Case Presentation

- 72M L sided mediastinal mass, right sided multinodular goiter
- PMHx: DM, chronic myeloid leukemia, HTN
- PE: trachea with slight left sided deviation, 4x3 cm thyroid nodule on right side
- Planned for: subtotal/total thyroidectomy with resection of mediastinal mass, possible sternal split
CT neck
CT neck
CT neck
CT neck
CT neck
Hospital course

- Operation performed: Right hemithyroidectomy, separate excision of mediastinal lesion

- Pathology:
  - Mediastinal mass: multinodular goiter
  - Right thyroid: follicular adenoma, multinodular goiter

- Pt discharged home on HD 2, tolerating diet, no signs of hematoma, tracheomalacia, or hypocalcemia
History of Multinodular goiters

1170 – Roger Frugardi
- Describes first accounts of thyroid surgery for goiters
- Placed setons through the mass → tightened, until goiter separated
- 40% mortality at the time, due to hemorrhage and infection

Factors leading to successful thyroid surgery
- Ether for anesthesia in 1846
- Antisepsis in 1867
- Artery forceps 1970
History of Multinodular Goiters

- Emil Theodor Kocher (1841-1917)
  - Father of thyroid surgery, Swiss professor
  - Won nobel prize in 1909 for his work on the thyroid
  - 146 thyroidectomies, 21% mortality (1850-1877)
  - 600 thyroidectomies, 0.5% mortality
Samuel Gross 1848

“Can the thyroid gland ... be removed... If a surgeon should be so foolhardy as to undertake it... every stroke of his knife will be followed by a torrent of blood ... “
Work up of thyroid nodule

- TSH (normal 0.5-5uU/mL)
- Thyroglobulin
  - Used to monitor pts with differentiated thyroid cancer for recurrence after total thyroidectomy and RAI ablation
- Hot vs cold nodules
  - Hot nodules <5% risk of malignancy
  - Cold nodules 20% risk of malignancy
- FNA
Workup of thyroid nodule

- **Thyroid US**
  - Assess nodules
  - if dominant nodule present → FNA

- **CT/MRI**
  - Don’t use contrast if plans for subsequent RAI therapy, will need to delay therapy for up to 6 months
  - large, fixed, or substernal goiters
    - → evaluates extent of disease and relationship to airway and vascular structures
Indications for surgery for benign thyroid disease

- Hyperthyroidism
  - Grave’s disease
  - Toxic multinodular goiter
    - Subtotal thyroidectomy
  - Plummer’s disease
    - Single hyperfunctioning nodule
    - Lobectomy and isthmusectomy
- Failure of T4 suppression
- Compressive symptoms
- Substernal extension
- Cosmesis
- Concern for malignancy
**Nontoxic multinodular goiter**

**Etiology**
- Endemic: iodine def., diet (cassava, cabbage, kelp)
  - Iodine def → hypothyroid → increase in TSH → hypertrophy of gland
- Medications: iodide, amiodarone, lithium
- Thyroiditis
- Familial: inherited enzyme deficiencies
- Neoplasm
- Iatrogenic: previous partial/subtotal thyroidectomy

**S/S:**
- Pemberton’s sign
- Compressive symptoms (dysphagia, dyspnea)
Pemberton’s sign
Nontoxic multinodular goiters

- **Treatment**
  - Exogenous thyroid hormone
    - small diffuse goiters
    - goiters with increased compensatory TSH after subtotal thyroidectomy
  - If endemic: iodine administration
  - Surgery
Total Thyroidectomy for Management of Benign Multinodular Goitre in an Endemic Region: Review of 620 Cases.

Total thyroidectomy for benign multinodular goiter

612 pts

<table>
<thead>
<tr>
<th>Final Pathology</th>
<th>Number (%)</th>
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<tbody>
<tr>
<td>Benign multinodular goiter</td>
<td>407 (75.8%)</td>
</tr>
<tr>
<td>Papillary ca</td>
<td>66 (10.3%)</td>
</tr>
<tr>
<td>Thyroiditis</td>
<td>59 (9.5%)</td>
</tr>
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<td>Follicular ca</td>
<td>10 (1.6%)</td>
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<td>Follicular adenoma</td>
<td>5 (0.8%)</td>
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<td>Thyroid lymphoma</td>
<td>3 (0.5%)</td>
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Complications

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<tr>
<td>b/l RLN</td>
<td>1 (0.3%)</td>
</tr>
<tr>
<td>Unilateral RLN</td>
<td>5 (0.8%)</td>
</tr>
<tr>
<td>Transient hypoparathyroidism</td>
<td>48 (7.8%)</td>
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<tr>
<td></td>
<td>3 (0.5%) permanent</td>
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<tr>
<td>Hematoma</td>
<td>4 (0.6%)</td>
</tr>
<tr>
<td>Seroma</td>
<td>3 (0.5%)</td>
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<td>Wound infection</td>
<td>2 (0.3%)</td>
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Five-year follow-up of a randomized clinical trial of total thyroidectomy versus Dunhill operation versus bilateral subtotal thyroidectomy for multinodular nontoxic goiter.

- Published 2010
- 1/2000-12/2003, 600 pts, 5 year follow-up

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Intrathoracic goiter

Def: >50% of thyroid located intrathoracically

+ Primary
  + Accessory thyroid tissue in chest
  + Supplied by intrathoracic blood vessels
  + <1% of substernal goiters
  + Can be anterior or posterior mediastinum
Intrathoracic Goiter

Secondary

+ Downward extension of cervical thyroid tissue
+ Blood supply from superior and inferior thyroid vessels
+ Usually into anterior mediastinum
  + Ant to RLN
  + Anterolateral to trachea
+ 10-15% into posterior mediastinum
  + Posterior to carotid sheath and RLN
  + R sided in 90%

Fig. 1 Secondary substernal goiter developing from the left thyroid lobe. (From Mack E. Management of patients with substernal goiters.)
Intrathoracic goiter

- *** almost all can be removed via cervical incision >90%
- Risk factors for median sternotomy
  - Invasive thyroid cancer
  - Previous thyroid operation/parasitic mediastinal vessels
  - Primary mediastinal goiters
Evidence-Based Surgical Management of Substernal goiter

- Incidence of cancer in cervical vs. substernal goiter
  - Level III/IV evidence
  - Incidence of cancer is NOT higher in substernal goiter
  - Risk factor for malignancy
    - Family hx of thyroid ca
    - Hx of cervical radiation
    - Recurrent goiter
    - Presence of cervical adenopathy
When is sternal split required?

- Level V data
- ~2% of the time


- 72 pts with substernal goiters
- 1 pt required sternal split
Evidence-Based Surgical Management of Substernal goiter

- Increased risk of permanent hypoparathyroidism and permanent RLN damage?
  - Level III/IV/V evidence
  - May be a higher rate of permanent hypoparathyroidism and unintentional permanent RLN injury with total thyroidectomy for substernal goiter vs cervical goiter
Incidence of tracheomalacia and tracheostomy?
- Level III/V evidence
- Presence of substernal goiter >5 yrs causes significant tracheal compression, likely risk factor for tracheomalacia
- Tracheomalacia is still rare and can usually be managed without tracheostomy
Surgical Tenets for large goiters

- Experienced anesthesiologist
- Small endotracheal tube
- Constant OR team/instrument tray
POSITIONING

• Shoulders elevated
• head extended

• Secure ET tube
• Reverse trendelenberg

Photos courtesy of Dr. Alfonso
Operative technique

- Adequate incision with generous exposure
- Dry planes, raise superior and inferior flaps
- Develop plane beneath both straps, if necessary divide straps for exposure

Photos courtesy of Dr. Alfonso
Surgical technique for mediastinal goiter

- Divide upper pole vessels, identify superior parathyroid
- Rotate thyroid medially
- Hand delivery of retrosternal component

Photos courtesy of Dr. Alfonso
Images courtesy of Dr. Lee

Slow educated finger dissection
Gradual delivery to the neck

Identify inf parathyroid and RLN after delivery
All of the following are indications for surgery except:

- a. Cosmesis
- b. Concern for malignancy
- c. Hypothyroidism
- d. Dysphagia
- e. Dyspnea
Question 2

- 56F with a slowly enlarging goiter with a history of radiation exposure to the neck presents with dysphagia with the following CXR:

- What do you do?
Indications for surgery of MNG include cosmesis, compressive symptoms, concern for malignancy, retrosternal goiter.

Retrosternal goiters carry same risk of malignancy as cervical goiters.

Most retrosternal goiters can be removed via cervical approach.

Primary vs secondary retrosternal goiters.

Operative technique include positioning → generous exposure → dry planes → control of sup thyroid vessels/identify sup parathyroid → medial rotation of thyroid → delivery of mediastinal component into the neck → identification of inf parathyroid and RLN.
Questions
References

  + [http://applications.emro.who.int/imemrf/professional_med_j_Quot/professional_med_j_Quot_2008_15_2_295_297.pdf](http://applications.emro.who.int/imemrf/professional_med_j_Quot/professional_med_j_Quot_2008_15_2_295_297.pdf)

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  + [http://cdn.intechopen.com/pdfs-wm/31312.pdf](http://cdn.intechopen.com/pdfs-wm/31312.pdf)

+ Total Thyroidectomy for Management of Benign Multinodular Goitre in an Endemic Region: Review of 620 Case.


References


