Eastern Association for the Surgery of Trauma

Advancing Science, Fostering Relationships, and Building Careers

MIS MASTERS Course

January 14, 2020
Loews Sapphire Falls Resort
Orlando, Florida

8:00 am-5:00 pm
Grand Caribbean Ballrooms 3-5

MIS M**ultisociety** A**dvanced** S**kills** T**raining in** E**me**R**gency** S**urgery (MASTERS) Course**

TUESDAY, JANUARY 14, 2020 **8:00 am-5:00 pm**

This Course is Co-Sponsored by: SAGES, ASCRS, AAST, and EAST

8:00 am-8:05 am
Introduction: Addressing the Education Gap in Acute Care Surgery and the Increasing Use of MIS Techniques

8:05 am-9:15 am - **MIS Techniques in Trauma -** Moderators: Robert Lim, MD (SAGES) & David Spain, MD (AAST)
8:05 am-8:20 am Exploration for Penetrating Abdominal Trauma – Matthew Martin, MD (EAST)
8:20 am-8:35 am Diaphragm Injury-Laparoscopy – Steve Eubanks, MD (SAGES)
8:35 am-8:50 am Retained Hemothorax-Percutaneous & Thoracoscopy – Clay Cothren Burlew, MD (AAST)
8:50 am-9:00 am Pro/Con Debate: MIS for Penetrating Trauma – Ruby Skinner, MD (EAST) vs. David Spain, MD (AAST)
9:00 am-9:15 am Panel Discussion – All Faculty

9:15 am-10:30 am - **Foregut and Small Bowel -** Moderator: Steve Eubanks, MD (SAGES) & Andrea Pakula, MD (EAST)
9:15 am-9:30 am Parasophageal/Diaphragmatic Hernias – Sharona Ross, MD (SAGES)
9:30 am-9:45 am Peptic Ulcer Disease – Michael Cripps, MD (SAGES)
9:45 am-10:00 am ACS Emergencies in the Post Bariatric Surgery Patient – Robert Lim, MD (SAGES)
10:00 am-10:10 am Pro/Con Debate – Lap SBO Exploration – Andrew Bernard, MD (EAST) vs. Robert Lim, MD, MD (SAGES)
10:10 am-10:30 am Panel Discussion – All Faculty

10:30 am-10:45 am Break

10:45 am-12:00 pm - **Hepatobiliary/Pancreatic -** Moderators: Sharona Ross, MD (SAGES) & Ruby Skinner, MD (EAST)
10:45 am-11:00 am The Disaster Gallbladder – David Spain, MD (AAST)
11:00 am-11:15 am Common Duct Exploration – Sara Hennessey, MD (SAGES)
11:15 am-11:30 am Necrotizing Pancreatitis & VARD – Andrew Bernard, MD (EAST)
11:30 am-11:40 am Debate: Subtotal Chole vs. Convert to Open – Matthew Martin, MD (EAST) vs. Ruby Skinner, MD (EAST)
11:50 am-12:05 pm Panel Discussion – All Faculty

Lunch Break 12:00 pm -1:00 pm

1:00 pm-2:15 pm - **Colorectal Emergencies -** Moderators: Neil Hyman, MD (ASCRS) & Najjia Mahmoud, MD (ASCRS)
1:00 pm-1:15 pm Complicated Diverticular Disease – Jason Hall, MD (ASCRS)
1:15 pm-1:30 pm Colorectal Cancer-Obstructing and Near-Obstructing – Larissa Temple, MD (ASCRS)
1:30 pm-1:45 pm Iatrogenic Colon Perforation – Timothy Geiger, MD, MMHC (ASCRS)
1:45 pm-2:00 pm The Difficult Stoma – Eric Johnson, MD (ASCRS)
2:00 pm-2:10 pm Pro/Con Debate: Hartmann's is Obsolete – Neil Hyman, MD (ASCRS) vs. Najjia Mahmoud, MD (ASCRS)
2:10 pm-2:30 pm Panel Discussion – Faculty

2:30 pm-3:45 pm - **Hernia/Abd Wall -** Moderators: Kimberly Davis, MD (AAST) & Eric Johnson, MD (ASCRS)
2:30 pm-2:45 pm Incarcerated /Strangulated Inguinal/Femoral Hernias – Sara Hennessey, MD (SAGES)
2:45 pm-3:00 pm Incarcerated/Strangulated Ventral Hernias – Patrick Reilly, MD (AAST)
3:00 pm-3:15 pm Approaches to Abd Wall Reconstruction – Andrea Pakula, MD, MPH (EAST)
3:15 pm-3:25 pm Pro/Con Debate: Mesh Use in Contaminated Hernia Cases – Michael Cripps, MD (SAGES) vs. Kimberly Davis, MD, MBA (AAST)
3:25 pm-3:45 pm Panel Discussion – All Faculty

3:45 pm-4:00 pm Break

4:00 pm-5:00 pm - **Robotics in Acute Care Surgery -** Moderators: Robert Lim, MD (SAGES) & Matthew Martin, MD (EAST)
4:00 pm-4:10 pm Robotic Surgery Platforms – Ruby Skinner, MD (EAST)
4:10 pm-4:20 pm Fluorescence Imaging-Overview & How to Use It – Sharona Ross, MD (SAGES)
4:20 pm-4:30 pm Integrating Robotics into Your ACS Practice – Andrea Pakula, MD, MPH (EAST)
4:30 pm-5:00 pm Panel: Integrating Robotics into Your Acute Care Surgery Practice – All Faculty

MIS for Penetrating Abdominal Trauma

Matthew Martin, MD, FACS, FASMBS
Scripps Mercy Hospital
San Diego, CA

MIS MASTERS COURSE
Multisociety Advanced Skills Training in Emergency Surgery

1

Disclaimers/Disclosures

- No financial conflicts to disclose
- These are my opinions and do not represent EAST, Scripps, or any other organization
- MD, FACS, FASMBS?

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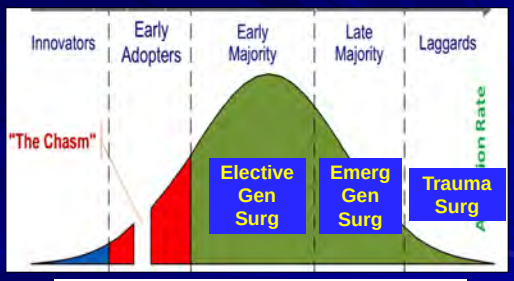

We have some catching up to do!

4

Role of Laparoscopy in Penetrating Abdominal Trauma: A Systematic Review

World J Surg (2013) 37:113–122

Eimer O'Malley · Emily Boyle · Adrian O'Callaghan · J. Calvin Coffey · Stewart R. Walsh

- 51 studies, 2569 patients
- 44% were positive
- 1497 (58%) avoided a NTL
- 3% complications

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Role of Laparoscopy in Penetrating Abdominal Trauma: A Systematic Review

World J Surg (2013) 37:113–122

Eimer O'Malley · Emily Boyle · Adrian O'Callaghan · J. Calvin Coffey · Stewart R. Walsh

- Sensitivity: 66% to 100%
- Specificity: 33% to 100%

23 of the studies had 100%

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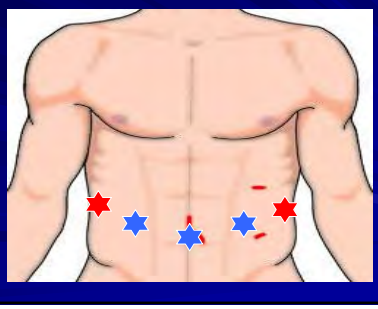
Trocar Placement?



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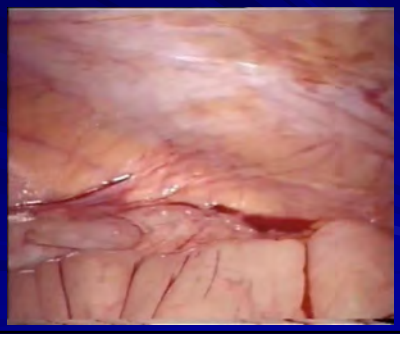
Evaluation for Peritoneal Penetration



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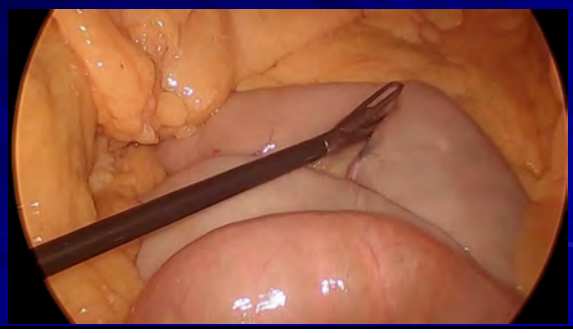
Bad Bowel Handling Habits



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Good bowel handling technique

10

The “Mesentery Handle”

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The Diaphragm Evaluation

- Left subcostal stab wound
- Stable and benign abdominal exam
- Mild intoxication
- No indication for urgent laparotomy
- Taken to OR for DL to eval diaphragm
- Small diaphragm lac repaired

- POD 1 has free air and peritonitis??

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Left Subcostal Stab Wound

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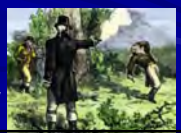
Avoiding Suboptimal MIS?

1. Going to OR too early

Never do today what you can put off till tomorrow. Delay may give clearer light as to what is best to be done.

(Aaron Burr)

Admit
Serial exams for 8-24 hrs
Then do focused laparoscopy



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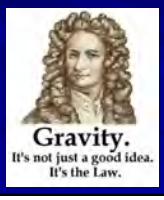
Avoiding Suboptimal MIS?

1. Going to OR too early
2. Inadequate visualization



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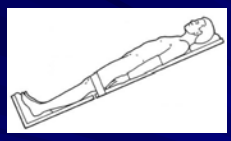
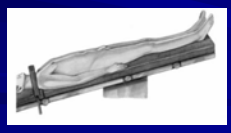


- Diaphragm/spleen
- Liver
- Stomach/duo



- Cecum/Sigmoid
- Bladder/Uterus
- Pelvis

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Gravity as your first assistant

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Avoiding Suboptimal MIS?

1. Going to OR too early
2. Inadequate visualization
3. Inadequate exploration

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Int J Crit Illn Inj Sci. 2015 Jul-Sep; 5(3): 196–205. PMCID: PMC4613419
doi: 10.4103/2229-5151.165004

Laparoscopy in trauma: An overview of complications and related topics

"Hypothesize high rate of missed injuries due to using 2 ports instead of 3"

Consequently, the use of TL
believed to be very depend
perforation cannot be confi
were seven missed injuries
importance, although the se
43% in the epigastric, flank
TL missed one (12.5%), wl
hemoperitoneum preventin
injury on TL was a pancrea
rate of missed bowel injury
and recommended that a st
also more reliably rule out

mains controversial and is
commend that if bowel
rmed.[3] In one study, there
us.[17] Of additional
lominal area, it was only
eight diaphragm injuries,
wound with injury and
ra *et al.*,[16] the only missed
ypothesized that the high
ic port sites instead of three,
ssary laparotomies but can
is utilized.[16]

One-armed man applauds the kindness

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Avoiding Suboptimal MIS?

1. Going to OR too early
2. Inadequate visualization
3. Inadequate exploration
4. Converting to open for any positive findings

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Laparoscopic Suturing

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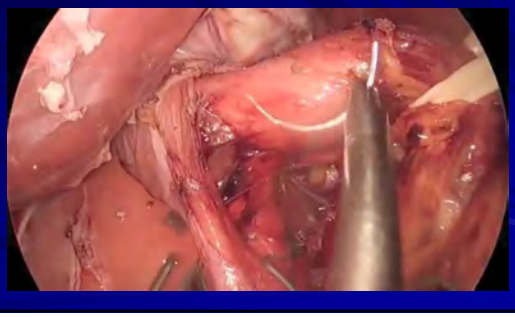
Laparoscopic Knot-Tying



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Laparoscopic Stapling

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The Positive Exploration

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Bowel Resection

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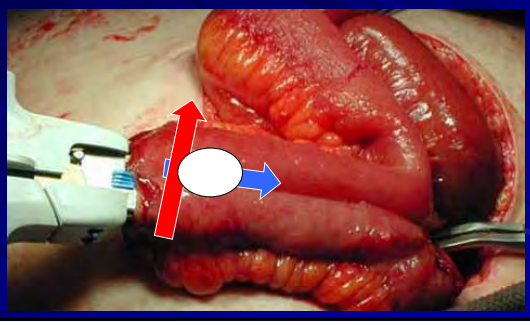
Standard Stapled Anastomosis



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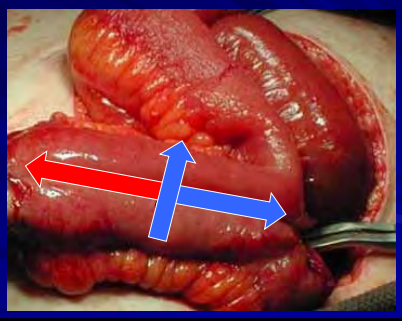
“Triple-Stapled” Anastomosis



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Anastomosis

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Mesenteric Defect Closure

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Extracorporeal Repair

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CURRENT OPINION

J Trauma Acute Care Surg
Volume 86, Number 2

Trauma laparoscopy and the six *w*'s: Why, where, who, when, what, and how?

Salomone Di Saverio, MD, Arianna Birindelli, MD, Mauro Podda, MD, Edoardo Segalini, MD, Alice Piccinini, MD, Carlo Coniglio, MD, Cristina Frattini, MD, *and* Gregorio Tugnoli, MD, PhD, *Cambridge, United Kingdom*

Standard Examination System for Laparoscopy in Penetrating Abdominal Trauma (*J Trauma.* 2009;67: 589–595)

Nilton Tokio Kawahara, MD, PhD, Clarissa Alster, MD, PhD, Ikurou Fujimura, MD, PhD, Renato Sergio Poggetti, MD, PhD, FACS, and Dario Birolini, MD, PhD, FACS

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Thank You!

east

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Multisociety Advanced Skills Training in EmeRgency Surgery

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Retained Hemothorax

Clay Cothren Burlew, MD FACS

Professor of Surgery
Director, Surgical Intensive Care Unit
Program Director, SCC & TACS Fellowships
Denver Health Medical Center / University of Colorado

No conflicts.

Retained Hemothorax

- Tips and Tricks
  - Diagnosis
  - How to avoid it
  - How to approach it

Retained Hemothorax

- Tips and Tricks
  - Diagnosis
  - How to avoid it
  - How to approach it

Retained Hemothorax

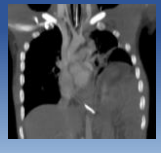
- May need to confirm the diagnosis
  - → a.k.a. avoid sabotage

Resolution once ETT pulled back

R mainstem intubation with L atalectasis

Retained Hemothorax

- May need to confirm the diagnosis



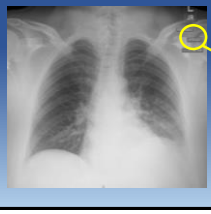
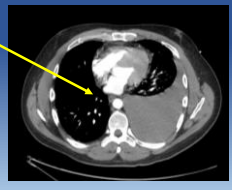
Diaphragm rupture with stomach/spleen in the L chest

Retained Hemothorax

- CXR can have many different findings:


Retained Hemothorax

- CXR can have very subtle findings:

Retained Hemothorax

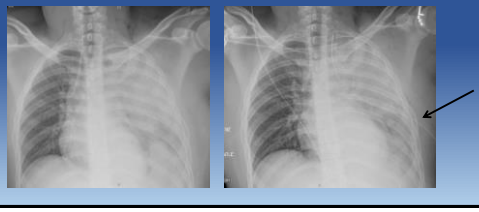
- Classic film and CT scan


Retained Hemothorax

- Tips and Tricks
  - Diagnosis
  - How to avoid it
  - How to approach it

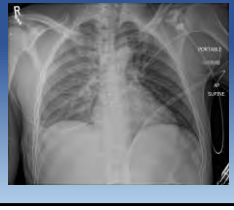
Retained Hemothorax

- How to avoid it (i.e. the film we all hate…):

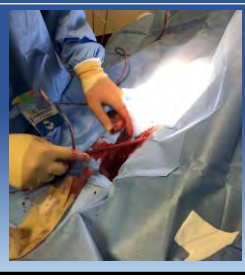
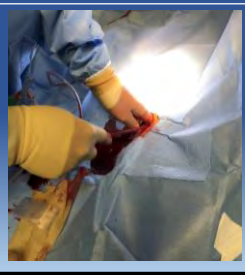


Retained Hemothorax

- Tube thoracostomy technique #1 – the "YATS"



The "YATS"

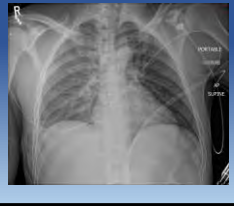



The "YATS"

- Sterile tubing
- Yankhauer suction
- Sweeping motion along posterior chest wall
- Importance of conscious sedation!

The "YATS"

- Before and after….

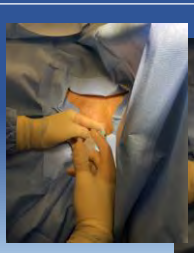


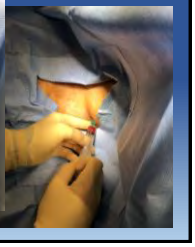

Retained Hemothorax

- Tube thoracostomy technique #2 – pleural irrigation

Pleural Irrigation

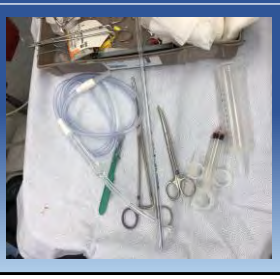
- Take time with local anesthetic
- Numb over top of the rib/pleura





Pleural Irrigation

- Toomey syringe with plunger out
- 28 Fr chest tube
- YATS items

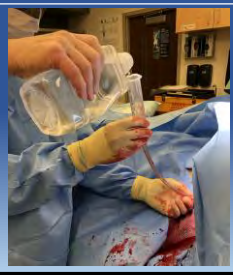


Pleural Irrigation

- YATS first to evacuate the liquid blood and "easy clot"

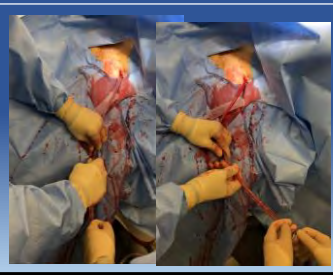
Pleural Irrigation

- Chest tube into pleural space
- Toomey into end of tube
- Warm irrigation



Pleural Irrigation

- Evacuate irrigant and clot
- Ideally like…



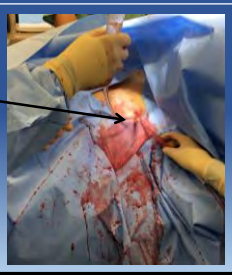
Pleural Irrigation

- More often like…

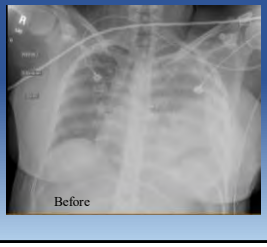
Pleural Irrigation

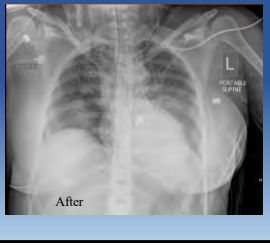
Trouble shooting:

- Irrigant exiting the chest tube hole
- Faster to use 2 tubes…irrigant in one, suction on other



Pleural Irrigation - Results





Retained Hemothorax

- Tips and Tricks
  - Diagnosis
  - How to avoid it
  - How to approach it (thoracoscopically)

Surgery for Retained Hemothorax

- Be in the OR within 48-72 hours
- Plan for both a VATS and thoracotomy

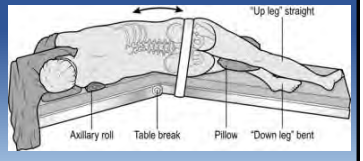
VS.

When To Say "No"

- Hemodynamic instability
- Inability to achieve lung isolation
- Lack of equipment availability/familiarity
- Failure to make progress or failure of prior VATS

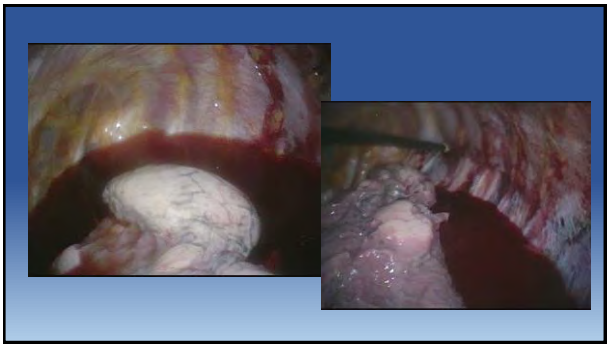
Positioning

- Coordinate with other services
- Pelvic fx?
- Cspine cleared?



Port Sites

- Wide prep and drape
- Plan potential incisions
  - Start with posterior
  - Then 1 or 2 chest tube sites as ports…



Questions??

MIS FOR PENETRATING ABDOMINAL TRAUMA (PRO)

Ruby A. Skinner MD FACS FCCP FCCM
EAST MIS Masters Course
January 2020

1

Am J Surg. 1995 Dec;170(6):632-6; discussion 636-7.

Therapeutic laparoscopy in trauma.

Smith RS[1], Fry WR, Morabito DJ, Koehler RH, Organ CH Jr.

JSLS. 2018 Oct-Dec;22(4). pii: e2018.00050. doi: 10.4293/JSLS.2018.00050.

Laparoscopic Splenectomy for Trauma.

Shamim AA[1], Zafar SN[2], Nizam W[1], Zeineddin A[1], Ortega G[1], Fullum TM[3], Tran DD[3].

Surg Endosc. 2019 Oct 11. doi: 10.1007/s00464-019-07169-z. [Epub ahead of print]

Are we doing too many non-therapeutic laparotomies in trauma? An analysis of the National Trauma Data Bank.

Shamim AA[1,2], Zeineddin S[3], Zeineddin A[4], Olufajo OA[4], Mathelier GO[5], Cornwell III EE[4], Fullum T[4], Tran D[4].

2

Patient Selection/ Technical Challenges

- CT imaging to guide surgical approach.
- The hemodynamic derangements that can tolerate pneumoperitoneum
- Injury complex/ non TBI / isolated abdominal?

Suturing-

- Controlled suturing of vascular injuries
- How to handle complex intestinal injuries

Exposure of retroperitoneum

Advanced Training- Courses/ /Fellowships

3

Controlled MIS Repair of IVC Injury

Con: MIS for Penetrating Trauma

David A. Spain, MD
Stanford University
@DavidASpain

Stanford MEDICINE | Surgery

S-SPIRE Stanford-Surgery Policy Improvement Research & Education

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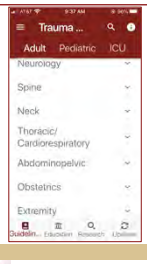
Our Trauma Manual: 2 indications for laparoscopy



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Open access Challenges in trauma and acute care surgery

Trauma Surgery & Acute Care Open

LAPRA-TY for laparoscopic repair of traumatic diaphragmatic hernia without intracorporeal knot tying

Jeff Choi,[1] Jenny Pan,[1] Joseph D Forrester,[2] David Spain,[2] Timothy D Browder[2]

Figure 1 Traumatic penetrating diaphragmatic injury to the left hemidiaphragm with a 1.5 cm defect.

Figure 2 Postrepair of TDI with figure-of-eight 0-Ethibond suture, secured with two LAPRA-TY clips.

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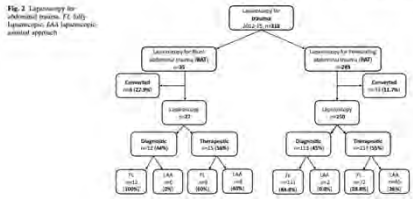
Trauma laparoscopy: when to start and when to convert?

Oleh Matsevych[1,2] · Modise Koto[1,2] · Moses Balabyeki[1] · Colleen Aldous[2]

Surg Endosc (2018) 32:1344–1352
https://doi.org/10.1007/s00464-017-5812-6



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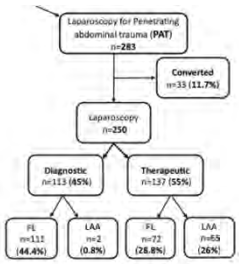

- About 3 patients/month in Therapeutic group
  - Never tell you the denominator
  - Don't tell you what was done in Therapeutic group but in another publication "small-bowel repair, resection, and anastomosis were the most commonly performed procedures."
- How many of the Diagnostic group would have been OK with OBS?

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Laparoscopy for Penetrating Trauma

- OK for a super-selective group of patients
  - Hemodynamically stable
  - Very specific indications: LUQ stab wound and tangential GSW
- Have to know what you are doing and its limitations

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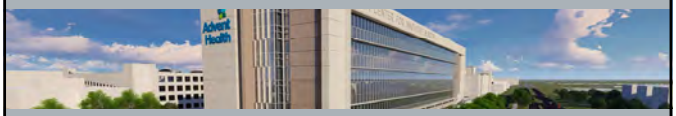
MIS Paraesophageal / Diaphragmatic Hernias



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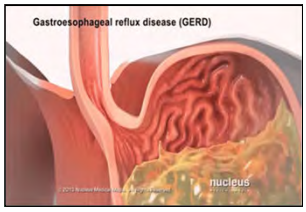
Background

- Gastroesophageal reflux disease (GERD)
  - What is it?



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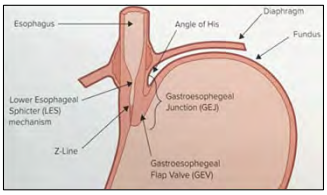
Background

- Gastroesophageal reflux disease (GERD)
  - What is it?



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Background

- Concerns
  - Short-term
    - Heartburn, non-cardiac angina, dysphagia, voice changes, recurrent pneumonia, and cough
  - Long-term
    - Ulcers
    - Barrett's esophagus
    - Esophageal cancer

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Background

- Long-term concerns
  - Ulcers
  - Barrett's esophagus
  - Esophageal cancer

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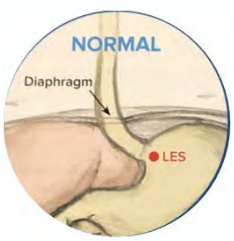
Background

- Hiatal hernias



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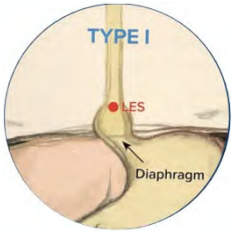
Background

- Hiatal hernias
  - Type I



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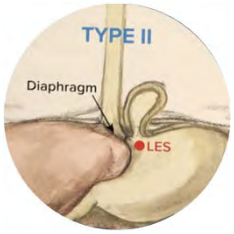
Background

- Hiatal hernias
  - Type I
  - Type II



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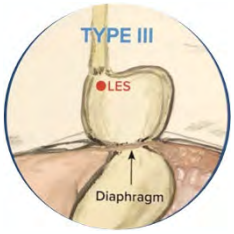
Background

- Hiatal hernias
  - Type I
  - Type II
  - Type III



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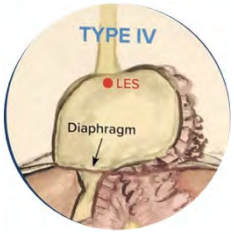
Background

- Hiatal hernias
  - Type I
  - Type II
  - Type III
  - Type IV



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Background

- Diagnosis
  - Upper gastrointestinal barium study (UGI)

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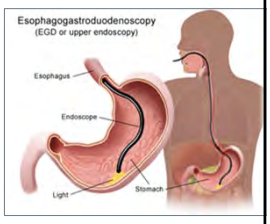
Background

- Diagnosis
  - Upper gastrointestinal barium study (UGI)
  - Esophagogastroduodenoscopy (EGD)



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Background

- Diagnosis
  - Upper gastrointestinal barium study (UGI)
  - Esophagogastroduodenoscopy (EGD)
  - Ambulatory pH study

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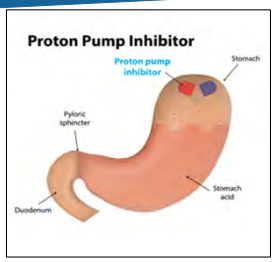
Background

- Treatment
  - Non-medical
    - Weight loss
    - Diet
  - Medical therapy
    - PPI's
    - H-2 histamine blockers
  - Surgical intervention



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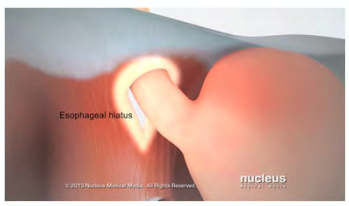
Background

- Treatment
  - Non-medical
    - Weight loss
    - Diet
  - Medical therapy
    - PPI's
    - H-2 histamine blockers
  - Surgical intervention



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Background

- Approaches

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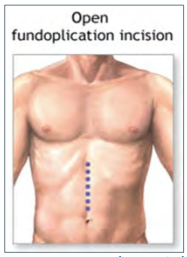
Background

- Approaches
  - Open



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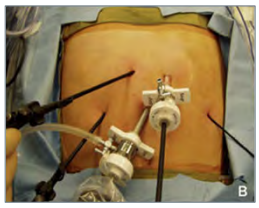
Background

- Approaches
  - Open
  - Laparoscopic



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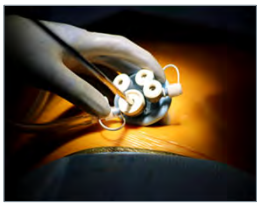
Background

- Approaches
  - Open
  - Laparoscopic
  - Laparoendoscopic single-site (LESS)



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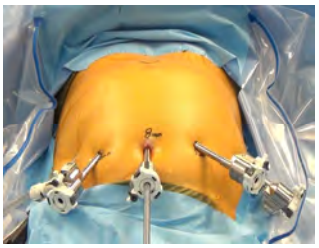
Background

- Approaches
  - Open
  - Laparoscopic
  - Laparoendoscopic single-site (LESS)
  - Robotics



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Robotic Approach

- In 1999, the first da Vinci® surgical system was launched
- In 2000, it obtained FDA approval and became one of the first robotic-assisted surgical systems.
- Transition from open operations to minimally invasive laparoscopic or robotic-assisted surgery
- Minimally invasive approaches require one or a few small incisions used to insert surgical equipment and a camera for viewing.

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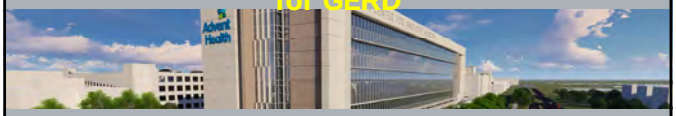
A Single Institution's Experience with Robotic Giant Hiatal Hernias & Redo Fundoplications for GERD



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Methods

- From 2012 to 2019, ninety-one patients that underwent a Robotic-assisted fundoplication for GERD were prospectively followed. Demographics and perioperative outcomes were analyzed.
- In-hospital outcomes were compared with predicted outcomes calculated using the American College of Surgeons-National Surgical Quality Improvement Program (ACS NSQIP): Surgical Risk Calculator and with national documented outcomes in ACS NSQIP.
- Variables:
  - reoperations
  - operative times
  - estimated blood loss (EBL)
  - conversions
  - complications
- For illustrative purposes, data are presented as median (mean ± SD). *Ross/Sucandy/Rosemurgy*

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ACS NSQIP **Surgical Risk Calculator** | American College of Surgeons

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Results

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Demographics

	Robotic (n=91)
Age (years)	67 (65 ± 11.0)
Sex (M/W)	25/66
BMI (kg/m^2)	26 (25 ± 3.0)
Previous Fundoplication, %	42%
Previous Abdominal Operations, %	80%

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Demographics

	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Age (years)	61 (64 ± 12.9)	66 (67 ± 9.6)	67 (67 ± 8.5)	67 (65 ± 9.7)
Sex (M/W)	8/17	7/18	9/16	1/15
BMI (kg/m^2)	26 (25 ± 2.8)	26 (25 ± 2.9)	26 (26 ± 2.6)	26 (25 ± 3.6)
Previous Fundoplication, %	44%	44%	20%	63%
Previous Abdominal Operation, %	72%	92%	92%	100%

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Demographics

	Cohort 1	Cohort 2	Cohort 3	Cohort 4	p-values
Previous Abdominal Operation, %	72%	92%	92%	100%	p=0.007*

* < 0.05

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Demographics

	Cohort 1	Cohort 2	Cohort 3	Cohort 4	p-values
Previous Abdominal Operation, %	72%	92%	92%	100%	p=0.007*

* < 0.05

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Demographics

	Cohort 1	Cohort 2	Cohort 3	Cohort 4	p-values
Previous Abdominal Operation, %	72%	92%	92%	100%	p=0.007*

* < 0.05

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Intraoperative Course

	Robotic (n=91)
Operative Duration (min)	184 (196 ± 74.3)
Estimated Blood Loss (mL)	24 (51 ± 82.9)
Conversion to laparoscopy	1
Intraoperative Complications	0
Concomitant Procedures	3

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Intraoperative Course

	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Operative Duration (min)	197 (214 ± 76.0)	190 (194 ± 68.9)	153 (187 ± 77.2)	143 (186 ± 76.7)
Blood Loss (mL)	28 (53 ± 72.7)	20 (65 ± 92.5)	20 (49 ± 104.2)	22 (32 ± 35.0)
Conversion to laparoscopy	1	0	0	0
Concomitant Procedures	0	0	2	1
Intraoperative Complications	0	0	0	0

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Intraoperative Course

	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Operative Duration (min)	197 (214 ± 76.0)	190 (194 ± 68.9)	153 (187 ± 77.2)	143 (186 ± 76.7)
Blood Loss (mL)	28 (53 ± 72.7)	20 (65 ± 92.5)	20 (49 ± 104.2)	22 (32 ± 35.0)
Conversion to laparoscopy	1	0	0	0
Concomitant Procedures	0	0	2	1
Intraoperative Complications	0	0	0	0

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Intraoperative Course

	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Operative Duration (min)	197 (214 ± 76.0)	190 (194 ± 68.9)	153 (187 ± 77.2)	143 (186 ± 76.7)
Blood Loss (mL)	28 (53 ± 72.7)	20 (65 ± 92.5)	20 (49 ± 104.2)	22 (32 ± 35.0)
Conversion to laparoscopy	1	0	0	0
Concomitant Procedures	0	0	2	1
Intraoperative Complications	0	0	0	0

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Intraoperative Course

	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Operative Duration (min)	197 (214 ± 76.0)	190 (194 ± 68.9)	153 (187 ± 77.2)	143 (186 ± 76.7)
Blood Loss (mL)	28 (53 ± 72.7)	20 (65 ± 92.5)	20 (49 ± 104.2)	22 (32 ± 35.0)
Conversion to laparoscopy	1	0	0	0
Concomitant Procedures	0	0	2	1
Intraoperative Complications	0	0	0	0

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Postoperative Course

	Robotic (n=91)
Length of Stay (days)	1 (2 ± 3.6)
In-Hospital Mortality	0
Postoperative Complications	3
Readmission	2

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Postoperative Course

	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Length of Stay (days)	1 (2 ± 1.7)	1 (2 ± 2.3)	1 (3 ± 4.3)	1 (4 ± 5.9)
In-Hospital Mortality	0	0	0	0
Postoperative Complications	0	1	1	1
Readmission	0	0	2	0

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	NSQIP Outcomes	Actual Outcomes	NSQIP Predicted
Serious Complication	3.6%	0%	4.6%
Any Complication	3.9%	0%	4.7%
Pneumonia	0.5%	0%	1.1%
Cardiac Complication	0.1%	1.1%	0.2%
Surgical Site Infection	0.5%	0%	0.5%
Urinary Tract Infection	0.6%	0%	0.9%
Venous Thromboembolism	0.4%	0%	0.5%
Renal Failure	0.1%	0%	0.1%
Readmission	3.8%	2.2%	5.3%
Return to OR	1.6%	0%	1.8%
Death	0.1%	0%	0.3%
Discharge to Nursing Facility	0.8%	1.1%	2.1%
Sepsis	0.4%	0%	0.6%

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	NSQIP Outcomes	Actual Outcomes	p-value
Serious Complication	3.6%	0%	p=0.001*
Any Complication	3.9%	0%	p=0.001*
Pneumonia	0.5%	0%	p=0.029*
Cardiac Complication	0.1%	1.1%	p=0.001*
Surgical Site Infection	0.5%	0%	p=0.029*
Urinary Tract Infection	0.6%	0%	p=0.016*
Venous Thromboembolism	0.4%	0%	p=0.050*
Renal Failure	0.1%	0%	p=0.338
Readmission	3.8%	2.2%	p=0.002*
Return to OR	1.6%	0%	p=0.001*
Death	0.1%	0%	p=0.338
Sepsis	0.4%	0%	p=0.050*

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	NSQIP Predicted	Actual Outcomes	p-value
Serious Complication	4.6%	0%	p=0.001*
Any Complication	4.7%	0%	p=0.001*
Pneumonia	1.1%	0%	p=0.001*
Cardiac Complication	0.2%	1.1%	p=0.017*
Surgical Site Infection	0.5%	0%	p=0.023*
Urinary Tract Infection	0.9%	0%	p=0.004*
Venous Thromboembolism	0.5%	0%	p=0.023*
Renal Failure	0.1%	0%	p=0.316
Readmission	5.3%	2.2%	p=0.001*
Return to OR	1.8%	0%	p=0.001*
Death	0.3%	0%	p=0.081
Sepsis	0.6%	0%	p=0.001*

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Conclusion

- Majority of our results after robotic fundoplication were superior to the predicted and national outcomes.
- Over time, the continued application of the robot to anti-reflux procedures led to an **increase in proficiency.**
  - **Operative duration** and **blood loss decreased**, even with the addition of more challenging patients.
  - More patients with **previous fundoplications and concomitant procedures**
  - **Significantly more patients other abdominal operations** were undertaken as time progressed.
- The utilization of the robotic platform to treat GERD is safe and efficacious, and a tool that surgeons should keep in their armamentarium.
- Our initial results with robotic fundoplication are encouraging and promotes its further application.

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Patient Profile

- 66 y/o woman with GERD, Type IV giant paraesophageal hernia with Cameron ulcers s/p hernia repair with Toupet fundoplication
- PMHx: excessive tobacco use, COPD, asthma, chronic bronchitis, hepatitis C, alcohol abuse with cirrhosis, chronic atrial fibrillation
- PSHx: heart valve repair operation, open appendectomy
- POD 1 discharged home

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CT Scan 1

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Patient Profile

- 94 y/o woman with GERD, Type IV giant hiatal hernia with symptoms of esophageal outlet obstruction: profound dysphagia
- PMHx: recurring pneumonia, hoarseness, 30lb weight loss
- PSHx: none
- POD 1 discharged home
- Seen in clinic with most notable symptoms of bloating and flatulence
- Usual activities by 3 weeks postop with flatulence and defecatory frequency: high fiber diet

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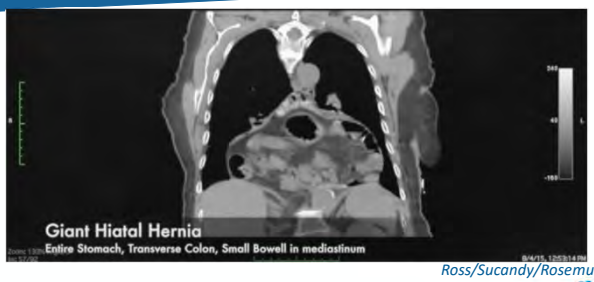
CT Scan 2



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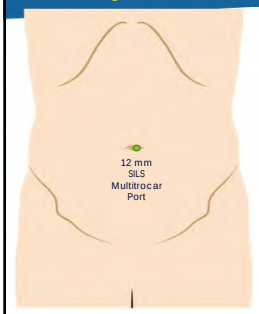
Fundoplication: LESS Port Placement



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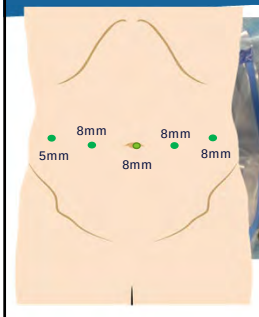
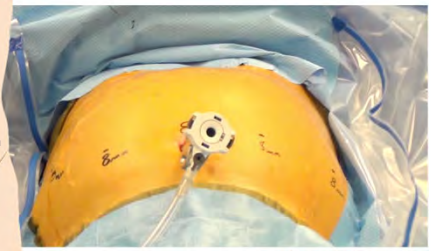
Fundoplication: Robotic Port Placement





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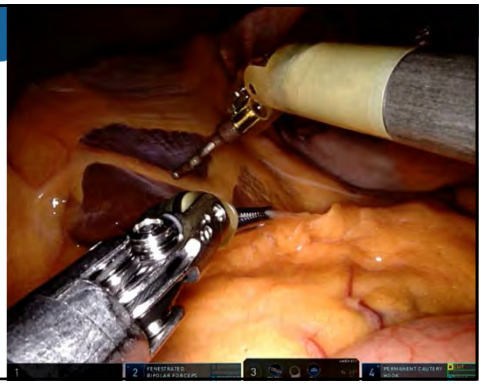
Step1:
Dissection along the right crus



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Step 2:
Dissection along the left crus

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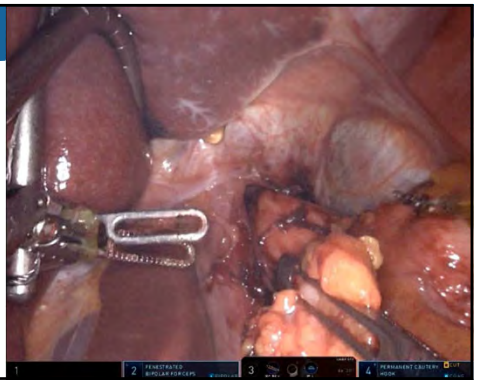
Step 3:
Circumferentially free the esophagus, excise the fat pad, cruroplasty



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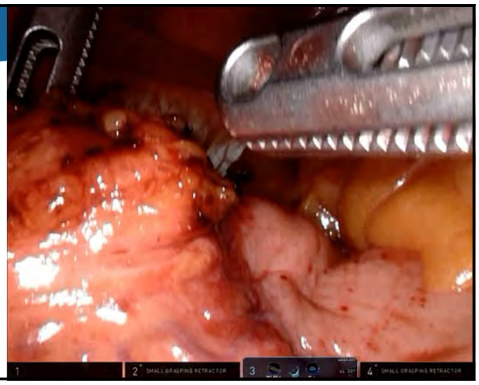
Step 4:
Construction of fundoplication



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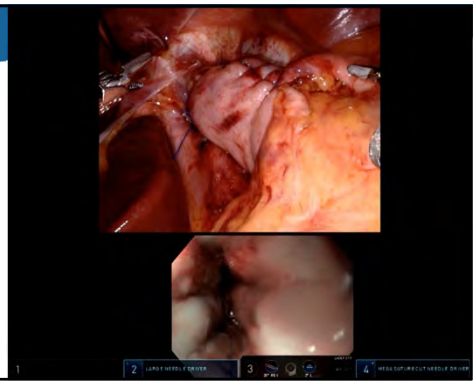
Step 5:
Inspect Fundoplication



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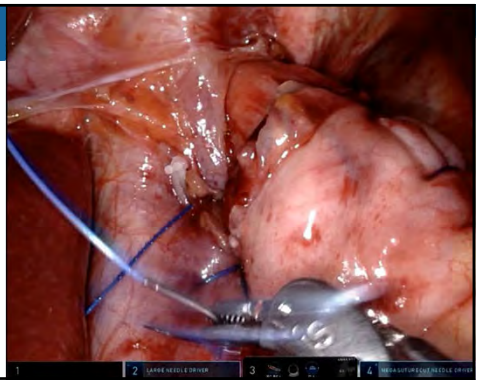
Step 6:
Anchoring fundoplication



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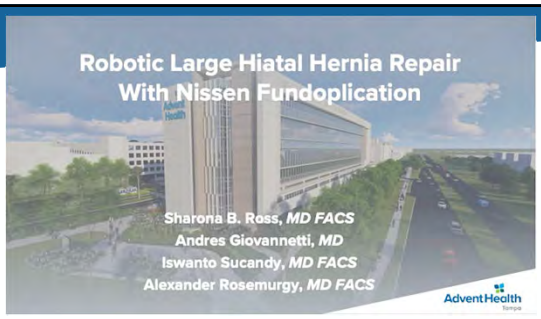

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What we have learned

- Work-up is the same
- Use all robot arms
- Esophageal lengthening procedures are not necessary
- Mesh at the hiatal reconstruction is nearly never needed
- With 'redo' operations place seprafilm
- Leave intraperitoneal dilute bupivacaine
- Local anesthesia into incisions before incisions made
- Don't use the body of the stomach

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What we have learned

- Determine esophageal motility: predict how patient will handle a food bolus postoperatively
- Everybody gets 8 things (to some degree):
  - Shoulder pain
  - Food catches
  - Bloating
  - Pass more gas (flatulence)
  - Defecatory frequency
  - Nausea
  - Early satiety
  - Pain at incision sites
- Patients and families want to feel good about healthcare choices

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Reasons Why You Should Utilize a Robot in Your Practice

1. You have a robot
2. Administration doesn't need more convincing
3. Just requires training the night staff
4. You operate during odd hours – robot is always available
5. There is skills transference

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Robotic Cholecystectomies

- Literature demonstrates the safety and efficacy of Robotic Cholecystectomy
  - Kane et al. showed, in propensity matched reports, of 3,255 patients robotics had shorter duration of stay less 90-day readmission rates when compared with laparoscopy
  - Grochola et al. showed in a randomized control trial of 60 patients, robotics patients' outcomes were superior than single port laparoscopy

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6. Enjoy professional growth

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1. You have a robot
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3. Just requires training the night staff
4. You operate during odd hours – robot is always available
5. There is skills transference
6. Enjoy professional growth
7. Extension of MIS

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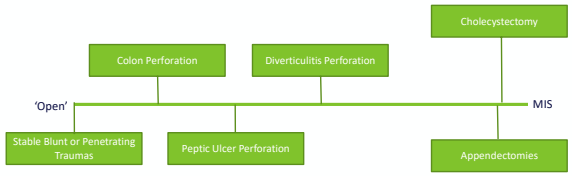
Spectrum of Operations



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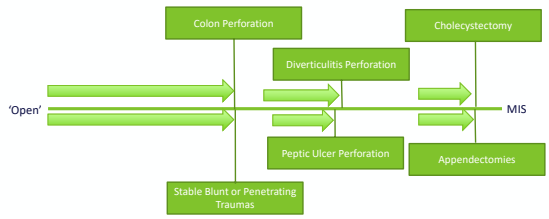
How can robotics make these operations more MIS?



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Reasons Surgeons May Not Want a Robot in Their Practice

- Change is painful
- Fear of complications and consequences
- Fear of failure (e.g., conversion to an 'open' operation
- Fear of peer disapproval and censure
- Lack of forces pushing adoption
- Increased duration of operations and time in the O.R.
- Need for capable 'wingman' or 'wingwoman'
- Access to the robot
- Requirement for new skills: skill acquisition
- An unfamiliar toolbox
- Time away from practice to train and acquire robotic skills
- Perceptions of cost and economic impact
- Lack of institutional conviction (e.g., risk management, O.R. support, ...)
- Lack of mentor, educator, teacher, trainer, support, ...
- Unfamiliar technology

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Reasons Surgeons May Not Want a Robot in Their Practice

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- Lack of mentor, educator, teacher, trainer, support, ...
- Unfamiliar technology

Have the conviction to 'get after it'

make a plan!

identify stakeholders

make an asset map

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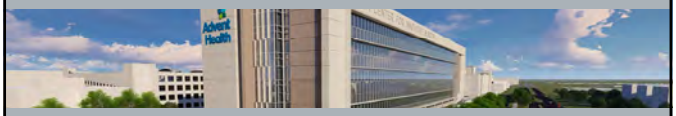
MIS Paraesophageal/Diaphragmatic Hernias



Sharona Ross, MD FACS

Professor, University of Central Florida
Professor, Nova Southeastern University
Director, MIS and Surgical Endoscopy
Director of Advanced GI and HPB Fellowship Program
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Peptic Ulcer Disease

Michael Cripps, MD, MSCS, FACS
Associate Professor
UT Southwestern Medical Center
Department of Surgery
Division of General and Acute Care Surgery

UTSouthwestern Medical Center

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Disclosures

- Consultant for Instrumentation Laboratory Worldwide
- Consultant for Hemosonics

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2

Peptic Ulcer Disease

- It is primarily a medical problem
  - H pylori
    - 90% of duodenal
    - 70% of gastric
  - NSAIDS
    - 10% of PUD
- Surgery is for complications
- We still need to know the medical therapy

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Medical Therapy

- Triple therapy
  - Double dose PPI
  - Clarithromycin
  - Amoxicillin
- Check local antibiogram for resistance

FOR ALL SURGICAL TREATMENTS, TRIPLE THERAPY SHOULD BE INCLUDED

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Surgery PUD

- Intractable
- Hemorrhage
- Obstruction
- Perforation

- You get PUD from eating at IHOP

ALL SURGICAL DATA IS IN THE PRE-H. PYLORI ERA

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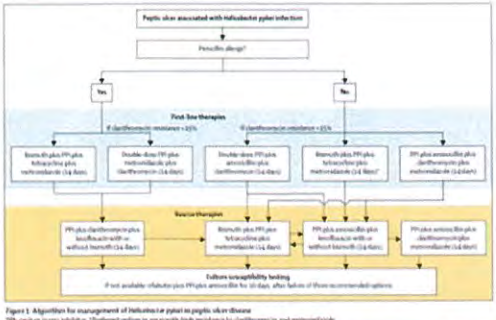
Medication algorithm



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Medication dosage

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Mortality of PUD

- Perforation
- Hemorrhage

- Intractable disease
  - Refractory symptoms
  - Obstruction

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Perforation

- 4-14/100,000 annually
- 23.5% 30d mortality

- Factors associated with morbidity:
  - Time delay to presentation and treatment
  - Gastric perforation
  - Older age
  - Hypotension at presentation

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Perforation

- Free air with no signs toxicity
  - CT scan with PO contrast
  - If duodenal and no extravasation → serial clinical examinations
    - Not recommended for gastric perforations
  - 40% to 73% managed non-operatively
  - IV abx, High dose IV PPI
  - Resource intensive
- Retroperitoneal perforations
  - Serial clinical examinations

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Perforation

- Toxicity or extravasation
- Duodenal
  - **Graham patch only** and **treat H. pylori post operatively** (~6% recurrence rate)
  - Laparoscopic approach has gained in usage as comfort levels grow
  - No need for drain

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Lap vs Open

REVIEW ARTICLE

Laparoscopic Repair for Perforated Peptic Ulcer Disease Has Better Outcomes Than Open Repair

- Meta-analysis of 7 RCT laparoscopic vs open repair:
  - Overall post op morbidity (LR = 8.9% vs. OR = 17.0%) , $p < 0.01$
  - Wound infections, (LR = 2.2% vs. OR = 6.3%), $p < 0.01$
  - Shorter hospital stay (6.6 days vs. 8.2 days, $p = 0.01$)
  - No significant differences in length of operation, leakage rate, incidence of intra-abdominal abscess, post-operative sepsis, respiratory complications, re-operation rate or mortality.

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Post op pathway

Enhanced postoperative recovery pathways in emergency surgery: a randomised controlled clinical trial

Murat Gonenc, M.D.[a,*], Ahmet Cem Dural, M.D.[a], Ferhat Celik, M.D.[a], Cevher Akarsu, M.D.[a], Ali Kocatas, M.D.[a], Mustafa Uygar Kalayci, M.D.[a], Yasar Dogan, M.D.[b], Halil Alis, M.D.[a]

Table 2 The postoperative management in group 2

PO day 0	Nil by mouth No nasogastric decompression Removal of the urinary catheter Diclofenac (Diclonec; Abdi İbrahim, Istanbul, Turkey) (75 mg every 12 hours intramuscularly) Pantoprazole (40 mg every 12 hours intravenously) Metoclopramide (10 mg every 8 hours intravenously)
PO day 1	Liquids Diclofenac (75 mg on demand intramuscularly) Pantoprazole (40 mg every 12 hours intravenously) Metoclopramide (10 mg every 8 hours intravenously)
PO day 2	Soft food Acetaminophen (500 mg on demand perorally) Pantoprazole (40 mg every 12 hours perorally)
PO day 3	Normal food Acetaminophen (500 mg on demand perorally) Pantoprazole (40 mg every 12 hours perorally) Moxifloxacin (400 mg daily perorally) Discharge

PO = postoperative.

The American Journal of Surgery (2014) 207, 807-814

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Post op pathway

Table 3 The results of the primary endpoints

	Group 1 (n = 26)	Group 2 (n = 21)	P value
Length of hospital stay (d) (mean, range)	6.9 ± 2.2 (4-17)	3.8 ± 1.9 (3-15)	.0001*

Table 4 The results of the secondary endpoints

	Group 1 (n = 26)	Group 2 (n = 21)	P value
Time to start oral intake (d) (mean, range)	4.82 ± 1.28 (3-8)	1.33 ± 1.27 (1-6)	.0001*

- Complete H pylori treatment (2 weeks)
- PPI for 4-6 weeks
- Duodenal and no symptoms – no need for f/u endoscopy

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Perforation – Gastric ulcer

- Much higher risk of malignancy
- Graham patch is acceptable
  - BIOPSY IS MANDATORY
  - MUST HAVE FOLLOW-UP ENDOSCOPY
  - Treat H. pylori
- Gastrectomy
  - Large ulcers
  - High suspicion of malignancy
  - 10% of those treated with patch

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Hemorrhage

- 19-57/100,000 annually
- 5 – 10% 30d mortality

- 80 to 85% stop bleeding spontaneously.
  - Of the remaining patients, 85% to 95% can be effectively treated by endoscopic means.

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PUD Hemorrhage

Fig. 2. Treatment for PUD-related UGI hemorrhage. (*From* Peter S, Wilcox CM. Modern endoscopic therapy of peptic ulcer bleeding. Dig Dis 2008;26:291-9; with permission.)

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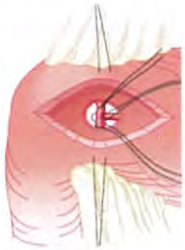
Hemorrhage

- If operation needed and *H. pylori* has not yet been treated:
  - Control of bleeding alone



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Acid Reducing Surgery?

- Only 40% to 70% of patients with a bleeding duodenal ulcer are positive for *H. pylori*.
  - *H. pylori* testing in the setting of an acute hemorrhage is less reliable, having a false-negative rate of 18% versus 1% in those not actively bleeding.
- If an acid-reducing procedure is not performed, up to 50% of patients are at risk of recurrent bleeding.
  - Conflicting evidence that *H. pylori* treatment changes the risk of recurrent bleeding.

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Hemorrhage

ORIGINAL ARTICLE

Vagotomy/Drainage Is Superior to Local Oversew in Patients Who Require Emergency Surgery for Bleeding Peptic Ulcers

Vanessa T. Schroder, MD, Theodore N. Pappas, MD,* Steven N. Vaslef, MD, PhD,* Sebastian G. De La Fuente, MD,† and John E. Scarborough, MD**

- Single NSQIP study
  - Vagotomy and drainage vs simple oversew
- Lower postoperative mortality rate
  - 12.3% vs 26.7%
- More data needed for recommendation

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Intractable and Obstruction

- Really an elective surgery
  - Surgery is rare
- Must ensure H. pylori eradicated
  - False negatives can occur during bleeding or when on PPI or antibiotics
  - Discontinue PPI 2 weeks and antibiotics for 4 weeks and test again

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Intractable

- Endoscopic evaluation
  - Cancer and biopsy (H. pylori)
    - Increase dose of PPI
    - Quadruple therapy
- Non-compliance
  - NSAIDs and ASA
  - Smoking
- Other causes

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Other Causes of PUD

- Gastric bypass surgery
- Cigarette smoking
- SSRIs
- Zollinger-Ellison syndrome)
- Serious trauma and critical illness
- Gastric tumors mistaken for peptic ulcers
- Autoimmune diseases, eg, vasculitis, sarcoidosis, and Crohn's disease
- Infections in immuno-compromised
- Psychological stress is not an established risk factor for peptic ulcer disease, although some research has suggested an association
- Consumption of alcohol or coffee does not seem to increase the risk of peptic ulcer disease

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Elective Surgery

- IF ALL of above are negative → surgery
  - All surgical data was pre-H. pylori era
- Duodenal ulcers:
  - Vagotomy with or without a drainage procedure
  - Antrectomy and vagotomy
- Gastric ulcers:
  - Ulcer location dependent

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Intractable DU – BEST CHOICE

- No definitive data
- Laparoscopic Proximal Gastric Vagotomy (Taylor procedure)
- Gastric emptying prior to OR to eval for delayed gastric emptying
  - Add drainage
- Failure – TV and antrectomy (roux)

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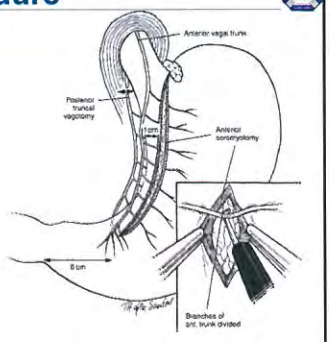
Taylor procedure

- Posterior truncal vagotomy
- Anterior seromyotomy
- Laparoscopic approach



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Gastric Ulcers

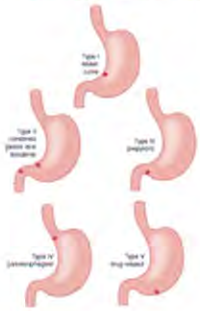

TABLE 59.2 Modified Johnson Classification of Gastric Ulcers

Type	Location	Acid Secretion
I	Lesser curvature	Low
II	Body of stomach and duodenum	High
III	Prepyloric (within 2–3 cm of pylorus)	High
IV	High on lesser curve, near gastroesophageal junction	Low
V	Anywhere, induced by medication	Low

Treatment by Type

- 1 – Distal gastrectomy only
- 2 – V and A
- 3 – V and A
- 4 – Subtotal
- 5 – V and A

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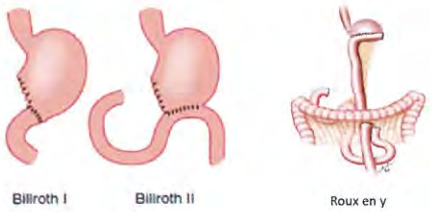
Antrectomy



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Billroth vs Roux-en-Y

- Long term follow up (12 to 21 years)
  - Improved patient satisfaction and endoscopic appearance of the esophagus and the gastric remnant after Roux-en-Y reconstruction

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Gastric Outlet Obstruction

- Rarely, if ever, emergent
- NGT, IVF, electrolytes, J-tube for nutrition
- Medication compliance
- Endoscopic stent and dilation
  - More than 2 attempts associated with failure
- If above fails
  - Vagotomy with antrectomy
  - Consider laparoscopic G-J with vagotomy or lifelong PPI

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Conclusion

- Perforation and hemorrhage have highest mortality in PUD
- Definitive acid reducing surgery often not needed at index operation for perforation
  - Laparoscopy for most
- Hemorrhage surgery – only after endoscopy
  - ? With acid reducing operation

Acute Care Emergencies in the Bariatric Patient

Robert B. Lim, MD, FACS, FASMBS
Vice-Chair of Education
Oklahoma University School of Medicine Tulsa

Physicians

1

Disclosures

UpToDate, Inc. - honoraria

Physicians

2

Outline

Leaks/Perforations

Obstructions

Bands/Balloons/Others

Endoscopy

Physicians

3

MIS in Acute Abdomen: Contraindications

Physiologic
- Cardiac
- Pulmonary
- Haemodynamic instability

Technical
- Lack of working space
- Lack of expertise (surgeon-anesthesia)
- Lack of specialized equipment

Physicians

4

Lack of Space

Small habitus

Peritonitis

Obesity

Previous surgery

Physicians

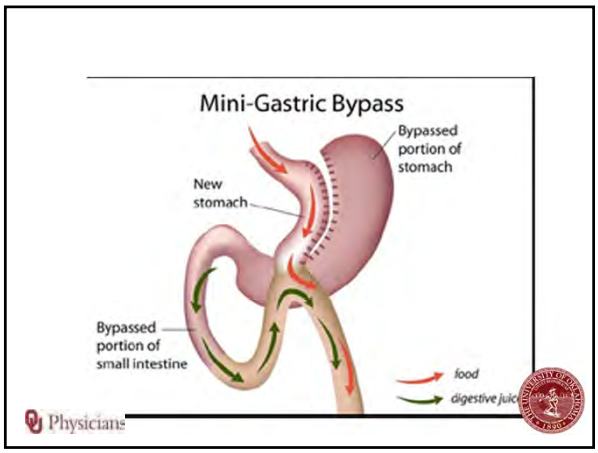
5

RYGB

- No pylorus

Physicians

6



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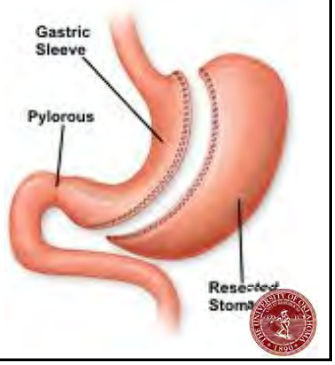
Laparoscopic Sleeve Gastrectomy

Pylorus involved



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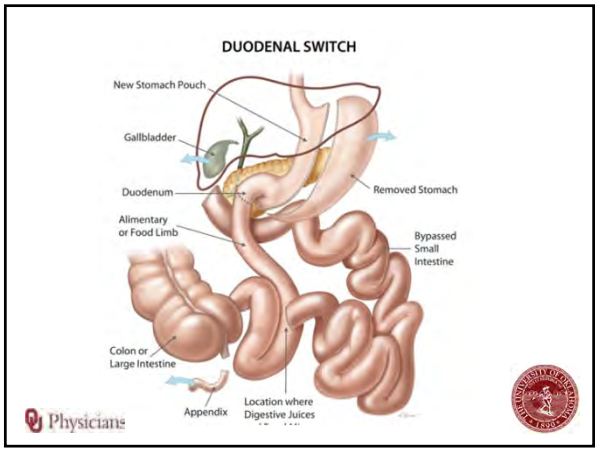

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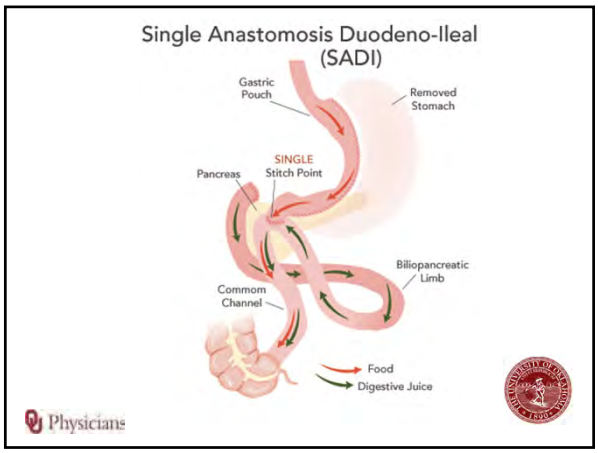

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Bariatric Procedure Leaks

HI PRESSURE

- Sleeve
- Duodenal Switch
- SADI bypass

LOW PRESSURE

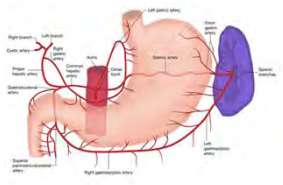
- Roux-en-Y Gastric Bypass
- Mini-Gastric Bypass

Physicians

11

Sleeve/HI Pressure Leaks

- Incidence 2-7%
- Poor blood supply
- May be associated with a twist, kink, or a stenosis
- Risks
  - small bougie
  - too narrow at cardia



Physicians

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Sleeve/HI Pressure Leaks

- Most at the angle of His
- Same symptoms as RYGB leak
- CT or Flouroscopy to diagnose

Physicians

13

Early Sleeve Leak Management

- Still DRAINAGE and primary repair
  - May have to do surgically
- MUST ADDRESS kink, twist, or stenosis
- EARLY ENDOSCOPY Stent must extend from esophagus to duodenum: 30cm

Physicians

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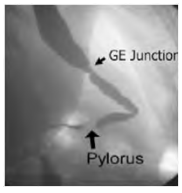
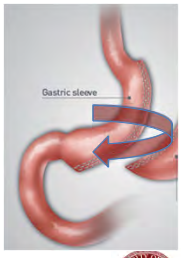
Reason for Sleeve Leaks





Physicians

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Sleeve Leak Repair

Physicians

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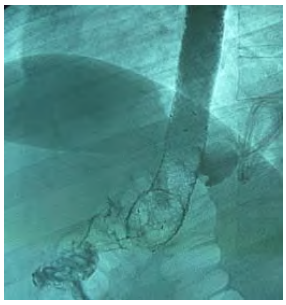
Repair of Sleeve Leak



- Covered self-expanding wallstent
- Covers the leak
- May fix the obstruction
- Balloon dilation may help with a stenosis

Physicians

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RYGB/LO Pressure Leaks

Incidence	0-3%
Risks	Revision Surgery BMI > 50 kg/m^2 Dysmetabolic Syndrome
Symptoms	Persistent Tachycardia > 120 Dyspnea Fevers
When	POD #7

Physicians

18

Leaks Diagnosis

CT scan

100 cc low density contrast just before laying down

60-80% sensitive

Evaluate pulmonary pathology

Abscess/Phlegmon = leak

Flouroscopy

100 cc of contrast in multiple views

Gastrograffin first then thin barium

22-75% sensitive

Physicians

19

Leak Treatment

Stable

Percutaneous drainage and NPO with TPN

85% will close

Endolumenal therapy for persistent leaks

Dilation first to ease flow

- Stent
- Clips
- Suction vacuum

Unstable

** Persistent HR > 120 = operation **

Wash out

- Wide drainage
- Primary repair vs. omental patch
  - Interrupted sutures
- G-tube or J-tube
- Watch out for sepsis post

Physicians

20

Operative Leak Management

- Control the sepsis
- Wide drainage
- Feeding tube
  - G-tube
  - J-tube distal
    - Common channel
    - BPD limb
    - Roux limb

Physicians

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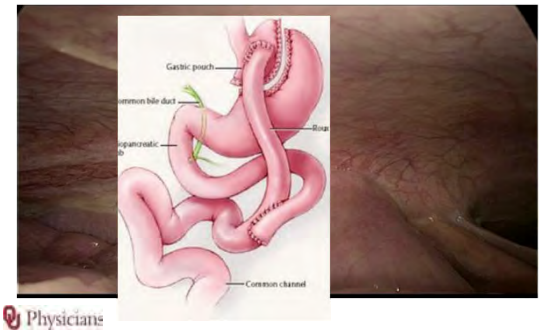
Leak after RYGB



Physicians

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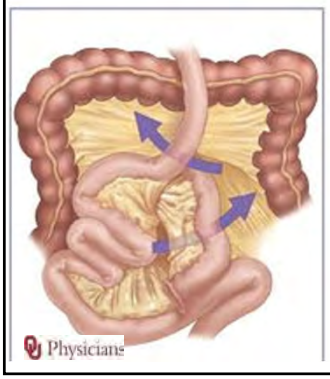
Internal Hernia after GB



- "Achilles heel"
  - 1 to 5% lifetime
  - MOST COMMON
- Several potential spaces for IH
- No way to prevent
- Missed on imaging

Physicians

23

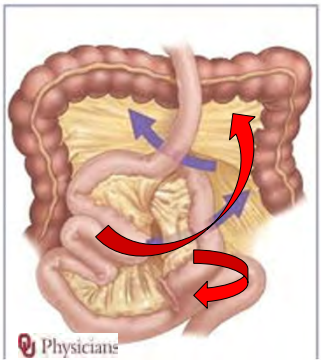
Bowel Obstruction

- Typically occurs 6-24 months after surgery
- May occur later after extensive weight loss:
  - Sutures loosen after weight loss
  - Less adhesions to block potential hernia sites due to laparoscopic approach

Physicians

24

Anatomy of Internal Hernia



- Bowel to LUQ
- JJ will twist on vascular pedicle
- Pan-dilation seen

Physicians

25

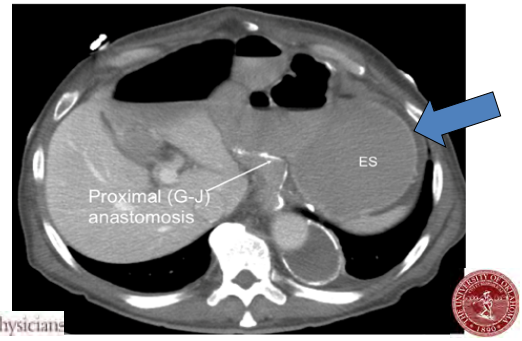
Bowel Obstruction

- Complete or incomplete
  - Acute signs of obstruction
  - CT or plain film confirmation: swirl sign
- Intermittent
  - Chronic pain, self-limiting
  - Swirl sign on CT
  - Pts usually have extensive work up for abdominal pain

Physicians

26

Dilated SB and remnant: needs an operation!



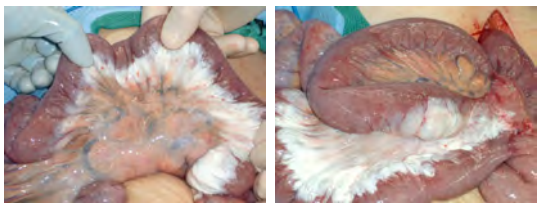
Physicians

27

28

29

Chylous staining



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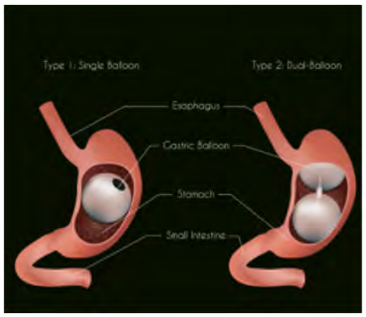


Physicians

31

Balloon Complications

Gastric perforation	0.19%
Balloon migration/Bowel Obstruction	0.76%
Deaths	0.01%

Other case reports: pancreatitis

Balloons not meant to stay more than 6 months

Obes Surg. 2005 Sep;15(8):1161-4

BioEnterics Intragastric Balloon: The Italian Experience with 2,515 Patients.

Genco A[1], Bruni T, Doldi SB, Forestiel P, Marino M, Busetto L, Giardiello C, Angrisani L, Pecchioli L, Stornelli P, Puglisi F, Alkilani M, Nigri A, Di Lorenzo N, Furbetta F, Cascardo A, Cipriano M, Lorenzo M, Basso N.

Physicians

32

Methylene Blue in Urine – Balloon Leak

Physicians

33

Balloon Migration

Physicians

34

Balloon PO Intolerance

- Under general anesthesia
- Needs needle from company
- Dual lumen scope: need 2 graspers
- Regular endoscope: needle and snare

Physicians

35

Adjustable Gastric Band

- 50-60% EWL in 2 yrs
- Adjusted by fills and unfills
- Not many placed but there are many out there. May be seen in combination with a RYGB.
- highest complication rate, 40%

Physicians

36

Adjustable Gastric Band

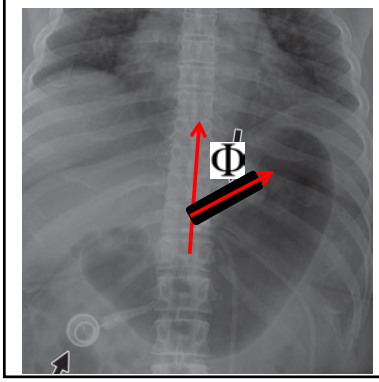
Obstructive symptoms
- **emesis, PO intolerance**
- **severe GERD**

Differential Diagnosis?
- **Early post op**
  - **Days 1-3**
  - **hematoma**
- **too tight, normal position**
- **band out of position**
- **UNFILL**

Physicians

37

Normal Band Position

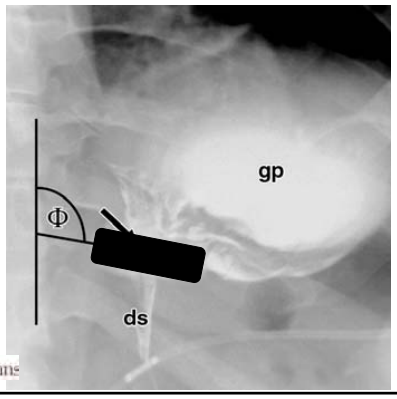


Normal phi angle = 4 to 58 degrees

phi > 60 = slipped band

38

Slipped Band



Physicians

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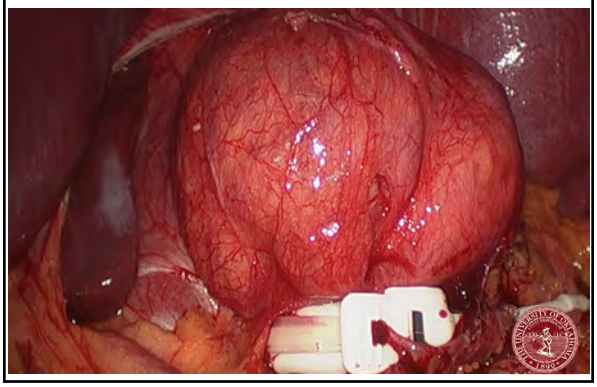
Slipped Band



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Bleeding

- Same for RYGB and SG 3-5% of cases
- Higher incidence in cases of dysmetabolic syndrome
- Most will stop without surgical intervention
- EGD to diagnose and treat intralumenal bleeding
- Bleeding sites: GJ, JJ, gastric remnant
  - Look for Roux limb dilatation

Physicians

41

PortoMesenteric Thrombosis

Incidence	0.2 – 0.9%
Symptoms	Tachycardia Dyspnea Chest Pain
Risks	Revision Surgery BMI > 50 kg/m^2 Surgery > 4 hrs Hypercoaguable State Poor functional status
When	POD #22

Physicians

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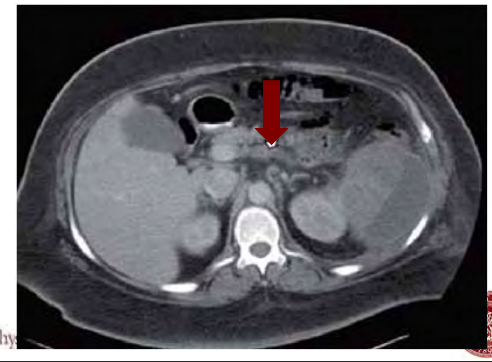
Venous Thrombotic Event



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Surgical Endoscopy

Operation	Clinical Situation	Endoscopic Tx
RYGB	Leak	Clip/Stent
	Stenosis	Balloon
	Bleeding	Control
Sleeve	Leak	Clip
	Twist/Kink/Stenosis	Stent or Balloon
PEH	Incarceration	Reduce PEH PEG
Colonoscopy	Perforation	Clip

Physicians

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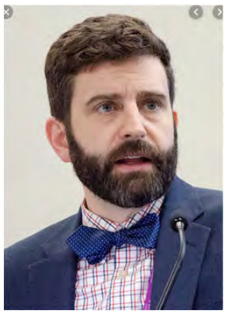
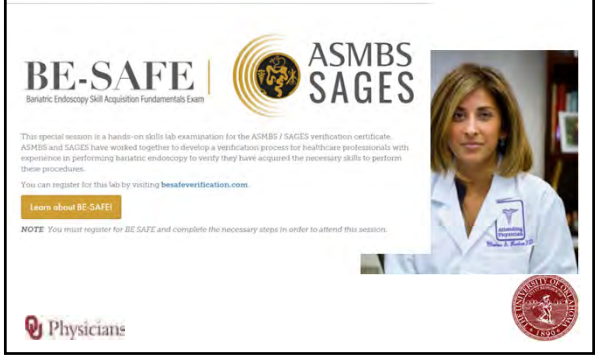
Role of Endoscopy



Physicians

45

Role of Endoscopy



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Summary

47

The Disaster Gallbladder

David A. Spain, MD
Stanford University
@DavidASpain

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1

1

I have nothing to disclose

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2

Me and GB Operations

- Consider myself a "bubble surgeon"
- Finished GS residency in 1992
- My ABS case logs
  - > 100 open chole
  - 22 open CBDE as a resident
  - 23 lap chole
- Feel comfortable either way – open or lap

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3

Biliary Tract Emergencies

- Development of endoscopy and laparoscopy have completely changed management
- However, the GS will occasionally be challenged in the middle of the night with complex biliary tract disease when treatment options may be limited or unavailable

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Biliary Tract Emergencies

- Difficult scenarios
  - Severe acute, gangrenous cholecystitis
  - Ascending cholangitis
  - Mirizzi syndrome
- Have to know how to *stay* out of trouble (most important) and how to *get* out of trouble (also useful)

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Acute Cholecystitis

- Meta-analysis
  - Compared early (≤ 1 week symptoms) to delayed lap chole (6 weeks)
  - Five trials involving 451 patients analyzed
  - No differences (bile duct injury or conversion)
  - Total HLOS was 4 days shorter for early op
- Thus, for patients with ≤ 1week of symptoms, early laparoscopic cholecystectomy should be done in most

Br J Surg. 2010;97:141-50

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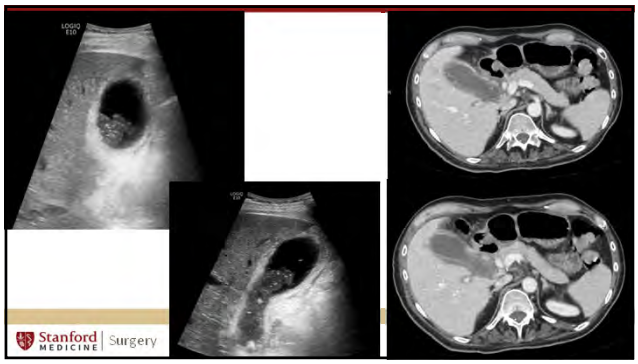


7

Acute Cholecystitis

- What happens when you find bad cholecystitis and can't identify hilar structures?
- Old trick – dome down lap chole

8

Acute Cholecystitis

What if you just can't safely get a critical view of safety?

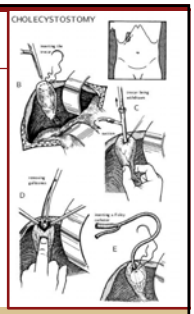
- Tube cholecystostomy (don't love this option…)
- Open cholecystectomy (not a crime)
- Partial cholecystectomy

9

Laparoscopic or Open Tube Cholecystostomy

The key steps:

- tube in fundus of GB
- evacuate GB as thoroughly as possible
- use a large drainage tube and secure with purse string suture
- direct egress of the tube to abd wall



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Acute Cholecystitis

11

Partial Cholecystectomy

- GB is opened at the fundus
- Anterior wall is excised down as low as safely possible
  - Posterior wall can either be resected or left intact, cauterize mucosa
- Some oversew the CD orifice from inside (if found) or close stump
- Otherwise, just leave a drain

12

Original Investigation

Subtotal Cholecystectomy for "Difficult Gallbladders"
Systematic Review and Meta-analysis

Mohamed Elshaer, MD; Gianpiero Gravante, MD, PhD; Katie Thomas, MD, PhD; Roberto Sorge, PhD; Salem Al-Hamali, MD; Hamdi Ebdewi, MD

The laparoscopic approach produced less risk of:

- subhepatic collection (odds ratio [OR], 0.4; 95%CI, 0.2-0.9)
- retained stones (OR, 0.5; 95%CI, 0.3-0.9)
- wound infection (OR, 0.07; 95%CI, 0.04-0.2)
- reoperation (OR, 0.5; 95%CI, 0.3-0.9)
- mortality (OR, 0.2; 95%CI, 0.05-0.9)

But more bile leaks (OR, 5.3; 95%CI, 3.9-7.2) compared with open

Overall
2.9%
3.1%
2.6%
1.8%
0.4%

JAMA Surg. 2015;150(2):159-168

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13

Laparoscopic Subtotal Chole

"Laparoscopic SC generally produces better outcomes compared with open SC, but no significant differences were found between the techniques of closure vs nonclosure of the CD or GB stumps and removal vs nonremoval of the GB posterior wall."

I use this technique frequently

- Try to remove the back wall if possible
- Leave the stump open
- Always leave a drain
- Many (1/3) close with 2 weeks, wait until after that to consider ERCP

JAMA Surg. 2015;150(2):159-168

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Ascending Cholangitis

- Rare, potentially life-threatening GS emergency caused by obstruction of the biliary tree, most often by CBD stones
- Usually Gram – organisms
- Classic presentation of Charcot's triad
  - Fever
  - Jaundice
  - RUQ pain
  - Present < 50% of patients

JAMA Surg. 215;150(2):159-168

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15

Ascending Cholangitis

- Most pts will get better with resuscitation and ABX
- Occasionally need urgent ERCP
- Rarely need urgent CBD exploration

16

Common Bile Duct Exploration

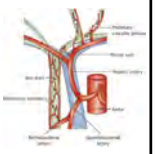
- I am *not* good at laparoscopic CBDE
- So, I will do it open
  - Dying art
  - If you have to do it, get some help

17

Open CBD Exploration - Quickly becoming a lost art

The hallmarks are:

- Kocher maneuver
- Minimal dissection anterior surface of CBD
  - Not circumferential
  - Arteries at 3 and 9 o'clock
- Two stay sutures in the CBD (4-0 PDS)
- Vertical choledochotomy



18

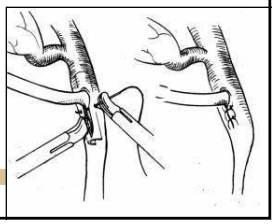
Open CBD Exploration

- First tricks
  - Irrigation with Glucagon
  - Fogarty balloon or basket catheter
- Second tricks
  - Choledochoscopy
- Avoid stone forceps if not familiar

19

CBD Exploration

- T-tube placement (at least 12 Fr. brought directly out)
- Closure of the CBD with absorbable monofilament sutures and JP drainage
- Completion cholangiogram



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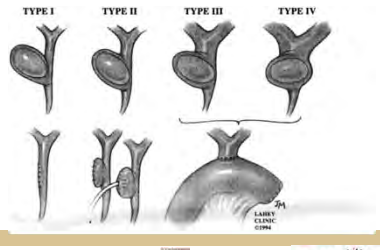
T-Tube Study

- Rt and Lt ducts
- Flow into Duod
- No leak
- Ideally, no stones

21

Mirizzi's Syndrome



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Bile Duct Injury

- Most feared complication in biliary surgery
- So what do you do if you realize in the OR (either open or lap) that you have a major ductal injury?

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Bile Duct Injury

- Recent studies suggest that successful repair is associated with
  - correct surgical technique
  - repair by an experienced biliary surgeon
  - timing of repair may be less critical
- When an injury is recognized, the most important thing is for the surgeon to slow down and assess resources

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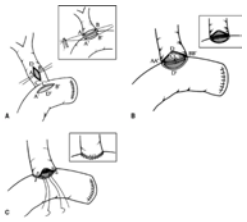
24

Major Bile Duct Injury Detected at Initial Operation (about 1/3)

- ***Call for help***
- If experienced biliary surgeon (senior partner, HPB/surg onc or transplant) is available, then immediate repair can be done
- Often tempting to repair over T-tube
  - Generally doesn't work (ischemia)
  - Hepaticojejunostomy usually the answer



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Acute Bile Duct Injury

- If a major duct injury has occurred or is suspected and no additional expertise is available, the patient should be widely drained and expeditious transfer to a tertiary referral center arranged
- If the pt is repaired within 48-72 hrs, results are the same

26

Delayed Recognition of Bile Duct Injury (about 2/3)

- Assess the patient for control of any abdominal infection
- Obtain drainage if needed (usually percutaneously)
- Arrange consultation or referral to an experienced biliary surgeon

27

Old problems are new again …

- Open experience with biliary tract emergencies is decreasing
- But MIS alternatives are developing and may be better
- The key thing is to know when trouble is ahead and call for help
- In the old days we used to say “a call for help is a sign of weakness”
- Now, we say “a call for help is a sign of professionalism”

33rd EAST Annual Scientific Assembly
www.east.org
@EAST_Trauma
#EAST2020

Necrotizing Pancreatitis & VARD

Andrew Bernard

MIS Multisociety Advanced Skills Training in EmeRgency Surgery (MASTERS) Course

1

Conflict Disclosure

- Consultant: Atox Bio

2

Objectives

Learners should describe management of pancreatic necrosis with respect to:

1. Peri-procedural care
2. Timing
3. Intervention, including VARD

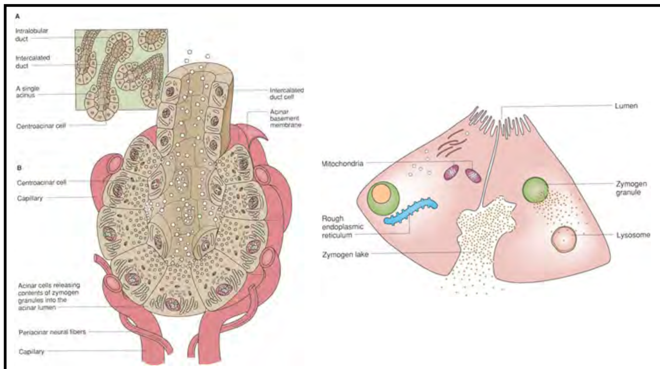
3

Etiology

1. Gallstones (biliary) 90%
2. EtOH
3. Hyperlipidemia
4. Iatrogenic
   - ERCP
   - Bypass
5. Hypercalcemia
6. Drugs
7. Hereditary
8. Scorpion
9. Idiopathic (15%)

1/3 of idiopathic → Stones

4



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Same-admission versus interval cholecystectomy for mild gallstone pancreatitis (PONCHO): a multicentre randomised controlled trial

	Interval cholecystectomy (n=136)	Same-admission cholecystectomy (n=128)	Risk ratio (95% CI)	p value
Primary endpoint				
Mortality or readmission for gallstone-related complications	23 (17%)	6 (5%)	0·28 (0·12–0·66)	0·002
Secondary endpoints				
Readmission for gallstone-related complications				
Recurrent pancreatitis	12 (9%)	3 (2%)	0·27 (0·08–0·92)	0·03
Cholecystitis	2 (2%)	0		0·50
Choledocholithiasis needing ERCP	2 (2%)	1 (1%)	0·53 (0·05–5·79)	1·00
Gallstone colic	7 (5%)	2 (2%)	0·30 (0·06–1·43)	0·17
Mortality	0	1 (1%)		0·48
Patients reporting colics during waiting period*	62 (51%)	3 (3%)	0·06 (0·02–0·19)	<0·0001

Lancet 2015; 386: 1261–68

6

Gallstone Pancreatitis

Admission Versus Normal Cholecystectomy—a Randomized Trial (Gallstone PANC Trial)

Krislynn M. Mueck, MD, MPH, MS,*†✉ Shuyan Wei, MD,*† Claudia Pedroza, PhD,‡ Karla Bernardi, MD,*† Margaret L. Jackson, MD,* Mike K. Liang, MD,*† Tien C. Ko, MD,* Jon E. Tyson, MD, MPH,‡ and Lillian S. Kao, MD, MS*†‡

- **Predicted mild pancreatitis (BISAP 0-2)**
- **Randomized to 24 hrs vs symptom resolution (N=97)**
- **Decreased time to surgery, LOS, and need for ERCP**
- **More complications (some types)**

(Ann Surg 2019;270:519–527)

7

Too Sick for CCY?

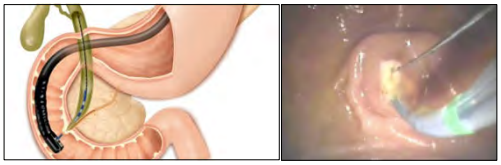
"sphincterotomy at index admission with interval cholecystectomy is a safe and accurate practice and is considered an alternative to index cholecystectomy in patients with severe biliary pancreatitis"

World J Gastroenterol. 2016 Sep 14; 22(34): 7708–7717.

8

Exception on Necessity: Frail

2-year readmission rates 49% ➔ 31%.



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Severe/Necrotizing

- 15% to 20% of cases
- Mortality: 20% (in severe/necrotizing)
  - 12% sterile
  - 50-75% infected

10

Terminology

- All about timing

Revised Atlanta Classification

11

4 Major Types

<4wk

1. **Acute peripancreatic fluid collection**
   - Sterile
   - Infected
2. **Post-necrotic pancreatic/peripancreatic fluid collection**
   - Sterile
   - Infected

>4 wk

3. **Pancreatic pseudocyst (high amylase/lipase)**
   - Sterile
   - Infected
4. **Walled off pancreatic necrosis (WOPN) (may or may not have high amylase/lipase)**
   - Sterile
   - Infected

.

Gut 2013;62:102–111

12

<4wks

1. **Acute peripancreatic fluid collection**
2. Post-necrotic pancreatic/peripancreatic fluid collection

>4wks

3. Pancreatic pseudocyst
4. Walled off pancreatic necrosis (WOPN)

13

<4wks

1. Acute peripancreatic fluid collection

2. **Post-necrotic pancreatic/peripancreatic fluid collection (PNPFC)**

>4wks

3. Pancreatic pseudocyst
4. Walled off pancreatic necrosis (WOPN)

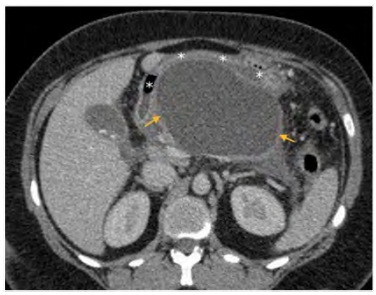
14

<4wks

1. Acute peripancreatic fluid collection
2. Post-necrotic pancreatic/peripancreatic fluid collection

>4wks

3. **Pancreatic pseudocyst**
4. Walled off pancreatic necrosis (WOPN)



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<4wks

1. **Acute peripancreatic fluid collection**
2. **Post-necrotic pancreatic/peripancreatic fluid collection**

>4wks

3. **Pancreatic pseudocyst**
4. **Walled off pancreatic necrosis (WOPN)**

16

Prognosis

- 15% mortality overall
- APACHE, Ranson, Balthazar
- Simple clinical assessment perhaps easiest and most valuable:
  - tachycardia
  - hypotension
  - tachypnea
  - hypoxemia
  - oliguria
  - encephalopathy

17

BISAP score

BUN	• BUN >25 mg/dl (8.9 mmol/L) (1 point)
Impaired mental status	• Abnormal mental status with a Glasgow coma score <15 (1 point)
SIRS	• Evidence of SIRS (systemic inflammatory response syndrome) (1 point)
Age	• age >60 years old (1 point)
Pleural effusion	• Imaging study reveals pleural effusion (1 point)

0-2 Points: Lower mortality (<2 percent)
3-5 Points: Higher mortality (>15 percent

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Critical Care

1. Resuscitation
   - Crystalloid-not too little, not too much, NOT NS
   - Use resuscitation guides
   - Beware ACS
2. Enteral nutrition
   - Reduces death, MOF, intervention, sepsis, LOS
   - NG (usually tolerated) > NJ (if not) > TPN (last resort)
3. Antibiotics should be avoided (until infection)

19

No Role

- Routine ERCP
- Probiotics
- Octreotide
- Routine abdominal re-imaging

20

Timing Intervention

- Early resection/debridement results in:
  - 2x mortality (56% vs 27%)
  - Mean 5700cc EBL
  - No mortality benefit
- Patience -> mortality 4%
- But: Early intervention IS indicated in acute decline
- Intervention rare before 28 days

21

4 Approaches

1. Endoscopic
   - Optimal
   - 1 procedure or repeated
2. Percutaneous
   - Can be very effective
   - Requires upsizing
   - Labor intensive
3. Lap/videoscopic
   - Principles are same
   - Can be very effective
   - Easiest via gutter/flank approach
4. Open
   - Last option

22

Principles of Intervention

1. Debride the necrosis
2. As minimally invasively as possible
3. Evaluate the PD
4. Support them in process

23

4 Approaches

1. Endoscopic
2. Percutaneous
3. Videoscopic (VARD)
4. Lap/Open

24

4 Approaches

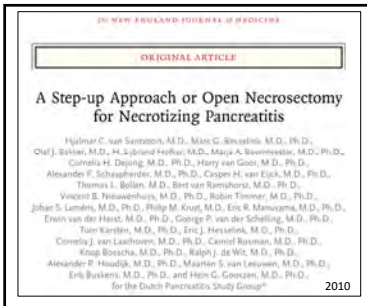
1. Endoscopic
2. Percutaneous
3. Videoscopic (VARD)
4. Lap/Open

25

Step Up

- Percutaneous/Endoscopic drainage
- Clinical improvement?
  - Yes: treatment complete
  - No: Repeat drainage
- Clinical improvement?
  - Yes: treatment complete
  - No: Video assisted retroperitoneal debridement (VARD)

26


ORIGINAL ARTICLE

A Step-up Approach or Open Necrosectomy for Necrotizing Pancreatitis

2010

- Multicenter
- Randomized
- 88 patients
- Infected necrosis
- Open necrosectomy vs. 'step-up approach'

- Primary endpoint:
  - Composite:
    major complications or death

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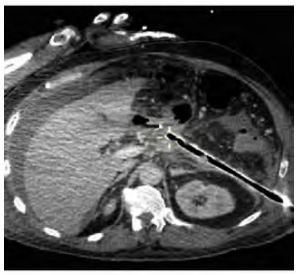


https://www.researchgate.net/figure/Retroperitoneal-drain-following-enhanced-step-up-percutaneous-necrosectomy-in-same_fig2_283338542

28

NEJM

A Step-up Approach or Open Necrosectomy for Necrotizing Pancreatitis

- Step-up: 35% percutaneous only
- Primary endpoint: 40% vs. 60%, p=0.006
- MSOF: 12% vs. 40%, p=0.001
- Incisional hernia: 7% vs. 24%, p=0.03
- New diabetes: 16% vs. 38%, p=0.02
- Pancreatic enzymes: 7% vs. 33%, p=0.002
- New ICU admission: 16% vs. 40%, p=0.01

29

Review

Step-up approach for the management of pancreatic necrosis: a review of the literature

Melanie Kay Sion[1], Kimberly A Davis[2]

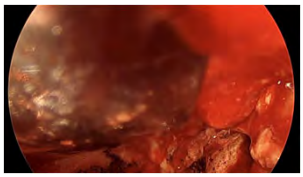
Trauma Surgery & Acute Care Open

tsaco-2019-000308

30

4 Approaches

1. Endoscopic
2. Percutaneous
3. Videoscopic (VARD)
4. Open



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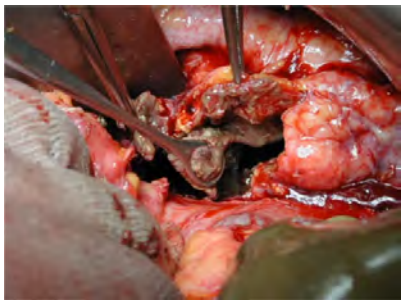
4 Approaches

1. Endoscopic
2. Percutaneous
3. Videoscopic (VARD)
4. Lap/Open



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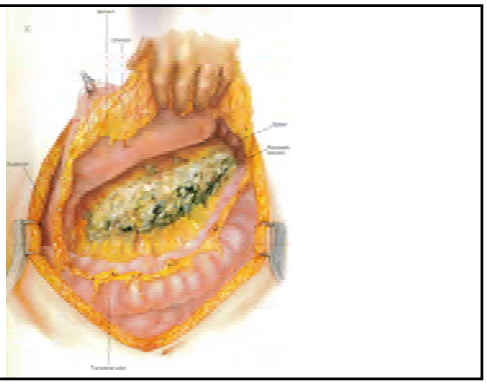

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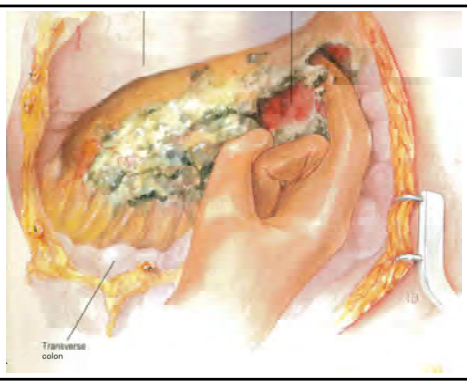
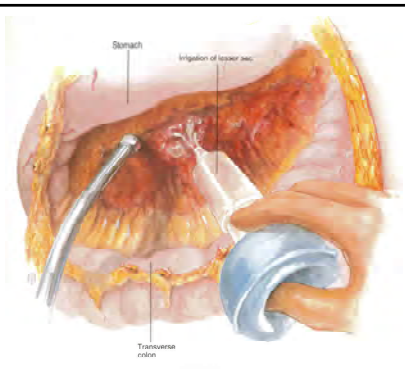
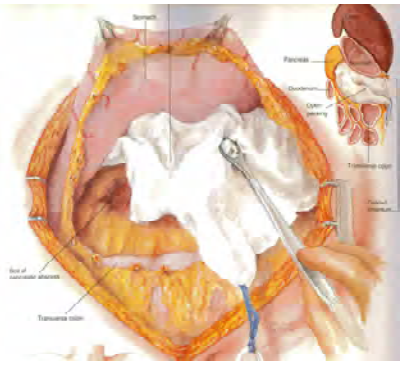

Transverse
colon

35


Stomach
Irrigation of lesser sac
Transverse
colon

36



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Complications

- Bleeding can be disastrous.
  - Artery-angioembolization
  - Vein-packing/clipping
- Pancreatic fistula-closure in 22-28 weeks
  - 'Disconnected duct syndrome'

39

Key Points

1. Good early resuscitation
2. Enteral nutrition.
3. Keep the faith.
4. Most will resolve.
5. Intervention late
6. Options depend on location and tools.

40

How much has changed?

Some:

1. Nomenclature
2. Drainage

But Not:

1. Enteral nutrition
2. Avoid antibiotics
3. Good critical care
4. Careful judgment

41

42

Iatrogenic Colon Perforation

Timothy Geiger, MD, MMHC
Associate Professor of Surgery, Colon and Rectal Surgery
Chief, Division of General Surgery
Vanderbilt University Medical Center

1

Disclosures

- INX medical- consultant
  - No relevance to this discussion

2

Iatrogenic injury

- 3 mechanisms in reviewing the literature
  1. Colonoscopies- represent 99.9% of all published data on iatrogenic colon injuries
  2. Barium Enemas- represent 0.1% of all published data
  3. Surgical misadventures- represent 0.0% of all published data

These numbers are based on my perception

3

Vanderbilt Division of General Surgery

Perforation from Colonoscopy

- Injuries occur due to:
  - Direct trauma of scope
    - Looping, retroflexion, sliding, blind pushing
  - Therapeutic measures
    - Polypectomy/thermal injury
    - Dilation, stenting, EMR/ESD
  - Air insufflation
- Sigmoid most commonly injured site
- Historically perforation = operative intervention
  - Significant literature, lack of consensus
    - Multiple etiologies
    - Variable time between procedure and presentation
    - Variability of who admits the patient- bias to care

Table 1 Incidence rates of perforation associated with colonoscopy procedures

Procedure	Perforation (%)
Screening colonoscopy	0.01–0.1
Snare polypectomy	0.17
Endoscopic mucosal resection (EMR)	0–5
Endoscopic submucosal dissection (ESD)	5–10
Anastomotic stricture dilation	0–6
Crohn's disease stricture dilation	0–18
Colonic stent placement	4
Decompressive probe positioning	2

Manta, et al. Tech Coloproctol (2015) 19:505-13

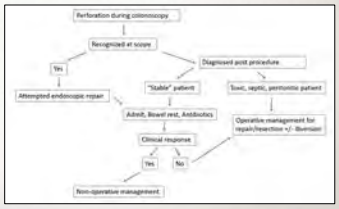
4

Vanderbilt Division of General Surgery

Perforations- when do we operate?

- Exhaustive review of the literature= more confused than before I started

Basic principles:
- Timing of diagnosis to scope
- Clinical presentation



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Vanderbilt Division of General Surgery

Perforation identified at time of scope

- Attempted endoscopic closure with clips, band ligation, or other novel means is reasonable/appropriate
- Highly recommend admission and observation


2 Sigmoid Colon ; first piecemeal excision

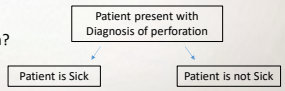
6

Perforation identified early (<24hours)

- Most common presentation
- Once diagnosed (radiographic imaging)

Multiple treatment strategies-

- endoscopic interventions- described, not recommended
- Surgery- when?
  - Peritonitis and/or sepsis
- Bowel rest, Antibiotics and Observation?
  - Stable patient, no peritonitis



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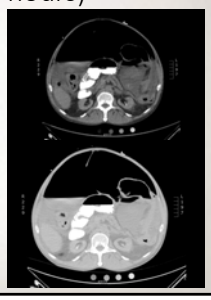
Perforation identified late (>24 hours)

- More common from intervention
  - Thermal injury
- Always check pathology!
- Treatment depends on patient
  - No recommendation for endoscopic management
  - Highly likelihood of surgical intervention



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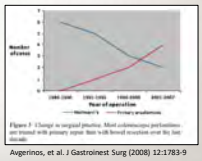
Colonic Perforation

- Operative strategies
  - Literature supports both laparoscopic and open techniques for surgical intervention
  - Small perforations- primary repair +/- diversion
  - Larger perforations- resection, probable anastomosis +/- diversion
    - Condition of patient, bowel, and abdomen



Avgerinos, et al. J Gastroinest Surg (2008) 12:1783-9

9

Rectal Perforations

- Intraperitoneal injuries should be treated as colon perforations
- Extraperitoneal injuries-
  - Manifest as subcutaneous air, retroperitoneal air, pneumomediastinum and may look different on CT scans
  - Much more likely to be responsive to bowel rest and antibiotics
  - If toxic/septic-
    Drainable fluid collection- consider IR drainage and diversion
    No drainable fluid collection- diverting stoma

10

Summary

- Literature shows a higher rate of surgical intervention in perforations from diagnostic colonoscopies than therapeutic
  - Nature of injury postulated as cause
- Those identified as having a perforation early (<24hrs) were more likely to undergo a laparoscopic procedure
- Conservative vs. operative management should depend on the clinical nature (and pathology)


The American Journal of Surgery

Review

Management of colonoscopic perforations: A systematic review

Alexander T. Hawkins*, Kenneth W. Sharp, Molly M. Ford, Roberta L. Muldoon, M. Benjamin Hopkins, Timothy M. Geiger

11

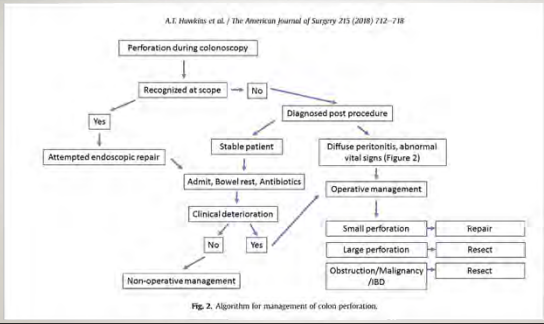
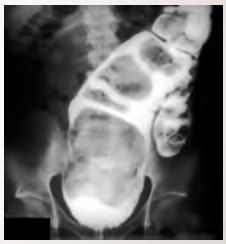


Fig. 2. Algorithm for management of colon perforation.

12

Barium Enema Perforation

- Etiology-
  - Catheter tip injury
  - Over inflation of balloon
  - Excessive pressure
  - "Weakened" colonic wall
  - Obstruction
- Retroperitoneal vs intraperitoneal



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Barium Enema Perforation

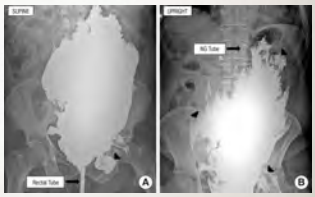
- Retroperitoneal perforations can be managed conservatively if minimal systemic symptoms
  - Any post perforation abscess should be managed appropriately
  - Catheter is recommended to be left in place to facilitate drainage of barium
- Intraperitoneal perforations typically will need immediate surgery
  - Much higher mortality rate due to infection and endotoxemia from the fecal matter/bacteria + irritating contrast material
  - Intraabdominal saline washout and probable resection with stoma

Feiter, et al. DCR (2006) 49:261-271
Nelson, et al. DCR (1982) 25:305-308
Gedebou, et al. Amer Jnl Surg (1996) 172:454-458

14

Barium Enema Perforation

- Intrabdominal perforation
  - Single center retrospective study- 8 years, 7 BE perforations
    - 100% mortality
  - 2006 review of the literature- morality was 35-50%
  - Survivors had a long term risk of bowel and ureteral obstructions



Feiter, et al. DCR (2006) 49:261-271
Nelson, et al. DCR (1982) 25:305-308
Gedebou, et al. Amer Jnl Surg (1996) 172:454-458

Image copied from:
Vahedina-Ardakani, et al. Ann Coloproc (2014) 30:285-289

15

Surgical misadventures

There is no algorithm for what to do

Lots of "feelings" of what to do

- James Kessel- *"When you cause an injury, the first thing you do is call in a partner"*
- Pat Roberts- *"Never follow up a complication with a complication"*
- Tom Read- *"Take 5 minutes, look up the patient's chart to understand all of the medical comorbid conditions prior to making a plan"*
- Tim Geiger- *"Always ask for a Flex sig"*
- Calm the team, calm the room, make a safe non-emotional decision

16

Conclusion

- Colonoscopic injuries are complex
  - Non-peritonic patients with normal vitals can typically be managed non-operatively
  - Peritonitis or signs of sepsis = Operate
    - Management depends on patient and findings
    - If polypectomy/biopsy- ALWAYS check the path!!!
- Barium enema injuries are rare
  - Intraperitoneal are devastating and require washout/resection
- Surgical misadventures are emotional
  - Calm the team, calm the room, make a rational plan of action

17

Subtotal Cholecystectomy: The REAL Safe Answer

Matthew Martin, MD, FACS, FASMBS
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San Diego, CA

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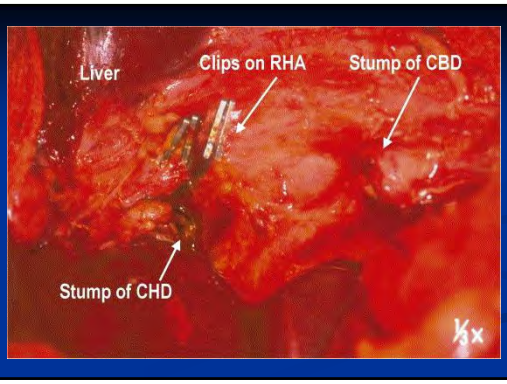
1

My REAL Disclosures

- I am a gallbladder nihilist

- Two operating principles of gallbladder surgery
  1. There is NO glory in gallbladder surgery
  2. You are always millimeters from disaster

2



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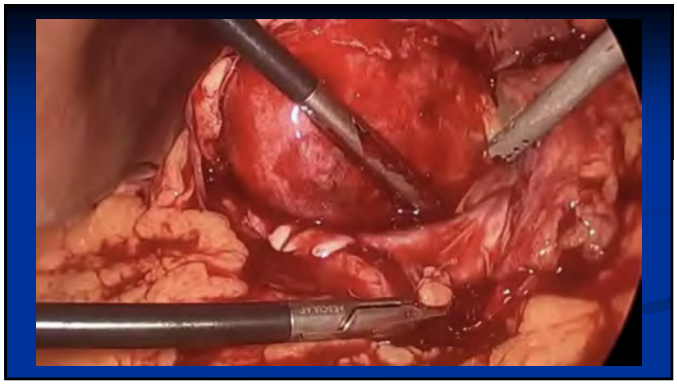

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Need to do the “SAFE” thing!

- Convert to open
- Is this safer?
- Easier?
- Outcomes?

5

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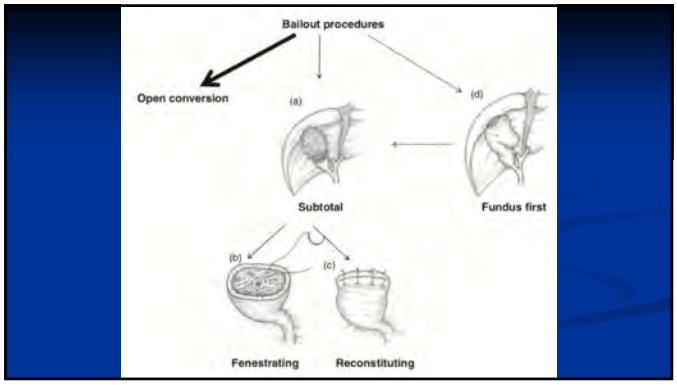
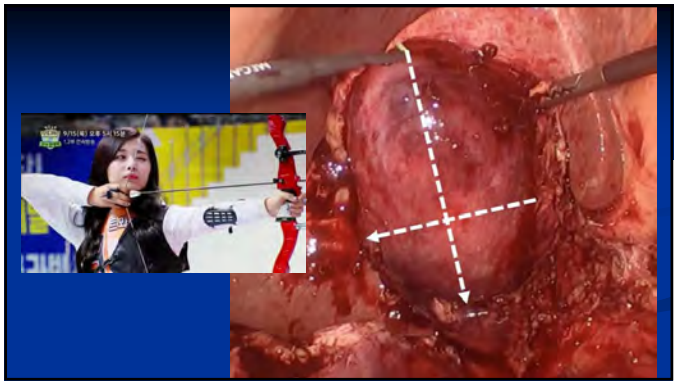

Bailout procedures
Open conversion
(a)
(d)
Subtotal
Fundus first
(b)
(c)
Fenestrating
Reconstituting

7



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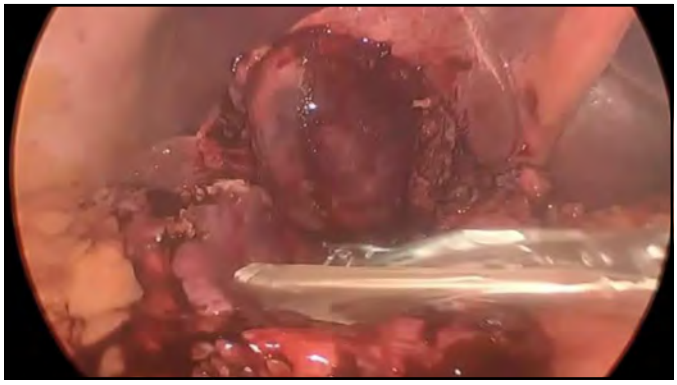

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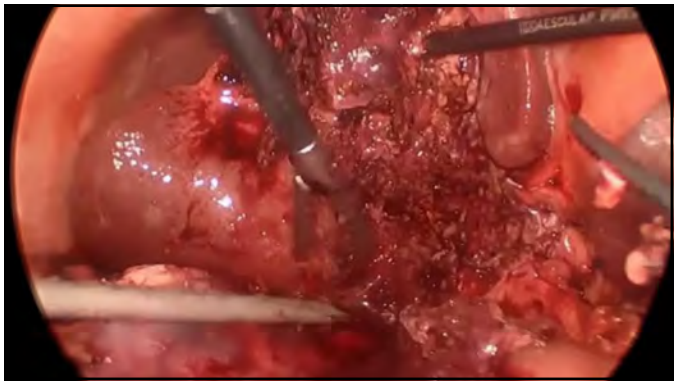

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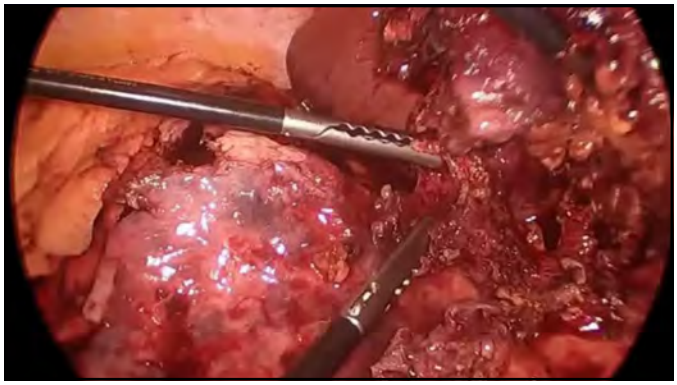

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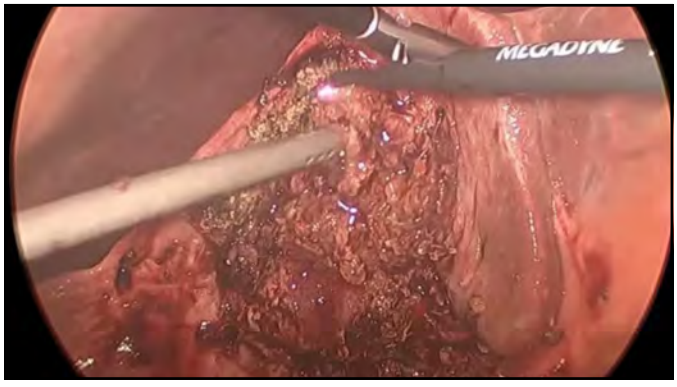

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Kaplan D, Inaba K, Chouliaras K et.al. Subtotal cholecystectomy and open total cholecystectomy alternatives in complicated cholecystitis. American Surgeon October 2014

- 214 cases of complicated cholecystitis
- 5 (3.3%) CBD injuries
  - ALL in Open group!!
- Severe complications
  - higher with open (0 vs 27.9%)

13

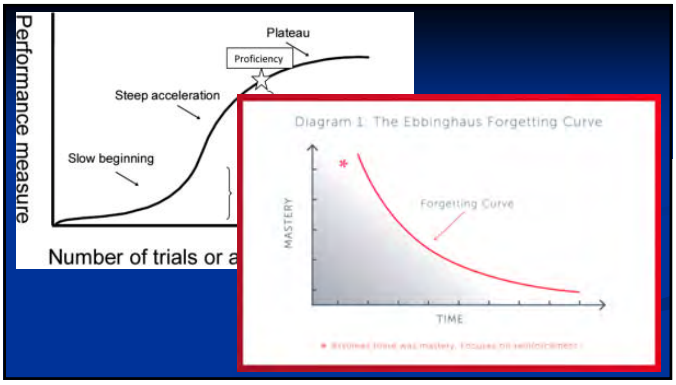
Original Investigation

Subtotal Cholecystectomy for "Difficult Gallbladders"
Systematic Review and Meta-analysis

Mohamed Elshaer, MD; Gianpiero Gravante, MD, PhD; Katie Thomas, MD, PhD; Roberto Sorge, PhD; Salem Al-Hamali, MD; Hamdi Ebdewi, MD

- 1.8% re-operation rate
- Bile duct injury - only ONE in 1231 cases
- LSC better than Open
  - abscess, retained stones, wound infection
  - reoperation and mortality

14



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National Case Numbers

16

Thank You!

east

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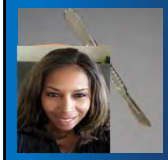
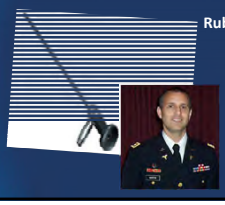
Open Conversion for the Disaster Gallbladder

Cold Steel Vs. The Scope





Ruby A. Skinner MD FACS FCCP FCCM
EAST MIS Masters Course
January 2020

1

Surgical Endoscopy And Other Interventional Techniques
February 2003, Volume 17, Issue 2, pp 338–340 | Cite as

The decline of training in open biliary surgery

Authors Authors and affiliations

R.S. Chung, L. Wojtasik, Q. Pham, V. Chari, P. Chen

Int J Surg. 2018 Mar;51:219-222. doi: 10.1016/j.ijsu.2018.01.037. Epub 2018 Feb 2.

Open cholecystectomy: Exposure and confidence of surgical trainees and new fellows.

Campbell BM[1], Lambrianides AL[2], Dulfuraty JM[3].

2

Technical Challenges of Open Cholecystectomy

Difficult Exposure of Triangle of Calot.

(Anterograde Vs. Retrograde Approaches)

Other Reasons for conversion – bleeding, dense adhesions with adjacent organs limiting exposure, patient body habitus, hemodynamics.

3

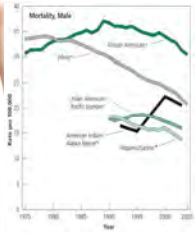
Conversion should not be considered a complication and surgeons should have a low threshold for conversion; the decision to convert to an open procedure must be based on intraoperative assessment weighing the clarity of the anatomy and the surgeon's skill/comfort in proceeding. (Level II, Grade A). (Sages .Org)

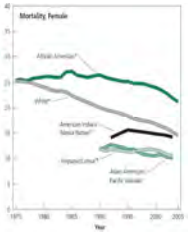
Colon Cancer: Near-Obstructing and Obstructing

Larissa KF Temple MD, MSc, FACS, FASCRS
Chief, Colorectal Surgery
Professor of Surgery and Oncology

1

Colorectal Cancer





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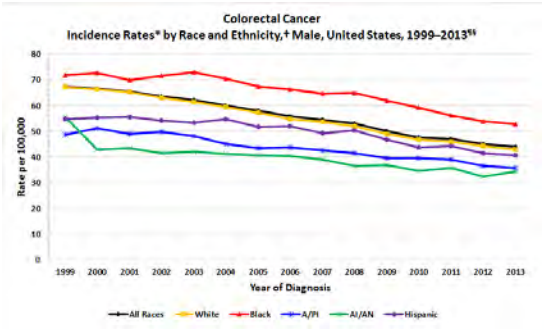

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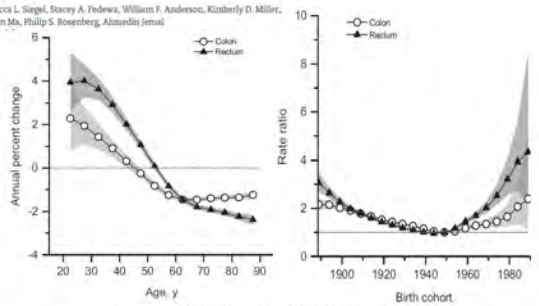
Colorectal Cancer Incidence Patterns in the United States, 1974–2013

Rebecca L. Siegel, Stacey A. Fedewa, William F. Anderson, Kimberly D. Miller, Jiemin Ma, Philip S. Rosenberg, Ahmedin Jemal



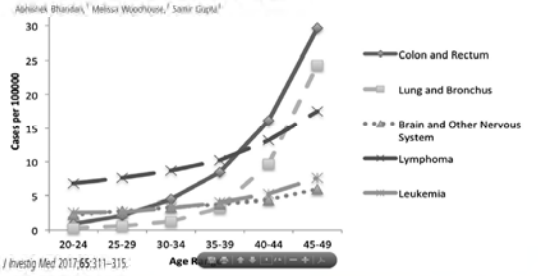
JNCI J Natl Cancer Inst (2017) 109(8): djw322

4

Original research

Colorectal cancer is a leading cause of cancer incidence and mortality among adults younger than 50 years in the USA: a SEER-based analysis with comparison to other young-onset cancers

Abhishek Bhandari,[1] Melissa Woodhouse,[1] Samir Gupta[1]



Bhandari A, *et al. J Investig Med* 2017;**65**:311–315.

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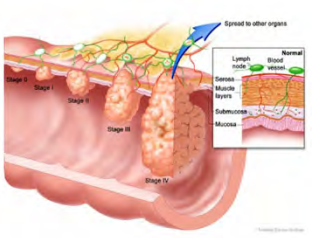
Staging



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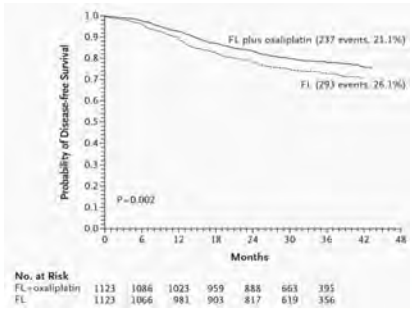
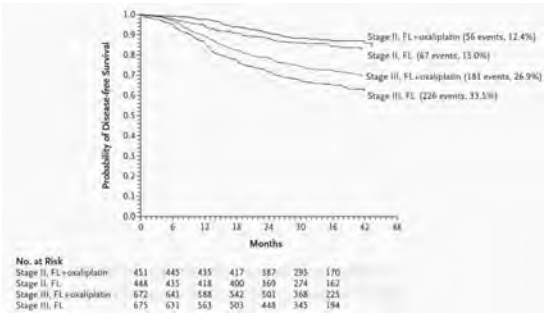
Stage II/III Outcomes



Andre et al. NEJM 2004: 2343-51.

7

Stage II-III Colon Cancer: Outcomes



Andre et al. NEJM 2004: 2343-51.

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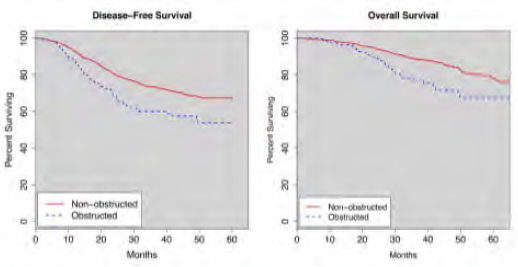
Clinical Scenario

9

Obstructing vs Non-Obstructing Colon Cancer



Dahdaleh et al. Surgery 2018: 1223-1229.

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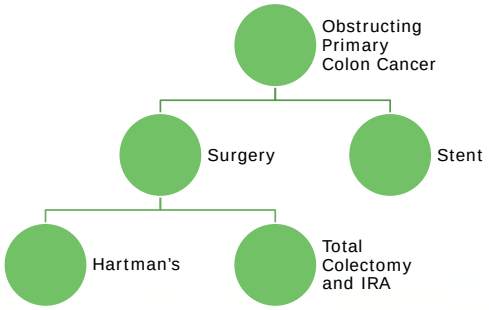
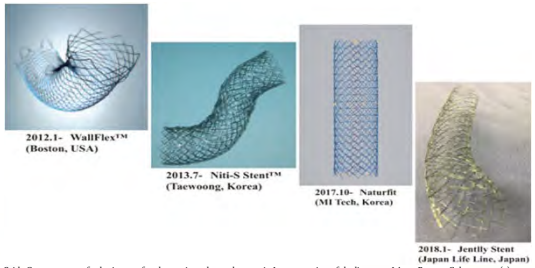
My Approach



11

Colonic Stenting

- Introduced in 1991
- Palliation vs "bridge to surgery"

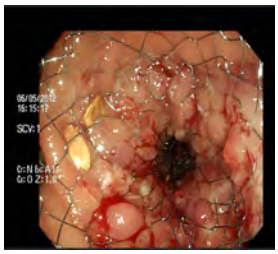


Saida Current status of colonic stent for obstructive colorectal cancer in Japan; a review of the literature J Anus Rectum Colon. 2019; 3(3): 99-105.

12

Stents

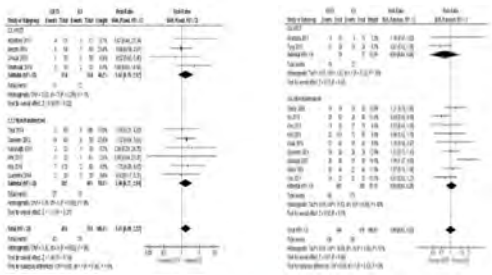
- Require a skilled endoscopist
- 90-100% technical success
- 71% clinical success
- Complications
  - 10% stent migration
  - 4% perforation rate
  - 0.5% mortality
- Long term outcomes
  - Impact on primary anastomoses
  - Impact on stoma rates
  - ? Rate of obstruction/tumor growth
  - Impact on local recurrence



Sebastian. Am J Gastro, 2004: 2051-57

13

Immediate Surgery vs Stent: Meta-Analysis



Ceresoli. J GI Onc, 2017: 867-876.

14

Immediate Surgery vs Stent: Meta-Analysis

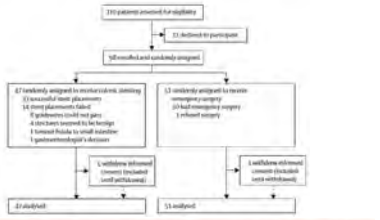
Author	Country	Journal	Year	SEMS	ES	Total
Alcantara [21]	Spain	World J Surg	2011	15	13	28
Ghazal [23]	Egypt	J Gastrointest Surg	2013	30	30	60
Cheung [7]	China	Arch Surg	2009	24	24	48
Sloothaak [22]	Netherlands	BJS	2014	26	32	58
Arezzo [20]	Italy/Spain	Surg Endosc	2017	56	59	115
Ho [24]	Singapore	Int J Colorectal Dis	2012	20	19	39
Pirlet [16]	France	Surg Endosc	2011	30	30	60
			Total	201	207	408

- 81 % technical & 76% clinical success
- 5% perforation rate
- Stoma rates 20.1% vs. 37.1%
- Permanent rates 8.7% vs. 20%

Boland. Int J Colorectal Disease, 2019[15]

15

Dutch RCT

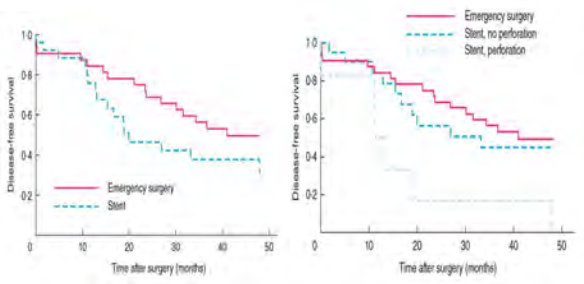


	Colonic stenting (n=47)	Emergency surgery (n=51)	Absolute risk difference (95% CI)	Relative risk (95% CI)	p value
Mortality					
30-day mortality	5	5	-0·01 (-0·14 to 0·12)	0·92 (0·28 to 2·98)	0·89
Overall mortality	9	9	-0·02 (-0·17 to 0·14)	0·92 (0·40 to 2·12)	0·84
Morbidity*	25	23	-0·08 (-0·27 to 0·11)	0·85 (0·57 to 1·27)	0·43
Stoma rates					
Directly after initial intervention	24	38	0·23 (0·04 to 0·40)	1·46 (1·06 to 2·01)	0·016
At latest follow-up	27	34	0·09 (-0·10 to 0·27)	1·16 (0·85 to 1·59)	0·35

vanHooft. Lancet, 2011. 344-52.

16

Dutch II RCT



Sloothaak. BJS, 2014: 1751-1757

17

The CREST Trial

A randomised phase III study of stenting as a bridge to surgery in obstructing colorectal cancer. Results of the UK ColoRectal Endoscopic Stenting Trial (CREST).

Funded by Cancer Research UK and developed by the National Cancer Research Institute

ASCO ANNUAL MEETING '16

Presented By Larissa Temple at 2016 ASCO Annual Meeting

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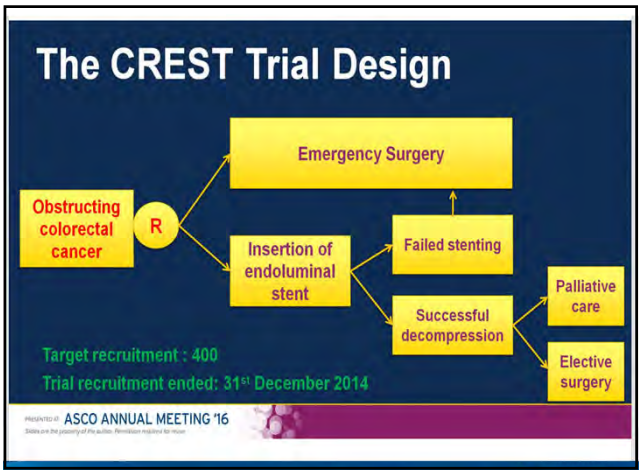
The CREST Trial Design
Emergency Surgery
Obstructing colorectal cancer
R
Insertion of endoluminal stent
Failed stenting
Successful decompression
Palliative care
Elective surgery
Target recruitment : 400
Trial recruitment ended: 31st December 2014
ASCO ANNUAL MEETING '16

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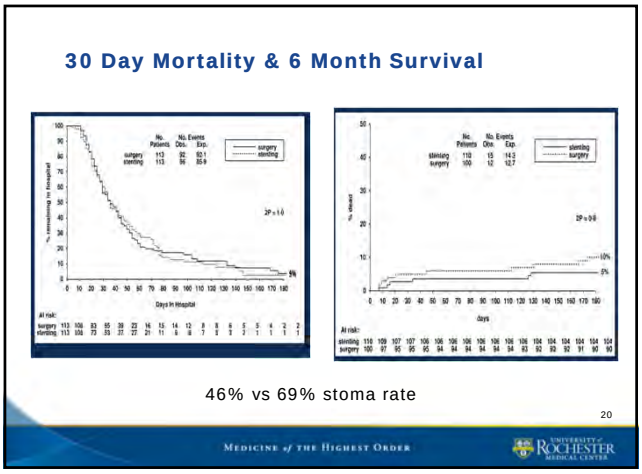
30 Day Mortality & 6 Month Survival
46% vs 69% stoma rate
20
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990 Guideline
Self-expandable metal stents for obstructing colonic and extracolonic cancer: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline
ESGE
2 Colonic self-expandable metal stent (SEMS) placement as a bridge to elective surgery is not recommended as a standard treatment of symptomatic left-sided malignant colonic obstruction (strong recommendation, high quality evidence).
3 For patients with potentially curable but obstructing left-sided colonic cancer, stent placement may be considered as an alternative to emergency surgery in those who have an increased risk of postoperative mortality, i.e. American Society of Anesthesiologists (ASA) Physical Status≥III and/or age>70 years (weak recommendation, low quality evidence).
2014
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ASCRS Clinical Practice Guidelines

Obstruction

1. For patients with obstructing left-sided colon cancer and curable disease, initial colectomy or initial endoscopic stent decompression and interval colectomy may be performed. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.
2. For patients with obstructing right or transverse colon cancer and curable disease, initial colectomy or initial endoscopic stent decompression and interval colectomy may be performed. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.

Vogel Dis Col Rectum, 2017: 999-1017

22

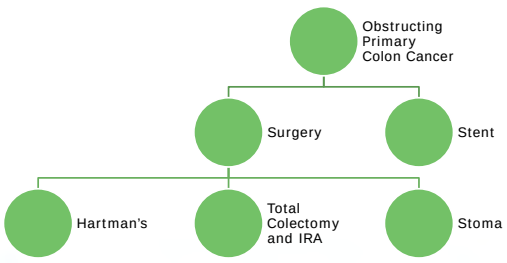
EAST Recommendations

Question	Recommendation
PICO #1: In adult patients with a colonic obstruction (neoplastic or benign) (P), does stenting (I) compared with surgery decrease mortality rates (O)?	In adult patients with colonic obstruction we conditionally recommend colonic stenting vs open surgery regarding decreasing mortality . This recommendation does not apply to benign disease
PICO#2: In adult patients with a colonic obstruction (neoplastic or benign) (P), does stenting (I) compared with surgery decrease emergency, non-planned interventions (O)?	In adult patients with colonic obstruction we conditionally recommend colonic stenting vs surgery regarding decreasing need for unplanned interventions. This recommendation does not apply to benign disease

Ferrada. J Trauma Acute Care Surg, 2016: 659-669.

23

My Approach to Metastatic Disease



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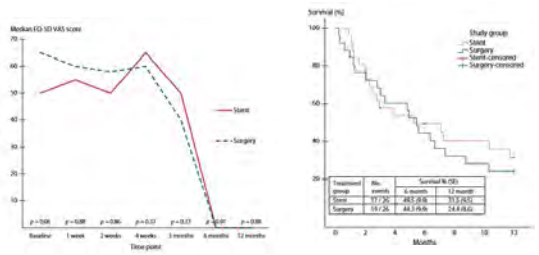
Metastatic Colon Cancer: Observational Data

Outcome	Odds Ratio (95% CI)		
	Unadjusted	Multivariable Regression	Propensity Score Matched
In-hospital events			
Death	0.47 (0.22-1.00)[a]	0.40 (0.14-1.10)[b]	0.64 (0.25-1.64)
Major events[c]	0.59 (0.27-1.29)	0.81 (0.30-2.18)	0.78 (0.29-2.09)
Procedure complications[d]	0.41 (0.15-1.09)[b]	0.37 (0.11-1.22)	0.44 (0.14-1.44)
Transfusion	0.56 (0.34-0.90)[a]	0.57 (0.31-1.06)[b]	0.61 (0.33-1.11)
Total parenteral nutrition	0.47 (0.25-0.90)[a]	0.44 (0.19-1.00)[b]	0.52 (0.25-1.09)[b]
Other than routine discharge	0.21 (0.12-0.36)[a]	0.14 (0.07-0.28)[a]	0.17 (0.07-0.37)[a]
Hospice	1.16 (0.55-2.43)	1.27 (0.46-3.53)	1.00 (0.43-2.31)
LOS >75th percentile	0.53 (0.31-0.89)[a]	0.50 (0.26-0.97)[a]	0.45 (0.23-0.86)[a]
Total charges >75th percentile	0.81 (0.50-1.32)	0.56 (0.29-1.11)[b]	0.48 (0.25-0.93)[a]
Readmission			
90 d	1.04 (0.65-1.64)	0.93 (0.49-1.78)	1.15 (0.68-1.95)
1 y	0.93 (0.59-1.46)	0.72 (0.38-1.37)	1.06 (0.66-1.71)
Return to OR			
90 d	2.07 (0.69-6.20)	1.34 (0.26-6.87)	1.67 (0.40-6.97)
1 y	3.18 (1.38-7.33)[a]	2.93 (1.12-7.68)[a]	3.50 (1.15-10.63)[a]

Abelson. JAMA Surg, 2017. 429-435.

25

Metastatic Colon Cancer: RCT



Procedure costs: 4462.50 v 3251.50 p<0.001
Overall hospital Costs: $3902.44

Young. Dis Col Rectum, 2015: 838-845.
Young. Colorectal Dis, 2018: 288-295.

26

Metastatic Colon Cancer & Bevacizumab

Complications	N (%)		
	No Treatment (n = 31)	Chemotherapy Alone (n = 31)	BV-based Regimen (n = 16)
Perforation	2 (6)	3 (9.7)	2 (12.5)
Re-obstruction	5 (16)	7 (22.5)	2 (12.5)
Minor bleeding	0	2 (6.5)	2 (12.5)
Stent migration	1 (3)	1 (3)	0
Total	8 (26)	13 (42)	6 (37.5)

Van Halsema. Gastrointest Endosc. 2019;90:125-126

Adverse event	Bevacizumab (n = 104)	No bevacizumab (n = 95)
Minor bleeding	2 (1.9%)	0
Perforation	1 (.9%)	3 (3.2%)
Abdominal pain	7 (6.7%)	5 (5.3%)
Stent migration	2 (1.9%)	2 (2.1%)
Respiratory insufficiency	0	1 (1.1%)
Total	12 (11.5%)	11 (11.6%)

Lee et al. Gastrointest Endosc. 2019;90(1):116-124

27

990 Guideline

Self-expandable metal stents for obstructing colonic and extracolonic cancer: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline

ESGE

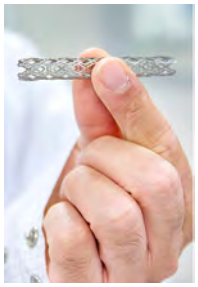
4 SEMS placement is recommended as the preferred treatment for palliation of malignant colonic obstruction (strong recommendation, high quality evidence), except in patients treated or considered for treatment with antiangiogenic drugs (e.g. bevacizumab) (strong recommendation, low quality evidence).

2014

28

28

Clinical Pearls



- Location matters
  - Right vs Left lesions
  - Colon vs Rectal lesions
- After successful stent
  - Low fiber diet
  - Aggressive bowel regimen
  - Stent for 10-21 days prior to surgery
- Difficult to "clear colon" after stent
- Metastatic patients with stent need careful follow-up

29

29

Conclusions

- Stenting has a role in the management of patients with obstructing colon cancer
- Stenting requires expertise & complications exist
- Patient selection is critical
- Important to consider long term plan when using stents

30

30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31

Iatrogenic Colon Perforation

Timothy Geiger, MD, MMHC
Associate Professor of Surgery, Colon and Rectal Surgery
Chief, Division of General Surgery
Vanderbilt University Medical Center

1

Disclosures

- INX medical- consultant
  - No relevance to this discussion

2

Iatrogenic injury

- 3 mechanisms in reviewing the literature
  1. Colonoscopies- represent 99.9% of all published data on iatrogenic colon injuries
  2. Barium Enemas- represent 0.1% of all published data
  3. Surgical misadventures- represent 0.0% of all published data

These numbers are based on my perception

3

Vanderbilt Division of General Surgery

Perforation from Colonoscopy

- Injuries occur due to:
  - Direct trauma of scope
    - Looping, retroflexion, sliding, blind pushing
  - Therapeutic measures
    - Polypectomy/thermal injury
    - Dilation, stenting, EMR/ESD
  - Air insufflation
- Sigmoid most commonly injured site
- Historically perforation = operative intervention
  - Significant literature, lack of consensus
    - Multiple etiologies
    - Variable time between procedure and presentation
    - Variability of who admits the patient- bias to care

Table 1 Incidence rates of perforation associated with colonoscopy procedures

Procedure	Perforation (%)
Screening colonoscopy	0.01–0.1
Snare polypectomy	0.17
Endoscopic mucosal resection (EMR)	0–5
Endoscopic submucosal dissection (ESD)	5–10
Anastomotic stricture dilation	0–6
Crohn's disease stricture dilation	0–18
Colonic stent placement	4
Decompressive probe positioning	2

Manta, et al. Tech Coloproctol (2015) 19:505-13

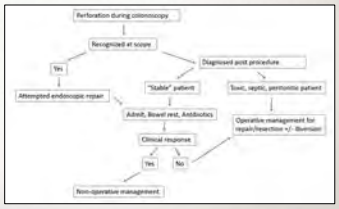
4

Vanderbilt Division of General Surgery

Perforations- when do we operate?

- Exhaustive review of the literature= more confused than before I started

Basic principles:
- Timing of diagnosis to scope
- Clinical presentation



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Vanderbilt Division of General Surgery

Perforation identified at time of scope

- Attempted endoscopic closure with clips, band ligation, or other novel means is reasonable/appropriate
- Highly recommend admission and observation


2 Sigmoid Colon ; first piecemeal excision

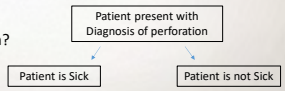
6

Perforation identified early (<24hours)

- Most common presentation
- Once diagnosed (radiographic imaging)

Multiple treatment strategies-

- endoscopic interventions- described, not recommended
- Surgery- when?
  - Peritonitis and/or sepsis
- Bowel rest, Antibiotics and Observation?
  - Stable patient, no peritonitis



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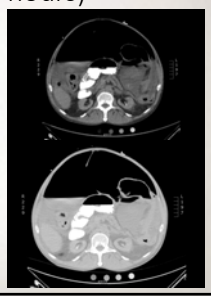
Perforation identified late (>24 hours)

- More common from intervention
  - Thermal injury
- Always check pathology!
- Treatment depends on patient
  - No recommendation for endoscopic management
  - Highly likelihood of surgical intervention



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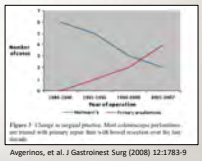
Colonic Perforation

- Operative strategies
  - Literature supports both laparoscopic and open techniques for surgical intervention
  - Small perforations- primary repair +/- diversion
  - Larger perforations- resection, probable anastomosis +/- diversion
    - Condition of patient, bowel, and abdomen



Avgerinos, et al. J Gastroinest Surg (2008) 12:1783-9

9

Rectal Perforations

- Intraperitoneal injuries should be treated as colon perforations
- Extraperitoneal injuries-
  - Manifest as subcutaneous air, retroperitoneal air, pneumomediastinum and may look different on CT scans
  - Much more likely to be responsive to bowel rest and antibiotics
  - If toxic/septic-
    Drainable fluid collection- consider IR drainage and diversion
    No drainable fluid collection- diverting stoma

10

Summary

- Literature shows a higher rate of surgical intervention in perforations from diagnostic colonoscopies than therapeutic
  - Nature of injury postulated as cause
- Those identified as having a perforation early (<24hrs) were more likely to undergo a laparoscopic procedure
- Conservative vs. operative management should depend on the clinical nature (and pathology)


The American Journal of Surgery

Review

Management of colonoscopic perforations: A systematic review

Alexander T. Hawkins*, Kenneth W. Sharp, Molly M. Ford, Roberta L. Muldoon, M. Benjamin Hopkins, Timothy M. Geiger

11

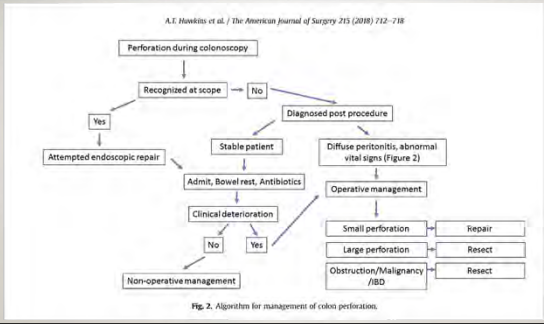
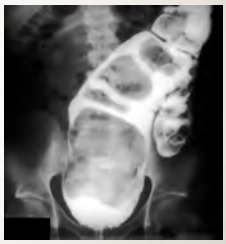


Fig. 2. Algorithm for management of colon perforation.

12

Barium Enema Perforation

- Etiology-
  - Catheter tip injury
  - Over inflation of balloon
  - Excessive pressure
  - "Weakened" colonic wall
  - Obstruction
- Retroperitoneal vs intraperitoneal



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Barium Enema Perforation

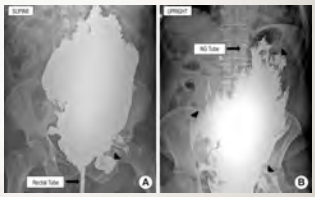
- Retroperitoneal perforations can be managed conservatively if minimal systemic symptoms
  - Any post perforation abscess should be managed appropriately
  - Catheter is recommended to be left in place to facilitate drainage of barium
- Intraperitoneal perforations typically will need immediate surgery
  - Much higher mortality rate due to infection and endotoxemia from the fecal matter/bacteria + irritating contrast material
  - Intraabdominal saline washout and probable resection with stoma

Feiter, et al. DCR (2006) 49:261-271
Nelson, et al. DCR (1982) 25:305-308
Gedebou, et al. Amer Jnl Surg (1996) 172:454-458

14

Barium Enema Perforation

- Intrabdominal perforation
  - Single center retrospective study- 8 years, 7 BE perforations
    - 100% mortality
  - 2006 review of the literature- morality was 35-50%
  - Survivors had a long term risk of bowel and ureteral obstructions



Feiter, et al. DCR (2006) 49:261-271
Nelson, et al. DCR (1982) 25:305-308
Gedebou, et al. Amer Jnl Surg (1996) 172:454-458

Image copied from:
Vahedina-Ardakani, et al. Ann Coloproc (2014) 30:285-289

15

Surgical misadventures

There is no algorithm for what to do

Lots of "feelings" of what to do

- James Kessel- *"When you cause an injury, the first thing you do is call in a partner"*
- Pat Roberts- *"Never follow up a complication with a complication"*
- Tom Read- *"Take 5 minutes, look up the patient's chart to understand all of the medical comorbid conditions prior to making a plan"*
- Tim Geiger- *"Always ask for a Flex sig"*
- Calm the team, calm the room, make a safe non-emotional decision

16

Conclusion

- Colonoscopic injuries are complex
  - Non-peritonic patients with normal vitals can typically be managed non-operatively
  - Peritonitis or signs of sepsis = Operate
    - Management depends on patient and findings
    - If polypectomy/biopsy- ALWAYS check the path!!!
- Barium enema injuries are rare
  - Intraperitoneal are devastating and require washout/resection
- Surgical misadventures are emotional
  - Calm the team, calm the room, make a rational plan of action

17

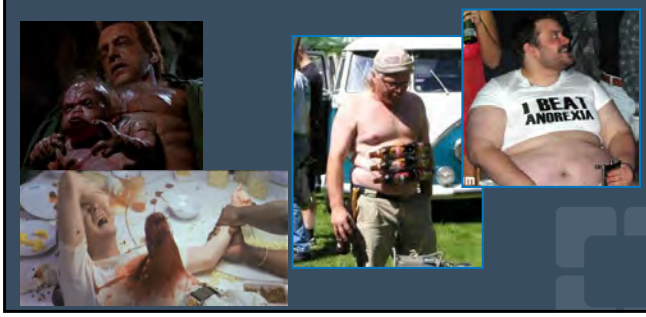
The "Difficult" Stoma

2020 MIS Masters Course

Eric K Johnson, MD
Professor of Surgery, CCLCM/CWRU

1

What Defines "Difficult"?



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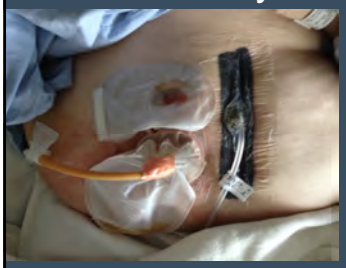
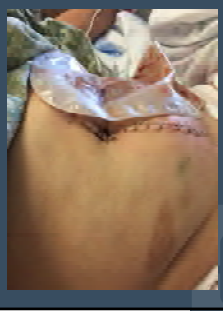
Quick Advice- BLUF

- Techniques work open or MIS
- The stoma is the "open" part of the case
- A bad stoma provides great torture
- Make it good the first time…no matter what it takes
- Know when, and how to fix a bad stoma

3

Try to Avoid…





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Advice

- Site preop (do your best)
- Upper abd wall is thinnest
- Stay out of the midline
- Don't settle
- Avoid creases/ scars

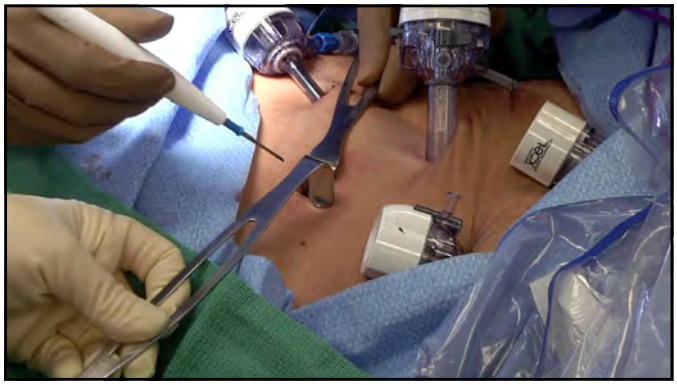
5

In General…

- If it's going well MIS, it's probably not a 'difficult" stoma- see video
- Errors-
  - Tension
  - Ischemia
  - Maturing the wrong end
  - Persisting with MIS technique

6

7



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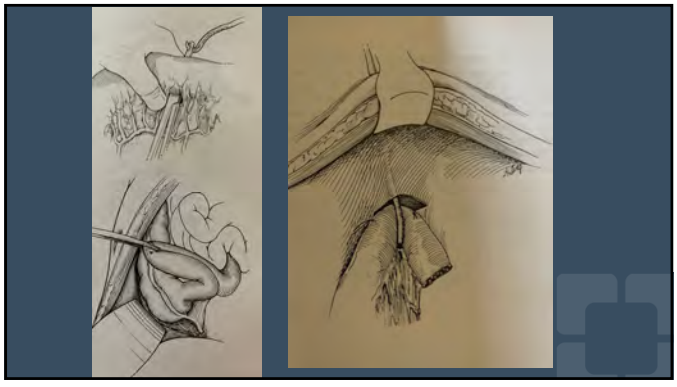

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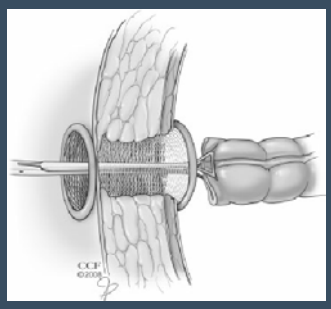

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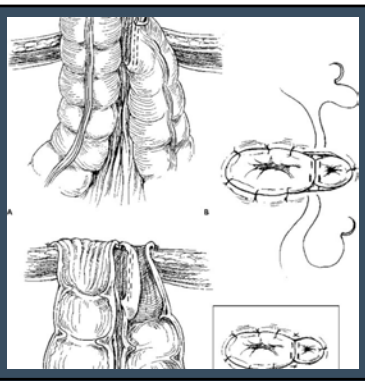


11

Issues with Shortened Mesentery

- Obesity
- Prior surgery
- Sclerosing mesenteritis
- Desmoid disease
- Malignancy
- Desmoplastic reaction

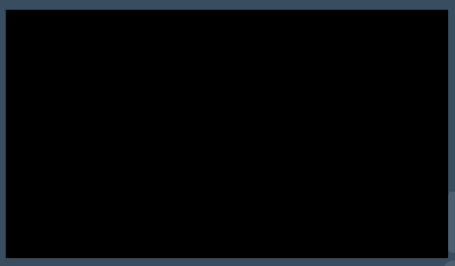
12

No Good News

- Not much to modify these scenarios
- Utilize techniques already mentioned
- Go more proximal…
- End-loop stoma; mesenteric division after trans-illumination

13

Fluorescence Angiography?



14

Early Postop Issues

- Ischemia
- Muco-cutaneous separation
- Retraction
- Difficulties with output

15

Ischemia

16

Ischemia

- Is any of it viable?
- Test tube illumination
- ? True necrosis below the fascia
- Is the patient stable?
- If not, is it because of the stoma?
- Often, it will “make it”
- Serial/ daily dilation

17

Muco-Cutaneous Dehiscence

18

Non-Operative!

- Avoid temptation to redo anything
- Enterostomal therapy in most cases
- Unless it retracts below the fascia

19

Enterostomal Therapy

20

Retraction

21

Retraction

- Rod may prevent- just to cause necrosis
- Colostomy easier than ileostomy
- Above or below fascia?
- Reducing the output may help
  - Imodium
  - Banana flakes
  - PPI
  - Octreotide/ TPN/ bowel rest

22

Retraction

- Buy the time you need
- Stoma revision
- You have to do something different than you did the first time!
- Bowel “stretches” over time

23

Large Pannus?

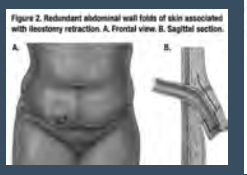
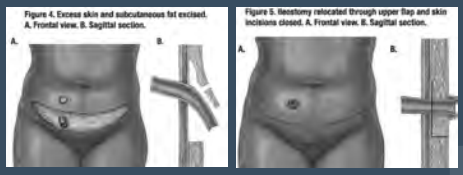


Figure 2. Redundant abdominal wall folds of skin associated with ileostomy retraction. A. Frontal view. B. Sagittal section.

Figure 3. Skin and subcutaneous fat incisions to produce flaps (sagittal section).

24

Abdominal Wall Contouring



Beck. The Ochsner Journal. 2007

25

Summary

- Bad scenarios
- Do you need the stoma?
- Often, no clear winning decision
- Do what buys time
- Make a plan that will stand the test of time

26

Cleveland Clinic

Every life deserves world class care.

27

THE UNIVERSITY OF CHICAGO MEDICINE & BIOLOGICAL SCIENCES

In the Hartmann procedure obsolete?

Neil Hyman MD
Professor of Surgery
Codirector, Center for Digestive Diseases
Chief, Colon and Rectal Surgery
University of Chicago Medicine

Dr. Hyman has disclosed that he has no relevant financial relationships with any commercial interests.

1

Answer

Just about….

Exceptions

- **Hemodynamic instability**
- **No reason for anastomosis (eg incontinence, dementia)**

2

COMPLICATED DIVERTICULITIS

Options – Generalized peritonitis

- Hartmann procedure
- Resection with anastomosis
- Resection with anastomosis, loop ileostomy
- Laparoscopic washout

3

Generalized Peritonitis
Hartmann Procedure

- **1/3 (or more) of stomas never closed**
- **Takedown morbid (mortality up to 14%)**
- **Stoma creation in the morbidly obese**

4

UVM Experience

(The dirty laundry)

- 49 complications in 30 pts (29%)
- 2 deaths (MI, leak)
- 4 anastomotic leaks
- 7 inadvertent enterotomies
- LOS 7.2 days (2-55)
- 7 protective loop ileostomies

5

Surgeon, not disease severity determines choice of operation

N=151

- 82 by general surgeon (70% get Hartmann)-43.2% complication rate
- 44 by colorectal surgeon (40% get Hartmann)-16.7% complication rate

Jafferji, *JACS* 2014

6

Hartmann procedure is usually a disservice to pt

- Permanent vs temporary stoma
- Usually 3 big operations vs one big and one small operation
- Prolonged functional detriment
- Greater cumulative morbidity

7

Why do a Hartmann?

SURGICAL HYPERBOLE

- Perfect for colleagues you don't want to see back at work……
- Perfect for pts who you want to have three major operations instead of one
- Perfect for pts who have always dreamed of a permanent colostomy
- Perfect for institutions who need more practice fixing ureters or inadvertent enterotomies
- Perfect for institutions where hernia or colorectal surgeons need more work to do

8

Incarcerated / Strangulated Ventral Hernias

Patrick M Reilly MD FACS

January 14, 2020

The Trauma Center at Penn
A Regional Resource Facility of the University of Pennsylvania Health System

1

Disclosures

- None
- I'm Old!

2

Cochrane Library

Cochrane Database of Systematic Reviews

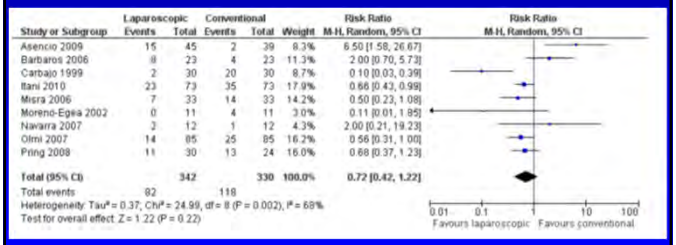
Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review)

Sauerland S, Walgenbach M, Habermalz B, Seiler CM, Miserez M

Cochrane Reviews 2011

3

Any Complication



Study or Subgroup	Laparoscopic Events	Total	Conventional Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Asencio 2009	15	45	2	39	8.3%	6.50 [1.58, 26.67]
Barbaros 2006	8	23	4	23	11.3%	2.00 [0.70, 5.73]
Carbajo 1999	2	30	20	30	8.7%	0.10 [0.03, 0.39]
Itani 2010	23	73	35	73	17.9%	0.66 [0.43, 0.99]
Misra 2006	7	33	14	33	14.2%	0.50 [0.23, 1.08]
Moreno-Egea 2002	0	11	4	11	3.0%	0.11 [0.01, 1.95]
Navarra 2007	3	12	1	12	4.3%	2.00 [0.21, 19.23]
Olmi 2007	14	85	25	85	16.2%	0.56 [0.31, 1.00]
Pring 2008	11	30	13	24	16.0%	0.68 [0.37, 1.23]
Total (95% CI)		342		330	100.0%	0.72 [0.42, 1.22]
Total events	82		118			

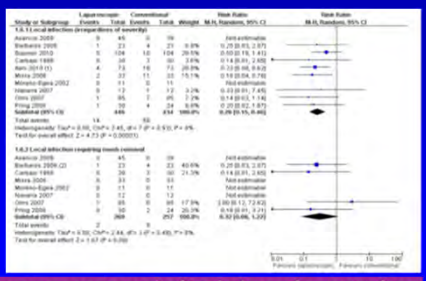
Heterogeneity: Tau² = 0.37; Chi² = 24.99, df = 8 (P = 0.002); I² = 68%
Test for overall effect: Z = 1.22 (P = 0.22)

Risk Ratio M-H, Random, 95% CI
0.01 0.1 1 10 100
Favours laparoscopic Favours conventional

Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review) Cochrane Reviews 2011

4

Local Infection



Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review) Cochrane Reviews 2011

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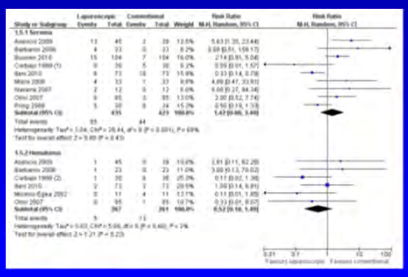
Seroma and Hematoma



Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review) Cochrane Reviews 2011

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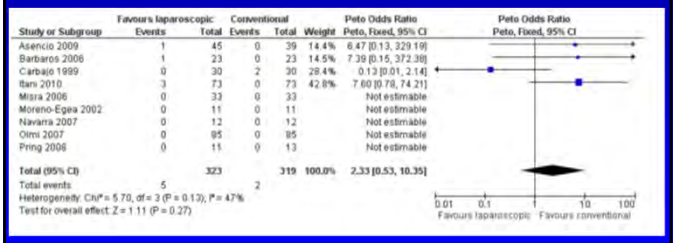
Enterotomy



Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review) Cochrane Reviews 2011

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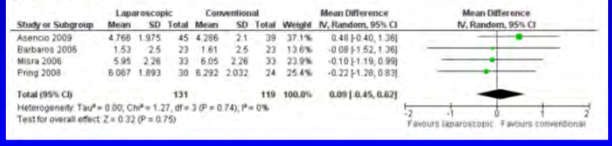
Acute Pain

Figure 10. Forest plot of comparison: 1 Laparoscopic versus open repair (overall analysis), outcome: 1.8 Acute pain (VAS or NRS data).



Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review) Cochrane Reviews 2011

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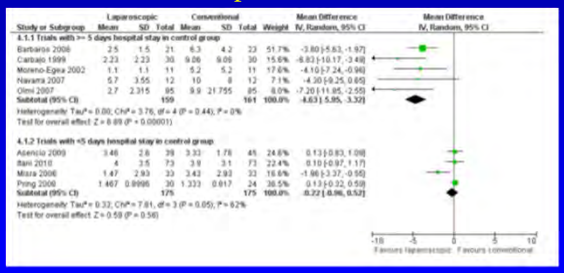
Hopsital LOS



Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review) Cochrane Reviews 2011

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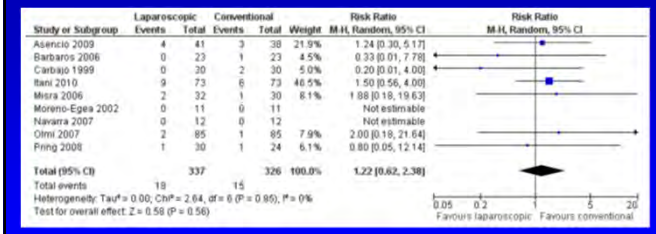
Hernia Recurrence



Laparoscopic versus open surgical techniques for ventral or incisional hernia repair (Review) Cochrane Reviews 2011

10

Laparoscopic VHR

- Safe / Remote Access
- Insufflation – Helps
  - Additional Defects?
- Blunt Adhesion Dissection
  - Would I Bovie That?
- Abdominal Wall Manipulation
- Abdominal Defect Repair

11

Abdominal Defect Repair

- Primary Fascial Closure
  - Yes or No
- Overlapping Mesh Repair

Surgical Innovation

Primary Fascial Closure During Minimally Invasive Ventral Hernia Repair

Karla Bernardi, MD; Oscar A. Olavarria, MD; Mike K. Liang, MD

JAMA Surg 2019

12

Incarcerated Ventral Hernia

- The Same Animal?
  - Urgent vs Emergent
- OR and Surgical Staff
  - Can't Find the _____
  - &%$#*&
- Concern for Strangulation
- Literature?

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Case Series

Laparoscopic repair of incarcerated ventral abdominal wall hernias

Table 1 Patient characteristics

Characteristic	Value
Female/male (number)	88/24
Mean age (years)	56±13.2 (range 27–76)
Mean body mass index (kg/m^2)	33 (range 20–44)
Primary ventral hernia (number)	23
Incisional hernia (number)	63
Recurrent incisional hernia (number)	26
Duration of hernia (months)	38 (range 3–104)
Type of incarceration	
Acute	9
Chronic	103

Table 2 Hernia location

Characteristic	Number
Incisional hernia	89
Lower midline	64
Upper midline	12
Pfannenstiel	9
Flank incisional	2
Right lower quadrant	2
Primary ventral hernia	23
Umbilical	14
Epigastric	9

Hernia 2008

14

Case Series

Laparosc … bdominal wall hern…

Table 3 Intraoperative characteristics

Characteristic	Value
Hernia contents	
Omentum	42
Small bowel	28
Large bowel	6
Omentum and small bowel	34
Mean number of trocars used	3.7 ± 1.1
Mean size of the largest defect through which incarceration occurred (diameter) (cm)	3.5 ± 1.6
Number of defects	5.1 ± 4.9 (range 1–19)
Mean mesh size (area)	379 ± 210 cm^2 (range 225–600)
Iatrogenic enterotomy	4
Omental vessel bleed	9
Inferior epigastric vessel bleed	12
Mean operating time (min)	96 ± 40.8 (range 50–170)

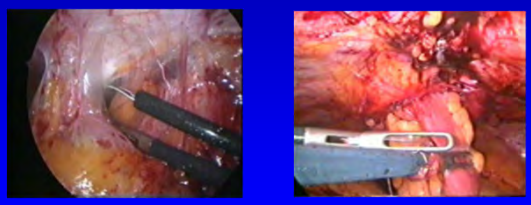
8% Conversion Rate

Hernia 2008

15

Case Series

Laparoscopic repair of incarcerated ventral abdominal wall hernias



Hernia 2008

16

Case Series

Laparoscopic repair of incarcerated ventral abdominal wall hernias

Table 4 Postoperative complications

Characteristic	Patients
Early	
Urinary retention	2
Prolonged ileus	3
Hematoma	2
Seroma	16
Cellulitis	3
Late	
Mesh infection with sinus	1
Recurrence	3

Hernia 2008

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Retrospective Cohort Study

Is laparoscopic repair of incarcerated abdominal hernias safe? Analysis of short-term outcomes

Table 1 Baseline patient characteristics

Patient characteristics	Laparoscopic (n = 2688)	Open (n = 15562)	Total (n = 18250)	p value
Demographics				
Male sex	1102 (41.0)	7205 (46.3)	8307 (45.6)	<0.001*
Morbid obesity	678 (25.2)	3367 (21.6)	4045 (22.2)	<0.001*
Smoker	512 (19.1)	3262 (21.0)	3774 (20.7)	0.024*
Dependent functional status	67 (2.5)	1071 (6.9)	1138 (6.3)	<0.001*
Comorbidities				
COPD	171 (6.4)	1262 (8.1)	1433 (7.9)	0.002*
Bleeding disorder	140 (5.2)	1325 (8.5)	1465 (8.0)	<0.001*
CHF	291 (10.8)	1718 (11.0)	2009 (11.0)	0.74
Hypertension	1557 (57.9)	8743 (56.2)	10,300 (56.4)	0.09
Steroid use	77 (2.9)	530 (3.4)	607 (3.3)	0.15
Diabetes	475 (18.2)	2202 (15.0)	2677 (15.5)	<0.001*
Acute renal failure	22 (0.8)	390 (2.5)	412 (2.3)	<0.001*
ASA > 3	121 (4.5)	1421 (9.1)	1542 (8.5)	<0.001*
Preoperative				
Recurrent hernias	465 (17.3)	3164 (20.3)	3629 (19.9)	<0.001*
Ventral hernias	2396 (89.1)	11,883 (76.4)	14,279 (78.2)	<0.001*
Presence of ascites	19 (0.7)	541 (3.5)	560 (3.1)	<0.001*
Sepsis syndrome	141 (5.3)	1991 (12.9)	2132 (11.8)	<0.001*

* Significance based on p value <0.05

Surg Endo 2016

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Retrospective Cohort Study

Is laparoscopic repair of incarcerated abdominal hernias safe? Analysis of short-term outcomes

Table 3 Multivariable regression analysis of 30-day outcomes

30-day outcomes	Unadjusted OR (95 % CI)	*p* value	Adjusted OR (95 % CI)	*p* value
Infectious complications	0.40 (0.27–0.61)	<0.001	0.36 (0.23–0.56)	<0.001*
Serious complications	0.55 (0.46–0.66)	<0.001	0.66 (0.55–0.80)	<0.001*
Reoperation	0.81 (0.56–1.17)	0.26	0.81 (0.56–1.18)	0.28
Mortality	0.50 (0.32–0.80)	0.53	0.94 (0.58–1.53)	0.80

Surg Endo 2016

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Comparative Analysis with Matching

Emergency laparoscopic and open repair of incarcerated ventral hernias: a multi-institutional comparative analysis with coarsened exact matching

Surg Endo 2019

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Comparative Analysis with Matching

Emergency laparoscopic and open repair of incarcerated ventral hernias: a multi-institutional comparative analysis with coarsened exact matching

Table 2 Clinical outcomes

	Laparoscopic approach	Open approach	*p*-value
Operative outcomes			
Total operative time, mean [sd]	89.54 (63.23)	75.42 (62.70)	<0.001
Length of stay, mean [sd]	3.65 (5.88)	4.33 (5.21)	0.014
Wound outcomes			
Any wound complication	25 (3.0)	65 (7.9)	<0.001
Superficial incisional SSI	15 (1.8)	31 (3.8)	0.017
Deep incisional SSI	3 (0.4)	16 (1.9)	0.004
Organ space SSI	8 (1.0)	8 (1.0)	1.0
Wound disruption	1 (0.1)	13 (1.6)	0.002

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Comparative Analysis with Matching

Emergency laparoscopic and open repair of incarcerated ventral hernias: a multi-institutional comparative analysis with coarsened exact matching

Table 2 Clinical outcomes

	Laparoscopic approach	Open approach	*p*-value
Morbidity			
All morbidity	75 (9.1)	124 (15.1)	<0.001
Non-wound morbidity	58 (7.1)	76 (9.3)	0.105
Pneumonia	15 (1.8)	14 (1.7)	0.851
Unplanned intubation	7 (0.9)	7 (0.9)	0.584
Pulmonary embolism	2 (0.2)	4 (0.5)	0.687
Ventilator requirement	7 (0.9)	9 (1.1)	0.803
Progressive renal insufficiency	0 (0.0)	5 (0.6)	0.062
Acute renal failure	6 (0.7)	1 (0.1)	0.124
Urinary tract infection	10 (1.2)	14 (1.7)	0.411
Stroke/CVA	1 (0.1)	0 (0.0)	1.0
Cardiac arrest	3 (0.4)	1 (0.1)	0.625
Myocardial infarction	4 (0.5)	1 (0.1)	0.374
Bleeding requiring transfusion	12 (1.5)	11 (1.3)	0.834
DVT	4 (0.5)	10 (1.2)	0.107
Sepsis	5 (0.6)	17 (2.1)	0.010
Septic shock	6 (0.7)	3 (0.4)	0.507

Surg Endo 2019

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Comparative Analysis with Matching

Emergency laparoscopic and open repair of incarcerated ventral hernias: a multi-institutional comparative analysis with coarsened exact matching

	Laparoscopic approach	Open approach	*p*-value
30 day reoperation	23 (2.8)	32 (3.9)	0.217
Missed enterotomy*	6 (0.7)	0 (0.0)	0.031
Operative classification			
I&D of abscess/seroma/hematoma	6 (0.7)	4 (0.5)	0.753
Surgical debridement/wound revision	0 (0.0)	8 (1.0)	0.008
Removal of infected mesh	0 (0.0)	1 (0.1)	1.0
Other unrelated procedure	4 (0.5)	7 (0.9)	0.547
Repair of recurrent hernia	1 (0.1)	1 (0.1)	1.0
Exploratory laparotomy	3 (0.4)	4 (0.5)	1.0
Bowel obstruction	0 (0.0)	1 (0.1)	1.0
Bowel resection	6 (0.7)	0 (0.0)	0.031
Unknown	3	6	

Surg Endo 2019

23

Prospective Randomized Studies

24

Laparoscopic Incarcerated VHR

- Safe / Remote Access
- Insufflation – Helps
  - Additional Defects?
- Blunt Adhesion Dissection
  - Would I Bovie That?
- Abdominal Wall Manipulation
- Reduce the Hernia
  - Enlarge Defect?
- Abdominal Defect Repair

25

Strangulated Ventral Hernia

- Incarcerated VHR Series
  - Many Excluded Bowel Resection
- Strangulated VHR Series
  - Mini-Laparotomy for Bowel Removal
- Technically Possible
- Mesh?

26

Incarcerated / Strangulated VHR: Mesh or No Mesh

- No Mesh
- Biologic Mesh
- Temporary Mesh
- Permanent Mesh
- Sounds Like a Great Debate Topic

27

Guidelines

WSES guidelines for emergency repair of complicated abdominal wall hernias

Laparoscopic approach
Repair of incarcerated hernias – both ventral and groin – may be performed with a laparoscopic approach (grade 1C recommendation).

Grade of recommendation	Clarity of risk/benefit	Quality of supporting evidence	Implications
1C Strong recommendation, low-quality or very low-quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	Observational studies or case series	Strong recommendation but subject to change when higher quality evidence becomes available

WJES 2013

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Laparoscopic Incarcerated VHR

- Summary
  - Potential Benefits
  - Achille's Heel
    - Recognized or Missed Enterotomy
  - Safe Entry
  - Safe LOA and Hernia Reduction
  - Start Laparoscopically
    - Conversion to Open not a Failure

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Thank You !

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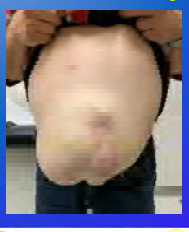
Minimally Invasive Approaches to AWR



Andrea Pakula MD, MPH, FACS

MIS MASTERS COURSE

33rd EAST Annual Scientific Assembly

Orlando, FL

ASCRS American Society of Colon and Rectal Surgeons

east

MIS MASTERS COURSE

Multisociety Advanced Skills Training in Emergency Surgery

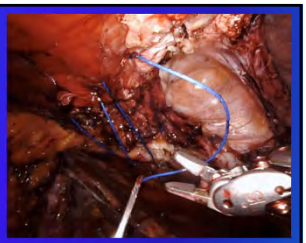
1

Disclosures

- Intuitive Surgical: Speaker, Trainer, Proctor
- Becton Dickinson: Speaker, Trainer

2

Objectives of AWR

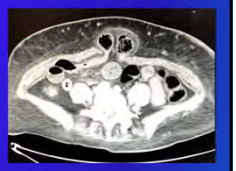


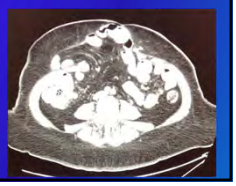
- Defect closure
- Medialization of rectus muscles
- Restoration of linea alba
- Adequate mesh overlap
- Return of functional dynamic abdominal wall

3

Progression of technique

- IPOM
- TAPP
- Rives-Stoppa
- TAR





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Robotic Ventral Hernia Techniques

eTEP

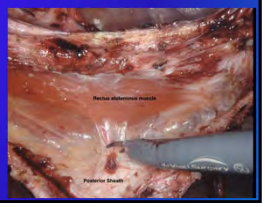
RoboTAR

TAPP

IPOM

5

Understanding Anatomy



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Port Placement

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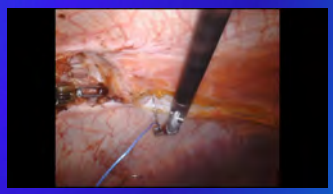
IPOM Plus
Defect Closure

Laparoscopic

Robotic



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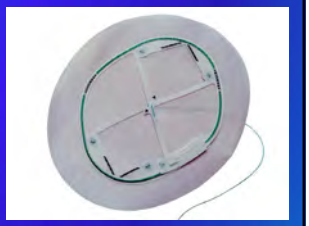
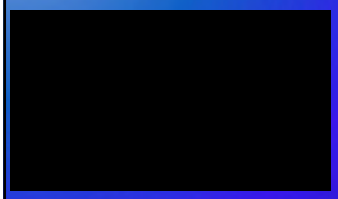
Defect closure & mesh positioning during IPOM Plus

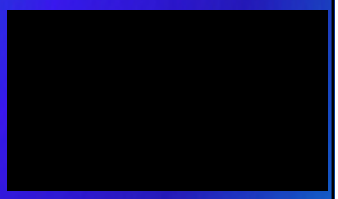


Echo 2™ Positioning System

9

Rives-Stoppa Retromuscular Repairs





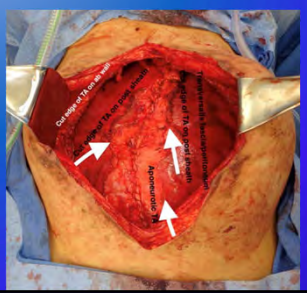
10

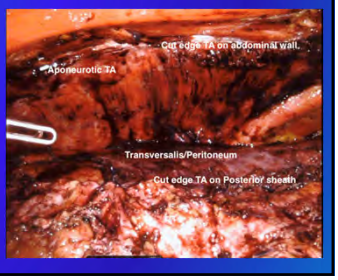
Indications for TAR

- Large, Complex Ventral Hernias
- ATYPICAL Locations
  - SUBXIPHOID AND SUBCOSTAL
  - SUPRAPUBIC
  - FLANK
  - PARASTOMAL

11

Critical View of TAR





12

Robotic transversus abdominus release

13

Robotic TAR

14

Conclusions

- Benefits of minimally invasive repair
- Minimize wound morbidity
- Shortened hospital LOS
- Less pain → less narcotics

- Robotic assisted approach is minimally invasive tool enabling MIS approach

15

Thank You

apakula333@aol.com
@AndreaPakula
RMISurgical.com

OF COURSE you can use mesh in a contaminated case!!

Michael Cripps, MD, MSCS, FACS
Associate Professor
UT Southwestern Medical Center
Department of Surgery
Division of General and Acute Care Surgery

UT Southwestern
Medical Center

Disclosures

- Consultant for Instrumentation Laboratory Worldwide (ROTEM device)

- Consultant for Hemosonics

Surgical Dogma is always true

- Never let the sun rise or sun set on a small bowel obstruction
- Levophed = “Leave ‘em dead”
- Lasix = 4 letter word; fireable offense
- Mandatory pre-sacral drains
- **NO synthetic mesh in a contaminated field**

Safety of Prosthetic Mesh Hernia Repair in Contaminated Fields

Alfredo M. Carbonell, DO*, William S. Cobb, MD

- The surgical dictum that permanent synthetic mesh is contraindicated in clean-contaminated and contaminated fields is unfounded, as an overwhelming amount of literature currently supports the use of prosthetic mesh in contaminated fields in a myriad of clinical scenarios, from the trauma open abdomen, to fascial dehiscence, incisional and parastomal hernia prophylaxis, emergent strangulated hernias, and elective procedures with breaching of the gastrointestinal tract.

Surg Clin N Am 93 (2013) 1227–1239

Final Word

"You know, I actually use mesh quite a bit in contaminated fields and it works **GREAT**"

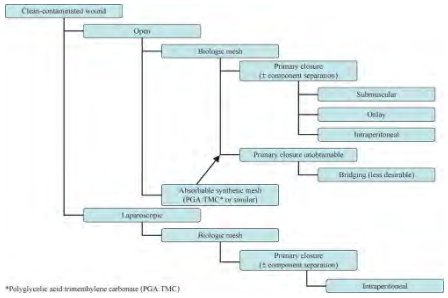
Personal communication

- Kim Davis, November 26, 2019, 09:19am

Synthetic mesh should not be used

Kimberly A. Davis, MD, MBA, FACS, FCCM
Professor of Surgery
Chief of the Division of General Surgery, Trauma and Surgical Critical Care
Yale School of Medicine

Yale SCHOOL OF MEDICINE

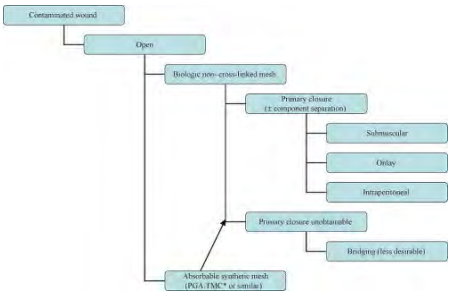


https://abdominalkey.com/infected-field-hernia-repair/

Yale SCHOOL OF MEDICINE SLIDE 3

No Disclosures

Yale SCHOOL OF MEDICINE SLIDE 1

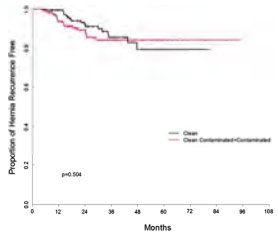


Yale SCHOOL OF MEDICINE SLIDE 4

Yale SCHOOL OF MEDICINE SLIDE 2

Outcomes of Abdominal Wall Reconstruction with Acellular Dermal Matrix Are Not Affected by Wound Contamination

Patrick B Garvey, MD, FACS, Roberto A Martinez, MD, Donald P Baumann, MD, FACS, Jun Liu, MD, PhD, Charles E Butler, MD, FACS



(J Am Coll Surg 2014;219:853–864.

Yale SCHOOL OF MEDICINE SLIDE 5

Multicenter, Prospective, Longitudinal Study of the Recurrence, Surgical Site Infection, and Quality of Life After Contaminated Ventral Hernia Repair Using Biosynthetic Absorbable Mesh

The COBRA Study

Michael J. Rosen, MD, Joel J. Bauer, MD,† Marco Harmaty, MD,† Alfredo M. Carbonell, DO,‡ William S. Cobb, MD,‡ Brent Matthews, MD,§ Matthew I. Goldblatt, MD,¶ Don J. Selzer, MD, MS,|| Benjamin K. Poulose, MD, MPH,** Bibi M. E. Hansson, MD, PhD,†† Camiel Rosman, MD,†† James J. Chao, MD,‡‡ and Garth R. Jacobsen, MD§§*

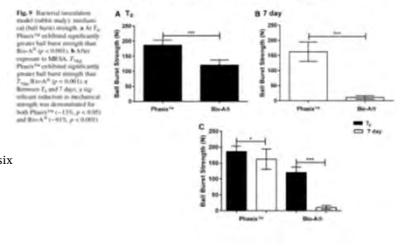
Conclusions: In this prospective longitudinal study, biosynthetic absorbable mesh showed efficacy in terms of long-term recurrence and quality of life for CVH repair patients and offers an alternative to biologic and permanent synthetic meshes in these complex situations.

Gore Bio-A

(*Ann Surg* 2017;265:205–211)

Characterization of host response, resorption, and strength properties, and performance in the presence of bacteria for fully absorbable biomaterials for soft tissue repair

N. F. N. Stokes[1] · J. R. Scott[2,3] · A. Badhwar[3] · C. R. Deeken[4] · G. R. Voeller[1]



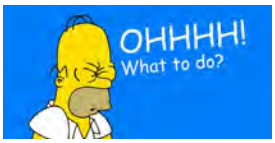
Bard Phasix

Hernia (2017) 21:771–782

Take home thoughts

- Primary repair is best
  - 30% recurrence -> delayed repair
- When primary repair is not possible
  - ?? Component separation

  - ?? Bioprosthetic
  - ?? Absorbable synthetic



Robotic Surgical Platforms

Ruby Skinner MD, FACS
MIS Masters Course
EAST 2020

1

Evolution of Technology

Intuitive surgical, Inc

- Founded in 1995, launched first system in 1999 cleared by FDA for general laparoscopic use

S, Si, Xi, X, SP

4 components:

- Patient cart, surgeon console, vision cart, endo-wrist instruments

2

Si Surgical System

Launched in 2009 as advancement to prior S model

- **Single quadrant surgery**

3

Xi Surgical System

4th Generation- 2014

- Multi-quadrant surgery

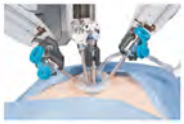
4

X Surgical System

- Launched 2017
- Budget friendly version
- Provides access to advanced technology
- Enables focused quadrant surgery

5

Single Site Platforms



Upgraded SP System

Focused quadrant surgery

6

Zeus Surgical Robotic System

- 2001 Transatlantic surgery, New York on pediatric patient in France
- Cedars 2002
- Discontinued in 2003
  - Merged with rival, Intuitive Surgical and developed daVinci

7

TransEnterix Senhance Surgical System

- Available in US and other countries with limited indications based on country

8

Medtronic Hugo RAS

- Expected launch 2020

9

Titan Surgical SPORT Robotic Surgical System

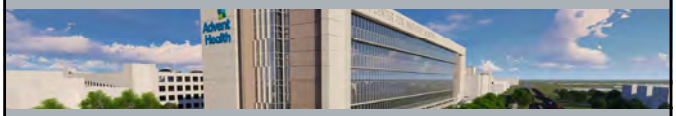
- Single port platform
- MIMIC Simulation skills modules
- Time line pushed to 2020

10

J&J and Google- VERB Surgical System

11

Florescence Imaging-Overview & How to Use it

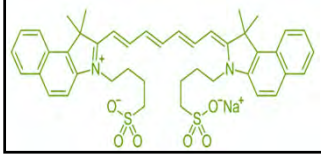


Sharona Ross, MD FACS
Professor, University of Central Florida
Professor, Nova Southeastern University
Director, MIS and Surgical Endoscopy
Director of Advanced GI and HPB Fellowship Program
AdventHealth Tampa

1

What is Florescence Imaging?

- Technique used to detect fluorescently labelled structures
- Most recently Indocyanine Green (ICG) enhanced fluorescence was introduced to Surgery
- ICG has been utilized since 1959 to measure cardiac output, anatomy of retinal vessels, measure liver function
- ICG is a water-soluble, tricarbocyanine dye
- Peak spectral absorption of 800 nm

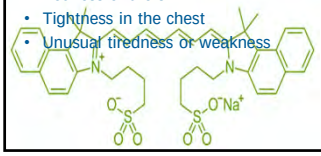


Ross/Sucandy/Rosemurgy

2

Side Effects

- Cough
- Difficulty swallowing
- Dizziness
- Fast heartbeat
- Hives or welts, itching, skin rash
- Puffiness or swelling of the eyelids or around the eyes, face, lips, or toungue
- Redness of the skin
- Tightness in the chest
- Unusual tiredness or weakness

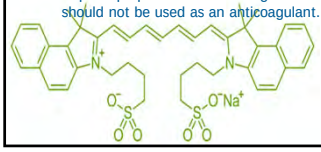


Ross/Sucandy/Rosemurgy

3

Indications for Use

- Intended to provide real-time endoscopic-visible and near-infrared fluorescence imaging.
- Enables surgeons visual assessment of vessels, blood flow, and related tissue perfusion.
- Contraindications
  - ICG contains Sodium Iodide and should be used with cautions in pts who have a hx of allergy to iodides
  - Heparin preparations containing sodium bisulfate reduce peak absorption in blood and should not be used as an anticoagulant.



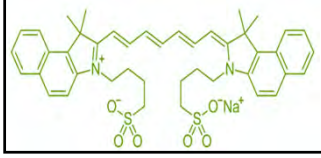
Ross/Sucandy/Rosemurgy

AdventHealth Tampa

4

Pre-operation and dosing of ICG

- Reconstitute ICG with 10 ml aqueous solution to obtain a 2.5 mg/ml concentration
- Maximum daily dose not to exceed 2 mg/kg per body weight
- Typical dose for IV injection could range from 0.5-1.5 ml at 2.5 mg/ml concentration.
- ICG should be injected in a rapid bolus
- Half-life of 2-5 minutes when bound to blood plasma



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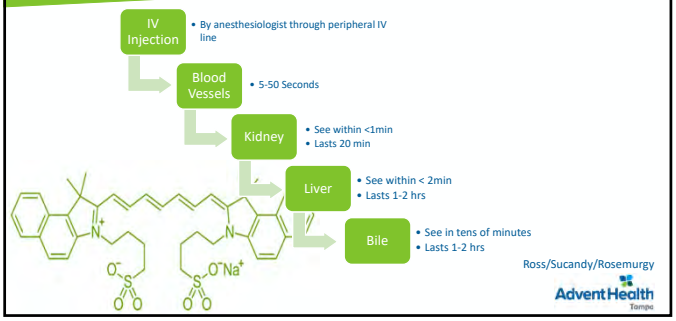
5

Pre-operation and dosing of ICG



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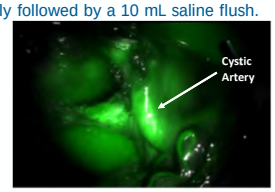
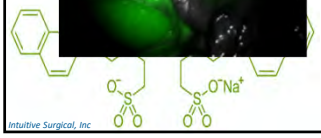
6

Laparoscopic Cholecystectomy - Vasculature

- Identify the cystic artery
- During dissection of Calot's triangle to identify the cystic artery.
- Systemic injection of 1.5 mL immediately followed by a 10 mL saline flush.





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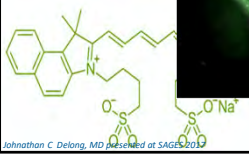
Intuitive Surgical, Inc

7

Laparoscopic Cholecystectomy – Biliary System

- Identify at least one of the extrahepatic biliary ducts.
- Systemic injection of 1.5-2.0 mL at least 45 min prior to start of case.



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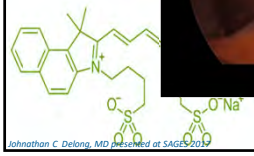
Johnathan C. Delong, MD presented at SAGES 2017

8

Laparoscopic Cholecystectomy



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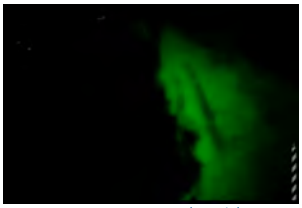
Johnathan C. Delong, MD presented at SAGES 2017

9

Hepatic Lesions

- Ligation of vascular inflow followed by 2.5 mg of ICG intravenously.



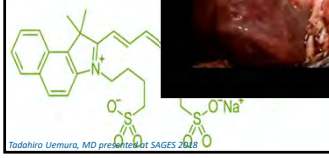
Ross/Sucandy/Rosemurgy

AdventHealth Tampa

Tadahiro Uemura, MD presented at SAGES 2018

10

Hepatic Demarcation



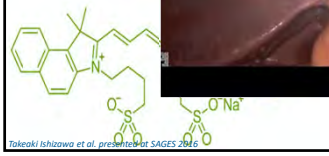
Ross/Sucandy/Rosemurgy

AdventHealth Tampa

Tadahiro Uemura, MD presented at SAGES 2018

11

Hepatic Lesions



Ross/Sucandy/Rosemurgy

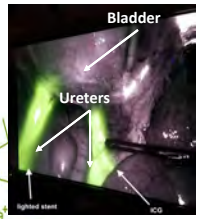
AdventHealth Tampa

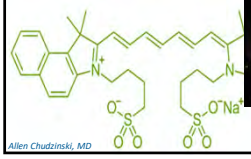
Takeaki Ishizawa et al. presented at SAGES 2018

12

Colectomy – Ureter Identification

- Use ICG to reduce ureter injury
- Urologist or surgeon performs an on-table cystogram with placement of stents and injecting 5 mL of ICG





Ross/Sucandy/Rosemurgy

AdventHealth Tampa

Allen Chudzinski, MD

13

Colectomy – Ureter Identification

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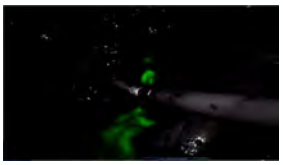
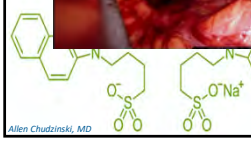




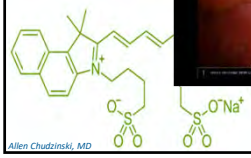
Ross/Sucandy/Rosemurgy

AdventHealth Tampa

Allen Chudzinski, MD

14

Colectomy – Ureter Identification



Ross/Sucandy/Rosemurgy

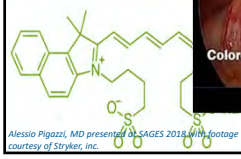
AdventHealth Tampa

Allen Chudzinski, MD

15

Colectomy – Anastomosis Perfusion

- Identify areas of perfusion from areas of ischemia during colectomy procedures.
- Inject a 3 mL dose of ICG and asses area of perfusion versus areas of de-vascularlized colon.



Ross/Sucandy/Rosemurgy

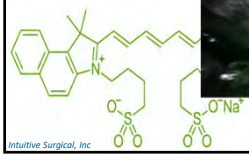
AdventHealth Tampa

Alessio Pigazzi, MD presented at SAGES 2018, GIVI footage courtesy of Stryker, inc.

16

Inguinal Hernia Repair

- Assess vascularity of tissues
- Systemic injection of 1.5-2 mL immediately followed by a 10 mL saline flush
- Approximately 30-60 seconds after peripheral IV injection.



Ross/Sucandy/Rosemurgy

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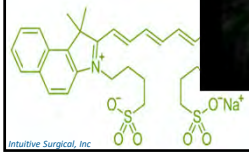
17

Endometrial Resection

- Identify areas of hypervascularity on the surface of the peritoneum
- Inject 1-1.5 mL dose of ICG
- 30-50 seconds after peripheral IV injection



Ross/Sucandy/Rosemurgy

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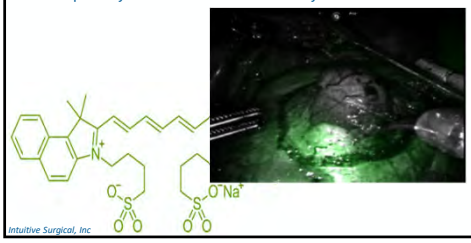
Intuitive Surgical, Inc

18

Partial Nephrectomy-Parenchymal perfusion assessment

- Assess the healthy parenchyma during tumor excision
- After Kidney is de-fatted and area of excision is exposed, inject a test dose of 0.25-0.5 ml
- Increase dose incrementally until optimal dose for assessment is found
- Clamp kidney as soon as ICG reaches kidney.



Ross/Sucandy/Rosemurgy

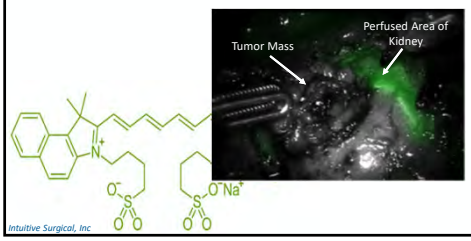
AdventHealth Tampa

Intuitive Surgical, Inc

19

Partial Nephrectomy - Selective arterial clamping

- Identify areas of perfusion from areas of occlusion as means to localize warm ischemia to specific regions of the kidney.
- Extend hilar dissection lateral to expose individual branching artery
- Surgeon clamps arterial branch then administers a 1.5 mL dose of ICG



Ross/Sucandy/Rosemurgy

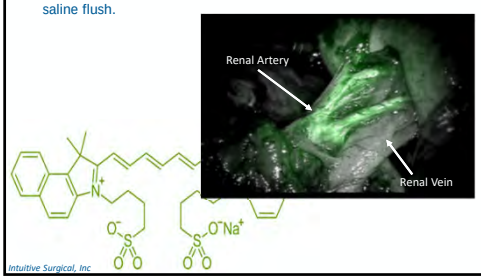
AdventHealth Tampa

Intuitive Surgical, Inc

20

Partial Nephrectomy - Vessel identification

- Identify arterial and venous structures of the renal hilum including any aberrant vasculature
- Before, during or after dissection of the renal hilum, inject a 1.5 mL dose followed by a 10 mL saline flush.



Ross/Sucandy/Rosemurgy

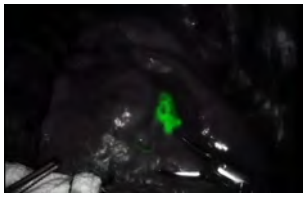
AdventHealth Tampa

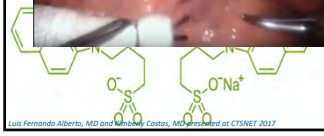
Intuitive Surgical, Inc

21

Pulmonary

- Tattoo lesion via bronchoscopy





Ross/Sucandy/Rosemurgy

AdventHealth Tampa

Luis Fernando Alberto, MD and Kimberly Costas, MD presented at CTSNET 2017

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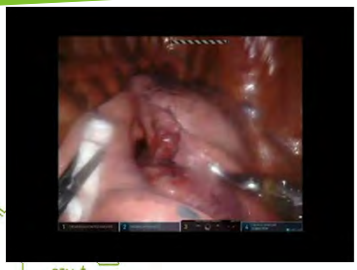
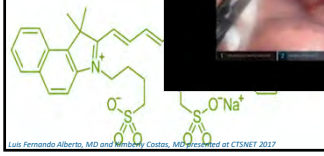
Pulmonary





Ross/Sucandy/Rosemurgy

AdventHealth Tampa

Luis Fernando Alberto, MD and Kimberly Costas, MD presented at CTSNET 2017

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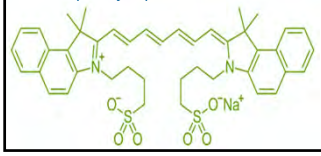
Conclusion

- ICG is a useful tool for various operations, especially:
  - Cholecystectomy
  - Bowel Resections
  - Inguinal Hernia Repairs
  - Liver Resections
- Minimal side effects are noticed
  - Especially in patients who do not have history of allergies to iodide



Ross/Sucandy/Rosemurgy

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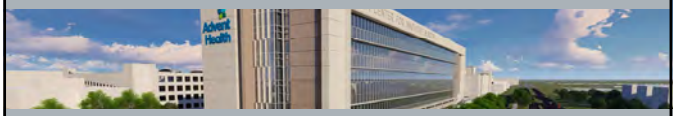
Florescence Imaging-Overview & How to Use it



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The Application of Robotics for the Acute Care Surgeon

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Trauma, Critical Care and Acute Care Surgery
Minimally Invasive/Robotic Surgery
EAST MIS Masters Course

MIS MASTERS COURSE
Multisociety Advanced Skills Training in Emergency Surgery

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Disclosures

- Intuitive Surgical: Speaker, Trainer
- Becton Dickinson: Speaker, Trainer

2

Acute Care Surgeon?

Components – Trauma, Critical Care, and Emergency GS.

Traditionally maximally invasive for trauma, complex GS.

Shift work with surgical volume from consults.

Elective practices vary- focus AWR, bariatric, etc.

3

Obstacles of the Trauma & Acute Care Surgeon

- Limited elective practice
- MIS skillset limited to routine EGS cases
  - Appys, gallbladders, etc
- Limited exposure to advance laparoscopic cases during training
  - Critical care year non-operative
- Management of complications (Bariatric, Colorectal, etc) after hours and inability to apply MIS.

4

Evolution of MIS Practice

- Previous hernia repair techniques
  - Open inguinal, Lap TEP, Lap Ventral
  - Open complex abd wall reconstruction
- Colon, Cholecystectomy, Appys
- Bariatric surgery

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Variety of Cases

- Cholecystectomy
- Inguinal hernia
- Ventral/incisional hernia
- Paraesophageal hernia/Foregut
- Bariatric Surgery
- Colorectal

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Start Simple

- Initial cases: inguinal hernia, small umbilical, cholecystectomy
- Patient selection
- Thoughtful progression of case complexity

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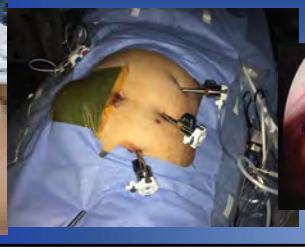
Its Just a Gallbladder…why not laparoscopic?



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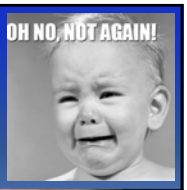
Another Gallbladder?



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Firefly and the Critical View of Safety

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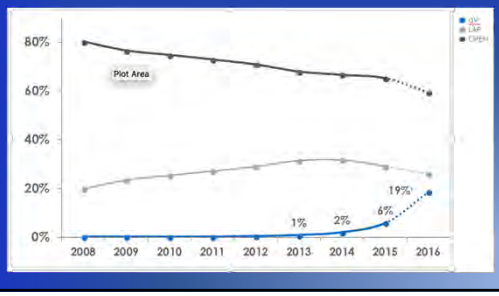
Enabling MIS Hernia Repair



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Progression of Case Complexity

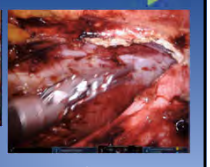
Easier

Harder

rIPOM

rTAPP

eTEP



RoboTAR

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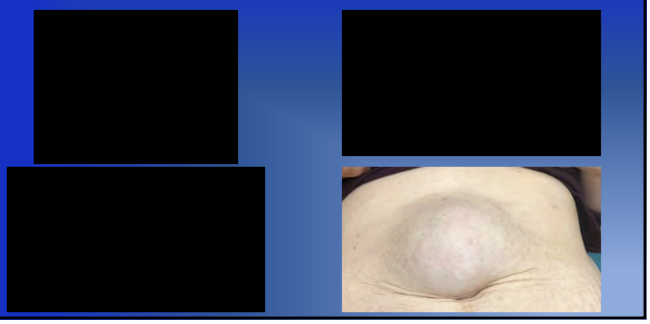
Variety of Hernia Techniques



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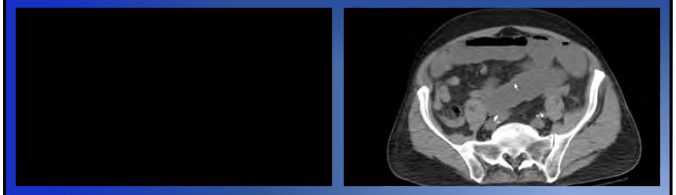
Robotics On Call

Incarcerated Inguinal Hernia

Strangulated Femoral Hernia



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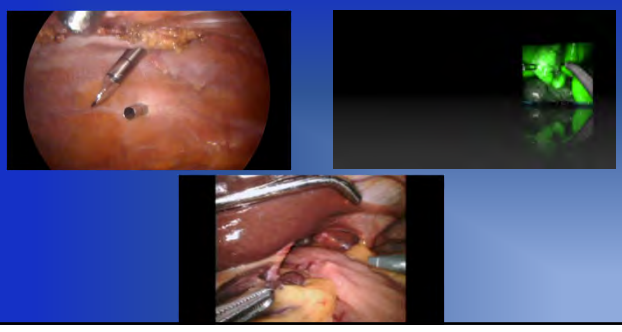
Foregut cases



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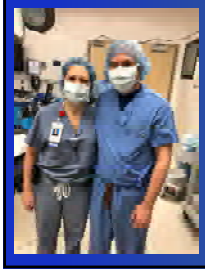
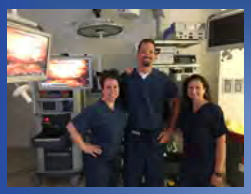
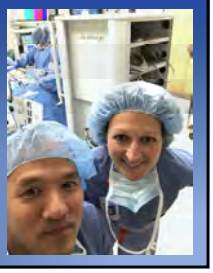
Engage your Mentors

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Summary

- Advanced MIS cases for Trauma/ACS surgeon
- Robot is a tool to expand MIS application
- Robot applied to a variety of cases



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THANK YOU

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