Substernal Thyroid Goiter: A Case Report

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Case Presentation:

- J.W. - 55 yo AA male with respiratory compromise following an uncomplicated lumbar laminectomy
- routine extubation in OR
- developed progressive stridor, recalcitrant to bronchodilator therapy
- respiratory acidosis (*ABG = 7.07/99/59*)
- reintubated ten hours after surgery
- lasix, steroids, and bronchodilators given
- OHNS consulted

past medical history:

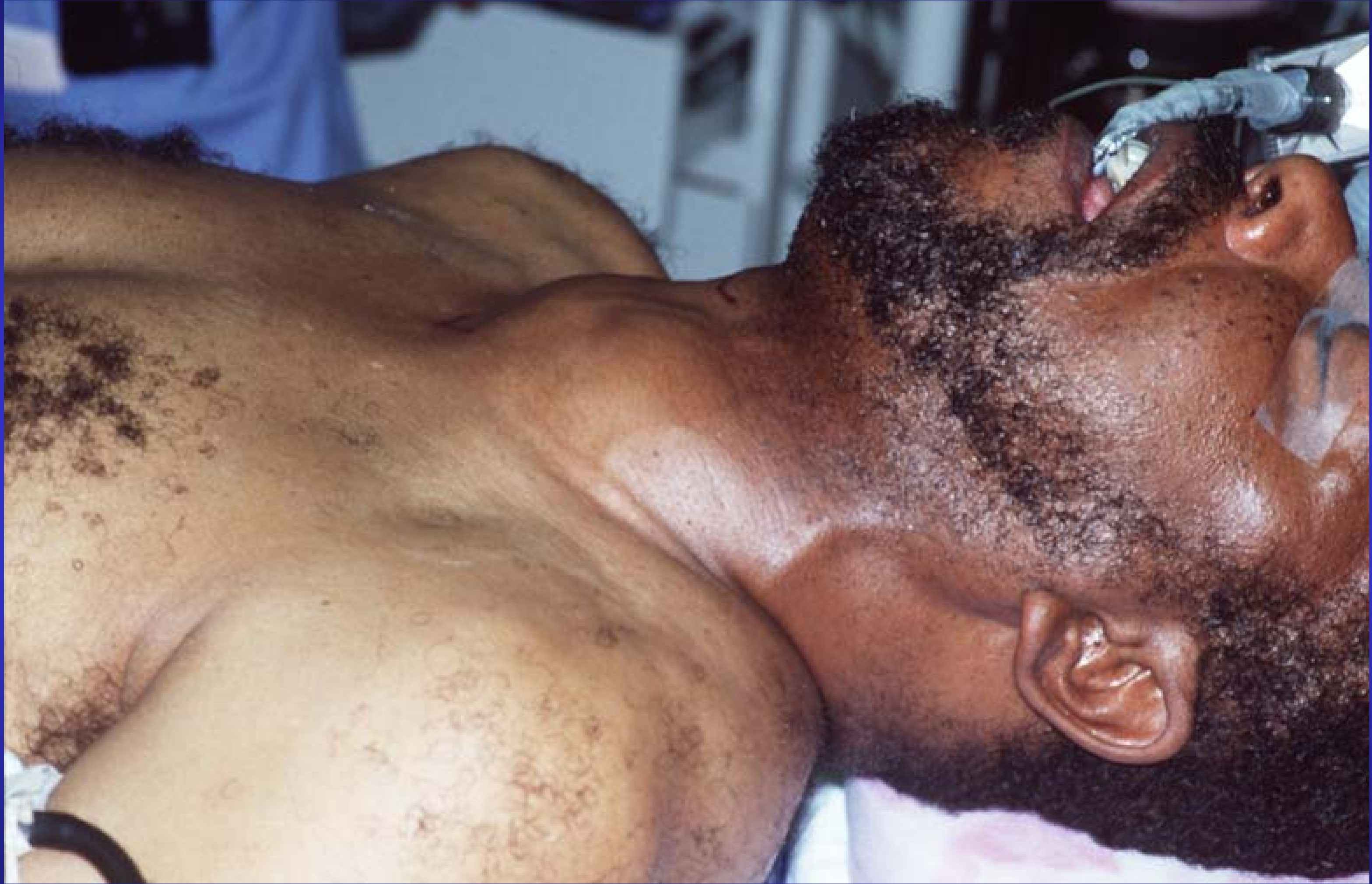
- remarkable for post-extubation “bronchospasm” after inguinal herniorraphy in 1995
- essential hypertension
- thyroid goiter
- meds - atenolol, synthroid

physical examination:

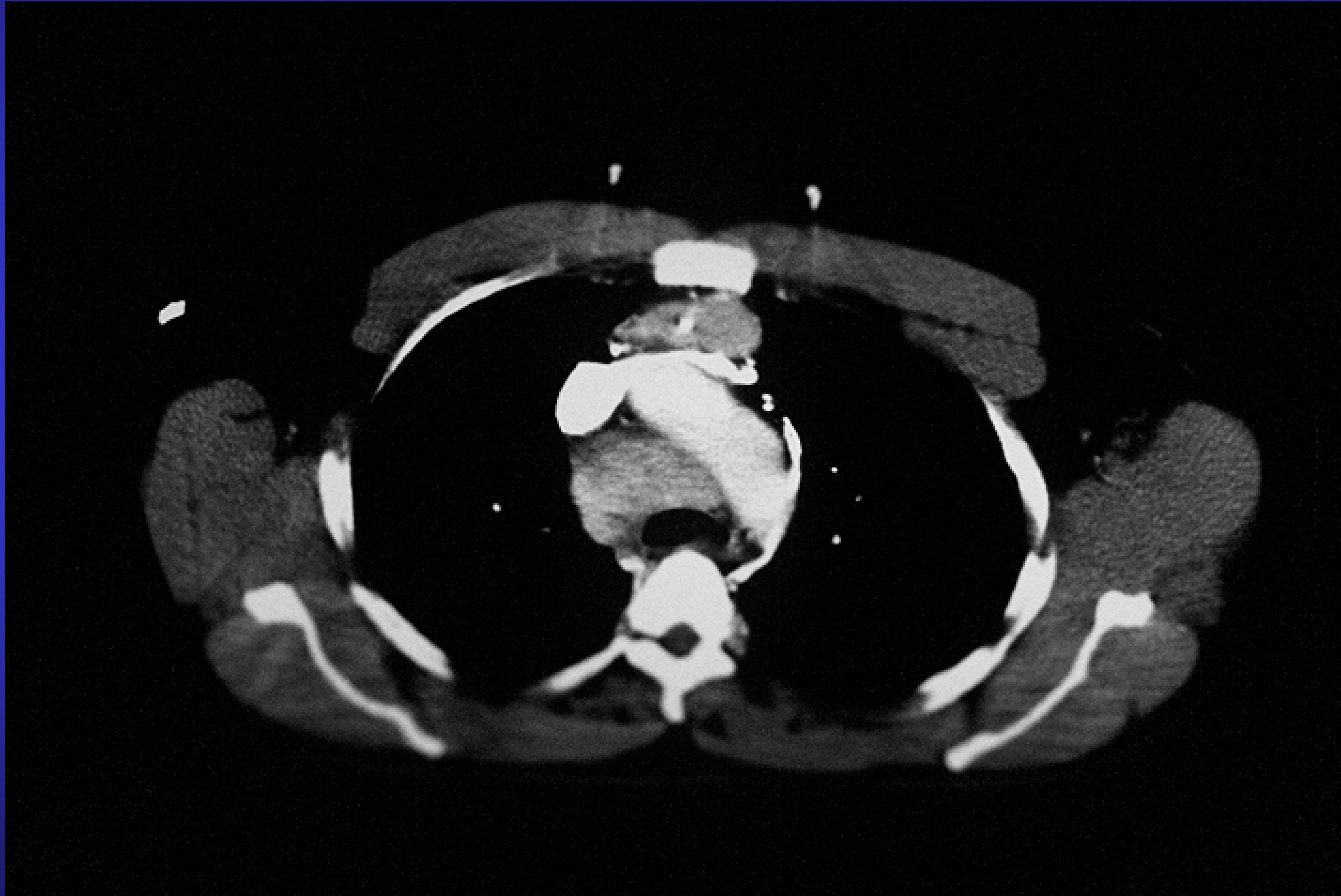
- medium build male
- EENT normal
- neck remarkable for diffuse thyroid goiter, with moderate asymmetry R>L
- fiberoptic laryngoscopy:

  normal supraglottic structures, normal TVC's, tracheal rings visable,

  subglottic "red reflection"



Radiography:



Diagnosis:

- Massive thyroid goiter with retrosternal extension causing critical upper airway obstruction.

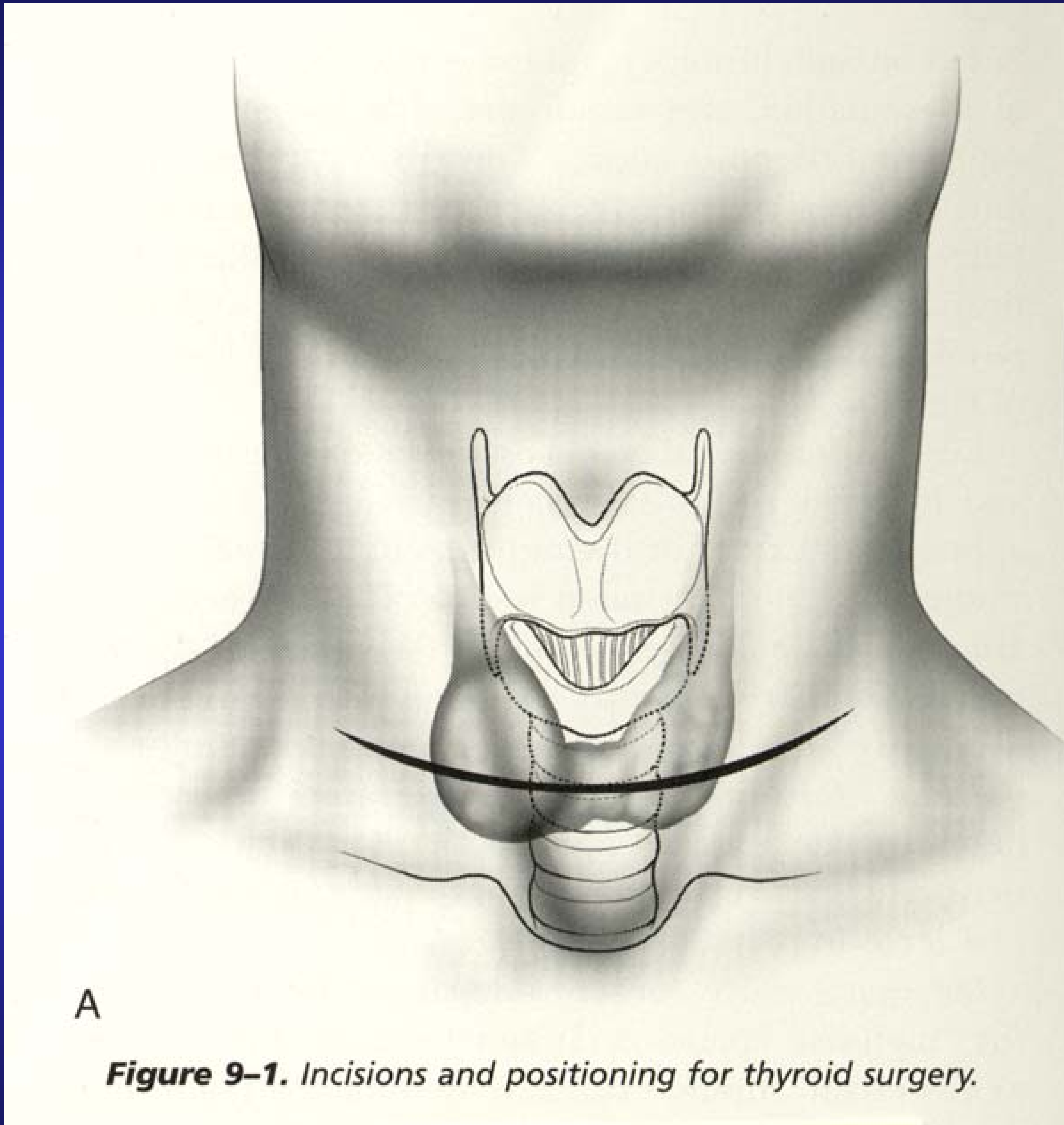
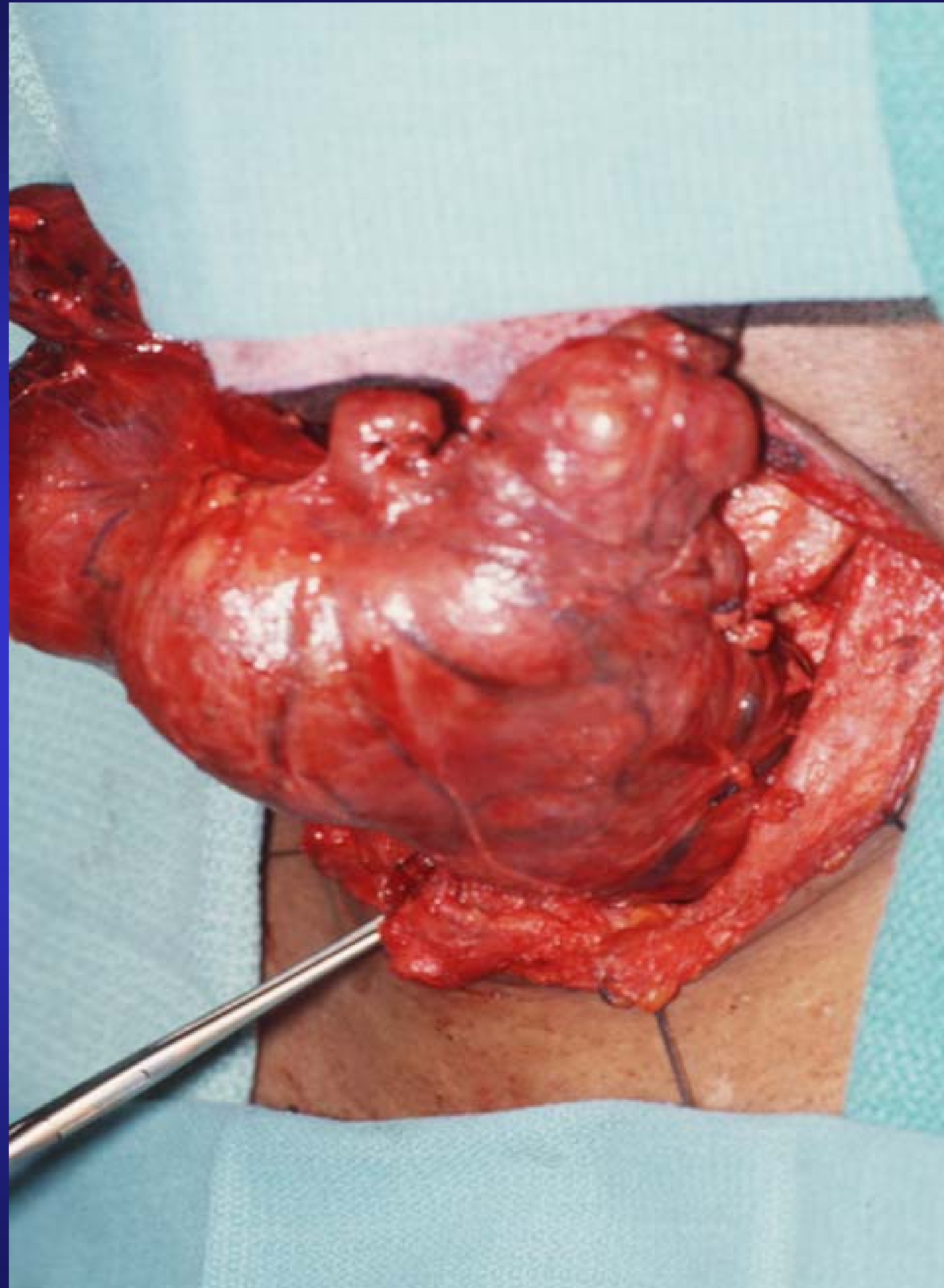
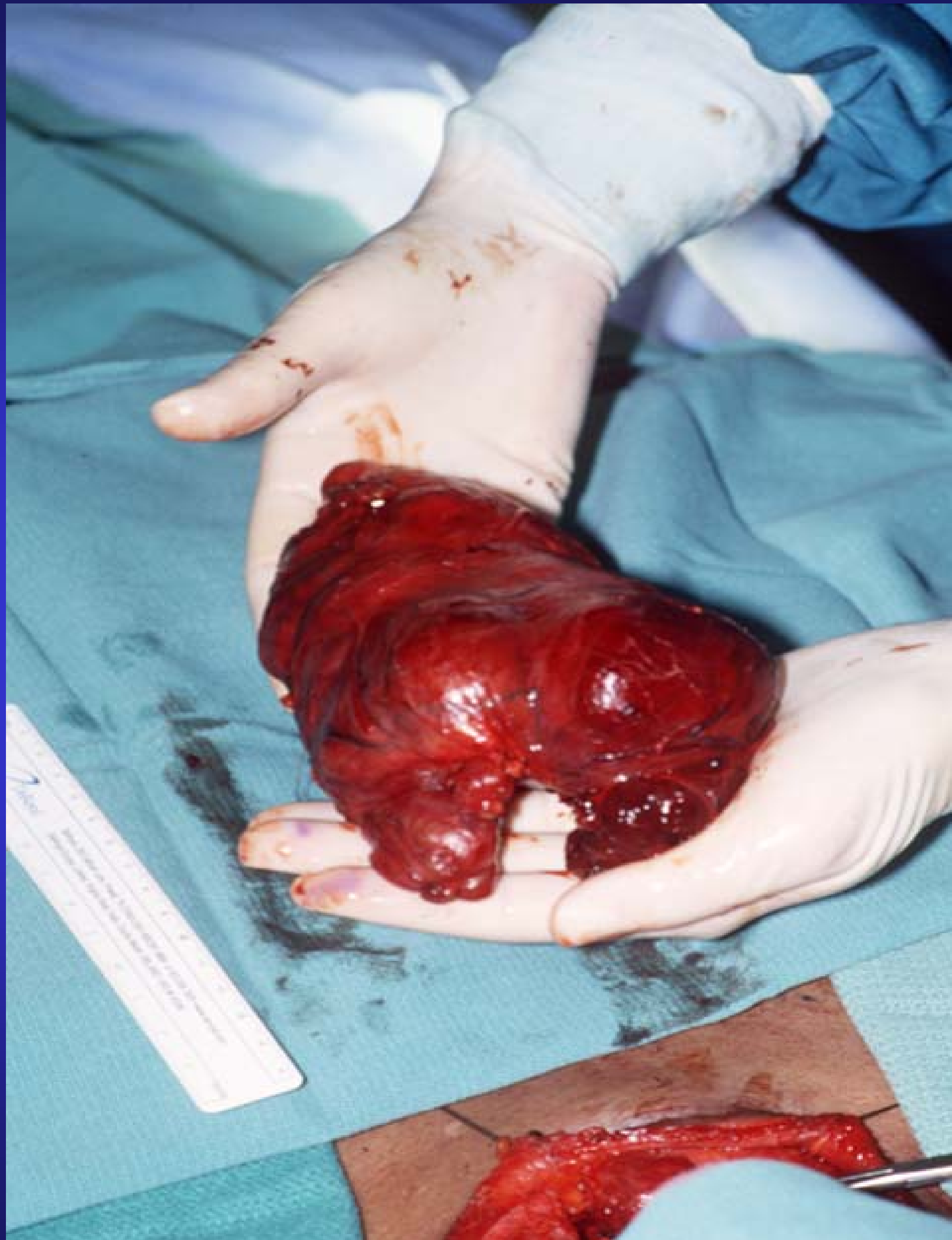
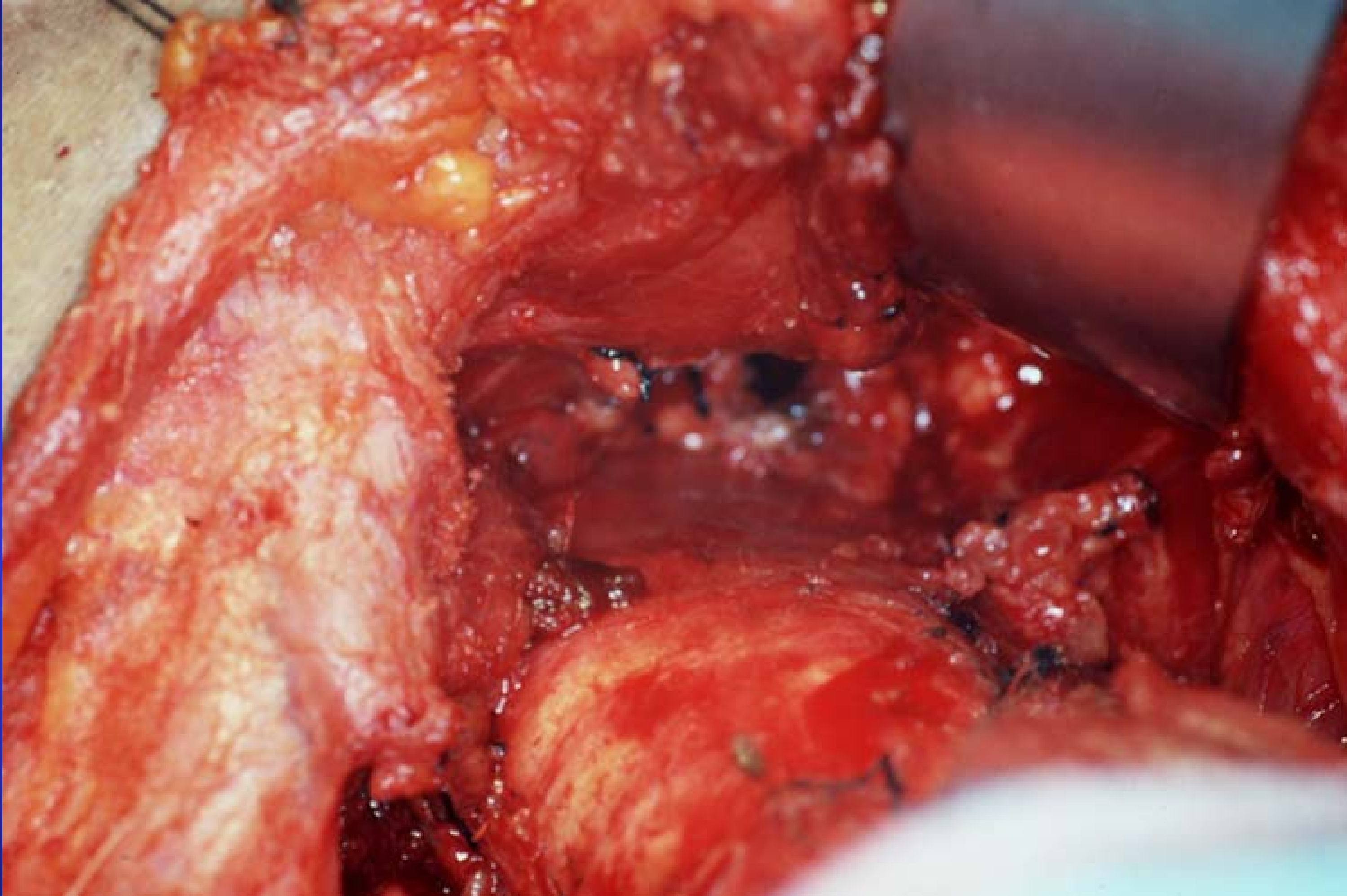
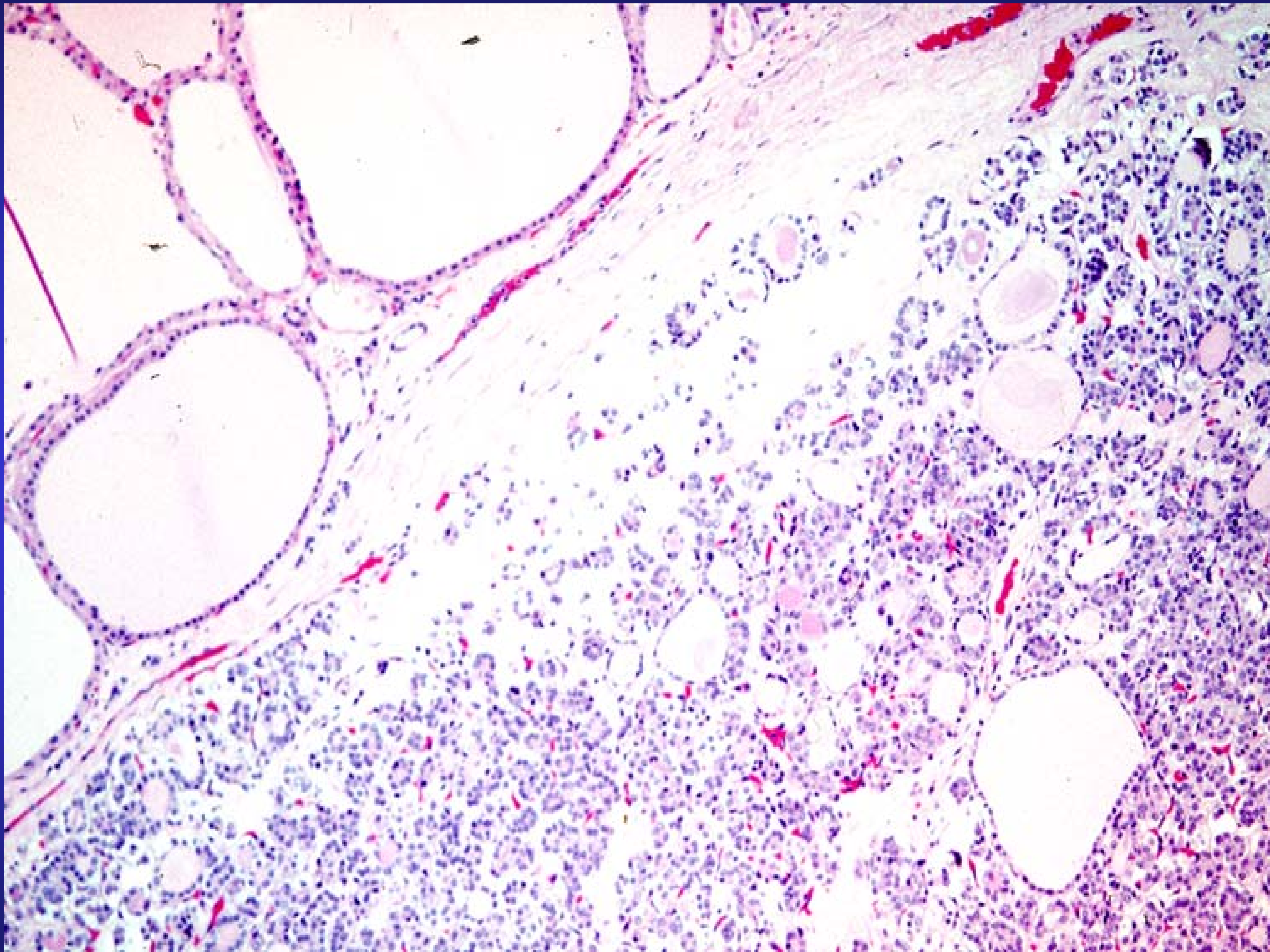


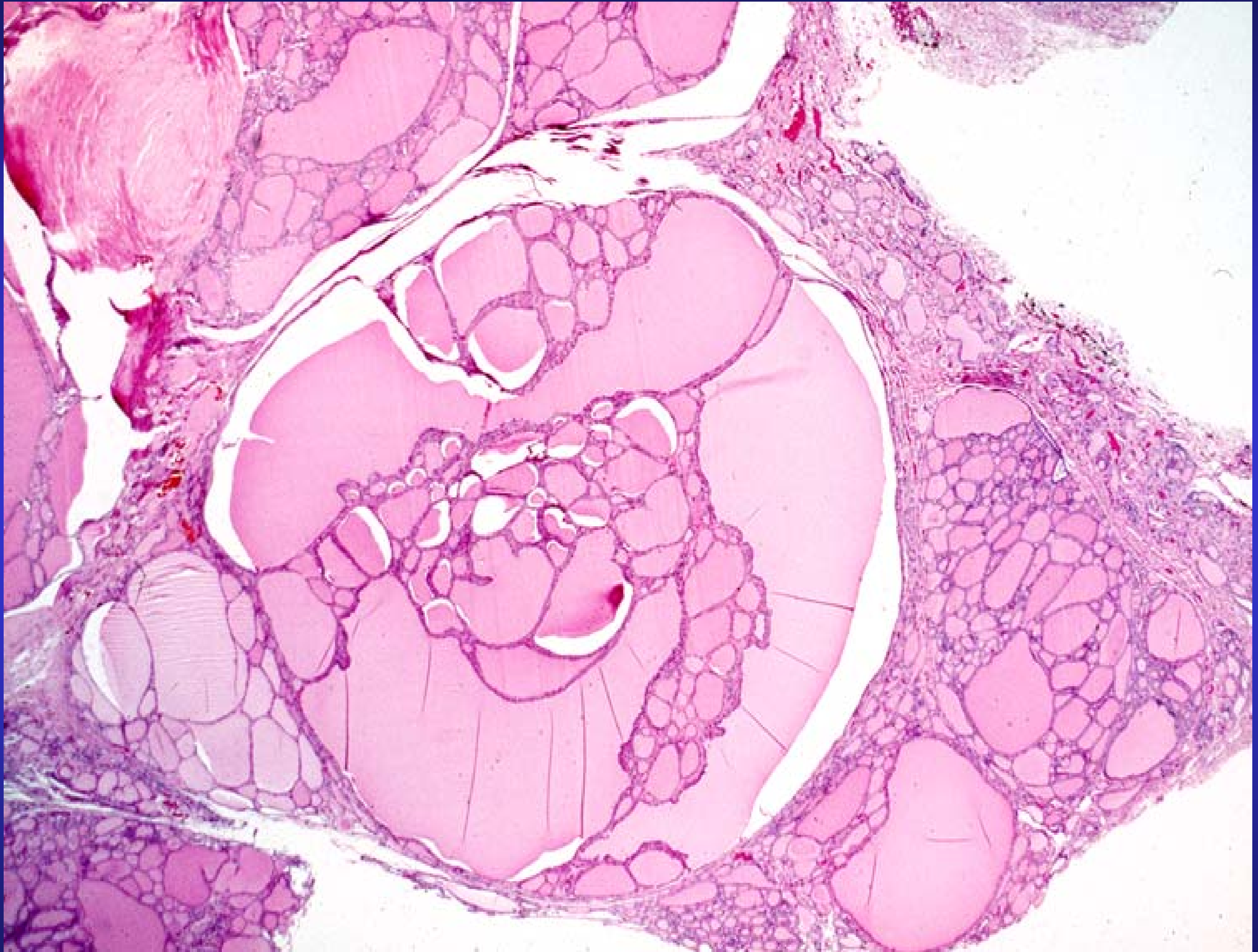
Figure 9–1. *Incisions and positioning for thyroid surgery.*











Thyroid Goiter:

- normal thyroid = 20 grams
- goiter = thyroid of at least twice normal size
- 5% of world's population
- 3:1 female:male
- a compensatory mechanism for deficiency in thyroid hormone production
- cause: impairment of any step in thyroid hormone synthesis or secretion

Superior Mediastinal Masses

- substernal thyroid goiter
- thymoma
- teratoma
- tuberculoma
- lymphoma
- lipoma
- metastasis
- dermoid cyst
- pleural cyst
- vascular aneurysm

Albrecht von Haller
1708-1777

Substernal Thyroid Goiter

- aka retrosternal, intrathoracic, mediastinal
- any goiter in which at least 50% of the thyroid lies below the level of the thoracic inlet
- first described by Haller in 1749
- first successfully resected by Klein in 1820

incidence:

- 1077/5131 (21%) - Lahey et al, 1934
- 540/4006 (13.5%) - Pemberton et al, 1921
- 237/3338 (14%) - Torre et al, 1995
- 23/938 (2.5%) - Wax et al, 1992
- 72/780 (9%) - Rodriguez et al, 1999
- 70/370 (19%) - Shaha et al, 1989
- 16/232 (7%) - Moran et al, 1998
- 23/150 (15%) - Netterville et al, 1998
- ***2058/14945 (14%) - total***

development I:

- normal thyroid develops in 4th week of gestation from pharyngeal endoderm (2nd branchial arch) and descends to its typical location in the neck
- the thyroglossal duct obliterates by the 8th week, with the foramen cecum and the pyramidal lobe as its remnants
- substernal thyroid can arise as primary type or secondary type

development II:

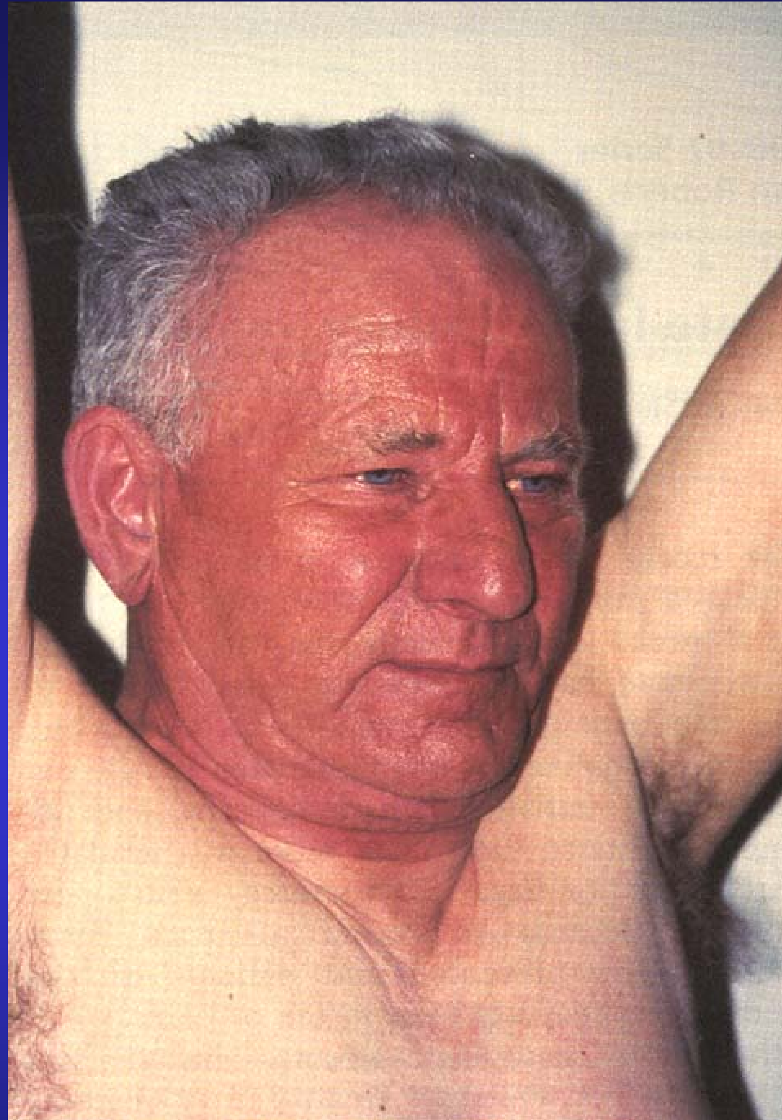
- *primary type (1%)* - ectopic thyroid parenchyma located in mediastinum, intimately associated with the primordial aorta. Separate from the cervical thyroid. Blood supply from innominate intrathoracic arteries.
- *secondary type (99%)* - extension of cervical thyroid into the mediastinum Blood supply from superior and inferior thyroid arteries.

Lahey & Swinton, 1934

- Why inferior extension?
  - thyroid not anatomically restrained inferiorly
    - ant : cervical fascia and strap musculature
    - post : prevertebral fascia and vertebral bodies
    - sup : thyroid and cricoid cartilages
  - swallowing causes downward traction
  - respiration causes negative intrathoracic pressure
  - gravity

signs and symptoms:

- neck mass
- dysphagia
- dyspnea
- dysphonia
- globus
- wheezing, coughing, stridor
- SVC syndrome
- Horner's syndrome
- UGI bleeding
- Pemberton's sign



Pemberton's Sign

complications:

- *permanent hypoparathyroidism*

Torre et al (1995)	1%
Rodriguez et al (1999)	2%

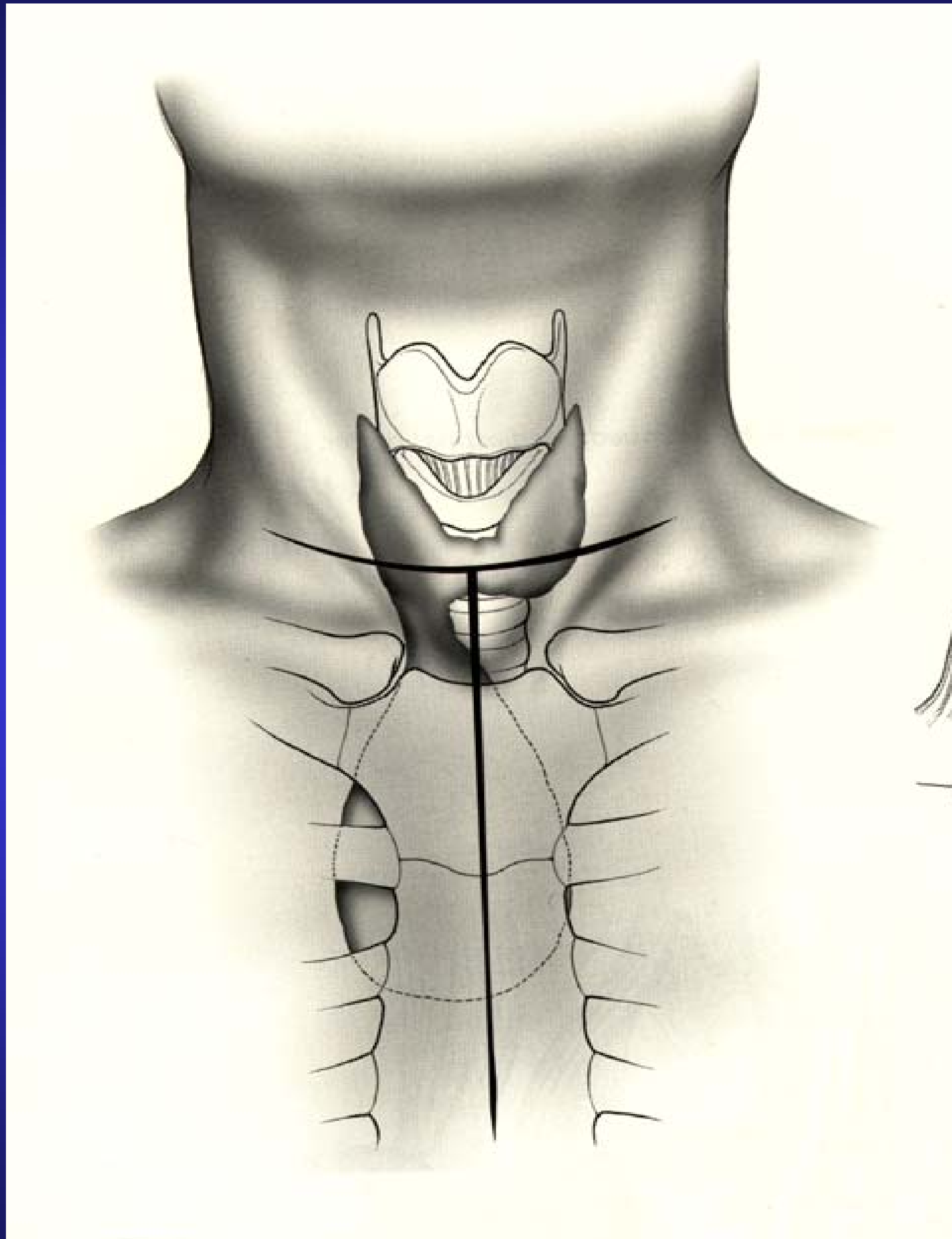
- *recurrent laryngeal nerve injury*

Torre et al (1995)	3%
Rodriguez et al (1999)	2%

- *hemorrhage* <1%
- *pneumothorax* <1%
- *tracheomalacia* <2%

median sternotomy:

- required for removal in 3-6% of substernal goiters
- indications:
  - extreme size
  - prior thyroid surgery
  - mediastinal blood supply (1%)
  - presence of carcinoma necessitating mediastinal dissection (2-3%)



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