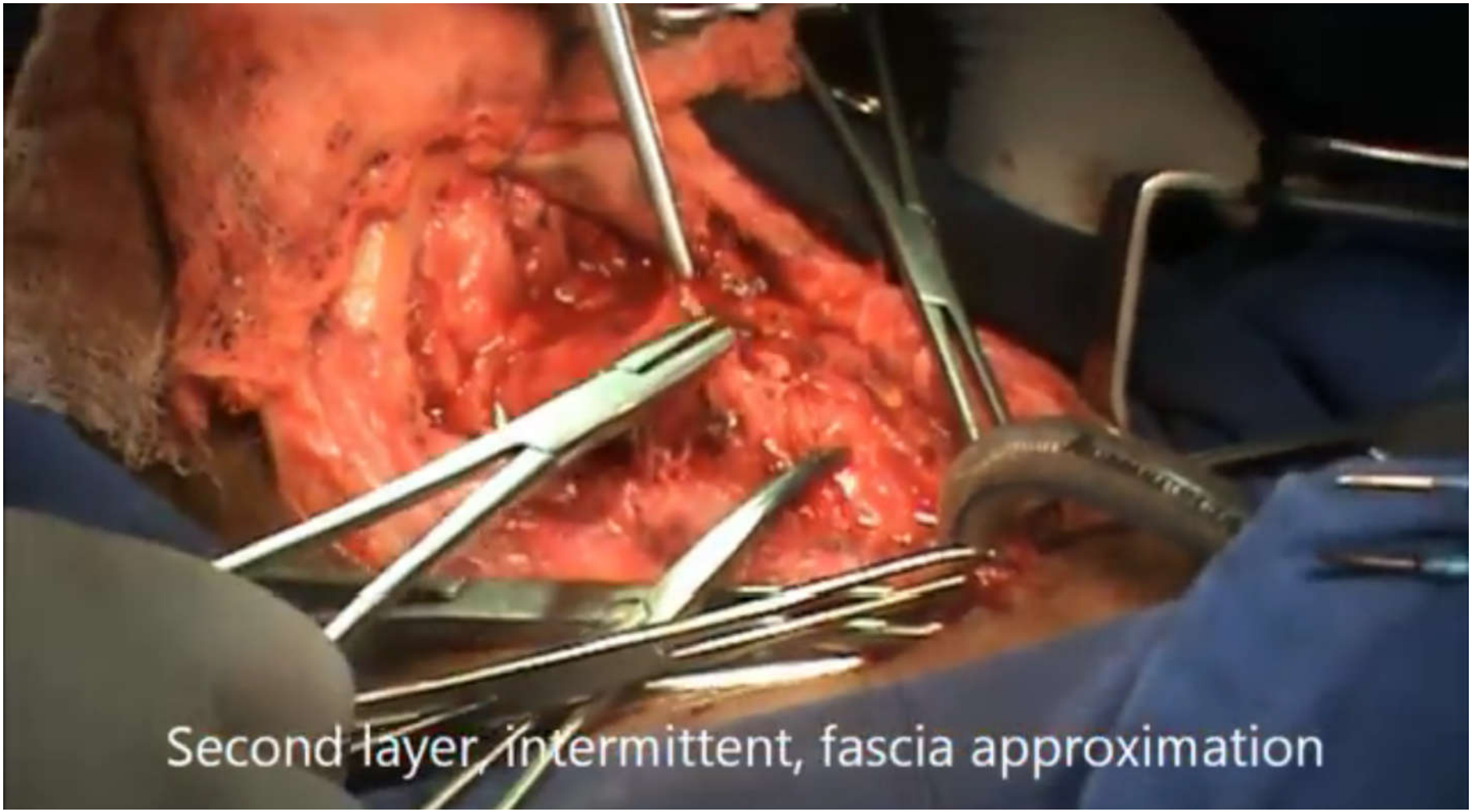
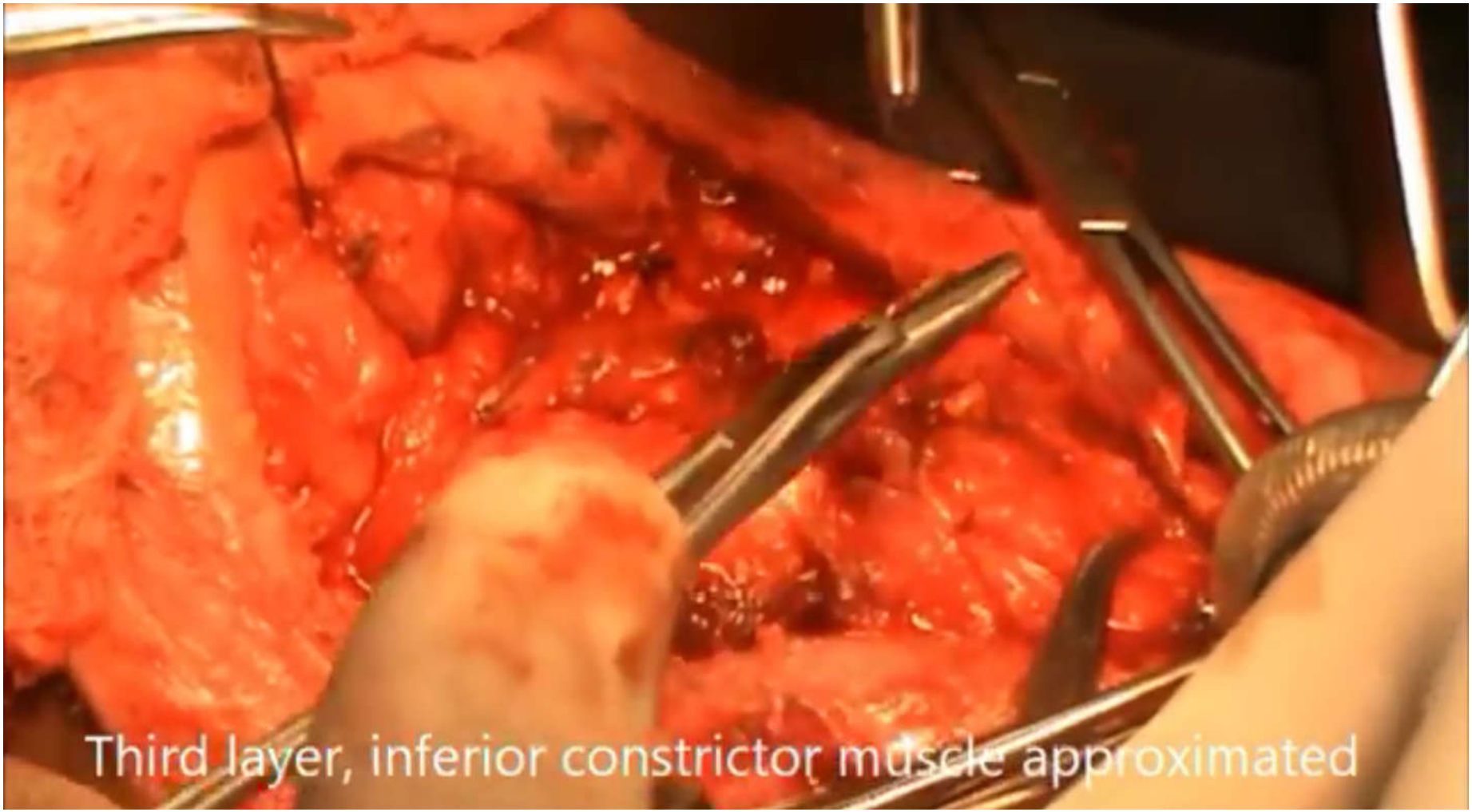


FIGURE 110-8. **A,** Closure of pharynx with detail of suturing technique. **B,** T-closure. **C,** Vertical closure. **D,** Horizontal closure.


First layer of pharyngeal repair, extramucosal,
continuous with interlocking at every third stitch


Second layer, intermittent, fascia approximation


Third layer, inferior constrictor muscle approximated

POSTOPERATIVE MANAGEMENT

- 1.Apart from routine postsurgical care, the specific treatment of early postlaryngectomy patients includes monitoring of systemic vital signs, fluid balance, oxygenation, wound drain vacuum retention and output, and neck flap viability. Postoperative treatment includes ventilator assistance based on respiratory status; tracheostomy tube care (cleaning, cuff pressure checks); airway humidification; bronchodilator treatments or chest physical therapy

- 2.suture line care three times daily
- 3.nasogastric or tracheoesophageal fistula tube feeding, once bowel sounds are present
- 4.Drains are removed when output is less than 25 mL/day for 2 consecutive days
- 5. oral feeding is normally begun 7 days after surgery in the nonirradiated patient. Patients with laryngectomies who were previously irra- diated are started on an oral diet 12 to 14 days in most cases,

Early Complications

- **1.Drain Failure**
- **2.Hematoma =**return to the operating room
- **3.Infection.** 3 to 5 days after surgery
- **4.Wound Dehiscence.**
- **5.Pharyngocutaneous Fistula.** may occur 1 to 6 weeks postoperatively,

Risk factores for fistula development

- **1.Patients with poor preoperative nutritional status**
  .
- 2.advanced tumor stage (positive margins)
- 3.diabete
- 4.hypothyroidism

Initial management in **Pharyngocutaneous Fistula**

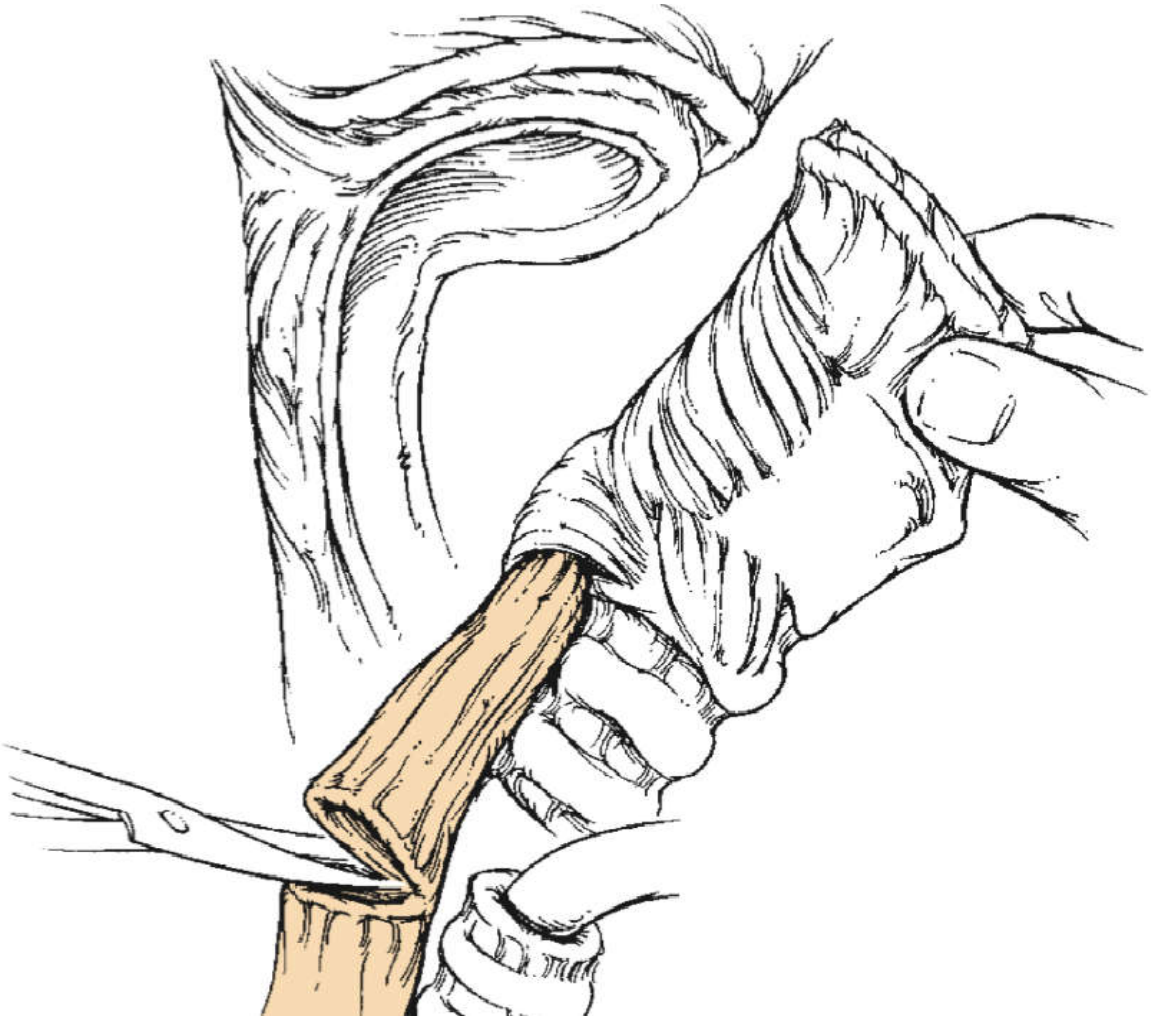
- 1.NPO
- 2.regular antiseptic gauze fistula- tract packing and dressings
- 3.antibiotic therapy
- 4. 10 mL of 0.25% acetic acid by mouth or an antibiotic or other antiseptic preparation three to four times daily
- 5.pedicled muscle flap (pectoralis, trape- zius, or latissimus dorsi)

Late Complications

- **1.Stomal Stenosis :**with V-Y advancement flaps, Z-plasties, and a “fish-mouth” stomaplasty
- **2.Pharyngoesophageal Stenosis :**tumor recurrence should be suspected; but once this has been ruled out by endoscopy and biopsy, outpatient dilation is usually an effective treatment
- **3.Hypothyroidism :**Thyroid function tests every 1 to 2

TOTAL LARYNGOPHARYNGECTOMY

The retropharyngeal dissection has been performed. Superior and inferior cirumferential cuts will complete the resection.



INDICATIONS

- 1.Piriform Sinus Carcinoma
- 2.Carcinoma of the Posterior Hypopharyngeal Wall
- 3.Postcricoid Carcinoma

برای آنکه قهرمان باشی ، باید خودت را باور داشته باشی، حتی
زمانی که هیچکس دیگری تو را باور ندارد.