Neck Dissection

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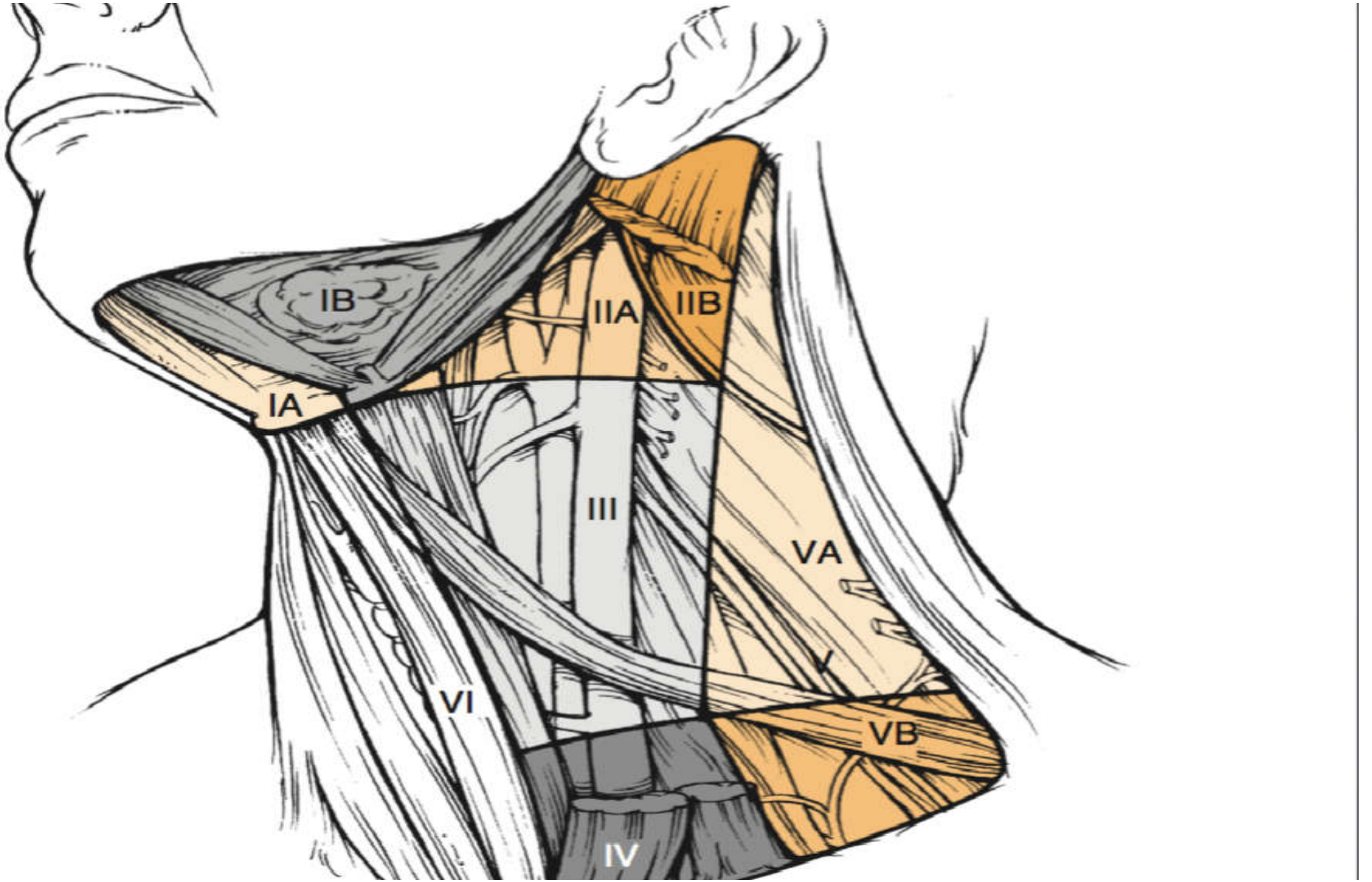
HISTORIC PERSPECTIVE

- In publications prior to the twentieth century, little attention was given to the indications or techniques for treating cervical lymph node metastases. The first conceptual approach for removing nodal metastases was made in 1880 by Kocher,1 who described the removal of the lymph nodes located within the contents of the submandibular triangle to gain surgical access to a cancer of the tongue .

CERVICAL LYMPH NODE GROUPS

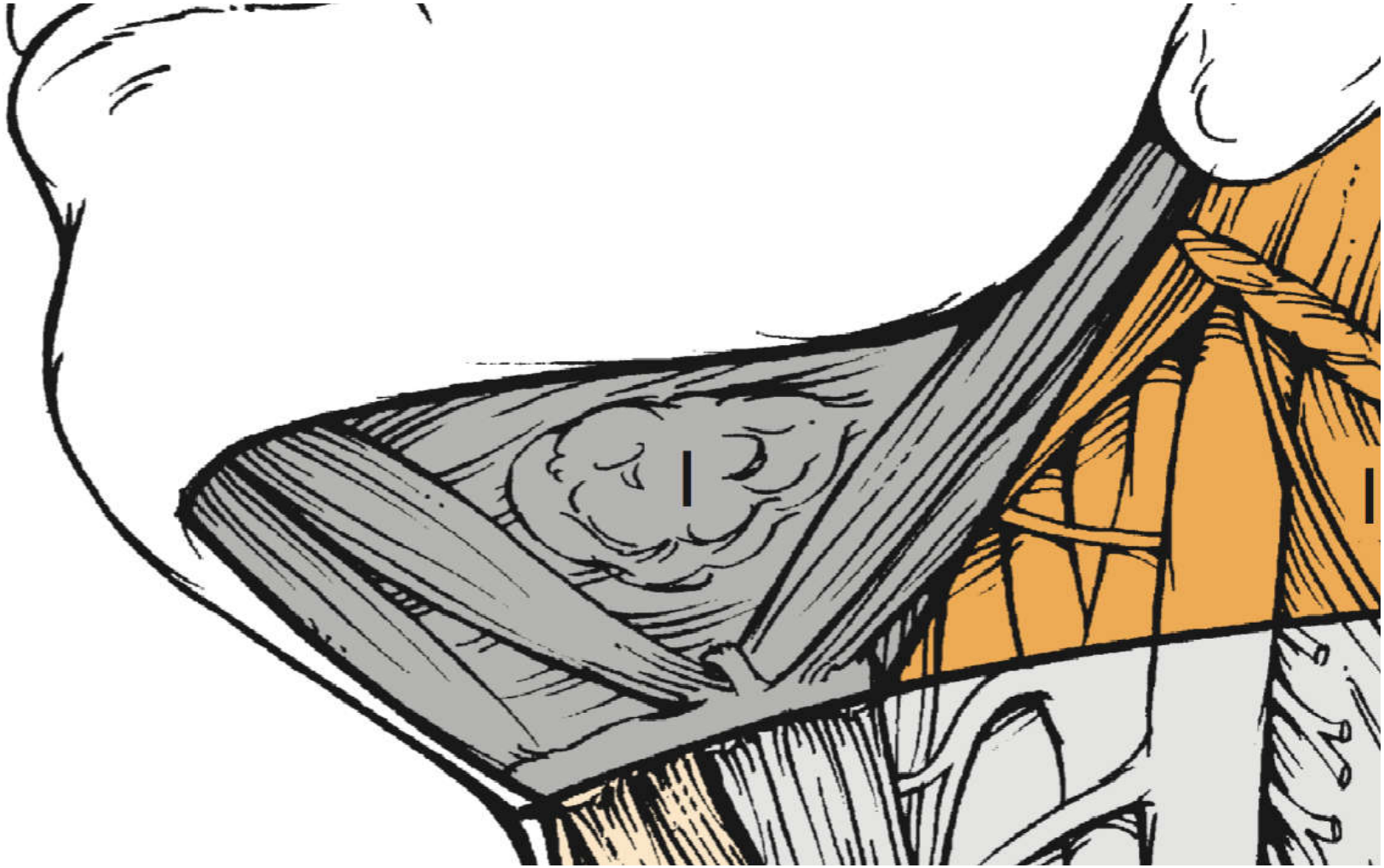


level I:

- IA :the submental group

Lymph nodes within the triangular boundary of the anterior belly of the digastric muscles and the hyoid bone .

from cancers that arise from the floor of the mouth, anterior oral tongue, anterior mandibular alveolar ridge, and lower lip



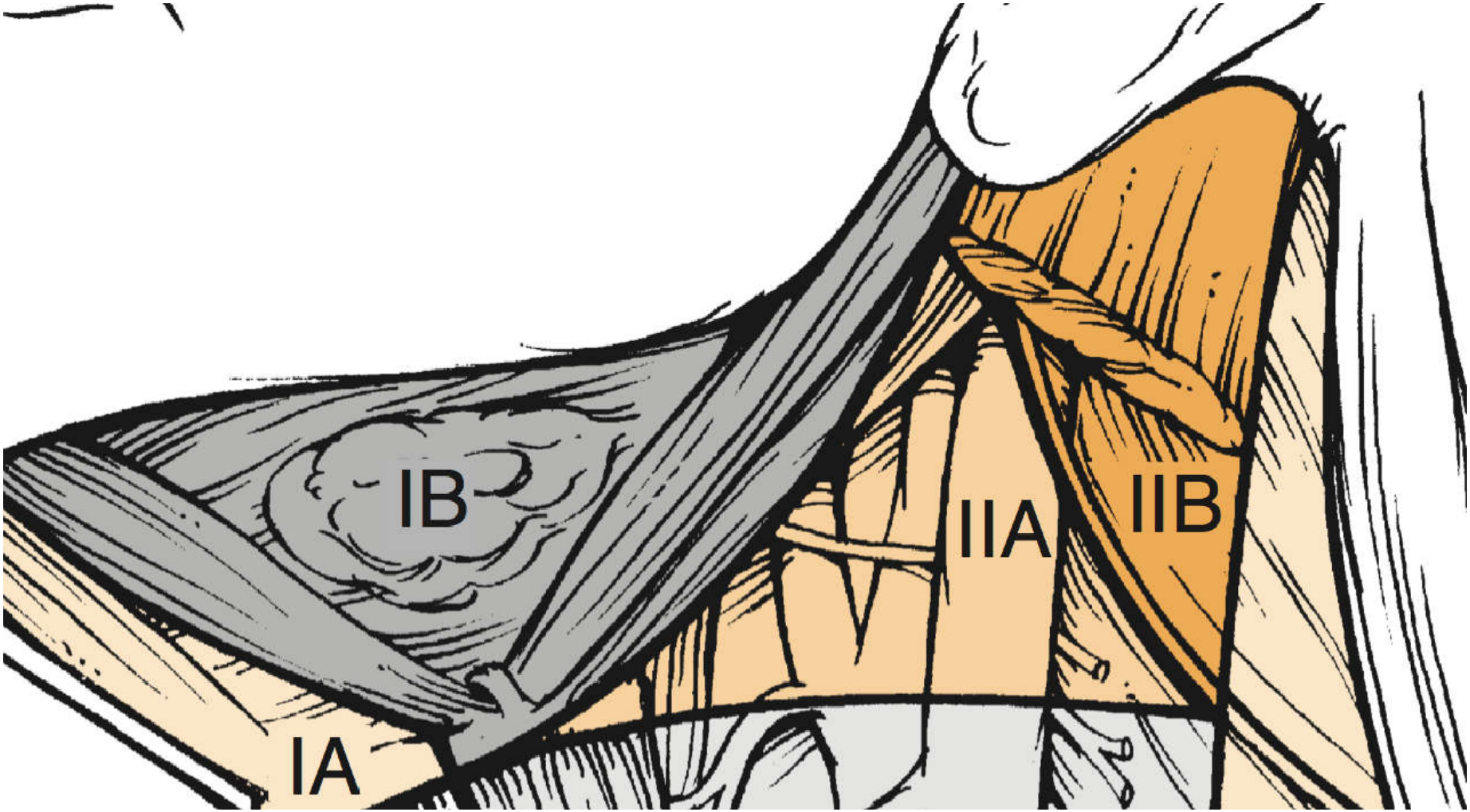
- IB:the Submandibular group

Lymph nodes within the boundaries of the anterior belly of the digastric muscle, stylohyoid muscle, and body of the mandible .

from the oral cavity, anterior nasal cavity, and soft tissue structures of the midface and the submandibular gland

Level II

- These are located around the upper third of the IJV and adjacent to the spinal accessory nerve, extending from the level of the carotid bifurcation (surgical landmark) or hyoid bone (clinical landmark) inferiorly to the skull base superiorly. The lateral boundary is the posterior border of the SCM, and the medial boundary is the stylohyoid muscle.


IB
IIA
IIB
IA

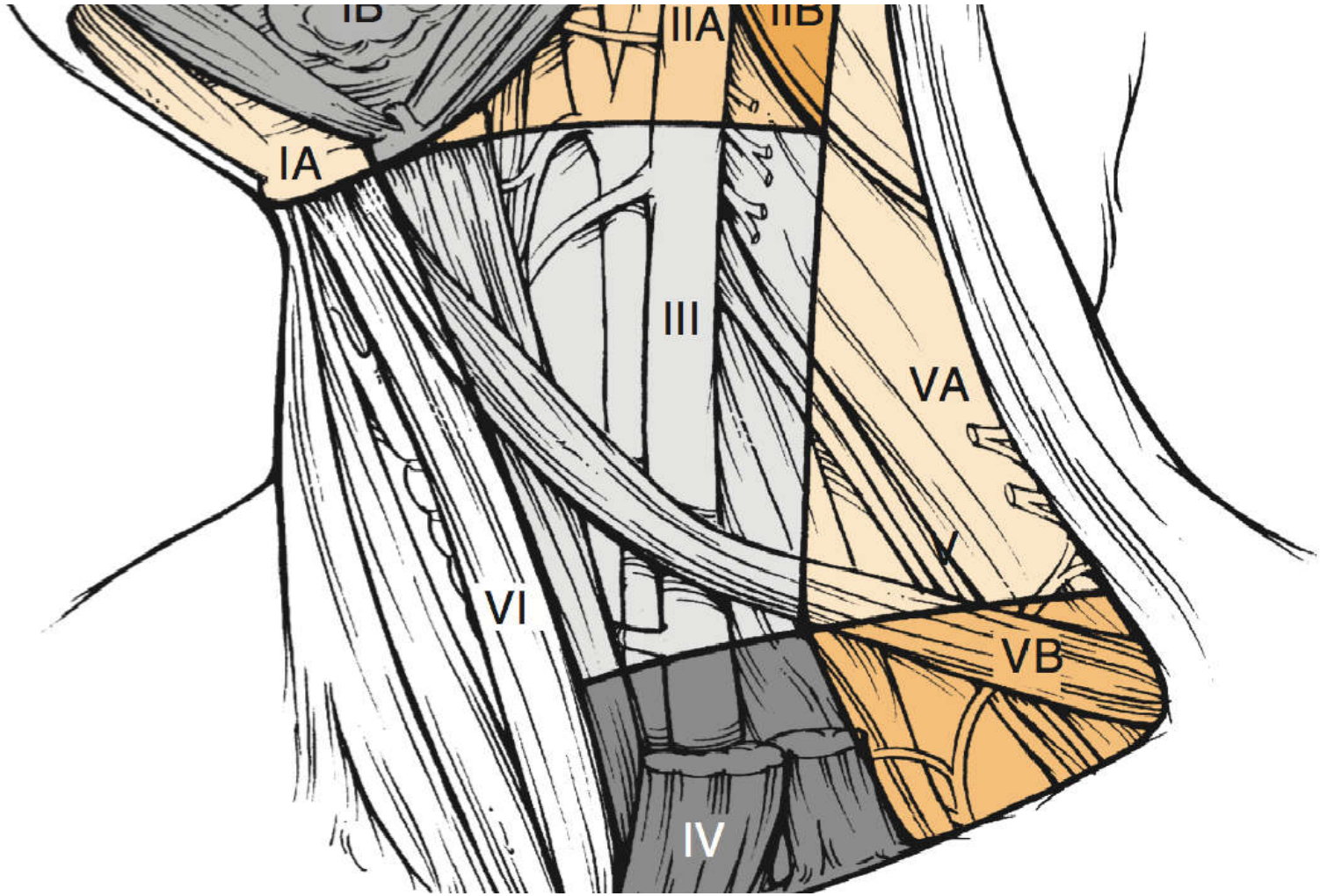
IIA: nodes are located anterior (medial) to the vertical plane defined by the spinal accessory nerve.

IIB: nodes are located posterior (lateral) to the vertical plane defined by the spinal accessory nerve.

- The upper jugular nodes are at greatest risk for harboring metastases from cancers that arise from the oral cavity, nasal cavity, nasopharynx, oropharynx, hypopharynx, larynx, and parotid gland

Level III

- These nodes are located around the middle third of the IJV and extend from the carotid bifurcation superiorly (surgical land- mark) or the level of the inferior aspect of the body of the hyoid bone (clinical and radiologic landmark) to the junction of the omohyoid muscle with the IJV (surgical landmark) or the lower border of the cricoid arch (clinical and radiologic landmark) inferiorly. The lateral boundary is the posterior border of the SCM, and the medial boundary is the lateral border of the sternohyoid muscle. Recently, the AHNS committee recommended that the lateral border of the common carotid artery could serve as the radiologic landmark for the medial boundary.


IB
IIA
IIB
IA
III
VA
V
VI
VB
IV

- These nodes are at greatest risk for harboring metastases from cancers that arise from the oral cavity, nasopharynx, oropharynx, hypopharynx, and larynx

Level IV

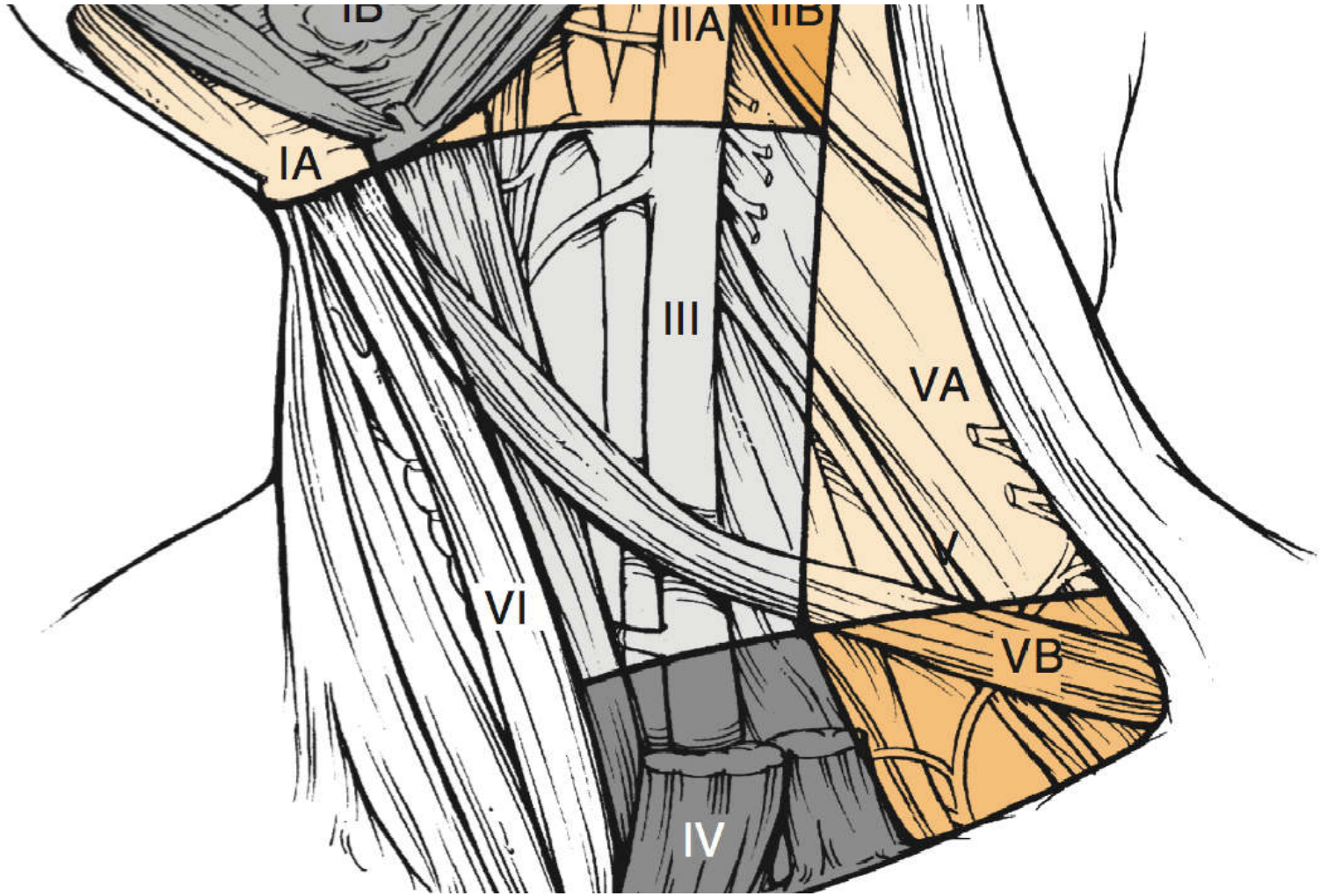
- These nodes surround the lower third of the IJV and extend from the omohyoid muscle (surgical landmark) or cricoid arch (clinical landmark) superiorly to the clavicle inferiorly. The lateral boundary is the posterior border of the SCM, and the medial or anterior boundary is the lateral border of the sternohyoid muscle.

- These nodes are at greatest risk of harboring metastases from cancers that arise from hypopharynx, thyroid, cervical esophagus, and larynx

Level V

- *posterior triangle group.*
  The boundaries include the anterior border of the trapezius muscle laterally, the posterior border of the SCM medially, and the clavicle inferiorly.

- Sublevel VA is separated from sublevel VB by a horizontal plane that marks the inferior border of the anterior cricoid arch.
- sublevel VA includes: the spinal accessory nodes.
- sublevel VB includes: the nodes that follow the transverse cervical vessels and supraclavicular nodes (with the exception of the Virchow node, which is located in level IV)


IB
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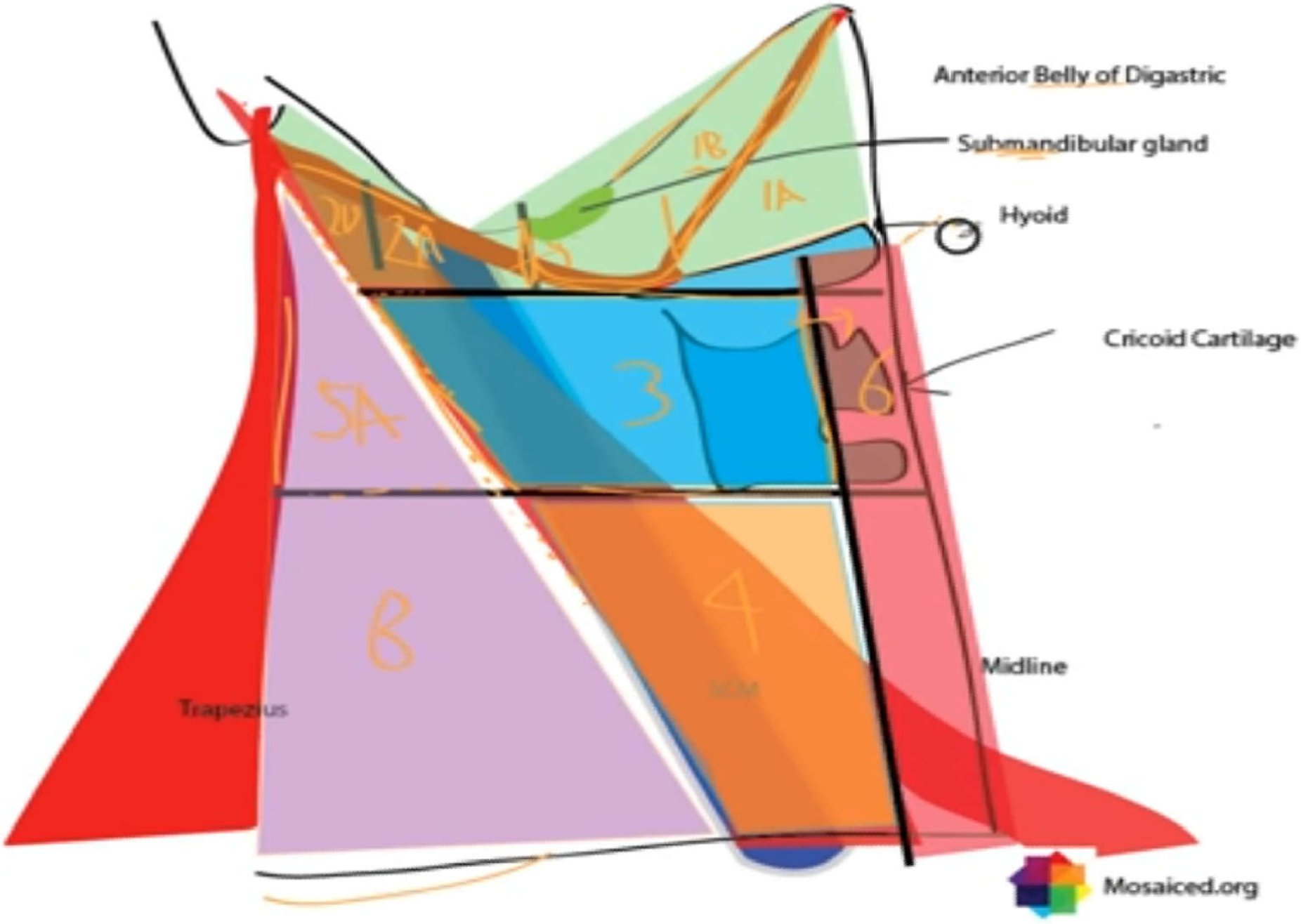
IV

- The posterior triangle nodes are at greatest risk for harboring metastases from cancers that arise from the nasopharynx, oropharynx, and cutaneous structures of the posterior scalp and neck .

Level VI

compasses the lymph nodes of the anterior compartment of the neck.This group comprises nodes that surround the midline visceral structures of the neck, extending from the level of the hyoid bone superiorly to the suprasternal notch inferiorly. On each side, the lateral boundary is formed by the medial border of the carotid sheath.

NECK ANATOMY (ESP LYMPH NODES) + ROBIN'S LEVELS



- Lymph nodes in this compartment include the pretracheal and paratracheal nodes, the precricoid (Delphian) node, and the perithyroidal nodes, including the lymph nodes along the recurrent laryngeal nerves.

- These nodes are at greatest risk for harboring metastases from cancers that arise from the thyroid gland, glottic and subglottic larynx, apex of the piriform sinus, and cervical esophagus .

level VII

- are bounded superiorly by the superior edge of the manubrium, inferiorly by the superior border of the arch of the aorta, and laterally by the common carotid artery on the left side and the innominate artery on the right.

- These nodes represent an extension of the paratracheal lymph node chain and extend inferiorly below the suprasternal notch along each side of the cervical trachea to the level of the innominate artery.

NECK DISSECTION CLASSIFICATION

1:Radical Neck Dissection

- Removal of:

  a:lymph node levels I to V

  b:sternocleidomastoid muscle

  c:spinal accessory nerve

  d:internal jugular vein

- **Indications:**

a: patients with extensive lymph node metastases with extension beyond the capsule of the node

b:nodes that involves the spinal accessory nerve and the IJV.

2:Modified Radical Neck Dissection

- Removal of lymph node levels I to V, as in RND, but with preservation of at least one of the nonlymphatic structures
- ***Indications:*** The major indication for a modified RND is to remove grossly visible lymph node disease that is not directly infiltrating or fixed to the nonlymphatic structures.

- The major purpose of these modifications relates to the morbidity encountered when the spinal accessory nerve is removed.

3:Selective Neck Dissection

- Preservation of one or more lymph node levels relative to an RND

4:Extended Neck Dissection

- Removal of an additional lymph node level or group or a nonlymphatic structure relative to an RND (muscle, blood vessel, nerve); examples of other lymph node groups are superior mediastinal, parapharyngeal, retropharyngeal, periparotid, postauricular, suboccipital, or buccinators; an example of other nonlymphatic structures can be external carotid artery or hypoglossal or vagus nerves .

Radical Neck Dissection
Technique

1:Positioning

- The patient is positioned supine on the table with a roll placed beneath the shoulders to optimally extend the neck

2:prepped and draped

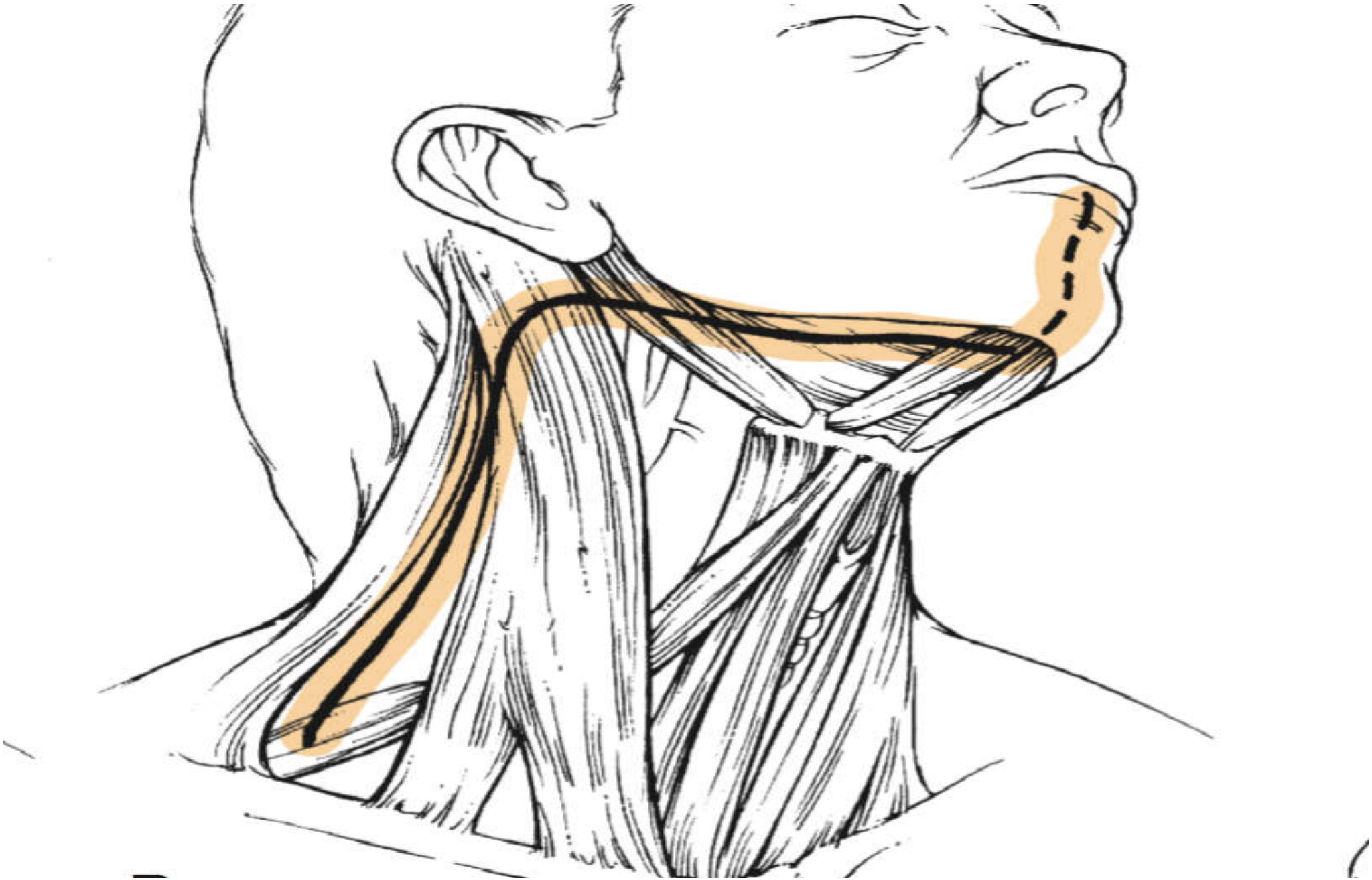
- The skin is prepped and draped to allow for full exposure of both sides of the neck with clear visualization of surrounding landmarks (e.g., the lower face, including the mentum, both mastoid processes, and earlobes) and the clavicles and suprasternal notch inferiorly.

3:Incision Planning.

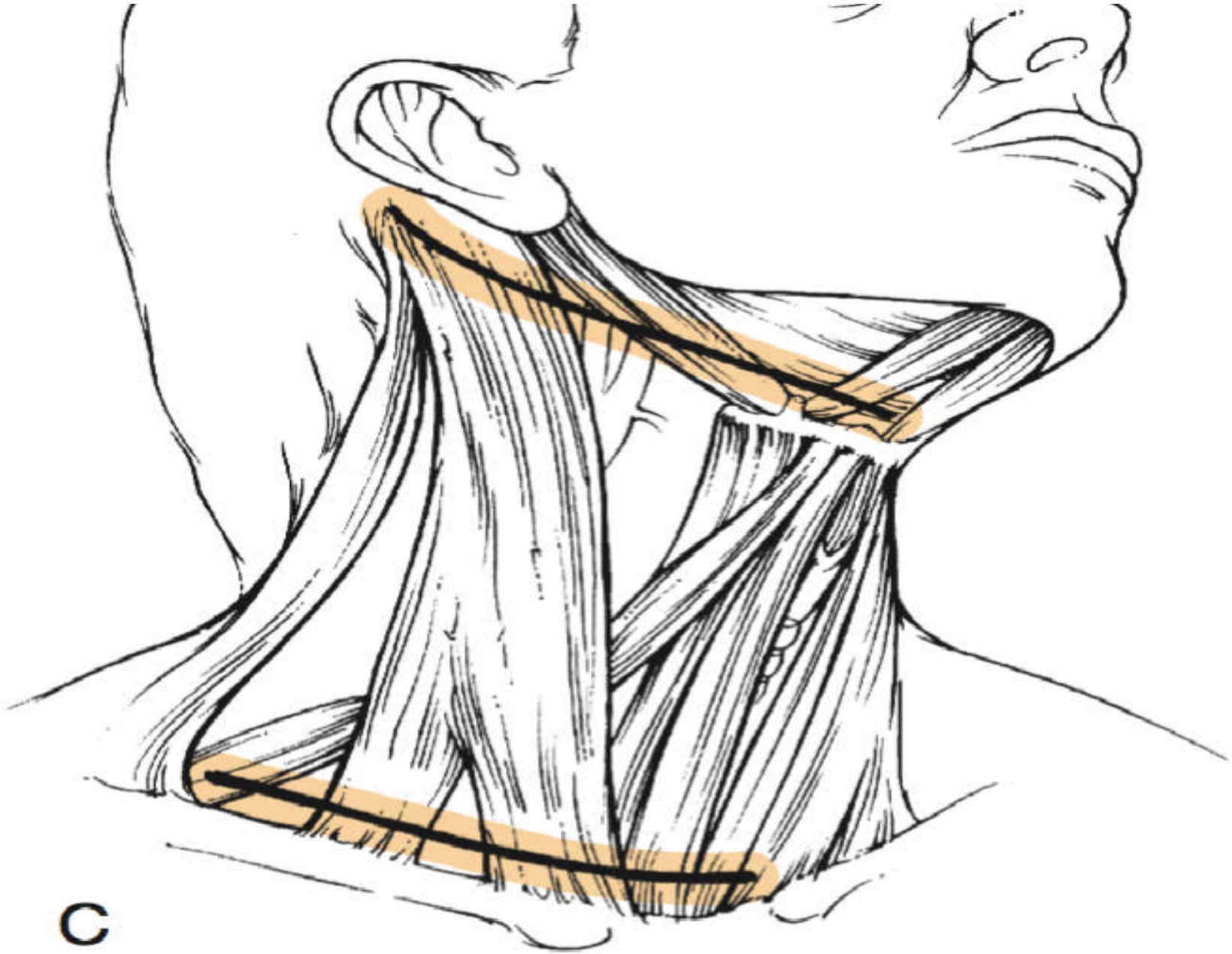
- The incision is planned for optimal exposure of all lymph node levels to be dissected (levels I through V) and to preserve as much blood supply as possible. The neck flaps raised should be broadly based, either superiorly or inferiorly, and should preferably avoid any trifurcations, particularly those that overlie the carotid sheath.

A: Hockey stick

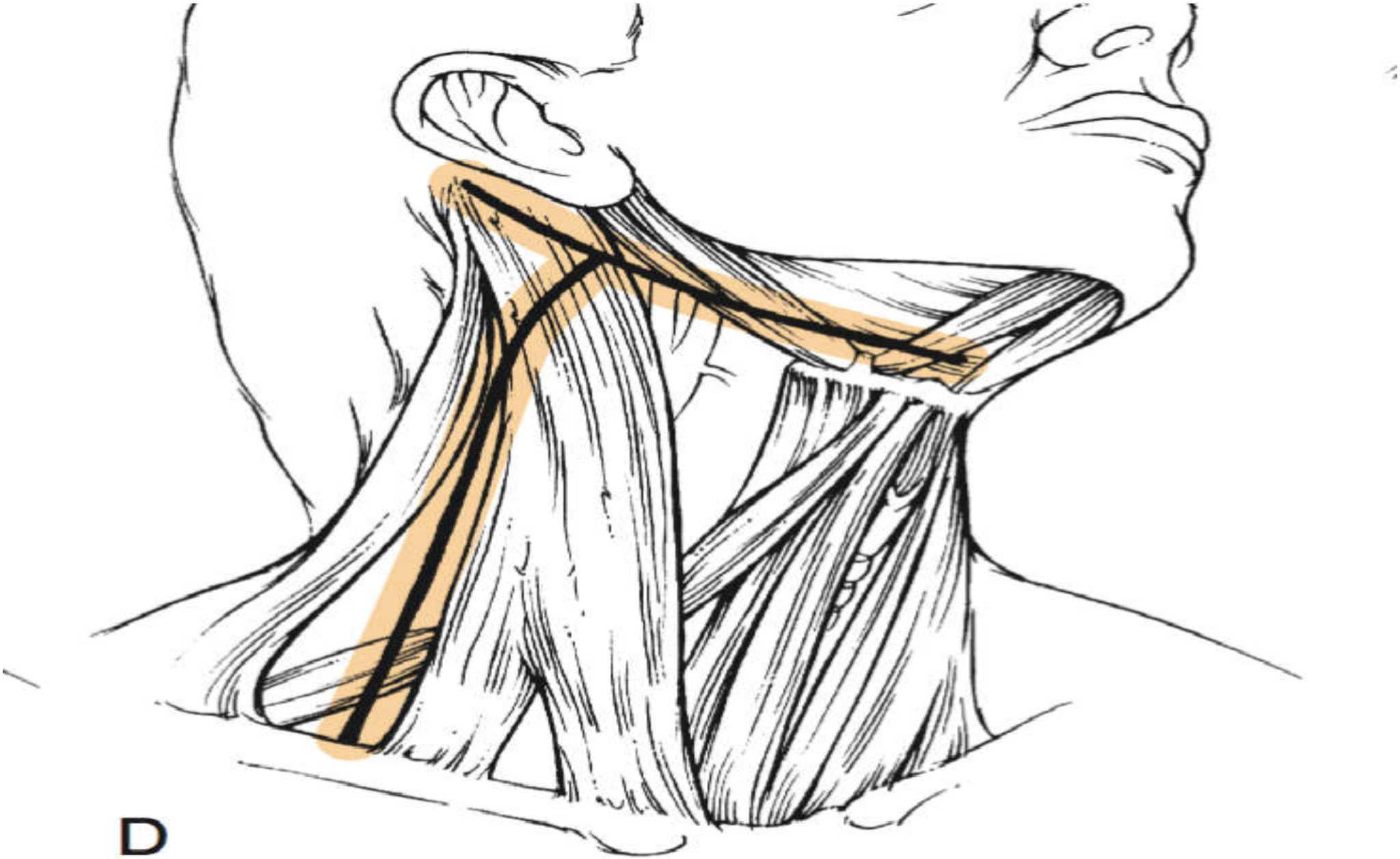
B: Boomerang



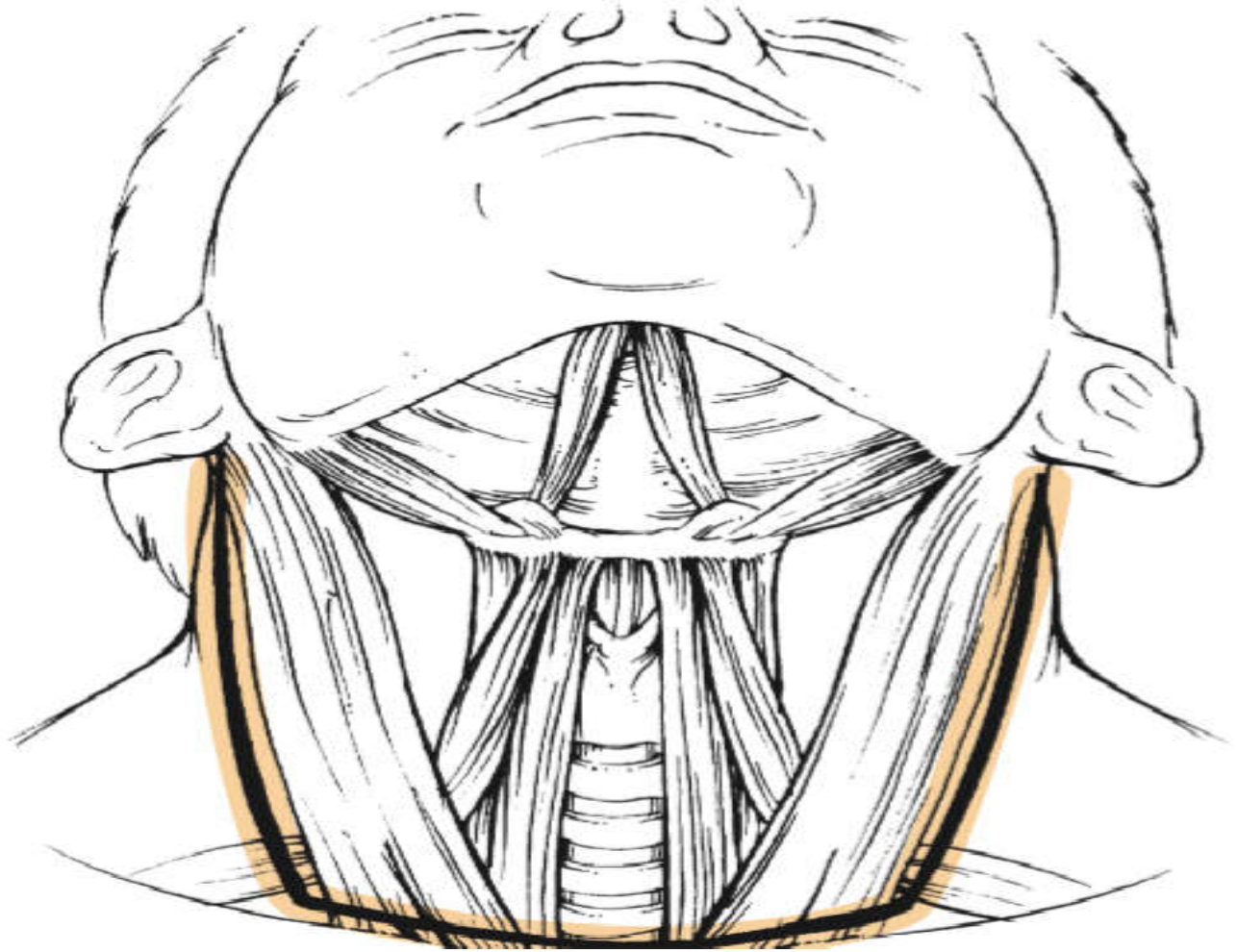
C: McFee



D: Modified Schobinger



E: Apron or bilateral hockey stick

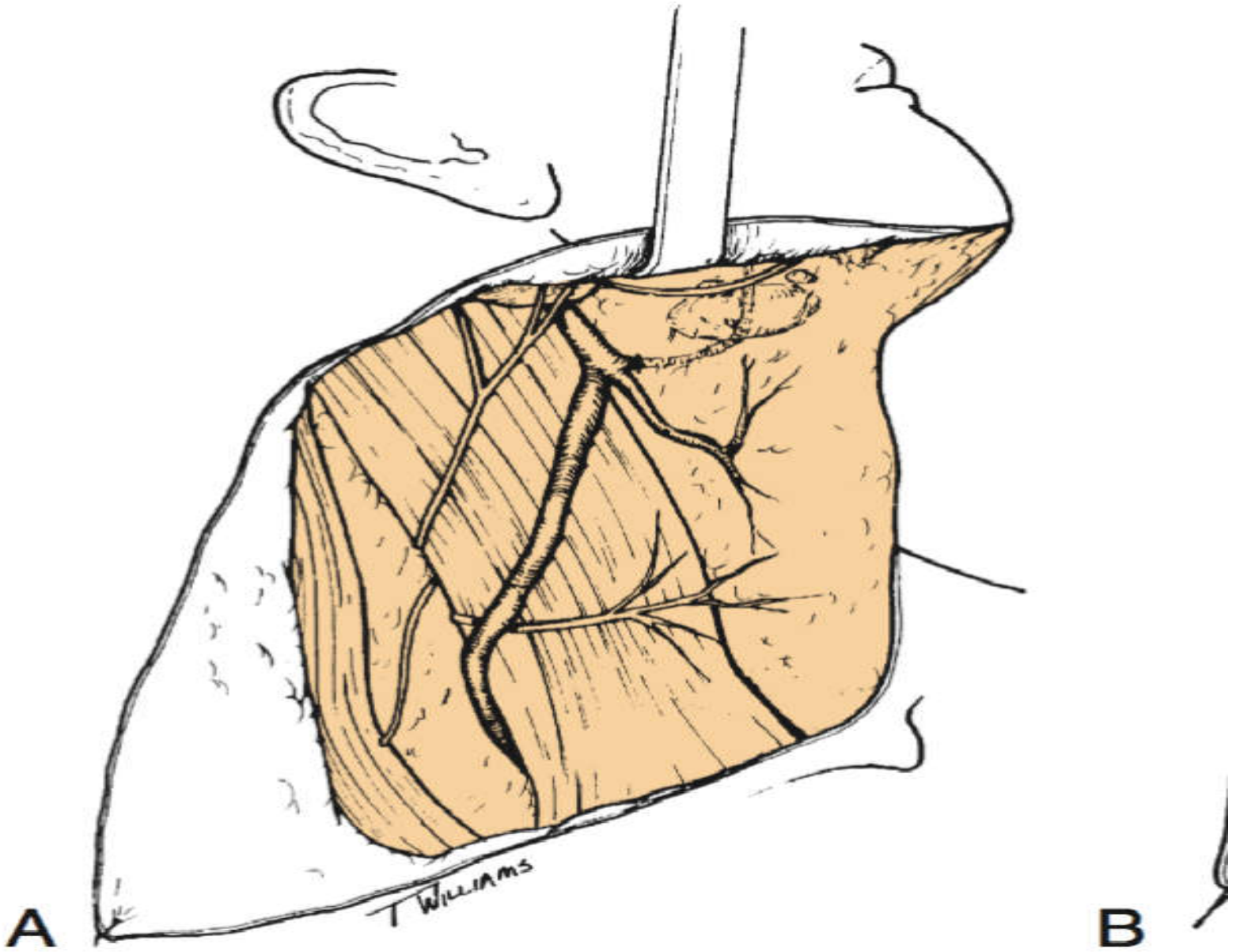


4:Flap Elevation

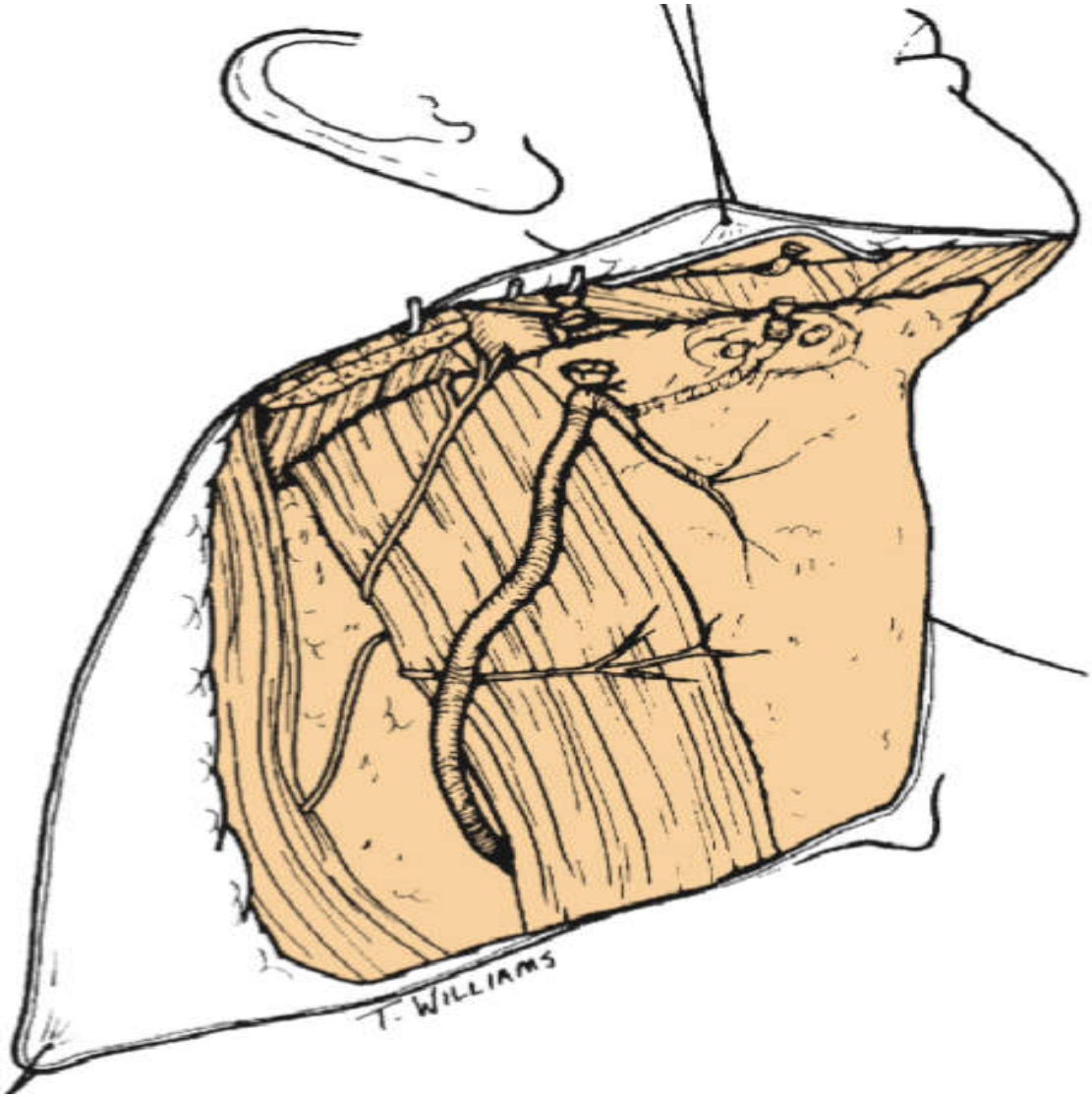
- The flap is raised in the subplatysmal plane so that the external jugular vein and the greater auricular nerves are not included in the flap

- When gross pathologic evidence of tumor extension through the platysma muscle is apparent, with or without skin involvement, the area of disease involvement also should be removed, and modification of the skin flap may be required.

Raising the subplatysmal flap.



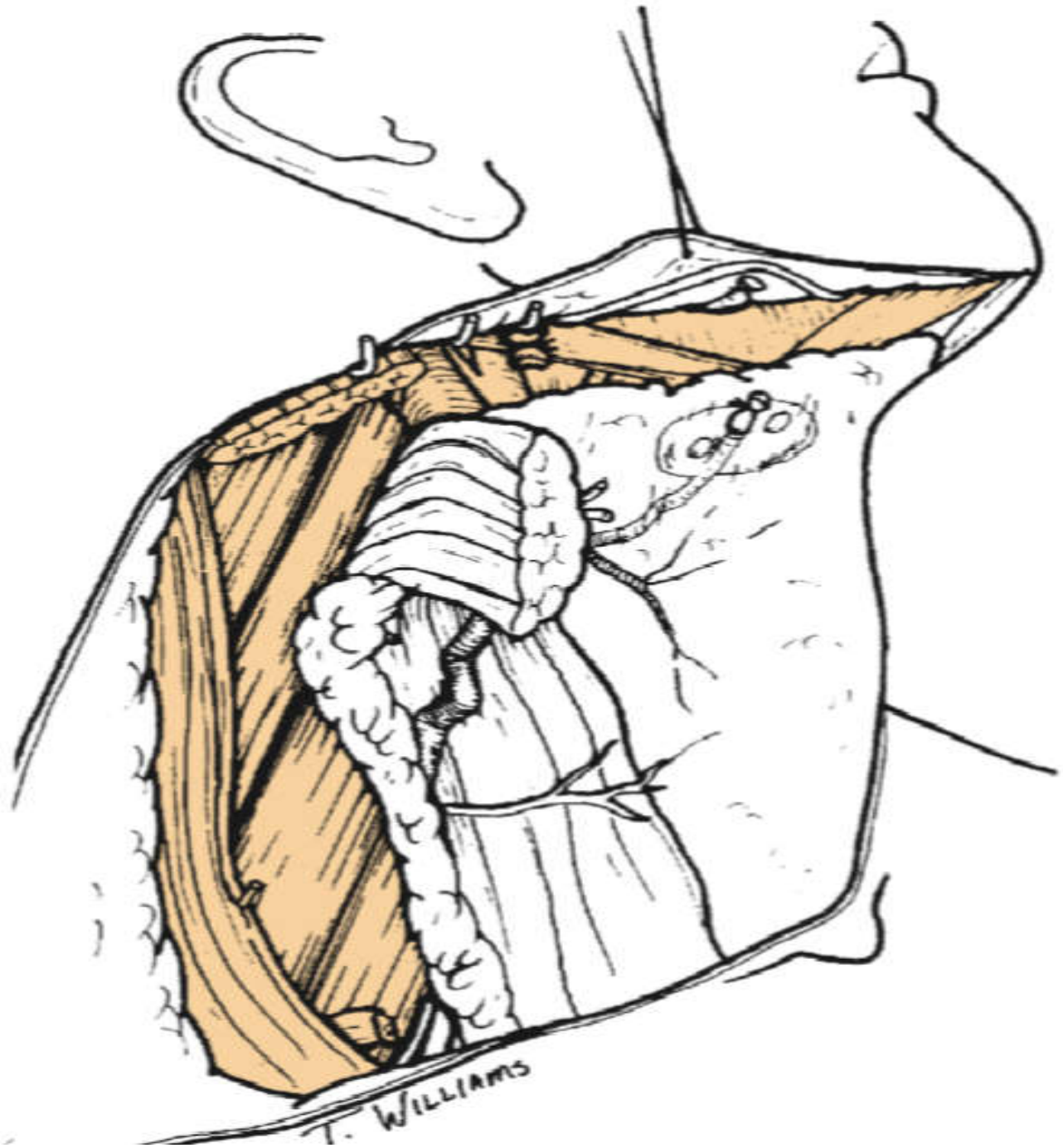
5:Ligation of the facial vein, thus preserving the mandibular branch of the facial nerve.



6:Dissection of the Posterior Triangle

- Thus the next step is to expose the anterior border of the trapezius muscle from its superior aspect, where it converges with the posterior border of the SCM, to its inferior aspect, where it approaches the clavicle .
- The fibrofatty tissue is then incised along its anterior border, beginning superiorly and working inferiorly to expose the muscular floor of the posterior triangle.
-

- It is important to remain superficial to the prevertebral fascia during this step of the operation to prevent injury to the phrenic nerve and the brachial plexus.
- As the fibrofatty tissue is swept in a lateral to medial direction, the sensory branches of the cervical plexus are encountered and divided.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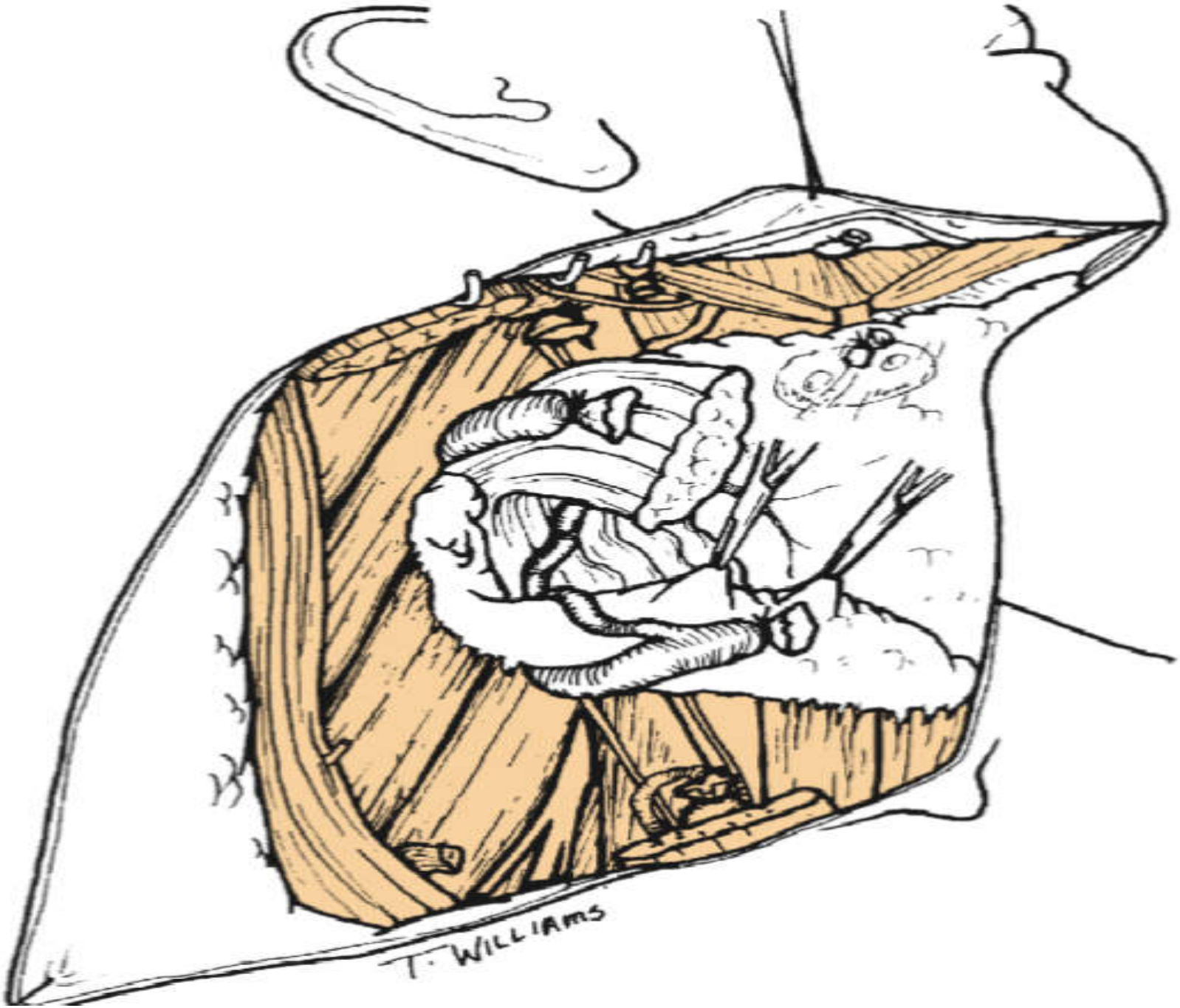
7:Anterior Triangle Dissection

- Dissection of the lateral levels with the sternocleidomastoid and internal jugular vein.
- As the fibrofatty tissue is elevated medially toward the carotid sheath, it will be necessary to incise the mastoid and clavicular attachments of the SCM .
- The carotid sheath will be exposed.
- Attention should be given to preserving the cervical sympathetic chain, which is closely applied to the prevertebral fascia behind the carotid sheath.

- The plane of dissection will be carried between the vagus nerve and the carotid artery below and the IJV above. Thus the IJV may be mobilized from the skull base superiorly to its inferior aspect near the clavicle; ties may then be placed around the upper and lower ends of the IJV, thereby allowing ligation and complete mobilization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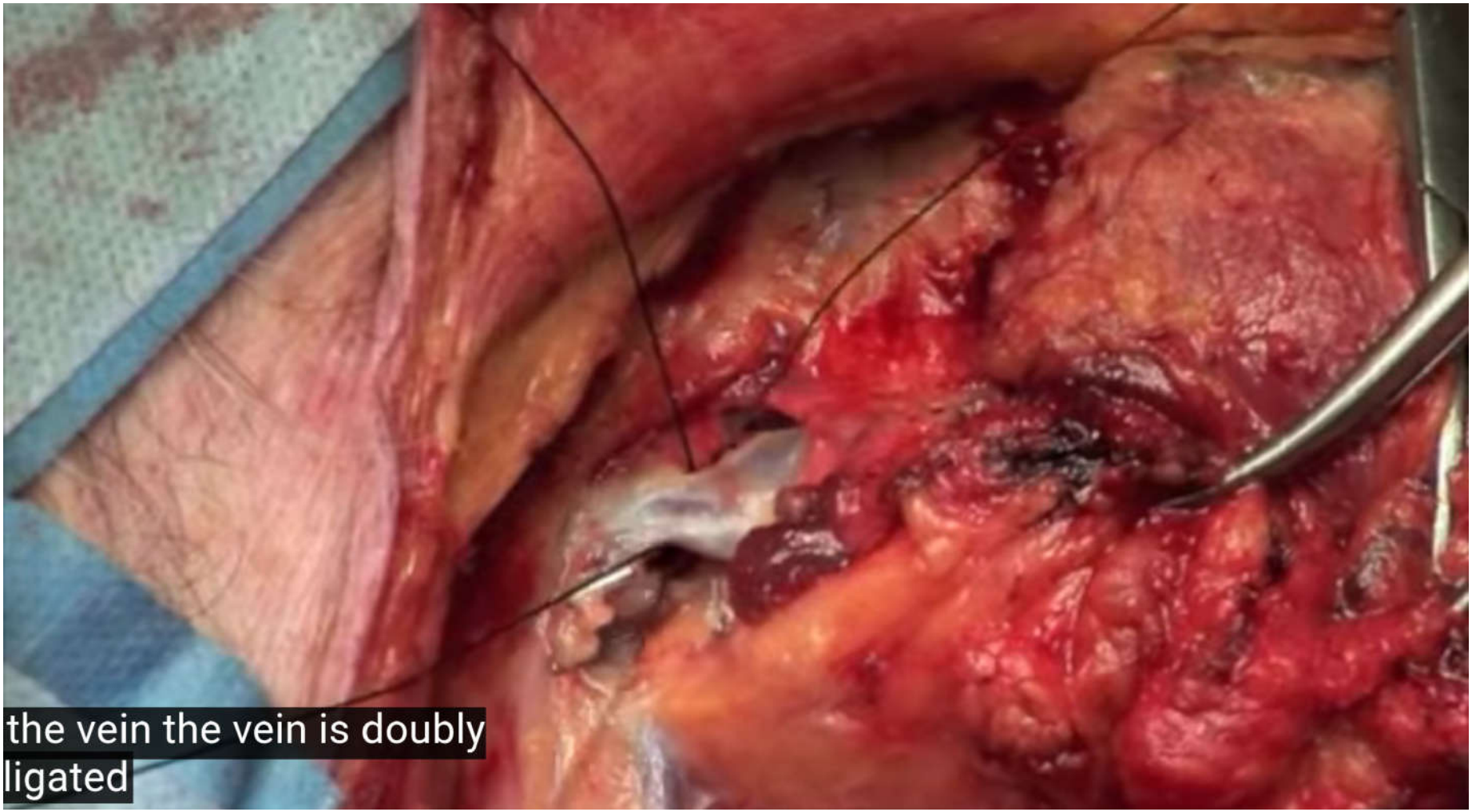
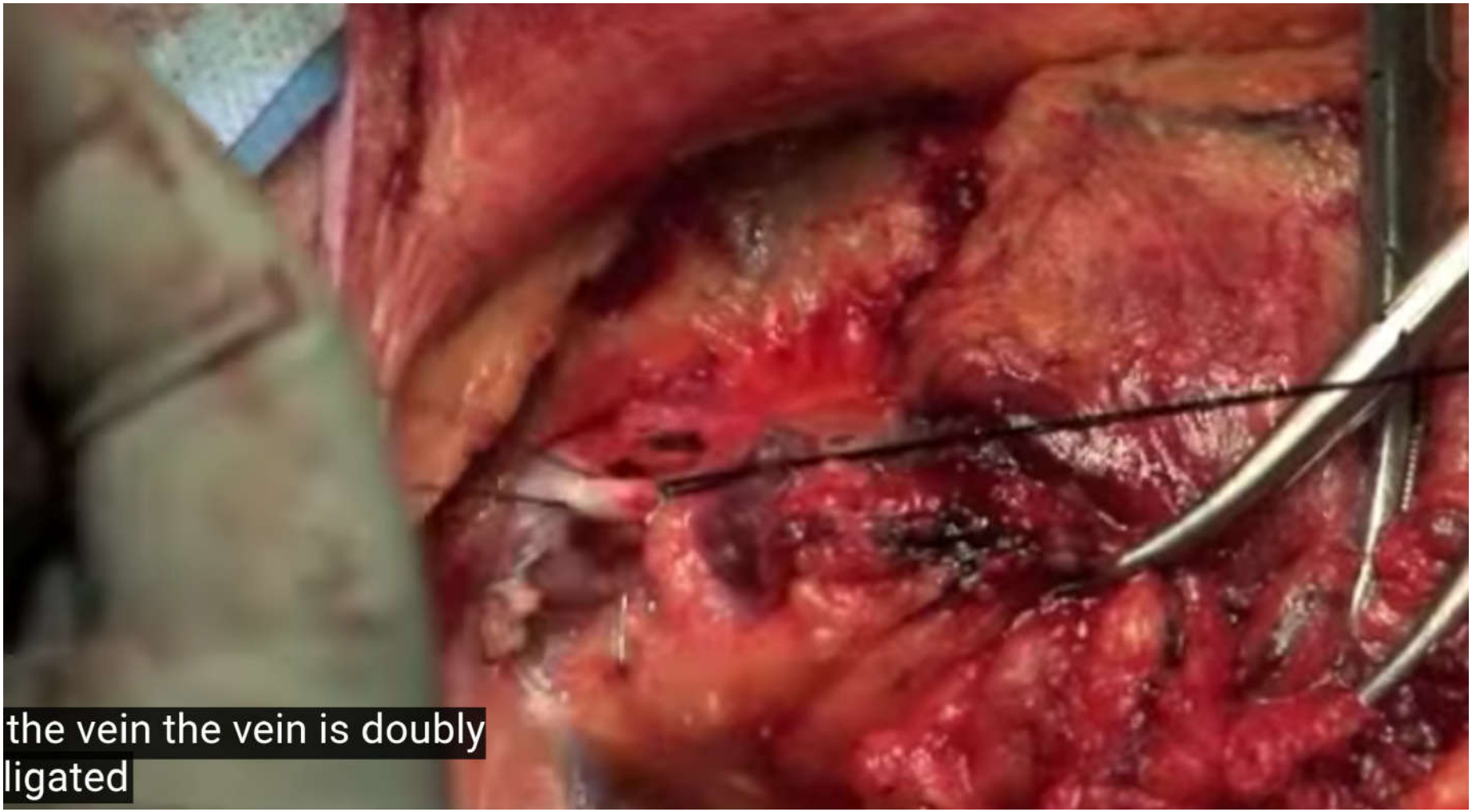

the vein the vein is doubly
ligated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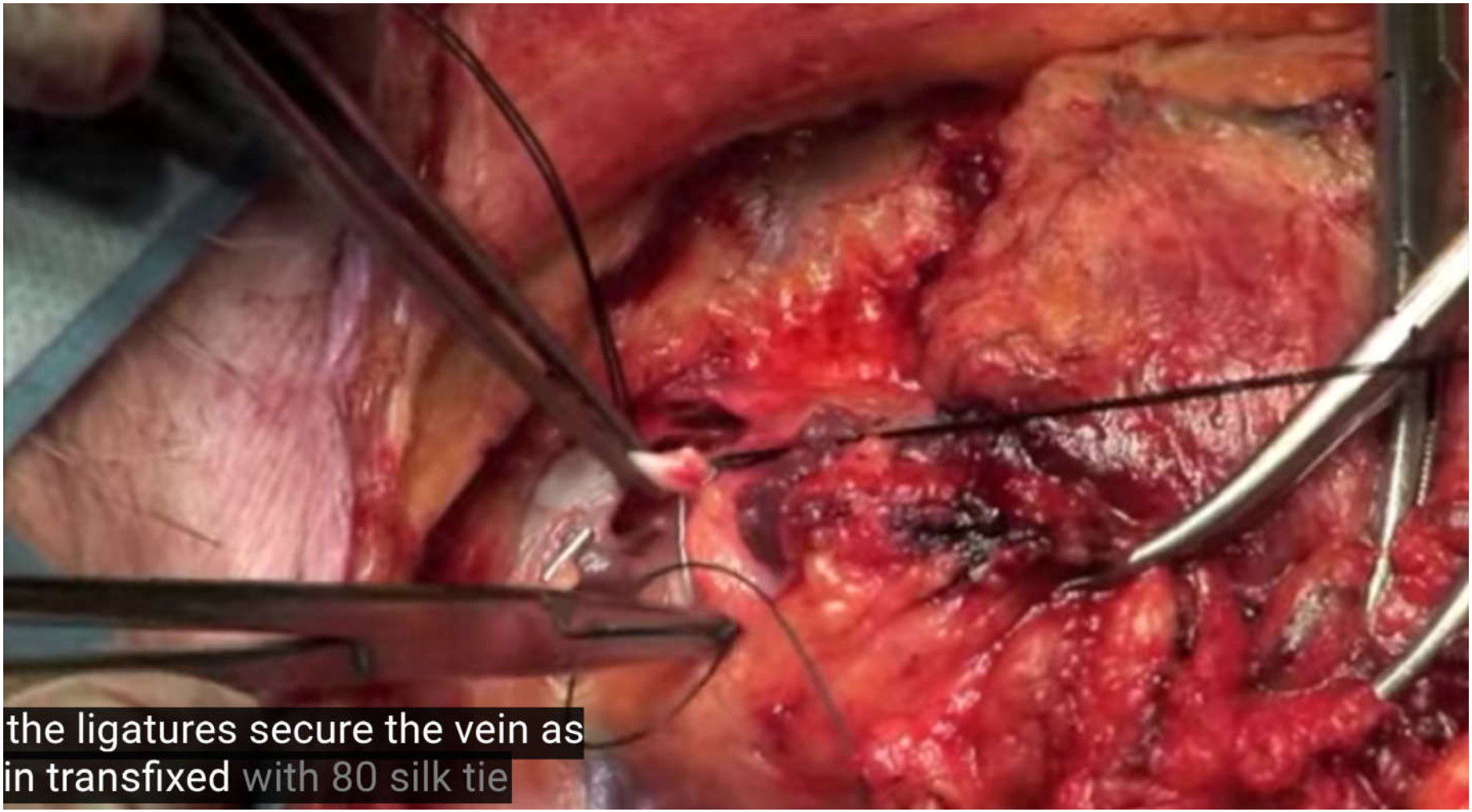
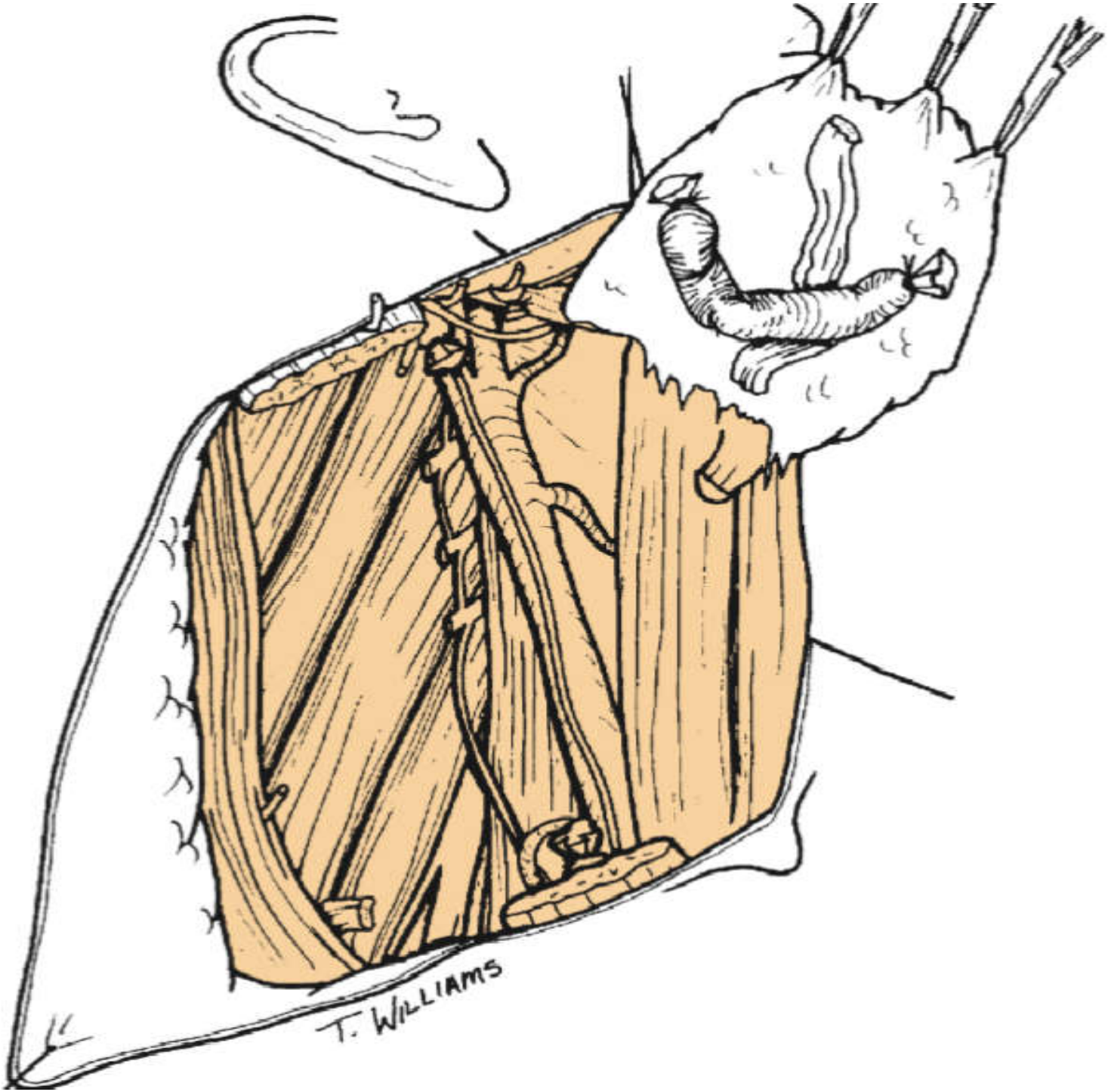

the ligatures secure the vein as
in transfixed with 80 silk tie

8:Dissection of the Upper Neck Compartments

- Excision of level I lymph nodes is begun by dividing the soft tissue that overlies the body of the mandible, including the facial artery and vein as they emerge above the submandibular gland and extend lateral to the body of the mandible.
- It is important to remember that complete excision is required of all contents of the submandibular triangle within its muscular boundaries, not just the submandibular gland.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9:Neck drains

- Neck drains are inserted and brought through separate stab incisions through the most dependent areas of the dead space.

10:Closure of the incisions

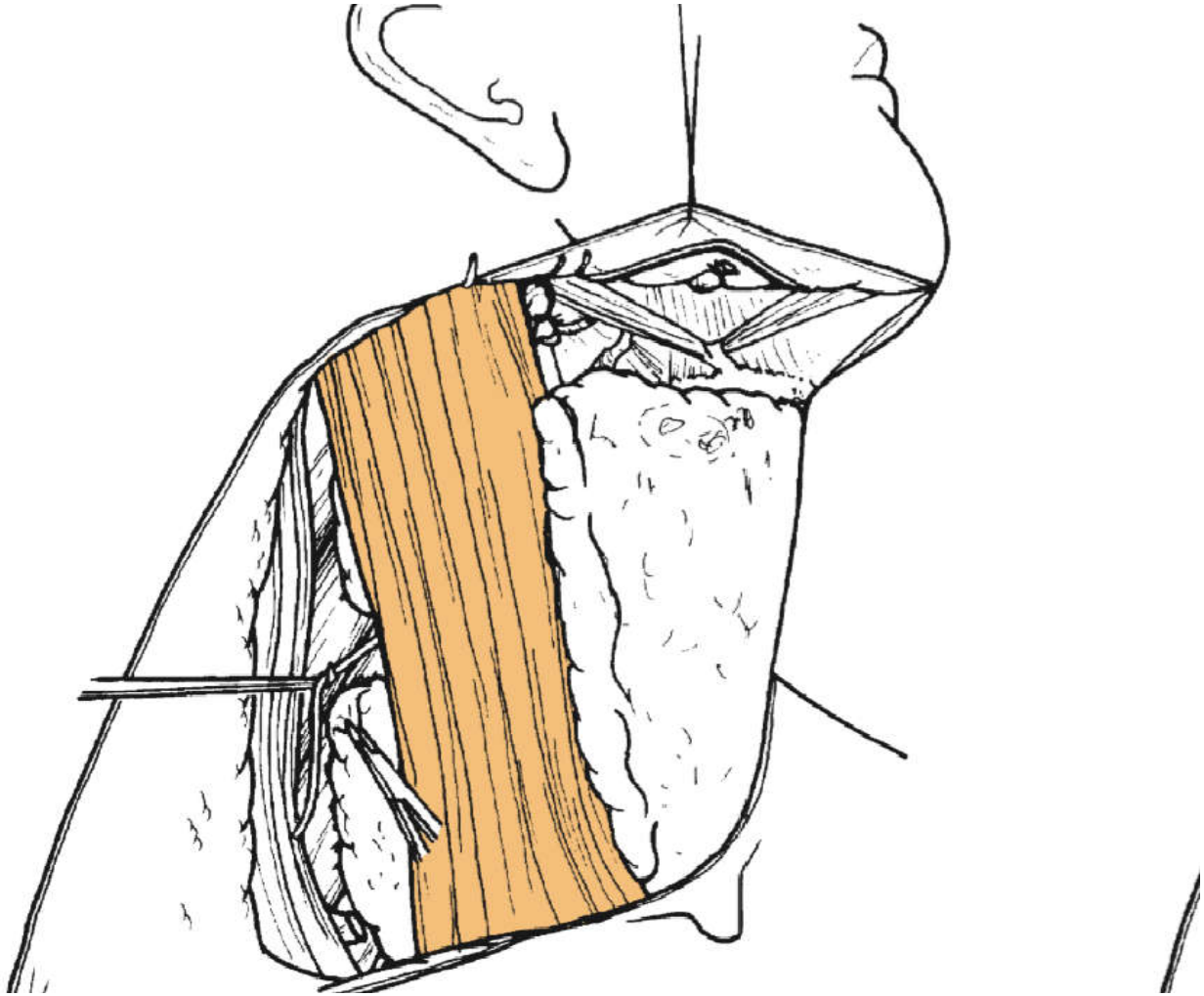
- Closure of the incisions is usually performed in two layers and includes approximation of the platysma anteriorly and the sub- cutaneous tissue laterally and the second layer approximating the skin.

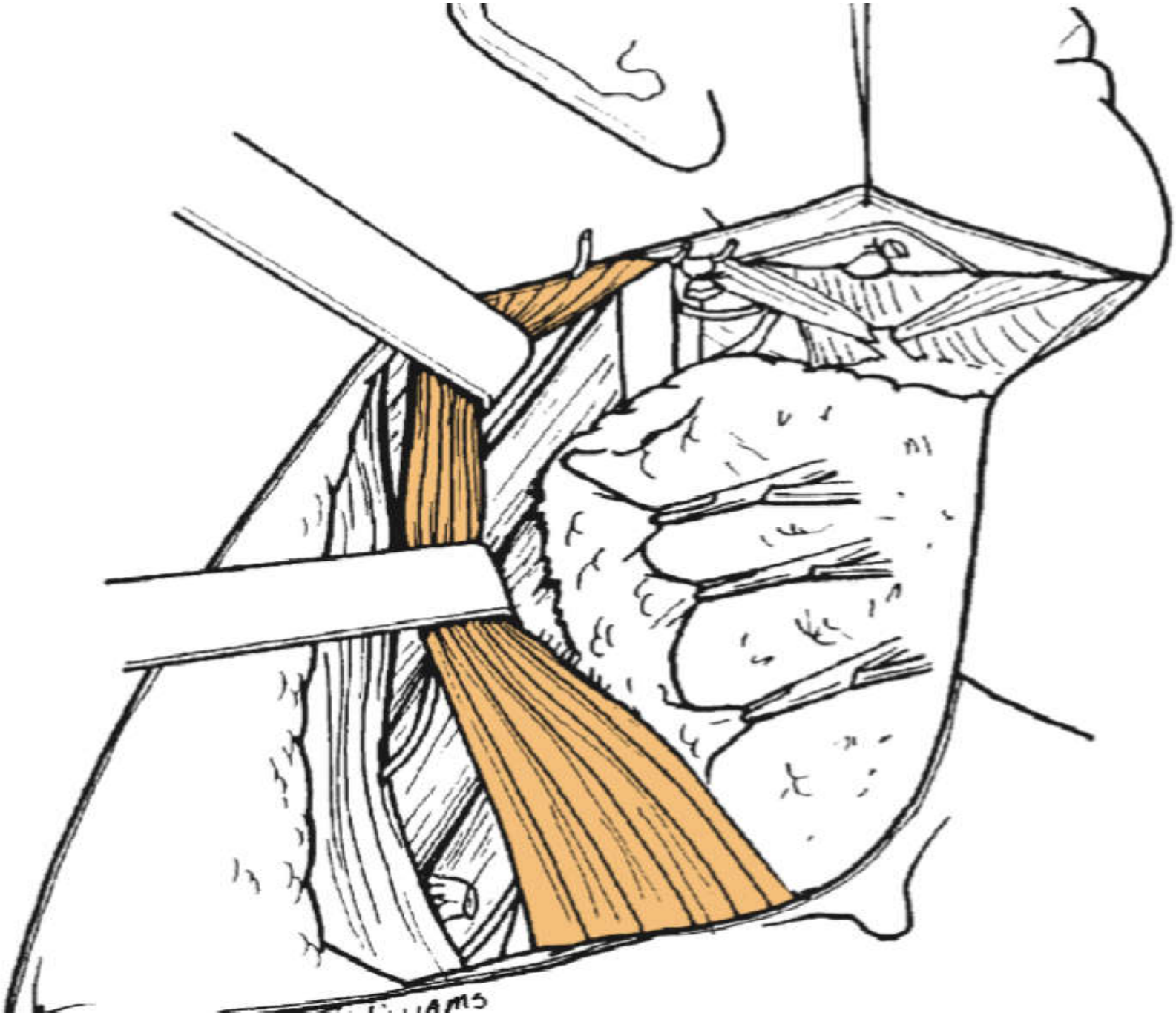
Modified Radical Neck Dissection

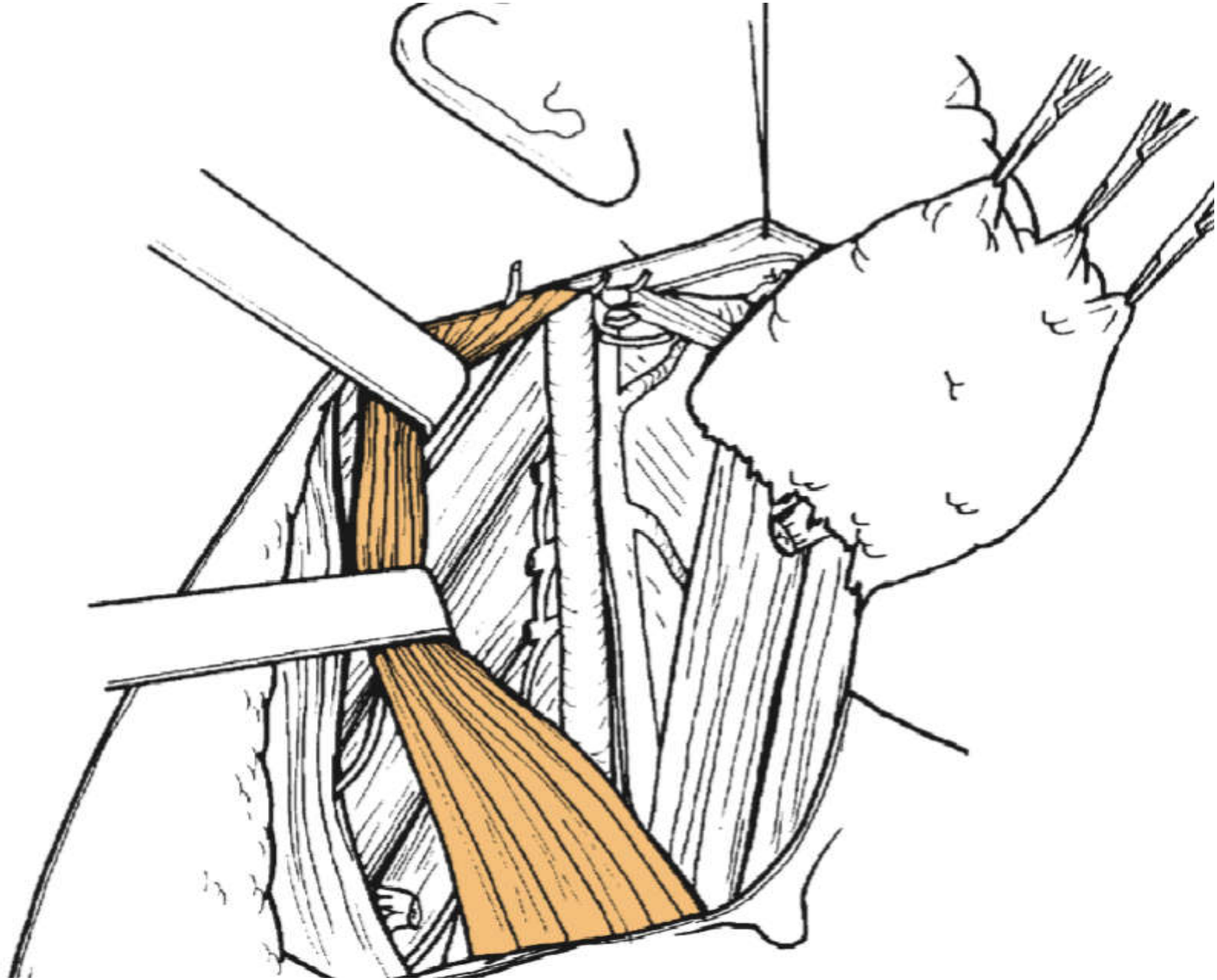
Technique

- The incisions and skin flaps are raised for modified RND as similarly described for the RND. The same procedure is followed to identify and protect the mandibular branch of the facial nerve in level I.

- Unlike in the RND procedure, the next step is to identify the spinal accessory nerve. This is initially done in the posterior triangle, from which the nerve exits at or around the Erb point. The nerve lies superficially in the fibrofatty contents of the posterior triangle .







Modified radical neck dissection with preservation of the spinal accessory nerve only

preservation of the spinal accessory nerve and internal jugular vein

Selective Neck Dissection

- SND is performed for patients who are at risk for early lymph node metastases.
- The procedure consists of the en bloc removal of one or more lymph node groups at risk for harboring metastatic cancer, an assessment that is based on the location of the primary tumor.
- Thus the levels removed depend on the location of the primary lesion and its known pattern of spread.
- It was based on removing lymph node groups

Selective Neck Dissection for Oral Cavity Cancer

- levels I through III, and this is often called *supraomohyoid neck dissection.*
- In patients with tongue cancer, the lower jugular lymph node groups (level IV) are also at risk .

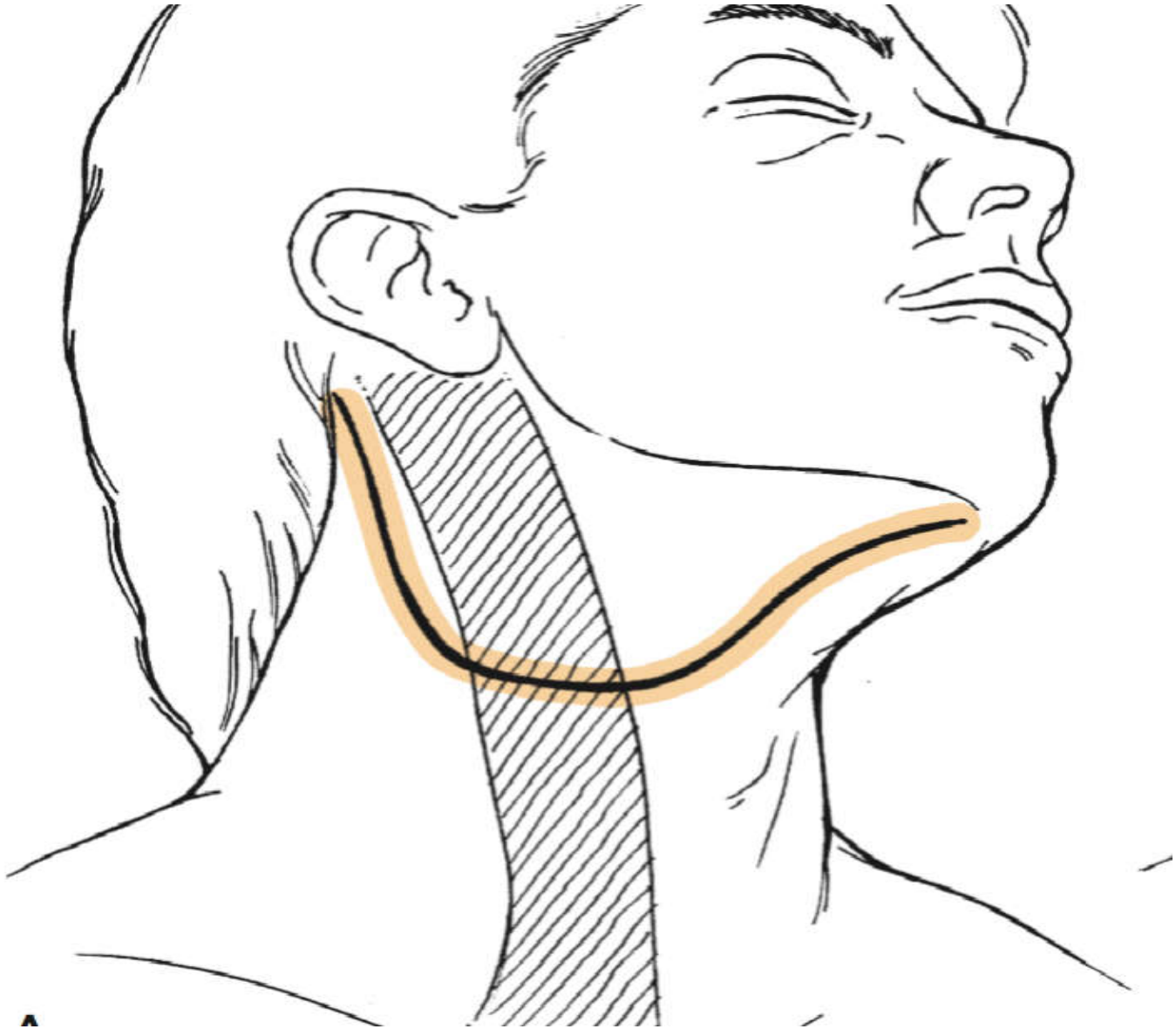
- Elective cervical lymphadenectomy of the contralateral neck is indicated for:

a: patients with primary lesions that involve the floor of the mouth or the ventral surface or with midline involvement of the tongue

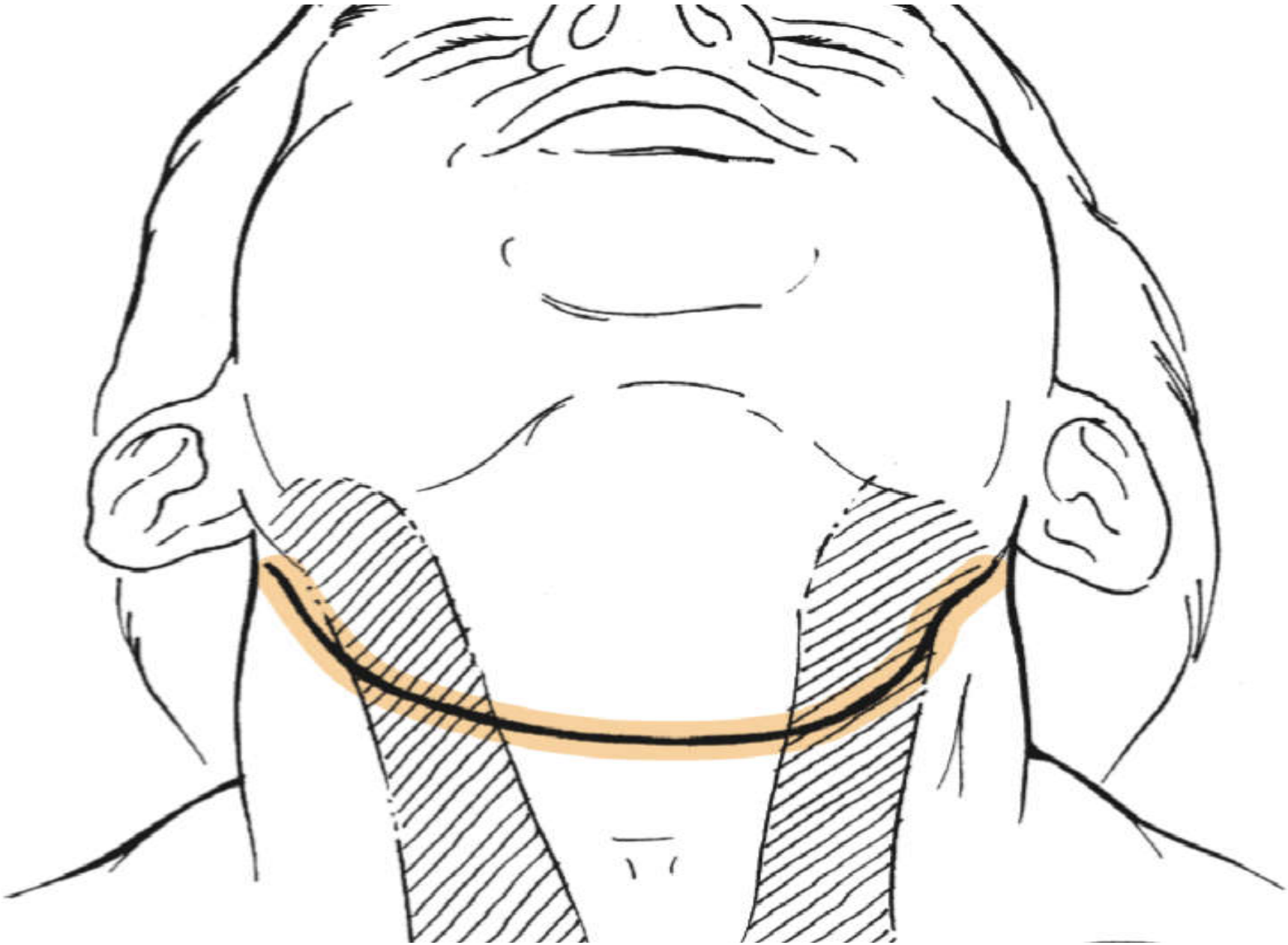
b: patients with clinically N2c disease.

Incisions for a selective neck dissection of levels I through III (SND I-III).

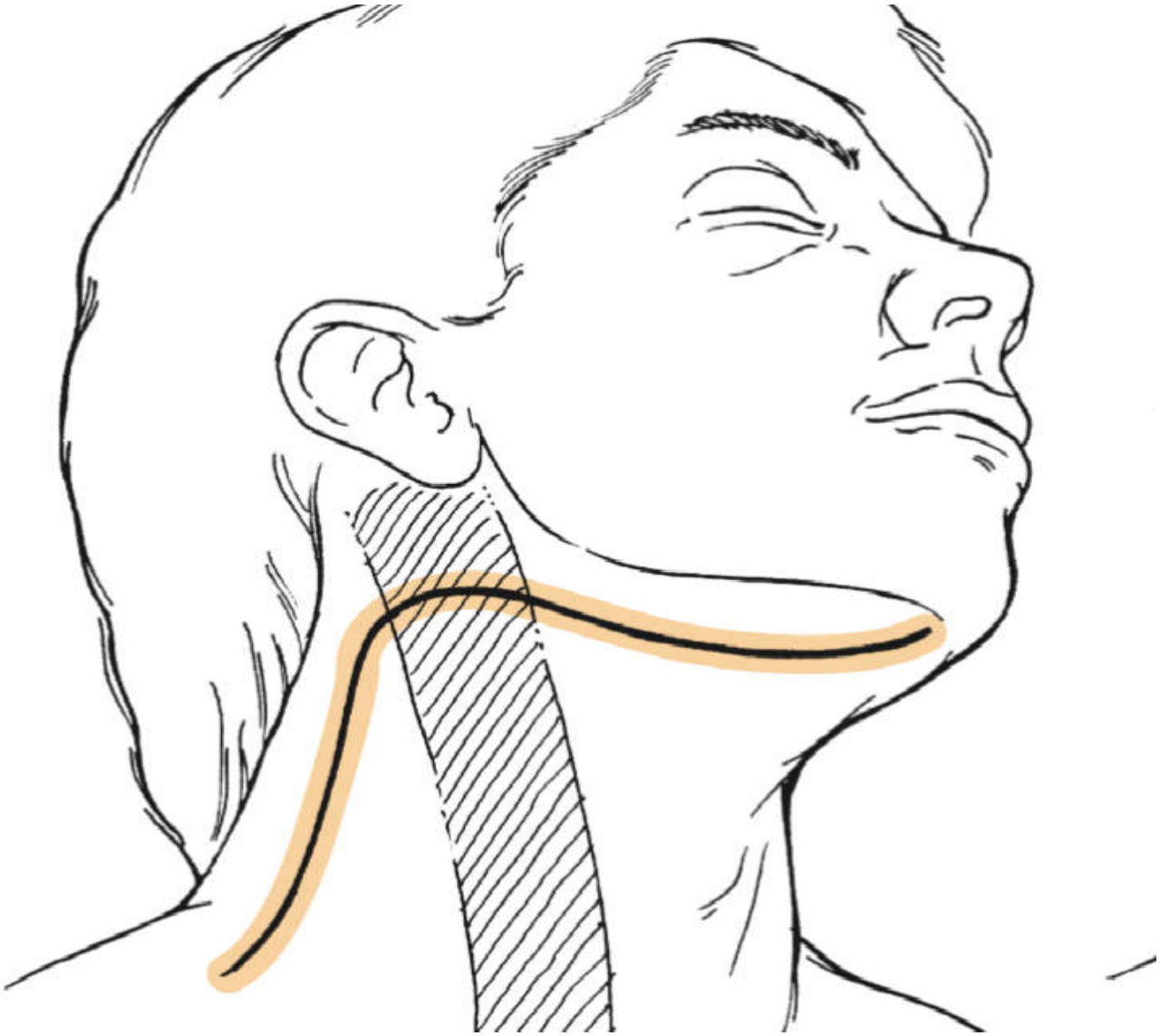
A: Modified apron incision.



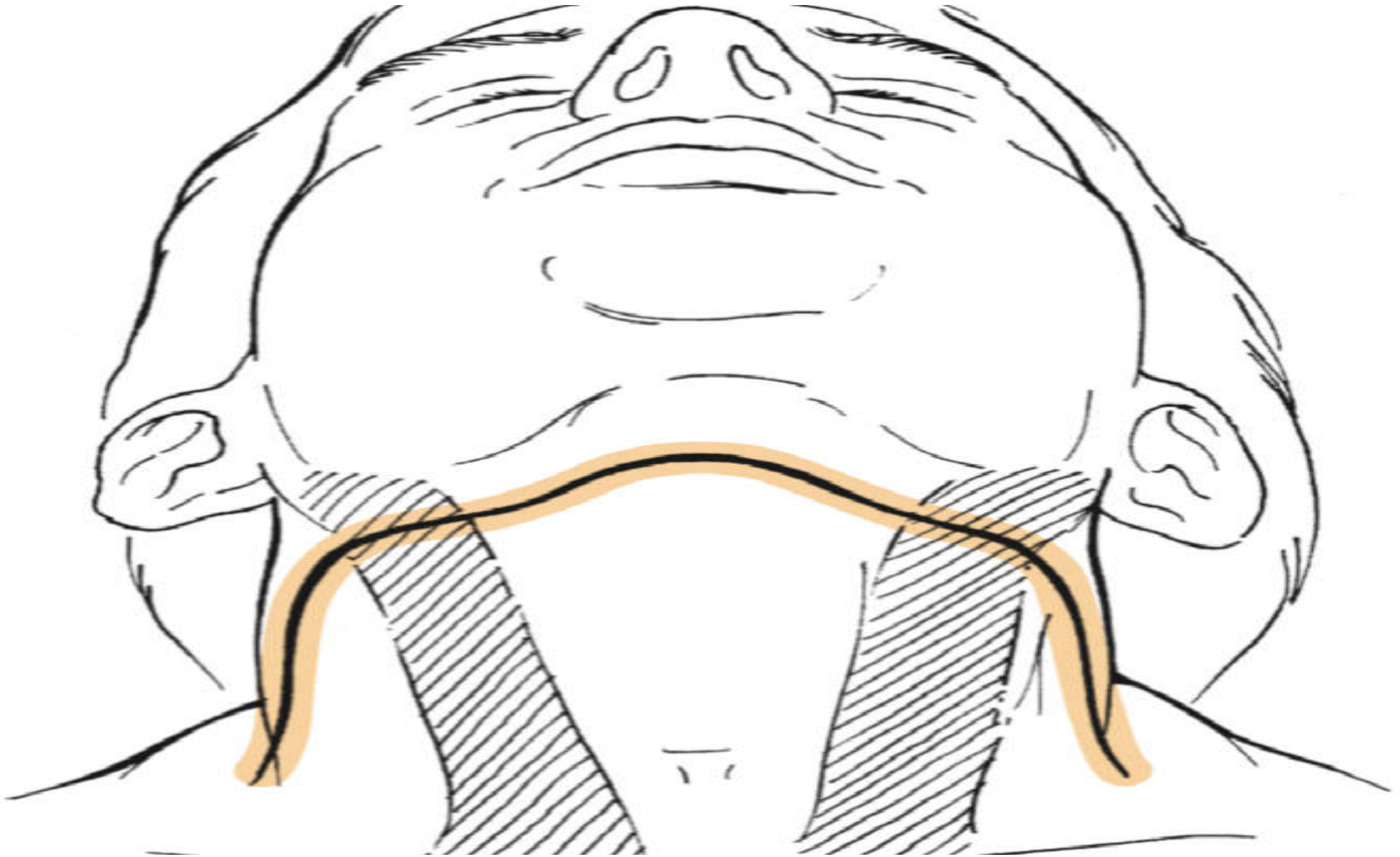
B: Apron incision



C:Boomerang incision

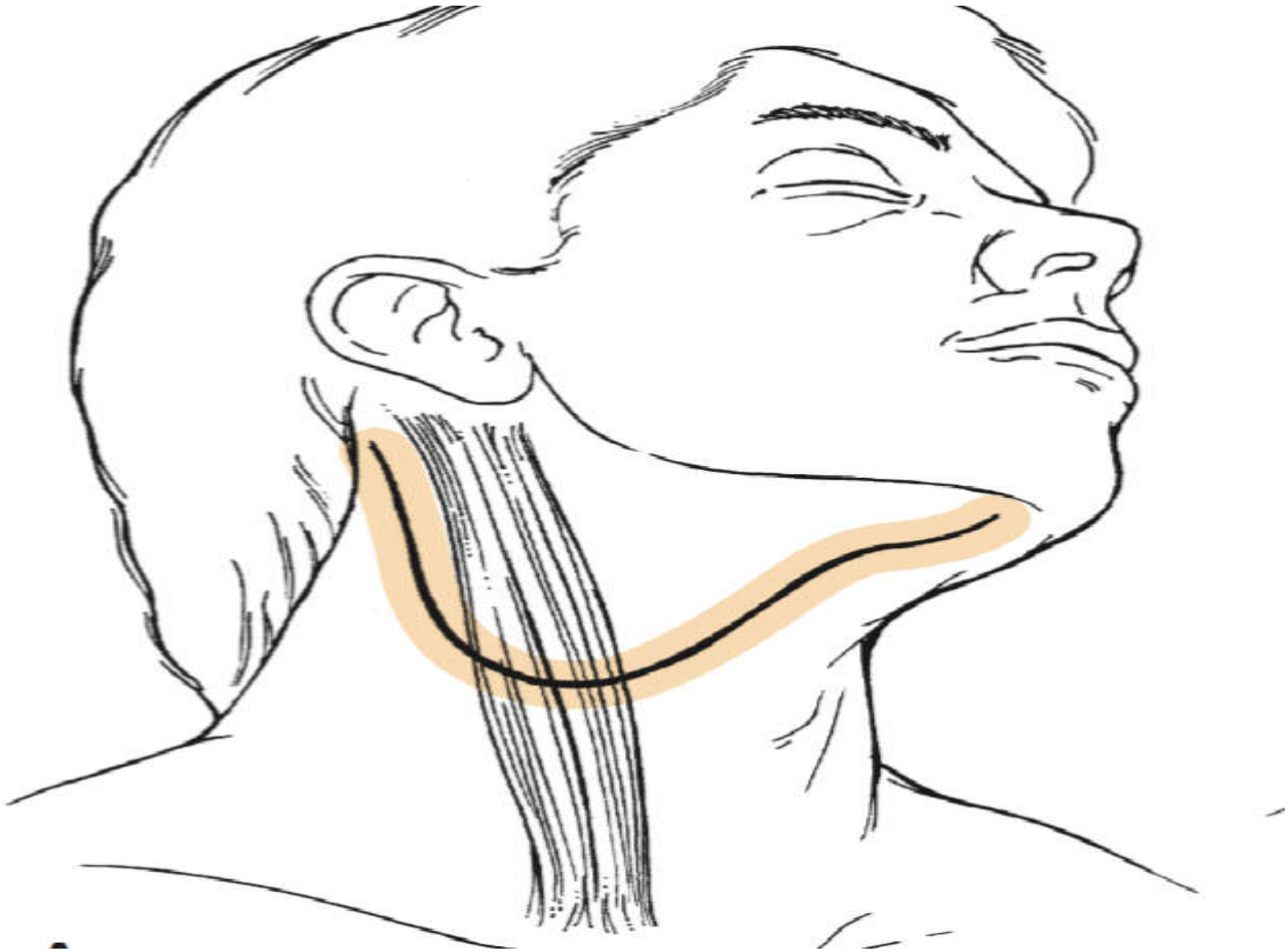


D: Bilateral boomerang incision

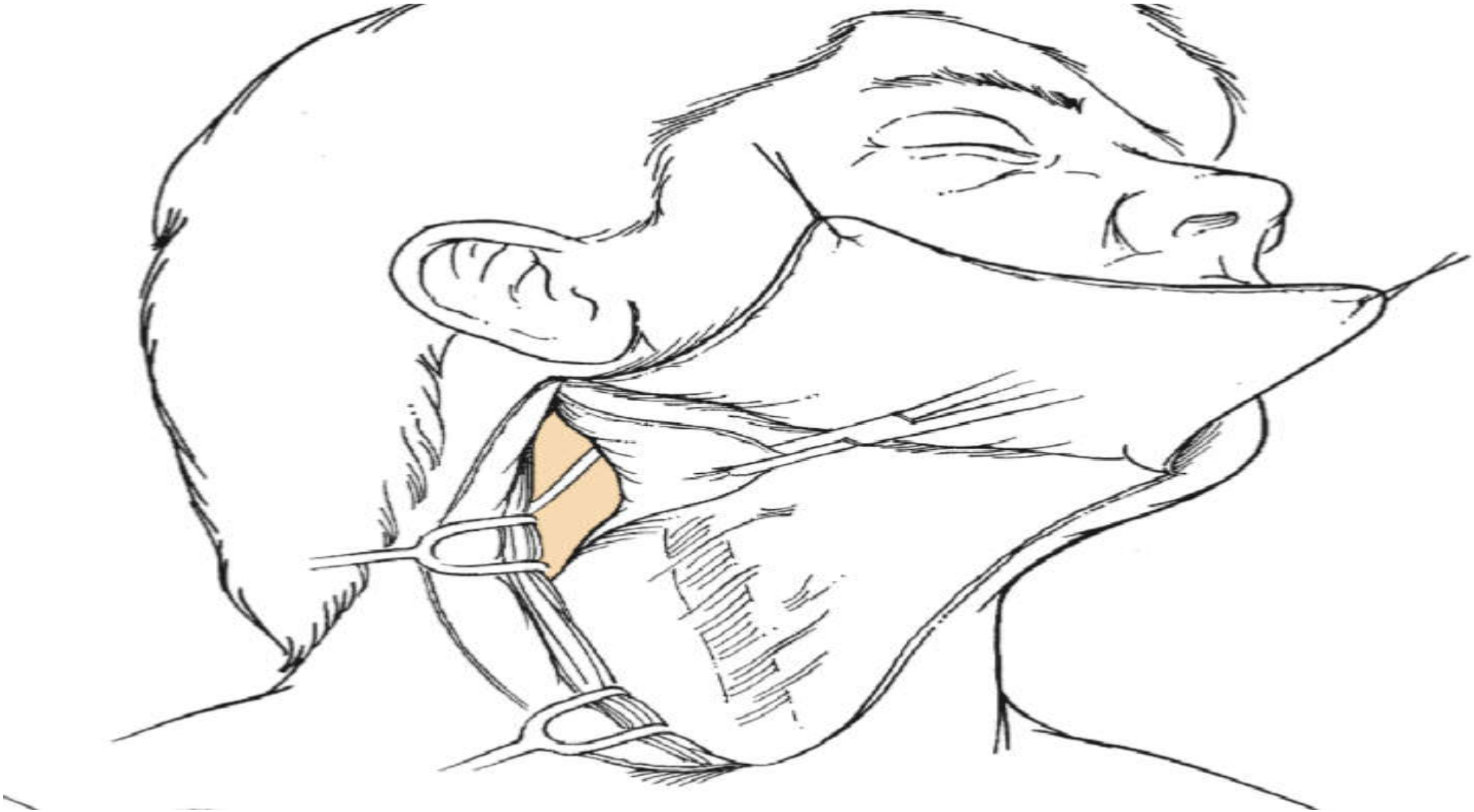


Steps of the selective neck dissection of levels I through III (SND I-III) for oral cavity cancer.

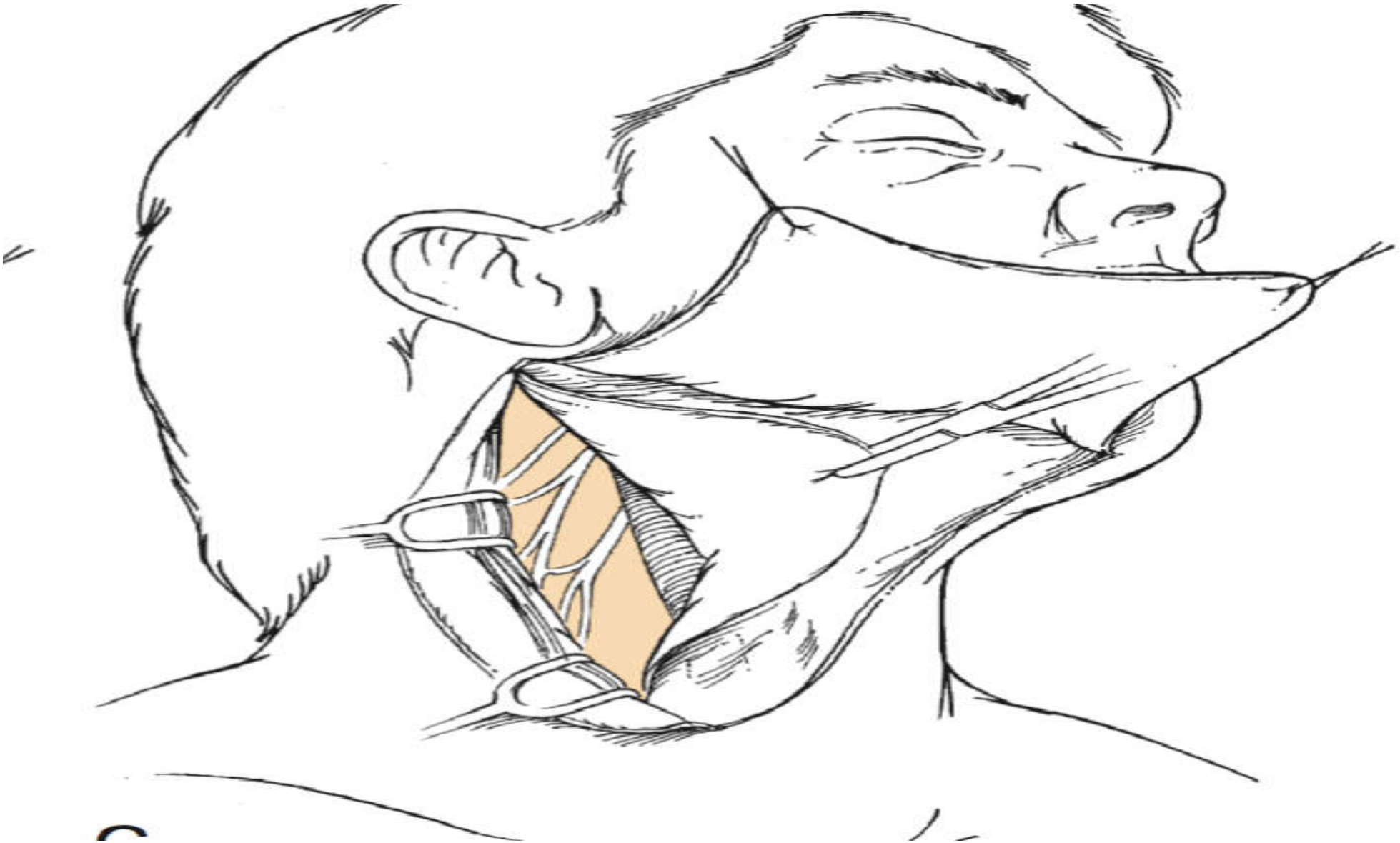
A, Modified apron incision.



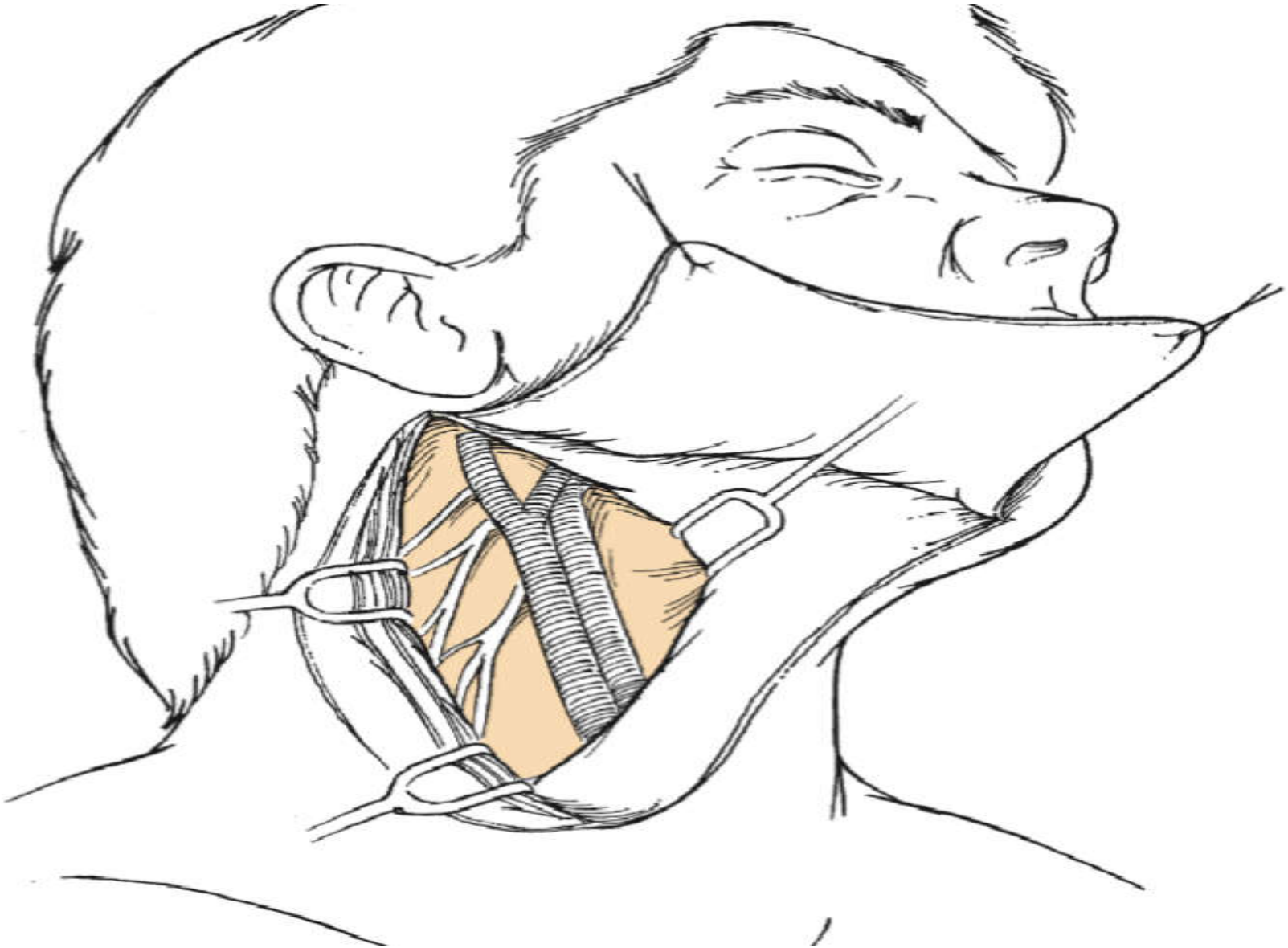
B, Flap raised in the subplatysmal plan and dissection of the submuscular recess (level IIB).



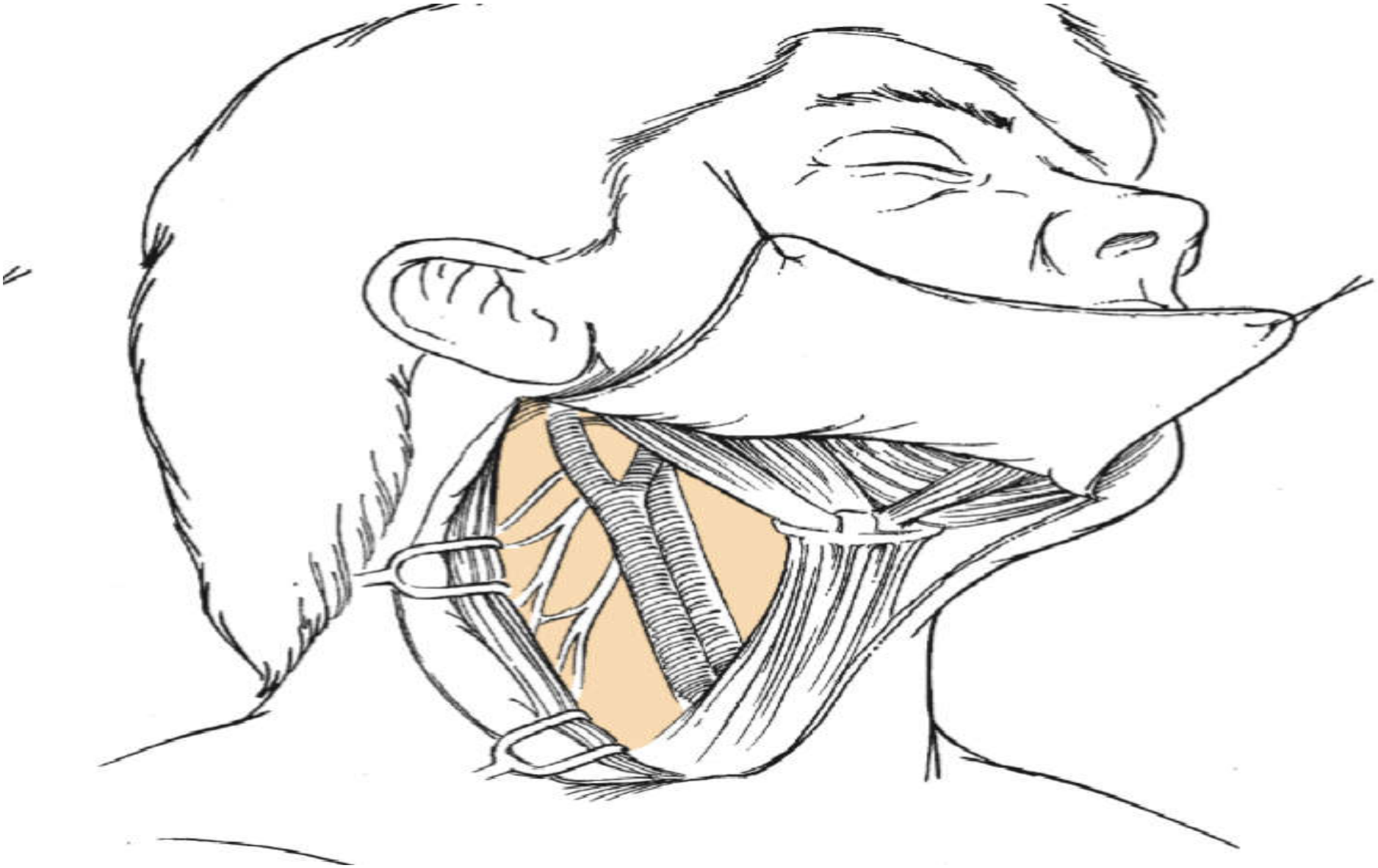
C, Dissection of level III and preservation of the cervical plexus.



D, Completion of the dissection of levels III and IIA.



E, Dissection of level I.

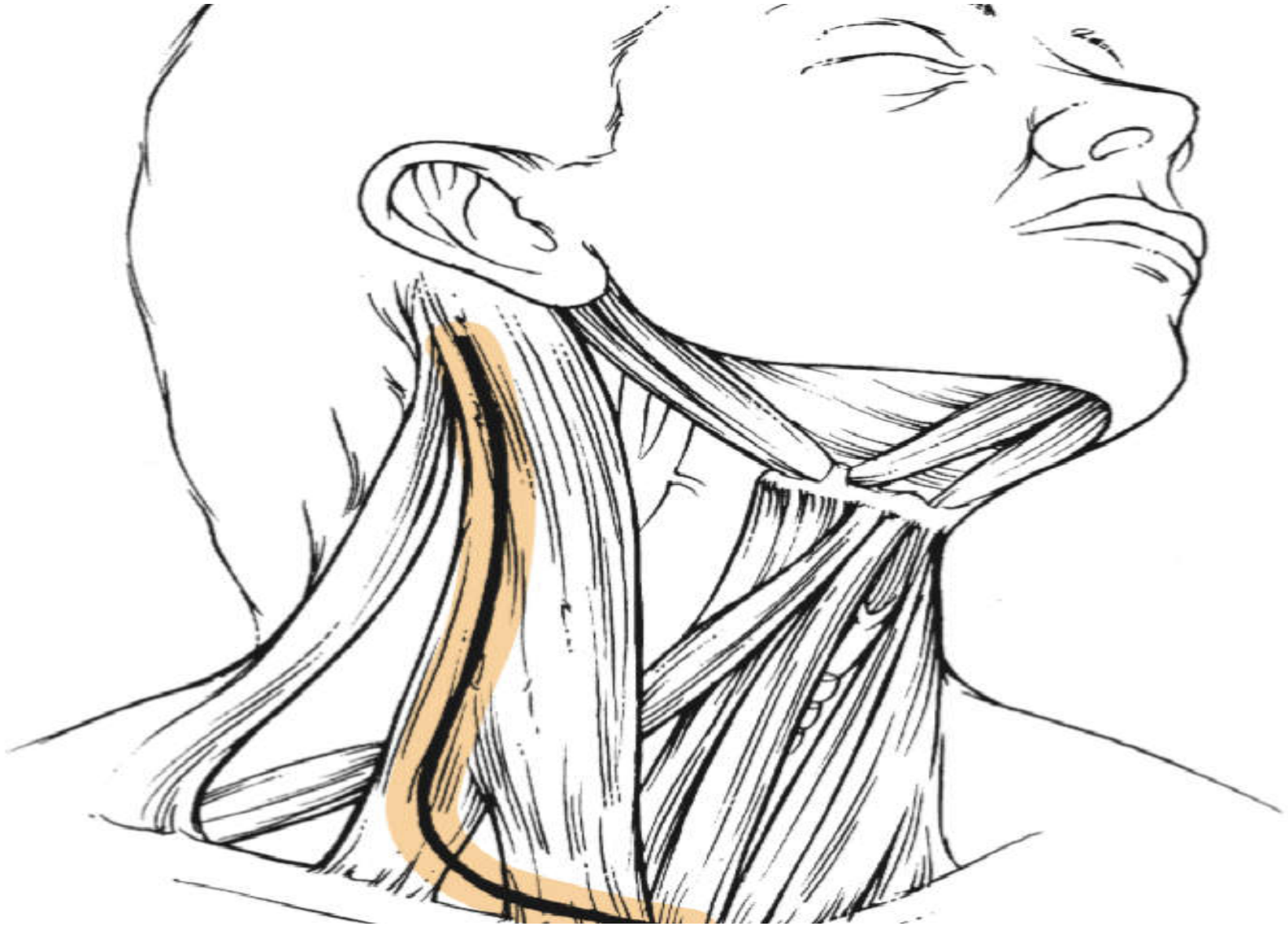


Selective Neck Dissection for Oropharyngeal, Hypopharyngeal, and Laryngeal Cancer

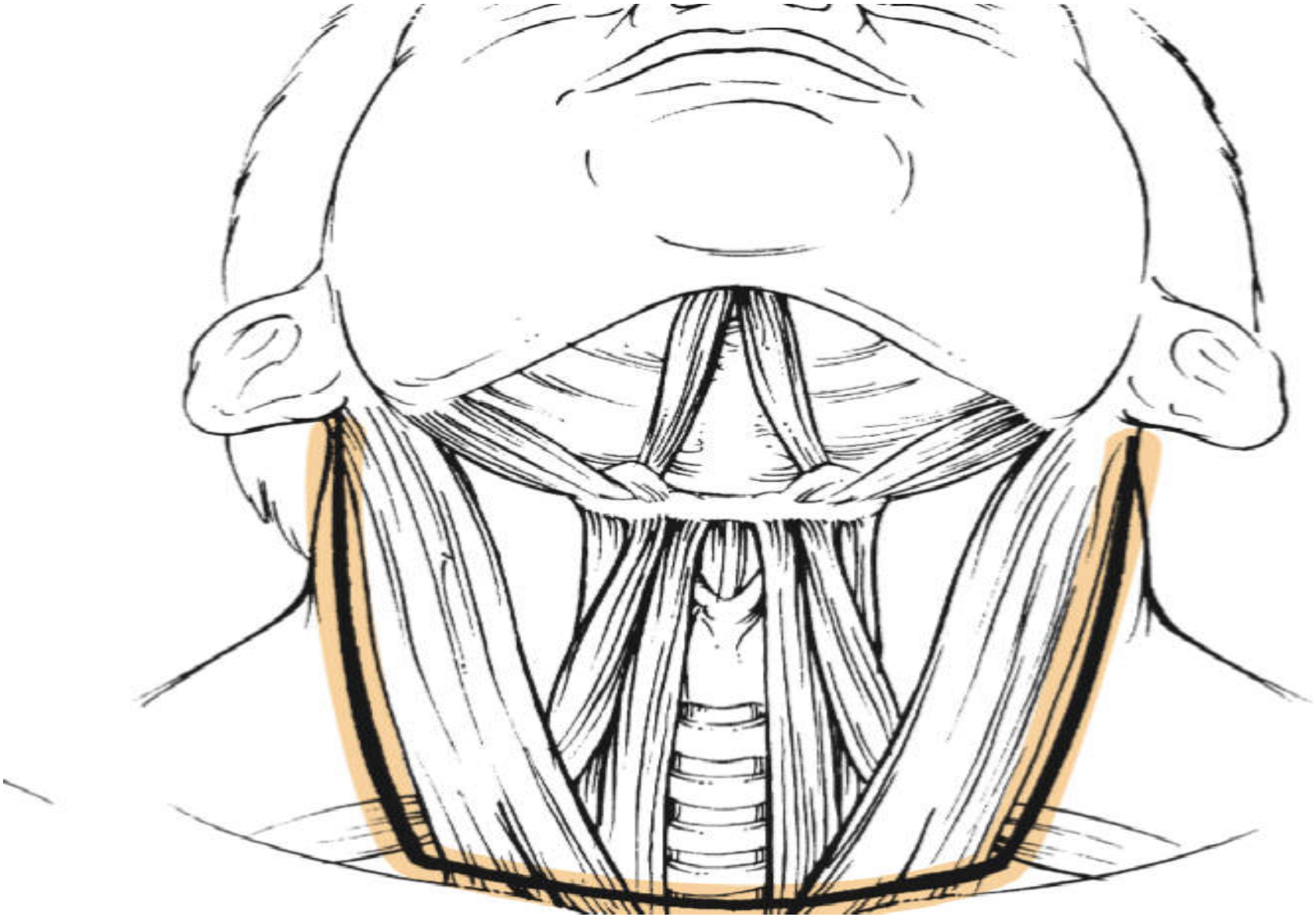
- levels II through IV, it is also called a *lateral neck dissection.*
- Level IIB is at greater risk for metastases associated with oropharyngeal lesions relative to laryngeal and hypopharyngeal cancers

Incisions for selective neck dissection of levels II through IV (SND II-IV)

A, Hockey stick.



B, Bilateral hockey stick.



Selective Neck Dissection for Cutaneous Malignancies

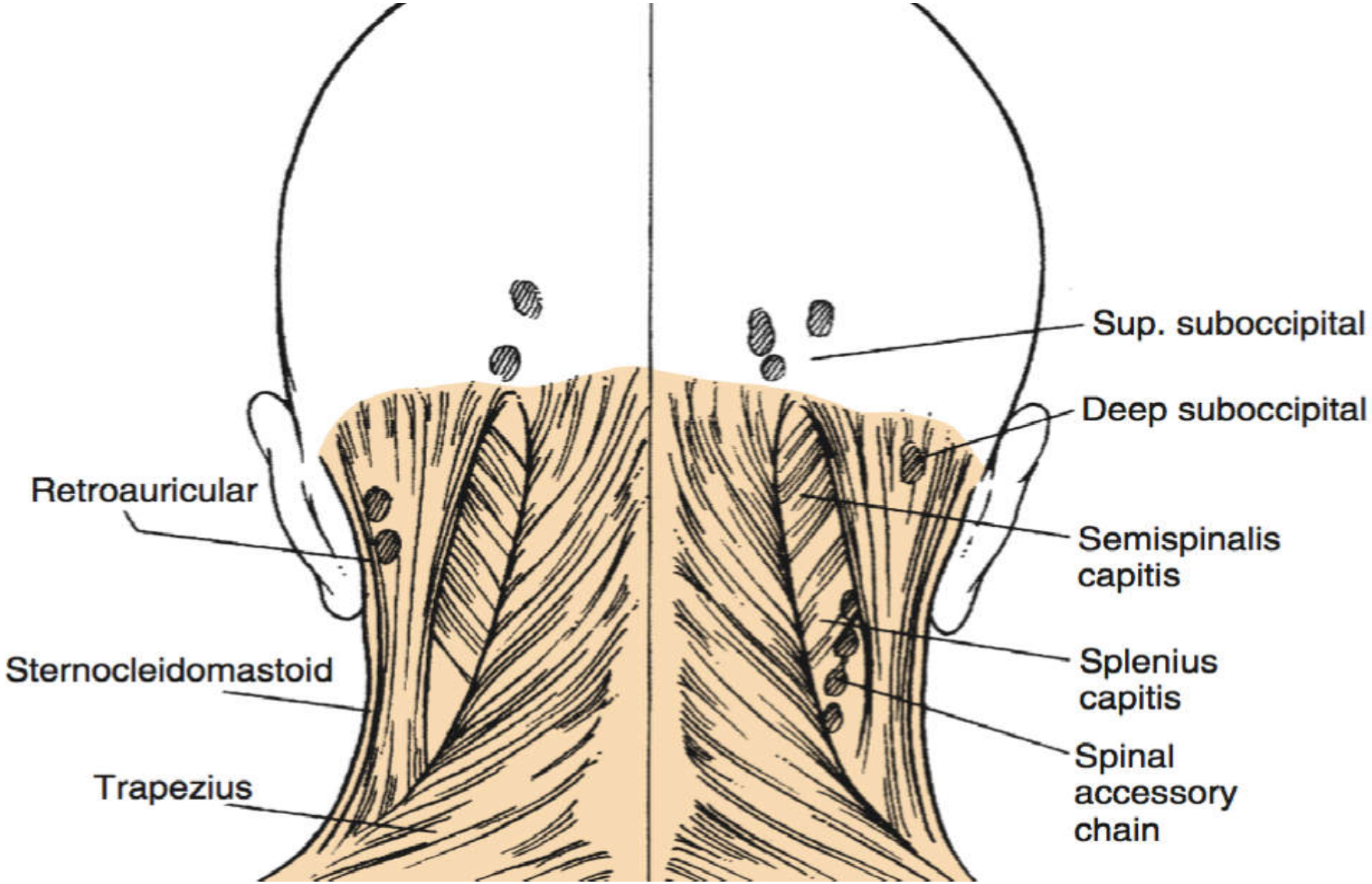
- The operation of choice depends on the location of the lesion and the adjacent lymph node groups:

postauricular and suboccipital:SND of levels II- V

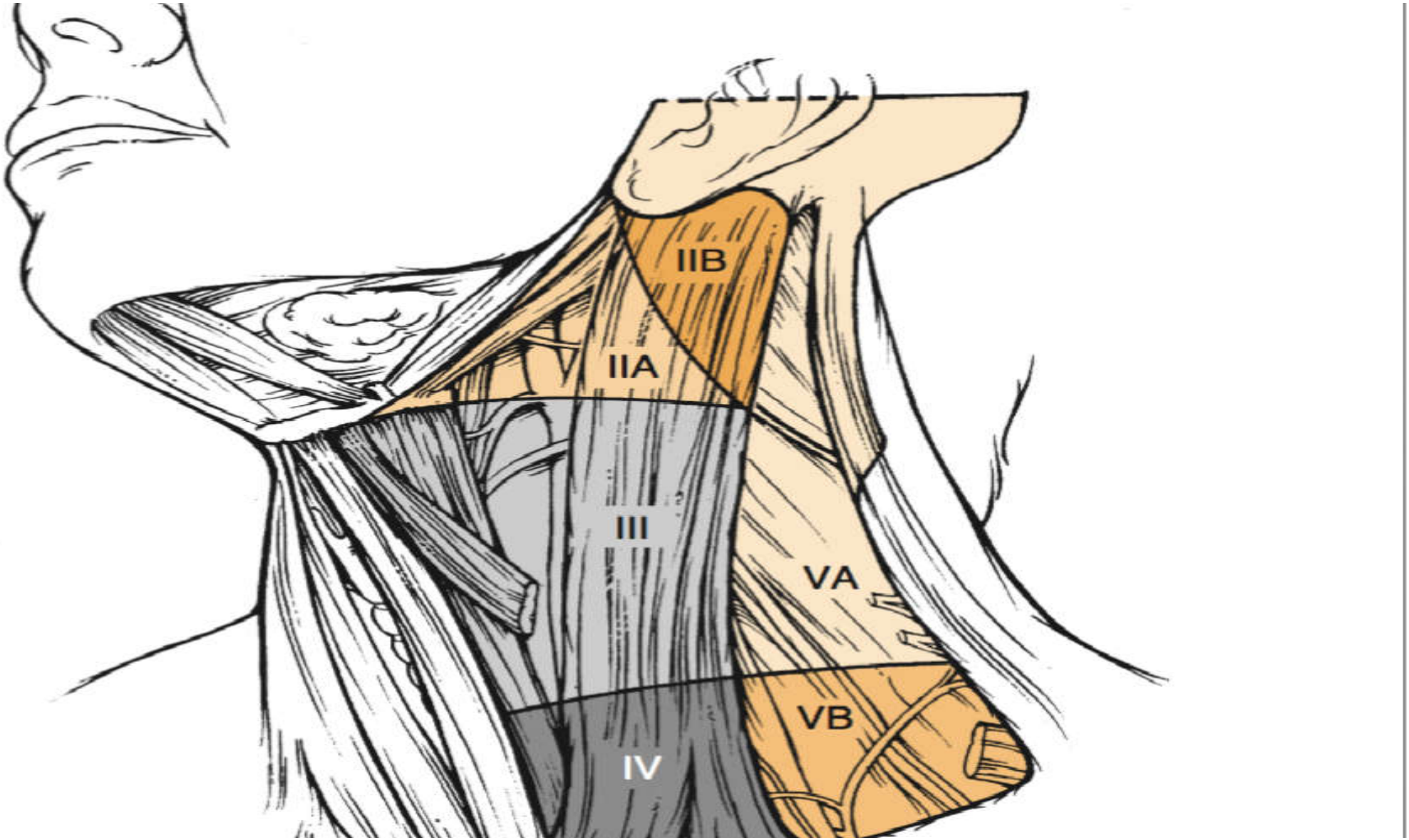
(posterolateral neck dissection)

- Posterolateral neck dissection involves the removal of the suboccipital, retroauricular, upper jugular (level II), middle jugular (level III), and lower jugular lymph nodes (level IV) along with the nodes of the posterior triangle of the neck (level V).
- **Technique.**
- The optimal incision for posterolateral neckdissection is one that allows exposure along the nuchal ridge to the occiput and posterior triangle and exposure of the upper, middle, and lower jugular lymph node groups; this can usually be accomplished with a lazy-S pattern or a combination of the hockey stick pattern with a horizontal extension from its upper aspect along the nuchal ridge.

Localization of retroauricular and suboccipital lymph nodes.



SND II-V, also called a *postauricular suboccipital* or *posterolateral neck dissection*

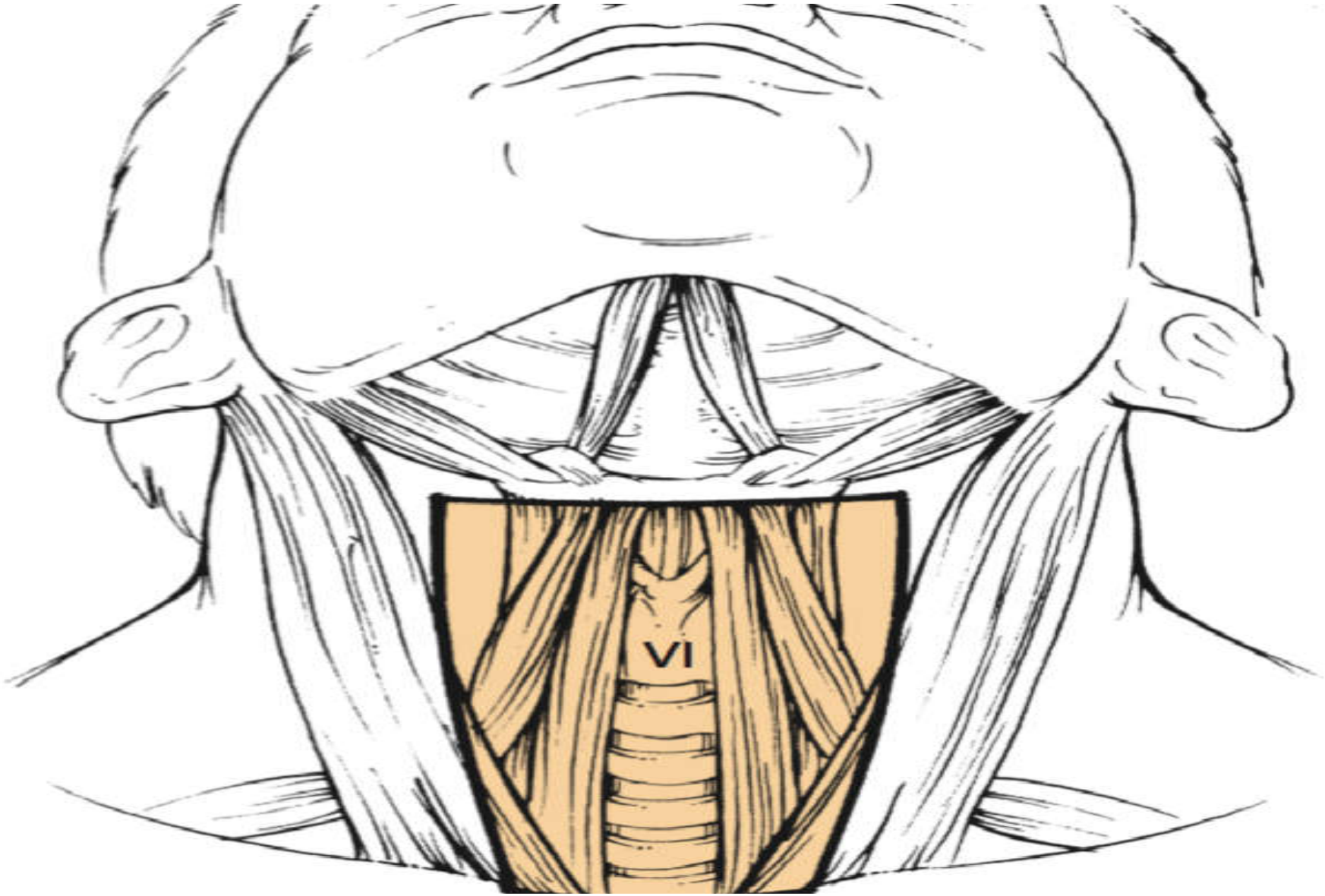


Selective Neck Dissection for Cancer of the Midline Structures of the Anterior Lower Neck

- The procedure of choice is the level VI SND, often called an *anterior neck dissection* or *central compartment dissection .*
- The procedure is most often indicated, with or without dissection of other neck levels, for cancer of the thyroid, advanced glottic and subglottic larynx cancer, advanced piriform sinus cancer, and cervical esophageal/ tracheal cancer.

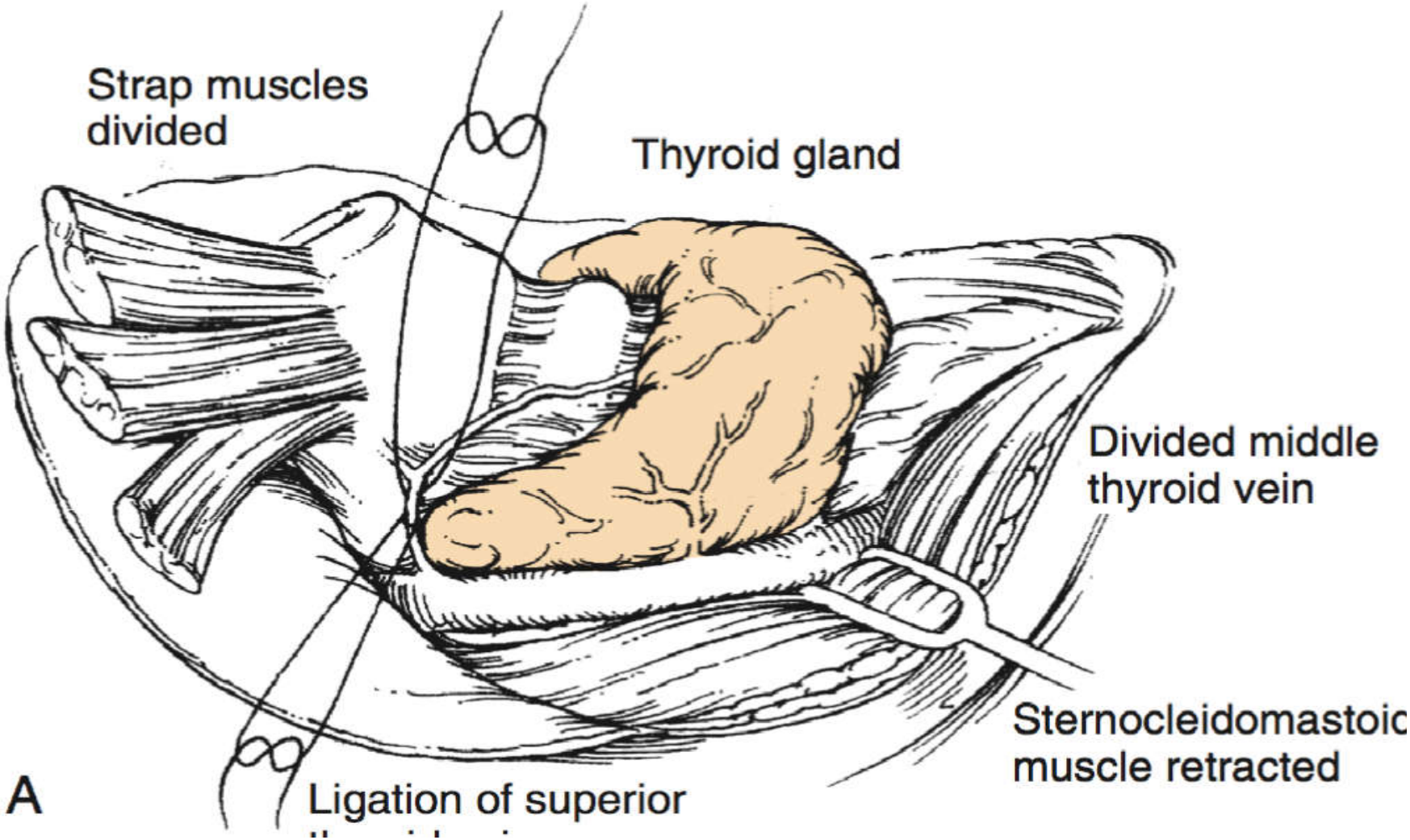
- including the paratracheal, precricoid (Delphian), and perithyroid nodes and the nodes located along the recurrent laryngeal nerves.

SND VI, or anterior neck dissection,

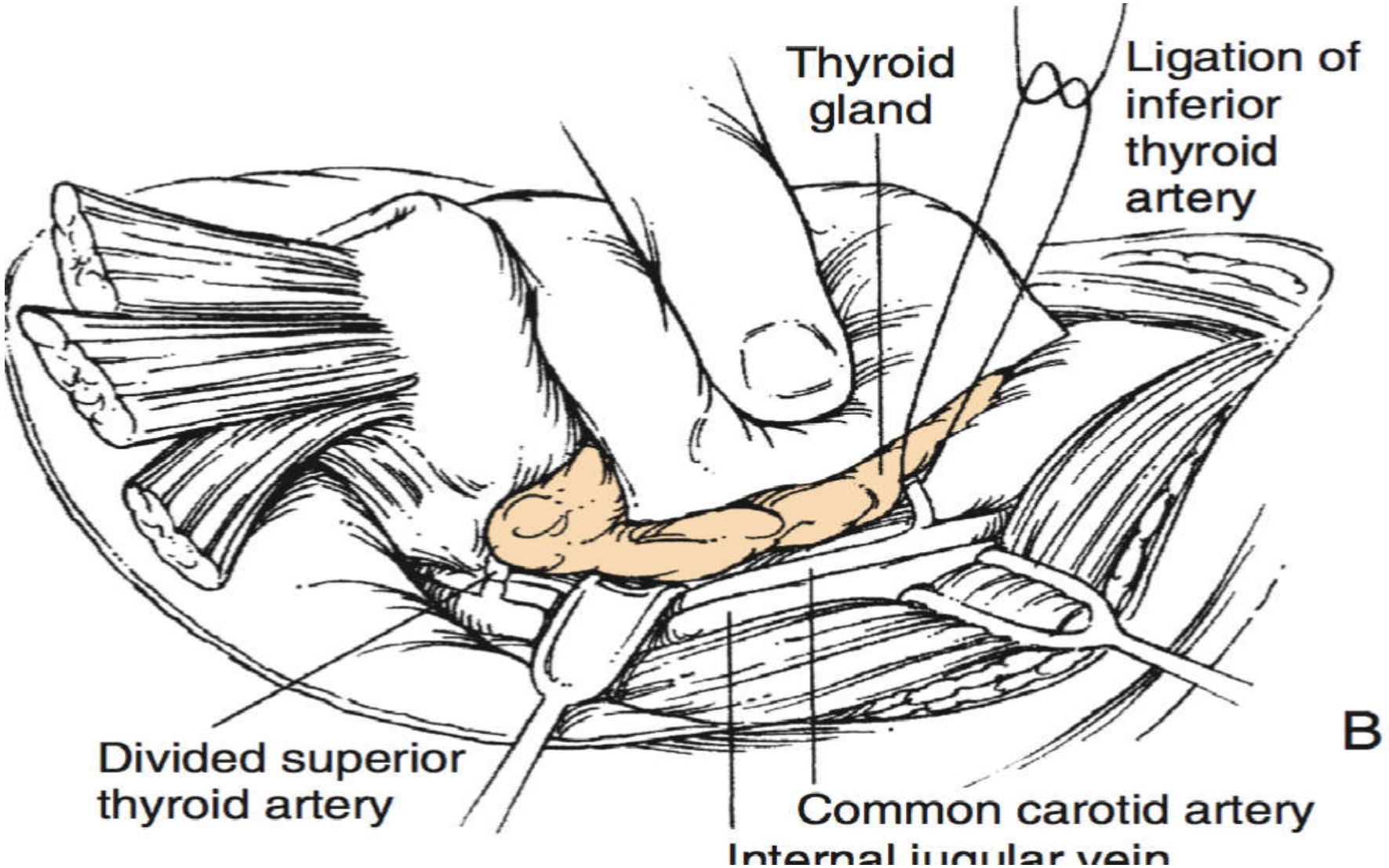


Steps of the selective neck dissection for level VI.

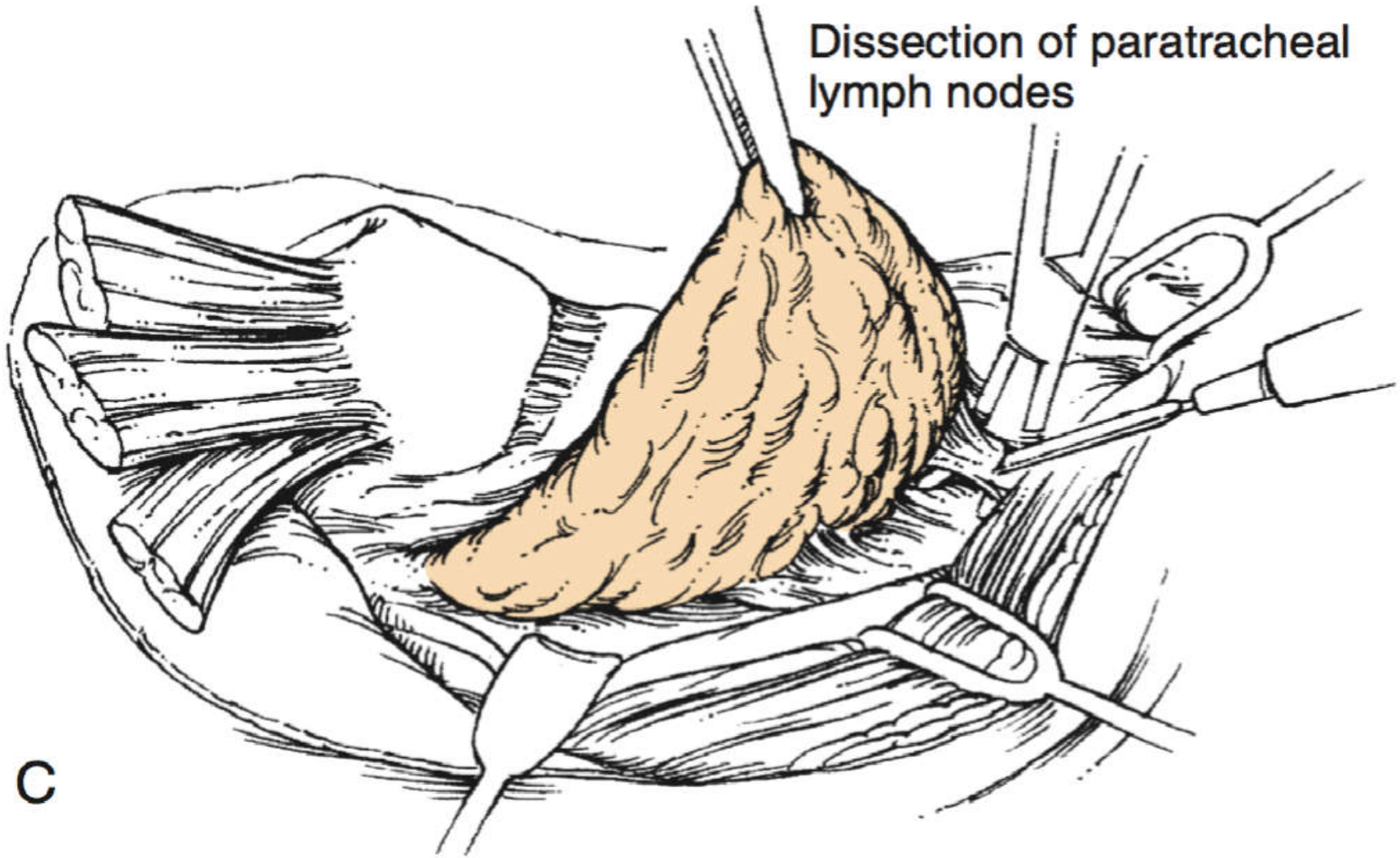
A, Ligation of the superior thyroid vessels.



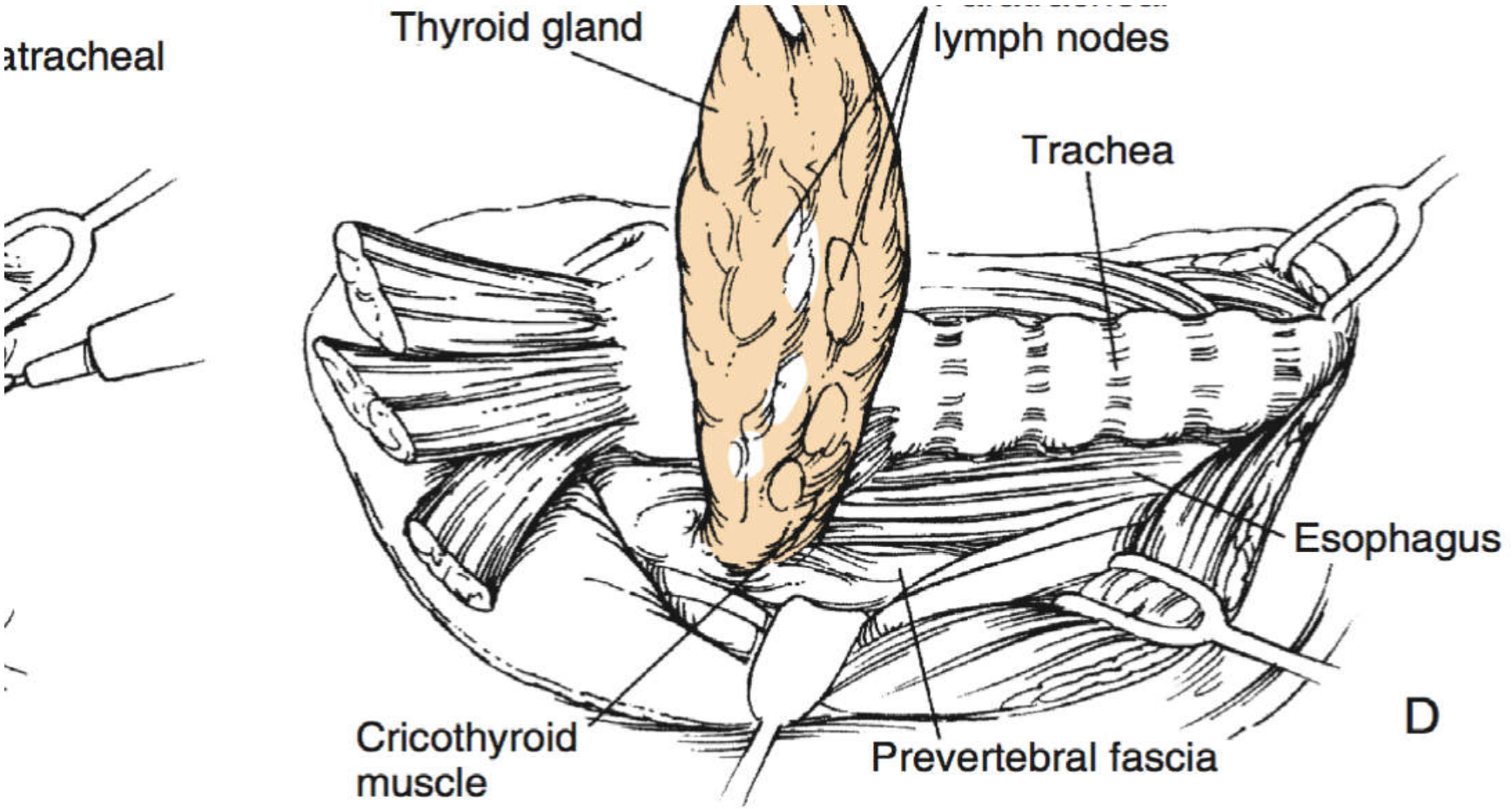
B, Ligation of the inferior thyroid vessels.



C, Resection of paratracheal lymph nodes.



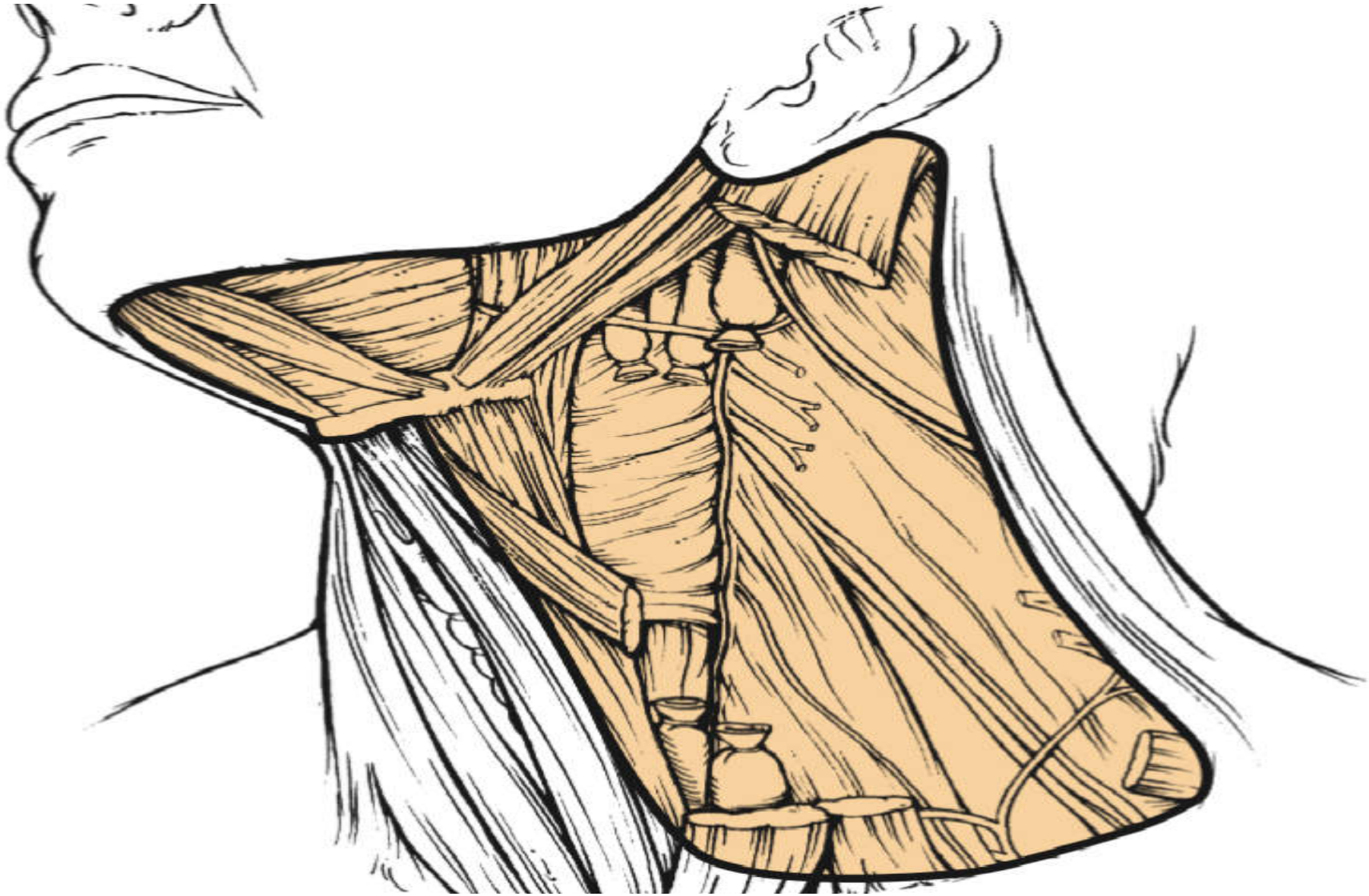
D, En bloc resection of the thyroid gland and levels VI while preserving the recurrent laryngeal nerve.



Extended Neck Dissection

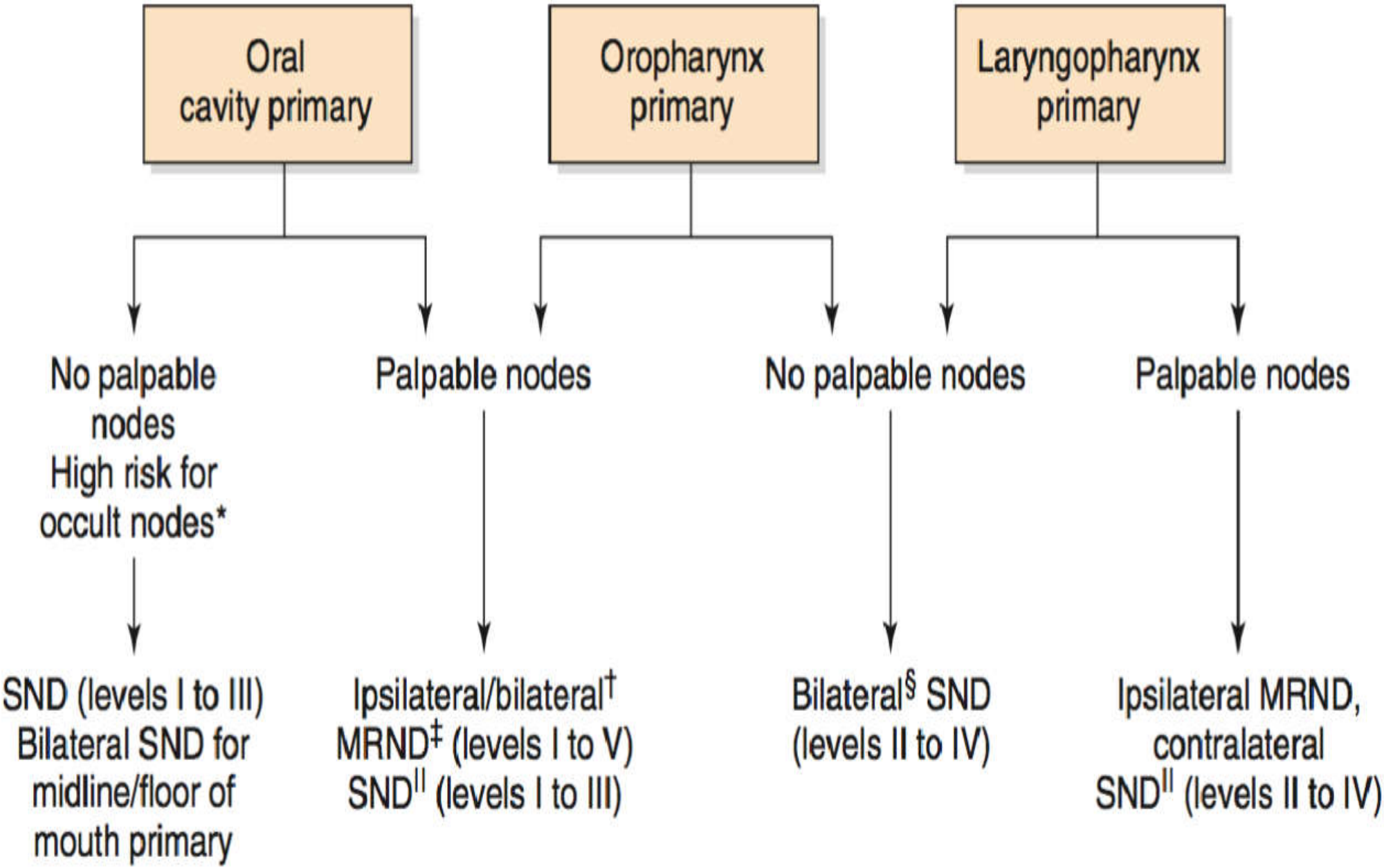
- Any of the neck dissections described previously may be extended to remove either lymph node groups or vascular, neural, or muscular structures that are not routinely removed in a neck dissection.

Extended radical neck dissection with resection of the common carotid artery.



SUPERSELECTIVE NECK DISSECTION

- Superselective neck dissection (SSND) is a procedure in which a compartmental removal of lymph nodes limited to one or two contiguous neck levels is performed.



rithm for cervical lymphadenectomy options in patients with carcinomas of the upper aerodigestive tract

COMPLICATIONS OF NECK DISSECTION

- AIR LEAKS
- BLEEDING
- CHYLOUS FISTULA
- FACIAL/CEREBRAL EDEMA
- BLINDNESS
- CAROTID ARTERY RUPTURE