Prevention, Recognition and Management of Complications of Operative Laparoscopy

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Disclosure

- Aragon
- Conceptus
- Covaleda
- Intuitive Surgical
- Karl Storz Endoscopy
- Plasma Surgical
- SurgiQuest

Ceana Nezhat, MD: Disclosure

Several products discussed in this presentation are reviewed in the textbook:

Objectives

- Identify the most common complications during laparoscopic surgery.
- Understand techniques of managing complications, including use of different devices, surgical techniques and consultation.
- List different methods of safe abdominal entry and techniques for preventing injury and complications during laparoscopy.

Cultural and Linguistic Care

- There are no racial or ethnic discrepancies in this presentation.
Introduction

"Wherever in the body a cavity exists or a cavity can be created, operative laparoscopy is indicated and probably preferable. The limiting factors are: skill and experience of the surgeon and the availability of proper instrumentation."


GROWTH

- Over four million laparoscopies per year in US
- Rapid growth of centers of MIS
- Increased industry interest
- More new instruments and technology


The only way to have NO surgical complications is to do NO surgery!
“Minimally Invasive"

IS NOT

"Minimal risk of complication or injury"

Preoperative Planning

- Bowel prep
  - Mechanical
  - Antibiotic
- Preoperative Imaging
- Ureteral Stents
- Cystoscopy
- Sigmoidoscopy

Planning should be individualized

Controversies in Preoperative Planning

- Kuno et al. review of 3071 major gynecologic surgeries
  - Prophylactic ureteral catheters did not prevent injury
- To Prep or Not to Prep…
  - Cochrane Database 2005 review of mechanical bowel prep (MBP) data
    - 9 RCT, 1592 patients: 789 MBP, 803 no MBP
    - No convincing evidence MBP reduces post-op complications
      when looking at anastomotic leakage, MBP was harmful


Concerns with Anesthesia

- Patient position
- Fluid intake
- Others…

Communicate with your Anesthesiologist

- Describe your anticipated procedure
- Estimated blood loss
- Estimated duration
- Preoperative antibiotics

Bowel Decompression
NG/OG tube
Trocar insertion accounts for 40% of laparoscopic complications & most of the fatalities


Traditional Methods for Safe Abdominal Entry
- Veress Needle Insertion
- Open Laparoscopy
- Direct Insertion Laparoscopy
- Optical Trocar Systems
- Alternate Entry Sites
Entry Complications

- Abdominal wall
- Vascular
- Gastrointestinal
- Genitourinary

Major Vascular Injuries

- Rare and under-reported
- Results in serious morbidity
- Major cause for litigation

Vascular injuries

- Vascular injuries are more likely to be fatal if they involve the aorta or inferior vena cava
Anatomic relationships of the bifurcation of the aorta, inferior vena cava and sacral promontory.

Trocar Insertion

- Vascular Injury – 47
  - Common Iliac
    - B = 16
    - L = 5
  - Aorta = 6
  - Vena Cava = 5

Soderstrom, JAAGL, 1997

AORTIC INJURY WITH VERESS NEEDLE

Figure 4.1.6. The Veress needle is grasped by the shaft and directed posteriorly at a 90° angle. Inset shows elevation of skin and subcutaneous tissue.
Alternative Approaches

- Open laparoscopy – Hasson
  - Does NOT eliminate risks
  - Visceral injuries
    0.08% closed vs. 0.05% open
  - Lower risk of vascular injuries
    0.07% closed vs. 0% open

- LUQ approach

Figure 4.4.8. Alternative sites for Veress needle insertion. (1) Infra- or infraumbilical. (2) Left upper quadrant, subcostal. (3) Supraumbilical. (4) Midline supra pubic. (5) Transcervical through the uterine fundus or transvaginal through the posterior fornix into the abdominal cavity.
Trocar Injuries in Laparoscopic Surgery

### Causes of Death in Fatal Trocar Injuries

<table>
<thead>
<tr>
<th>Type of injury</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrecognized bowel injury</td>
<td>6</td>
</tr>
<tr>
<td>Aorta</td>
<td>6</td>
</tr>
<tr>
<td>Inferior Vena Cava</td>
<td>3</td>
</tr>
<tr>
<td>Mesenteric Vessel</td>
<td>2</td>
</tr>
<tr>
<td>Iliac Artery and Vein</td>
<td>2</td>
</tr>
<tr>
<td>Aorta and Inferior Vena Cava</td>
<td>1</td>
</tr>
<tr>
<td>Iliac Artery</td>
<td>1</td>
</tr>
<tr>
<td>Gastrointestinal Artery</td>
<td>1</td>
</tr>
<tr>
<td>Hypogastric Artery</td>
<td>1</td>
</tr>
<tr>
<td>Omental Vessel</td>
<td>1</td>
</tr>
<tr>
<td>Portal Vein</td>
<td>1</td>
</tr>
<tr>
<td>Unspecified Vessel</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total number</strong></td>
<td><strong>32</strong></td>
</tr>
</tbody>
</table>
If blanching or burn on bowel is noted, treat it as a hole and suture imbricate.

In case of a hole, layered closure with 3-0 silk or vicryl.

Second layer is used as imbricating suture if 1st layer is insecure.

- No need for NG tube
- No colostomy
- Prophylactic antibiotics for 24hrs
- If soilage noted, copious irrigation and suction
Repair of Colon Injury

- Run first layer with 3-0 vicryl SH-I
- Interrupt second layer to imbricate first layer
- Test-closure: Inflate colon with air
- Standard prophylactic antibiotics for 24 hours
- If gross soilage:
  - copious suction & irrigation taking care not to contaminate surrounding areas
  - Flagyl + Levaquin until normal WBC
  - No colostomy
  - No NG tube
  - Feed after flatus

Symptom: SB0 after your procedure

- If belching, ileus or SBO four days after surgery... Differential:
  - Trocar site hernia, even if 5mm trocars
  - Small bowel adhesions to vaginal apex
  - Urological injury
  - Ileus from narcotic use
  - GI injury: small or large bowel punction or breakdown.
- If you thought you had a GI injury you would have already fixed it. Think GI injury!
- Better to suspect for the worst always and test for it!!
  - Abdominal pain
  - Fever
  - Nausea, vomiting, diarrhea, bloating

Diagnostic Delay

- Suspect only ileus? (but laparoscopic patients improve quickly)
- Fooled by intraperitoneal gas
- R/O PE
- Diverticulitis
- C. difficile
- Enterotomy, Fistula
DEVELOP A PRESUMPTIVE DIAGNOSIS

Q: In worst case scenario what do you need to do?

A: Rule out bowel obstruction.

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Signs & Symptoms of GI Injury

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Pain</td>
<td>Direct and rebound tenderness</td>
</tr>
<tr>
<td>Bloating</td>
<td>Abdominal distension</td>
</tr>
<tr>
<td>Nausea, vomiting</td>
<td>Diminished bowel sounds</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>Hypomotility</td>
</tr>
<tr>
<td>Fever, chills</td>
<td>Elevated or lower temperature</td>
</tr>
<tr>
<td>Difficulty breathing</td>
<td>Tachypnea, tachycardia</td>
</tr>
<tr>
<td>Weakness</td>
<td>Palor, hypotension, lethargy</td>
</tr>
</tbody>
</table>

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C-Reactive Protein

CRP is elevated after surgery, but more so after GI injury

<table>
<thead>
<tr>
<th></th>
<th>CRP level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control surgery</td>
<td>7-72</td>
</tr>
<tr>
<td>Surgery + GI injury</td>
<td>110-550</td>
</tr>
</tbody>
</table>

Rongiers, JAAGL, 2002
Treatment of Suspected GI Injury

- Admit and hydrate
- Review and consult with colleague for objectivity
- Confirm with:
  - CBC with bands - Bands are early marker
  - BMP - R/O urologic injury, acidotic?
  - CT abdomen and pelvis with IV & oral contrast
  - Communicate with radiologist before scan, review the films & discuss how much free air is OK after laparoscopy?

Suspected Colon Injury

- Immediate surgical intervention with your friendly general surgeon
- Culture
- Lavage with 6-10 liters saline
- Drains
- Triple antibiotics: cipro, flagyl & ampicillin
- Plan repeat lavages every 3 days if diffuse colonic peritonitis
Robotic Bladder Injury & Repair

Incidence of Ureteral Injuries

- 1/1000 after abdominal hysterectomy
- 2-5/1000 after vaginal hysterectomy
- 13.9/1000 after laparoscopic hysterectomy
- 0-3/1000 after laparoscopic supracaervical hysterectomy

Harkki-Siira et al. Obstet Gynecol 1999
Bojahr et al. JSLS 2009
Jung and Huh JMIG 2008
Common site of ureteral injury is near the cervix where the ureter crosses the cardinal ligament dorsal to the uterine vessels.
Role of Cystoscopy

Prior to routine cystoscopy
- Only 11.5% ureteral injuries, and
- 51.6% of bladder injuries identified intra-operatively

After routine cystoscopy
- 90% of unsuspected ureteral injuries, and
- 85% of unsuspected bladder injuries identified intra-operatively

Gilmour et al 1999 Obstet Gynecol

For Best Care:

Cultivate a good working relationship with your general surgeon. They want to help.

We should all work together.

Laparoscopic patients should feel better every day.

When they don’t …….. start to suspect.
**Trocar Removal**
- Also under direct vision
- Release pneumoperitoneum
- Re-inspect trocar sites
- Inspect umbilical port on way out

**UMBILICAL PORT BLEED**

**Laparoscopic Trocar Site Hernia**

3 TYPES
- Early-onset
  - occurs immediately after the operation, with a small-bowel obstruction (e.g. Richter’s hernia)
- Late-onset
  - occurs several months after the operation, mostly with local abdominal bulging with small-bowel obstruction
- 3rd type
  - protrusion of the intestine and/or omentum
Instinctive Thinking

Experience and Training
Dependent

Patterns sought in long-term memory

Conclusion

- Knowledge of anatomy
- Keep open mind to the staff and suggestions
- Be familiar with instruments
- Understand energy sources
- Learn how to manage complications & emergencies
- Learn proper techniques

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