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 herniorrappy 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 visible,
  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%)
REFERENCES

1.) Hall TS, Caslowitz P, Popper C, Smith G: Substernal Goiter versus Intrathoracic
    75:377-394, 1995
3.) Moran JC, Singer JA, Sardi A: Retrosternal Goiter: A Six-year Institutional
4.) Netterville JL, Coleman SC, Smith JC, Smith MM, Day TA, Burkey BB: