Session VI: Minimally Invasive Thoracic Surgery: Miscellaneous

NOTES and POEM

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Overview

• Achalasia Overview
• Treatment options
• NOTES and Per Oral Endoscopic Myotomy Surgery (POEMS)
Achalasia

- Most common primary esophageal motility disorder
- 2,000 new cases diagnosed per year in the United States
Treatment Options for Achalasia

• Surgery
  • Thoracotomy with Heller myotomy and Belsey
  • Laparotomy with Heller and partial fundoplication
  • Esophagectomy reserved for end-stage cases

• Non-surgical Management
  • Balloon dilation
  • Botox injection

• Minimally Invasive Surgery
  • VATS myotomy and Belsey, largely abandoned
  • Laparoscopic myotomy and partial fundoplication

• NOTES Approach
  • Per-Oral Endoscopic Myotomy Surgery (POEMS)
Newest Therapy for Achalasia taking the world by storm: NOTES and POEMS

- **Natural Orifice Translumenal Endoscopic Surgery**
- Per Oral Endoscopic Myotomy Surgery (Poems) for achalasia is a form of NOTES
- Not a new concept: PEGs, Colonoscopic polyp removal, Esophageal mucosal resections, Transoral Zenkers, etc.
What is NOTES?

• NOTES utilizes natural body orifices and endoscopic based platforms to access body cavities to perform surgical interventions.
  – Incisionless
  – Rapid convalescence
  – Improved cosmesis
  – Less pain
Animal Studies

Submucosal endoscopic esophageal myotomy: a novel experimental approach for the treatment of achalasia

Authors

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Institutions

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Pasricha PJ et al. Endoscopy 2007
Materials And Methods

- Four pigs were used for this experiment.
- Baseline lower esophageal sphincter (LES) pressures were recorded and the pigs underwent upper endoscopy using a standard endoscope.
- POEM performed
- Manometry was repeated on day 5 after the procedure and the animals were euthanized on day 7.
Materials And Methods: Technique

• A submucosal saline lift was created approximately 5 cm above the LES and a small nick was made in the mucosa in order to facilitate the introduction of a dilating balloon.

• After dilation, the scope was introduced over the balloon into the submucosal space and advanced toward the now visible fibers of the LES. The circular layer of muscle was then cleanly incised using an electrocautery knife in a distal-to-proximal fashion, without complications.

• The scope was then withdrawn back into the lumen and the mucosal defect was closed with endoscopically applied clips.

  *Pasricha et al; Endoscopy 2007*
Standard upper endoscope fit with oblique cap attachment to facilitate dissection
Virtual perspective of the steps in the POEM procedure

A. Cushion creation via sub-mucosal injection of indo-carmine solution.
B. Longitudinal mucosal incision with triangle tip knife

*Ponsky et al; J GI Surg 2012*
Virtual perspective of the steps in the POEM procedure

C. Sub-mucosal tunnel creation extending towards the GE junction.
D. Retroflexed view looking towards the gastric cardia to identify indo-carmine solution in the sub-mucosal plane

Ponsky et al.; J GI Surg 2012
Virtual perspective of the steps in the POEM procedure

E. Circular muscle fibers division maintaining intact longitudinal fibers beneath.
F. Endoscopic clip closure of mucosal incision
Results

• LES pressures fell significantly from an average of 16.4 mm Hg to an average of 6.7 mm Hg after the myotomy.

• The necropsy examinations revealed no evidence of mediastinitis or peritonitis.

_Pasricha et al; Endoscopy 2007_
Conclusions Were Optimistic But Way Overstated

• Endoscopic submucosal esophageal myotomy is feasible, “safe, and effective” in the short term.

• It has the potential for being useful in patients with achalasia. The submucosal space is a novel and potentially important field of operation for endoscopic procedures.
Peroral endoscopic myotomy (POEM) for esophageal achalasia

Authors

Institution
Digestive Disease Center, Showa University Northern Yokohama Hospital

Inoue H et al. Endoscopy 2010
Methods

- POEM was performed in 17 consecutive patients with achalasia (10 men, 7 women; mean age 41.4 years).
- A long submucosal tunnel was created (mean length 12.4 cm), followed by endoscopic myotomy of circular muscle bundles of a mean total length of 8.1 cm (6.1 cm in distal esophagus and 2.0 cm in cardia).
- Smooth passage of an endoscope through the gastroesophageal junction was confirmed at the end of the procedure.

Inoue H et al. Endoscopy 2010
Results

• In all cases POEM significantly reduced the dysphagia symptom score (from mean 10 to 1.3; \( P = 0.0003 \))

• Resting lower esophageal sphincter (LES) pressure decreased from mean 52.4mmHg to 19.9 mmHg; \( P = 0.0001 \)).
Lateral esophagogram view demonstrates endoclips in position over the mucosal incision, no evidence of leak and prompt passage of contrast across the gastro-esophageal junction

Ponsky et al. : J GI Surg 2012
Results and Conclusions

• No serious complications related to POEM were encountered.

• Mean follow-up 5 months, with good relief of dysphagia

• Additional treatment or medication was necessary in only one patient (case 17) who developed reflux esophagitis (Los Angeles classification B);

• This was well controlled with regular intake of protein pump inhibitors (PPIs).

Inoue H et al. Endoscopy 2010
Peroral Endoscopic Myotomy (POEM) for Esophageal Primary Motility Disorders: Analysis of 100 Consecutive Patients

Ahmed M. Sharata • Christy M. Dunst • Radu Pescaru •
Eran Shlomovitz • Aaron J. T. Wille • Kevin M. Reavis •
Lee L. Swanström

Sharata AJ .... Swanstrom LL Gastrointest Surg  2015
Methods

• All patients (n=100) undergoing POEM from October 2010 to November 2013 at a single institution.
• Patients were classified based on high-resolution manometry (HRM).
• Operative data and immediate outcomes were reviewed. Symptom scores, HRM, and timed barium swallow (TBS) were performed prior to the procedure.
• Patients were asked to undergo routine postoperative testing 6–12 months after surgery with the addition of standard 24-h pH to the preoperative protocol.
• Morbidity was defined as requiring additional procedures or prolonged hospital stay >2 days

Sharata AJ …. Swanstrom LL Gastrointest Surg 2015
Results

- One hundred POEM patients were included in the final analysis.
- The mean age was 58 years (18–83 years).
- Primary presenting symptoms included dysphagia 81, chest pain 10, and regurgitation 9.
- The mean follow-up was 16 months.
- Manometry diagnoses:
  - Achalasia in 75 patients
  - Nutcracker esophagus in 12
  - Diffuse esophageal spasm (DES) in 5
  - Isolated hypertensive non-relaxing LES in 8
Results

The mean operative time was 128 min.

• The median hospital length of stay (LOS) was 1 day.
• The overall morbidity was 6%
  - Postoperative intra-tunnel hemorrhage in 1 patient
  - Ogilvie’s Syndrome in 1
  - Prolonged intubation for CO2 retention in 1 patient

All were treated endoscopically or with conservative management without further sequelae

*Sharata AJ …. Swanstrom LL Gastrointest Surg  2015*
Results

- The average LES resting/residual pressure significantly decreased (44.3/22.2 to 19.6/11.7 in millimeters of mercury).
- Timed barium swallow:
  - Esophageal emptying improved from 40 to 90 %
  - 93% of patients demonstrating >90 % emptying at 1 min.
- Of the achalasia patients, 36 % (17/47) showed some return of normal peristalsis (≥70 % peristalsis) on post-op HRM.
- Abnormal acid exposure was present on postoperative testing in 38 % (26/68).
- Of these, 14 were asymptomatic.
- No reflux patient required additional antireflux procedure.

*Sharata AJ .... Swanstrom LL Gastrointest Surg  2015*
Results

- Eckardt scores decreased from 6 to 1.
- Dysphagia was improved in 97% with a complete resolution accomplished in 89%.
- Complete dysphagia relief was better for achalasia patients (46/47 patients; 97.8%) vs. non-achalasia patients (17/24; 70.8%).
- Of those with preoperative chest pain, 91.5% reported complete relief.
- Four patients have refractory dysphagia.
- Two nonachalasia patients underwent subsequent laparoscopic Heller myotomy and two are improved following serial endoscopic dilatations.

*Sharata AJ …. Swanstrom LL Gastrointest Surg 2015*
Conclusions

- This study represents the largest single institution POEM series to date
- Reflux in one/three of patients
- Provided excellent relief of dysphagia (97%) and chest pain (91.5%) for patients with esophageal spastic disorders with acceptable procedural morbidity

*Sharata AJ …. Swanstrom LL Gastrointest Surg  2015*
Clinical response to peroral endoscopic myotomy in patients with idiopathic achalasia at a minimum follow-up of 2 years

Yuki B Werner, Guido Costamagna, Lee L Swanström, Daniel von Renteln, Pietro Familiari, Ahmed M Sharata, Tania Noder, Guido Schachschal, Jan F Kersten, Thomas Rösch
Objective

• To systematically report clinical outcome with a minimum post-POEM follow-up of 2 years
• Three centers (Hamburg, Germany, Rome, and Portland USA)

Werner YB et al Gut April 30, 2015 Online
Results

• Of 85 patients treated, five (5.9%) cases were excluded due to protocol violation or loss to follow-up.
• The remaining 80 patients were followed clinically for 29 months (range 24–41).
• Initial clinical response was observed in 77 cases (96.3%) (3 failures).
• Clinical recurrences (later failures) were seen in a further 14 cases (17.7%), accounting for total of 17 patients, a total failure rate of 21.5%.

*Werner YB et al Gut April 30, 2015 Online*
Treatment of Failures

• Of the 17 failures, 13 have been treated, with good symptom relief in 5 out 13
• Balloon Dilation : n=4; failed in all 4 as a single retreatment
• Re-POEM: n=4, successful in 3 out of 4.
• Lap Heller Myotomy n=5, 2/5 successful
Conclusions: Multicenter Study 2 year follow-up

• In this multicenter retrospective analysis, a high initial success rate (96%) of POEM is followed by a midterm recurrence rate of 18% (2 year follow-up).

• Reflux esophagitis is frequent and should probably be treated by regular low-dose PPI therapy.
Final Study is a Retrospective Comparison of Laparoscopic Heller vs. POEM (Swansonstrom)

- Retrospective study, 101 patients: 64 Heller Myotomy (42% Toupet and 58% Dor fundoplications) and 37 POEMs.
- Median operative time and mean LOS were significantly higher for Laparoscopic Myotomy, no difference in complications.
- Eckardt scores were significantly better for POEMs in 1 month, no difference in 6 months.
- Post-op Manometry: Both groups had significant improvements in LES profiles, resting LES pressure higher in POEM.
- 24-hour pH testing was obtained in 48% Heller’s and 76% POEMs; 39% of POEMs and 32% of HM had abnormal acid exposure (P = 0.7).
- **Conclusion:** POEM is comparable with laparoscopic Myotomy for safe and effective treatment of achalasia.

*Bhayani NH,.... Swanstrom LL, Ann Surg 2014*
Meta Analyses POEM vs. Laparoscopic Heller Myotomy: Results and Conclusions

• No differences between POEM and Laparoscopic Myotomy in:
  - Pain score
  - Operating time
  - Length of hospital stay
  - Complications
  - Gastroesophageal reflux
  - Symptomatic recurrence by Eckardt score

**Conclusion:** POEM achieves equivalent *short-term outcomes* compared with Laparoscopic Heller Myotomy for achalasia.

*Wei M et al. Journal Of Laparoendoscopic & Advanced Surgical Techniques; 2015*
University of Pittsburgh
POEMS Program-1

- Two thoracic surgical attendings took the Cadaver Course in an established center
- Observed two live cases
- One surgeon had experience with over 300 laparoscopic myotomies
- First 8 cases with proctor present from established center, same surgeons on all cases
University of Pittsburgh
POEMS Program-2

• Initial Series of POEM for achalasia presented at the 2016 annual AATS meeting

• The preliminary results of the POEM series at UPMC will be discussed
Conclusions

• Laparoscopic surgical myotomy with partial fundoplication remains the standard of care for achalasia

• POEMS is a new technique for Achalasia
  – published short term results in small series of patients, and limited 2 year data show low morbidity in experienced hands
  – Relief of dysphagia appears adequate and comparable to Laparoscopic Heller
  – Significant incidence of documented gastroesophageal reflux after procedure but preliminary uncontrolled data showed similar to Heller
  – Further studies on durability of relief of symptoms and outcomes is required, would be best addressed by randomized, controlled trial
Thank You