Impact of an Innovative Interdisciplinary Conference Focused on High-Yield Images: Significant Improvement in Image Recognition Skills with Gastroenterology, Radiology and Pathology Faculty Collaboration

Abstract

Background: An innovative interdisciplinary conference focused on recognition of high-yield images was established by faculty from the Gastroenterology Division and Pathology and Radiology Departments.

Objective: To assess the effectiveness of the interdisciplinary conference in improving image recognition skills.

Methods: A prospective observational study. Primary Outcome: Anonymous surveys assessed the effectiveness of the conference in improving the perception of image recognition. Secondary Outcome: Anonymous pre- and post-test scores assessed objective image recognition. Statistics: A Likert scale was used to assess perceived improvement in image recognition. A paired Student’s t-test and a Chi-squared test were used to compare pre- and post-test scores and Likert scale scores, respectively.

Results: Ten conferences were given between 2016 and 2018. A total of 51 out of 70 (72.9%) surveys were returned. 98% of the participants perceived the conference as “Extremely helpful” (59%) or “Very helpful” (39%) to their image recognition. Prior to the conference, their comfort level with the subject matter was “Somewhat Comfortable” (comfort score of 2.5 ± 1.1). After the conference, their comfort level increased to being “Very Comfortable” (comfort score of 4.0 ± 0.7) (p<0.0001). Participants’ surveys indicated a trend for the knowledge in the non-GI disciplines to improve the most (Pathology 55%, Radiology 49%, Endoscopy 33%, p=0.08). At the beginning of the academic year, the average pre-test score on image recognition skills of the gastroenterology fellows was 57% ± 19%. At the end of the academic year, the post-test score on the same images improved to 70% ± 7% (p=0.0004).

Conclusion: An innovative, collaborative conference developed by faculty experts in multiple disciplines focusing on high-yield endoscopic, pathologic and radiologic images was effective at improving objective and subjective image recognition skills.

Keywords: Interdisciplinary Conference; Gastroenterology Fellowship Training; Medical Education; Image Recognition

Introduction

Image recognition is an important skill for all gastroenterologists, particularly trainees. To diagnose most gastrointestinal and liver diseases, a combination of endoscopic, pathologic and radiologic knowledge is usually required. The American Gastroenterological Association’s (AGA) Core Curriculum has required training for all Gastroenterology Fellows in both Radiology and Pathology [1]. Specifically, in the section on the training of gastroenterologists in Radiology, the Core Curriculum recommends that “trainees must have exposure at regular conferences that include radiographic imaging studies in relation to gastrointestinal disease.” For Pathology, it advises that multidisciplinary conferences of gastroenterologists and pathologists should be organized on a weekly or every other week basis to review specimens. In addition, the Core Curriculum encourages assessment of knowledge in radiology and pathology. While single focused conferences in radiology or pathology are frequently included in the gastrointestinal (GI) fellows’ curriculum at individual programs and are an integral part of the fellowship training experience, either as a four week block or ongoing weekly established conferences, at our GI fellowship program, we did not have specific radiology and pathology conferences before this interdisciplinary conference was started in 2016. We are unaware of another Gastroenterology program that has developed a specific conference to help GI fellows recognize, not only GI endoscopy images, but also in the same conference receive training in the recognition of high-yield radiologic and pathologic images.

It has been shown that learning in clinical settings alone is sometimes inadequate for trainees to acquire sufficient expertise. Previous studies have explored the effect of additional educational offerings outside the clinical settings to augment this knowledge. For example, other groups have pioneered standardized educational programs to improve the endoscopic detection of early gastrointestinal cancers. The Asian Novel Imaging and Intervention Group organized a conventional classroom style program from November 2013 to March 2016 with a total of 41 workshops held in 13 different cities and countries in Asia. They were able to show a significant improvement in the post-test results compared to pre-test results for diagnosis of early esophageal neoplasia, early gastric neoplasia and early colorectal neoplasia (p<0.0001) [2]. An E-learning system was also used to improve the endoscopic diagnosis of early gastric cancer worldwide. These investigators designed and developed an international, randomized, controlled trial to evaluate the effectiveness of the E-learning system using video lectures and self-exercise tests to gain experience in image recognition versus a control group who did not receive E-Learning and showed that it led to a significant improvement (p<0.001) [3]. In addition to the benefits of teaching outside the clinical settings, prior studies have shown the effectiveness of an interdisciplinary approach for teaching in various disciplines, such as Internal Medicine, Family Medicine, Mental Health Diseases and Medical Simulation [4-10].

In this article, we describe a novel interdisciplinary conference created for gastroenterology fellows using faculty in endoscopy, radiology and pathology. We then conducted a prospective study of GI fellows to evaluate the effectiveness of this newly created conference at improving self-reported image recognition skills and objective image-based pre- and post-test scores given at the beginning and at the end of each academic year.

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Methods

Study Design

The study was a prospective observational study conducted at an academic tertiary care center from September 2016 to May 2018. Interdisciplinary conference participants included gastroenterology (GI) fellows, GI pathology fellows, radiology residents and abdominal imaging and interventional radiology fellows. Attendance was voluntary. As each participant entered the conference, they were given the Immediate Feedback Assessment Technique (IF-AT) (Epstein Educational Enterprises, Cincinnati, Ohio) card (Figure 1) [11]. Pre- and post-conference self-assessment tests were conducted on the subject of the individual conference. An anonymous paper survey assessing the effectiveness of the conference and the quality of teaching was given to each participant at the end of each conference.

Gastroenterology fellows were invited to take an additional cumulative image recognition testing at the beginning and at the end of the academic years 2016-2017 and 2017-2018. These tests focused on testing the knowledge on high-yield endoscopic, pathologic and radiologic images. All participants were given a random number in order to keep the pre- and post-test results anonymous and assessed for differences. The study was approved by the Partners Institutional Review Board (IRB) in 2016.

Interdisciplinary Conferences with Faculty Collaboration

The focus of the conferences during the academic year 2016-2017 was Gastrointestinal Cancers. For the academic year 2017-2018, the focus was Gastrointestinal Inflammation and/or Infection. Prior to each conference, collaborative discussions among the faculty from the three disciplines—Endoscopy, Radiology and Pathology—consistently took place to ensure the highest quality images and teaching points. Endoscopic, radiologic and pathologic images of normal and diseased processes constituted the majority of each conference in addition to updated society guidelines and a brief discussion of practical management [12-15]. The conference took place every two months (8 weeks) and lasted 45 minutes. Faculty from all three disciplines participated in a collaborative format led by the moderator (P.J.). The conferences were interactive with ongoing questions and answers from the participants throughout. In addition, each conference was begun with a fun 5-minute self-assessment quiz of 3-5 case-based high-yield images reflecting specialty Board type questions using IF-AT (Epstein Educational Enterprises) (Figure 1) [11]. These same images were shown and discussed during the conference and reviewed again at the end.

Outcomes

The primary outcome was the effectiveness of the conference in improving confidence in image recognition skills as assessed by anonymous paper surveys using a 5-point Likert scale (Appendix 1). These surveys were given out at the beginning and collected at the end of each conference from all participants including gastroenterology, radiology and pathology residents and fellows.

The secondary outcome was fellows’ subjective perception of their level of readiness for the GI Training Examination (GTE) and the ABIM GI Board Examination. Subjective feedback on how to improve the conference was also collected, analyzed and used to improve subsequent conferences (Appendix 1) Additionally, for only GI fellows, a cumulative image recognition test was administered at the beginning of the academic year (2016-2017 and 2017-2018) and was compared to the scores at the end of the year (Appendix 2 and Appendix 3). These tests were given to all 14 general GI fellows at our institution during each of the two consecutive years when the study was conducted.

Statistical Analysis

Perception of comfort with image recognition was assessed using an anonymous paper survey with a Likert scale from 1 to 5 with 1 being “not at all comfortable” or “not at all helpful” and 5 being “extremely comfortable” or “extremely helpful.” The responses to this survey were analyzed using both a Student’s t-test and a Chi squared test where the Likert scores of 1-3 were grouped as “neutral/not comfortable” and Likert scores of 4-5 were grouped as “comfortable.” A paired Student’s t-test was used to compare pre- and post-test image recognition test scores. A p-value less than 0.05 was deemed statistically significant. Statistical analysis was performed using Statistical Analysis Software version 9.4 (SAS Institute, Cary, NC).

Results

A total of ten GI interdisciplinary conferences were given between September 2016 and May 2018. Conference topics are shown in Table 1. A sample of high yield images from one of the conferences on Barrett’s esophagus and esophageal adenocarcinoma is shown in Figure 2. The topics during the academic year 2016 to 2017 focused on GI malignancy, while those given during the academic year 2017 to 2018 focused on GI infection and inflammation. Two of the five topics from the academic year 2016 to 2017 with the highest evaluation scores (Pancreatic Cystic Neoplasms and Choledochal Cysts and their Malignant Potential) were updated and given again during the academic year 2017 to 2018.

On average, seven trainees (five GI fellows and two radiology/pathology residents/fellows) attended each conference. Out of 70 given surveys, 51 were returned, with a response rate of 72.9%. Fifty of 51 participants (98%) perceived the conference as being “Extremely helpful” (59%) or “Very helpful” (39%) to their recognition of endoscopic, pathologic and radiologic images. Specifically, participants found the following features of the conferences to be the most helpful to their learning: an interdisciplinary approach with multiple faculty from different disciplines (39%), comparison of normal and abnormal pathologic images (14%), clear explanation with well-organized conference (14%), slide and image quality (10%), guideline update with management summary (8%), high-yield topics (6%), collegial environment (6%) and an interactive format (4%).

Prior to the conference, participants’ comfort level with the subject matter was “Somewhat comfortable” (average comfort score of 2.5 ± 1.1 on a scale of 1 to 5 with 1 being “Not at all comfortable” and 5 being “Extremely comfortable”). After the conference, their comfort level increased to being “Very comfortable” (average comfort score of 4.0 ± 0.7) (p<0.0001). When the Likert scores were grouped as “neutral/uncomfortable” and “comfortable,” 9 out of 51 trainees...
(17.6%) reported feeling comfortable with the materials prior to the conferences. This proportion of trainees who felt comfortable with the materials increased to 44 out of 51 trainees (86.3%) after the conference (p<0.0001). Participants’ surveys indicated that their knowledge of image recognition improved most in the area of Pathology (55%), second in Radiology (49%), and third in Endoscopy (33%), although these differences did not reach statistical significance (p=0.08) (Table 2).

Seventy-nine percent of the GI fellow participants felt more prepared for the GTE and the ABIM GI Board Exam as a result of attending the lectures with 37% feeling “A lot more prepared” and 42% feeling “Very prepared.”

At the beginning of the academic year, the GI fellows’ cumulative image recognition pre-test score was 57 ± 19% (n=24). At the end of the academic year, the cumulative image recognition post-test score on the identical images improved to 70 ± 7% (n=20) (p = 0.0004). The improvement in cumulative image recognition test scores persisted when a subgroup analysis was performed by each academic year.
Specifically, for academic year 2016-2017, the scores improved from 49 ± 14% (n=10) prior to the first conference to 67 ± 8% (n=10) after the last conference (p=0.01). For academic year 2017-2018, the scores increased from 67 ± 20% (n=14) prior to the first conference to 74 ± 7% after the last conference (n=10) (p=0.04).

Discussion

This study proposes a novel method for teaching gastroenterology fellows using an interdisciplinary approach and faculty collaboration. In contrast, training on the cognitive aspects of gastroenterology consists of technical and cognitive training. The technical aspects of GI training usually take place in the endoscopy suite and occasionally in the simulation laboratory. In contrast, training on the cognitive aspects of gastroenterology occurs in a more varied setting, such as on-the-spot teaching during in-patient consultations, faculty teaching during fellows' subspecialty clinic sessions. In addition, the Division of Gastroenterology provides required grand rounds, journal clubs and didactic lectures. In this study, we propose an alternative method of providing cognitive training during the gastrointestinal endoscopy fellowship using a voluntary attendance conference using an interdisciplinary collaborative approach of faculty in the three major disciplines. In contrast to a multidisciplinary approach, where “knowledge is sequenced in a manner that allows students to experience related disciplinary contributions to a topic” [16], interdisciplinary refers to “an integration of knowledge from multiple disciplines in pursuit of an outcome that is not possible from a single disciplinary approach” [17,18]. In our conferences, the curricula were designed so that each diagnosis required the knowledge from at least two of the three disciplines—endoscopy, pathology or radiology—in order to encourage image recognition, integration and synthesis. Ivanitskaya et al. proposed that interdisciplinary curricula promote flexible thinking, enhanced cognitive skills, ability to synthesize information and improved critical thinking [19]. Additionally, interdisciplinary courses appear to promote structure knowledge that leads to better and deeper analyses of the interdisciplinary problem and topic, which may lead to longer term memory [20,21].

Participants also rated having a comparison of normal and abnormal images helpful to their learning. In 1967, Bruner et al. defined concept learning, also known as category learning, as “the search for and listing of attributes that can be used to distinguish exemplars from non-exemplars of various categories”[22]. While there are many methods of learning a concept, exemplars comparison and contrast has been proposed as an efficient way to learn [23]. Comparing different examples from the same category allows learners to exemplify variability within the category. On the other hand, contrasting two examples from different categories may allow learners to identify attributes within each example with diagnostic value [24]. Applying this theory, our conferences were designed so that several images from the same category, such as different radiologic images of choleodochal cysts, and several images from different categories, such as pathologic images of normal esophagus, Barrett’s esophagus without and with dysplasia, were used as teaching exemplars (Figure 2).

In our study, participants rated the interactive format with a collaborative environment of multi-specialty faculty as useful to their learning. In 1991, Bonwell and Eison defined active learning as “instructional activities involving students in doing things and thinking about what they are doing” [25]. This approach focuses on developing students’ skills rather than on transmitting information. According to the constructivist learning theory, “individuals learn through building their own knowledge, connecting new ideas and experiences to existing knowledge and experiences to form new or enhanced understanding” [26]. Several techniques were used during our conferences to promote active learning including the IF-AT card to promote self-assessment about the subject, adequate time to allow participants to synthesize information and ask questions of the faculty. In addition, the round robin question-and-answer technique was used throughout the conferences to encourage participation in addition to the case-based learning format. In 2014, Freeman and colleagues conducted a meta-analysis demonstrating that compared to traditional lectures, courses with some active learning components were associated with increased student performance on exams, concept inventories and other assessments with weighted standardized mean difference of 0.47 (p < 0.001). These results were consistent across disciplines [27]. Recently, the flipped classroom has also highlighted the enjoyment and effectiveness of students actively teaching each other in small groups [28].

Our interdisciplinary conferences have several strengths. First, the conferences stressed both concept learning and active learning/teaching methods. Second, the format of the conferences we created was simple and easily reproducible across institutions. Third, the expert-driven curricula were strategically designed to include high-yield topics that readily integrated and intertwined the three disciplines with high quality visuals. Fourth, we demonstrated that in addition to participants’ subjective comfort level, their objective scores on a cumulative image recognition test improved. In this study, the post-test was given at the end of each academic year to the Gastroenterology fellows rather than after each conference in order to assess knowledge retention.

The weakness of our study is that it was performed at a single institution with a limited number of participants.

Conclusion

In summary, an innovative, novel, interdisciplinary conference with faculty collaboration across the three different disciplines of gastroenterology, radiology and pathology resulted in significant improvement in image-recognition skills both objectively and subjectively. Our methods are readily translatable to all subspecialty medical and surgical fellowships where image recognition is of paramount importance for both clinical care and Specialty Board preparation. The success of this interdisciplinary conference has led to our Division of Gastroenterology, Hepatology and Endoscopy to agree to scale up this conference with an inter-disciplinary conference every two weeks instead of every eight weeks beginning in the fall of 2020. These more frequent conferences will focus on the interdisciplinary approach to GI Trainees’ learning image recognition using endoscopy, radiology and pathology images as well as an in-depth discussion of specific topics.

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Ethical statement

This study was presented as a poster abstract at the Brigham and Women’s Hospital’s Medical Education Day in April 2018 in Boston, M.A. and at Digestive Diseases Week in June 2018 in Washington, D.C. This material has not been published in whole or in part elsewhere. Additionally, the manuscript is not currently being considered for publication.
publication in another journal. All authors have been personally and actively involved in substantive work leading to the manuscript.

References


25. Bonwell CC, Sutherland TE. The active learning continuum: Choosing activities to engage students in the classroom. New Directions for Teaching & Learning 1996: 67:3-16.


1. Appendix 1

Sample Anonymous Survey Given the End of Each Conference.

High-Yield Images for Your Boards: A Multidisciplinary Lecture Series
Fellows Evaluation
“Barrett’s Esophagus and Esophageal Adenocarcinoma”
September 21, 2017

1a) Was the conference helpful to your learning image recognition?
   Not at all  Somewhat helpful  Neutral  Very helpful  Extremely helpful

1b) What was most helpful about the conference?

2) As a result of attending this lecture, do you feel more prepared for the GI Training Exam and the ABIM GI Board Exam?
   Not at all  Not prepared  Neutral  Very prepared  A lot more prepared

3a) How comfortable/confident were you with this subject matter before the lecture?
   Not at all  Somewhat comfortable  Neutral  Very comfortable  Extremely comfortable

3b) How comfortable/confident are you with this subject matter after the lecture?
   Not at all  Somewhat comfortable  Neutral  Very comfortable  Extremely comfortable

4) How could this conference be improved?

5) Which of your image recognition skills do you think was most improved?
   Endoscopy  Pathology  Radiology

Question 1

- A 65 year old construction worker has the polyp below removed from his ascending colon. Based on the histology, what type of polyp is this?

A) Hyperplastic polyp
B) Sessile serrated adenoma
C) Juvenile polyp
D) Adenoma with dysplasia

Question 2

- This 4 cm lesion is found at the splenic flexure in a 55 year old woman on a screening colonoscopy. Biopsies show that the lesion is a villous adenoma. What is the chance of malignancy?

A) 20%
B) 40%
C) 60%
D) 80%

Question 3

- This desmoid lesion is seen on an abdominal/pelvic CT scan of a 35 year old woman with a history of colon cancer. Which polyp syndrome is a desmoid tumor associated with?

A) Gardner's syndrome
B) HNPCC
C) Juvenile polyposis syndrome
D) Peutz-Jeghers syndrome
**Question 4**

- A 47 year old man who is a heavy smoker has a long history of severe acid reflux. Recent esophageal biopsies showed an abnormality (see arrow) that is most compatible with which of the following diagnoses?

  A) Barrett’s esophagus
  B) Barrett’s esophagus with dysplasia
  C) Adenocarcinoma
  D) Squamous cell carcinoma

**Question 5**

- Here is an endoscopic finding of a 45 year old man with a long history of acid reflux. What is the Prague staging of this Barrett’s esophagus?

  A) C31M29
  B) C7M2
  C) C5M2
  D) C5M7

**Question 6**

- A 46 year old woman complains of worsening dysphagia to both solids and liquids for the past 5 years. Her barium study shows the following image. What is the most likely cause of this finding?

  A) Failed LES relaxation
  B) Malignancy
  C) Esophageal spasm
  D) Stricture

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Question 7

A 42 year old woman from Moscow presents with epigastric pain over the past year. Biopsy of her stomach is looked at by routine H&E and immunohistochemistry. What abnormality is seen on the top of the gastric mucosal cells?

A) Schistosomiasis  
B) Ascaris  
C) Hookworm  
D) H. pylori
Question 8

- A 72 year old woman who was found on a CT scan to have large ovarian masses presents with early satiety and weight loss for 3 months. An endoscopy shows a non-distendable stomach with large heaped-up submucosal masses. What is this endoscopic finding most likely due to?

A) NSAIDs-induced peptic ulcer
B) H. pylori gastritis
C) Leiomyosarcoma
D) Signet ring adenocarcinoma

Question 9

- A 52 year old woman with history of breast cancer who presents with few month history of early satiety and weight loss. CT abdomen shows the following finding. What is the most likely diagnosis?

A) Liver metastases causing external compression of the stomach
B) Linitis plastica
C) Gastritis
D) Foreign body ingestion

Question 10

- 74 year old female with jaundice and weight loss. What is the diagnosis?

A) Pancreatic neuroendocrine tumor
B) Pancreatic adenocarcinoma
C) Metastatic colonic adenocarcinoma
D) Intraductal Papillary Mucinous Neoplasm
Question 10

• 74 year old female with jaundice and weight loss. Enzymes. What is the diagnosis?

A) Pancreatic neuroendocrine tumor
B) Pancreatic adenocarcinoma
C) Metastatic colonic adenocarcinoma
D) Intraductal Papillary Mucinous Neoplasm

Question 10

• 74 year old female with jaundice and weight loss. Enzymes. What is the diagnosis?

A) Pancreatic neuroendocrine tumor
B) Pancreatic adenocarcinoma
C) Metastatic colonic adenocarcinoma
D) Intraductal Papillary Mucinous Neoplasm

Question 11

• A 73 year old woman with a history of epigastric pain and anorexia. What does this endoscopic finding suggest?

A) Ampulla adenoma
B) Biliary stone
C) Pancreatic duct stone
D) Intraductal papillary mucinous neoplasm
Question 12

• The following incidental MRI finding is seen in a 42 year old man with no pertinent past medical history. What is the next best step?

A) Endoscopic ultrasound
B) Surveillance MRI in 12 months
C) Endoscopic or percutaneous drainage
D) Surgical referral

Question 13

• 71 year old man with a solitary right hepatic lobe nodule (6 cm x 5 cm). What is the diagnosis?

A) Metastatic adenocarcinoma
B) Hepatocellular carcinoma
C) Hepatic Adenoma
D) Focal Nodular Hyperplasia

Question 13

• 71 year old man with a solitary right hepatic lobe nodule (6 cm x 5 cm). What is the diagnosis?

A) Metastatic adenocarcinoma
B) Hepatocellular carcinoma
C) Hepatic Adenoma
D) Focal Nodular Hyperplasia
Question 13

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A) Metastatic adenocarcinoma  
B) Hepatocellular carcinoma  
C) Hepatic Adenoma  
D) Focal Nodular Hyperplasia

Question 14

• A 23 year old Asian American woman with no other past medical history presents with recurrent pancreatitis. Fluoroscopic examination is shown here. What is the recommended management?

A) Bile duct cyst excision + CCY  
B) Bile duct cyst excision + CCY + hepatectomy  
C) Sphincterotomy  
D) Liver transplantation

Question 15

• A 42 year old man with history of hemochromatosis underwent surveillance MRI of the liver. What is the risk for HCC?

A) 5%  
B) 10%  
C) 20%  
D) 30%
Question 1

- A 35 year old woman presents with right upper quadrant pain. Labs are notable for AST/ALT 582/756, Tbili/Dbili 2.4/1.7. RUQ ultrasound is normal. Endoscopy shows the following. What is the diagnosis?

A) Choledochal cyst I
B) Choledochal cyst III
C) Choledochal cyst V
D) Intraductal papillary mucinous neoplasm

Question 2

- A 67 year old woman presents with recurrent cholangitis. MRCP shows the following. What malignancy is she at the highest risk for?

A) Gallbladder adenocarcinoma
B) Cholangiocarcinoma
C) Hepatocellular carcinoma
D) Pancreatic adenocarcinoma

Question 3

- An 80 year old man with a history of choledochal cyst I presents with jaundice and weight loss. EUS and FNB of the cyst yield the following. What is the diagnosis?

A) Gallbladder adenocarcinoma
B) Cholangiocarcinoma
C) Hepatocellular carcinoma
D) Pancreatic adenocarcinoma
Question 4

- A 37 year old man with a history of squamous cell lung cancer (on chemotherapy) complains of odynophagia. Endoscopy shows the following. What is the likely diagnosis?

A) Candida esophagitis
B) Herpes simplex esophagitis
C) CMV esophagitis
D) Radiation-induced esophagitis

Question 5

- A 45 year old man with a history of HIV presents with odynophagia. Biopsies of the esophageal lesions show the following. What is the diagnosis?

A) Candida esophagitis
B) HSV esophagitis
C) CMV esophagitis
D) Pill esophagitis

Question 6

- A 65 year old man with a long history of acid reflux presents with worsening of his reflux symptoms despite PPI. CT scan shows the following. What is the likely diagnosis?

A) Achalasia
B) Esophagitis
C) Esophageal spasm
D) Stricture
**Question 7**

- A 40 year old woman with history of rheumatoid arthritis presents with diarrhea. Labs are notable for iron deficiency anemia. Endoscopy shows the following. What is the possible diagnosis?

A) Crohn’s disease  
B) Celiac disease  
C) Ulcerative colitis  
D) H. pylori

**Question 8**

- The same patient undergoes biopsies of the duodenum, which shows the following. What is the diagnosis?

A) Crohn’s disease  
B) Celiac disease  
C) Ulcerative colitis  
D) H. pylori

**Question 9**

- A 62 year old man with a history of refractory sprue who presents with 25 pound weight loss. CT scan shows the following. What is the possible diagnosis?

A) Enteropathy-associated T-cell lymphoma  
B) Small bowel adenocarcinoma  
C) Leiomyosarcoma  
D) Gastrointestinal stromal tumors
Question 10
• A 65 year old woman presents with watery diarrhea and bloating. Colonoscopy shows the following. What is the possible diagnosis?

A) Microscopic colitis
B) Ulcerative colitis
C) Crohn’s disease
D) Clostridium difficile colitis

Question 11
• The same patient undergoes random colonic biopsies, which show the following. What is the diagnosis?

A) Collagenous colitis
B) Lymphocytic colitis
C) Ulcerative colitis
D) Crohn’s disease

Question 12
• A 33 year old woman presents with a 10 day history of RLQ severe crampy pain, bloating, nausea, vomiting and decreased stool output. What is the likely diagnosis?

A) Collagenous colitis
B) Lymphocytic colitis
C) Ulcerative colitis
D) Crohn’s disease
Question 13

• A 73 year old woman with a history of epigastric pain and anorexia. What does this endoscopic finding suggest?

A) Ampulla adenoma
B) Biliary stone
C) Pancreatic duct stone
D) Intraductal papillary mucinous neoplasm

Question 14

• 45 year old woman is found incidentally to have the following finding. What is the possible diagnosis?

A) Intraductal papillary mucinous neoplasms
B) Serous cystadenoma
C) Mucinous cystic neoplasm
D) Pancreatic adenocarcinoma

Question 15

• The same patient underwent a surgical resection of the lesion. Pathology shows the following. What is the diagnosis?

A) Intraductal papillary mucinous neoplasms
B) Serous cystadenoma
C) Mucinous cystic neoplasm
D) Pancreatic adenocarcinoma