FLS Module 3: Basic Laparoscopic Procedures

* Current Laparoscopic Procedures (Everybody is doing it!)
* Diagnostic Laparoscopy
	+ Elective: Cancer staging, chronic abdominal pain
	+ Urgent: Small bowel obstruction vs ileus
	+ Emergent: Trauma, Suspected Iatrogenic injury, Perforated viscous
	+ May require LOA
	+ Examination of the Liver
		- Angled or flexible scope, may need USN
		- Anterior surface: May require LOA
		- Posterior surface: Specialized liver retractor, blunt instruments
	+ Laparoscopy of the anterior abdominal wall
		- Angled or flexible scope
		- LUQ port site (unless biopsy needs to be obtained in LUQ)
	+ Pelvic Laparoscopy
		- Arms tucked
		- Lithotomy
		- Trendelenburg
		- Uterine retraction
			* Manipulator vs laparoscopic retractor vs suture retraction
	+ Appendicitis
		- Left arm tucked (surgeon and assistant stand on left side)
		- Right side up lateral positioning
	+ Examination of the Small Bowel
		- Position two monitors (near head and near feet)
		- Place ports along left abdomen if feasible



* + - Keep instrument tips in field of view
		- Use graspers designed for atraumatic handling
		- Avoid torqueing bowel wall with graspers
		- Handle mesenteric fat rather than bowel wall when possible
		- Handle dilated bowel with extreme caution
		- When obstruction is present:
			* Initial entry under direct visualization
			* Begin bowel examination distantly (decompressed)
			* Manipulate dilated small bowel with extreme caution
			* Perform instrument exchanges carefully due to decreased working space
	+ Examination of retroperitoneal structures
		- Lateral positioning for structures above aortic bifurcation and spleen
		- Supine/Trendelenburg for structures below aortic bifurcation
		- Ports for kidneys and adrenal glands:



* + Diagnostic laparoscopy for trauma
		- Contraindicated if severe or uncorrectable hypovolemic instability
		- Arms tucked
		- Monitors on each side
		- Angled laparoscope
* Biopsy
	+ Methods:
		- Peritoneal washings and scrapings
			* Should be obtained early in procedure
			* Occasional mixed with heparin solution (depending on pathology recommendation)
		- Fine Needle Aspiration
			* 20-22 gauge needle
		- Core Needle Biopsy
			* Form of incisional biopsy, most commonly used in the liver (avoid vascular lesions)
			* 14-18 gauge needle
		- Incisional biopsy
			* Larger lesions
		- Excisional biopsy
			* Smaller lesions
	+ Site Specific Biopsy Techniques
		- Avoid damaging the specimen
		- Ensure appropriate location is biopsied
		- Ensure enough tissue is collected for pathologic analysis
		- Peritoneal lesions
			* Generally small
			* Excisional biopsy using biopsy forceps or grasper and scissors
		- Lymph Node Biopsy
			* Usually located in retroperitoneal space
			* Excisional biopsy usually performed
		- Liver Biopsy
			* Generalized parenchymal disease (ex: cirrhosis
				+ Core needle biopsy
				+ Wedge biopsy of edge of liver
			* Solid liver lesions
				+ Small surface lesions

Incisional/Excisional biopsy, core needle, wedge

* + - * + Large surface lesions

Incisional biopsy, core needle, wedge

* + - * + Lesion below the surface

FNA, core needle

May require USN

* + - * + Fluid filled liver lesions (cysts and vascular lesions)

Cysts generally do not require biopsy

Vascular lesions may cause excessive bleeding and should be avoided

* + - * Ovary
				+ Oophorectomy
				+ Biopsy forceps
				+ Small wedge resection
				+ Technique based on:

Menopausal status

Suspicion for malignancy

* + - * + For full staging:

Peritoneal washings

Diaphragm sampling

Paracolic gutter sampling bilaterally

Paraaortic lymph node sampling

* + - * + Avoid seeding abdominal wall or colpotomy with specimen (malignant potential, ovarian remnant syndrome)
			* Hollow viscera
				+ If lesion is superficial, excision may be possible with reapproximation of tissue
			* Retroperitoneal
				+ Most often used for lymph nodes or retroperitoneal mass
				+ Approach may be trans or retro peritoneal, USN may be necessary
				+ Judicious use of monopolar cautery with care regarding proximity of large vascular structures
	+ Hemostasis is obtained secondarily to avoid damage to the specimen
* Laparoscopic suturing
	+ Suture selection
		- Monofilament vs Braided (Braided generally easier to handle bc they lack inelastic memory, fewer throws per knot)
		- Absorbable vs nonabsorbable (dependent on clinical scenario)
		- Dyed sutures preferred for visibility
	+ Needle selection
		- Tapered needle (smooth) vs conventional cutting needle (taper preferred)
		- Curved vs partially straight vs straight
	+ Instrument port positions
		- 10-12 mm trocar for standard SH type needle
		- Ports should be at least 10cm apart for efficiency with intracorporeal techniques
	+ Suturing and knot tying instruments
	+ Introducing the needle
		- Needle holder should grasp the suture 5-10 mm proximal to the junction of the suture and the needle
		- Consider backloading port on instrument and inserting needle without the port
	+ Positioning the needle
	+ Placing the needle through tissue
		- Choose appropriate needle entry site
		- Grasp tissue with assisting instrument
		- Push needle through tissue along its arc with needle driver
		- Make sure needle exit site is appropriate
		- Grasp needle tip with assisting instrument and pull through tissue along its arc OR hold tissue steady with assisting instrument and pull needle through tissue along its arc with needle driver
		- General principles:
			* Avoid moving needle driver in and out of trocar while driving needle through tissue
			* Avoid lifting needle driver tip excessively when needle is in tissue
			* Pull needle through tissue at exit site along its arc to avoid tissue damage
	+ Interrupted and continuous sutures
	+ Knot Tying
		- Intracorporeal vs Extracorporeal
			* Ideal length for intracorporeal suture: 6 inches (15 cm)
			* Ideal length for extracorporeal suture: 30 inches (75 cm)
		- Extracorporeal Roeder’s knots (Endoloops)
	+ Mechanical Tissue Approximation Devices
		- Sutures
		- Clips
			* Suitable for smaller tubular structures
			* Generally not suitable for closing openings in hollow organs
			* Disposable vs reusable appliers (5 and 10mm sizes)
		- Linear Staplers
			* Placed 2-3 rows of staples on each side of knife blade
			* Cut tissue between rows
			* Cartridges available in 30-60 mm in length
			* Staple size available from 2-4.5 mm
				+ Smaller staples give more hemostasis, appropriate for thinner tissue
				+ Larger staples appropriate for thicker tissue
				+ 2-2.5mm Vascular
				+ 3-3.5mm GI Tract
				+ 4-4.5mm distal stomach, unusually thickened portions of the GI tract
* Hemorrhage and Hemostasis
	+ General Principles
		- Optimize visualization
		- Identify, grasp, and hold bleeding source using an atraumatic grasper
		- Maintain exposure (suction/irrigation)
		- Apply proper hemostasis techniques
		- Failure to maintain hemodynamic stability or adequately control bleeding laparoscopically should prompt rapid conversion to open surgical techniques
	+ Bleeding from port site
		- External port site bleeding
			* Caused by scalpel or trocar
			* Bleeding site in skin, subcutaneous vessels, and/or muscle
		- Internal port site bleeding
			* Trocar may tamponade during case (may not be evident)
			* Remove ports under direct laparoscopic vision
			* Highest risk to injure the epigastric vessels occurs when trocars are placed through the rectus muscles
			* Control:
				+ Slow bleeding: energy, direct pressure
				+ Faster bleeding: control with grasper, temporary control with foley catheter, dissection to identify source, suture ligation and/or energy, full thickness abdominal wall sutures with laparoscopic assisted technique (cephalad and caudad to incision)
	+ Retroperitoneal Bleeding
		- Causes: Veress needle injury, trocar injury, injury from instrument introduction
		- Sx: Retroperitoneal hematoma, mesenteric hematoma, free blood that is not from port or operative site, hypovolemic shock not otherwise explained
		- Treatment: Temporary control laparoscopically with conversion to laparotomy, definitive control laparoscopically, consult as needed
	+ Hemostasis Techniques
		- Electrocautery
			* Monopolar: Smaller vessels, slow rate of bleeding, need a relatively dry operative field
			* Bipolar: Larger vessels, works in “wet” operative field, less lateral thermal spread, lower energy requirement
			* Advanced bipolar – improved hemostatic capability
		- Clips
			* Need to be placed precisely on vessel, may dislodge if vessel not completely dissected, may hamper subsequent efforts if clip is unsuccessful, easy single-handed deployment
		- Suture
			* Single, simple suture (intracorporeal vs extracorporeal)
			* Figure of eight (intracorporeal vs extracorporeal)
			* Roeder’s knot (Endoloop)
		- Hemostatic agents
			* Useful for slow rate of bleeding and raw surfaces
	+ Hemostasis During Resection