The Endoscope is a Surgical Tool When in the Hands of Surgeons.

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Professor of Surgery

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Director Bariatric and Metabolic Institute
Vice Chairman Business Development
Director Center For the Future of Surgery
Department of Surgery
Predicting the future…

“I think there is a world market for about five computers”

Thomas Watson
Chairman IBM, 1943
Predicting the Future...

“640K ought to be enough for anybody”

Bill Gates (1981)
History of Endoscopy

- Desormeaux (1853) coined term “endoscope”
  - first use of Bozzini’s “lichtleiter” in a patient
  - later used metallic tube illuminated by gasogene lamp
- Kussmaul (1868)
  - first successful gastroscopy
- Leiter (1881)
  - esophagoscope with oil lamp
- Kelly (1895) - sigmoidoscope
- Chevalier Jackson (1907) - American surgeon
  - foreign body removal
- Rudolf Schindler (1937)
  - developed semi-flexible endoscope
- Basil Hirschowitz (1957)
  - fiberoptic endoscope
History of Flexible Endoscopy
Role of Surgeons

- Endoscopic Retrograde Choleangiopancreatography
- Colonoscopic polypectomy
- Percutaneous Endoscopic Gastrostomy
- Variceal banding

- Endoscopic GERD therapy ?
- Endoscopic bariatric procedure ?
- Translumenal surgery ?
The reasons for NOTES

- Less pain
- No infections
- The concept that technological advancements will help in improving trauma and discomfort of surgery
- Improved cosmetic appearance
NOTES

Video. NOTES: transvaginal cholecystectomy with assisting articulating instruments.

Transvaginal organ extraction: potential for broad clinical application.
Jacobson GR¹, Ebara-Gamboa JS, Coker AM, Cheverla J, Maciej CA, Sandler BJ, Talamini MA, Horgan S.

NOTES laparoscopic-assisted transvaginal sleeve gastrectomy in humans—description of preliminary experience in the United States.

Clinical experience with a multifunctional, flexible surgery system for endoluminal, single-port, and NOTES procedures.
Horgan S¹, Thompson K, Talamini M, Ferreras A, Jacobson G, Spaun G, Cullen J, Swainstrom L.

NOTES: a review of the technical problems encountered and their solutions.
Mintz Y¹, Horgan S, Cullen J, Stuart D, Faler E, Talamini MA.

The inflammatory response in transgastric surgery: gastric content leak leads to localized inflammatory response and higher adhesion disease.
Ramamoorthy S¹, Leal IA, Leal AI, Carloni E, Sato T, Sato T, Sato T, Sato T, Sato T, Sato T, Sato T, Sato T.

NOTES: the hybrid technique.
Mintz Y¹, Horgan S, Cullen J, Ramamoorthy S, Chock A, Saru MK, Easter DW, Talamini MA.

Natural orifice surgery: initial clinical experience.

Women's positive perception of transvaginal NOTES surgery.
Peterson CY¹, Ramamoorthy S, Andrews B, Horgan S, Talamini M, Chock A.
Transvaginal access
Retraction
Removal
Post op
Transgastric set-up
Transgastric appendectomy
Transgastric cholecystectomy
Learning curve

Operating Time (Minutes)

Number of Transvaginal Cases

$R = 0.755$
NOTES
TRANSORAL REMNANT EXTRACTION (TORE) FOR SLEEVE GASTRECTOMY

Sheetal Nijhawan, MD
Saniea Majid, MD
Toshio Katagiri, MD
Takayuki Dotai, MD
Bryan Sandler, MD

Garth Jacobsen, MD
Michael Sedrak, MD
Alan Wittgrove, MD
Mark Talamini, MD
Santiago Horgan, MD

UCSD
Center for the Future of Surgery
Gastric Closure
Intragastric surgery
Laparo-endoscopic Transgastric Resection of GIST

- 14 patients total
- Conclusions:
  - Progress is still needed to push the envelope in the care of cancer patients
  - Minimally invasive surgical approaches are emerging as a valid and potentially better approach for resecting malignancies
  - Advancing surgical techniques with new approaches such as laparo-endoscopy may limit surgical trauma while meeting oncologic standards

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent (%)</th>
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<tr>
<td>Operative time (min)</td>
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<td></td>
</tr>
<tr>
<td>Mean</td>
<td></td>
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<tr>
<td>Median</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
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<tr>
<td>84.1 ± 33.9</td>
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<tr>
<td>Estimated blood loss (ml)</td>
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<td></td>
</tr>
<tr>
<td>Mean</td>
<td></td>
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<tr>
<td>Range</td>
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<tr>
<td>20 ± 12.8</td>
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<tr>
<td>20</td>
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<tr>
<td>5-50</td>
<td></td>
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<tr>
<td>Length of postoperative hospital stay (days)</td>
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</tr>
<tr>
<td>Mean</td>
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<td>Range</td>
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<td>1.8 ± 1.5</td>
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<td>Patients with Intra-Operation Complication</td>
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<td>Reoperation</td>
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<tr>
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<td>14</td>
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<td>Patients with Post-Operation Complication</td>
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<tr>
<td>Bleed at resection site/hematemesis</td>
<td>2</td>
<td>14.3</td>
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<tr>
<td>Nausea</td>
<td>3</td>
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<td>Abdominal Pain</td>
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<td>Other (Urinary retention)</td>
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<tr>
<td>No</td>
<td>14</td>
<td>100</td>
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</table>
Treatment of Achalasia
Evolution of the Technique

- Open Surgery: 1990
- Thoracoscopic/Laparoscopic Surgery: 1995
- Robotic Surgery: 2000
- POEM 2010: First USA site to perform POEM
The Steps And Outcome Of Trans Esophageal Endoscopic Myotomy (TEEM)

Takayuki Dotai MD
Toshio Katagiri MD
Sheetal Nijhawan MD
Sanjea Majid MD
Ozanan Meireles MD
Michael Sedrak MD

Abraham Mathew MD
Bryan Sandler MD
Garth Jacobsen MD
Mark Talamini MD
Santiago Horgan MD

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Results

- 110 patients
- Hospital stay: 2 days per protocol
- Pain: minimal
- OR time: 60 minutes (50 - 80
- Manometric findings:
  - LES preop: 35 mmHg
  - LES post op: 8 mmHg
ACES
articulated circular endoscopic stapler
### Results

**Weight loss**

<table>
<thead>
<tr>
<th>Follow up</th>
<th># patients</th>
<th>Mean % EWL</th>
<th>Mean % Total Weight loss (kg)</th>
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<td>7 days</td>
<td>21</td>
<td>13.8</td>
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<td>1 month</td>
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<td>2 months</td>
<td>15</td>
<td>24.6</td>
<td>9.2</td>
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<td>3 months</td>
<td>10</td>
<td>28.4</td>
<td>11.2</td>
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<td>6 months</td>
<td>21</td>
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<td>12</td>
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<tr>
<td>9 months</td>
<td>10</td>
<td>31</td>
<td>13</td>
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</table>
Endoluminal Bypass

Restriction of Stomach Volume
Endoscopic, Endolumenal Bypass

• Fully endoscopic, trans-oral endolumenal procedure
Endoscopic, Endolumenal Bypass
Endoscopic, Endolumenal Bypass
Clinical Data

Subgroup analysis of good food capture

- 53.6% EWL (52 lbs)

Full cohort – 45.4% EWL

- (46 lbs)
A New Anastomosis Technique
Endoscopic Leak Closure

- 41 patients treated with over-the-scope clip application
  - 17 acute leaks (<6 months)
  - 20 chronic leaks (>6 months)
  - 4 uncontrolled GI bleeding

- Acute leak resolution better than chronic (94% vs 50%)

- 70% overall resolution
  - 10 required multiple clips
  - 5 re-operations

Liu et al. Surg Endosc 2017 - accepted
Endoscopic Stent Placement

- 67 bariatric patients with leaks
- 88% leak closure rate with stents
  - radiographic closure documented after stent removed
- Migration most common stent complication (17%)
- 9% of patients (6/67) required revision surgery due to unsuccessful leak closure with stent
- 6-8 weeks appears to be optimal time for stent removal

Puli et al. Gastrointest Endosc 2012
Medigus

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Procedure Overview

- Overtube placed
- Stapler inserted and retroflexed
- Tissue clamped and staples fired
Procedure Goal: Anterior Fundoplication

- Endoscopic flap valve reconstruction
Collaboration with Head and Neck Surgery

• Endoscopic treatment of Zenker’s Diverticulum
Reverse NOTES: Hypopharyngeal stenosis

Reverse NOTES: Esophageal Canulization

John Cullen MD
Kari Thompson MD
Adam Spivack MD
Brian Wong MD

Lauren Fischer MD
Garth Jacobsen MD
Mark Talamini MD
Santiago Horgan MD
ABS Establishes New Requirement for Endoscopic Training and Assessment

MARCH 6, 2014 | MEDIA CONTACT: CHRISTINE SHIFFER, 215-568-4000 EXT. 137

A new national curriculum in endoscopy to be required of all general surgery trainees

The American Board of Surgery (ABS), the national certifying body for general surgeons and related specialists, announces a new requirement to ensure all ABS-certified general surgeons have completed a standard curriculum in the use of endoscopic techniques. This new requirement will apply to applicants for board certification in general surgery who complete their residency training in the 2017-2018 academic year or thereafter.

During their general surgery residency, applicants will be required to have completed the ABS Flexible Endoscopy Curriculum (pdf). The curriculum provides a consistent instructional program for residents to acquire the essential knowledge and skills to perform flexible endoscopy.

The Flexible Endoscopy Curriculum is designed to provide general surgery residency programs with a stepwise, milestone-based program for the teaching of endoscopic procedures over the five years of residency. For each step (level), there are a variety of suggested resources, including direct links to content on the SCORE® Portal (www.surgicalcore.org). The ABS is not mandating the use of any particular resource and encourages programs to take advantage of the resources for endoscopic training already in existence at their institution.

Programs should track residents’ progress by documenting when each level of the curriculum is completed. In addition, one of the final milestones in the curriculum is successful completion of the Fundamentals of Endoscopy program offered by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) validated assessment of a surgeon’s competency in flexible endoscopy and includes didactic material, examination, and a hands-on skills test. Residents will be required to provide evidence of FES completion.

The FES didactic materials are available without charge at www.fesdidactic.org. Preparation for and exam is available at www.fesprogram.org.
SAGES Fundamentals of Endoscopic Surgery (FES) program is a comprehensive educational and assessment tool designed to teach and evaluate the fundamental knowledge, clinical judgment and technical skills required in the performance of basic gastrointestinal (GI) endoscopic surgery.

- Both web-based didactic curriculum and 2-part validated assessment
- [http://www.fesprogram.org](http://www.fesprogram.org)
Surgical Education: *Then*

- Trainees were truly residents of the hospital
- Surgery was life
- Apprenticeship model
- No work-hour restrictions
- High case volume
- Absence of surgical simulation
Club Med
Center for the Future of Surgery

- 5 operating suites
- 22 fully functioning operating bays
- 2 da Vinci Surgical Robotic Systems
- Porcine, cadaver and inanimate simulation labs
  - 15 full simulation labs per month
Background

- Established since 2011
- The CFS has trained > 20,000 medical professionals
  - 8661 Surgeons in practice
  - 754 Physicians in other specialties
  - 3346 Surgical Residents
  - 2820 Medical students
  - 978 Nurses
  - 2643 Other health professionals and Industry representatives

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HYBRID OR
MICROSURGERY LAB
MICROSURGERY LAB
ICG Coated Needle Project:
Simulating Lost Needle During Laparoscopic Surgery in a Rabbit Model

Jonathan DeLong, Erin Ward, Sarah Blair, Santiago Horgan
UC San Diego Department of Surgery
Conclusions

- The future is now - endoscopic tool/technique/development will continue

- Laparoscopic procedures will be affected by this evolution in flexible endoscopy

- Endoscopic training and competence is essential during surgical training