Humanitarian Thyroid Surgery: Management in Low-Resource Settings

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Goals & Objectives

• Understand the challenges faced in performing thyroid surgery during international humanitarian mission work
• Discuss ethics in surgical decision-making: what is minimum standard of care?
• Suggest preoperative, intraoperative, and postoperative management practices suited to the patient and the environment
• Discuss opportunities for research and blending of public health and surgical care
Scope of Problem

- 5% world population have goiters
- 75% of people with goiter live in less developed countries where iodine deficiency is prevalent
- Sub-Saharan Africa carries 25% of the world’s disease burden but has only 2% of the world’s resources for health care
- In some endemic goiter countries such as Haiti, NGOs account for >70% total healthcare delivery

Prevention and Control of IDD: Economics

- Salt iodization is cheap
- Cost to avert one child’s death: $1000
- Cost per disability-adjusted life year (DALY): $34-36
- Return to economy by reversing hypothyroidism and increasing IQ: priceless

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1. Gaitan, Endemic Goiter and Endemic Thyroid Disorders WJS 1991
5. Who.int/vmnis/iodine/data
Scope of Problem

- Thyroid surgery considered Priority 2 surgery in WHO GIEESC
  - Prioritized by burden of disease, success of surgical intervention and cost-effectiveness
  - Ranked with obstetric fistula repair and cleft palate repair
- Humanitarian surgical missions increasing in number
  - Unknown how many HIC surgeons/groups perform thyroid surgery in LMIC
  - Specialty mix of humanitarian thyroid surgeons unknown

Standard of Care in Humanitarian Surgery: 12-Point Checklist

1. Perform anesthesia pre-operative evaluation
2. Pulse oximetry is available and working
3. Procedure explained to patient and informed consent signed
4. Confirm patient identification
5. Mark operative site
6. If significant blood loss anticipated, obtain IV access and ensure blood availability
7. The appropriate surgical instruments are available and working
8. Antibiotics have been given if wound is/expected to be contaminated
9. Postanesthesia care is available
10. Postoperative care protocol is established
11. In a mass casualty, the procedure performed, date of dressing change or re-intervention are written on the bandage
12. Patient and surgical data entered into a database

Comparison of Thyroid Surgery in the First vs. Developing World

- Philippines, 2010
  - Back to Basics
    - Drain all wounds
    - Watch all patients overnight
    - No PTH assays, check Chvostek’s sign
    - “DO NO HARM”
Comparison of Thyroid Surgery in the First vs. Developing World

- **United States, 2012**
  - High Tech
    - Physiologic ID of RLN (RLN monitor)
    - Postoperative rapid assay PTH to predict postop hypocalcemia in total thyroidectomy
    - Minimally Invasive Surgical Techniques (endoscopic/video assistance, harmonic hemostasis, robot)

- **LMIC, 2012**
  - Back to Basics
    - Anatomic ID of RLN
    - ONLY perform hemithyroidectomy to prevent postop hypocalcemia and bilateral TVC injury
    - Traditional exposure incisions

Definition of Standard of Care

- **Local standards**
  - Local practice may be NO care
  - Is Mission care really “better than nothing”?

- **National standards**
  - Equivalence to the nation’s largest/most advanced medical center (*modified de jure*)
    - Difficult to achieve locally
    - Patients unable to travel

- **International standards**
  - Are all “First-World” standards evidence-based?

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Definition of Standard of Care

- Just because you “must have it” in your home practice, is it necessary on a mission?

> “...there are no special technological requirements. ...other than a sterile operating theatre with good light and reasonable instruments. Surgical technique and training is more important than technology.”

*Watters, et al Thyroid Surgery in the Tropics, 2007*

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HUMANITARIAN GOITER SURGERY:
Ethics and Best Practices in Low Resource Settings

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Thyroid Function Testing

- Can assessment of thyroid toxicity be made clinically without labs?¹
  - Resting heart rate
  - Weight stability

- Need for baseline TSH if intention to supplement with levothyroxine pre or postop

- Elevated TSH surrogate for iodine status²

- Spot (qualitative) TSH rapid assay ~$20


Preoperative Imaging

- Do patients need imaging?
  - Malignant features (11% goiters in Nepal malignant)
  - Vascularity for hyperfunctioning goiter (25% goiters in Nepal toxic)
  - Substernal extension

- Ultrasound vs CT
  - Ultrasonic Smartphone: www.mobisante.com

- CXR screening
  - Estimate airway compression
  -TB screening

¹ Baxi, WJS 2006  ² Shin, Laryngoscope 2010
Preop Vocal Cord Assessment

• Voice change not fully predictive of vocal cord mobility issue\(^1\)
• Indirect laryngoscopy vs fiberoptic
  • Mirrors easier to transport than scopes
• Ultrasound may be good tool if already in location for imaging
  • Operator dependent
  • Needs validation as a tool
• Keep records

Preop Vocal Cord Assessment

Do you visualize the vocal cords for mobility prior to goiter surgery in the US vs. during a mission?

<table>
<thead>
<tr>
<th></th>
<th>US</th>
<th>Mission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always, by direct or indirect laryngoscopy</td>
<td>97%</td>
<td>45%</td>
</tr>
<tr>
<td>Always, by other means (e.g. ultrasound)</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>On a case-by-case basis, e.g. voice change</td>
<td>23%</td>
<td>3%</td>
</tr>
<tr>
<td>Not routinely</td>
<td>29%</td>
<td>3%</td>
</tr>
<tr>
<td>Would routinely if means available</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

\(^1\) Shin Laryngoscope 2010
Iodine status

- Assume patient is iodine-deficient by region and presence of goiter
  - Check WHO database on region before mission
- Iodine testing: is it a population screen or individual patient care?
  - 24 hour urine collection traditional
  - Spot urine testing available ~$75/test


Iodine Status

- Who.int/vmnis/iodine/data/database/countries
  - Migori, Kenya
  - School children (9-13y/o) in 2003-2004
    - 45.6% <100μ/L (92 ss)
    - 5.3% TGP (total goiter prevalence, all Grade I)
  - In 1994, only 27.5% of 40 sampled were iodine deficient


Iodine status

- Can replace iodine (iodinized oil) or administer Lugol solution preop
  "In general the goitres associated with iodine deficiency are treated by iodine, not surgery." 1,2

- In Sudan, prospective trial of iodine replacement, Grades I, II goiters responded well
- Only 1/3 Grade III goiter patients displayed "modest thyroid shrinking" 3


Images kindly provided by Samuel Dagogo-Jack, MD (Nigerian-American Endocrinologist at UTHSC)
Preoperative Evaluation Summary

1. Labs
   - TSH qual vs. quant
   - Pregnancy tests
2. Imaging
   - Consider ultrasound, CXR (TB, tracheal compression)
3. FNA
   - Examine resources, collaborate with path colleagues (local vs. opportunity for telemedicine)
4. Vocal cord assessment
   - Mirror, scope, US
5. Iodine
   - Know your area, WHO database

Airway Management

Intraop 1
For goiter with tracheal compression with or without substernal extension in US vs. mission

- Plan fiberoptic intubation
- Counsel patient about risk of tracheotomy
- Have thoracic surgeon on standby for sternotomy
- Combination of A, B, C
- None of the above, do not operate on these patients
- Would take care of this patient in the US, but not in a low-resource setting

Intraop 2
What extent of thyroidectomy do you perform for goiter in the US vs. during a mission?

- Total thyroidectomy
- Near-total thyroidectomy
- Sub-total thyroidectomy
- Hemithyroidectomy

11/9/2012
Need for an Individualized and Aggressive Management of Multinodular Goiters of Endemic Zones by Specially Trained Surgeons: Experience in Western Nepal

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Hypocalcemia (<5%) and wound dehiscence (3.5%). The choice of operation depends on the local practice and the likelihood of being able to obtain thyroid tissue. Total thyroidectomy should be avoided whenever possible, especially in patients with unsuspectable. Advanced hypocalcemia with wound dehiscence is going to be the case. These changes are not able to be reversed. The management options are limited by the resources available. Similar surgical outcomes should be attempted to be achieved in every setting where the surgery is feasible.

Recurrent Nerve Monitoring
Intraop 4

If you had only one additional method of hemostasis besides monopolar cautery to use...US vs. mission?

- Bipolar cautery: 36% US, 60% Mission
- Vascular clips: 12% US, 11% Mission
- Suture ligature: 9% US, 17% Mission
- Ultrasonic coagulation (Harmonic) or bipolar vessel sealing (LigaSure): 42% US, 11% Mission

Hemostasis Options
Intraoperative Management Summary

1. Anticipate/avoid airway disasters
   - Say no
2. Individualize extent of surgery to resources
   - Default to hemithyroid
3. Plan for systematic RLN management
   - Exposure, palpation
4. Minimum of 3 hemostasis methods:
   - Monopolar + Bipolar + Suture Ligature
   - “The most critical technology is electricity” – D. Terris
5. Drains are good idea, despite lack of data

Wound drains following thyroid surgery

Cochrane Database Syst Rev. 2007 Oct

AUTHORS’ CONCLUSIONS:
There is no clear evidence that using drains in patients undergoing thyroid operations significantly improves patient outcomes and drains may be associated with an increased length of hospital stay. The existing evidence is from trials involving patients having goitres without mediastinal extension, normal coagulation indices and the operation not involving any lateral neck dissection for lymphadenectomy.

Use of Drains
Postoperative Management Summary

1. Watch all patients overnight or until stable
   • Hazard of short term missions
2. Avoid exposure of second side to preserve parathyroid function
3. Develop relationships with on-the-ground providers (do not have to be MDs if communication lines open)
4. Assess voice AND vocal cord mobility
5. KEEP RECORDS!

SOLUTIONS?
Reconciliation of:
Back-end Intervention (Thyroidectomy) with Front-End Prevention (Population-Based Iodine Repletion and Goitrogen Reduction)?
**SOLUTIONS?**

- Consider discovery of goiter patients in a population a “red flag” for ID and goitrogens
- Communication between thyroid surgeons and:
  - Primary care with Endocrine interest/training
  - Public health/micronutrient experts

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**SOLUTIONS?**

- Produce collaborative treatment protocols that refine those patients whose best option is surgery

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**SOLUTIONS?**

- Incorporate knowledge of IDDs into surgery training programs
- Establish “Centers of Excellence” for thyroid surgical and medical education and treatment

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**Solutions?**

- Perform resource-allowable preoperative evaluation: *Imaging studies +/- FNA for extent of surgery and risk of malignancy *Lab (TFTs, pregnancy test) *Vocal cord assessment *Iodine status/treatment
- Perform anesthesia pre-operative evaluation
- Pulse oximetry is available and working
- Procedure explained to patient and informed consent signed
- Confirm patient identification
- Mark operative site
- The appropriate surgical technology is available and working: *Airway management *Lighting, instruments, powered cutting, hemostasis *Recurrent nerve monitoring *Extent of surgery planned in accordance with resources *Drains
- Postanesthesia care is available
- Postoperative care protocol is established: *Vocal cord assessment *Calcium supplementation *Thyroid supplementation *Iodine repletion *Local followup
- Patient and surgical data entered into a database: TRACK OUTCOMES!
Standard of Care in Humanitarian Thyroid Surgery: 10-Point Checklist plus

1. Research
   • Of 46 humanitarian surgical providers (from OGB database) surveyed in 2008, 91% tracked volume, 60-80% tracked rudimentary outcomes (mortality, infections)\(^1\)

2. Sustainability
   • 56.5% integrated with local referral patterns
   • 78.3% incorporated local providers into delivery of care

3. Education
   • 89.1% included some component of educational exchange

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Survey of ENT services in Africa: need for a comprehensive intervention

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How can AAO-HNS contribute?

- Travel, work in Africa
  - Values / Ethics
  - Change practice in USA
- Teaching and training
  - Courses
  - Residencies
  - Fellowships
  - Affiliations
- Support
  - Twinning
  - Telemedicine (U Michigan)
- Adapt
  - Instrumentation
  - Techniques
  - Management guidelines
- Open access materials

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The Open Access Atlas of Otolaryngology, Head & Neck Operative Surgery

20,000 chapter downloads: Nov 2011 – Sept 2012
>120 downloads/day
Thank you!