Abdominal Entry for Laparoscopic Surgery

Larry R. Glazerman MD, MBA
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LAPAROSCOPIC ENTRY

Relevant Disclosure

• Covidien
  ▪ Preceptor, Consultant

• CooperSurgical
  ▪ Preceptor, Consultant

• Intuitive Surgical
  ▪ Proctor
Objectives

- Interpret the data regarding techniques of laparoscopic abdominal entry
- Describe three different techniques for primary trocar entry
- Discuss placement of auxiliary trocars
Preoperative Evaluation

• Evaluate for the possibility of adhesions
  ▪ Prior operative reports
  ▪ History of peritonitis
  ▪ Abdominal scars

• Umbilical anatomy

• Distribution of abdominal wall adiposity
  ▪ Obese patient
  ▪ Thin patient
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In the OR

- Empty gastric contents
- Position patient
- Examine abdomen
  - Size
  - Surgical scars
  - Laxity of abdominal wall
  - Umbilical anatomy (?hernia)
  - Palpate bifurcation and sacral promontory
  - Presence of mass
Veress Needle Technique

- Infiltrate with local anesthesia
  - Pre-emptive analgesia
- Incision at base of umbilicus
Veress Needle Technique

• Lift abdominal wall
  - Manual
  - Towel clips

• Whether elevation of the umbilicus either manually or with towel clips really elevates the peritoneum has been a subject of debate
Avoiding the Great Vessels: Size Does Matter

Figure 12.7. Relationship of Aortic Bifurcation to Umbilicus. In women of normal weight for height the bifurcation is, on average, 0.4 cm cephalad to and 6 cm (±3) beneath the umbilicus. For overweight women, the distances are 2.4 and 10 cm (±2), respectively. In obese women, the umbilicus is 2.9 cm inferior to the bifurcation and 13 cm (±4) anterior to the level of the aorta.

Avoiding Vascular Injuries

Anatomy of Abdominal Wall/Retroperitoneal Blood Vessels

• Abdominal CT scans from 35 reproductive-age women were reviewed to determine the location of the umbilicus

• The location of the umbilicus, but not the aortic bifurcation, was more caudal in heavier women

• The umbilicus is often located at or cephalad to the aortic bifurcation, and consistently located cephalad to where the left common iliac vein crosses the midline.

Effect of obesity on location of great vessels
Trocar insertion with operating table flat

Position of the trocar and great vessels in trendelenburg
Determining needle placement

- Four tests reported
  - Double click
  - Hanging drop
  - Aspiration
  - Intraabdominal pressure
- Opening intraabdominal pressure is the best measure of intraperitoneal placement
- Liver dullness is lost after 500-700 cc of gas
Veress needle insufflation
Veress needle insufflation

- Advantage of hyperdistension
Trocar insertion

- Shielded pyramidal
- Shielded blade
- Conical
- Radial expandable
- Hasson-type open blunt
- Short-stroke knife
- Winged cone
- Optical

Fig. 3-2
"Safety Shielded Trocars"

- In 1996, based upon a lack of data to support safety claims, FDA asked manufacturers to refrain from using the term “safety trocar” to refer to shielded trocars.
Shielded “Safety” Trocars
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Step System Trocar Insertion
Step System trocars

- 3,735 Radially Expanded Access (REA) Trocar Sites in 747 bariatric surgery patients
  - 1/2002 to 4/2005
  - Two 12 mm; three 5 mm; no fascial closure
  - One Hasson; figure-of-eight #1 Polysorb closure
- 0/3,735 (0%) hernias in REA sites
- 10/747 (1.34%) hernias at Hasson site

Optical trocar
Visual trocar

- 3,744 Visual Entry Trocar (VET) Sites in 844 bariatric surgery patients
  - 7/2000 to 12/2003
  - Five 12 mm; two 5 mm; no fascial closure
- 2/3,744 (0.2%) hernias

Trocar insertion

- Trocar held in palm of hand
- Index finger extends down shaft
- Remove obturator
  - Depending on type of trocar, gas should be heard escaping
Open Laparoscopy

• Hasson technique
  ▪ First described in 1971
  ▪ Involves the use of a modified trocar and a very specific surgical technique

• Fewer unrecognized bowel complications

• Nullifies the risk of gas embolism or injury to major vessels
Hasson trocar

Fig. 3-10
Open Laparoscopy
Open laparoscopy

• Risk of bowel injury 0.1%
  ▪ The majority of injuries occur early in the “learning curve”
• Risk of post-op infection 0.4%
• Risk of vascular injury ~0%
• Risk of gas embolism 0%
• ? Longer
Direct Trocar Insertion

• First described in 1978
• Correct placement is confirmed before CO$_2$ is attached to cannula
  ▪ No risk of gas embolus
• ? preferable in obese
Direct Trocar Insertion

- Two randomized trials
    - 200 pts: Veress, reusable direct, and disposable shielded direct
    - Significantly more minor complications in Veress needle group (22% vs. 6%)
  - Byron and Markenson, (Surg Gynecol Obstet 1993)
    - 252 pts: Veress vs. direct
    - No major comps. More minor in Veress.
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Alternative sites

• Left upper quadrant (Palmer’s Point)
• Supraumbilical
• Midline suprapubic
• Trans-fundal
• Trans-forniceal
Transforniceal insufflation
Transfundal insufflation
The Bottom Line

• “Despite the variety of methods described for the creation of pneumoperitoneum, no one method can claim to be fundamentally superior to any other.”

• In order to demonstrate 33% reduction with 80% power and 95% confidence, a study would need >800,000 cases
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Accessory Ports

- Abdominal Wall Vessel Injury
  - Most common complication of multi-port laparoscopy
  - AAGL Survey of LAVH 1995
    - Incidence of Inf. Epigastric Laceration: 24/1000

- Morbidity
  - Significant hemorrhage
  - Hematoma
Abdominal Wall Vessels

• Avoidance
  ▪ Transilluminate
    • Will avoid *superficial* epigastrics
    • Will never illuminate *inferior* epigastrics
  ▪ Visualization of vessel course
  ▪ Use the “Rule of 8’s”
Abdominal Wall Vessels
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Anterior Abdominal Wall Anatomy
Abdominal Wall Vessels

• Management
  ▪ Superficial Epigastric Vessel Injury
    • Conservative Observation
    • Pressure dressing/heating pad
  ▪ Inferior Epigastric Vessel Injury
    • Coagulate
    • Suture directly/indirectly
    • Suture with ligature carrier
    • Foley balloon tamponade
Incisional Hernia Risk Factors

- Multiple ancillary ports
- Extirpative procedures
- Instruments requiring 10-12 mm ports
- Increased operating time
- Use of port anchoring devices
- Failure to close fascial defect
- Prior history of hernias
Incisional Hernias

<table>
<thead>
<tr>
<th>Site</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Umbilical</td>
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<tr>
<td>Extraumbilical</td>
<td>64%</td>
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</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>10 mm</td>
<td>0.23%</td>
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<tr>
<td>12 mm</td>
<td>3.1%</td>
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Time to reoperation: 9.6 days
Bowel resection: 19%

Cochrane Review

• “On the basis of evidence investigated in this review, there appears to be no evidence of benefit in terms of safety of one technique over another.”
• “The included studies are small and cannot be used to confirm safety of any particular technique.”

Cochrane Review

- Open entry vs. Closed Entry (Veress or Direct)
  - No advantage with either
- Open entry vs. Direct entry
  - No advantage with either
- Open entry vs. Veress entry
  - No advantage with either

Art. No.: CD006583. DOI: 10.1002/14651858.CD006583.pub2.
Cochrane Review

- Direct entry vs. Veress entry
  - No advantage of either
- STEP trocar vs. standard trocars
  - Less extraperitoneal and failed entry with STEP
  - No advantage for injury with either

Art. No.: CD006583. DOI: 10.1002/14651858.CD006583.pub2.
Cochrane Review

- Lifting vs. not lifting abdominal wall
  - Successful entry increased with NOT lifting abdominal wall, without increased complications

Even data has limits!

- 42 YO G0
- PSH – lap chole
- Admitted for robotic myomectomy
- Step trocar in umbilicus
  - Opening pressure 5 mm hg
- 12 mm trocar placed through sheath
Transumbilical colonoscopy 🤔