93 yo man with hypothermia

Sharon H. Chou
Endorama
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History of Present Illness

- 93 year old Mexican man who travels between Chicago and Mexico.
  - His daughter was visiting him in Mexico, saw his edematous, erythematous, scaly legs, and brought him back to Chicago.
  - Found to be hypothermic to 33.1°C (91.6°F) rectally, new atrial fibrillation (HR 40-60).
  - TSH returned 14.18.
  - Received hydrocortisone 100 mg IV x1, followed by levothyroxine 100 mcg IV x1.
The First 24 hours

<table>
<thead>
<tr>
<th>Temp</th>
<th>33.1 (91.6)</th>
<th>35.6 (96.1)</th>
<th>37.1 (98.8)</th>
<th>35.7 (96.3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>39-58</td>
<td>59-70</td>
<td>53-74</td>
<td>43-64</td>
</tr>
<tr>
<td>BP</td>
<td>128/74</td>
<td>110/54</td>
<td>103/48</td>
<td>103/50</td>
</tr>
</tbody>
</table>

HC100 mcg IV
LT4 100 mcg IV
Past Medical History

- **Past Medical History:**
  - Diet-controlled diabetes mellitus type 2
  - NO history of thyroid problems

- **Medications:**
  - None

- **Social History:**
  - Living with a different daughter in Mexico
  - Quit tobacco over 30 years ago

- **Family History:**
  - No known thyroid disease
Past Medical History

- **ROS:**
  - Weight loss of 3 kg in the last few months
  - Good appetite
  - No cold intolerance
  - No dry skin
  - + constipation
  - No palpitations
Physical Exam

- BP 97/46 | Pulse 50 | Temp 36.1 °C (97 °F) (Tympanic) | Resp 16 | Ht 152.4 cm (5') | Wt 68.04 kg (150 lb) | BMI 29.30 kg/m2 | SpO2 94%
- Constitutional: Patient appears stated age, in no acute distress.
- Eyes: Conjunctivae are not injected. Sclerae anicteric. R pupil is postsurgical. L pupils is round and reactive to light. Extraocular movements are intact.
- ENT: Mucous membranes moist. No buccal hyperpigmentation.
- Neck: Supple. No thyromegaly or nodules palpated.
- Respiratory/Chest: Normal respiratory effort. No wheezes or crackles.
- Gastrointestinal/Abdomen: Normoactive bowel sounds. Soft, nontender, nondistended.
- Musculoskeletal/extremities: 3+ peripheral edema. Ulcer on ball of L foot.
- Skin: Blanching erythematous rash on back. Dry, scaly erythematous rash in bilateral groin. Bilateral lower extremities erythematous, edematous, warm, and scaly. No acanthosis nigrans noted.
- Psychiatric: Somewhat confused, able to joke with daughter.
Labs

141 106 20
4.7 29 0.9 118
Ca 8.8, Phos 3.6, Mg 2.3

Total protein 6.8, alb 2.9
Tbili 0.2, alk phos 103
AST 23, ALT 20

CK 32, CKMB 6.7
TropT 0.03
BNP 1061 (<450)

TSH 14.18
fT4 1.58 (0.9-1.7)
T4 5.6 (5-11.6)
T3 64 (80-195)
Neg TPO, Tg antibodies

A1c 6.7
Cort stim:
11:30 AM 20 (19.8) → 28
The Effects

LT4 100 IV

Temperature
Heart Rate
Systolic Blood Pressure

Hours after admission
Assessment & Plan

- Subclinical Hypothyroidism:
  - LT4 12.5 mcg daily
  - Recheck in 1 month
- Concern for Adrenal Insufficiency:
  - Cort stim
- Hypothermia:
  - Sepsis: pneumonia, cellulitis
  - Vascular insufficiency
  - Malnutrition
  - Neuromuscular inefficiency (extremes of age, impaired shivering, inactivity)
  - Environmental exposure
- Diabetes mellitus type 2, diet controlled: BS 118-145.
Subclinical Hypothyroidism in the Elderly

- 15% in individuals >80 years old
  - Compared to <2% in those 20-60 years old
- Age $\geq 65$: Not associated with impairment in physical and cognitive function, depression, poor quality of life, metabolic disturbances, or mortality.
- Age <65: Associated with mild cognitive impairment, cardiovascular risk, neuromuscular dysfunction.

Subclinical Hypothyroidism and Heart Disease in Elderly

<table>
<thead>
<tr>
<th></th>
<th>Euthyroid</th>
<th>Subclinical hypothyroid</th>
<th>Overall</th>
<th>TSH 4.5–6.9</th>
<th>TSH 7.0–9.9</th>
<th>TSH 10.0–19.9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>CHD</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Person-years</td>
<td>26,627</td>
<td></td>
<td>3,887</td>
<td>2,782</td>
<td>719</td>
<td>306</td>
</tr>
<tr>
<td>No. of events</td>
<td>788</td>
<td></td>
<td>130</td>
<td>94</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>Incidence (95% CI) per 1,000 person-years</td>
<td>29.6 (27.6–31.7)</td>
<td>33.4 (28.2–39.7)</td>
<td>33.8 (27.6–41.4)</td>
<td>36.2 (24.6–53.1)</td>
<td>25.9 (13.9–48.1)</td>
<td></td>
</tr>
<tr>
<td>HR (95% CI)</td>
<td>1.0</td>
<td></td>
<td>1.12 (0.93–1.36)</td>
<td>1.12 (0.90–1.39)</td>
<td>1.26 (0.85–1.87)</td>
<td>0.85 (0.45–1.87)</td>
</tr>
<tr>
<td>HF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person-years</td>
<td>31,887</td>
<td></td>
<td>4,731</td>
<td>3,377</td>
<td>883</td>
<td>470</td>
</tr>
<tr>
<td>No. of events</td>
<td>790</td>
<td></td>
<td>128</td>
<td>96</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Incidence (95% CI) per 1,000 person-years</td>
<td>24.8 (23.1–26.6)</td>
<td>27.1 (22.8–32.2)</td>
<td>28.4 (23.3–34.7)</td>
<td>23.8 (15.5–36.5)</td>
<td>23.4 (13.0–42.3)</td>
<td></td>
</tr>
<tr>
<td>HR (95% CI)</td>
<td>1.0</td>
<td></td>
<td>1.05 (0.87–1.27)</td>
<td>1.12 (0.90–1.38)</td>
<td>0.89 (0.58–1.38)</td>
<td>0.80 (0.44–1.47)</td>
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<tr>
<td>CV death</td>
<td></td>
<td></td>
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<tr>
<td>Person-years</td>
<td>35,348</td>
<td></td>
<td>5,250</td>
<td>3,766</td>
<td>980</td>
<td>503</td>
</tr>
<tr>
<td>No. of events</td>
<td>639</td>
<td></td>
<td>116</td>
<td>82</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>Incidence (95% CI) per 1,000 person-years</td>
<td>18.1 (16.7–19.5)</td>
<td>22.1 (18.4–26.5)</td>
<td>21.8 (17.5–27.0)</td>
<td>22.4 (14.8–34.1)</td>
<td>23.9 (13.5–42.0)</td>
<td></td>
</tr>
<tr>
<td>HR (95% CI)</td>
<td>1.0</td>
<td></td>
<td>1.07 (0.87–1.31)</td>
<td>1.10 (0.87–1.38)</td>
<td>1.04 (0.68–1.60)</td>
<td>0.92 (0.51–1.65)</td>
</tr>
</tbody>
</table>

Adjusted for age, sex, race, and initiation of thyroid medication during follow-up period.

Treatment of Subclinical Hypothyroidism in Elderly

- Controversial
- Improves lipid profile but no clear evidence that it decreases CV or all-cause mortality
- Does not improve cognitive function
- Higher TSH levels (>8-10) were associated with progression to overt hypothyroidism

TSH and longevity

Ashkenazi controls: 1.55 (0.46–4.55)

Centenarians: 1.97 (0.42–7.15)

TSH and longevity

- Decline in thyroid function
  - Increase in prevalence of acquired autoimmune thyroid disease
  - Atrophic nonautoimmune changes
- Reset in TSH set point
- Reduced TSH bioactivity
- Chronic illness, medications
- Genetic predisposition
  - Offsprings had higher TSH levels, estimated heritability of 0.33
  - 2 SNPs in the promoter/enhanced region of TSHR gene

Animal Studies

- Inducing hypothyroidism in young rats resulted in living 4 months longer.
- Inducing hyperthyroidism led to a 3 month life span reduction.
- May be due to reduced metabolic rate, body temperature, oxygen consumption, and reactive oxygen species generation.

Hospital Course

- No definitive infection found, antibiotics tapered.
- Started on anticoagulation for atrial fibrillation, led to melena.
- Worsening respiratory status from pulmonary edema, was DNR/DNI.
- Made comfort care.
Take Home Points

- Subclinical hypothyroidism in the elderly is not generally associated with adverse effects, in contrast to the younger population.
- Thus, treatment for subclinical hypothyroidism in the elderly is controversial.
- **Leave 93 year olds alone!**
References

# Subclinical Hypothyroidism and Heart Failure

<table>
<thead>
<tr>
<th></th>
<th>Euthyroidism</th>
<th>Subclinical Hypothyroidism</th>
<th>HR (95% CI), Age/Sex-Adjusted</th>
<th>HR (95% CI), Multivariate Model*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Participants</td>
<td>Events</td>
<td>Participants</td>
</tr>
<tr>
<td><strong>Total population</strong></td>
<td>1762</td>
<td>22,674</td>
<td>250</td>
<td>2068</td>
</tr>
<tr>
<td><strong>Sex†</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>977</td>
<td>10,793</td>
<td>120</td>
<td>730</td>
</tr>
<tr>
<td>Female</td>
<td>785</td>
<td>11,881</td>
<td>130</td>
<td>1338</td>
</tr>
<tr>
<td><strong>P for interaction</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Age, y‡</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–49§</td>
<td>15</td>
<td>2,756</td>
<td>2</td>
<td>107</td>
</tr>
<tr>
<td>50–64</td>
<td></td>
<td></td>
<td>128</td>
<td>5,798</td>
</tr>
<tr>
<td>65–79</td>
<td>1,370</td>
<td>12,666</td>
<td>205</td>
<td>1,428</td>
</tr>
<tr>
<td>≥80</td>
<td>249</td>
<td>1,454</td>
<td>33</td>
<td>160</td>
</tr>
<tr>
<td><strong>P for trend</strong></td>
<td></td>
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</tbody>
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