

# Curriculum

## A. DEFINED CURRICULUM

### University Hospitals Cleveland Medical Center

#### Goals and Objectives for Advanced GI Minimally Invasive Surgery and Flexible Endoscopy Fellowship

##### 1. Introduction

The purpose of Fellowship education in Minimally Invasive Surgery is to provide structured educational and training experience necessary to achieve expertise in minimally invasive surgery techniques relating to advanced GI surgery and advanced flexible endoscopy.

##### 2. Curriculum Structure

This document, as produced and maintained by The Fellowship Council details the core requirements common to all Fellowships in Advanced GI Surgery, including those denoted as providing advanced training in:

- i. Minimally Invasive Surgery (MIS) (SAGES)
- ii. Bariatric Surgery (ASBMS)
- iii. Hepato-pancreatic & biliary surgery (AHPBA)
- iv. Flexible endoscopy (SAGES)
- v. GI Surgery (SSAT)

The Core Curriculum for Advanced GI Surgery Fellowship describes the following goals and objectives of the core competencies that are common to and required by all Fellowships in Advanced GI Surgery including:

- i. Patient care, including minimum Minimally invasive surgical skills
- ii. Medical knowledge
- iii. Practice-based learning and improvement
- iv. Interpersonal and communication skills
- v. Professionalism
- vi. Systems based practice

At the conclusion of the Fellowship in Minimally Invasive Surgery, the Fellow should be able to provide comprehensive, state-of-the-art medical & surgical care to patients with surgical diseases approachable through minimal access and flexible endoscopic techniques.

This National Curriculum consists of 7 Major Units of which there are 6 major units for this fellowship, some with Subunits:

Unit 1- Advanced Minimally invasive Skills

Unit 2- Foregut

- A. Esophagus
- B. Stomach and Duodenum

Unit 3- Midgut

Unit 4-Hindgut

Unit 5- Solid Organ

- A. Adrenal Gland
- B. Pancreas
- D. Spleen

Unit 6- Abdominal Wall and Retroperitoneum

Unit 7- Diaphragm

Each Unit or Sub-unit is organized into 3 Sections:

1. Objectives: description of the topics the Fellow must understand and the specific knowledge to be acquired.
2. Content: description of the specific areas of study necessary to achieve the unit objectives
3. Clinical Skills: description of the clinical activities and technical skills that are to be mastered

### **Unit 1 – Advanced Minimally Invasive Skills**

#### Objectives

Upon completion of this unit the fellow will be able to understand and describe the following:

1. Physiology of pneumoperitoneum.
2. Proper selection and placement of trocars in a safe and effective manner in order to optimize Minimally Invasive capabilities and minimize patient harm.
3. Proper positioning of patients for a given procedure with emphasis on safety and protection of patient and personnel.
4. Proper placement of monitors and personnel to optimize operative approach.
5. Proper choice of instrumentation, equipment, and energy sources.
6. Trouble shoot MIS equipment including monitors, insufflation, and recording components.
7. Safe use of Energy sources with advantages and limitations of each.

#### Content

1. Physiology of Pneumoperitoneum- describe the effect on the following:
  - a. Renal function
  - b. Cardiovascular function
  - c. Pulmonary function
  - d. Abdominal Wall and Diaphragm
2. Minimally Invasive Equipment
  - a. Monitor
  - b. Insufflator
  - c. Light Sources
  - d. Camera
  - e. Operating Table- standard, split leg
  - f. Trocar choices- bladed, bladeless, optical
  - g. Minimally Invasive instruments, proper function and utilization
3. Energy Sources
  - a. Ultrasonic dissector
  - b. Monopolar cautery
  - c. Bipolar cautery

#### Clinical Skills

1. Demonstrate the following:
  - a. Minimally Invasive exposure of all intraabdominal areas, including use of retractors.
  - b. Proper tissue handling and two handed surgical technique
  - c. Intracorporeal and extracorporeal Minimally Invasive suturing
  - d. Endoscopic stapling
  - e. Intracorporeal anastomosis- sutured, linear, and circular
  - f. Minimally Invasive adhesiolysis
  - g. Minimally Invasive running of bowel
  - h. Placement and fixation of prosthetic materials
  - i. Use and interpretation of intraoperative ultrasound

j. Use and interpretation of intraoperative endoscopy

## Unit 2 – Foregut

### A. Esophagus

1. Objectives: Upon completion of this unit, the Fellow will have a comprehensive understanding of the anatomy and physiology of the esophagus. The fellow will have expertise in the investigation and treatment of esophageal disorders, with a focus on minimally invasive approaches.

2. Content:

a. Anatomy and physiology of the thoracic and abdominal esophagus and the gastroesophageal junction

b. Physiologic and radiographic tests used in the evaluation and treatment of esophageal disorders and interpretation of such studies.

i. Esophageal manometry

ii. Barium/Gastrograffin swallow

iii. Computed tomography

iv. pH studies- Bravo probe, 24-hour with proximal and distal measurements

c. Endoscopic procedures

i. Esophagogastroduodenoscopy

-Biopsy

-Dilation

-Stenting

-Ablative therapy

-Plication of GE junction

-Endoscopic suturing

-Endoscopic closure of gastrointestinal defects

-Per oral endoscopic myotomy

d. Achalasia

i. Epidemiology

ii. Natural History

iii. Pathophysiology

iv. Diagnosis

v. Treatment

e. Gastroesophageal reflux disease

i. Epidemiology

ii. Pathophysiology

iii. Complications

iv. Diagnosis

v. Treatment

f. Esophageal Diverticula

i. Epidemiology

ii. Pathophysiology

iii. Diagnosis

iv. Treatment

g. Hiatal Hernia

i. Epidemiology

ii. Pathophysiology

iii. Diagnosis

iv. Treatment

h. Esophageal Carcinoma

i. Epidemiology

- ii. Pathophysiology
- iii. Diagnosis
- iv. Treatment
- v. Management

Clinical Skills:

1. Identify and recognize the anatomic structures of the gastroesophageal junction both on imaging and intra-operatively
2. Understand the salient features of the esophageal physiologic studies and interpret them
  - a. Esophageal manometry
  - b. Barium/gastrografin swallow
  - c. Computed tomography
  - d. pH studies- Bravo probe, 24-hour with proximal and distal measurements
3. Describe the indication for and perform esophagogastroduodenoscopy, with biopsy or ablation where indicated
4. Describe the indication for endoscopic ultrasound and interpret reports
5. Describe indication, patient selection, and outcomes for endoscopic plication of the gastroesophageal junction. This may include performing the procedure in some programs.
6. Describe the indications, options and potential complications of minimally invasive procedures done for the following disorders of the esophagus:
  - a. Achalasia
  - b. Epiphrenic diverticula
  - c. Hiatal hernia
  - d. Adenocarcinoma
7. Develop an operative strategy, including port positioning, patient positioning for the following minimally invasive esophageal procedures:
  - a. Minimally invasive Heller myotomy
  - b. Minimally invasive diverticulectomy with or without myotomy
  - c. Minimally invasive hiatal hernia repair
  - d. Fundoplication
    - i. Nissen fundoplication
    - ii. Toupet fundoplication
    - iii. Dor fundoplication
    - iv. Collis gastroplasty

B. Stomach and Duodenum

1. Objectives: Upon completion of this unit, the Fellow will have a comprehensive understanding of the embryology, anatomy, and physiology of the stomach and duodenum. The fellow will have expertise in the investigation and treatment of stomach and duodenal disorders, with a focus on minimally invasive approaches.
2. Content
  - a. Embryology, physiology, and anatomy of the stomach and duodenum
  - b. Physiologic and radiographic tests used in evaluation of stomach and duodenal disorders and the interpretation of such studies.
    - i. Computed tomography
    - ii. Magnetic resonance imaging
    - iii. Upper gastrointestinal series
    - iv. Gastric emptying study
  - c. Endoscopic procedures
    - i. Esophagogastroduodenoscopy
      - Biopsy

- Dilation
- Stenting
- Ablative therapy
- Endoscopic suturing
- Endoscopic closure of gastrointestinal defects
- iii. Per oral pyloromyotomy
- d. Benign gastric disease
  - i. Peptic ulcer disease
    - Epidemiology
    - Natural History
    - Pathophysiology- including importance of Helicobacter pylori infection
    - Diagnosis- including malignant potential
    - Treatment- medical and surgical
    - Complications- stricture, gastric outlet obstruction
  - ii. Gastric Polyps
    - Classification
    - Epidemiology
    - Natural History
    - Pathophysiology
    - Diagnosis
    - Treatment- endoscopic, surgical, medical
- e. Malignant gastric tumors
  - i. Carcinoid tumor
    - Epidemiology
    - Pathophysiology- multiple vs. single
    - Diagnosis
    - Treatment
    - Management- medical and surgical
  - ii. Adenocarcinoma
    - Epidemiology
    - Pathophysiology
    - Diagnosis
    - Treatment
    - Management- adjuvant therapies
  - iii. Lymphoma
    - Epidemiology
    - Pathophysiology
    - Diagnosis
    - Treatment
    - Management- indications for surgery, adjuvant therapies

#### Clinical Skills

1. Identify and recognize the structures associated with the stomach and duodenum with particular attention to blood supply.
2. Interpret the significance of the reports and images from the following physiologic and radiographic studies of the stomach and duodenum:
  - a. Computed tomography
  - b. Magnetic resonance imaging
  - c. Upper gastrointestinal series
  - d. Gastric emptying study

3. Interpret the results of and perform esophagogastroduodenoscopy
4. Interpret the findings of endoscopic ultrasound
5. Describe the indications, options and potential complications of minimally invasive procedures done for the following disorders of the stomach and duodenum:
  - a. Peptic ulcer disease
  - b. Gastric Neoplasms
    - Polyps
    - Carcinoid
    - Adenocarcinoma
  - c. Morbid Obesity
    1. Roux-Y Gastric bypass
    2. Minimally invasive adjustable gastric banding
    3. Vertical sleeve gastrectomy
    4. Biliopancreatic diversion with duodenal switch
6. Develop an operative strategy and perform the following procedures, including port positioning, patient positioning, and instrument selection
  - i. Partial Gastrectomy
    - Wedge resection
  - ii. Antrectomy
    - Bilroth I reconstruction
    - Bilroth II reconstruction
    - Roux-Y reconstruction
  - iii. Total gastrectomy
  - iv. Vagotomy
    - Truncal- transabdominal or transthoracic
    - Highly selective
  - v. Omental patch for ulcer disease (Graham patch)
  - vi. Palliative intestinal bypass for unresectable or intractable duodenal or pyloric disease

### **Unit 3- Midgut**

#### **A. Small Intestine**

1. Objectives: Upon completion of this unit, the Fellow will have a comprehensive understanding of the embryology, anatomy, and physiology of the small intestine. The fellow will have expertise in the investigation and treatment of small intestinal disorders, with a focus on minimally invasive approaches
2. Content
  - a. Embryology, physiology, and anatomy of the small intestine
  - b. Physiologic and radiographic tests used in evaluation of small intestinal disorders.
    - i. Computed tomography
    - ii. Magnetic resonance imaging
    - iii. Upper gastrointestinal series
    - iv. Small bowel follow-through
  - c. Endoscopic procedures
    - i. Enteroscopy- including intraoperative
    - ii. Pill camera enteroscopy
  - d. Benign gastric disease
  - e. Small bowel obstruction
    - i. Etiology
      - mass
      - hernia
      - adhesive disease

- ii. Pathophysiology
- iii. Diagnosis
- iv. Treatment
- v. Complications
- f. Crohn's Disease
  - i. Epidemiology
  - ii. Natural History
  - iii. Pathophysiology
  - iv. Diagnosis
  - v. Treatment: medical & surgical
- g. Meckel's diverticulum
  - i. Epidemiology
  - ii. Natural History
  - iii. Pathophysiology
  - iv. Diagnosis
  - v. Indications for resection
- h. Intussusception
  - i. Epidemiology
  - ii. Natural History
  - iii. Pathophysiology
  - iv. Diagnosis
  - v. Indications for operation
- i. Malignant small intestinal tumors
  - i. Carcinoid tumor
    - Epidemiology
    - Pathophysiology
    - Diagnosis
    - Treatment
    - Management- medical & surgical
  - ii. Adenocarcinoma
    - Epidemiology
    - Pathophysiology
    - Diagnosis
    - Management- surgical & adjuvant therapies
  - iii. Lymphoma
    - Epidemiology
    - Pathophysiology
    - Diagnosis
    - Treatment
    - Management- surgical & adjuvant therapies

#### Clinical Skills

1. Identify and recognize the structures associated with the small intestine.
2. Interpret the significance of the reports and images from the following physiologic and radiographic studies of the small intestine:
  - i. Computed tomography
  - ii. Magnetic resonance imaging
  - iii. Upper gastrointestinal series
  - iv. Small bowel through
3. Interpret the results of enteroscopy and pill camera studies
4. Describe the indications, options and potential complications of minimally invasive procedures done for the following disorders of the small intestine:
  - i. Small bowel obstruction

- ii. Crohn's disease
  - iii. Meckel's diverticulum
  - iv. Intussusception
  - v. Malignant small intestinal disease
    - Polyps
    - Adenocarcinoma
    - Carcinoid
5. Develop an operative strategy and perform the following procedures, including port positioning, patient positioning, and instrument selection.
- i. Minimally invasive small bowel resection with anastomosis
  - ii. Minimally invasive creation of gastrointestinal bypass

#### Unit 4-Hindgut

##### A. Large intestine

1. Objectives: Upon completion of this unit, the Fellow will have a comprehensive understanding of the embryology, anatomy, and physiology of the large intestine. The fellow will have expertise in the investigation and treatment of large intestinal disorders, with a focus on minimally invasive approaches

##### 2. Content

- a. Embryology, physiology, and anatomy of the large intestine
- b. Physiologic and radiographic tests used in evaluation of large intestinal disorders.

- i. Computed tomography
- ii. Magnetic resonance imaging
- iii. Barium enema

##### c. Endoscopic procedures

- i. Colonoscopy- including intraoperative

##### d. Diverticular disease

##### e. Large intestinal obstruction

- i. Etiology
  - mass
  - hernia
  - diverticular disease
  - extraluminal disease

##### ii. Pathophysiology

##### iii. Diagnosis

##### iv. Treatment

##### v. Complications

##### f. Crohn's Disease

- i. Epidemiology
- ii. Natural History
- iii. Pathophysiology
- iv. Diagnosis
- v. Treatment: medical & surgical

##### g. Benign and Malignant large intestinal tumors

- i. Carcinoid tumor
  - Epidemiology
  - Pathophysiology
  - Diagnosis
  - Treatment
  - Management- medical & surgical

##### ii. Adenocarcinoma



- Epidemiology
- Pathophysiology
- Diagnosis
- Management- surgical & adjuvant therapies
- iii. Lymphoma
  - Epidemiology
  - Pathophysiology
  - Diagnosis
  - Treatment
  - Management- surgical & adjuvant therapies
- iv. Adenomatous polyps
  - Epidemiology
  - Pathophysiology
  - Diagnosis
  - Treatment
  - Management- medical & surgical

#### Clinical Skills

1. Identify and recognize the structures associated with the large intestine.
2. Interpret the significance of the reports and images from the following physiologic and radiographic studies of the large intestine:
  - i. Computed tomography
  - ii. Magnetic resonance imaging
  - iii. Barium enema
3. Interpret the results of colonoscopy, CT colonography, and barium enema
4. Describe the indications, options and potential complications of minimally invasive procedures done for the following disorders of the large intestine:
  - i. Large bowel obstruction
  - ii. Crohn's disease
  - iii. diverticular disease
  - iv. Intussusception
  - v. Malignant large intestinal disease
    - Polyps
    - Adenocarcinoma
    - Carcinoid
5. Develop an operative strategy and perform the following procedures, including port positioning, patient positioning, and instrument selection.
  - i. Minimally invasive large bowel resection with anastomosis
  - ii. colonoscopy
    - management of bleeding
    - polyp resection
    - endoscopic mucosal resection
    - endoscopic full thickness resection
    - endoscopic stenting

#### Unit 5- Solid Organ

##### A. Adrenal Gland

1. Objectives: Upon completion of this unit, the Fellow will have a comprehensive understanding of the embryology, anatomy, and physiology of the adrenal gland.

The

fellow will have expertise in the investigation and treatment of large intestinal disorders, with a focus on minimally invasive approaches.

2. Content

a. Embryology, physiology, and anatomy of the adrenal gland with particular

attention to blood supply

b. Physiologic tests used in evaluation of adrenal disorders.

- i. Biochemical studies
- ii. Hormone level studies
- iii. 24 hour urine studies

c. Radiographic test used in evaluation of adrenal disorders

- i. Computed tomography
- ii. Magnetic resonance imaging
- iii. Selective venous hormonal sampling
- iv. MIBG scan

d. Adrenal mass

- i. Nonfunctioning adrenal mass/Incidentoloma
- ii. Functioning adrenal mass
  - Addison's Disease
  - Cushing's Disease
  - Gonadotropin secreting tumors
  - Pheochromocytoma
- iii. Etiology
- iv. Pathophysiology
- v. Diagnosis
- vi. Treatment

e. Malignant adrenal tumors

i. Metastasis

- Epidemiology
- Diagnosis
- Treatment
- Management- medical vs. indication for resection

ii. Adenocarcinoma

- Epidemiology
- Pathophysiology
- Diagnosis
- Treatment
- Management- adjuvant therapies

iii. Pheochromocytoma

- Epidemiology
- Pathophysiology
- Diagnosis
- Treatment
- Management

3. Clinical Skills

a. Identify and recognize the structures associated with the adrenal gland.

b. Interpret the significance of the reports and images from the following physiologic and radiographic studies of the small intestine:

- i. Computed tomography
- ii. Magnetic resonance imaging
- iii. Selective venous hormonal sampling
- iv. MIBG scan

c. Describe the indications, options and potential complications of minimally

invasive procedures done for the following disorders of the adrenal gland:

- i. Incidentaloma
- ii. Functioning adrenal masses
- iii. Malignant adrenal disease
  - Metastasis
  - Adenocarcinoma
  - Pheochromocytoma

d. Develop an operative strategy and perform the following procedures, including port positioning, patient positioning, and instrument selection. Particular focus on preoperative preparation for surgery.

- i. Minimally invasive adrenalectomy

## B. Kidney

1. Objectives: Upon completion of this unit, the Fellow will have a comprehensive understanding of the embryology, anatomy, and physiology of the kidney. The fellow will have expertise in the investigation and treatment of renal disorders, with a focus on minimally invasive approaches.

### 2. Content

a. Embryology, physiology, and anatomy of the kidney with particular attention to other retroperitoneal structures.

b. Physiologic tests used in evaluation of renal disorders.

- i. Biochemical studies
- ii. Hormone level studies
- iii. Urine studies

c. Radiographic test used in evaluation of renal disorders

- i. Computed tomography
- ii. Magnetic resonance imaging
- iii. Renal Scan

d. Benign renal disease

- i. Chronic renal Failure
  - Epidemiology
  - Diagnosis
  - Treatment
  - Indications for transplantation

## C. Spleen

1. Objectives: Upon completion of this unit, the Fellow will have a comprehensive understanding of the embryology, anatomy, and physiology of the spleen. The fellow will have expertise in the investigation and treatment of splenic disorders, with a focus on minimally invasive approaches.

### 2. Content

a. Embryology, physiology, and anatomy of the spleen with particular attention to other retroperitoneal structures.

b. Physiologic tests used in evaluation of splenic disorders.

- i. Biochemical studies

- ii. Hematologic studies
  - c. Radiographic test used in evaluation of splenic disorders
    - i. Computed tomography
    - ii. Magnetic resonance imaging
  - d. Benign splenic disease
    - i. Hematologic disorders- ITP, TTP, polycythemia vera
      - Epidemiology
      - Diagnosis
      - Treatment
      - Indications for splenic resection
    - ii. Splenic cysts
      - Epidemiology
      - Diagnosis
      - Treatment
      - Indications for splenic resection
  - e. Malignant splenic disease
    - i. Lymphoma
      - Epidemiology
      - Pathophysiology
      - Diagnosis
      - Treatment
      - Management- adjuvant therapies
3. Clinical Skills
- a. Identify and recognize the structures associated with the spleen.
  - b. Interpret the images and significance of reports from the following radiographic studies of the spleen:
    - i. Computed tomography
    - ii. Magnetic resonance imaging
  - c. Describe the indications, limitations, options and potential complications of minimally invasive procedures done for the following disorders of the spleen:
    - i. Hematologic disorders of spleen
    - ii. Splenic cysts
    - iii. Lymphoma
  - d. Develop an operative strategy and perform the following procedures, including port positioning, patient positioning, and instrument selection. Particular focus on preoperative preparation for surgery.
    - i. Minimally invasive splenectomy
    - ii.

### **Unit 6- The Abdominal Wall and Retroperitoneum**

1. Objectives: Upon completion of this unit, the Fellow will have a comprehensive understanding of the embryology, anatomy, and physiology of the abdominal wall and retroperitoneum. The fellow will have expertise in the investigation and treatment of abdominal wall disorders, with a focus on open and minimally invasive approaches.
2. Content
  - a. Embryology and anatomy of the abdominal wall and retroperitoneum.
  - b. Radiographic test used in evaluation of abdominal wall and retroperitoneal disorders
    - i. Computed tomography
    - ii. Magnetic resonance imaging

- c. Hernia
  - i. Inguinal
    - Epidemiology
    - Diagnosis
    - Treatment
  - ii. Ventral
    - Classification- incisional, flank, spigelian
    - Epidemiology
    - Diagnosis
    - Treatment
  - iii. Graft materials
    - Synthetic grafts- gore-tex, polypropylene, polyester
    - Biomaterials- cadaver, porcine
    - Bioabsorbables –vicryl, Poly-4-hydroxybutyrate
- d. Describe the characteristics and indications for use of the following abdominal wall grafts
  - i. Synthetic mesh- goretex, polypropylene, polyester
  - ii. Biomaterials- cadaver and porcine grafts
  - iii. Bioabsorbables –vicryl, Poly-4-hydroxybutyrate
- e. Describe the indications, limitations, options and potential complications of minimally invasive procedures done for the following disorders:
  - i. Inguinal hernia
  - ii. Ventral hernia
- f. Develop an operative strategy and perform the following procedures, including port positioning, patient positioning, and instrument selection. Particular focus on preoperative preparation for surgery.
  - i. Minimally invasive inguinal hernia repair
    - TEP (Totally extraperitoneal hernia repair)
    - TAPP (Transabdominal preperitoneal hernia repair)
  - ii. Minimally invasive ventral hernia repair

### **Unit 7- The Biliary System**

- A. Interpret the images and significance of reports from the following radiographic studies of the biliary system:
  - i. Computed tomography
  - ii. Magnetic resonance imaging
  - iii. HIDA scan
  - iv. Percutaneous cholangiography
  - v. Ultrasound
- B. Interpret the reports of the following endoscopic evaluations of biliopancreatic disorders:
  - i. ERCP
- C. Describe the indications, options and potential complications of minimally invasive procedures done for the following disorders of the biliary system:
  - i. Cholelithiasis
    - Cholecystitis- calculous and acalculous
  - ii. Gallbladder polyp
  - iii. Biliary stricture
  - iv. Biliary dyskinesia
- D. Develop an operative strategy and perform the following procedures, including port positioning, patient positioning, and instrument selection.
  - i. Minimally invasive cholecystectomy
  - ii. Minimally invasive cholangiogram
  - iii. Minimally invasive intraoperative ultrasound

- iv. Minimally invasive common bile duct exploration

### **Unit 7- The Diaphragm**

- A. Interpret the images and significance of reports from the following radiographic studies of the diaphragm:
  - i. Computed tomography
  - ii. Magnetic resonance imaging
  - iii. Xray
- B. Interpret the reports of the following endoscopic evaluations of the diaphragm:
  - i. EMG
- C. Describe the indications, options and potential complications of minimally invasive procedures done for the following disorders of the diaphragm:
  - i. Paralysis
  - ii. Diaphragmatic hernia
- D. Develop an operative strategy and perform the following procedures, including port positioning, patient positioning, and instrument selection.
  - i. Minimally invasive diaphragm pacer
  - ii. Minimally invasive diaphragmatic hernia repair