Objectives

- Review the types of complications related to direct injury that can occur during laparoscopy for benign gynecologic procedures
- Review anatomy of the pelvis as it relates to gynecologic procedures and prevention of injuries
- Discuss current evidence regarding techniques and their safety profiles
UP TO ONE-HALF OF COMPLICATIONS OCCUR AT THE TIME OF ABDOMINAL ACCESS FOR CAMERA OR PORT PLACEMENT


July 3rd, 5pm: My first call as a brand new attending......

- 28 yo healthy female, P1001, s/p uncomplicated laparoscopic tubal sterilization around 12pm in a nearby outpatient surgical center
- Pt was d/c to home 2 hrs following the procedure.
- Began to feel dizzy and passed out at home
- Brought to ER via ambulance
- Alert and oriented, complaining of abdominal/pelvic pain
- Vitals: Temp 98, BP 100/60, Pulse 98, O2 Saturation 95%, RA
- Abdomen mildly distended, moderate guarding & rebound
- Hb 7.8, HCT 26
- Beside US- "some free fluid and clots in the pelvis by the posterior cul de sac"

What's going on here?
1. Laceration of inferior epigastric artery?
Ligation of Inferior Epigastric Artery

- If an injury occurs, leave the trocars in place until a plan for repair is devised.
- Start by compressing the bleeding point by moving the cannula against it.
- Vessels must be sutured cephalad and caudad to the site of injury.
- Electrosurgical desiccation is usually less successful.
- Can suture-ligate the bleeder intracorporeally or use a laparoscopic port closure device.
- Placement of a Foley catheter to tamponade the vessel using a large balloon placed on tension.
What's going on here?
1. Laceration of epigastric artery?
2. Uterine perforation?

Retrospective study:
512 consented for TLH for benign disease
503 (98.2%) successful TLH
3 converted to minilaparotomy
6 converted to laparotomy
Uterine perforation: 1
Vaginal laceration: 2

1. Laceration of epigastric artery?
2. Uterine perforation?
3. Retroperitoneal/hematoma?
Phone a vascular surgeon friend!

Major Vascular Injury
- 0.3–1% incidence rate
- 13.50% of vascular injuries are undiagnosed at the time of surgery
- Mortality rate of 15%
- Distal aorta and right common iliac artery are particularly prone to injury

Krishnakumar et al. J Gynecol Endosc 2009
Bowel Injury

- Mortality rate from bowel injury is 2.5-5%.
- 30-50% of bowel injuries are not recognized at time of surgery.
- Small bowel was most common injury and large bowel (12%) was third most common injury after vascular injury in a large series.
- Bowel injury is the third cause of death from a laparoscopic procedure after major vascular injury and anesthesia.
- Large bowel injury associated with sepsis and death.
- Phone a DYN ONC or General Surgery Friend
  - Large bowel injury needs to be managed at time of recognition
  - Superficial injuries may be managed conservatively with in hospital IV hyperalimentations and antibiotics.
  - Injuries due to electrocautery need to be resected
  - Obliteration is usually in 2 layers
  - Care to avoid constriction of bowel lumen.
Risk Factors for Bowel Injury

- Previous intraabdominal procedures
- Vertical incision
- Endometriosis
- Pelvic infection
- Extensive bowel dissection obscuring the operative field
- Large abdominal or pelvic mass
- Uterine size over 500gm
- Diaphragmatic hernia

Schulz et al. Archives of Surgery 1999
Kekrasu et al. World J Clinical Cases 2009

Tests to Confirm Intra-abdominal Placement

- Manometer test - involves connecting the gas tubing to the Veress needle and raising the abdominal wall to create negative pressure
- Hissing sound test
- Aspiration test
- Saline drop test
- Hanging drop test
- Attach to insufflator to measure pressure - pressure should be <5mm Hg

None of these tests are confirmatory for the intraperitoneal placement of the Veress needle

Most valuable test is to observe the actual insufflation pressure to be 8 mm or less and that the gas is flowing freely

Teoh B et al. J Minimally invasive Gynecol 2005

Number of Attempts with Veress needle for Successful Entry

- First attempt - 85.5-86.9%
- 2 attempts required in 8.5-11.6%
- 3 attempts - 2.6-3.0%
- More than 3 attempts in 0.3-1.6%
- Complication rates associated are:
  - 1 attempt 0.8-16.3%
  - 2 attempts 16.3-37.5%
  - 3 attempts 44.4-64% and
  - More than three attempts 84.6-100%

The complications associated were extraperitoneal insufflation, omental and bowel injuries and failed laparoscopy.

Richardson et al. Gynaecol Endosc. 1999
Comparison of Entry Techniques

- 46 RCTs including three multi-arm trials (7389 participants) and evaluated 13 laparoscopic entry techniques.
- No evidence of advantage using any single technique for preventing major vascular or visceral complications.
- Evidence was generally of very low quality; the main limitations were imprecision and poor reporting of study methods.
- No difference between the groups for vascular injury (Peto OR 0.14, 95% CI 0.00 to 6.82, three RCTs, n = 795, I² = n/a; very low quality evidence).
- No difference between groups for visceral injury (Peto OR 0.61, 95% CI 0.06 to 6.08, three RCTs, n = 795, I² = 0%; very low quality evidence).
- Lower risk of failed entry in the open-entry group (Peto OR 0.16, 95% CI 0.04 to 0.63, n = 665, two RCTs, I² = 0%; very low quality evidence).

Ahmed et al Cochrane Review 2015

ALTERNATIVE ENTRY SITES

Vesicoureteral Injury during Benign Hysterectomy MIS vs Laparotomy

- Retrospective population-based observational study.
- National Inpatient Sample
- A total of 501,110 women who had undergone hysterectomy for benign gynecologic disease between January 2012 and September 2015
- Total abdominal hysterectomy (TAH, n = 284,365 [56.7%])
- Total laparoscopic hysterectomy (TLH, n = 60,430 [12.1%])
- Abdominal supracervical hysterectomy (Abd-SCH, n = 55,655 [11.1%])
- Laparoscopic-assisted vaginal hysterectomy (LAVH, n = 45,620 [9.1%])
- Total vaginal hysterectomy (TVH, n = 34,865 [7.0%])
- Laparoscopic supracervical hysterectomy (LSC-SCH, n = 20,195 [4.0%]).

Change et al. J Minimally Invasive Surgery 2019
Vesicoureteral Injury during Benign Hysterectomy MIS vs Laparotomy

- Vesicoureteral injury was reported in 1045 (0.21%) women overall.
- LAH (0.28%) had the highest bladder injury rate,
- LSC-SCH had the lowest bladder injury rate (0.10%) (p < .001)
- TLH (0.13%) had the highest ureteral injury rate
- TAH had the lowest ureteral injury rate (0.04%) (p < .001).

Vesicoureteral Injury during Benign Hysterectomy MIS vs Laparotomy

- Compared with TAH, TLH was associated with an increased risk of ureteral injury (odds ratio [OR] 3.95, 95% confidence interval [CI] 2.03−7.67, p < .001) but not bladder injury (OR 1.04, 95% CI 0.57−1.90, p = .897).
- Risk of ureteral injury was particularly high when TLH was performed for endometriosis (OR 5.10, 95% CI 1.18−21.8, p = .031) or for uterine myoma (OR 4.15, 95% CI 2.19−7.81, p < .001).
- In contrast, for supracervical or vaginal hysterectomy, minimally invasive laparoscopic approaches were not associated with an increased risk of vesicoureteral injury (LSC-SCH vs Abd-SCH: OR 0.62, 95% CI 0.19−1.98, p = .419; LAVH vs TVH: OR 1.21, 95% CI 0.63−2.33, p = .564).

Bladder Injury

- Close in layers
- Stent ureter if close to trigone
- Leave Foley catheter in for 10-14 days
- Voiding cystogram
Identifying Ureteral Injury

- Intraoperative cystoscopy is useful to detect entrapment and transection.
- Facilitates immediate correction and avoidance of subsequent operations and/or permanent sequelae to the patient, and possible litigation to the surgeon.
- However, it is not useful for detection of ureteral injuries such as thermal damage or ischemia, which may result in subsequent ureteral sloughing.
- There are no methods other than ureteral dissection and identification to prevent any type of ureteral injury.

Cadish et al Am J Obstet Gynecol 2019

Laparoscopic Ureterolysis

Laparoscopic ureterolysis: Techniques and approaches for ureter identification and dissection

Cara R. King, DO, MS
University of Wisconsin-Madison
Solstein Mersereau, MD
Magee-Womens Hospital of UPMC
Nerve Injury

- **Iliohypogastric Nerve**
  - Emerges from the T12 to L1 regions
  - Penetrates the fascia of the internal oblique muscle.

- **Ilioinguinal Nerve**
  - Emerges from L1 to L2 regions
  - Penetrates the fascia of the transverse abdominus muscle

Both are prone to injury from trochar insertion or impingement from fascial closure. NSAIDS, trigger point injections are helpful.

---

**COMPLICATIONS HAPPEN... FORTUNATELY, NOT VERY OFTEN! KNOW YOUR ANATOMY!!**

---

THANK YOU!