Minimally Invasive Thyroidectomy: Lessons From the Learning Curve

David L. Steward, M.D.
Director Thyroid and Parathyroid Surgery
Department of Otolaryngology – HNS
Division of Endocrinology
University of Cincinnati

Minimally Invasive Thyroidectomy

- Small neck incision < 3cm
  - Mini open approach
  - Video assisted (MIVAT)
- Endoscopic
  - Neck
  - Chest
  - Axilla
  - Transoral?

MIVAT vs Traditional

- Randomized controlled trials
  - Improved cosmetic outcome
  - Reduced postoperative pain
  - Increased operative time
  - No difference in complications

Miccoli P et al, Surgery 2001
Bellantone R et al, Arch Surg 2002
Sgourakis G et al, Thyroid 2008

Video Assisted Thyroidectomy

- Advantages
  - Magnification 10x
  - Lighting
  - Supervision
- Disadvantages
  - Learning curve
  - Additional equipment
MIVAT – Indications (20-30% of Thyroidectomies)

- Diagnostic
  - Suspicious nodule (70%)
- Prophylactic
  - Calcitonin negative MEN2a (6%)
- Therapeutic
  - Hyperthyroidism (10%)
  - Low risk malignancy (10%)
    - PTC T1N0

MIVAT – Relative Contraindications

- Thyroid gland volume > 20-30 cm$^3$
  - Estimate gland volume via US
    - Gland volume = height x width x length of larger lobe
      - Note lobe volume = height x width x length x 3.14/6
    - Thyroid nodules > 3cm
- Thyroiditis
- Malignancy
  - Especially T3 or N1

MIVAT – Harmonic

- Reduces operative time for MIVAT
  - Hemithyroidectomy (37 vs. 49 mins)
  - Total thyroidectomy (54 vs. 91 mins)
- RCT of Harmonic vs. Clips in MIVAT
  - Shorter operative time (31 vs 48 mins, p<0.001)
  - Decreased EBL (13 vs. 33 ml, p<0.001)
  - Decreased scar length (1.6 vs. 2.2 cm, p<0.001)
  - Increased cost 20-30 Euros
    - Barcynski M et al, Langenbecks Arch Surg 2008
MIVAT - Steps

• Start open
  – Skin incision 2-3cm
  – Define subplatysmal plane
  – Separate strap muscles in midline
  – Retract straps, medialize thyroid
• Introduce 30 deg scope for superior pole
  – Retract straps superior and lateral
  – Mobilize superior pole laterally
  – Identify SLN and cricothyroid muscle
  – Ligate superior pole vessels

MIVAT – Steps Continued

• With scope or open
  – Release middle thyroid veins and inferior parathyroid
  – Release inferior thyrothyric vessels anterior to trachea
    • May need to drop superior pole back in
  – Find RLN now or after delivery
• Open
  – Deliver thyroid, superior pole first
  – Identify RLN and superior para
  – Transect Berry’s ligament
  – Transect isthmus or go to other side
    • May need to dunk lobe back in if thick isthmus
Findings on final pathology

- Nodular goiter 62%
- Diffuse toxic goiter 2%
- Glands prophylactically removed 8%
- Intrathyroid parathyroid adenoma 8%
- Papillary carcinoma 18%
- Hurthle cell CA 6%
- Follicular CA 2%
- Microscopic medullary CA 2%

MIVAT Complications

- Transient hypocalcemia = 2.3%
- Permanent hypocalcemia = 0%
- Transient RLN injury = 0.7%
- Thermal skin injury = 5.8%
- Conversion rate (4cm incision) = 6.5%
  - Thyroiditis
  - Extrathyroidal extension (T3)
  - Thyroid too large

Vaysberg M, Steward DL, Laryngoscope 2007

Mean Operative Times
Significantly Reduced with Experience

- Hemi 66 vs. 42 mins p<0.05
- Total 110 vs. 77 mins p<0.05

Mean incision length 2.4cm
Lessons From the Learning Curve

• Thyroiditis can make MIVAT very difficult
  – Increased operative time
  – Consider conversion to open approach
• Early stage (T1-2) PTC, FTC, HTC
  – Can perform central node removal if clinically N0
  – Consider conversion for extrathyroidal extension or N1
• Size and shape matter
  – Long and skinny OK (5x2x2cm)
  – Thickness of lobe determines incision size

Lessons From the Learning Curve

• Skin incision stretches about 0.2-0.5cm
  – Avoid skin traction, pull on straps
  – Remove retractors during gland delivery
• Skin burn threatens cosmetic advantages
  – Care with scope, bovie, bipolar, and harmonic
  – Excise skin if deep thermal injury occurs

UC Ultrasound Course
Saturday Nov 1, 2008