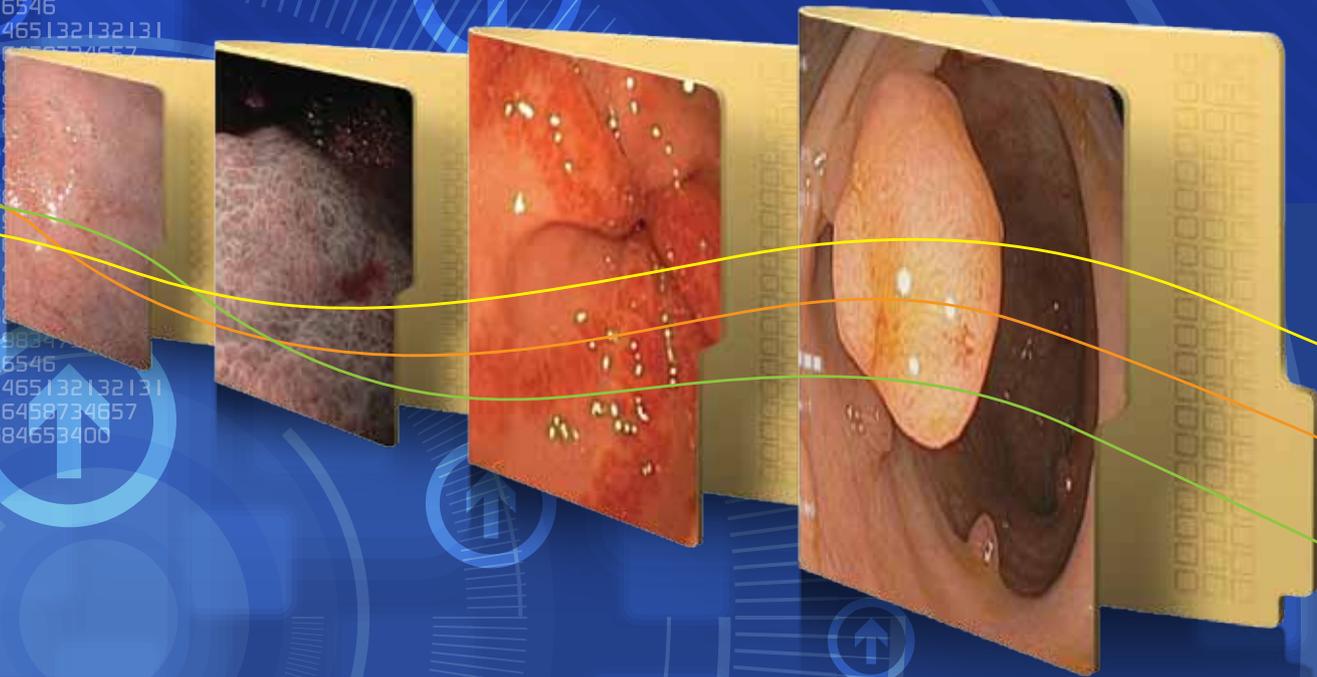


# The GI Endoscopy Atlas: New Bowel Imaging (NBI) - 6<sup>th</sup> edition



Pradermchai Kongkam  
Rapat Pittayanon  
Rungsun Rerknimitr  
Satimai Aniwan  
Sombat Treeprasertsuk  
Editors



**The GI Endoscopy Atlas:  
New Bowel Imageing  
(NBI)-6<sup>th</sup> edition**

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## Edited by

Pradermchai Kongkam  
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Rungsun Rerknimitr  
Satimai Aniwana  
Sombat Treeprasertsuk

## 6<sup>th</sup> edition

Thai Association for Gastrointestinal Endoscopy (TAGE)

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All endoscopic pictures in this New Bowel image (NBI) atlas.()6<sup>th</sup> edition were taken by staffs of Excellent Center for GI Endoscopy (ECGE), Division of Gastroenterology, Faculty of Medicine, Chulalongkorn University, Rama 4 road, Patumwan, Bangkok 10330 Thailand Tel: 662-256-4265, Fax: 662-252-7839, 662-652-4219.

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# Preface

## Dear Passionate Endoscopists,

Image-enhanced endoscopy has been developed far beyond our expectation. It seems that the quotation by Albert Einstein “imagination is more important than knowledge” is also true for GI Endoscopy. This latest book series of “Atlas in GI Endoscopy” by TAGE provides a case series of GI Endoscopy from top to bottom (upper GI, HPB, and lower GI Endoscopy). It includes many fantastic images with high quality obtained by EVIS EXERA III-190 HD (Olympus Medical). This case series provide not only the advancement in the Art and Knowledge of GI Endoscopy but also all the related radiology and pathology.

I would like to take this opportunity to express my deeply thanks to the editors, Professor Rungsun Rerknimitr, Associated Professor Sombat Treeprasertsuk, Dr.Linda Pantongrag-Brown and colleagues who contribute their great efforts to make this important 6th edition of the GI Endoscopy atlas available under the TAGE support.

Last but not least, I hope that you will enjoy learning and reading this book and this in turn will ultimately help your daily practice at certain level.

Dr. Thawee Ratanachu-Ek, M.D.

TAGE President

# From Editors

Gastro-intestinal endoscopy knowledge and technologies have significantly changed over the last few decades. Many new endoscopic findings has been discovered and effectively used for both diagnostic and the treatment purpose. Nevertheless, it is still difficult for beginners to learn about these endoscopic findings within a short period of time. Especially, in uncommon diseases, trainees may have never seen those lesions during their training time. A helpful endoscopic atlas with a brief summary of the case followed by a practical discussion is an invaluable resource for learners including gastroenterologists, surgeons, internists, nurses and all GI paramedics.

This book was written by our faculties of the excellence center of GI Endoscopy, Chulalongkorn University. This version is the sixth edition and consists of 4 section including upper GI endoscopy, lower GI endoscopy, ERCP, and EUS. It comes in a package of interesting presentations. Each case will be displayed with an intriguing image findings and followed by the literature review of such case. Systematic indexing of all case scenarios will help the readers to search for the most appropriate cases within a few minutes. However, reading through all cases probably the most valuable way.

We hope that the book will help our readers to improve the practice and clinical knowledge and all readers would enjoy the content of this New Bowel image (NBI) atlas.

# Contributors

- 1. Kessarín Thanapirom**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 2. Kittiyod Poovorawan**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 3. Narisorn Lakananurak**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 4. Naruemon Wisedopas-Klaikew**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 5. Nopavut Geratikornsupuk**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 6. Nopporn Anukularnkusol**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 7. Phonthep Angsuwatcharakon**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 8. Piyapan Prueksapanich**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 9. Pradermchai Kongkam**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 10. Rapat Pittayanon**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 11. Rungsun Rerknimitr**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand
- 12. Satimai Aniwan**  
- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**13. Sombat Treeprasertsuk**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**14. Tanassanee Soontornmanokul**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**15. Vichai Viriyautsahakul**

- Department of Medicine, King Chulalongkorn Memorial Hospital, Thai Red Cross Society

**16. Wiriyaporn Ridditid**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**17. Sasipim Sallapant, M.D.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**18. Suppakorn Malikhao, M.D.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**19. Boonlert Imraporn, M.D., M.Sc.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand  
Vejthani Hospital, Bangkok, Thailand

**20. Sayamon Kimtrakool, M.D.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**21. Piyachai Orkoonsawat, M.D.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**22. Puth Muangpaisarn, M.D.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**23. Yuthana Sattawatthamrong, M.D.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**24. Sukprasert Jutaghokiat, M.D., M.Sc.**

- Division of Gastroenterology, Vejthani Hospital, Bangkok, Thailand

**25. Khin San Aye, M.D.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**26. Tanyaporn Chantarojanasiri, M.D.**

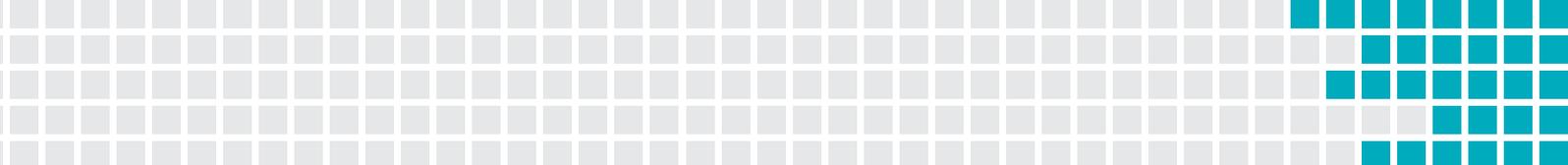
- Division of Gastroenterology, Department of Medicine, Police General Hospital, Bangkok, Thailand

**27. Sutep Gonlachanvit, M.D., M.Sc.**

- Division of Gastroenterology, Department of Medicine, Chulalongkorn University, Bangkok, Thailand

**28. Linda Pantongrag-Brown**

- AIMC, Ramathibodi Hospital, Bangkok, Thailand



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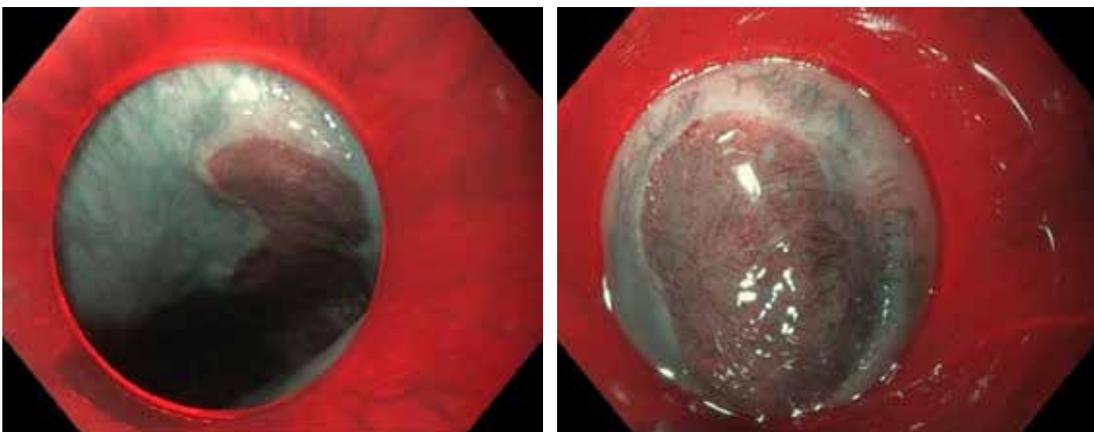


# Upper

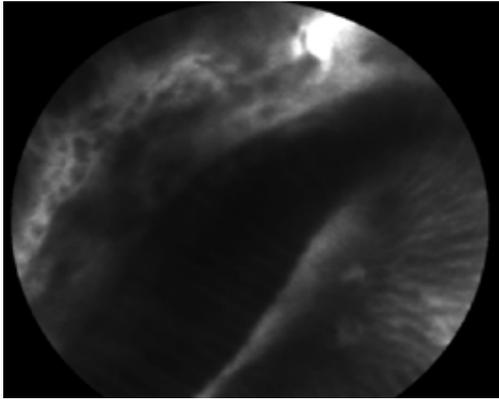
## Case 1

Piyapan Prueksapanich, M.D.  
Rapat Pittayanon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

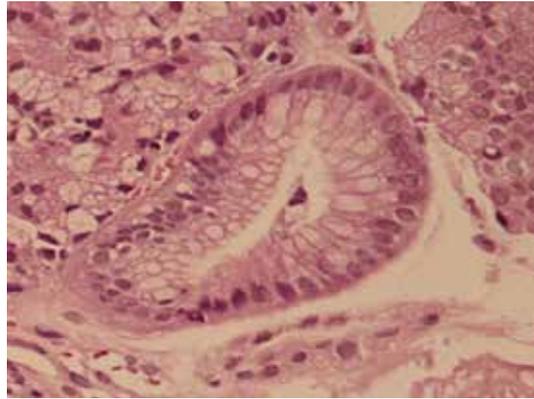
A 58-year-old male with a history of stage I squamous cell carcinoma of the oral cavity for a year underwent an esophagogastroduodenoscopy (EGD) for esophageal cancer surveillance. He reported no upper GI symptom. The EGD showed an ill-defined salmon-colored patch at the proximal esophagus just below the upper esophageal sphincter. The narrow band imaging (NBI) showed a well-defined pink patch with a clear margin separated from the normal surrounding greenish NBI based mucosa (Figures 1 and 2). Probe-based confocal laser endomicroscopy (pCLE) revealed a columnar epithelium without goblet cells (Figure 3). Biopsy was done and the pathological study showed an area of gastric mucosa (Figure 4) compatible with the diagnosis of **an inlet patch**.



*Figures 1 and 2 NBI showed a well-defined pink patch surrounded by normal esophageal mucosa.*



*Figure 3* pCLE revealed columnar epithelium without goblet cell.



*Figure 4* Histology confirmed the columnar epithelium as gastric mucosa.

## Diagnosis:

Inlet patch of the esophagus

## Discussion:

The inlet patch of the esophagus is a congenital anomaly consisting of ectopic gastric mucosa located mainly in the upper part of the esophagus or just below the upper esophageal sphincter. The incidence was reported as 1%-20% in routine upper endoscopies. The inlet patches are usually asymptomatic and incidentally detected by EGD.<sup>1,2</sup> However, the inlet patch can rarely be associated with some complications such as bleeding, perforation, stricture or malignancy.<sup>1,2</sup>

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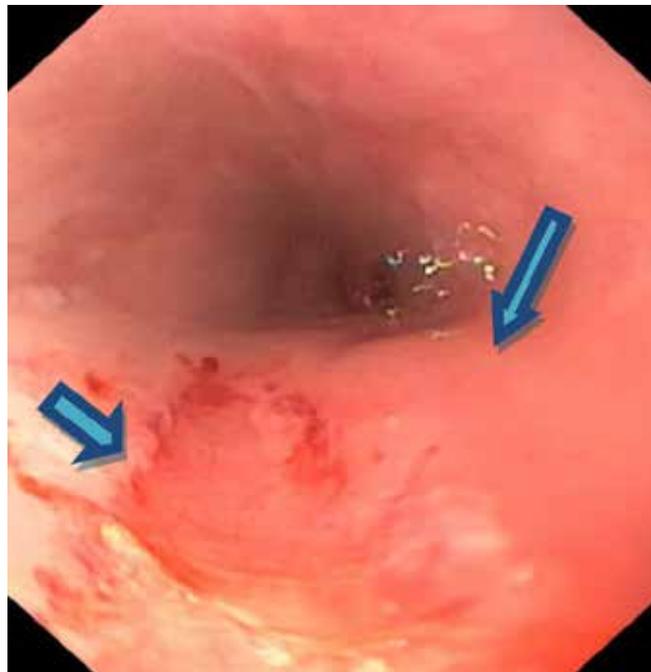
## Case 2

Kessarín Thanapirom, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 66-year-old female presented with melena for 3 weeks. She had a history of NSAIDs usage for knee pain. EGD revealed a 1.5 cm, oval-shaped, well-circumscribed, clean-based esophageal ulcer at mid esophagus without active bleeding (short arrow). The location was adjacent to the aortic arch (long arrow) (Figure1).



*Figure 1* A clean-based ulcer at mid esophagus.

## Diagnosis:

Pill-induced esophageal ulcer

## Discussion:

Various drugs such as NSAIDs, tetracycline, penicillin, potassium chloride tablet, alendronate and quinidine were the common medicine causing pill-induced esophageal injury. The symptom onset may occur from a few hours to one month after ingestion of the drug.<sup>1</sup> Common symptoms are odynophagia (72%), chest pain (59%), vomiting (58%), dysphagia (33%), and hematemesis (15%).<sup>2</sup>

Endoscopic findings of pill-induced esophagitis included acute superficial erythema (83%), esophageal erosion (58%), esophageal ulcer with exudates (27%), esophageal ulcer with bleeding (19%), kissing ulcer with bleeding (8%), and denudation of esophageal mucosa (3%).<sup>2</sup> The important clinical clues for diagnosis of NSAIDs- induced esophageal injury are a history of drug usage, a shallow, discrete ulcer at mid esophagus near aortic arch with normal surrounding mucosa.<sup>3</sup> The differential diagnoses are foreign body induce ulcer, esophageal carcinoma, and infection, especially herpes esophagitis.

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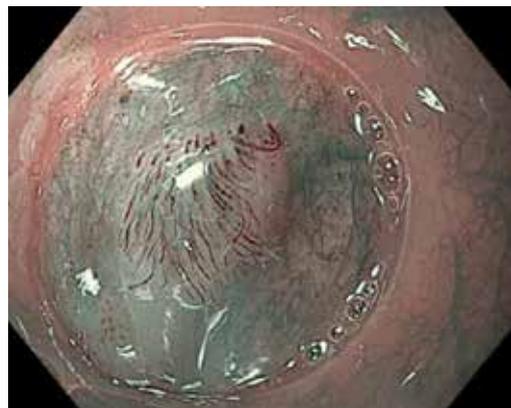
## Case 3

Piyapan Prueksapanich, M.D.  
Rapat Pittayanon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 65-year-old male with a history of stage II squamous cell carcinoma of the hard palate diagnosed 4 years ago underwent NBI-protocol EGD for esophageal cancer surveillance. He was asymptomatic and confirmed to be in a complete remission of his hard palate cancer. EGD showed a nodular appearance of the esophageal mucosa. The 6-8 raised whitish nodules sized 2-5 mm were scatterly detected along the esophagus more predominantly at the distal esophagus (Figure 1). Dual focus NBI showed white and red strips (Figure 2) representing the extended intrapapillary capillary loops<sup>1</sup>. Under Lugol chromoendoscopy, the lesions were heavily stained (Figure 3). The finding was compatible with esophageal glycogenic acanthosis. Biopsy was done and pathology confirmed the diagnosis of glycogenic acanthosis.



**Figure 1** A nodular appearance at mid esophagus.



**Figure 2** NBI with magnification showed white and red strips on top of the nodules.



*Figure 3* Lugol chromoendoscopy showed heavily stained nodule by iodine.

## Diagnosis:

Glycogenic acanthosis of the esophagus

## Discussion:

Glycogenic acanthosis is a benign esophageal lesion with an unclear pathogenesis. Its association with aging, gastroesophageal reflux, Cowden's syndrome or celiac disease has been reported in the literatures.<sup>2,3</sup> Glycogenic acanthosis itself is asymptomatic and can be found in 20-40% of the endoscopy which are more prominent in the lower esophagus than in the upper esophagus.<sup>2</sup>

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## Case 4

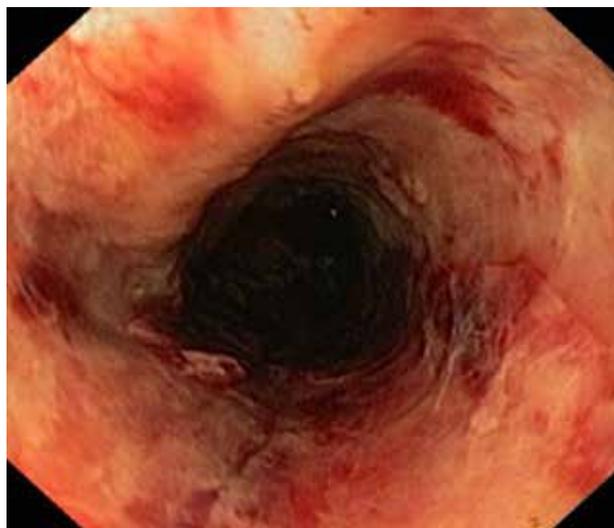
Sasipim Sallapant, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 50-year-old male with previously healthy admitted in the surgical department due to gastric ulcer perforation. He underwent exploratory laparotomy with simple suture and omental patch. One week after operation, he developed acute hematemesis with postural hypotension. Emergency EGD was performed and showed multiple long linear esophageal ulcers and erosions with bridging of mucosal folds extending from mid esophagus to gastroesophageal junction (Figure 1). There are moderate amount of blood clot in the esophagus. The stomach and duodenum revealed neither erosion nor ulcer.

He was treated with NPO, intravenous fluid, high dose proton pump inhibitors as well as a head elevation. After a few days of treatment, the symptom improved and the enteral feeding was initiated. He had no recurrent upper GI bleeding.



*Figure 1 Severe reflux esophagitis*

## Diagnosis:

Upper GI bleeding from severe reflux esophagitis, LA classification grade C

## Discussion:

Bleeding reflux esophagitis is usually associated with deep esophageal ulcers or severe esophagitis (LA classification grades C and D).<sup>1</sup> Clinical presentation can range from active GI bleeding to iron deficiency anemia. Clinically important hemorrhage has been reported in 7% to 18% of GERD patients.<sup>2</sup>

A history of reflux esophagitis or heartburn was noted in only 28% or 37% of the patients with bleeding reflux esophagitis. Severe bleeding from reflux esophagitis is treated medically with a proton pump inhibitor (PPI). The patient should be treated with a minimum 8-week course. Head of bed elevation and avoidance of meals 2–3 hours before bedtime are recommended.<sup>3</sup>

EGD is critical for diagnosis of the bleeding etiology, but endoscopic treatment generally has not been required in this setting unless a focal ulcer with a stigma of recent hemorrhage was found.<sup>4</sup> Repeat endoscopy should be performed in patients with severe erosive reflux disease after a course of PPI therapy to exclude underlying Barrett's esophagus.<sup>3</sup>

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## Case 5

Kessarín Thanapirom, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 28-year-old male presented with hematemesis after vomiting and retching for one day after an overnight heavy alcohol drinking. Physical examination showed tachycardia and mild pale mucosa. He had no sign of chronic liver stigmata. EGD was performed and revealed one linear clean-based ulcer at the esophagogastric junction (EGJ).



**Figure 1** One linear clean-based ulcer, 1.5 cm long without visible vessel at EGJ (arrow).

## Diagnosis:

Mallory-Weiss syndrome

## Discussion:

Three percent of patients with acute non-variceal upper gastrointestinal bleeding is due to Mallory-Weiss syndrome (MWS).<sup>1</sup> Mostly, bleeding from MWS is mild and self-limited, and the patient can be safe only by a conservative medical treatment. However, in certain patients such as patients with the overt stigmata of recent bleeding, or with unstable vital signs or with severe co-morbid diseases, the hemostatic procedure may be required.<sup>1</sup> Endoscopic treatment is currently recommended as the first-line therapy for active bleeding of Mallory–Weiss syndrome. Many endoscopic hemostatic techniques including local adrenaline injection, hemoclipping, band ligation, and electrocoagulation achieved a high rate of primary hemostasis (90%).<sup>1-3</sup> Mechanical hemostatic method is more effective than local adrenaline injection in patients with active bleeding stigmata since re-bleeding rate was reportedly lower.<sup>2</sup>

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## Case 6

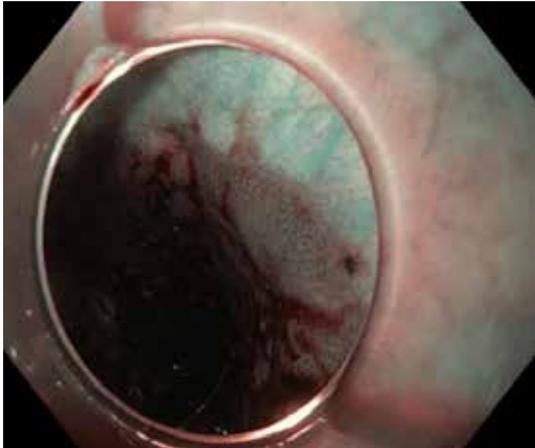
Piyapan Prueksapanich, M.D.  
Rapat Pittayanon, M.D., M.Sc.  
Nareumon Wisedopas, M.D.  
Rungsun Rerknimitr, M.D.

A 63-year-old male with a history of complete remission of stage III supraglottic squamous cell carcinoma for one year underwent a surveillance EGD for esophageal cancer. He was asymptomatic, EGD showed a flat and irregular boarder lesion at 20-30 cm from the incisor with fungating mass sized 1.5 cm on-top (Figure 1). NBI confirmed as a well-defined brownish lesion (Figure 2) with abnormal intrapapillary capillary loops (IPCLs). The IPCLs characters showed tortuous, dilated, irregular caliber, and various in shapes of capillary loops with some avascular area (Figure 3). The NBI finding of the IPCLs was compatible with carcinoma in situ according to the Inoue's classification.

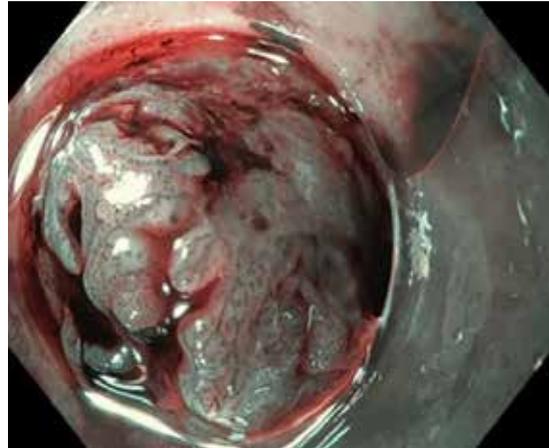
After Lugol solution staining, the lesion was unstained and the border was more clearly defined (Figure 4). The lesion was biopsied with the biopsy forceps. Pathology showed well-differentiated squamous cell carcinoma with no basement membrane penetration which was compatible with Tis staging (carcinoma insitu) (Figure 5).



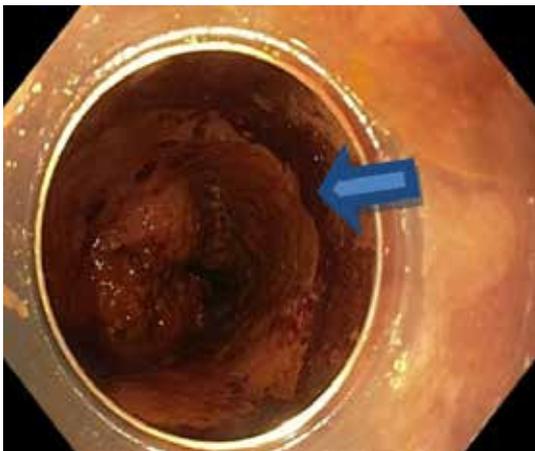
**Figure 1** EGD showed a flat and irregular boarder lesion at 20-30 cm from the incisor with a fungating mass sized 1.5 cm on-top.



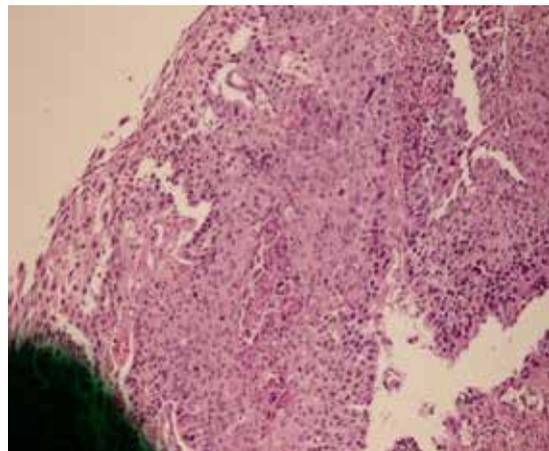
**Figure 2** With NBI mode, the lesion was seen as a well-defined brownish lesion.



**Figure 3** The IPCLs pattern showed tortuous, dilated, irregular caliber and various in shapes of capillaries with some avascular area.



**Figure 4** After a Lugol solution staining, the lesion was unstained and the border was well demarcated (arrow).



**Figure 5** Pathology demonstrated well-differentiated squamous cell carcinoma with no basement membrane penetration compatible.

## Diagnosis:

Esophageal squamous cell carcinoma in situ

## Discussion:

The metachronous squamous cell carcinoma of esophagus can be developed in the patient with history of head and neck cancer according to the “field cancerization” hypothesis.<sup>1</sup> Early detection of the second primary esophageal cancer in these patients was a key to improve the prognosis. Chromoendoscopy with Lugol’s solution has an excellent sensitivity to detect the early esophageal cancer in this group of patients.<sup>2</sup> Narrow band imaging has comparable performance with additional ability to characterize the lesion by the IPCLs pattern.<sup>3</sup>

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## Case 7

Suppakorn Malikhao, M.D.

Boonlert Imraporn, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 70-year-old male presented with a longstanding history of heartburn, regurgitation and dyspeptic symptoms. EGD found a lower esophageal ring at the esophagogastric junction with a sliding hiatal hernia. This esophageal ring is characterized by thin concentric protrusions covered proximally by normal esophageal epithelium and on the distal side of the membrane was covered by gastric epithelium (Figure 1).



**Figure 1** EGD showed a lower esophageal ring at the esophagogastric junction.

## Diagnosis:

Schatzki's ring

## Discussion:

Schatzki's ring, B type esophageal ring, is the most common esophageal ring found on either barium radiographs or endoscopy. The pathogenesis and etiology remain controversial.<sup>1</sup> Although most of Schatzki's rings are asymptomatic, they can be the cause of episodic dysphagia for solids and food impaction regarding to the narrowing esophageal lumen if the diameter is less than 13 mm in diameter.<sup>2</sup> In those symptomatic patients, esophageal dilatation is the mainstay of therapy.<sup>1</sup>

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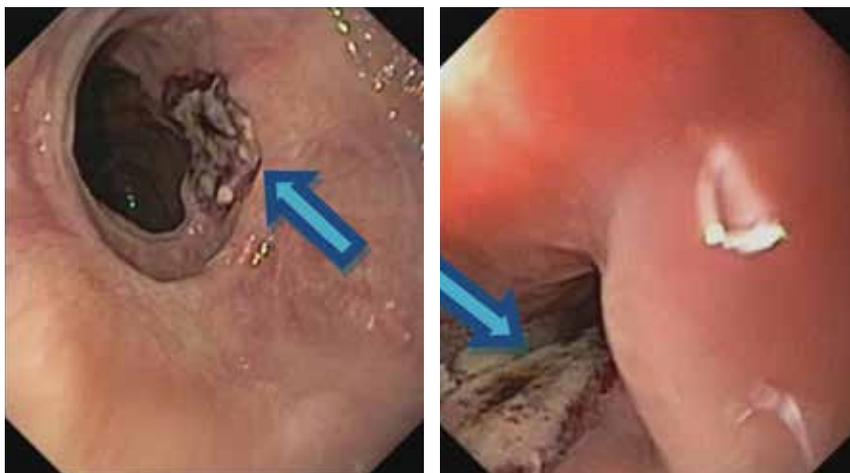
## Case 8

Sayamon Kimtrakool, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 54-year-old Thai male with underlying alcoholic cirrhosis child B was transferred to the emergency room due to hematemesis for 4 hours. An emergency EGD revealed a pulsatile bleeding from a small esophageal varix at the distal esophagus. Endoscopic variceal ligation (EVL) was not successfully able to control the bleeding at the first attempt due to a small size of varix on the post EVL scar. Then, N-butyl-2-cyanoacrylate (Histoacryl) 0.5 ml mixed with Lipiodol 0.8 ml was injected at the bleeding point and eventually bleeding stopped. At four days after the procedure, EGD was repeated as a second-look EGD. It revealed only a superficial solitary ulcer with necrotic area, representing the healing process from previous glue injection. After a few days of supportive treatments, his hematocrit was stabilized and finally discharged from the hospital.



*Figures 1 and 2 EGD showed a superficial solitary ulcer with necrotic area resulting from the prior glue injection (arrow).*

## Diagnosis:

Glue injection-associated esophageal ulcer

## Discussion:

Cyanoacrylate becomes polymerized rapidly after contacting with blood (just a few minute after injection into the varix). This effect results in rapid hemostasis. Moreover, it also provide the secondary change such as perivascular inflammation, vessel-wall necrosis, sloughing of mucosa, and tissue adhesion.<sup>1</sup> Consequently, the ulceration from cyanoacrylate injection has been reported as an asymptomatic finding during second-look EGD.<sup>1, 2</sup> However, the treatment of symptomatic glue injection-associated ulcer can be successfully management by supportive treatment.<sup>1</sup>

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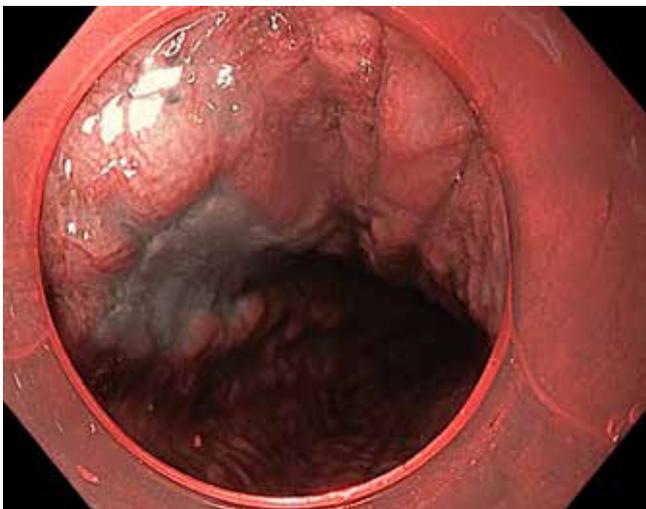
## Case 9

Piyachai Orkoonsawat, M.D.

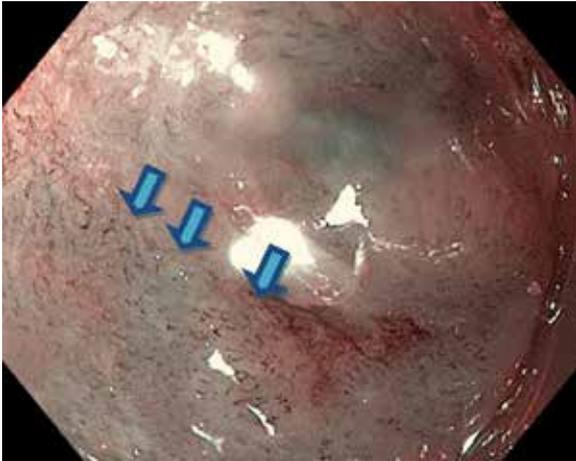
Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

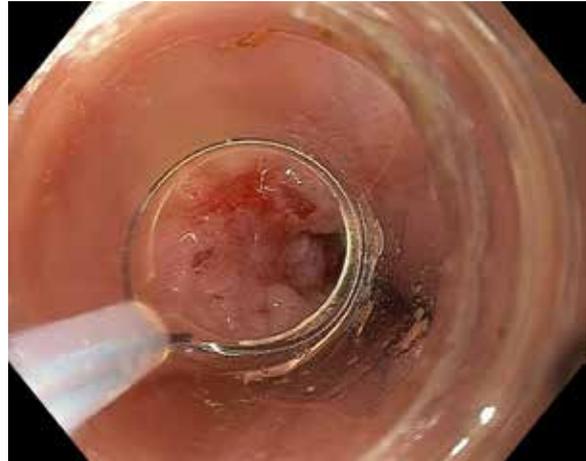
A 70-year-old male with a history of stage I squamous cell carcinoma of the oral cavity for a year came for esophageal cancer surveillance. He reported no upper GI symptom. EGD exam was unremarkable under the white light mode. After Lugol's iodine staining, a well-demarcated depressed mucosa was observed at the proximal esophagus. Under NBI exam, it showed a 1x3 cm, well-demarcated purplish area (Figure 1). Under magnifying NBI, the abnormal pattern of the intraepithelial papillary capillary loop (IPCL) was clearly demonstrated including dilatation, tortuosity, variation in the shape and caliber of IPCL which were compatible with neoplasia (Figure 2). Biopsy was done and pathology showed a high grade dysplasia. Subsequently, an endoscopic mucosal resection (EMR) was carried on. Cap-assisted esophageal EMR was done by using a crescent (Duck bill) snare (Figure 3). No active bleeding developed after the procedure (Figure 4).



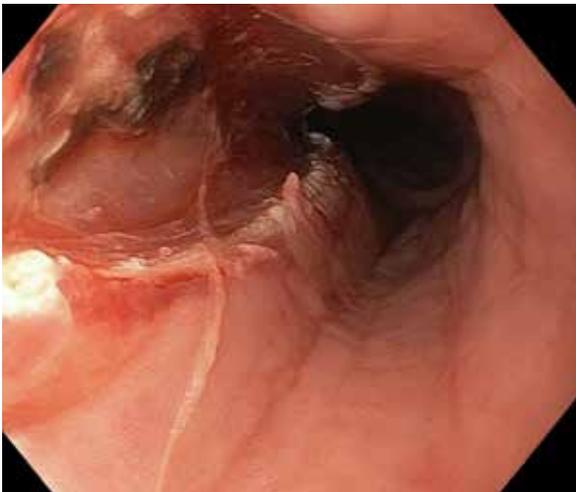
**Figure 1** NBI showed a 1x3 cm, well-demarcated with purplish color of the unstained lugol area.



**Figure 2**



**Figure 3**



**Figure 4**

**Figure 2** Magnifying NBI showed dilatation, tortuosity, variation in the shape and calibre of the intraepithelial papillary capillary loop (IPCL) (arrow).

**Figure 3** Cap-assisted esophageal EMR was done by using a crescent (Duck bill) snare.

**Figure 4** Post cap-assisted esophageal EMR without active bleeding.

## Diagnosis:

High grade dysplasia of the second primary esophageal squamous cell neoplasm treated with an endoscopic mucosal resection (EMR)

## Discussion:

Head and neck squamous cell carcinomas patients have a high risk of developing other neoplasms either simultaneously or subsequently. The incidence of second primary esophageal squamous cell carcinoma (ESCC) was reported as 9%-44%.<sup>1</sup> The treatment for early ESCC including high grade dysplasia when it is limited to the superficial layers of the mucosa and also measures less than 2 cm in extension with involvement less than 1/3 of the circumference is EMR. With a complete en-bloc resection, the 5-year survival rate is up to 95%.<sup>2,3</sup>

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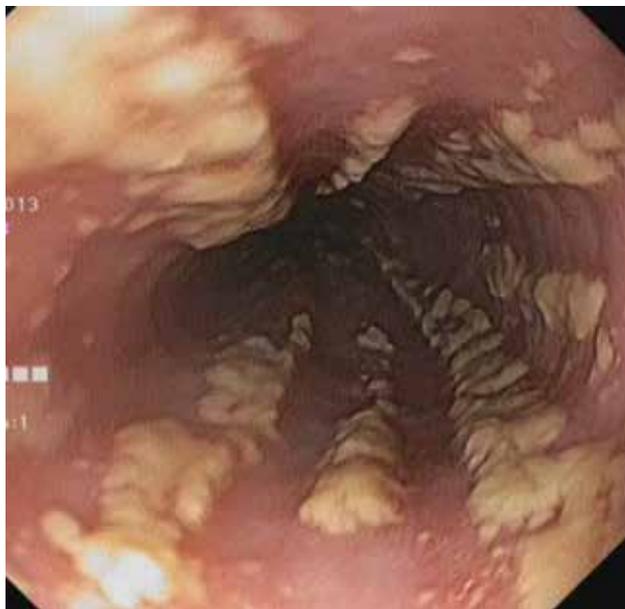
## Case 10

Suppakorn Malikhao, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 56-year-old male with a history of heavy alcohol drinking, has complaint about dysphagia and retrosternal pain during swallowing for 3 months. EGD demonstrated confluent, linear, yellowish elevated plaques covering on the erythematous mucosa throughout the esophagus (Figure 1). His anti-HIV result was non-reactive.



**Figure 1** EGD revealed confluent, linear, yellowish elevated plaques covering on the erythematous mucosa throughout the esophagus.

## Diagnosis:

Esophageal candidiasis (EC)

## Discussion:

Esophageal candidiasis (EC) is the most common infectious disease of esophagus in patients with human immunodeficiency virus (HIV) infection and other conditions that impaired cellular immunity, but a rare condition among healthy people. Half of those with EC are asymptomatic. The risk factors of EC healthy individuals are prolonged use of antibiotics, corticosteroids, heavy drinking and herb medication.<sup>1,2</sup>

Endoscopy is essential for the diagnosis, not only for evaluation by the gross appearance but also it can enable tissue biopsy. Systemic antifungal therapy with oral fluconazole remains the mainstay of treatment.<sup>3</sup>

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## Case 11

Narisorn Lakananurak, M.D.  
Rapat Pittayanon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 67-year-old Thai monk presented with 2 episodes of melena within 3 months. He refused any history of hematemesis or dysphagia. EGD showed a deep, linear, friable ulcerative mass with elevated and irregular border, measured as 10 cm in length (Figures 1 and 2). This lesion was near the esophagogastric junction (EGJ) (Figure 3). Biopsy at the edge of ulcerative mass was done and histology showed squamous cell carcinoma.



*Figure 1*



*Figure 2*



*Figure 3*

*Figures 1 and 2* Deep, linear, friable ulcerative mass with elevated and irregular border with easily contact bleeding.

*Figure 3* The lesion did not involve EGJ.

## Diagnosis:

Squamous cell carcinoma of the esophagus

## Discussion:

Esophageal squamous cell carcinoma (ESCC) is one of the two most common types of esophageal cancer. The incidence of ESCC is varying widely. It is accounting for 50-90% of esophageal cancer in developing countries but the incidence was lower by time.<sup>1</sup> The risk factors of ESCC include tobacco and alcohol drinking, achalasia, caustic injury and dietary such as drinking very hot beverages, aromatic hydrocarbon, and N-nitroso compound.<sup>1,2</sup> Symptoms of esophageal cancer depend on the stage of disease that usually asymptomatic but may present with melena as in this case. Others symptoms are dysphagia, weight loss, odynophagia, and fistula in advance stage.<sup>3</sup> Endoscopic findings of ESCC include fungating, friable, ulcerated mass lesions occupying some or the entire luminal circumference, usually with unclear margins. The middle esophagus is the most common involved location.<sup>4</sup>

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## Case 12

Sasipim Sallapant, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 17-year-old female without previous medical illness, presented with chronic esophageal dysphagia with significant weight loss for 3 years. EGD was performed and showed proximal esophageal dilatation with tight gastroesophageal junction (EGJ). However, scope can pass through EGJ and revealed no lesion at the gastric cardia. Barium meal was compatible with non-sigmoid type achalasia cardia. Esophageal manometry also confirmed as achalasia cardia.

Peroral endoscopic myotomy (POEM) was performed as the treatment. The procedure was successfully done without complication. The submucosal tunnel length was 10 cm and the total myotomy was 8 cm in length (5 cm above and 3 cm below lower esophageal sphincter) (Figures 1-6). The patient was safely discharge at day 3 after the procedure the resolution of dysphagia.



**Figures 1-6** Endoscopic images illustrating POEM. (1) Submucosal lifting by glycerol and indigo carmine injection followed by a 2-cm long mucosal incision. (2) A long submucosal tunnel extended 2 cm beyond the EGJ was created. (3) Myotomy of the circular muscle started from 5 cm above lower esophageal sphincter (LES). (4) Scope can pass through EGJ without any difficulty. (5 and 6) clips closure were placed at the mucosal incision site.

## Diagnosis:

POEM for achalasia cardia

## Discussion:

Achalasia cardia is a motility disorder of the esophagus of unknown etiology and the important feature is the failure of LES relaxation after swallowing.<sup>1</sup> Diagnosis is confirmed by manometric, endoscopic, and radiographic investigations.

The mainstay of treatment is either pneumatic balloon dilatation or laparoscopic myotomy which demonstrate a similar short term outcome.<sup>2</sup> Endoscopic and surgical therapy are focused disrupting the LES rather than correcting the motility abnormalities.

POEM is a new paradigm shift in achalasia therapy. It is convenient and less invasive than surgery.<sup>3</sup> Recent studies have demonstrated the excellence in efficacy and safety of this procedure.<sup>3,4</sup> The treatment success rate was greater than 90% and similar to the initial treatment success rate of laparoscopic Heller myotomy (LHM).<sup>4</sup>

## References

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## Case 13

Suppakorn Malikhao, M.D.

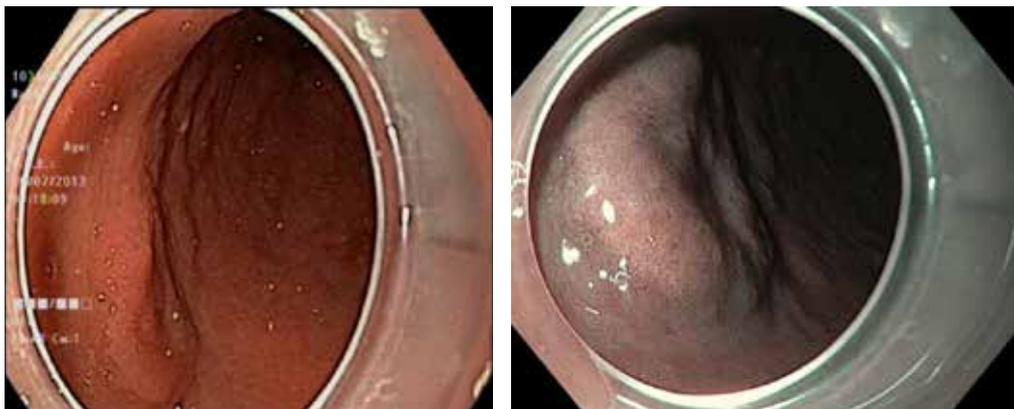
Rapat Pittayanon, M.D., M.Sc.

Naruemon Wisedopas, M.D.

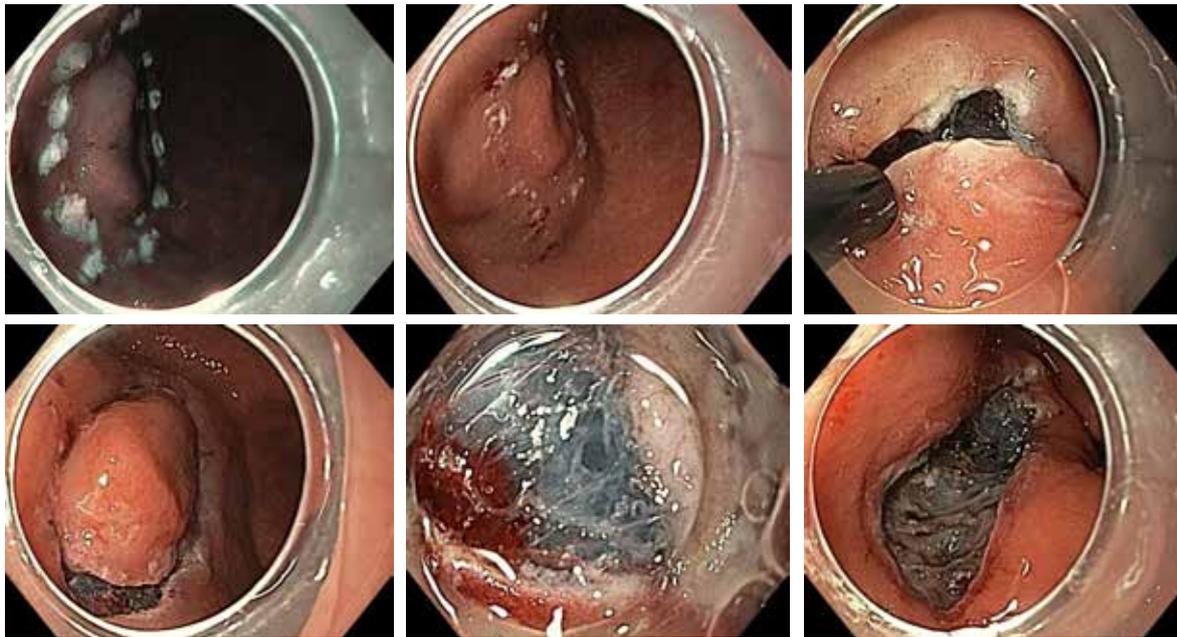
Rungsun Rerknimitr, M.D.

A 80-year-old Thai female presented with dyspepsia. EGD found a solitary elevated lesion (0-IIa), 2.0 cm in size with no ulceration at the lesser curvature of gastric body (Figures 1 and 2). The biopsy was done and showed high grade dysplasia of columnar epithelium.

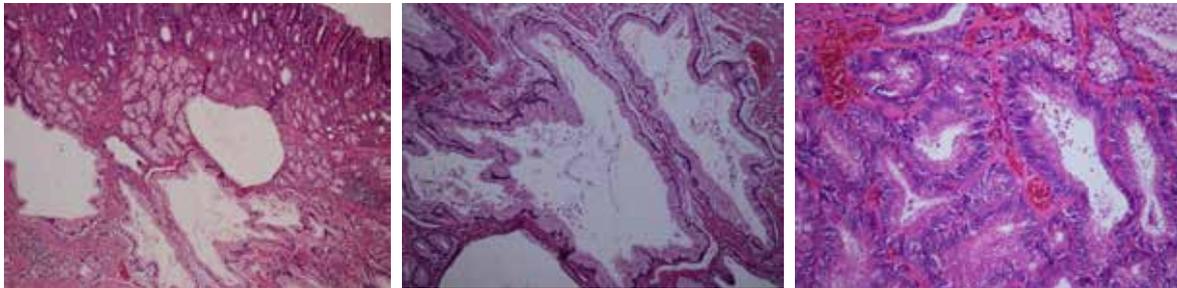
Endoscopic submucosal dissection (ESD) was subsequently performed (Figures 3-8). The final histopathology was compatible with gastritis cystica profunda (GCP) with low grade dysplasia (Figures 9-11).



*Figure 1 and 2 EGD with Narrow band imaging (NBI) showed elevated lesion (0-IIa).*



*Figures 3-8 Demonstrated ESD technique starting by marking the area followed by circumferential incision and dissection of the lesion.*



*Figures 9-11 Multiple cystic gastric glands located underneath low grade dysplastic gastric epithelium.*

## Diagnosis:

Gastritis cystica profunda (GCP)

## Discussion:

Gastritis cystica profunda (GCP) is a rare disorder characterized by polypoid gastric mass typically located beneath a normal mucosa and histopathological characteristics demonstrated by foveolar hyperplasia and cystic glands extend through a disrupted muscularis mucosae into the submucosa.<sup>1,2</sup> The pathophysiology is still

unclear but GCP may develop secondary to chronic inflammation, foreign body reaction or ischemic injury.<sup>2</sup> Prior gastric surgery is the most common occurrence in several reported cases; nevertheless, GCP was described in non-surgical patient as well.<sup>3,4</sup>

Clinical manifestations are typically nonspecific symptoms and seldom give rise to the symptoms.<sup>1,5</sup> GCP generally has a benign behavior; however, several reports have documented accompanied by gastric carcinomas but the relationship between the two conditions remains uncertain.

Endoscopic submucosal dissection (ESD) technique is an en-bloc endoscopic tumor removal. It was developed for definite treatment of benign mucosal lesion with more than 2 cm in size and early malignant lesion (with less than 3 cm in size without ulcer or less than 2 cm in size with ulcer) in digestive tract. The outcome of ESD showed complete resection in 73.9% and very low complication rate of bleeding and perforation in 1.4% and 0.5%, respectively.<sup>6</sup>

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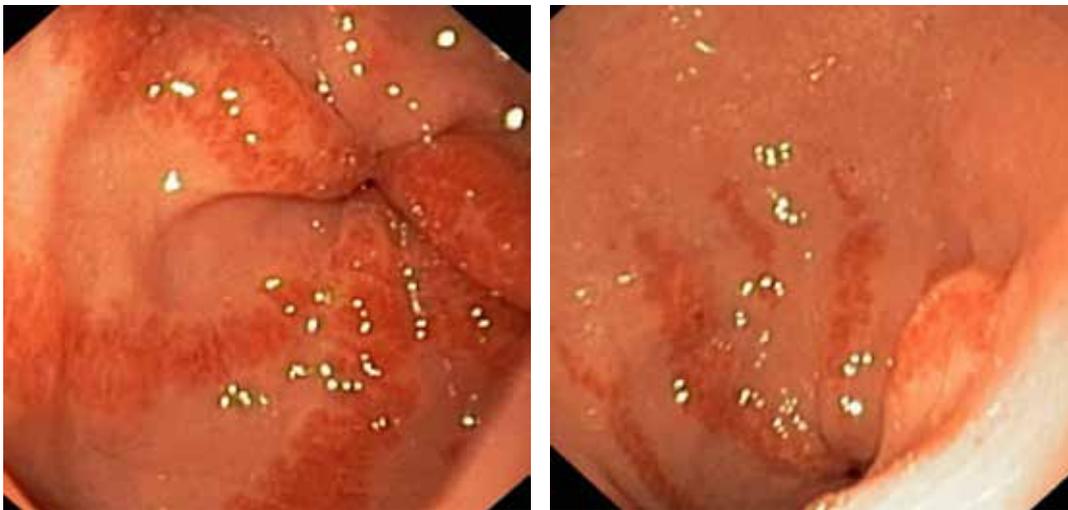
## Case 14

Suppakorn Malikhao, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 69-year-old female presented with fatigue, dizziness, and melena for 1 month. Laboratory investigation showed iron deficiency anemia. The endoscopy showed multiple erythematous stripes of red tortuous ectatic vessels along longitudinal rugal folds in the antrum converging toward the pylorus (Figures 1 and 2).



*Figures 1 and 2 Multiple stripes of red tortuous ectatic vessels along longitudinal folds of the antrum and converging toward the pylorus.*

## Diagnosis:

Gastric antral vascular ectasia (GAVE)

## Discussion:

Gastric antral vascular ectasia (GAVE) accounted for 4% of non-variceal upper GI bleeding and usually presented with iron deficiency anemia due to occult GI bleeding.<sup>1</sup> The most commonly proposed mechanisms of GAVE are mechanical stress to gastric antral mucosa and locally high concentrations of vasoactive substance, leading to the dilatation of the blood vessels.<sup>1,2</sup> The most common underlying chronic illness is cirrhosis (30% of case.<sup>3</sup>, therefore, portal hypertensive gastropathy (PHG) can be found in the same situation. GAVE is most commonly limited to the antrum, while PHG predominantly located in the fundus and corpus, and with endoscopic appearance of snake-skin mosaic pattern. Moreover, the severity of portal pressure is not directly related to GAVE which is totally different from PHG.<sup>4</sup>

APC was considered as the effective endoscopic therapy for GAVE with the success rate of 90%-100%.<sup>5</sup> Medical treatment has no benefit in GAVE-related bleeding.<sup>5</sup>

## References

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## Case 15

Piyapan Prueksapanich, M.D.

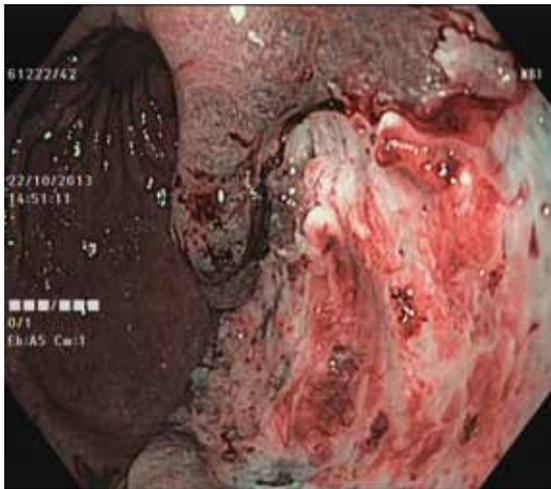
Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

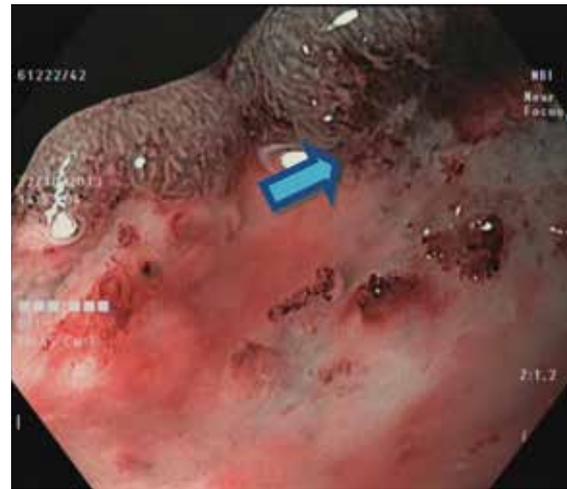
An 86-year-old male with a history of hypertension and dyslipidemia presented with melena and anemic symptom. Esophagogastroduodenoscopy (EGD) was done and showed a large gastric ulcer at the gastric body. The ulcer was deep and had irregular border (Figures 1 and 2). The microvascular pattern was clearly demonstrated by NBI (Figure 3). Magnify NBI showed a focal abnormal area of absence in microsurface pattern (MSP) and irregular microvascular pattern (MVP) at the border of the ulcer (Figures 4). Biopsy taken from the area was compatible with **adenocarcinoma**.



*Figures 1 and 2* White light endoscopy showed a large gastric ulcer at the body of stomach. The ulcer was deep with irregular border.



**Figure 3** The microsurface pattern and microvascular pattern was clearly visible under the NBI mode.



**Figures 4** Magnifying NBI showed the **absence of microsurface pattern with irregular microvascular pattern** at the focal area near ulcer border (arrow).

## Diagnosis:

Adenocarcinoma of the stomach.

## Discussion:

White light endoscopy has a limitation in differentiating malignant from benign gastric ulcer and also in detecting the early malignant gastric lesion. Only certain characteristics such as irregular shape, irregular and necrotic base, size larger than 2 cm and rigid border may suggest malignant lesions which yield a correct diagnosis in only about two-third of lesions. Some gastric cancers may have benign appearance with the reported rate of misclassification of 2-6%.<sup>1,2</sup> With magnifying NBI, the microstructure can be identified. In 2009, the new classification system was proposed by Yao.<sup>3</sup> The absence microsurface pattern (MSP) and irregular microvessel pattern (MVP) (type IV) had 89.7% in accuracy to identify malignancy.<sup>4</sup>

## References

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## Case 16

Sasipim Sallapant, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 46-year-old female presented with chronic dyspepsia with partial response to medical treatment. She denied weight loss or nausea/vomiting. Her past medical history was not significant. She has no family history of gastrointestinal malignancy. During EGD a 2 cm submucosal mass with central umbilication at the prepyloric region was found (Figure 1). The esophagus and duodenum appeared normal.



**Figure 1** A 2 cm well-defined submucosal lesion with central umbilication at the prepyloric area.

## Diagnosis:

Pancreatic rest (Heterotopic pancreas)

## Discussion:

Pancreatic rest is a pancreatic tissue found outside the usual anatomical location of the pancreas and thought to be a result of separation of fragments from the main pancreatic mass due to the rotation of the foregut.<sup>1</sup> The stomach is the most common location (25 to 38%),<sup>2</sup> mostly located within 3-4 cm of the pylorus and usually found on posterior side.<sup>3</sup> This remnant can migrate with the developing gastrointestinal tract accounting for its various locations including duodenum, small bowel, gall bladder, common bile duct, spleen, and mesentery.

Most patients are asymptomatic but they can present with nonspecific symptoms such as abdominal pain, abdominal fullness, nausea, vomiting, anorexia, weight loss, anemia, and melena.<sup>4</sup> In terms of endoscopic characteristics, the pancreatic heterotopia appears as smooth-walled, well circumscribed, and firm consistency submucosal lesion. It is typically 1-4 cm in size. Its shape can be round, oval, or hemispherical. A distinctive feature is the presence of central dimple that corresponding to the opening of a duct. Microscopically and immunohistochemically, heterotopic pancreas contain all features of a normal pancreas.<sup>5</sup>

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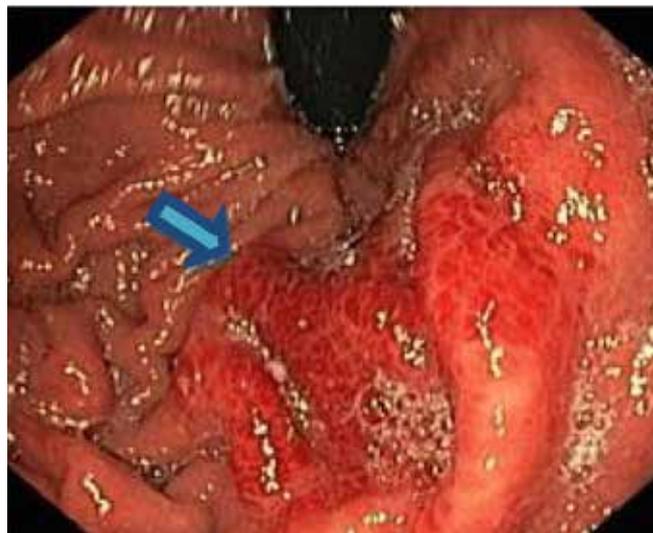
## Case 17

Kessarín Thanapirom, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A healthy 34-year-old male presented with coffee-ground vomiting after frequent retching for one day. He admitted that he heavily consumed a large amount of alcohol one day before this presentation. Physical examination was unremarkable. EGD was performed and revealed well-demarcated, congested, erythematous, mosaic mucosa in one sector of the gastric fundus. No other source of bleeding was seen.



**Figure 1** EGD revealed a 4x5 cm well-demarcated, congested, erythematous, mosaic mucosal pattern in one sector of the gastric fundus.

## Diagnosis:

Prolapse gastropathy

## Discussion:

Prolapse gastropathy can be found in two percent of patients presenting with upper GI bleeding.<sup>1</sup> About half of patients with prolapse gastropathy present with hematemesis and abdominal pain after multiple episodes of vomiting.<sup>2</sup> Typical endoscopic finding is well-demarcated, localized area of congested or hemorrhagic mucosa in the upper stomach with several centimeters distal to the EGJ. Transient gastric mucosal prolapsed may be observed in some patients during the time of endoscopy. Conservative treatment with antiemetic, prokinetic or tranquilizer medications is more than appropriate.<sup>1,2</sup>

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## Case 18

Piyapan Prueksapanich, M.D.  
Rapat Pittayanon, M.D., M.Sc.  
Satimai Aniwana, M.D., M.Sc.  
Naruemon Wisedopas, M.D.  
Rungsun Rerknimitr, M.D.

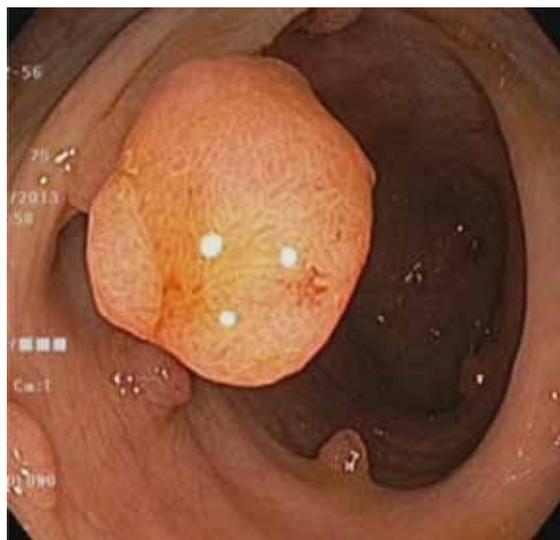
A 75-year-old male presented with iron deficiency anemia. He denied a familial risk of colonic cancer. EGD and colonoscopy were performed. The EGD revealed numerous carpet-like sessile gastric polyps occupying almost the entire of stomach, mostly at the body and fundus (Figures 1 and 2). There were some duodenal adenomas without ampullary adenoma (Figure 3). The colonoscopy showed numerous colonic sessile and pedunculated polyps (Figure 4). NBI showed that the colonic polyps had a browner color relatively to the background. There were also brown vessels surrounded with tubular white structures compatible with NICE classification type 2 or adenomatous-type polyps type (Figure 5). Polypectomy was done and pathology confirmed the diagnosis of adenomatous polyps. According to the age of the patient, **attenuated familial adenomatous polyposis** was the mostly likely diagnosis.



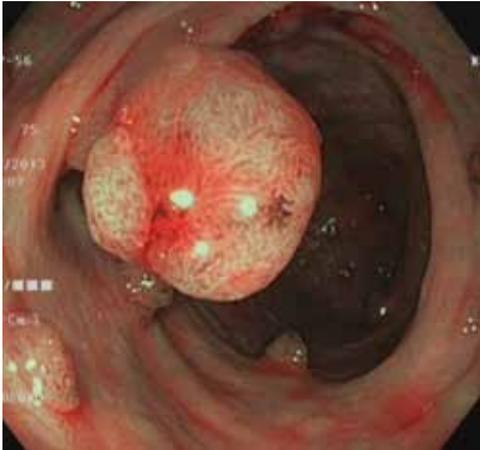
**Figures 1 and 2** The EGD under white light and NBI revealed numerous carpet-like sessile gastric polyps occupying almost the entire of stomach, mostly at the body and fundus.



**Figure 3** There were some duodenal adenomas without ampullary adenoma.



**Figure 4** Colonoscopy showed numerous colonic polyps both sessile and pedunculated types.



*Figure 5 Under NBI examination, colonic polyps had browner color relatively to the background. There were brown vessels surrounded with tubular white structures which compatible with NICE classification type 2 or adenomatous-type polyps.*

## Diagnosis:

Attenuated familial adenomatous polyposis (AFAP)

## Discussion:

Familial adenomatous polyposis (FAP) is an inherited adenomatous polyposis syndrome related to APC gene mutation. Attenuated FAP (AFAP) is one of the subtypes of FAP characterized with less than 100 colonic adenomas which are more predominant in the proximal colon and more delayed in onset as compare to the classic FAP. The duodenal, periampullary adenomas, gastric fundic gland polyps are also its features. The median age of diagnosis in AFAP was reported to be in the fourth decade which range from 12–77 years.<sup>1</sup> The risk of the colorectal cancer is up to 80% by the age of 80 years in AFAP. The course of the disease is variable hence the therapeutic decisions should be based on the colonoscopic findings in each individual.<sup>2</sup>

## References

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## Case 19

Piyapan Prueksapanich, M.D.

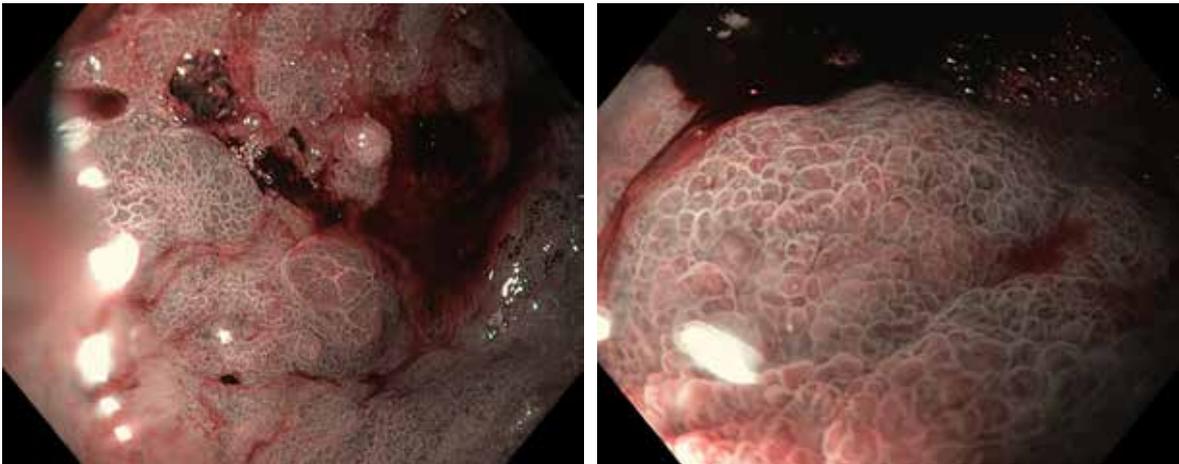
Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 45-year-old female presented with early satiety, anorexia and significant weight loss for 3 months. She had an unremarkable medical history and no family history of cancer. EGD was done and revealed diffuse swelling gastric mucosa with poor distension upon the air insufflations. The mucosa was friable with contact bleeding (Figure 1). Under magnifying NBI, the microvascular pattern of gastric mucosa was irregular, tortuous with asymmetrical distribution of microvessels. In certain area, the microvascular pattern was absent. The microsurface pattern was also irregular (Figures 2 and 3). The pathology of the gastric biopsy was compatible with **poorly-differentiated adenocarcinoma**. The computerized tomography was done for staging and showed omental thickening with peritoneal nodules, multiple bony metastasis, and multiple intraabdominal lymphadenopathy with moderate ascites.



**Figure 1** Gastric mucosa was friable with diffusely swelling and it had poor distension upon air insufflation.



**Figures 2 and 3** Under magnifying NBI, the microvascular pattern of gastric mucosa was irregular, tortuous with asymmetrical distribution of microvessels. In certain area that the microvascular pattern was absent. The microsurface pattern was also irregular.

## Diagnosis:

Diffuse type poorly-differentiated adenocarcinoma of the stomach (Linitis plastica).

## Discussion:

NBI can help to diagnose gastric cancer by demonstrating abnormal microvessels and surface patterns. The findings are a well-demarcated lesion with abnormal or absence of microvascular (MV) and microsurface (MS) patterns. The accuracy, sensitivity and specificity were 90.4%, 60% and 94.3% respectively.<sup>1,2</sup>

## References

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## Case 20

Kessarín Thanapirom, M.D.

Rapat Pittayanon, M.D., M.Sc.

Nareumon Wisedopas, M.D.

Rungsun Rerknimitr, M.D.

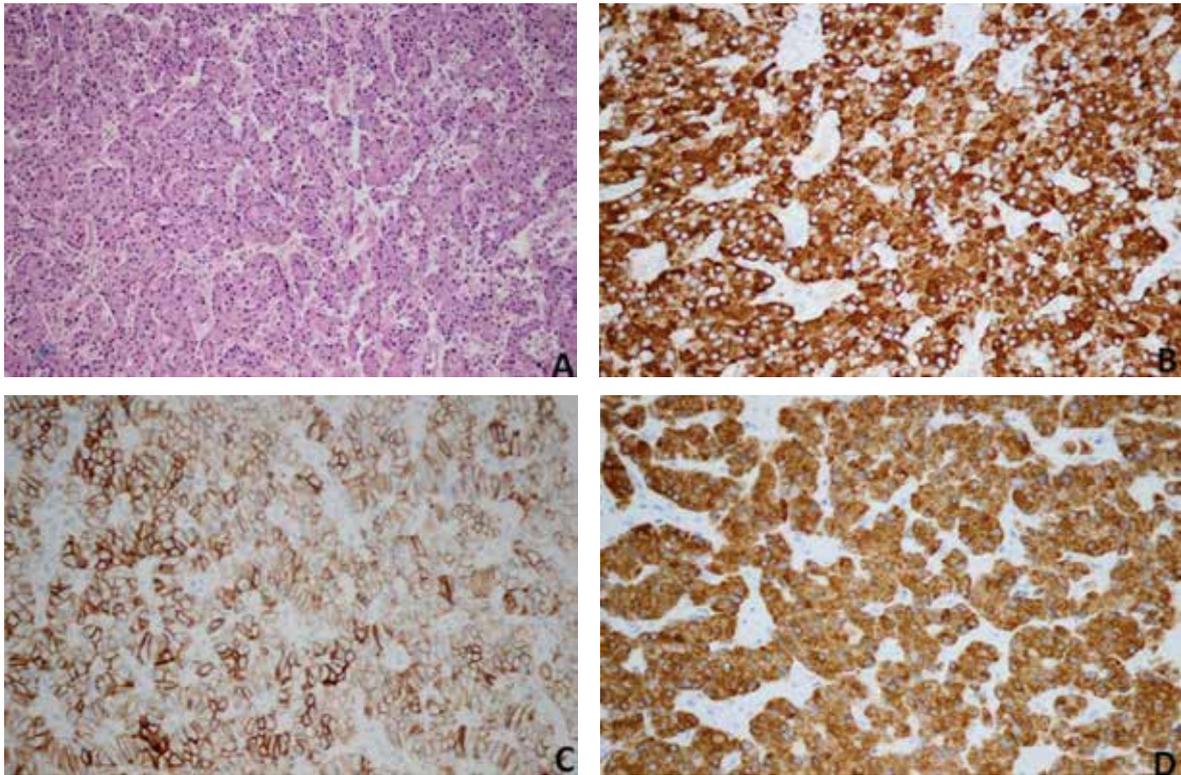
A 42-year-old female with known case of peripheral T-cell lymphoma stage IV (bone marrow and liver involvement) with secondary hemophagocytic lymphohistiocytosis came for a disease staging with computerized tomography (CT) of the abdomen. CT scan incidentally showed a contrast-enhanced gastric mass at the gastric cardia (Figure 1). She denied gastrointestinal symptoms. EGD revealed a submucosal mass, 3 cm in diameter at the fundus of stomach (Figure 2). Endoscopic ultrasound (EUS) and fine needle aspiration was performed and found atypical abnormal cell by histology. Subtotal gastrectomy was done. Pathology demonstrated round cell tumor expressing diffuse immunoreactive for chromogranin, CD56 and AE1/AE3 (Figure 3). Ultimately, a neuroendocrine tumor (NET) was diagnosed. The percentage Ki-67 index is less than 2 compatible with well differentiated, grade 1, NET.



**Figure 1** CT scan of abdomen showed contrast-enhanced gastric mass at the gastric cardia (arrow).



**Figure 2** EGD showed a submucosal mass, 3 cm in diameter at the fundus of stomach.



**Figure 3** Pathology showed round cell tumor (A) expressing diffuse immunoreactive for chromogranin (B), CD56 (C) and AE1/AE3 (D).

## Diagnosis:

Well differentiated gastric neuroendocrine tumor (NET)

## Discussion:

Gastric NETs are often incidentally found during upper GI endoscopy. The prevalence of gastric well differentiated NETs (gastrointestinal carcinoids) has been calculated at 35/100000.<sup>1</sup> Gastric NET may present in a wide variety of endoscopic morphological aspects of submucosal mass including sessile, papule and rarely polypoid. Surgery is indicated for gastric NET larger than 10mm in diameter. Five-year-survival of gastric NETs is high (71%) on average.<sup>2</sup>

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## Case 21

Sittikorn Linlawan, M.D.

Piyapan Prueksapanich, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 59-year-old female with a history of familial adenomatous polyposis (FAP) underwent a surveillance EGD. There were multiple, small, velvety sessile polyps in the gastric body and antrum (Figure 1) and a 1.5-cm pedunculated polyp at gastric body (Figure 2) was also observed. Under NBI, the pedunculated polyp had clear marginal crypt epithelium (MCE) with unclear microvessel pattern (MVP). These were compatible with gastric adenoma (Figure 3). As shown in the figure 3, the fundic gland polyp (left; short arrow) was seen next to the gastric adenoma (right; long arrow).

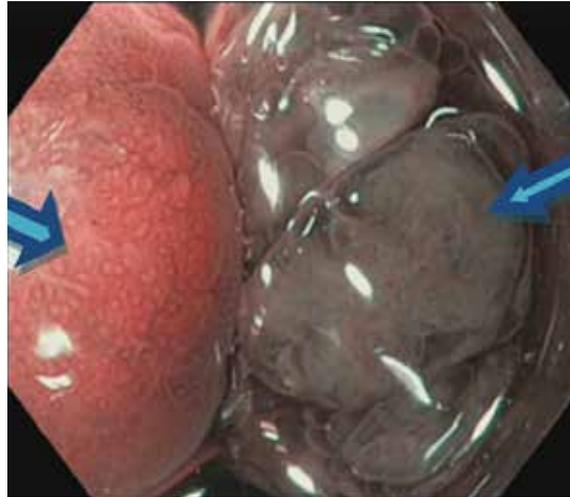
Biopsy and polypectomy were performed and pathology confirmed all endoscopic readings.



**Figure 1** Multiple gastric polyps in the gastric body and antrum.



**Figure 2** Large pedunculated adenomatous polyp in the gastric body.



**Figure 3** NBI with magnification of the fundic gastric polyp (short arrow) and the adenomatous polyp (long arrow).

## Diagnosis:

Gastric adenoma arising among multiple fundic gland polyps (FGPs) in a patient with familial adenomatous polyposis (FAP)

## Discussion:

Familial adenomatous polyposis (FAP) is an inherited autosomal dominant disease caused by a mutation in the APC gene on chromosome 5. Apart of hundreds of adenomatous colonic polyps, multiple adenomas can also be observed throughout the upper gastrointestinal tract.<sup>1,2</sup> Fundic gland polyps (FGPs) are the most common gastric lesion in FAP and have higher rate of foveolar dysplasia in contrast to the sporadic FGPs. The adenomas of stomach which usually arise in the gastric antrum also have the mutation in APC gene and have been reported to occur in up to 6-60% of patients with FAP.<sup>3</sup> All gastric adenomas and FGPs larger than 1 cm should be removed for histopathological assessment and need to be scheduled in a surveillance program for recurrence and early cancer detection. *H. pylori* eradication followed by biopsy examination or urea breath test is necessary for those patients with gastric adenoma.<sup>4</sup>

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## Case 22

Puth Muangpaisarn, M.D.

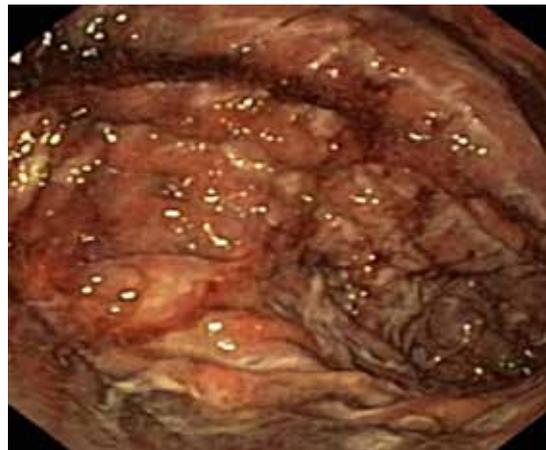
Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 77-year-old male with underlying disease of essential hypertension and chronic kidney disease admitted to the hospital with aortic dissection type B followed by a cardiac arrest. He was stable after aortic graft operation. On admission day 20, moderate amount of hematemesis was observed in his nasogastric tube. EGD was performed and showed submucosal gangrene with mucosal bleeding from the fundus and upper part of gastric body (Figure 1). There was only erythematous and edematous mucosa at the lower part of gastric body (Figure 2).



**Figure 1** Submucosal gangrene (arrow) with clot blood at the fundus.



**Figure 2** Erythematous and edematous mucosa of the gastric body.

## Diagnosis:

Gastric infarction

## Discussion:

Gastric infarction is one of the extremely rare conditions because of the high collaterally vascular supply of the stomach.<sup>1</sup> There are various causes of gastric infarction including mechanical cause (eg. acute gastric dilatation and gastric volvulus)<sup>2</sup>, thrombosis of the artery and vein, and poor perfusion from shock.<sup>3</sup> Smoking, hypertension and atherosclerosis are risk factors of gastric ischemia.<sup>4</sup> Symptom and sign of gastric infarction are non-specific such as abdominal pain, vomiting, hematemesis, fever and tachycardia. Abdominal signs are epigastric pain and absence of bowel sound.<sup>3</sup> In this patient, the aortic dissection and circulatory failure may be the causes of his gastric infarction.

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## Case 23

Sittikorn Linlawan, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

An 82-year-old female with a history of old ischemic stroke, hypertension, and old myocardial infarction underwent percutaneous endoscopic gastrostomy (PEG) without complication. During the routine schedule of PEG replacement at 6 months, only the tube was removed but the inner PEG bumper was still left in the patient body. EGD was performed and showed the bumper was embedded into the gastric wall at the PEG site (Figures 1 and 2).



**Figure 1** The bumper embedded in the gastric wall.



**Figure 2** The PEG tube after removal without the bumper.

## Diagnosis:

Buried bumper syndrome (BBS)

## Discussion:

Buried bumper syndrome (BBS) is a major complication in a patient after a percutaneous endoscopic gastrostomy (PEG), it occurs as a result of excessive tension between the internal and external bumpers. The bumper of PEG tube can lodge anywhere between the skin and the gastric wall along the PEG tract. Most common symptoms of BBS are the inability to infuse feeding content through the tube, leakage around the tube, abdominal pain, and gastric ulceration at the bumper site.<sup>1</sup> A buried bumper should be removed even if the patient is asymptomatic, because of the risks of tube impaction in the abdominal wall and/or gastric perforation.<sup>2,3</sup> However, there is no report of buried bumper syndrome that left without treatment as shown in this case. In our opinion, this patient was not fit enough to have a therapeutic endoscopy and the tube was completely removed from the PEG tract; therefore, the endoscopic therapy was not required at that time.

Endoscopic therapies for releasing the bumper are external traction, endoscopic traction, external pressure and dissection of the overgrowing tissue using a needle-knife, argon plasma coagulation, or a balloon dilatation.<sup>3,4</sup>

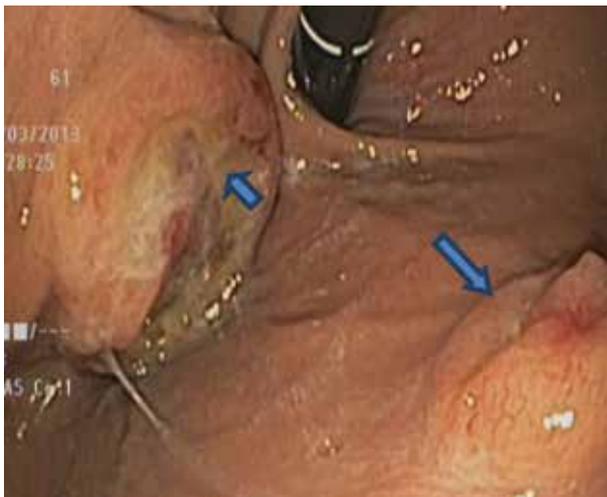
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## Case 24

Narisorn Lakananurak, M.D.  
Rapat Pittayanon, M.D., M.Sc.  
Nauremon Wisedopas, M.D.  
Rungsun Rerknimitr, M.D.

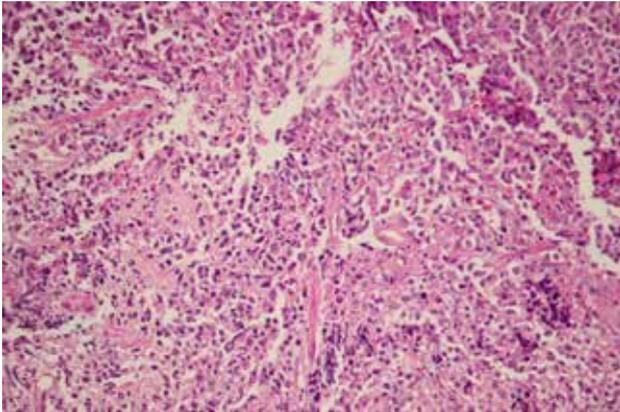
A 61-year-old healthy male presented with melena for 2 days. His physical examination showed mild pale conjunctiva. EGD revealed three gastric submucosal masses with clean based ulcer on top of the cardia and body of stomach (Figures 1 and 2). Pathology from gastric masses showed acute ulcer with patchy malignant round cell infiltration compatible with malignant lymphoma (Figure 3). Immunohistochemistry stain was positive for CD20 but negative for CD3. This confirmed the diagnosis of diffuse large B-cell lymphoma (DLBCL). His bone marrow study was normal.



**Figure 1** Gastric submucosal mass size 3 cm at the cardia with clean based ulcer on top (short arrow). Another submucosal mass size 1.5 cm was also discovered at the gastric body (long arrow).



**Figure 2** Gastric submucosal mass size 2 cm at the body with pigmented spot on top of the ulcer.



**Figure 3** Malignant round cell (left) with positive immunohistochemistry for CD20 (right).

## Diagnosis:

Primary gastric diffuse large B-cell lymphoma (DLBCL)

## Discussion:

The most common extranodal site involved by lymphoma is the gastrointestinal tract that accounting for 5%-20% of all lymphoma cases.<sup>1</sup> It occurs most commonly in the stomach (60-75% of the cases), followed by the small intestines, ileum, cecum, colon, and rectum.<sup>2</sup> Mucosa-associated lymphoid tissue (MALT) and diffuse large B cell lymphomas (DLBCL) are the two most common histologic subtypes.<sup>3</sup> The symptoms include dyspepsia, nausea, vomiting, weight loss, anemia, a lesser extent ulceration, and perforation. Interestingly, a few patients were reportedly asymptomatic in GI symptom while the disease was discovered from other organs.<sup>2</sup>

Endoscopic findings of gastric lymphoma may show multiple nodular lesions similar to reactive lymph nodes or lymphoma can manifest as mucosal ulceration, hyperplasia, polyp, or as an infiltrative lesion. Biopsy is essentially needed to differentiate between neoplastic lymphoid nodules and benign reactive lymphoid follicles.<sup>4</sup>

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## Case 25

Suppakorn Malikhao, M.D.

Rapat Pittayanon, M.D., M.Sc.

Satimai Aniwan, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 9-year-old boy came with anemic symptom without obvious GI bleeding. He had a previous episode of iron deficiency anemia requiring blood transfusion for several times. Since infancy, the patient had repeatedly suffered from multiple soft, bluish nodules at the skin and all extremities. On examination, he had severe anemia. There were multiple, bluish-black rubbery blebs (nevi), measuring 5 mm to 1 cm on both palms and soles (Figures 1 and 2). The similar lesions were also noted at his tongue (Figure 3). The lesions were non-tender, compressible with wrinkled surface and had never bled. EGD showed multiple purplish polyp-like mass lesions with abundant vasculature in the stomach and duodenum (Figures 4-6).



*Figures 1-3 Demonstrated multiple violaceous, nonpulsatile, soft, compressible papules and nodules, 0.5-1 cm in diameter at both palms and soles and undersurface of the tongue.*



*Figure 4-6 Multiple purplish, polyp-like lesions, 0.5-1 cm in diameter, located in stomach and duodenum (arrows).*

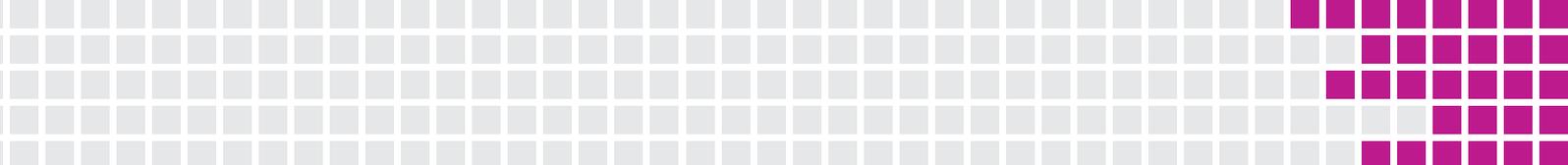
## Diagnosis:

Blue Rubber Bleb Nevus Syndrome

## Discussion:

Blue Rubber Bleb Nevus Syndrome (BRBNS) is a vascular malformation of the skin and multiple visceral organs. Cutaneous lesions are often first noticed at birth or in the neonatal period, but sometimes can present during adulthood.<sup>1</sup> Although, autosomal dominant (AD) pattern of inheritance has been documented, most cases are sporadic. The lesions typically increase in size and number with age and progress throughout patient's life. However, spontaneous resolution has been reported. Fortunately, no malignant transformation of the lesions has been demonstrated.<sup>2</sup>

The gastrointestinal tract is the most common affected visceral organ, which predominantly located in small intestine and distal large bowel. Therefore, occult blood loss and iron deficiency anemia commonly result. Abdominal pain, infarction, intussusception and volvulus are possible complications.<sup>3</sup> Endoscopic treatments for GI bleeding in BRBNS include electrocoagulation, laser photocoagulation, injection of sclerotic, band ligation, and polypectomy with saline lift. Enterotomy with excision of lesions have been shown to be effective in case of refractory and life-threatening hemorrhage.<sup>1</sup>



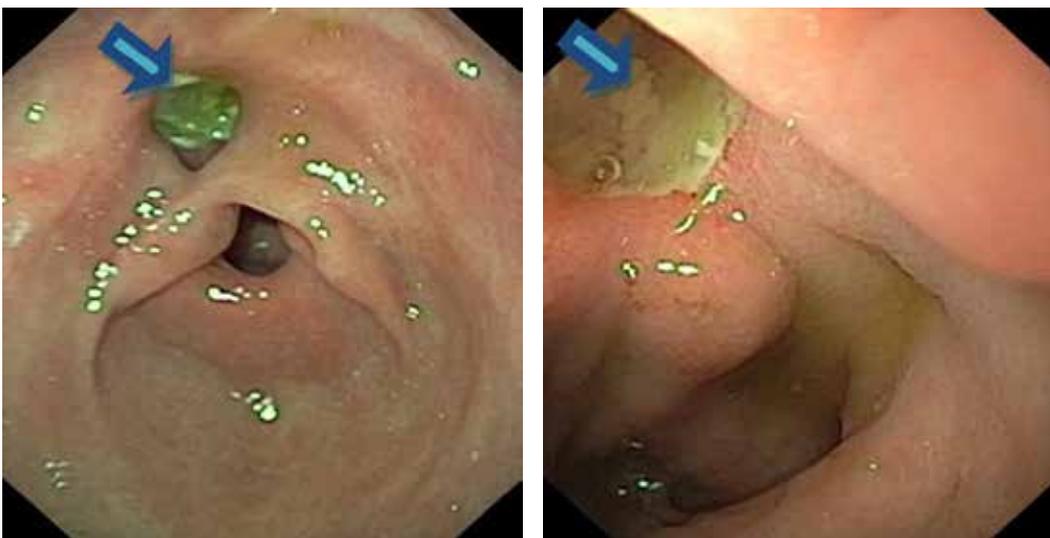
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## Case 26

Piyapan Prueksapanich, M.D.  
Rapat Pittayanon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 50-year-old male with a history of NSAIDs abuse, presented with melena. EGD was done and showed antral gastritis with duodenitis. There were two connecting channels between gastric antrum and the duodenal bulb. As shown in figures 1 and 2, the upper pseudopylorus led to a clean based ulcer in the duodenal bulb whereas the lower channel was a native pylorus. Multiple small clean based duodenal ulcers were also noted. The rapid urease test for *H.pylori* was positive. The patient was treated with standard triple therapy.



*Figures 1 and 2 EGD showed two connecting channels between gastric antrum and the duodenal bulb. The upper pseudopylorus led to a clean based ulcer in the duodenal bulb (arrow) whereas the lower channel was a native pylorus.*

## Diagnosis:

Acquired double pylorus

## Discussion:

The double pylorus can be congenital or acquired. The acquired double pylorus is a rare finding with a reported incidence of 0.02-0.4%. It occurs as a complication of peptic ulcer disease. The common location is at the lesser curvature of the gastric antrum near the native pylorus and it usually connects to the superior part of the duodenal bulb. Hypothetically, gastric ulcer could induce adhesions between the adjacent walls of the duodenum and the stomach. If the further ulceration occurs, the fistulous tract is generated. The association between the double pylorus and *H.pylori* has also been reported. Most patients with double pylorus are asymptomatic and do not require treatment.<sup>1,2</sup> In a small group of patients, a spontaneous fusion of both channels may occur.<sup>3</sup>

## References

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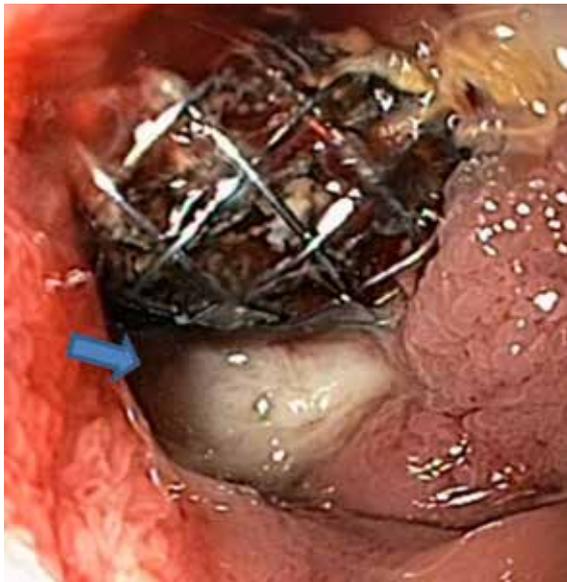
## Case 27

Narisorn Lakananurak, M.D.

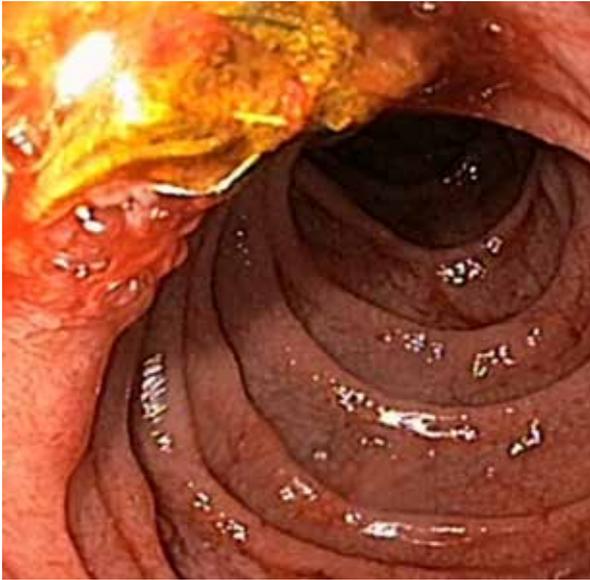
Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 43-year-old Thai male diagnosed as advanced stage hilar cholangiocarcinoma and liver metastasis had undergone metallic stent placement 10 months ago. He presented with hematemesis for 1 day with stable vital signs. His physical examination was unremarkable except mild RUQ pain. EGD showed choledochoduodenal fistula at the first part of duodenum (Figure 1). A previously placed metallic stent was found in the fistula (Figure 2).



**Figure 1** Choledochoduodenal fistula at the first part of duodenum with clean based ulcer at the fistula opening (arrow). A previously placed metallic stent was found inside the fistula.



*Figure 2* Distal end of the metallic stent located at the second part duodenum.

## Diagnosis:

Choledochoduodenal fistula caused by radial expansile force of metallic stent.

## Discussion:

A choledochoduodenal fistula is an abnormal passage between the common bile duct (CBD) and the duodenum. It is an uncommon finding during EGD with the reported incident rate of 3-5%.<sup>1</sup> Common etiologies include instrumentation (iatrogenic), choledocholithiasis, duodenal ulcer, and cancer associated fistula (ampullary cancer, duodenal cancer, gallbladder cancer, pancreatic cancer, and cholangiocarcinoma).<sup>2</sup> The clinical manifestations vary from asymptomatic, nonspecific abdominal pain to gastrointestinal bleeding. CT abdomen often shows pneumobilia. EGD or endoscopic retrograde cholangiopancreatography (ERCP) is employed to diagnose choledochoduodenal fistulas.<sup>3</sup> A biliary stent-related choledochoduodenal fistula is very rare complication with incident rate below 1%. It is usually caused by the sharp end of a metallic stent, stent migration and rarely caused by direct the radial expansile force of the metallic stent.<sup>4</sup>

Management of choledochoduodenal fistula depends on the type and etiology. In fistula with complicating duodenal ulcer, medical management or surgery can be used. Endoscopic management and the extraction of a bile duct stone (if present), may be needed.<sup>5</sup>

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## Case 28

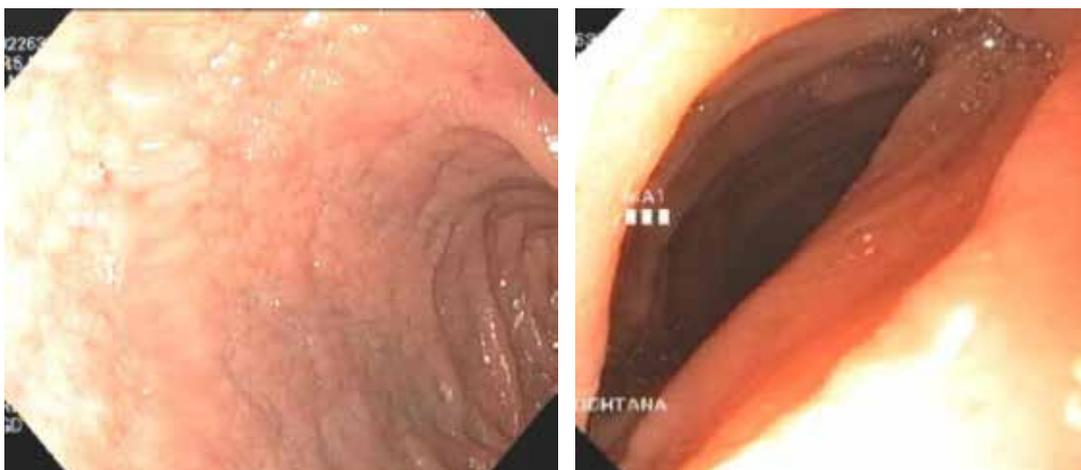
Suppakorn Malikhao, M.D.

Rapat Pittayanon, M.D., M.Sc.

Yuthana Sattawatthamrong, M.D.

Rungsun Rerknimitr, M.D.

A 22-year-old female presented with longstanding dyspepsia and flatulence. She has visited various health centers. She was diagnosed as having IBS and managed accordingly with negative response. EGD found atrophic and subtle scalloping along mucosa at the first part of the duodenum (Figures 1 and 2). Duodenal biopsy was obtained and histopathology revealed total villous atrophy (flat and shortened) with moderate inflammation in lamina propria. The anti-gliadin antibody IgG and antitissue-transglutaminase IgA were positive. The patient was managed as celiac disease and dramatically responded to gluten-free diet.



*Figures 1 and 2 EGD found atrophic and subtle scalloping folds along the first part of duodenum.*

## Diagnosis:

Celiac disease

## Discussion:

Celiac disease is a chronic immune-mediated disorder that occurs in genetically predisposed populations.<sup>1</sup> Patients affected by the disease may be asymptomatic or manifest with classic malabsorption symptoms of bloating, abdominal pain, weight loss, diarrhea, and steatorrhea after gluten ingestion (and related derivatives found in other grains).<sup>1</sup> The clinician must be aware of a more subtle GI picture as well as non-GI signs and symptoms. Diagnosis and screening begin with the use of serologic tests: IgA anti-tissue transglutaminase (tTG), IgA antiendomysial antibodies (EMAs), and serum IgA level.<sup>1, 2</sup> The endoscopic appearance of celiac disease can vary widely, ranging from normal to atrophic mucosal folds. Endoscopic markers of celiac disease include the following: **a reduction or absence of duodenal folds, scalloping, mosaic pattern and mucosal fissures or grooves.** The overall sensitivity and specificity of endoscopic markers of celiac disease vary from 6% to 94% and from 83% to 100%, respectively.<sup>3</sup> Duodenal biopsy, still considered by many as the standard criterion necessary for the correct diagnosis. Histology demonstrates small intestinal villous atrophy, intraepithelial lymphocytosis, and crypt hyperplasia that occur on exposure to dietary gluten.<sup>4</sup> These changes exhibit improvement after withdrawal of gluten from the diet. Resolution of clinical symptoms after initiation of gluten-free diet is considered to be part of the diagnostic picture.<sup>2, 5</sup> Genetic tests revealing permissive haplotypes may be helpful in confirming the diagnosis as well as identifying susceptible individuals.<sup>2</sup>

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## Case 29

Pradermchai Kongkam, M.D., M.Sc.

Piyapan Prueksapanich, M.D.

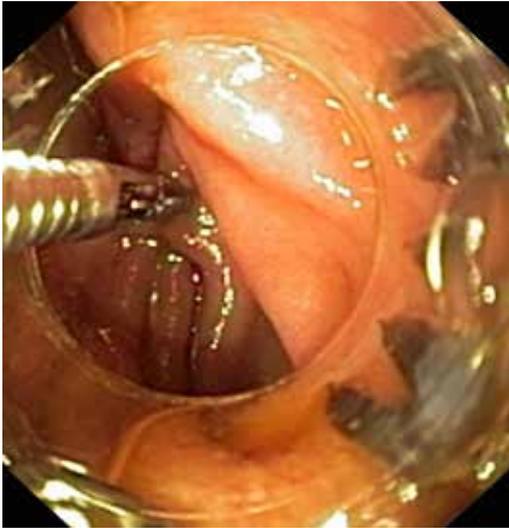
Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 56-year-old female presented with painless jaundice and significant weight loss. Computed tomography showed a delayed contrast enhancing 8 cm liver mass at right hepatic lobe invading posterior aspect of liver capsule with multiple intra-abdominal lymphadenopathy causing distal common bile duct obstruction. Liver biopsy was done and showed moderately differentiated adenocarcinoma. Endoscopic retrograde cholangiography (ERC) was done and failed to cannulate into the biliary ampulla. Then EUS-guided choledochoduodenostomy was performed. Unfortunately, an iatrogenic duodenal perforation sized 1 cm in diameter occurred during the procedure (Figure 1). Ovesco Twin Grasper and Over-The-Scope Clip (OTSC) (Ovesco Endoscopy AG, Tübingen, Germany) were used for full thickness duodenal wall closure (Figures 2 and 3). Post-procedural contrast injection confirmed the successful closure of the wall defect with no extraluminal contrast leakage. Large amount of intraperitoneal air was also noted (Figure 4). The patient had a clinical of mild peritonitis which resolved without surgical treatment and oral intake was resumed at one week later.



**Figure 1** A 1-centimetered iatrogenic duodenal perforation was seen in the first part of duodenum (arrow).



**Figure 2** The twin grasper was used to grasp the two opposing ends of the wall defect.



**Figure 3** The Ovesco OTSC clip was applied successfully.



**Figure 4** Post-procedural contrast injection confirmed the successful closure of the wall defect with no extraluminal contrast leakage (long arrow). Large amount of intraperitoneal air was also noted (short arrow).

## Diagnosis:

Successful duodenal perforation closure with the Ovesco OTSC Clip

## Discussion:

The OTSC system, also known as “bear claw”, has been used to close mucosal or luminal gastrointestinal defects larger than 5 millimeters which the traditional clips may not have enough tensile force. For perforation closure, the defect can be as large as 10-20 millimeter in size. The OTSC clip is made of nitinol. The other uses are anastomotic leak or fistular closure, gastrointestinal bleeding, stent anchoring and resection of submucosal lesions. The overall success rate has been reported as 75-82.6%.<sup>1, 2</sup>

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## Case 30

Narisorn Lakananurak, MD.  
Rapat Pittayanon, MD., M.Sc.  
Rungsun Rerknimitr, MD.

A 59-year-old Thai female with advanced stage pancreatic head cancer having tumor invasion to celiac axis and superior mesenteric artery/vein came for a palliative management of his obstructive jaundice. An endoscopic retrograde cholangiopancreatography (ERCP) found dilated, tortuous vessel at the second part of duodenum, just above the ampulla of Vater (Figure 1).



**Figure 1** Dilated, tortuous vessel (arrow) at the second part duodenum.

## Diagnosis:

Duodenal varices

## Discussion:

The term “ectopic varices ” has been used to describe varices other than those found in the esophagus and stomach.<sup>1,2</sup> The “duodenal varices” is one of the rare ectopic varices and has the afferent vessel originates either from the superior mesenteric vein (SMV) or from the portal vein trunk via either the superior or inferior pancreaticoduodenal vein, whereas the efferent vein drains into the inferior vena cava.<sup>3</sup> A single-center retrospective review of 5,664 endoscopic procedures performed over<sup>4</sup> years found the prevalence of duodenal varices to be 1 in every 435 endoscopic procedures.<sup>4</sup> They are located in the duodenal bulb in 3.5%, the descending part in 82.5%, and the transverse part in 14.0%.<sup>5</sup>

Most underlying cause of duodenal varices is alcoholic liver diseases. Pancreatic cancer, as in this case, is a very rare cause of ectopic varices and account for only 0.6% of all ectopic varices. Duodenal varices is the second most common site of bleeding of ectopic varices follow by rectal varices (34% and 38% respectively). The management of duodenal varices is mainly endoscopic and interventional approach (31.6% and 21% respectively).<sup>5</sup>

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## Case 31

Puth Muangpaisarn, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

An 85-year-old male presented with near-syncope for 5 hour prior to this admission. Physical examination showed stable vital signs but moderately pale icteric conjunctiva. Rectal examination revealed maroon stool. His hemoglobin level was 7 g/dL. After fluid resuscitation and blood transfusion, EGD was performed.

EGD revealed a large blood clot at the medial wall of D1-D2 junction (Figure 1). Diluted adrenaline 1:20,000 was injected 11 ml at this lesion. Subsequently, CT scan of the abdomen was done and revealed a distended gallbladder containing heterogenous hyperdensity content, measured about 9.2x6.2 cm. There was asymmetrical thickening with focal discontinuity of gallbladder. It also presented air in the gallbladder together with fistula tract connecting the gallbladder to the 2<sup>nd</sup> part of duodenum. Pericholecystic fat stranding was observed (Figure 2). Moreover, small area of gallbladder wall was found to invade into the duodenum (Figure 3). Due to the poor general health of the patient, he and his family decided not to pursue with any further treatment.



*Figure 1* A large blood clot found at the medial wall of D1-D2 junction.



**Figure 2** Distended gallbladder containing heterogenous hyperdensity content with air bubble (arrow).



**Figure 3** Gallbladder wall invading into the second part of duodenum (arrow).

## Diagnosis:

Hemocholecyst with cystoduodenal fistula

## Discussion:

Hemocholecyst (HC) is defined as a clot-filled gallbladder caused by bleeding into its lumen, which does not result in rupture of the gallbladder wall.<sup>1</sup> HC is rarely reported with a variety of etiology including trauma, iatrogenic manipulation, gallbladder tumor, cholecystitis, gall stones and ruptured cystic artery aneurysm.<sup>2</sup> Additionally, hematological disorders such as hemophilia was reported as the cause of HC.<sup>3</sup> It could be presented as several manifestations, including, cholecystitis from cystic obstruction<sup>1</sup>, obstructive jaundice by hilar compression, and upper gastrointestinal (GI) bleeding from hemobilia or cholecystoenteric fistula.<sup>2</sup>

Based on the clinical presentations of this patient, HC with upper GI bleeding in this case presumably developed from a gallbladder tumor invading into the duodenal wall and resulting to a cholecystoenteric fistula with GI bleeding.

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## Case 32

Sasipim Sallapant, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 63-year-old female with underlying of ischemic heart disease and diabetes was admitted in the intensive care unit due to acute pyelonephritis with septic shock. She was treated with intravenous ceftriaxone and vasopressor. Two days later, she had small amount coffee ground content via her NG tube. Hematocrit dropped inappropriately and then hypotension developed. Her abdomen was distended with hypoactive bowel sound but no point of tenderness. EGD showed multiple small ulcers in the gastric body (Figure 1), with areas of sharply demarcated necrotic mucosa at the third part of duodenum (Figures 2 and 3).

She then underwent an emergency exploratory laparotomy. The operative finding was suggestive of non-occlusive mesenteric ischemia (NOMI). Part of the gangrenous bowel was resected. The patient could not recover from infection and finally passed away from multiple organ failure.



*Figure 1* The multiple ulcers at the gastric body of stomach.



*Figures 2 and 3 EGD showed well demarcated area of necrotic tissue at the 3rd part of duodenum (arrow).*

## Diagnosis:

Acute mesenteric ischemia (AMI)

## Discussion:

Acute arterial mesenteric ischemia includes SMA embolus, SMA thrombosis, non-occlusive mesenteric ischemia (NOMI). NOMI is responsible for 20% to 30% of AMI.<sup>1</sup> A spectrum of bowel injury ranges from transient bowel function alteration to transmural gangrene and multiple organ failure. If intestinal infarction developed, the mortality rate is as high as 70%.<sup>2</sup> Identification of AMI requires a high index of suspicion.

Unexplained abdominal distention or gastrointestinal bleeding may be the only symptom and sign of AMI when pain is absent, especially when AMI is due to NOMI.<sup>3</sup> Currently, CT angiography is the mainstay of diagnosis.<sup>4</sup> Endoscopy is not indicated.<sup>5</sup> But in some difficult cases, this etiology is not suspected before performing EGD.

The endoscopic spectrum of intestinal ischemia includes edema, pale mucosa, erosion, ulcer, hemorrhage, and dark bluish necrotic tissue with segmental or circumferential involvement. The presence of pseudomembrane overlying the intestinal mucosa can develop. The well demarcated margin of lesion is the characteristic of mesenteric ischemia.<sup>3</sup>

## References

1. Acosta S. Epidemiology of mesenteric vascular disease: clinical implications. *Semin Vasc Surg* 2010;23:4–8.
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3. Alhan E, Usta A, Çekiç A, et al. A study on 107 patients with acute mesenteric ischemia over 30 years. *Int J Surg* 2012;10:510-3.
4. Menke J. Diagnostic accuracy of multidetector CT in acute mesenteric ischemia: systematic review and meta-analysis. *Radiology* 2010;256:93–101.
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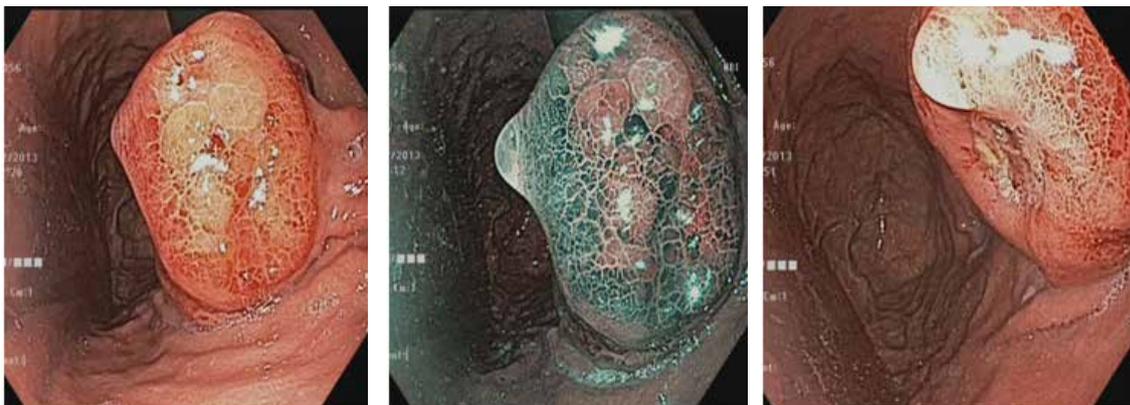
## Case 33

Sittikorn Linlawan, M.D.

Nopporn Anukulkarakusol, M.D.

Rungsun Rerknimitr, M.D.

A 60-year-old woman presented with chronic dyspepsia for 3 months. She had no other alarm features except the complete blood count showed microcytic anemia. EGD revealed a 5.5-cm pedunculated polyp with a wide-based in the lesser curvature of gastric body. NBI confirmed as inflammatory mucosa. There was a central umbilication of the polyp (Figures 1-3). After placement of a detachable nylon snare loop (Endoloop, MAJ-254; Olympus, Aomori, Japan) at the base of mass for 5 days (Figures 4 and 5), a repeated EGD was performed for electrosurgical snare polypectomy. There was no complication (Figure 6). Histopathology demonstrated mucosal ulceration with multinodular submucosal mass, composed of bundles of spindle cells with elongated nuclei and epithelioid tumor cells.



**Figures 1-3** Large gastric polypoid mass at lesser curvature of stomach (White light and Narrow band imaging).



Figure 4



Figure 5



Figure 6

**Figure 4** After Endoloop placement on day 0.

**Figure 5** Showed necrotic tissue above endoloop.

**Figure 6** Post snare polypectomy.

## Diagnosis:

Gastric gastrointestinal stromal tumor (GIST) removed by a snare polypectomy after an endoloop strangulation

## Discussion:

Management of patients with gastrointestinal stromal tumor (GIST) need multidisciplinary approach involving of endoscopic, surgical, pathologic, and pharmacologic interventions. Diagnosis of GIST should be considered whenever a submucosal lesion is detected endoscopically.<sup>1</sup> NBI usually shows only non-neoplastic changes of the polyp mucosa. The use of snare polypectomy with endoloop is the technique described for removal of giant polyps and minimize postprocedural bleeding.<sup>2,3</sup>

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# Lower

## Case 1

Sasipim Sallapant, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 36-year-old female with a 2-year history of ulcerative colitis. She had been in remission with mesalamine until she developed lower abdominal pain and hematochezia for 2 weeks. Physical examination was unremarkable except mild tenderness at left lower abdomen. Colonoscopy revealed diffuse inflammatory ulcerations with friable and spontaneous bleeding mucosa at the sigmoid colon. NBI showed an inflamed mucosa as a dark green area. There were multiple pseudopolyps in the transverse colon.



*Figures 1 and 2* White light imaging showed severe inflammatory ulcerations with friable mucosa. NBI demonstrated inflamed area in dark green color.



*Figures 3 and 4 White light imaging showed multiple pseudopolyps at transverse colon. NBI demonstrated the polyps as non-inflamed mucosa by showing only light green area.*

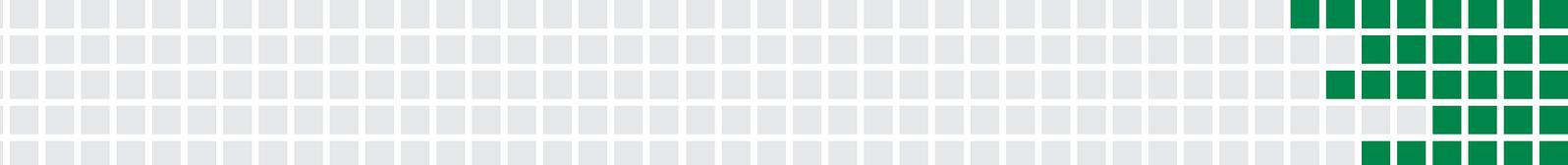
## Diagnosis:

Active ulcerative colitis with non-inflamed pseudopolyps

## Discussion:

Ulcerative colitis (UC) is a chronic idiopathic inflammatory disease of the gastrointestinal tract that affects the large bowel. Approximately, 40-65% of patients have an intermittent flare episode following the initial flare.<sup>1</sup> In the active UC, NBI colonoscopy reveals mucosal edema and granularity in inflamed mucosa with obscuration of intra-mucosal capillary network.<sup>2</sup> Area of bleeding or marked erythematous mucosa are recognized as dark green mucosa. Ulcers or mucous exudates are found as distinctive whitish areas.<sup>3</sup>

Inflammatory pseudopolyps result from a regenerative and healing process that leaves inflamed colonic mucosa in a polypoid configuration.<sup>1</sup> On endoscopic findings, pseudopolyps have varied widely in size and shape and may be flat, sessile or pedunculate. Because they are not true adenomas, therefore in a non-inflamed polyp, NBI image reveals a normal pit and mucosal vascular pattern.<sup>4</sup>



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## Case 2

Narisorn Lakananurak, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 67-year-old Thai male known as end-stage renal disease and coronary heart disease. He was admitted due to severe pneumonia with septic shock. One week after hospitalization, he developed bright red blood per rectum. Sigmoidoscopy showed an irregular border rectal ulcer size 3 cm in diameter just above the dentate line. The ulcer involved 75% of rectal circumference and it contained a non-bleeding visible vessel (NBVV) (Figures 1 and 2). A hemoclip was applied at NBVV and hemostasis was achieved (Figure 3).



*Figures 1 and 2 A hemicircumferential irregular border rectal ulcer located just above the dentate line with a visible vessel (yellow arrow).*



*Figures 3 Post hemoclipping*

## Diagnosis:

Acute hemorrhagic rectal ulcer syndrome (AHRUS) with non-bleeding visible vessel.

## Discussion:

Acute hemorrhagic rectal ulcer syndrome (AHRUS) is characterized by profuse and painless rectal ulcer bleeding in elderly patients who were hospitalized with serious illness and comorbidities.<sup>1</sup> The common underlying diseases are cerebrovascular disease, chronic renal disease, and cardiovascular disease.<sup>1</sup> The typical location is around the dentate line. Endoscopic findings were classified in 4 types ; type A = Partial or whole circumferential, type B = Linear or nearly round small ulcer(s), type C = Mixture of types A and B, and type D = Dieulafoy's type.<sup>1</sup> Many hemostatic treatments of AHRUS were reported such as transanal suture ligation, APC, and clipping but endoscopic treatment was the most preferred.<sup>2</sup>

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## Case 3

Narisorn Lakananurak, M.D.

Satimai Aniwon, M.D., M.Sc.

Pradermchai Kongkam, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 52-year-old Thai female underwent a colorectal cancer screening program. A colonoscopy showed a yellowish smooth soft subepithelial lesion measured as 7 mm in diameter in the descending colon. A surface indentation was observed upon pushing the lesion with closed biopsy forceps (Pillow sign) (Figure 1).



*Figure 1* a yellowish smooth soft subepithelial lesion in the descending colon.

## Diagnosis:

Colonic lipoma

## Discussion:

Lipoma of the colon is a rare entity and its exact incidence is difficult to estimate because most of them are asymptomatic.<sup>1</sup> It has been reported in 0.15% of all colonoscopies and 0.32-4.4% of autopsies.<sup>2</sup> The common location are ileocecal valve, cecum, rectum, sigmoid, and descending colon, respectively.<sup>1</sup>

Colonoscopy showed directly visualize mass with tenting of the mucosa, which indent with a closed biopsy forceps. When the forceps is withdrawn, the tumor will spring back to resume the previous shape (pillow or cushion sign). A pressure put on the lesion compresses superficial vessels and a distinctive yellow color of fat will disclose. When biopsy is taken, adipose tissue will protrude through the biopsy site (naked fat sign) which is the fatty characteristic of tumor.<sup>3</sup>

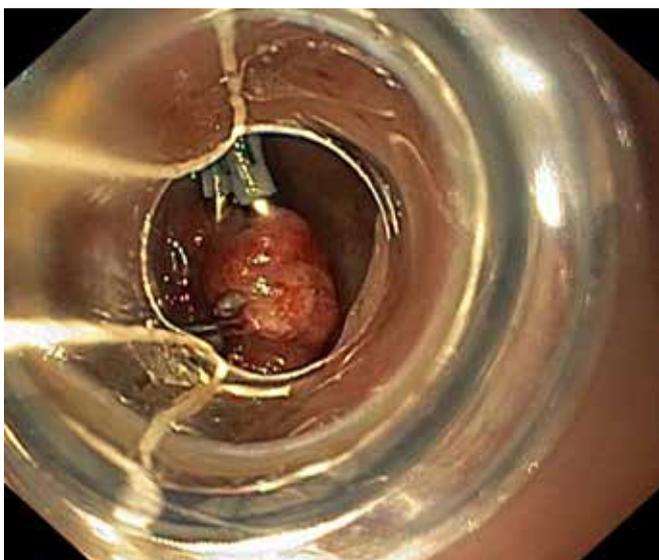
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## Case 4

Piyapan Prueksapanich, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

An 89-year-old female with chronic atrial fibrillation has been taken a life-long warfarin presented with hematochezia. One week earlier, she underwent colonoscopy with polypectomy of the polyp at the rectosigmoid colon. She required three hemoclips placement to control the bleeding after polypectomy. Warfarin was stopped before colonoscopy and resumed right after the procedure. One day before admission, she developed a new onset of hematochezia. Colonoscopy revealed a bleeding visible vessel at the post-polypectomy stump where three hemoclips were still in-placed (Figure 1). A band ligation was performed with no recurrence bleeding (Figures 2, 3 and 4).



*Figure 1* A bleeding visible vessel at the post-polypectomy stump where the three hemoclips were still in-placed.



Figure 2



Figure 3

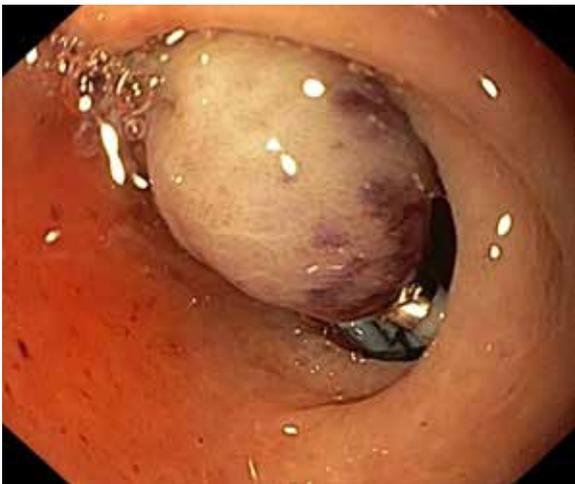


Figure 4

*Figures 2, 3 and 4 Endoscopic band ligation was performed successfully over the stumps and the three hemoclips were still intact.*

## Diagnosis:

Endoscopic band ligation for treatment of post-polypectomy bleeding

## Discussion:

Post-polypectomy bleeding rate has been reported to be 0.3-6.1%. The post-polypectomy bleeding can occur immediately or can be delayed up to 30 days. Risk factors are the large sessile polyp, polyp in the right side colon, cold snaring, elderly patient, patient with underlying of chronic renal insufficiency and the coagulation status of the patient. The delayed bleeding occurs in up to 2% of patients which develops mostly within 5-7 days after polypectomy.<sup>1</sup> Endoscopic treatment including endoscopic band ligation (EBL) is the mainstay for post-polypectomy bleeding with

various techniques. EBL is known as the standard treatment for esophageal variceal bleeding. Recently, EBL has been widely used for the treatment of many non-variceal gastrointestinal bleeding such as angiodysplasia, Dieulafoy's lesion, Mallory-Weiss tears, polypectomy bleeding, and colonic diverticular bleeding.<sup>2</sup> EBL has also been reported to have a role as the treatment of gastric, duodenal and colonic perforations.<sup>3</sup>

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## Case 5

Piyapan Prueksapanich, M.D.

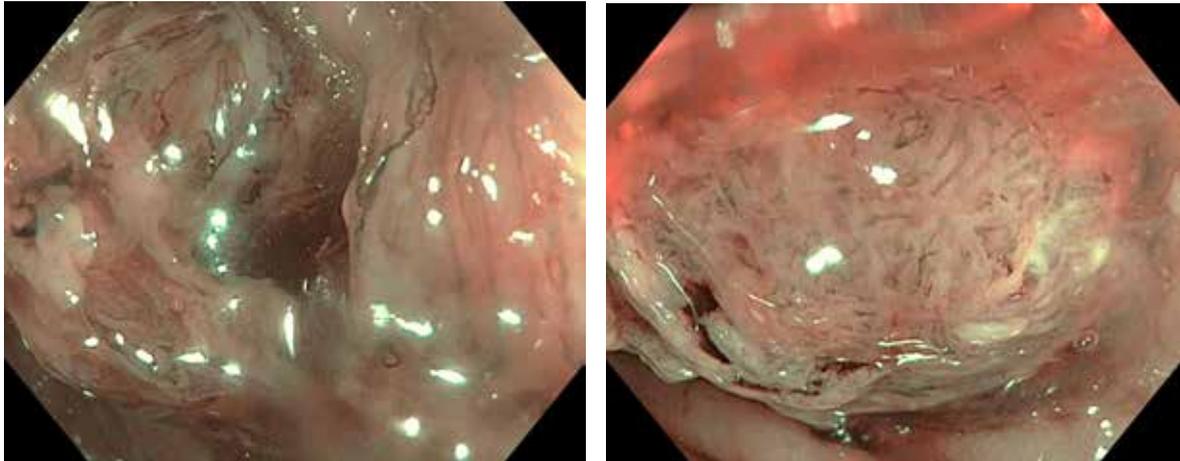
Satimai Aniwon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

An 88-year-old male with type 2 diabetes mellitus and hypertension presented with iron deficiency anemia. A colonoscopy revealed a hemi-circumferential mass measured as 5 cm in size at the rectosigmoid colon (Figure 1). A colonoscope was able to pass through the location and showed no synchronous lesion. Under NBI exam, it showed irregular, elongated, tortuous vessels with some disrupted and absent vessels area which was compatible with NBI international colorectal endoscopic (NICE) classification type III (Figures 2 and 3). Pathology confirmed as **an invasive adenocarcinoma of the colon**. A computerized tomography was done for staging and showed focal thickened wall of the upper sigmoid colon without pericolonic fat stranding or sentinel node.



*Figure 1* A hemi-circumferential mass measured as 5 cm in size. at the rectosigmoid colon.



*Figures 2 and 3 NBI showed dark brown mucosa with irregular, elongated, tortuous vessels and some area of the mucosa contained disrupted with absent vessels pattern.*

## Diagnosis:

Invasive adenocarcinoma of the colon.

## Discussion:

Colonoscopy is one of investigations for patients with iron deficiency anemia. Although, previous studies showed NBI did not increase adenoma or polyp detection rates as compare to the new high definition white light colonoscopy<sup>1,2</sup>, However NBI could enhance lesion characterization. According to NBI International Colorectal Endoscopic (NICE) Classification, the lesion color, the surface pit pattern and the microvascular architecture were evaluated. NICE type III provides a high accuracy to diagnose deeply SM-invasive carcinoma.<sup>3</sup>

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## Case 6

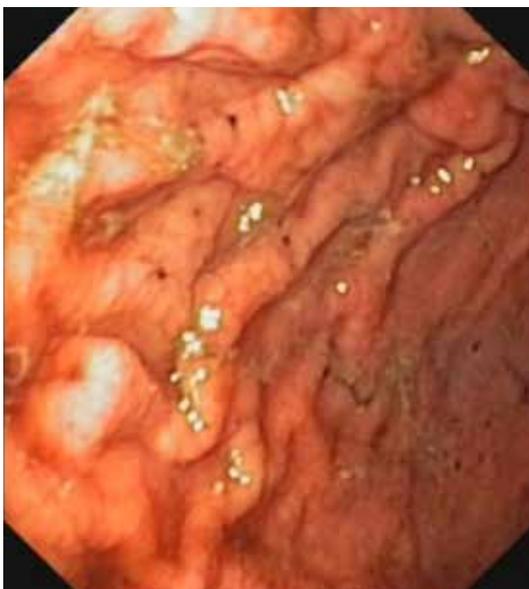
Sasipim Sallapant, M.D.

Rapat Pittayanon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 63-year-old female with underlying of ischemic heart disease and diabetes admitted to the intensive care unit with a diagnosis of acute pyelonephritis and septic shock. She had been treated with intravenous ceftriaxone and vasopressor. Two days later, she presented with a small amount of coffee ground content via the NG tube. She became hypotensive. Her abdomen was distended with hypoactive bowel sound but no tenderness. The upper endoscopy was performed and showed multiple small ulcers in the gastric body (Figure 1). A deeper push with a gastroscope demonstrated an area of sharply demarcated necrotic mucosa in the third part of duodenum (Figures 2 and 3).

She then underwent an emergency exploratory laparotomy. The operative finding was suggestive of long segment small bowel gangrene. The patient failed to recover from the infection and finally succumbed.



*Figure 1 Multiple ulcers in gastric body*



*Figures 2 and 3 EGD showed well demarcated area of necrotic tissue at the 3<sup>rd</sup> part of duodenum (arrow).*

## Diagnosis:

Acute mesenteric ischemia (AMI) causing infarction of the entire small bowel.

## Discussion:

Etiopathogeneses of acute arterial mesenteric ischemia include SMA embolus, SMA thrombosis, nonocclusive mesenteric ischemia (NOMI). NOMI is responsible for 20% to 30% of AMI.<sup>1</sup> A spectrum of bowel injury ranges from transient bowel function alteration to transmural gangrene with multiple organ failure. If intestinal infarction developed, the mortality rate can be as high as 70%.<sup>2</sup> Identification of AMI requires a high index of suspicion.

Unexplained abdominal distention or gastrointestinal bleeding may be the only symptom and sign of AMI when pain is absent, especially when AMI is due to NOMI.<sup>3</sup> Currently, CT angiography is the mainstay for diagnosis.<sup>4</sup> Endoscopy is not routinely indicated.<sup>5</sup> In certain difficult cases, this etiology cannot be predicted before performing EGD.

The endoscopic spectrum of intestinal ischemia includes edema, pale mucosa, erosion, ulcer, hemorrhage, and dark bluish necrotic tissue with segmental or circumferential involvement. The presence of pseudomembrane overlying the intestinal mucosa can develop. The well demarcated margin of lesion is the characteristic of mesenteric ischemia.<sup>3</sup>

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## Case 7

Satimai Aniwon, M.D., M.Sc.

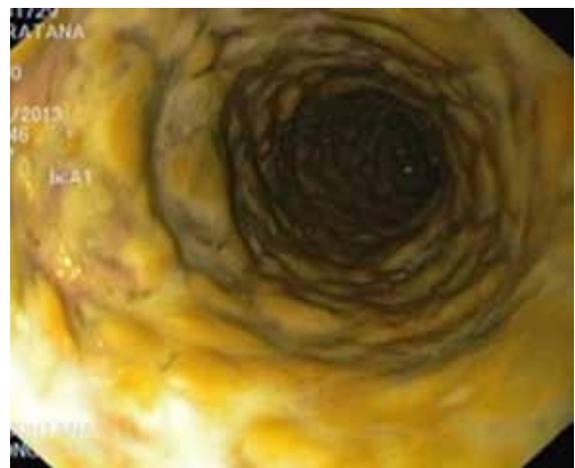
Yudthana Sattawatthamrong, M.D.

Rungsun Rerknimitr, M.D.

An 80-year-old female presented with abdominal pain and abdominal distension. Physical examination demonstrated that she had sinus tachycardia. Her abdomen was markedly distended with normal bowel sound. There were no tenderness and no ascites. Laboratory results showed a leukocytosis. Plain abdomen x-ray revealed markedly dilated small bowel and colon (Figure 1). A colonoscopy was performed. The scope was able to pass to 20 cm from the anus. Then the lumen was narrow with inflamed mucosa with thick exudate (Figures 2-5). Tattoo was done. Biopsy was performed. The diagnosis was **gangrenous ischemic colitis**. She underwent an emergency surgical exploration. Operative findings showed colonic necrosis with reduction in vascular supply started from sigmoid colon to proximal colon. Left hemicolectomy was performed (Figures 6 and 7). Histology was compatible with ischemic colitis with no evidence of vasculitis or thrombosis.



*Figure 1* Generalize dilatation of small bowel and colon.



*Figures 2-5 Diffuse thick exudate on an inflamed colonic mucosa starting from the sigmoid colon to the transverse colon.*



*Figures 6 and 7 Surgical specimen showed discoloration of colonic wall with transitional zone.*

## Diagnosis:

Gangrenous ischemic colitis

## Discussion:

Clinical presentations of ischemic colitis may be classified into non-gangrenous and gangrenous forms.<sup>1</sup> A gangrenous ischemic colitis is an uncommon form occurring in 15% of colonic ischemia.<sup>2</sup> Gangrenous ischemic colitis is quite different from usual non-gangrenous ischemic colitis because it develops in a rapid progression and leads to a fatal outcome.<sup>1</sup> Patients with gangrenous colitis commonly present with nausea/vomiting and hyperleukocytosis whereas hematochezia and diarrhea are less frequently found than that of in patients with non-gangrenous forms.<sup>3</sup> Most patients required an emergency operative treatment. Many medical comorbidities have been reported as risk factors for infarction including hypertension, chronic renal disease, diabetes mellitus, and history of cancer.<sup>3</sup>

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## Case 8

Kessarin Thanapirom, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 72-year-old female was brought to an emergency room for a history of hematochezia. She had a history of chronic kidney disease, coronary artery disease, and diabetes mellitus. Three days before admission, she passed maroon stool without abdominal pain. On physical examination, she was hypotensive and appeared anemic. After intravenous fluid resuscitation and rapid bowel preparation, a colonoscopy was performed. Colonoscopy showed segmental erythema with longitudinal ulcers, and subepithelial hemorrhage at the rectosigmoid colon (Figures 1-3). A well-demarcated line between normal and abnormal area was demonstrated. Biopsy was performed. The diagnosis was **ischemic colitis (non-gangrenous type)**.



*Figures 1-3* Colonoscopy revealed segmental colonic erythema with ulcerations and subepithelial hemorrhage at the rectosigmoid colon.

## Diagnosis:

Ischemic colitis (non-gangrenous type)

## Discussion:

Non-gangrenous ischemic colitis occurred in 80-85% of ischemic colitis cases.<sup>1</sup> Usual clinical manifestation is a sudden onset of left lower quadrant abdominal pain, followed by a passage of bright red blood per rectum. Most common location of ischemic colitis is left-sided colon (80%).<sup>2</sup> Colonoscopy and biopsy play an important role for the early diagnosis. Typical endoscopic findings of transient ischemic colitis are petechial hemorrhages, edematous with fragile mucosa, segmental erythema, scattered erosion, longitudinal single linear ulcerations, and sharply defined segment of involvement.<sup>2</sup> Later, blue-black mucosal nodules with a darker, dusky background can be seen. If no clinical signs of complete gangrene or perforation, the managements include usually bowel rest, parenteral fluid administration, and broad-spectrum antibiotic. The natural course of disease is usually transient and the complete reversibility can be expected in 50% of patients.<sup>3</sup>

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## Case 9

Narisorn Lakananurak, M.D.

Satimai Aniwon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

Sombat Treeprasertsuk, M.D., Ph.D.

A 65-year-old Thai male underwent a colonoscopy for colorectal cancer screening. He had a history of essential thrombocytosis for 30 years. He had been treated with hydroxyurea. Recently, he was asymptomatic with normal platelets count. Physical examination showed splenomegaly. A routine colonoscopy for colon cancer screening was performed. White light endoscopy and NBI exam revealed blue-colored, dilated, tortuous veins starting from the rectum (Figure 1), to the sigmoid colon (Figure 2), and the descending colon (Figure 3).



**Figure 1** Blue-colored, dilated, tortuous veins in the rectum (left) and under narrow band imaging exam (right).



*Figure 2 Blue-colored, dilated, tortuous veins in the sigmoid colon (left) and under narrow band imaging exam (right).*



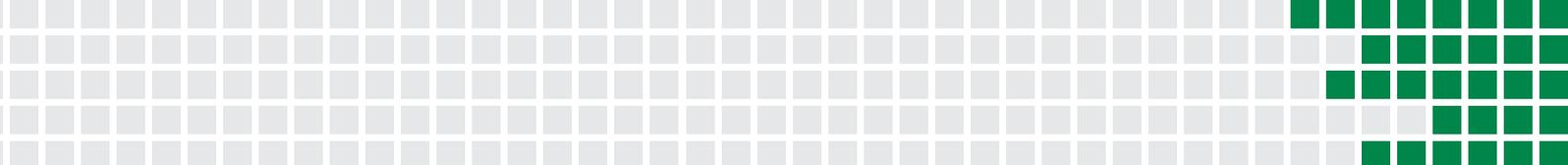
*Figure 3 Blue-colored, dilated, tortuous veins in the descending colon (left) and under narrow band imaging exam (right).*

## Diagnosis:

Colonic varices

## Discussion:

Colonic varices are one pattern of ectopic varices. The site of colonic varices depends on venous systems that draining venous blood from the colon i.e. superior mesenteric vein (cecum to transverse colon), inferior mesenteric vein (descending colon to rectum).<sup>1</sup> The prevalence of colonic varices is about 34-46% in patients with



cirrhosis.<sup>2</sup> About five percent of patients with myeloproliferative disorders such as essential thrombocytosis may develop asymptomatic colonic varices.<sup>3</sup> Endoscopic findings are serpiginous, dilated, blue-colored veins which is similar to varices in the esophagus and stomach.<sup>1</sup>

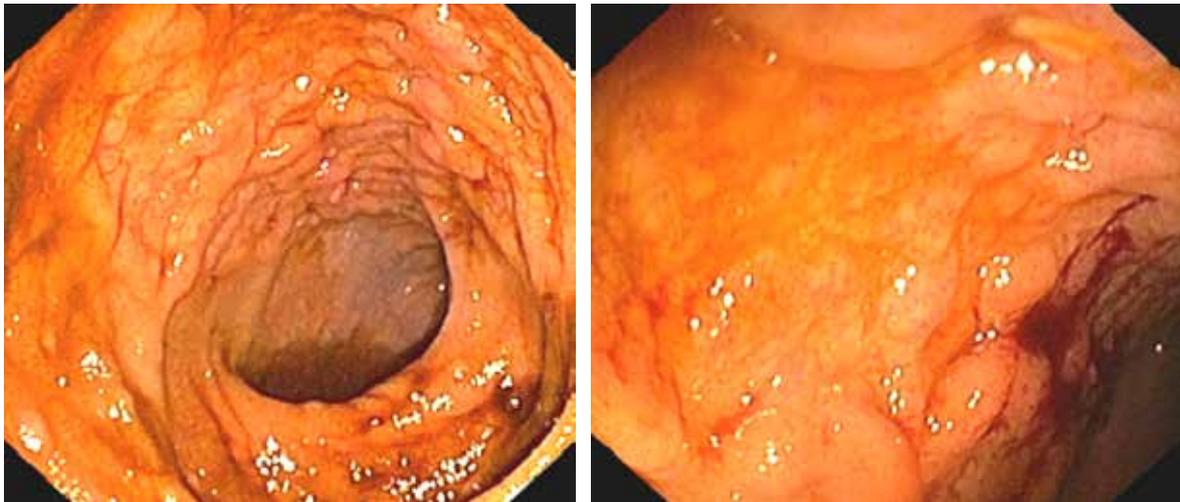
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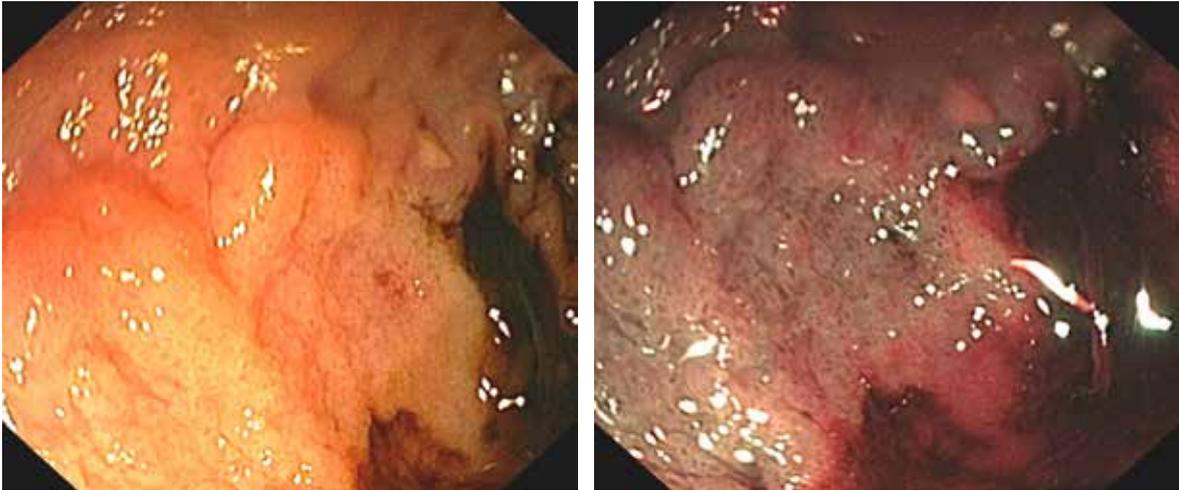
## Case 10

Sayamon Kimtrakool, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 20-year-old male presented with chronic right lower abdominal pain with significant weight loss for 3 months. He had a history of bilateral episcleritis. On physical examination, he had anemia and pretibial edema of both legs. Colonoscopy showed multiple ileal ulcers with inflamed mucosa at the terminal ileum, however colonic mucosa appeared normal. Histology revealed chronic and mild acute ileitis. AFB stain and PCR-TB study were negative.



*Figures 1 and 2 Multiple ulcers with inflamed mucosa at the terminal ileum.*



*Figures 3 and 4 White light imaging showed edematous mucosa with ulcerative inflammation and NBI imaging exam showed dark color area of inflammation.*

## Diagnosis:

Isolated Crohn's disease (CD) in the terminal ileum.

## Discussion:

Isolated ileal CD can be found in about 30% of CD patients.<sup>1</sup> Typically, clinical presentations of CD are abdominal pain, diarrhea, fever, weight loss and extraintestinal features. The common GI involved segments are terminal ileum and colon. Immune response is one of the importance roles for developing CD. As a result, CD usually occurs in terminal ileum which is rich in gut-associated lymphoid tissues.<sup>2</sup> However, the isolated lesion is considered as rare.

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## Case 11

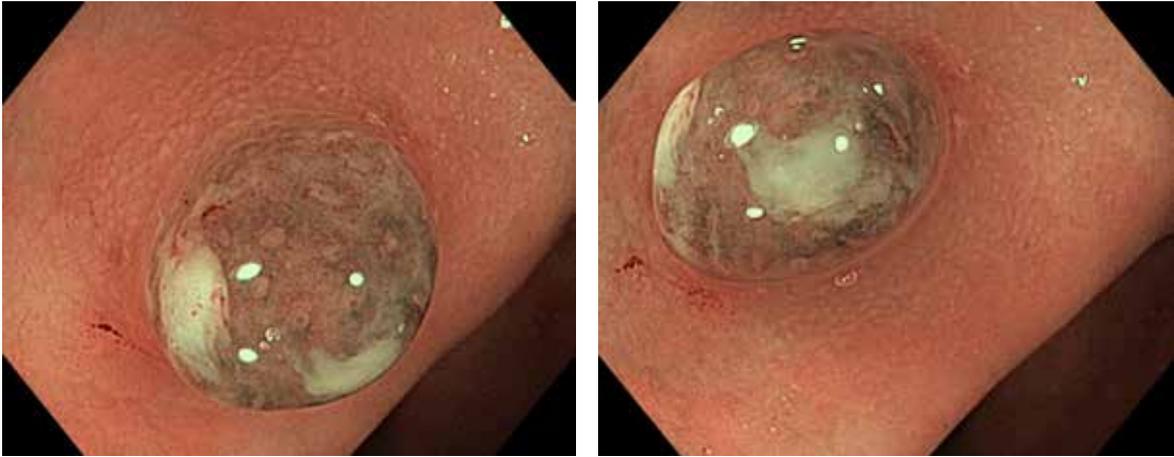
Sayamon Kimtrakool, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 54-year-old woman underwent a colorectal cancer screening. Her fecal immunochemical test was positive. Colonoscopy was performed and revealed a 0.7-cm sessile polyp with whitish exudate covered on the hyperemic smooth surface mucosa at the descending colon (Figures 1 and 2). Narrow band imaging (NBI) showed a dark color surface polyp with round pit pattern surrounded by normal capillary vessels (Figures 3 and 4).

Polypectomy was performed. Histological diagnosis was an inflammatory polyp.



*Figures 1 and 2* White light colonoscopy showed a sessile polyp with hyperemia smooth surface covered by whitish exudate.



*Figures 3 and 4* Narrow band imaging (NBI) with magnification revealed a uniform dark color surface polyp with normal capillary pattern and some area of the polyp contained whitish exudate.

## Diagnosis:

Colonic inflammatory polyp

## Discussion:

Inflammatory polyp of the colon is a result of mucosal inflammation and regeneration with healing process after inflammation or ulceration. The etiology of inflammatory polyps may be classified into two group; pseudopolyps and prolapse-induced inflammatory polyp.<sup>1</sup> Pseudopolyps are the most common cause of inflammatory polyps and associated with inflammatory bowel disease (IBD) which can be found about 10-20% of the patients.<sup>2</sup> Inflammatory polyps may also develop after severe colitis from any causes.<sup>3</sup>

Endoscopic appearances are vary; a sessile or pedunculated, single or multiple, smooth with hyperemic mucosa with/without exudation, or erosion on the surface of polyps.

Inflammatory polyps do not significantly increase the risk for dysplasia or carcinoma.<sup>4</sup>

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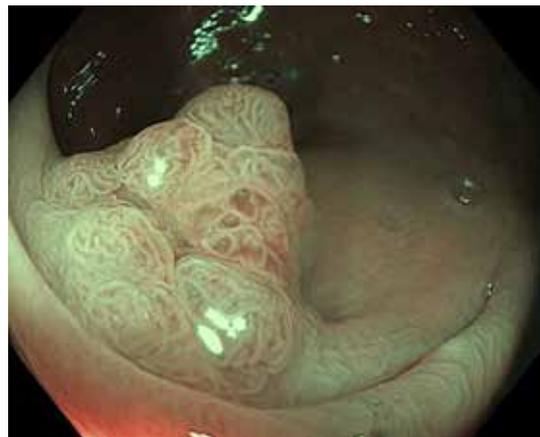
## Case 12

Sittikorn Linlawan, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 48-year-old man with a family history of colorectal cancer underwent a colonoscopy screening. White light image (Figure 1) showed a 1.2 cm semi-pedunculated polyp (Paris classification Isp) at the sigmoid colon. Under magnifying NBI (dual focus) the pits were confirmed as villous pattern and surrounded by the thick, high density with tortuous brown vessels (Sano's classification type IIIa). It was compatible with NICE classification type 2 (Figure 2). Polyp removal was done (Figure 3). Pathology confirmed as a **villous adenoma**.



*Figure 1* White light image of a semi-pedunculated polyp (Isp).



*Figure 2* Narrow band image of villous adenoma.



*Figure 3 Snare polypectomy*

## Diagnosis:

Villous adenoma

## Discussion:

Colorectal cancer (CRC) is a major cause of death worldwide. Magnified colonoscopy is a useful diagnostic tool for a real-time evaluation of many polypoid lesions. Under magnifying NBI, microvascular architecture and surface pits pattern are clearly demonstrated. Its role is also for the assessment of the depth of invasion in early CRC without the need for dye spraying.<sup>1, 2</sup> Villous adenoma can be showed as type IIIa in Sano's classification and type 2 in NICE classification. According the ESGE guideline, patients with villous adenoma was classified as a high risk group.<sup>3</sup> The surveillance colonoscopy at 3 years after polypectomy is recommended.<sup>3</sup>

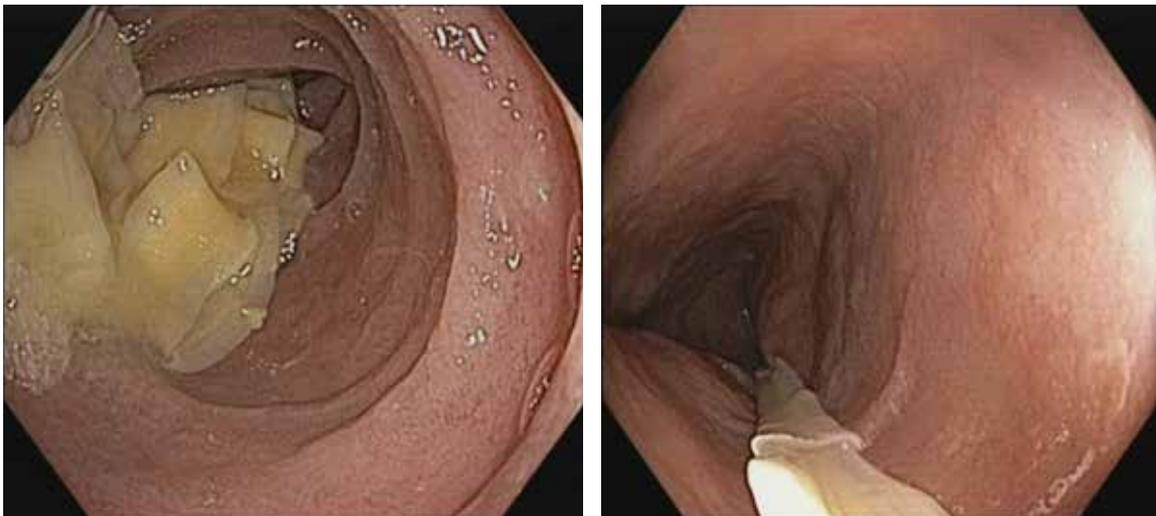
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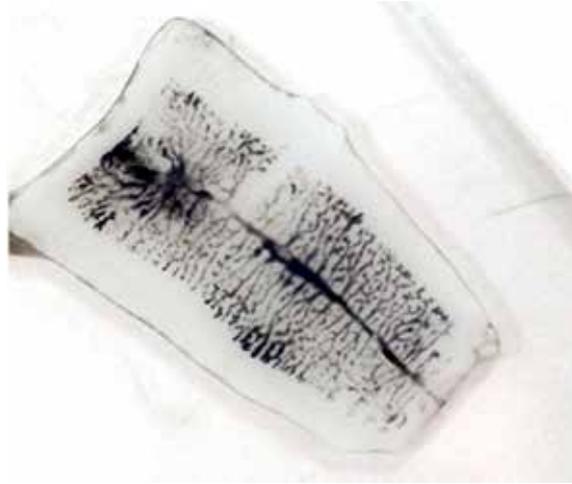
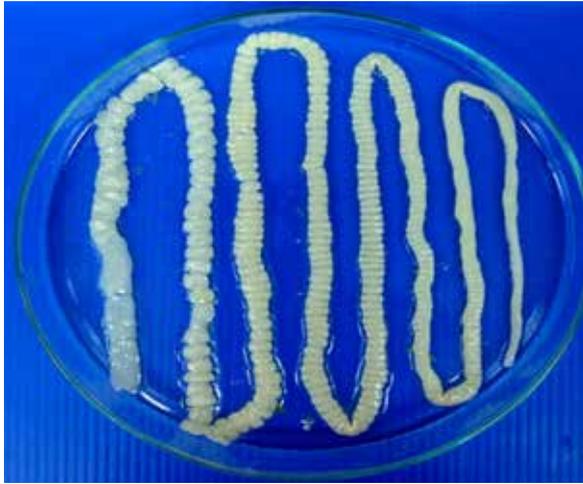
## Case 13

Sittikorn Linlawan, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 51-year-old female underwent colonoscopy for a colorectal cancer screening. She also complained of vague abdominal pain for a month. Colonoscopy showed a linear white movable parasite in the terminal ileum (Figures 1 and 2). She was treated with praziquantel 600 mg single dose, then she passed a tapeworm (95 cm-in-length) (Figure 3). After an ink injection for identification, the diagnosis was confirmed as *Taenia saginata* infestation (Figure 4).



*Figures 1 and 2 Taenia saginata in the terminal ileum*



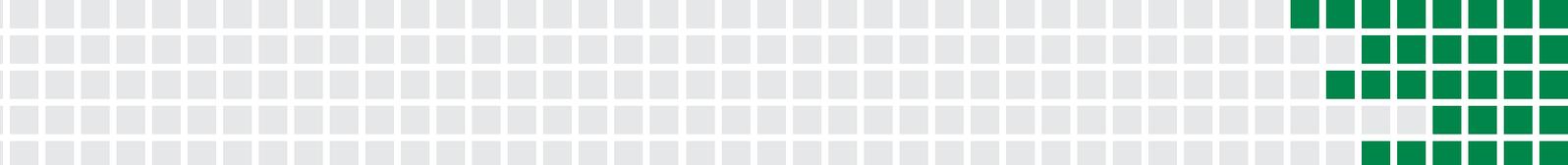
**Figures 3 and 4** *Taenia saginata* and a proglottis of *Taenia saginata* after an ink injection.

## Diagnosis:

*Taenia saginata* infestation

## Discussion:

Ingestion of imperfectly or raw cooked beef may result to *T. saginata* infestation. In the host's stomach, proteolytic enzymes digest the capsule of cysticerci and later a scolex attaches to the intestine. Subsequently, it develops to an adult tapeworm.<sup>1</sup> *T. saginata* is a large tapeworm with an average size of 2-5 meter and its size may be up to 6-8 meter in length.<sup>1</sup> The adult worm may contain more than hundreds to thousands of proglottids. Taenia species bud off distal segments from the rest of the body that are passed through the feces.<sup>1</sup> Most patients carrying an adult *T. saginata* tapeworm are asymptomatic. Rarely, non-specific symptoms, such as abdominal discomfort, epigastric pain, nausea, vomiting, diarrhea, weight loss, and perianal symptoms associated with the discharge of proglottids, can be observed.<sup>2</sup> The treatment of human intestinal Taeniasis (*T. saginata* and *T. solium*) is usually effective (85–98%) with anthelmintics such as praziquantel (5 mg/kg, single oral dose) or niclosamide ( 2 g, single oral dose).<sup>3</sup>



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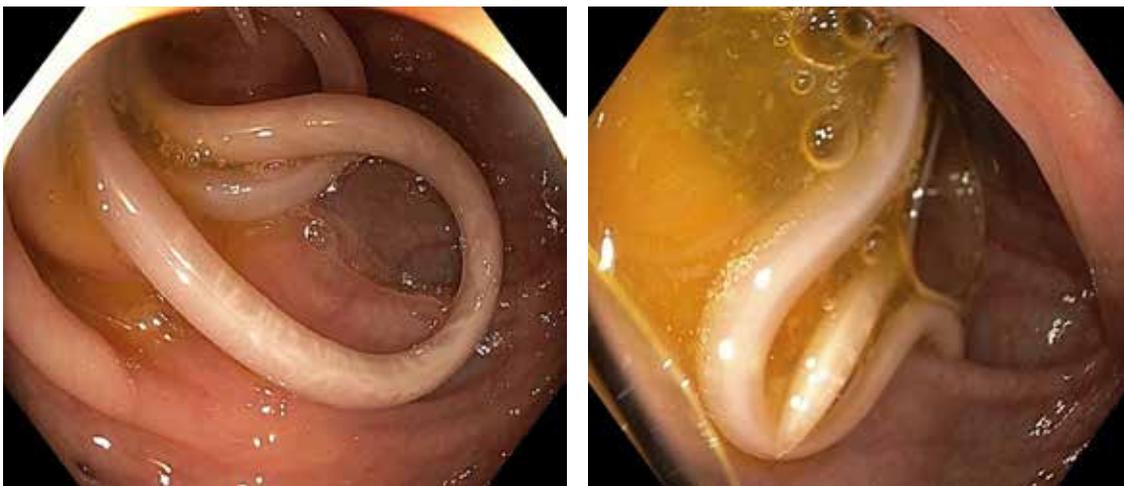
## Case 14

Sittikorn Linlawan, M.D.

Satimai Aniwon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 44-year-old man presented with chronic diarrhea and abdominal pain. Stool examination and stool culture were unremarkable. Colonoscopy was performed. A giant long roundworm was detected at the ascending colon (Figures 1 and 2). The diagnosis was *Ascaris lumbricoides* infestation. His clinical symptoms improved after a single dose of albendazole.



*Figures 1 and 2* A giant long roundworm was detected at the ascending colon.

## Diagnosis:

*Ascaris lumbricoides* infestation

## Discussion:

*Ascaris* infection in human occurs after accidentally after an ingestion of contaminated food with the parasite's eggs. The eggs become larvae that penetrate the duodenal wall and enter blood circulation to heart and lungs.<sup>1</sup> The larvae pass from the respiratory system and return to the small intestine after swallowing.<sup>1</sup> Male and female adult worms size are 15-25 cm and 20-35 cm respectively. Symptoms of adult worm infestation or chronic ascariasis are abdominal pain, distension, nausea, and diarrhea. Entangled adult worms have also been reported as leading to mechanical intestinal obstruction in 0.005-2 per 1,000 infestations per year.<sup>2</sup> Treatments of choice are a single-dose oral mebendazole (500 mg), albendazole (400 mg), with response rates in 88-95% of patients.<sup>3</sup> Colonoscopy and EGD may be useful in removing the obstructive masses formed by the worms.<sup>3</sup>

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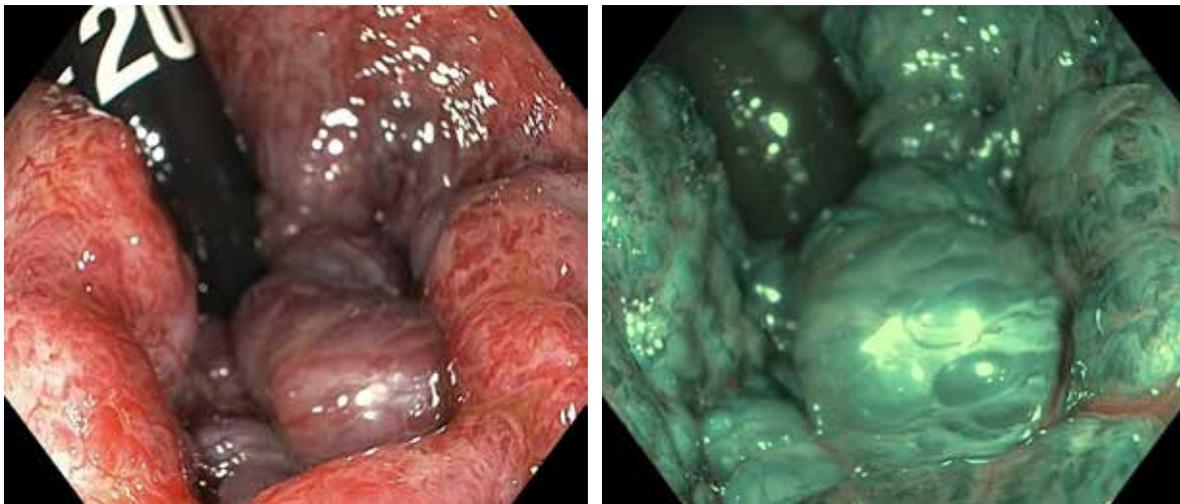
## Case 15

Sittikorn Linlawan, M.D.

Satimai Aniwon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 53-year-old man presented with painless rectal bleeding. He had a history of chronic constipation. Colonoscopy was done. In retroflexed view, colonoscopy showed cherry-red spots of prominent internal hemorrhoids (Figures 1 and 2).



*Figures 1 and 2* White light imaging showed prominent internal hemorrhoids with cherry-red spots and dark color of the spots was also demonstrated under NBI.

## Diagnosis:

Internal hemorrhoids with cherry-red spots

## Discussion:

Internal hemorrhoids (originate above the dentate line) classified into 4 grades: Grade 1, hemorrhoids with bleeding; Grade 2, hemorrhoids with bleeding and protrusion, with spontaneous reduction; Grade 3, hemorrhoids with bleeding and protrusion that require manual reduction; and Grade 4, prolapsed hemorrhoids that cannot be replaced.<sup>1</sup> With the recent advancement in video endoscopy including NBI, hemorrhoids can be clearly demonstrated the stigmata with the determination for the site of potentially bleeding such as the Cherry-red spots. A proposed theory is that of the displacement of anal lining mucosa of the anal cushions.<sup>2</sup> Conservative treatment is effective for an early stage. High dietary fiber, oral fluids, non-steroidal anti-inflammatory drugs (NSAIDs), sitz baths, and rest are recommended. Several new minimally invasive surgical procedures including stapled mucopexy and doppler-guided hemorrhoid artery ligation, are now offered to patients with grade 3 hemorrhoids. Endoscopic infrared coagulation therapy (IRC) improved visibility and efficiency. In addition, simultaneous treatment of symptomatic internal hemorrhoids at the time of endoscopy was allowed.<sup>3</sup>

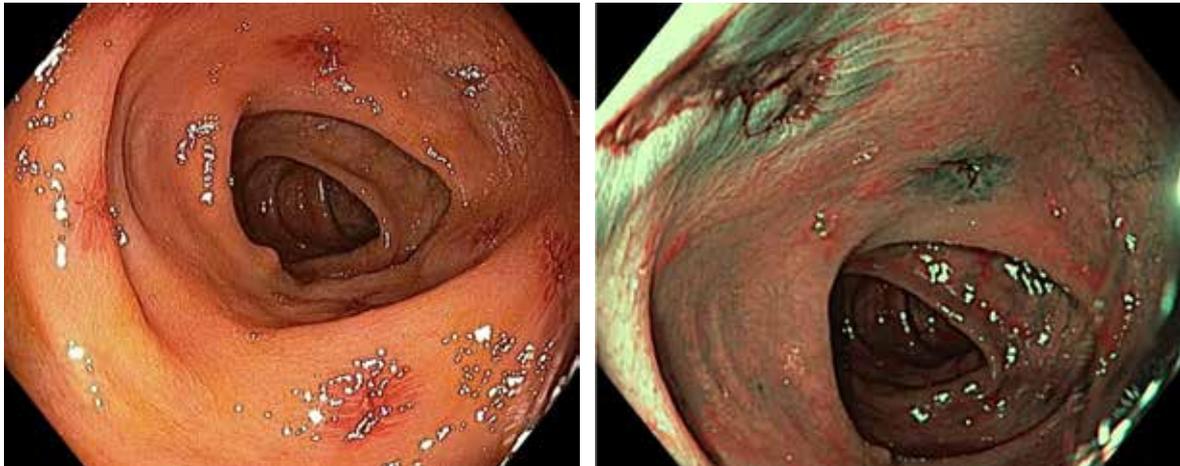
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## Case 16

Sayamon Kimtrakool, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 62-year-old female underwent a colonoscopy for a colorectal cancer screening. She had end-stage renal disease and has been on a regular hemodialysis. She has no symptom. Colonoscopy showed multiple small shallow clean base discrete ulcers with acute inflammation edge (detected under NBI) along the descending colon (Figure 1). Biopsy was taken. Pathology showed only mild ischemic change of ulcerative tissue lesion.



*Figure 1* Colonoscopy showed multiple small shallow clean base ulcers along the descending colon .The inflamed edge was enhanced by NBI.

## Diagnosis:

End-stage renal disease related ischemic colitis

## Discussion:

Chronic hemodialysis patients usually have higher risks to develop intestinal ischemia such as atherosclerosis, hemodialysis induced hypotension, and others comorbid conditions including arrhythmia, myocardial infarction, and congestive heart failure.<sup>1</sup> All of these factors can contribute to the poor perfusion to colonic wall and eventually can develop ischemic colitis. Important factors for prediction the severity in chronic hemodialysis related ischemic colitis are the short duration between symptoms occurrence until the diagnosis and patient's co-morbid conditions.<sup>2,3</sup>

To prevent the disease, physicians should avoid or minimize the hypotensive period between dialysis sessions. Intravenous fluid replacement and bowel rest should be managed in almost cases and empirical antibiotics should be designed in only moderate to severe cases.<sup>1</sup>

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## Case 17

Kessarín Thanapirom, M.D.

Satimai Aniwán, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

Asymptomatic 64-year-old man underwent a colonoscopy for colorectal cancer screening. Colonoscopy revealed a large sessile polyp with cerebriform pit pattern and avascular capillary network (Sano's classification type IIIb) (Figure 1). Under NBI exam, the endoscopic finding was compatible with NICE classification type 3. Endoscopic mucosal resection was performed. Pathology showed an intramucosal well-differentiated adenocarcinoma.



**Figure 1** A large sessile polyp with cerebriform pit pattern and avascular capillary network (Sano's classification type IIIb) that compatible with NICE classification type 3.

## Diagnosis:

Intramucosal colon cancer

## Discussion:

Half of patients with early colorectal cancer have intramucosal cancer or noninvasive cancer.<sup>1</sup> Endoscopic characteristic findings of intramucosal cancer are varied, 80% of the lesions have a size less than 2 cm, 56% of lesions have sessile morphology.<sup>2</sup> Most patients with intramucosal cancer have cancer arising on the adenoma background and have no angiolymphatic invasion.<sup>1</sup> Intramucosal cancer usually have a good prognosis, with a low recurrent rate after a complete tumor removal either by surgery or endoscopy.<sup>1</sup> A previous study reported that no patient developed recurrence during 20 months follow-up period after an endoscopic mucosal resection.<sup>1</sup>

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## Case 18

Sayamon Kimtrakool, M.D.  
Satimai Aniwan, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 65-year-old-female underwent colonoscopy for a colorectal cancer screening. She has no GI symptoms. Colonoscopy revealed one polyp, Isp (Paris classification) size 1.2 cm with central depression and ulceration in the ascending colon (Figure 1). NBI showed a high density of capillary network with lack of uniformity (Sano's classification type IIIa). The polyp also showed the absence of surface pattern compatible with NBI international Colorectal Endoscopic (NICE) type 3 (Figure 2). The sessile polyp was removed by an endoscopic mucosal resection (EMR) by using a snare polypectomy and then one hemoclip was applied to cover the mucosal defect (Figures 3 and 4). Histology demonstrated well-differentiated adenocarcinoma with abnormal gland infiltration through muscularis mucosa into submucosa. The diagnosis was **submucosal invasive colonic cancer (well-differentiated adenocarcinoma)**.



*Figures 1 and 2* White light imaging showed a 1.2 cm colonic polyp Isp with central ulceration and depression. Narrow band imaging showed darker color of polyp surface relative to the background. This was read as Sano's classification type IIIa, and NICE classification type 3.



*Figures 3 and 4 Endoscopic mucosal resection*

## Diagnosis:

Submucosal invasive colonic cancer (Well-differentiated adenocarcinoma)

## Discussion:

NBI exam during colonoscopy provides a high accurate test for the differentiation of neoplastic from non-neoplastic polyps. Comparing with pathology, NBI provided 91% sensitivity and 82.6% specificity.<sup>1</sup> Additionally, NBI technique can provide a high confidence in diagnosis of flat and diminutive (< 5 mm) polyps.<sup>1</sup> The evaluation is based on microvascular architecture change reading for the angiogenesis in carcinoma development.<sup>2</sup> Vessels and surface patterns read by magnifying NBI are essential for Sano's classification and NBI International Colorectal Endoscopic (NICE) classification. A recent study demonstrated that NICE classification type 3 could predict a deep submucosal (SM-d) invasive colonic cancer with high accuracy.<sup>3</sup>

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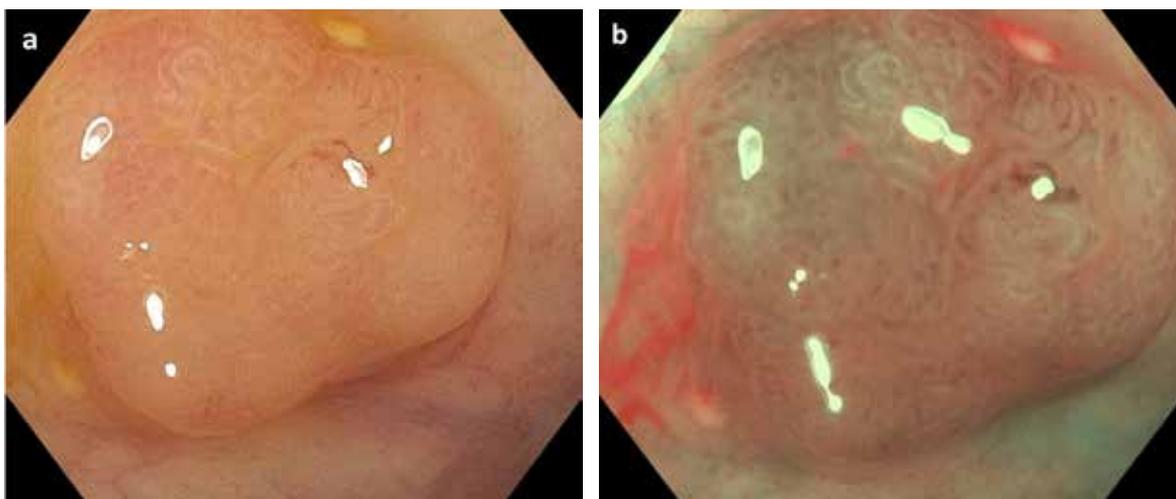
## Case 19

Puth Muangpaisarn, M.D.

Satimai Aniwon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 62-year-old Thai female underwent colonoscopy for a colorectal cancer screening. Colonoscopy showed a sessile polyp sized 0.5 cm at the descending colon. NBI showed vascular pattern with high density of capillary vessels (Sano's classification type IIIa). Pit pattern showed branch-like pit (Kudo's classification type IV). Based on the NICE classification, its color was browner relative to the background and its vessels were thick brown. Surface pattern showed branch white structure surrounded by brown vessels. Therefore it was compatible with NICE classification type II (Figure 1). Polypectomy was performed. Histopathology revealed a tubular adenoma with high grade dysplasia.



**Figure 1** White light imaging (a) showed a sessile polyp with branch-liked pit pattern and high density vascular pattern under NBI (b).

## Diagnosis:

Tubular adenoma with high grade dysplasia

## Discussion:

Technically, NBI can enhance the visualization of mucosal surface structure and vascular pattern and help for identifying colonic neoplasia.<sup>1</sup> Several studies supported the effectiveness in differential diagnoses of colorectal polyps.<sup>1</sup> NBI international colorectal endoscopic (NICE) classification system is a simple categorical classification (types 1–3) based on 3 parameters: (i) lesion color; (ii) microvascular architecture; and (iii) surface pattern.<sup>2</sup> Most likely pathology in NICE type II is adenoma.<sup>2</sup> In this case, based on the NICE classification, NBI read as type II that compatible with adenoma that later confirmed by pathology.

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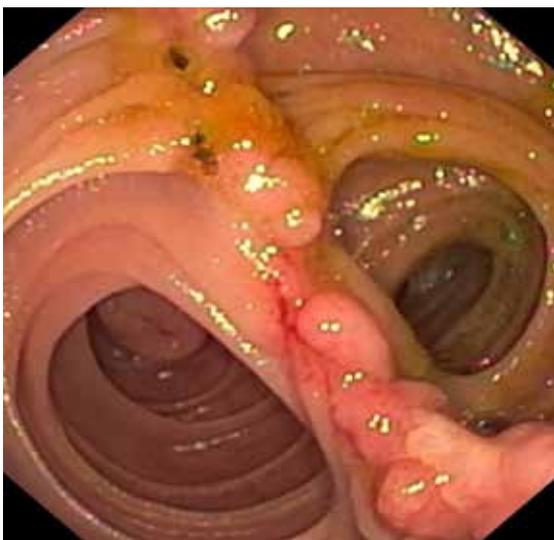
## Case 20

Sittikorn Linlawan, M.D.

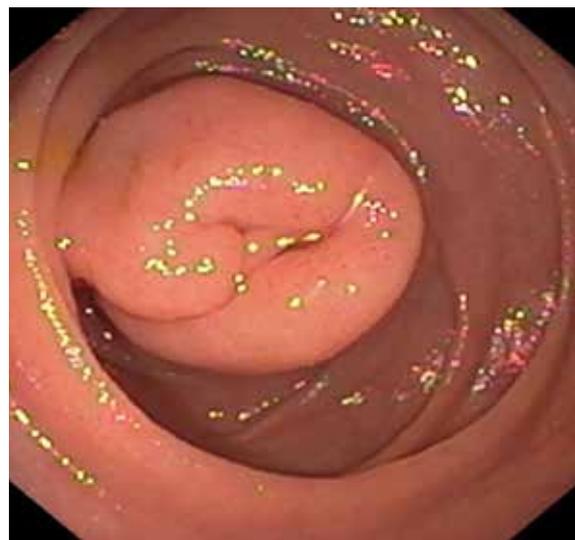
Satimai Aniwon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 46-year-old male presented with intermittent cramping abdominal pain, along with postprandial vomiting, and melena. He had undergone a Roux-en-Y hepaticojejunostomy due to common bile duct injury from the previous laparoscopic cholecystectomy 3 years ago. One day before admission, he developed an acute intermittent abdominal pain followed by a severe vomiting. He also passed melena. Push enteroscopy revealed anastomotic ulcer with granulation tissue at the jejunojejunostomy site (Figure 1). During enteroscopy there was a small bowel loop protruding through the anastomotic site representing the intussusceptum (Figure 2). However, there was no sign of gangrene. Later his clinical symptoms improved by a conservative management.



**Figure 1** Anastomotic ulcer with granulation tissue at the jejunojejunostomy site.



**Figure 2** Anterograde jejunojejunal intussusception without evidence of gangrene.

## Diagnosis:

Intermittent jejunojejunal intussusception with anastomotic ulcer

## Discussion:

Jejunojejunal intussusception is an uncommon complication of hepatico-jejunostomy.<sup>1</sup> Jejunojejunal intussusception can cause acute or chronic bowel obstruction, haemorrhage, and perforation.<sup>2</sup> A computed tomography scan of the abdomen with oral and intravenous contrast is the most accurate diagnostic tool for diagnosis. It typically showed a target lesion, reniform pattern (bi-lobed mass with peripheral high attenuation due to thickened bowel wall) and sausage pattern.<sup>3</sup> It may resolve with conservative management because of intermittent intussusception. However, endoscopic diagnosis is sometimes possible such as in this patient. Surgical treatment is usually not indicated if there is no gangrenous change, perforation or stenosis.<sup>4</sup>

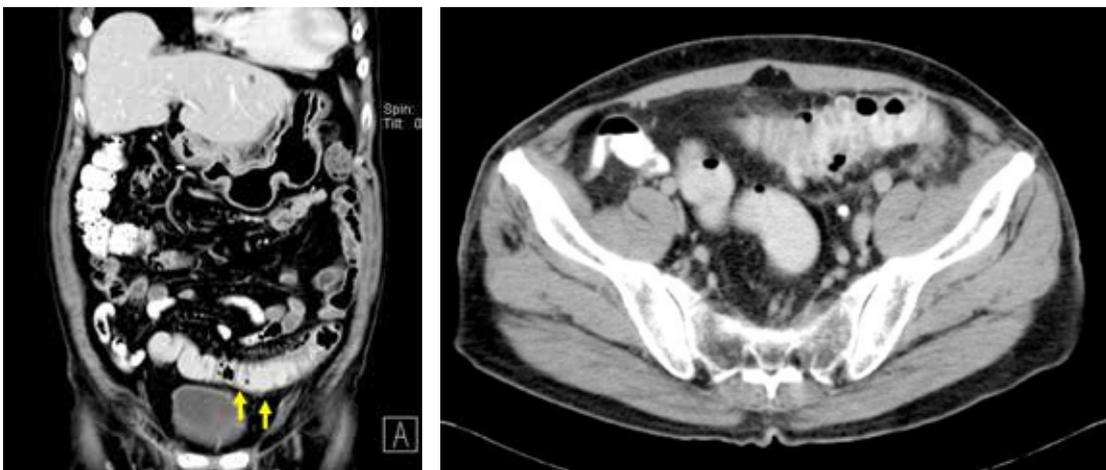
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## Case 21

Sayamon Kimtrakool, M.D.  
Satimai Aniwan, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 75 year-old-male presented with chronic left lower abdominal quadrant pain. Five months earlier, he had developed left lower abdominal pain and mucous diarrhea for one week. He was diagnosed as acute diverticulitis and treated with antibiotic. His diarrhea resolved however his abdominal pain still persisted. He had no fever and no weight loss. On abdominal examination, he had abdominal tenderness at the left lower quadrant. A compute tomography (CT) scan of abdomen revealed a segmental circumferential bowel wall thickening involving the mid portion of sigmoid colon and distal descending colon. There were also multiple diverticula (Figures 1 and 2). A colonoscopy revealed pus emanating from one of the diverticular orifices (Figures 3 and 4)



*Figures 1 and 2 A CT scan of the abdomen showed a segmental circumferential bowel wall thickening of the sigmoid colon with multiple diverticula (arrow).*



*Figures 3 and 4 Colonoscopy revealed pus emanating from a diverticular orifice (arrow).*

## Diagnosis:

Smoldering diverticulitis

## Discussion:

Diverticular disease has a wide clinical spectrum ranging from asymptomatic disease to symptomatic or complicated diverticular disease.<sup>1</sup> Patients with chronic diverticular disease usually present with chronic abdominal pain which can be misunderstood as irritable bowel syndrome (IBS). Chronic left lower abdominal pain without the document of fever or leukocytosis in patients with a history of diverticulosis defined the term “smoldering diverticulitis”.<sup>2</sup> The diagnosis includes radiologic or endoscopic finding of inflamed diverticula with no evidence of complications such as abscess, obstruction or stricture.<sup>2</sup> Surgical treatment should be preserved only for patients who failed medical therapy.<sup>2, 3</sup>

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## Case 22

Piyapan Prueksapanich, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 70-year-old male presented with iron deficiency anemia. He had chronic constipation with no significant weight loss. A colonoscopy was performed. In a rectal retroflexion view, a 3-centimeter diverticuli was observed at 5 cm from the anal verge (Figures 1 and 2). Under NBI exam, there was a diverticulum with a normal vascular pattern. There was no stigmata of bleeding (Figure 3). The diagnosis was **rectal diverticulum**.



*Figures 1 and 2 In a rectal retroflexion view, NBI showed a 3-centimetered diverticulum at rectum.*



*Figure 3 NBI imaging showed a normal vascular pattern with no stigmata of bleeding.*

## Diagnosis:

Rectal diverticulum

## Discussion:

Diverticulum is not a common finding in the rectum because the rectum is encased in firm musculature tissues and internal pressure is also constant with less peristaltic activity than colon.<sup>1</sup> Unlike colonic diverticulosis, the rectal diverticula are usually solitary and considered to be true diverticula which generally larger than the usual diverticula. They occurred at the point of weakness in the rectal wall. The etiologies include congenital diverticulum and iatrogenic diverticulum developed postsurgical trauma.<sup>1</sup> Most of the rectal diverticula reported in the literature are asymptomatic.<sup>2</sup>

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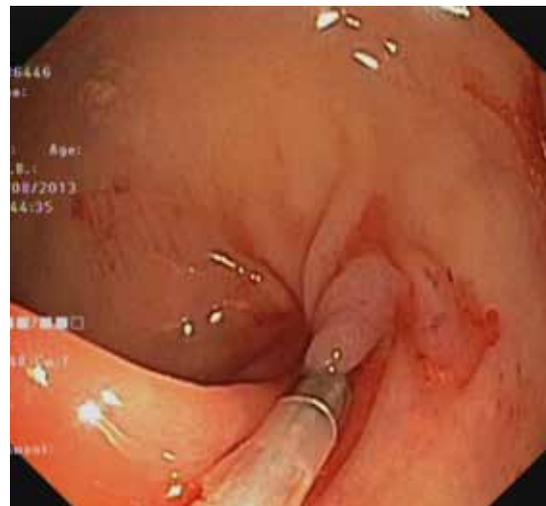
## Case 23

Kessarinn Thanapirom, M.D.  
Satimai Aniwann, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 68-year-old female known case of diabetes mellitus, hypertension, chronic kidney disease presented with hematochezia for 1 day. Colonoscopy showed an active diverticular bleeding from the ascending colon. Endoscopic therapy with adrenaline injection followed by hemocclipping was performed. An immediate hemostasis was achieved.



**Figure 1** Colonoscopic finding of a bleeding diverticulum.



**Figure 2** Adrenaline injection and hemocclipping was done with successful endoscopic hemostasis.

## Diagnosis:

Colonic diverticular bleeding

## Discussion:

Diverticular bleeding is a common cause of lower gastrointestinal bleeding. Patient with diverticular bleeding typically presents with an abrupt onset painless rectal bleeding. The bleeding usually stops spontaneously.<sup>1</sup> In active bleeding, colonoscopy is an important tool for the diagnosis and treatment. Non-surgical treatment modalities include endoscopic treatment and embolization. Results of the endoscopic therapy including hemoclipping, electrocoagulation, endoscopic band ligation with or without adrenaline injection are usually acceptable. The immediate hemostasis can be obtained in 62% -100% of patients with a low rebleeding rate within 30 days.<sup>2-6</sup>

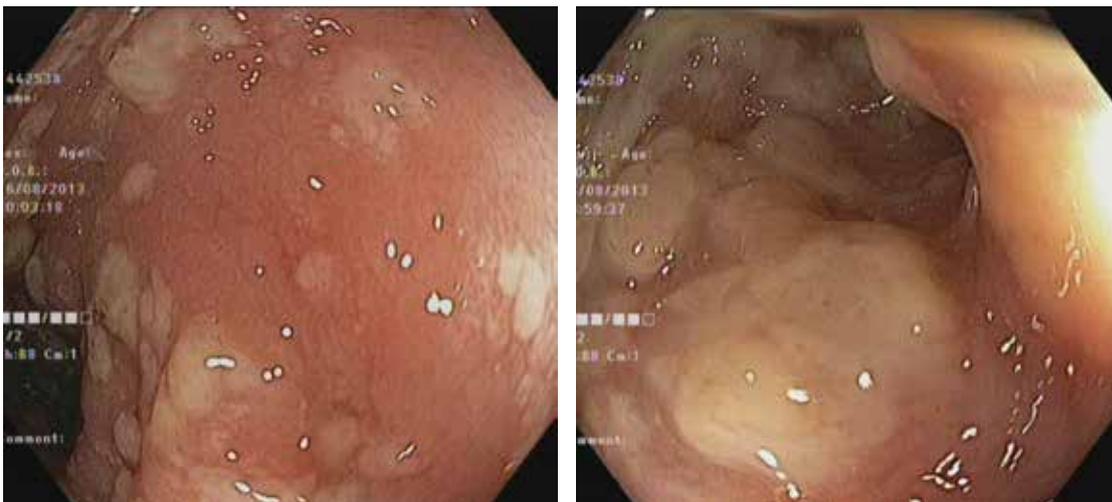
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## Case 24

Suppakorn Malikhao, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 78-year-old female known for malignant histiocytoma of the abdominal wall with lung metastasis was admitted due to severe pneumonia. After receiving an intravenous Meropenem for 2 weeks, she developed fever, abdominal pain, and watery diarrhea. A stool test for clostridium difficile toxins was negative. A sigmoidoscopy found multiple raised whitish plaques from the rectum to sigmoid colon. These plaques ranged in size from small distinct nodules (5–15 mm) to a confluent layer of pseudomembrane overlying the inflamed colonic mucosa. The colonic mucosa also showed erythema, friability and edema (Figures 1 and 2). Biopsy was obtained. Her symptoms improved after a treatment with oral vancomycin.



*Figures 1 and 2 Multiple whitish raised, 5-10-mm plaques overlying an erythematous, edematous mucosa.*

## Diagnosis:

Pseudomembranous colitis (PMC)

## Discussion:

*Clostridium difficile* is the most common pathogen for nosocomial diarrhea. The main risk factors are exposure to antibiotics and exposure to the organism.<sup>1,2</sup> Clinical presentations of *Clostridium difficile* infection include diarrhea, usually nonbloody, and colitis associated with severe abdominal pain with fever.<sup>1</sup> Although stool studies are now widely available, an endoscopic evaluation remains very useful in many aspects such as; for excluding other pathology, for making the diagnosis, and for assessing severity. Colonoscopy has generally been preferred over sigmoidoscopy because the characteristic findings of pseudomembranes may be limited to the right colon in approximately one-third of cases.<sup>1,3</sup> Endoscopic findings usually show characteristic raised yellow-tan or white plaques with contact bleeding. These plaques coalesced to form a layer of pseudomembrane overlying the inflamed mucosa. The colonic mucosa may show erythema, friability, and edema.<sup>4</sup> Other causes of diarrhea which may mimic PMC, are medications/toxin (alcohol, NSAID, gold, etc.), other chronic conditions (inflammatory bowel disease, ischemic colitis) and other infectious colitis (*Campylobacter*, *Salmonella*, *Shigella*, *Escherichia coli* 0157:H7).<sup>3</sup>

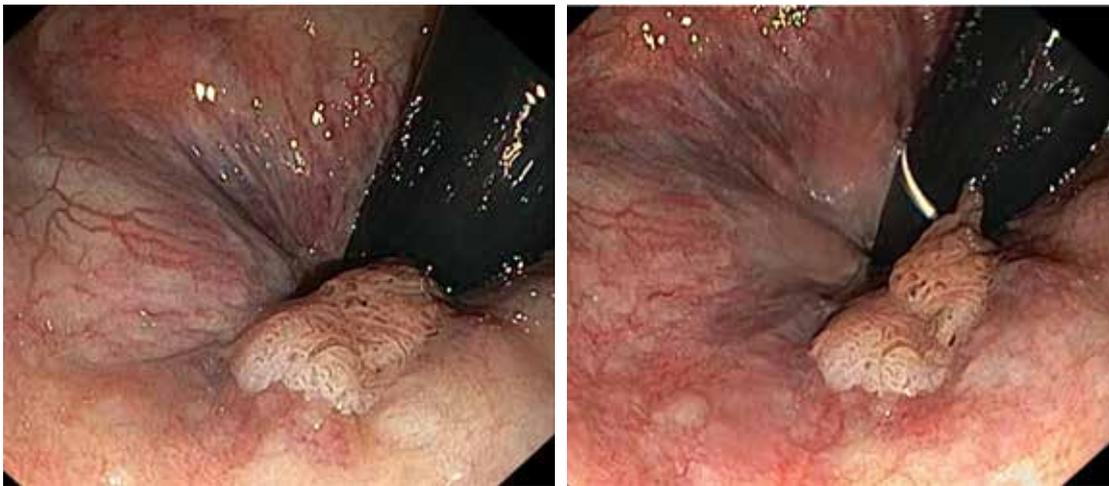
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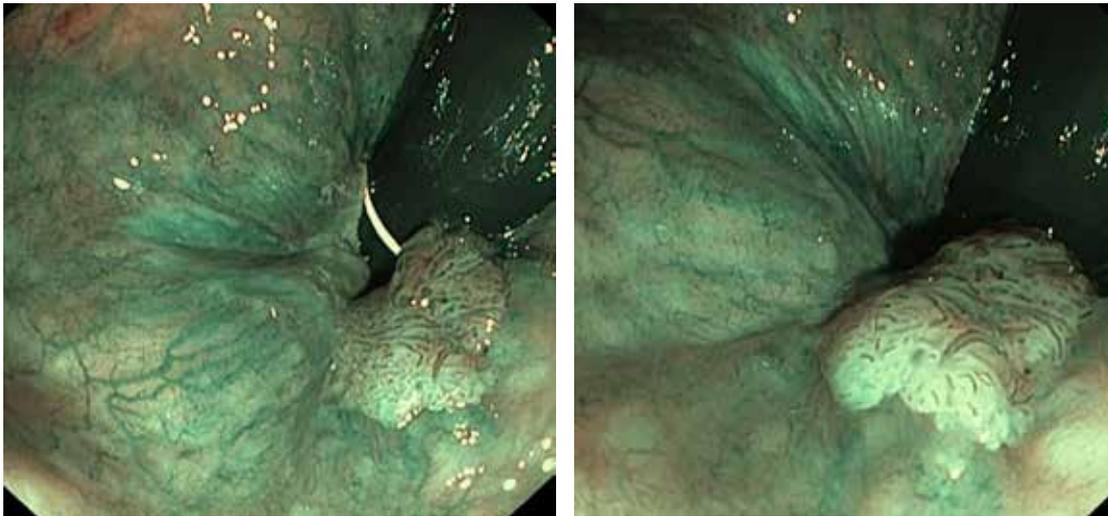
## Case 25

Phonthep Angsuwatcharakon, M.D., M.Sc.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 45-year-old homosexual, non-HIV infected man presented with bright red blood per rectum after defecation. Rectal examination revealed a polypoid nodule in the anal canal with contact bleeding. A colonoscopy was done and revealed a 1-cm. papilliform nodule at the dentate line (Figures 1 and 2). A magnified NBI revealed dilated and elongated microvessels in the papillae (Figures 3 and 4). The other parts of colon were normal.



*Figures 1 and 2 A 1 cm papilliform nodule at the dentate line.*



*Figures 3 and 4 Magnifying NBI revealed dilated and elongated microvessels in the papillae.*

## Diagnosis:

Condyloma acuminatum

## Discussion:

Condyloma acuminatum is caused by human papilloma virus (HPV) infection<sup>1</sup> and associated with the increased risk of anal, penile, cervical, vulva, vaginal, and head and neck cancers.<sup>2</sup> Condyloma acuminata can be diagnosed by inspection of a typical verrucous or villiform appearance. NBI enhanced the vascular structures and demonstrated dilated and elongated microvessels in the papillae, and the papillae of the lamina propria were increased in length.<sup>3</sup> Magnifying NBI is reported to be useful for making a diagnosis of early-stage squamous cell carcinoma associated with HPV infection. The finding of early cancer is irregular intraepithelial papillary capillary loop which is similar to superficial squamous cell carcinoma of the esophagus.<sup>3, 4</sup> In this case, there is no evidence of squamous cell carcinoma by endoscopy or histology.

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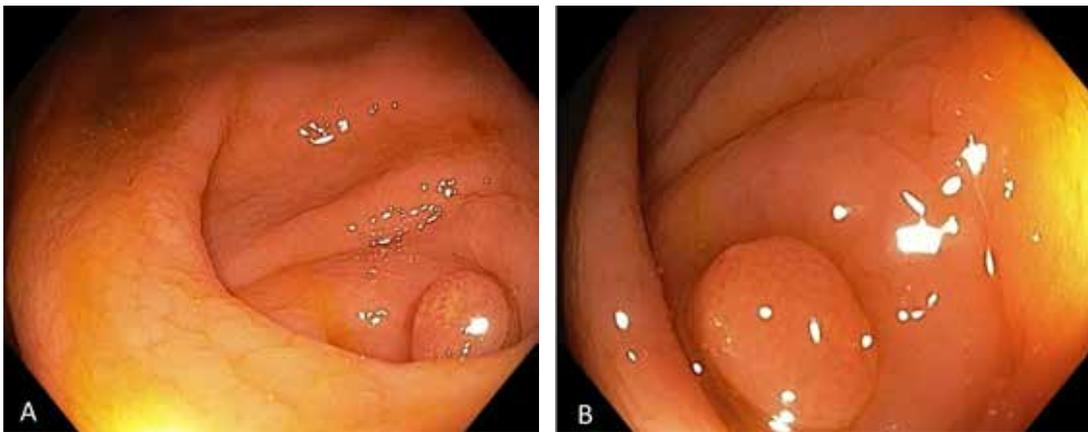
## Case 26

Sasipim Sallapant, M.D.

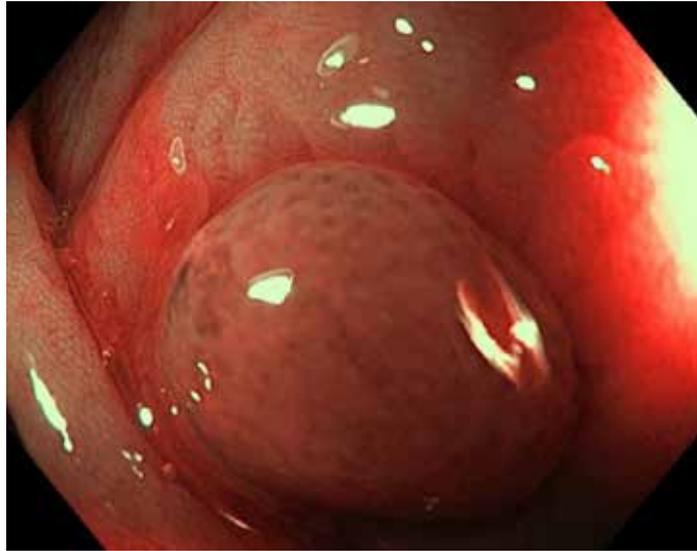
Satimai Aniwon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

An asymptomatic 62-year-old male underwent a colonoscopy for colorectal cancer screening. A colonoscopy showed a 0.5 cm sessile polyp at the appendiceal orifice. Under NBI exam, it showed uniform round pit central with central dark dots (type I Sano's classification) which was compatible with type 1 NICE classification. Snare polypectomy was successfully done without complication. Pathology confirmed as a hyperplastic polyp.



**Figure 1** White light image (A, B) of a 0.5 cm sessile colonic polyp at the appendiceal orifice.



*Figure 2 NBI image of type 1 NICE classification.*

## Diagnosis:

Hyperplastic polyp at the appendiceal orifice

## Discussion:

Hyperplastic polyps are found more common than adenomas. They are usually small and located in the left sided colon without potential for malignancy.<sup>1</sup> NBI international colorectal endoscopic (NICE) classification can be used as a diagnostic tool to predict histology.<sup>2-4</sup> The evaluation of both the vascular pattern and surface pattern are important. However a polypoid inverted appendiceal orifice can mimic a true polyp<sup>5</sup>, but it can easily differentiate from a polyp by using NBI which usually show normal appearing mucosa. Although there was no risk for malignancy in this case, the polyp was removed due to the worry of potential risk for polyp occluding the appendiceal orifice.

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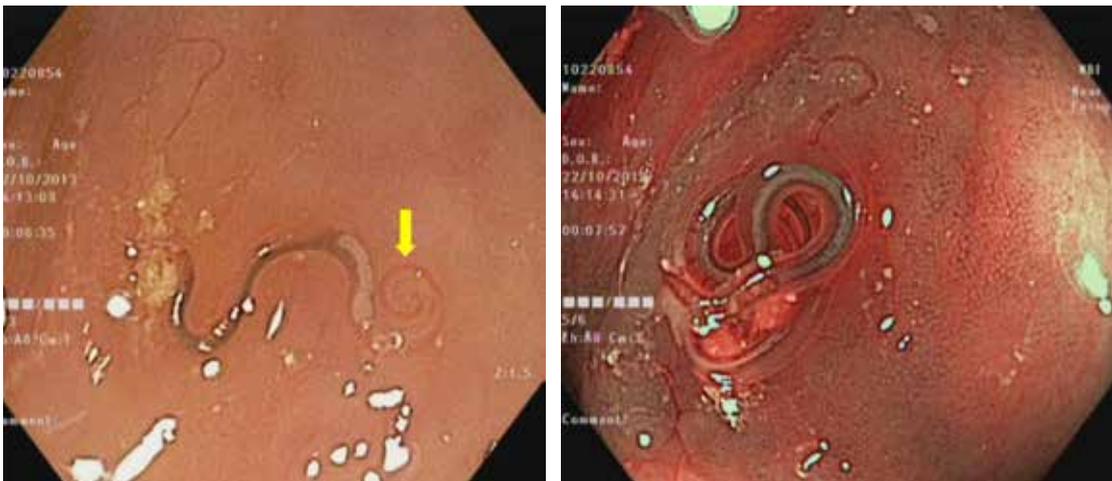
## Case 27

Sasipim Sallapant, M.D.

Satimai Aniwon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A healthy 56-year-old male underwent a screening colonoscopy. A colonoscopy revealed a small slender shape white parasite attached to the descending colon. Its head was embedded in the colonic wall and the tail was coiled liked a whip with wider handles. Under NBI exam, human blood in its body cavity was demonstrated (Figures 1 and 2). The surrounding mucosa was normal. The parasite was removed by a forceps (Figure 3). A microscopic examination demonstrated *Trichuria trichiura*. The patient was treated with an oral albendazole.



*Figures 1 and 2* a movable small whitish worm with coiled tail (arrow) embedded in the descending colon. Under NBI exam, the internal blood was clearly detected.



**Figure 3** The parasite was removed by a biopsy forceps.

## Diagnosis:

*Trichuris trichiura* infestation

## Discussion:

*Trichuris trichiura* or whipworm is known as a soil-transmitted helminth. *T. trichiura* lives in the large intestine and the eggs are passed in the feces of infected person. This infestation is caused by an ingestion of parasite's eggs.<sup>1</sup> The adult worm is 3-4 cm in length and has a thin tapered anterior region. The adult worm invades mucosa and produces localized mild inflammation.<sup>1</sup> Most people with light infestation usually have no symptoms. Only patients with heavy infestation develop nausea, vomiting, abdominal pain, watery or mucus bloody diarrhea. The treatment is either oral mebendazole or oral albendazole.<sup>2</sup>

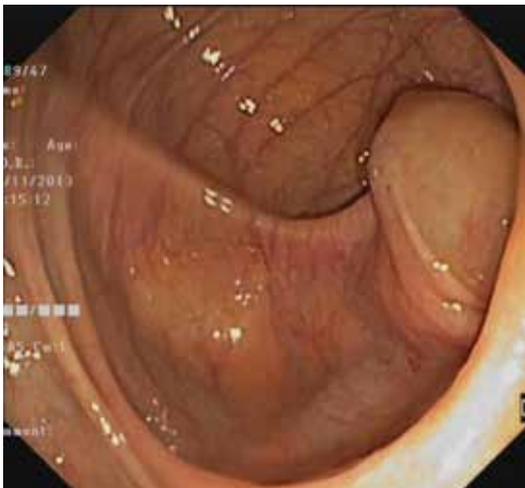
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## Case 28

Piyapan Prueksapanich, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

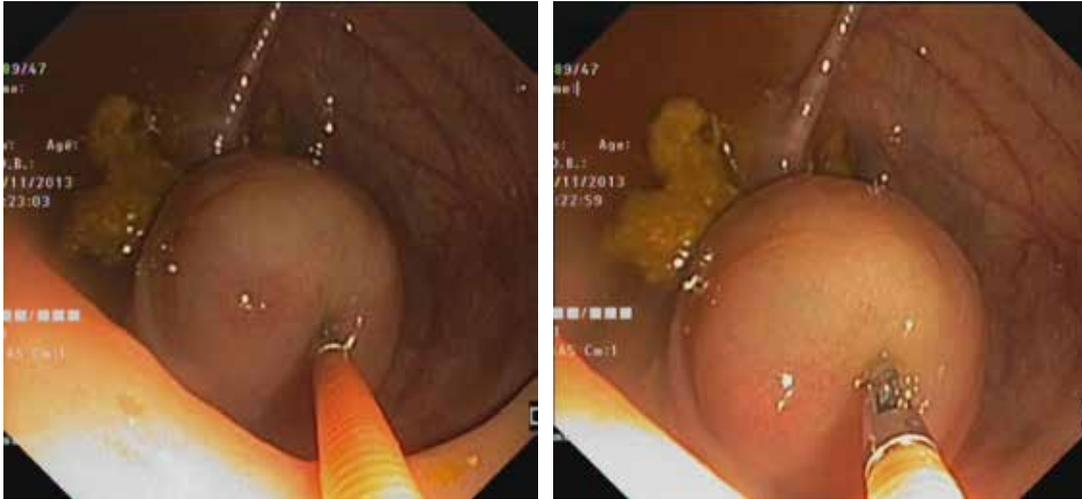
An 80-year-old female presented with iron deficiency anemia. She had no experiences of melena and no family history of colon cancer. She underwent a colonoscopy. Colonoscopy showed a smooth shiny round-shaped submucosal mass at the appendiceal orifice (Figure 1). Under NBI exam, there was no mucosal abnormality (Figure 2). The lesion showed a dimple during poking by a biopsy forceps as shown in Figures 3 and 4. The endoscopic diagnosis was **appendicocoele**.



*Figure 1* A smooth shiny round-shaped submucosal mass at the appendiceal orifice.



*Figure 2* NBI exam showed no mucosal abnormality.



*Figures 3 and 4 A dimple was made by a biopsy forceps.*

## Diagnosis:

Appendicocoele

## Discussion:

Appendicocoele can be an incidental finding or can cause symptoms such as right lower quadrant abdominal pain, intussusceptions, and gastrointestinal bleeding.<sup>1</sup> Appendicocoele was found more frequently in middle-aged women<sup>1</sup>. The etiologies of appendicocoele are appendiceal obstruction and distension, hyperplastic mucocoeles, and mucinous cystadenoma.<sup>2</sup> Endoscopic biopsy is usually not informative because an overlying mucosa is not involved, a miniprobe endoscopic ultrasound (EUS) may be useful to characterize the cystic lesion and to exclude other look-alike solid lesions such as carcinoid, lipoma, or lymphangioma.<sup>2, 3</sup> Surgical treatment is the mainstay of therapy especially in a patient with possible malignancy since there is a potential rupture causing pseudomyxoma peritonei.<sup>4</sup>

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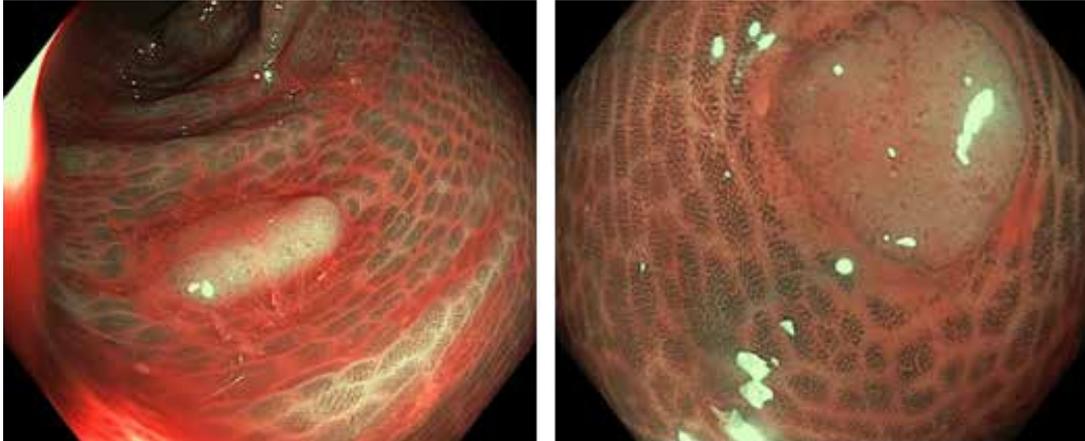
## Case 29

Sittikorn Linlawan, M.D.  
Satimai Aniwon, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 77-year-old female presented with chronic constipation. She used many kinds of laxatives including sennosides to relieve the symptoms. Colonoscopic finding revealed diffuse, dark brown pigmentation from the rectosigmoid junction through the ascending colon and multiple sessile polyps (0.3-0.8 cm in diameter) were found in the sigmoid, descending, and ascending colon (Figures 1 - 4). Notably, all polyps were not stained with the pigment. Polypectomy was done. Histology was compatible with tubular adenoma.



*Figures 1 and 2 diffuse brown pigmentation of mucosa at sigmoid colon with sessile polyps under white light and Narrow band imaging (NBI).*



*Figures 3 and 4 NBI imaging showed a pale, unpigmented lesion on the pigmented background of colonic mucosa.*

## Diagnosis:

Melanosis coli with tubular adenoma

## Discussion:

Melanosis coli is probably the most common pigmentation seen in the intestinal mucosa during endoscopic evaluation especially with history of chronic constipation or long-term use of anthraquinone cathartics (including cascara, senna, aloes and rhubarb).<sup>1</sup> Anthraquinones damage the colonic epithelial cells causing irreversible injury to the organelles. The apoptotic cells are ingested by macrophages and are converted into brownish pigment in the lamina propria. Previous studies found this substance primarily from lipofuscin, rather than melanin, so it has been suggested to define as “pseudomelanosis coli” or colonic “lipofuscinosis”.<sup>2</sup> Contrast to the adenomatous epithelium, the apoptotic bodies remain in the epithelium because the macrophages can not reach the lamina propria in the adenomatous epithelium. Due to sparing of pigment deposition, it helps to identify the neoplastic colonic lesions such as adenomas or carcinomas.<sup>3-5</sup>

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# ERCP

## Case 1

Puth Muangpaisarn, M.D.

Phonthep Angsuwatcharakon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 61-year-old Thai man presented with progressive painless jaundice and weight loss for 2 months. The CT scan of abdomen revealed a soft tissue mass measuring 1.6 cm at peri-ampullary region with dilated biliary tree, markedly distended gallbladder, and ascites (Figure 1). ERCP was performed for preoperative drainage. Endoscopic findings showed an ulcerative tumor, 2 cm in size, at the ampulla of Vater (Figure 2). The cholangiogram revealed a 1.5 cm distal CBD stricture with marked dilatation of upstream bile duct (Figure 3). A fully-covered self-expandable metal stent (FCSEMS) was inserted across the stricture (Figure 4). Histopathology of the biopsy specimen confirmed as adenocarcinoma of the bile duct.



**Figure 1** CT scan showed a soft tissue mass at peri-ampullary region (black arrow) causing bile duct dilatation.



Figure 2



Figure 3



Figure 4

*Figure 2* An ulcerative mass at the ampulla of Vater.

*Figure 3* Cholangiogram showed a 1.5 cm distal CBD stricture with marked dilatation of upstream bile duct.

*Figure 4* A fully-covered self-expandable metal stent (FCSEMS) was inserted across the stricture.

## Diagnosis:

Ampullary adenocarcinoma underwent preoperative biliary drainage with FCSEMS

## Discussion:

Ampullary adenocarcinoma is one of the differential diagnoses of periampullary malignancies which can cause obstructive jaundice, or nonspecific upper abdominal pain.<sup>1</sup> Ampullary cancer has a better prognosis among all periampullary cancers with five-year survival of 45%. The favorable prognosis of ampullary cancer is associated with early diagnosis, and tumor biology.<sup>2</sup> Pancreaticoduodenectomy is considered to be the standard treatment.<sup>2</sup>

Preoperative biliary drainage in the ampullary cancer reduces the incidence of post-operative wound infection when compare with non-drainage group. However, the median survival and 30-day mortality are not significantly different.<sup>3</sup> In unresectable groups, endoscopic biliary drainage is used for a palliation of obstructive jaundice. When using uncovered metal stent the stent patency and stent malfunction (stent occlusion and stent migration) are not different from using two plastic stents. The median period of stent patency is 132.7 days and 128.5 days in metal stent and plastic stents, respectively.<sup>4</sup>

Fully-covered self-expandable metal stent (FCSEMS) has recently emerged for drainage of malignant distal biliary stricture. The FCSEMS can be used in both operable and inoperable patients, because it can be successfully removed just before the surgery. In palliative purpose, FCSEMS provides the 97% patency rate at 12 months. The common complications of FCSEMS are pancreatitis (10%) and stent migration (7%).<sup>5</sup>

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## Case 2

Puth Muangpaisarn, M.D.

Phonthep Angsuwatcharakon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 77-year-old Thai woman presented with progressive painless jaundice and weight loss for 2 months. The CT scan showed dilated bile duct and pancreatic duct without an obvious cause of obstruction, there were numerous subcentimeter, intra-abdominal lymph nodes (Figure 1). Endoscopy revealed a bulging ampulla with a 2 cm mass at the major duodenal papilla (Figure 2). Biliary cannulation via major papilla was unsuccessful. The endoscopic ultrasound (EUS) revealed no peri-lesion vascularity and cholangiogram was performed with 20G needle. The cholangiogram demonstrated dilated CBD with distal CBD stricture, 1.5 cm in length (Figure 3). Then the scope was switched to a side-viewing duodenoscope to perform supra-papillary drainage by using needle knife followed by 7 Fr. Soehendra dilator, and non-covered SEMS was inserted through the choledochoduodenostomy. The double pigtail plastic stent was inserted in the metallic stent to prevent stent migration (Figure 4).



*Figure 1* CT scan revealed double duct sign without demonstrable cause of obstruction.



**Figure 2**



**Figure 3**



**Figure 4**

**Figure 2** Side-viewing duodenoscopy revealed an ampullary mass with bulging ampulla.

**Figure 3** EUS-guided cholangiogram revealed dilated CBD with 1.5 cm stricture at distal CBD.

**Figure 4** SEMS and pigtail stent was inserted across the choledochoduodenostomy.

## Diagnosis:

EUS guided suprapapillary drainage after failed conventional ERC in Ampullary tumor

## Discussion:

Endoscopic retrograde cholangiography (ERC) is the major procedure for biliary drainage. But some patients could not achieve drainage by ERC because of altered anatomy (e.g. Roux-en-Y, gastric outlet obstruction) or technical reasons (e.g. failed cannulation, failed guide-wire access beyond the stricture, or failed stent insertion).<sup>1</sup> Endoscopic ultrasound (EUS) has been used as the salvage therapy. EUS guided choledochoduodenostomy (EUD-CDS) is one of three types of EUS-guided

biliary drainage. Prospective study showed that insertion of plastic stent in EUS-CD had technical and functional success rates of 94% and 100%, respectively. Median duration of stent patency is 272 days.<sup>2</sup> The recent study in EUS-CDS with FCSEMS showed the technical success rate of 86.7% and the functional success rate of 100%. Additionally, the mean duration of stent patency was 264 days. Therefore EUS-CD is feasible and effective for biliary tract obstruction.<sup>3</sup>

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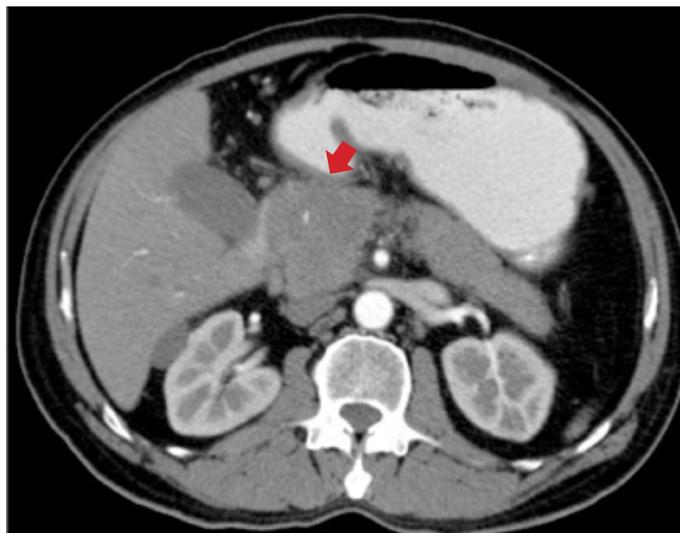
## Case 3

Puth Muangpaisarn, M.D.

Phonthep Angsuwatcharakon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

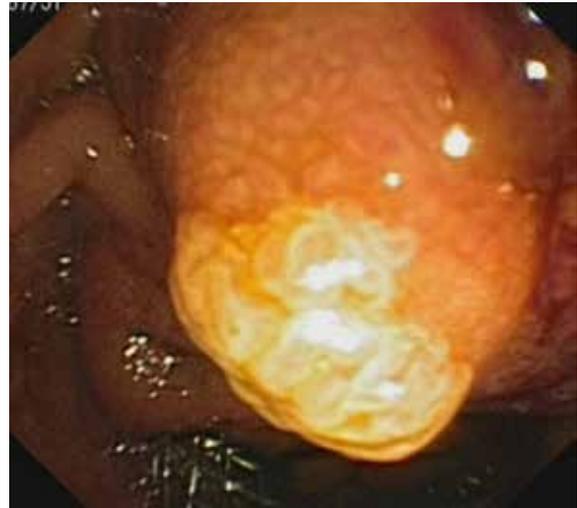
A 65-year-old Thai male presented with non-specific epigastrium pain, progressive painless jaundice, and weight loss for 3 months. The CT scan of abdomen revealed an ill-defined hypodensity mass, 5.8x5.3 cm in size, at the head of pancreas with common bile duct and pancreatic duct dilatation (Figure 1). The mass encased SMV, and partially compressed duodenal bulb. The endoscopy showed normal major duodenal papilla (Figure 2), and prominent minor duodenal papilla (Figure 3). The cholangiogram revealed a malignant stricture at distal CBD, 4 cm in length, with proximal dilatation of the bile duct (Figure 4). A SEMS was inserted across the stricture and good bile flow was achieved (Figure 5). EUS-guided FNA was done later and the histopathology confirmed as pancreatic adenocarcinoma.



*Figure 1* The CT scan of abdomen revealed an ill-defined hypodensity mass at the head of pancreas.



**Figure 2** Endoscopy showed normal size but congested major duodenal papilla.



**Figure 3** Endoscopy showed prominent minor duodenal papilla (noted a metallic stent was already inserted via major papilla).



**Figure 4** Cholangiogram showed a 5 cm long malignant distal CBD stricture.



**Figure 5** After SEMS deployment, good bile flow was observed.

## Diagnosis:

Unresectable pancreatic cancer underwent endoscopic drainage with prominent minor papilla

## Discussion:

More than 80% of pancreatic cancer patients presented at advanced stage of the disease.<sup>1</sup> Approximately 70% of pancreatic adenocarcinomas were located at the head of pancreas and caused any degree of biliary compression.<sup>2</sup> Endoscopic biliary drainage is one of the choices for palliative drainage with favorable short-term success rates (80-90%). The minor duodenal papilla receives pancreatic fluid mainly from the head of pancreas.<sup>3</sup> In cases of obstruction or decreased flow of the main pancreatic duct, eg. pancreas divisum, chronic pancreatitis, or pancreatic head cancer, the minor papilla might be prominent.

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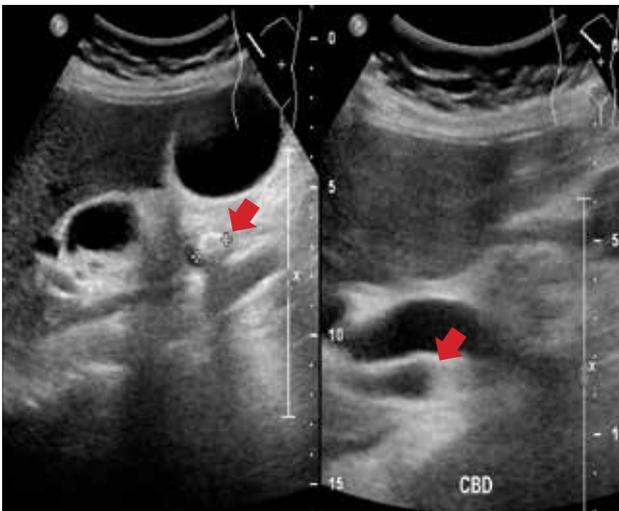
## Case 4

Piyapan Prueksapanich, M.D.

Phonthep Angsuwatcharakon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 67-year-old female with diabetes mellitus, hypertension and dyslipidemia presented with biliary pain for 3 days and high grade fever for a day. She had the similar, episodic pain since 5 years ago. She had no history of alcohol abuse. Her abdomen was mildly tender without guarding. The Murphy's sign and Fist test were negative. Abdominal ultrasonography showed a dilated common bile duct and a 1.3 cm round hyperechoic lesion with acoustic shadow at the distal part of the common duct (Figure 1). Gallbladder appeared normal without gallstone. ERCP was performed and revealed a bulging ampulla with an impacted, white stone at the major duodenal papilla (Figure 2). A free-handed precut sphincterotomy over the stone with a needle knife exposed a large whitish stone clogging the ampulla. Via common bile duct sweeping, stone removal was unsuccessful (Figure 3). A pancreatogram showed few filling defects within the dilated pancreatic duct. The obstructing 2-cm stone was removed via pancreatic duct sweeping. The remaining pancreatic duct stones were successfully removed by repeat balloon extraction (Figures 4 and 5). The final cholangiogram showed an upstream-dilated common bile duct without any filling defect (Figure 6).



*Figure 1: Abdominal ultrasonography showed a 1.3 cm dilatation of the common bile duct and a 1.3 cm round hyperechoic lesion with acoustic shadow at the distal part of the common duct.*



**Figure 2** Side-viewing duodenoscopy revealed a bulging ampulla.



**Figure 3** Free-handed precut sphincterotomy over a stone with a needle knife exposed a large whitish stone clogging the major duodenal papilla tightly.



**Figures 4 and 5** Stone clearance via pancreatic duct was able to remove a 2 cm oval stone.



*Figure 6 The following cholangiogram showed an upstream-dilated common bile duct without any filling defect.*

## Diagnosis:

Pancreatic duct stone causing biliary obstruction and acute cholangitis.

## Discussion:

An impacted pancreatic duct stone is a rare cause of obstructive jaundice which has been reported for only less than 10 cases to date.<sup>1,2</sup> Malunion of pancreatobiliary ducts may be one of the possible causative mechanisms in these patients.<sup>2</sup> Successful endoscopic treatment with a pre-cut papillotomy using a needle knife had been reported.<sup>3</sup> In this case, the color of stone is a clue to differentiate between pancreatic and biliary stones. A pancreatic duct stone is mainly composed of calcium carbonate without bile pigment resulting in chalk-white color,<sup>4</sup> whereas pigmented biliary stone have concentric layered pigment resulting in brown or black color. A cholesterol biliary stone has bile stain resulting in yellow color.<sup>5</sup>

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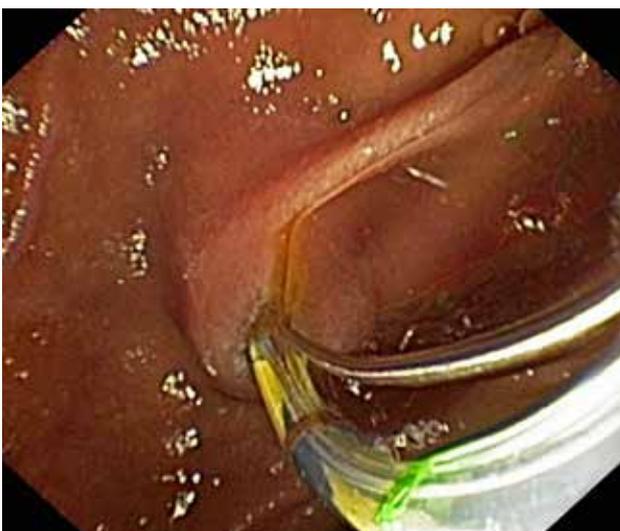
## Case 5

Piyapan Prueksapanich, M.D.

Phonthep Angsuwatcharakon, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

An 85-year-old male who had experienced an episode of acute cholecystitis was admitted for an elective laparoscopic cholecystectomy. Due to severe adhesion, only partial cholecystectomy could be performed and the patient was complicated with bile leakage after surgery. Endoscopic retrograde cholangiogram (ERC) was performed and showed a contrast extravasation from the remnant of gallbladder with no intraductal filling defect in the biliary tree (Figures 1 and 2). Endoscopic sphincterotomy was done and a fully covered self-expandable metal stent (FCSEMS) was inserted to seal the leakage (Figure 3). The proximal tip of the FCSEMS was above the cystic duct insertion which resulted in an immediate closure of the cystic duct leakage as shown in the final cholangiogram. After the procedure, the patient had no further bile leakage and the draining tube was removed.



*Figures 1 and 2* Endoscopic retrograde cholangiogram (ERC) was performed and showed contrast extravasation from the remnant of gallbladder with no intraductal filling defect in the biliary tree.



*Figure 3*

*Figure 3* FCSEMS was inserted into the common bile duct after endoscopic sphincterotomy.

*Figures 4 and 5* The proximal tip of the FCSEMS was above the cystic duct insertion which resulted in an immediate closure of the cystic duct leakage.



*Figure 4*



*Figure 5*

## Diagnosis:

FCSEMS for a large cystic duct leak

## Discussion:

Biliary leakage is an early complication after cholecystectomy which its incidence has been reported to be 0.1-0.5% after conventional open cholecystectomy and up to 3% after laparoscopic cholecystectomy especially during the learning curve<sup>1</sup>. The biliary leakages can be resulted from common bile duct injuries, cystic duct stump leaks with or without bile duct stone(s), or leakage from ducts of Luschka. The leakages are usually treated successfully with endoscopic measures such as

biliary sphincterotomy (in patients having normal common bile ducts), biliary stent placement, and nasobiliary drainage which results to reduction of the transpapillary pressure gradient and the leakage can be healed spontaneously. ERCP can be done safely within 24 hours after LC with a high success rate.<sup>2</sup> Internal stents are usually left for 30 days.<sup>3</sup> The use of nasobiliary drainage is decreasing because of its risk for displacement, epistaxis, collapse of the tube and the patients' discomfort. Traditionally, surgery is reserved for major duct leakages due to bile duct transection, complete obstruction by clips, and leakage that failed to improve after endoscopic treatment.<sup>1,4</sup> Recently, FCSEMS has been introduced as another salvage therapy before considering surgery since it can provide a high success rate in a case with complex bile leak or failed treatment with plastic stent.<sup>5</sup>

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## Case 6

Puth Muangpaisarn, M.D.

Phonthep Angsuwatcharakon, M.D., M.Sc.

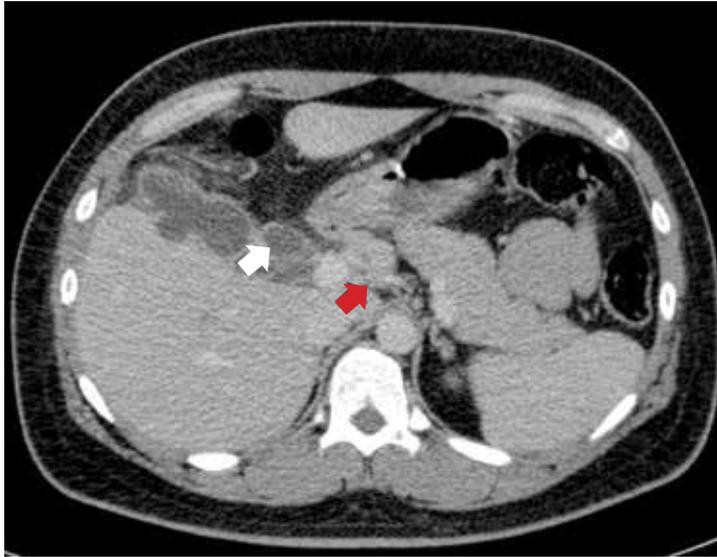
Pradermchai Kongkam, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 25-year-old Thai man had intermittent biliary pain for 2 months, later he developed fever with chills one day before admission. Physical examination showed icteric sclera, tenderness at right upper abdomen with positive Murphy's sign. Upper abdominal ultrasonography revealed a distended gallbladder with a 1.2 cm gallstone (Figure 1). Common bile duct (CBD) measured 1.2 cm in diameter without dilation of intrahepatic bile ducts. CT scan of the upper abdomen revealed focal disruption of posterior gallbladder wall with small locolated pericholecystic collection (Figure 2). ERCP was performed. Cholangiogram revealed a 1.5 cm external compression effect at mid common duct causing upstream dilatation of bile ducts (Figure 3). The contrast did not fill the cystic duct or gallbladder despite vigorous contrast injection. There was no filling defect in biliary tree. A 10-Fr double pigtail plastic stent was placed across the stricture (Figure 4). His symptoms improved after the procedure.



**Figure 1** A hyperechoic material with posterior acoustic shadow in the gallbladder. This was consistent with a gall stone.



**Figure 2** Focal disruption of the posterior gallbladder wall (white arrow) with small loculated pericholecystic collection (red arrow).



**Figure 3** Extrinsic compression of mid-bile duct with upstream dilatation of biliary tree (white arrow).



**Figure 4** Plastic stent was placed across the stricture.

## Diagnosis:

Mirizzi's syndrome type I with concealed ruptured of gallbladder.

## Discussion:

Mirizzi's syndrome is an uncommon complication of cholelithiasis. The reported incidence was 1.07% in the patients underwent ERCP.<sup>1</sup> Mirizzi's syndrome consists of external compression of the bile duct from impacted stone in the cystic duct. It may lead to cholecystobiliary and cholecystoenteric fistulas. The syndrome is caused by an acute or chronic inflammatory condition secondary to gallstone impacted in the Hartmann's pouch or infundibulum or cystic duct. Predisposing factors are a long cystic duct; parallel to the bile duct, and a low insertion of the cystic duct into the bile duct.<sup>2</sup> The most common clinical manifestation is obstructive jaundice (60%-100%), followed by abdominal pain over the right upper abdominal quadrant (50%-100%), and fever.<sup>3</sup> The diagnostic accuracy of Mirizzi syndrome by ERCP was 55% to 90%. Typically, cholangiogram shows narrowing or curvilinear extrinsic compression involving the lateral portion of the distal common hepatic duct with proximal ductal dilatation and normal distal caliber.<sup>2</sup> Specific treatments are biliary stenting for temporarily drainage of the obstruction then followed by cholecystectomy.

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## Case 7

Sayamon Kimtrakool, M.D.

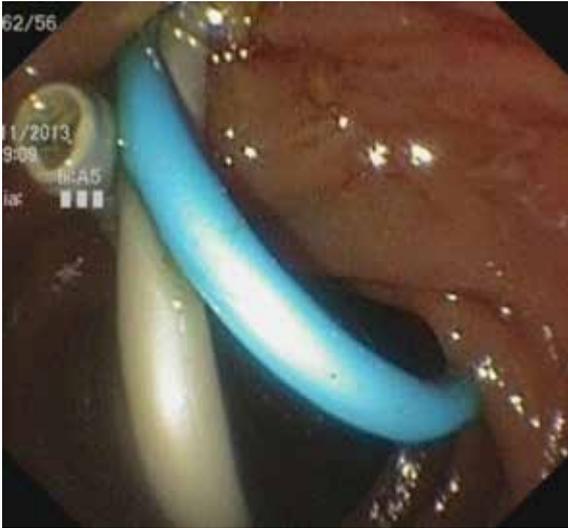
Phonthep Augsuwatcharakorn, M.D., M.Sc.

Rungsun Rerknimitr, M.D.

A 73-year-old woman presented with fever, right upper abdominal pain, and jaundice for 3 days. Physical examination revealed marked jaundice with high grade fever, and tenderness at right upper quadrant. Ultrasonography of the upper abdomen showed diffusely dilated intrahepatic ducts and common bile duct (CBD) was 1.0 cm. in diameter. Endoscopic retrograde cholangiopancreatography (ERCP) was performed.



*Cholangiogram (Figures 1, 2 and 3) revealed cholecystocholedochal fistula with 2 cm filling defect in common bile duct, dilatation of common hepatic duct, and contracted gallbladder.*



*Endoscopic view of ERCP (Figure 4) showed a 10-Fr double pigtailed was inserted into left intrahepatic duct and another 7-Fr double pigtail stent was inserted into the cystic duct.*

## Diagnosis:

Mirizzi's syndrome type IV

## Discussion:

Mirizzi's syndrome is a rare complications of symptomatic gallstone disease.<sup>1</sup> Inflammatory process together with gallstones obstruction at neck plays an importance role to develop this conditions.<sup>2</sup> Mirizzi's syndrome was classified into 4 types according to Csendes's classification by different degrees of cholecystocholedochal fistula.<sup>3</sup> Mirizzi's syndrome type IV, fistula involves complete destruction of the common biliary ducts wall, is an uncommon type with reported incidence about 4%.<sup>4</sup> Diagnosis was made during ERCP by demonstration of fistula between gallbladder and bile duct wall. Surgical intervention is a treatment of choice for definite treatment. Partial cholecystectomy and T-tube placement in distal common duct should be done in robust bile duct tissue.<sup>3</sup> Roux-Y reconstruction was performed for patients with unsatisfactory destruction of bile ducts tissue.<sup>3</sup>

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# EUS

## Case 1

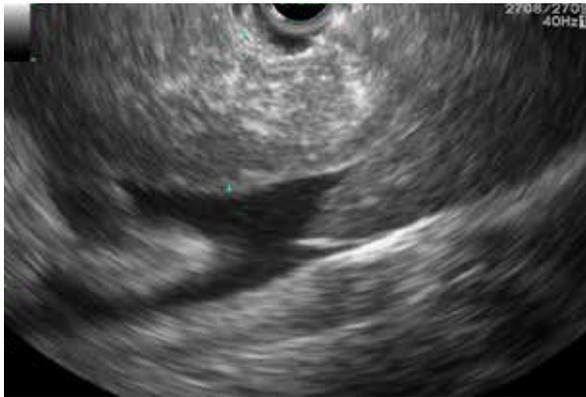
Piyapan Prueksapanich, M.D.  
Pradermchai Kongkam, M.D., M.Sc.

A 72-year-old female patient presented with abdominal distention for 14 days. No significant past medical history. Physical examination revealed mild abdominal distention. Abdominal CT demonstrated thickening gastric wall and omental cake. EGD showed thickening gastric fold with negative endoscopic mucosal biopsy. EUS was scheduled for an evaluation of gastric lesions and tissue diagnosis. It revealed a heterogeneous hypoechoic mass infiltrating the whole layer of gastric wall (Figure 1). It also demonstrated ascites, lymph nodes and omental cake (Figure 2). EUS guided trucut biopsy was performed with a 19G needle. Preliminary onsite cytopathological diagnosis was suggestive for lymphoma.

**Diagnosis:** Gastric lymphoma

### Discussion:

Thickening gastric fold can be from various causes including linitis plastica, lymphoma, or metastatic cancer. In this patient, endoscopic mucosal biopsy was performed to make a tissue diagnosis, unfortunately, the result was negative. Then EUS guided trucut biopsy successfully provided the tissue diagnosis without any complication. A recent retrospective study recruiting 10 and 21 patients with thickening esophageal and gastric wall, respectively. The EUS guided trucut biopsy with 19G needles reported sensitivity, specificity, PPV, and NPV as 85%, 100%, 100%, and 74 % respectively.<sup>1</sup> In another large series reported the complication rate of EUS guided trucut biopsy to be less than 2%. Additionally, authors concluded that diagnostic rate is higher when lesions are close to the stomach.<sup>2</sup> Therefore, EUS guided trucut biopsy is considered the investigation of choice for thickening gastric wall lesions with negative endoscopic mucosal biopsies.<sup>3</sup>



**Figure 1** Thickening gastric wall with disruption of whole layers.



**Figure 2** Omental cake was demonstrated by EUS.

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## Case 2

Sukprasert Jutaghokiat, M.D., M.Sc.  
Pradermchai Kongkam, M.D., M.Sc.  
Naeuemon Wisedopas, M.D.,

A 32-year-old female patient presented with mild abdominal pain for 2 months. No significant medical history. Physical examination was unremarkable. An abdominal ultrasound suspected a pancreatic mass. Abdominal CT scan demonstrated a hypodensity solid mass in the head of pancreas (Figure 1). The mass measured about 3.1x3.9x4.1 cm in diameter. It was a heterogeneous enhancing mass. No vessel invasion. No peri-lesional lymph node was seen. Serum Ig G4 was 120 mg/dl.

EUS examination demonstrated a well-defined, irregular boarder, heterogeneous hypo-echoic mass measuring 34x30 mm in diameter (Figure 2). A few tiny calcified spots were seen inside the mass. There was an area of hypo-echoic area measuring about 20x17 mm in diameter inside of the mass. No vessels invasion was seen. No lymph node was seen. The patient underwent Whipple surgery. Pathology showed findings consistent with the solid pseudopapillary tumor of the pancreas (Figures 3 and 4).

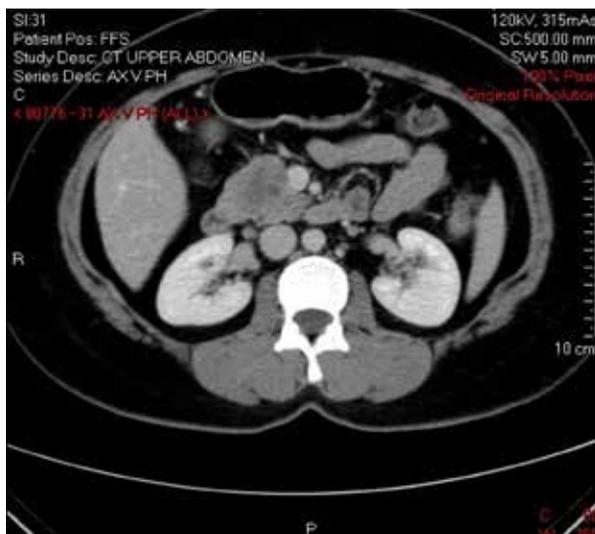
### Diagnosis:

Solid Pseudopapillary Tumor of the Pancreas (SPT)

### Discussion:

Solid pseudopapillary tumor of the pancreas (SPT) can be either benign or low malignant potential tumor of the pancreas.<sup>1</sup> The tumor occurs predominantly in women as shown in a study of 96 patients by Buetow and colleagues which recruited 56 patients with solid pseudopapillary tumor of the pancreas.<sup>2</sup> The study reported that more than 90% of patients were female. Mean age of patients is around 30 years.<sup>1,3</sup>

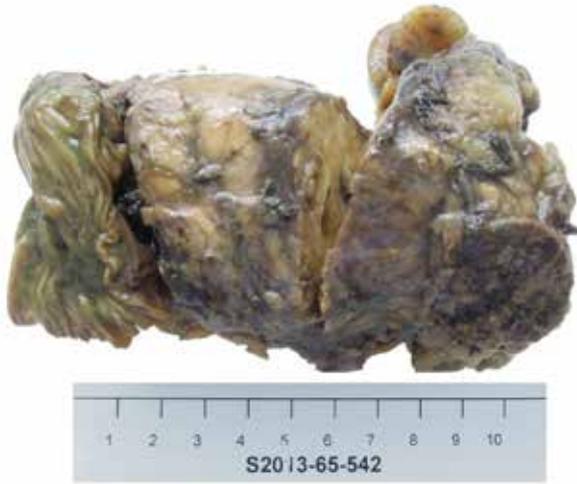
Typically, the tumor is larger than 30 mm in diameters at time of presentation. Radiologically, the tumor is an encapsulated mass with heterogeneous enhancement including some cystic space and solid component. In our case, the tumor is a well encapsulated mass with heterogeneous enhancement. Endosonographically, it was a well-defined boarder, encapsulated, hypo-echoic solid lesions with irregular margin. Deep hypoechoic area was seen inside the mass. This is likely the beginning of cystic degeneration of the mass. This area could not be noted in CT scan which reflects superiority of EUS over CT scan. The lesion was located in the head of the pancreas without obstruction of the main pancreatic duct, no side branches dilation. In a recent cases series, EUS-FNA can provide preoperative diagnosis of SPT in all 3 cases.<sup>4</sup> In our case, we decided not to perform FNA as it was felt that the lesion anyway required surgical removal.



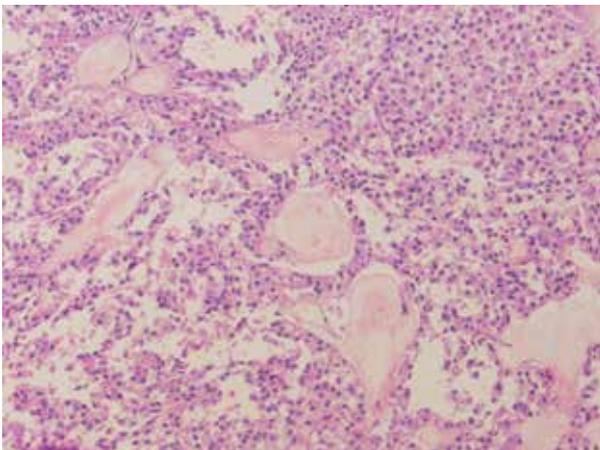
*Figure 1* A heterogeneous hypodensity mass in the head of pancreas.



*Figure 2* A heterogeneous hypoechoic mass with a few calcified spots and deep hypoechoic lesions are found inside.



**Figure 3** Gross surgical specimen of the mass.



**Figure 4** Histology reveals a circumscribed mass composed of solid sheets of uniform bland looking cells admixed delicate blood vessels that are surrounded by myxoid material.

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## Case 3

Puth Maungpaisarn, M.D.

Phonthep Angsuwatcharakon, M.D., M.Sc.

Pradermchai Kongkam, M.D., M.Sc.

A 66-year-old male patient presented with jaundice. He denied significant medical history. CA 19-9 level was 486 IU/mL. CT scan revealed a solid pancreatic mass measuring about 3 cm in diameter at the head of pancreas causing distal bile duct obstruction with upstream dilation of the bile duct (Figure 1). No main pancreatic ductal dilation was seen. The mass was considered potentially resectable. EUS was scheduled for an evaluation of the lesion and tissue diagnosis. It revealed a solid-cystic mass measuring 54x44 mm in diameter at the head of pancreas with communication with non-dilated main pancreatic duct (Figures 2 and 3). The mass located closed to the main portal vein (Figure 4). Endosonographic diagnosis was intraductal papillary mucinous neoplasm (IPMN) of the pancreas.

Impression: Intraductal papillary mucinous neoplasm (IPMN)

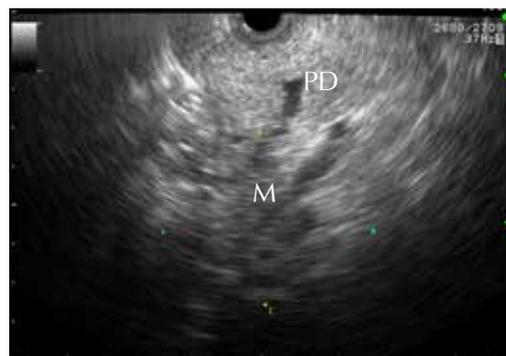
### Discussion:

IPMNs are classified into 3 types; main duct type, branch duct type, and mixed type.<sup>1</sup> Surgical removal is recommended in majority of IPMNs. Resection of IPMNs before the development of invasive carcinoma is a curative treatment. However, according to an international consensus of group of experts in 2006 (the Sendai Consensus Guidelines), branch duct type IPMN should be resected only one of more of the following features present; symptomatic cyst, main pancreatic duct dilation more than 10 mm, diameter of cyst larger than 30 mm, presence of mural nodules and suspicious of positive cytology for malignancy from cystic fluid.<sup>2</sup> Later on, the guideline was revised in 2012. The recent one classified IPMN in to high-risk lesions and equivocal ones. For lesions with high-risk features, surgical resection is

recommended. Those features include obstructive jaundice in a patient with a cyst in the pancreatic head, enhancing solid component of the cyst, and main pancreatic duct dilatation  $\geq 10$  mm. In this patient, the lesion caused obstructive jaundice and contained solid component. Thus, surgical resection is the recommended treatment of choice for this patient.<sup>3</sup>



**Figure 1** A multiloculated pancreatic cyst at the head of pancreas.



**Figure 2** Communication of the main pancreatic duct (PD) with the mass (M).



**Figure 3** Cystic component of the solid-cystic mass.



**Figure 4** The solid-cystic mass (M) located close to portal vein (PV) and pancreatic duct (PD).

## References

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## Case 4

Piyachai Orkoonsawat, M.D.  
Pradermchai Kongkam, M.D., M.Sc.

A 49-year-old female patient presented with back pain. She has a past medical history of cervical cancer stage IIB diagnosed 9 months ago and treated with concurrent chemo-radiation. CT showed a heterogeneous enhancing mass measuring 27x18 mm in diameter with minimal calcification abutting lesser curve of gastric body and superior aspect of pancreatic tail. EUS revealed a well-defined border, heterogeneous hypoechoic solid mass measuring 16x14 mm in diameter adjacent to tail of the pancreas (Figure 1). The pancreas and the spleen appeared unremarkable (Figure 2). EUS-FNA was performed with a 22G needle (Olympus) without suction. Bloody content was shown. Final cytopathological diagnosis was accessory spleen.

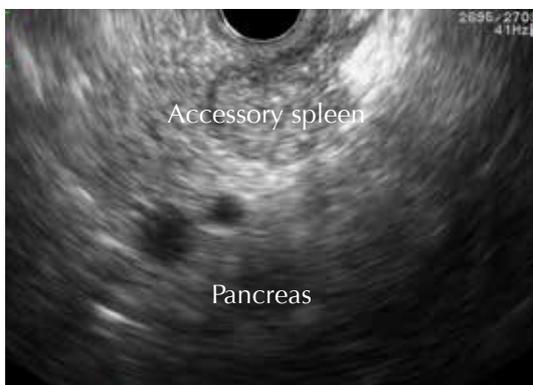
Impression: Accessory Spleen

### Discussion:

Accessory spleen is a congenital anomaly caused by failure of the splenic remnant to fuse with the spleen during embryology. It can be found in 10–15% of the general population, mainly without any symptom. Anatomically, it can be either a lesion connecting to the main spleen or a separate nodule. In general, lesions are usually smaller than 2 cm; however, they can be as large as the spleen.<sup>1</sup> About 80% and majority of the rest of accessory spleens located adjacent to the splenic hilum and tail of the pancreas, respectively. However, occasionally, they can be along the course of the splenic artery or anywhere in the abdominal cavity. Lesions can be either solitary or multiple ones in about 80% and 10% of them, respectively.<sup>2</sup>

Intrapancreatic accessory spleens are solid, well-defined, hypervascular lesions by CT scan. Such lesions should be differentiated with well-differentiated

adenocarcinoma, mucinous cystic neoplasm, solid pseudopapillary neoplasm of the pancreas, neuroendocrine tumor, and metastasis.<sup>3</sup> Endosonographically, the accessory spleens are usually round or oval shaped lesions with regular and sharp margin. They are typically homogeneous echogenic lesions with similar echogenic pattern to the major spleen. The lesions can be either hyperechoic or hypoechoic structure. It is difficult to differentiate from a splenic lobule. In equivocal cases, EUS-FNA can provide the definite diagnosis.<sup>4</sup> Classic cytopathological features are heterogeneous population of lymphocytes, traversing small vascular structures, and a background of mixed inflammatory cells and blood.<sup>3</sup>



**Figure 1** A well-defined heterogeneous hypoechoic mass seen adjacent to the pancreas.



**Figure 2** Similar appearance of the spleen to the lesion.

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## Case 5

Piyachai Orkoonsawat, M.D.  
Pradermchai Kongkam, M.D., M.Sc.  
Rungsun Rerknimitr, M.D.

A 32-year-old male patient presented with hemoptysis, progressive dysphagia and hoarseness of voice for 2 months. Laryngoscopy revealed a right vocal cord paralysis. CT chest showed posterior mediastinal mass measuring 6x5x4 cm in diameter at T1-T4 level with tracheal and esophageal stenosis. Upper endoscopy showed narrowing esophageal lumen from extrinsic compression. EUS showed a well-defined border, heterogeneous hypoechoic mass measuring at least 7x4 cm in diameter. The lesion was located at 18 cm from incisor. Video-assisted thoracoscopic surgery (VATs) was done for get tissue diagnosis. It showed a hypervascular tumor in the upper posterior mediastinum behind superior vena cava. Final pathology revealed poorly differentiated neuroendocrine carcinoma.



**Figure 1** A well-defined border heterogeneous hypoechoic mass measuring 60x43 mm in diameter.

Impression: Mediastinal neuroendocrine tumor

## Discussion:

Evaluation of posterior mediastinal mass usually can be performed by CT chest as it is a non-invasive imaging and widely available. Posterior mediastinal tumors can be lung cancer, lymphoma, tuberculosis, mediastinal cysts, abscess, atrial myxoma, etc.<sup>1</sup> Primary high grade neuroendocrine tumor of the esophagus is rare. A large study recently identified 42 neuroendocrine tumors (3.8%) from 1,105 patients with esophageal tumors.<sup>2</sup> In this series, dysphagia was present in 79% of patients.

EUS and EUS-FNA is a test of choice for an evaluation of posterior mediastinal lesions as it can provide much closer images of lesions and more importantly tissue diagnosis. It is usually used for an evaluation of the mediastinum in patients with lung cancer. However, in a case with narrowing lumen tissue acquisition may not be possible.

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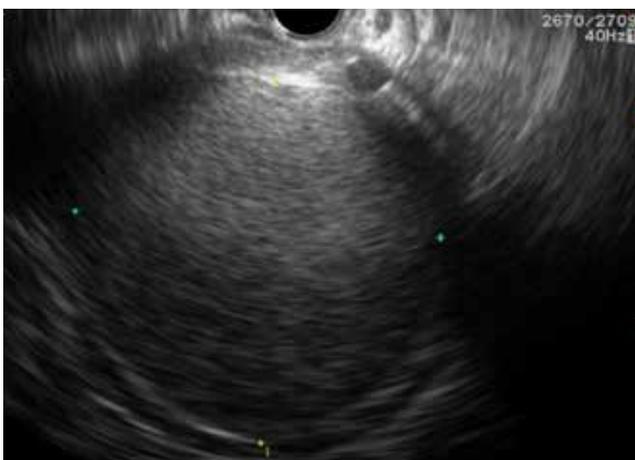
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## Case 6

Sayamon Kimtrakool, M.D.

Pradermchai Kongkam, M.D., M.Sc.

A 43-year-old male patient presented with painless jaundice and epigastric abdominal pain for 1 month. He has lost weight for 5 kg. Physical examination revealed markedly icteric sclera. He has a significant history of alcoholic drinking and smoking. CT scan of the upper abdomen showed a well-defined border, homogeneous hypodense, round lesion measuring 10x6.5x5 cm in diameter in the left upper quadrant abdomen with dilated common and intrahepatic bile duct. EUS showed a pseudocyst measuring 53x53 mm in diameter with internal echogenic material (Figure 1). A 19G needle was used for puncturing into the pseudocyst. Pus was aspirated and sent for culture (Figure 2). A double pigtail plastic stent was successfully placed into the pseudocyst although a double anchor metal stent (Nagi Stent) incidentally migrated into the pseudocyst (Figure 3). Consequently, two days later, the migrated metal stent was successfully removed under endoscopic and fluoroscopic guidance. No post-procedural complication was observed.



**Figure 1** A well-defined border pseudocyst with internal echogenic material inside the cyst.



*Figure 2 Pus was aspirated from the infected pseudocyst.*

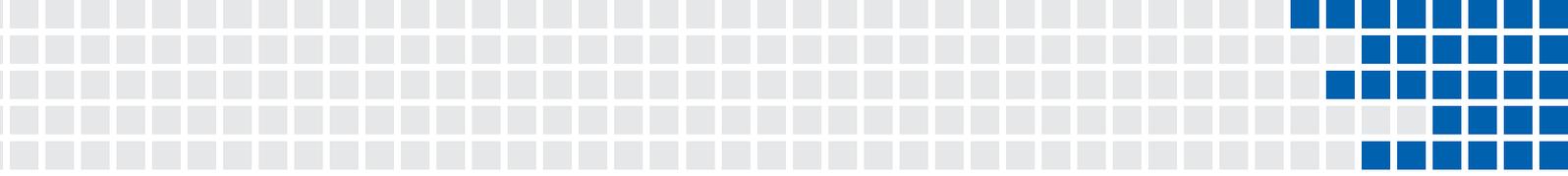


*Figure 3 A double plastic stent was successfully placed.*

Diagnosis: Infected pancreatic pseudocyst

## Discussion:

EUS guided pseudocyst drainage can be performed either by the endoscope under sonographic or fluoroscopic guidance. The endoscopists mostly use a 19G needle to puncture into the pseudocyst via gastrointestinal tract wall. Pseudocyst and lumen will then connect to each other. Subsequently, puncture hole will be dilated to allow stents to be placed across the wall of pseudocyst. The procedure will then be named as a cysto-gastrostomy or cysto-duodenostomy depending upon the connecting organ.<sup>1</sup>



Ultrasound that is used to guide puncturing into pseudocyst provides color doppler flow which is used to check the intervening vessel. This feature is used to avoid unnecessary bleeding from those vessels.<sup>2</sup>

EUS -guided pseudocyst drainage has disadvantage of technical feasibility as the echoendoscope sometimes cannot be placed into the appropriate position to drain pseudocyst. This made the procedure not possible in all cases despite it has lower procedural related complication rate than surgery and lesser infection rate than percutaneous drainage. In fact, side-viewed duodenoscope used for endoscopy guided trans-mural pseudocyst drainage has more appropriate design in order to drain pseudocyst. Therefore, in some cases that pseudocyst cause bulging gastro-intestinal wall and no intervening vessels are expected from CT, the duodenoscope is considered the scope of choice for an endoscopic guided pseudocyst drainage.

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## Case 7

Piyachai Orkoonsawat, M.D.

Pradermchai Kongkam, M.D., M.Sc.

A 60-year-old female patient presented with fever and right upper abdominal pain for three days. A clinical diagnosis of cholangitis was made. Abdominal ultrasound revealed common bile duct (CBD) dilatation, measuring 9 mm in diameter without any stone in the gallbladder. Magnetic resonance cholangiopancreatography (MRCP) showed circumferential thickening distal common bile duct wall without any explainable cause. EUS demonstrated a hyperechoic material with posterior acoustic shadow in the common bile duct (Figure 1). A small gall stone was identified in the gallbladder. Consequently, the patient was diagnosed the common bile duct stone and underwent Endoscopic retrograde cholangiopancreatography (ERCP) for stone removal. The procedure was successful and confirmed the presence of stones in the common bile duct.



**Figure 1** A hyperechoic material measuring about 5 mm in diameter was identified in the common bile duct. This was consistent with a common bile duct stone.



*Figure 2 A stone(GS) was identified in the gallbladders despite negative upper abdominal ultrasound.*

Impression: Choledocholithiasis with cholelithiasis

## Discussion:

Mildly dilatation of the common bile duct can be observed in patients with advancing age.<sup>1</sup> Nevertheless, any bile duct larger than 8 mm in diameter in patients with an intact gallbladder is usually suggestive for possible bile duct obstruction.<sup>2</sup> In order to demonstrate cause of bile duct dilatation, trans-abdominal ultrasound has a relatively poor sensitivity (22%-55%) for detecting common bile duct stones.<sup>3</sup> In fact, ERCP is the gold standard tool for diagnosis and treatment of common bile duct stone. Unfortunately, ERCP is associated with a significant complication rate. In patients with intermediate risk for the presence of common bile duct stone, EUS or MRCP should be utilized first to avoid unnecessary risk of the ERCP procedure.<sup>3</sup> EUS and MRCP has sensitivity and specificity rate at 90% and 99% respectively, for the detection of choledocholithiasis.<sup>4</sup> In this case, both common bile duct and gall stone were missed by MRCP, fortunately, EUS successfully identified stones in both places and this lead to the appropriate treatment for the patient. In fact, a recent study supported that EUS is recommended in cases of inconclusive MRCP in any patients suspected for pancreas and bile duct disease.<sup>5</sup>

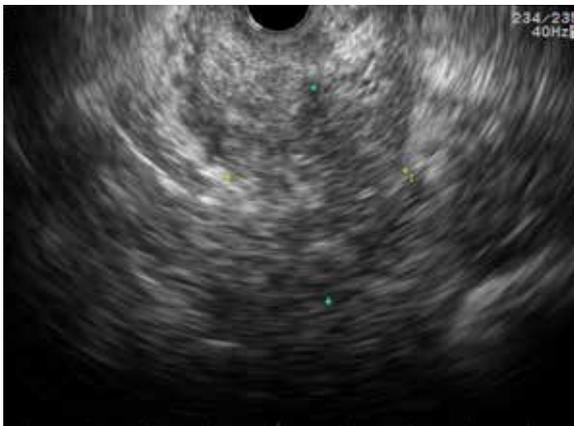
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## Case 8

Piyachai Orkoonsawat, M.D.  
Pradermchai Kongkam, M.D., M.Sc.

A 56-year-old male patient presented with epigastric pain radiating to upper back. He also complained of weight loss for 18 kg over the last 3 months. He has a longstanding history of significant alcoholic drinking and smoking. Abdominal CT scan showed swollen pancreatic head with heterogeneous parenchymal enhancement. The lesion abutted the first part of the duodenum. Serum CA 19-9 level was 8.35 U/L. Differential diagnoses of the mass included pancreatic cancer and mass-forming chronic pancreatitis. EUS showed an ill-defined, heterogeneous hypoechoic mass measuring 31x26 mm in diameter at the head of pancreas (Figure 1). The rest of pancreas appeared unremarkable. Pancreatic duct measured 2 mm in diameter at the body of pancreas. EUS-FNA was performed. Final cytopathology was consistent with chronic pancreatitis.



**Figure 1** An ill-defined heterogeneous hypoechoic mass measuring 35x29 mm in diameter at the head of pancreas.

Impression: Mass-forming chronic pancreatitis

## Discussion:

Preoperative evaluation of solid pancreatic mass is a challenging clinical problem. The mass can be either pancreatic cancer or benign masses including mass-forming chronic pancreatitis, autoimmune pancreatitis, etc. If the diagnosis was wrong, Unfortunate results such as changing early pancreatic cancer to unresectable stage and unnecessary invasive surgery for benign lesion may occur. Multiple technologies are used to ensure that the most likely diagnosis of solid masses was made before surgical decision. CT, MRI, MRCP, EUS and EUS-FNA are commonly used to serve the purpose. EUS can identify smaller pancreatic lesions than CT scan. However, in the setting of chronic pancreatitis, EUS may miss certain lesions.<sup>1</sup> Varadarajulu et al demonstrated the decreased sensitivity rate of EUS-FNA of pancreatic masses in the background of chronic pancreatitis to be at 73%.<sup>2</sup>

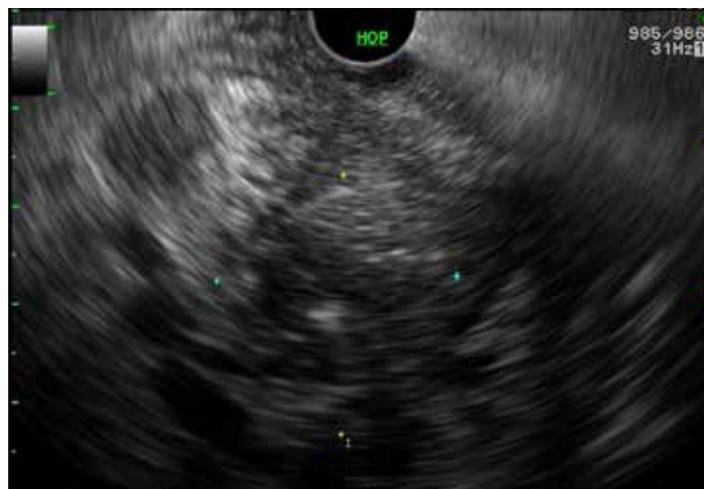
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## Case 9

Piyachai Orkoonsawat, M.D.  
Pradermchai Kongkam, M.D., M.Sc.

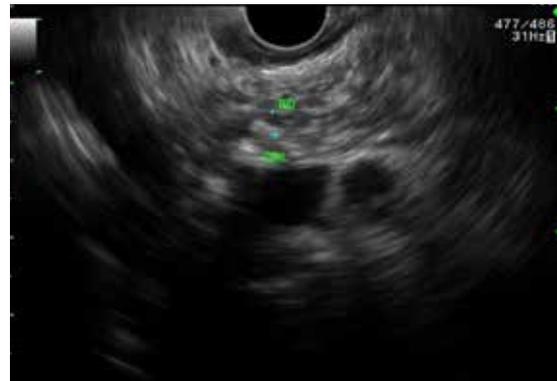
A 36-year-old male patient presented with a history recurrent abdominal pain for five months. He has a significant history of chronic alcoholic drinking and heavy smoking for more than 20 years. Abdominal CT scan showed an ill-defined heterogeneous hypodense area at the head of pancreas, causing diffuse dilatation of intrahepatic and extrahepatic bile ducts. Peripancreatic fluid and fat stranding as well as an enlarged pancreatic head with scattered multiple small calcifications in the parenchyma plus dilated main pancreatic duct were found. EUS demonstrated a calcified mass measuring 26x24 mm in diameter in head of the pancreas (Figure 1). In addition, lobulation, calcification and hyperechoic ductal wall were identified in the entire pancreas (Figure 2 and 3). Main pancreatic duct measured 4 mm in diameter at the head and neck of pancreas. EUS-FNA was done from pancreatic head mass. Cytology was compatible with chronic pancreatitis.



**Figure 1** A calcified mass in the head of pancreas.



*Figure 2 Lobulation of pancreatic parenchyma suggesting chronic pancreatitis.*



*Figure 3 Calcification and hyperechoic ductal wall in pancreatic parenchyma.*

Impression: Chronic pancreatitis

## Discussion:

Early chronic pancreatitis can produce several non-specific symptoms including symptom-free, indigestion and chronic abdominal pain. Diagnosis of early CP can lead to effective treatment of the disease. When attempting to detect the first signs of change in the pancreas using imaging, the various methods used can be divided between non-invasive tests (CT, MRI and plain X-ray) and invasive procedures (ERCP, EUS). The former tests are generally less sensitive than the latter ones. While non-invasive procedures are very effective at determining the later stage of chronic pancreatitis, ERCP and EUS are significantly more sensitive when trying to detect the disease in its infancy. The lower complication rate of EUS when compared to ERCP makes it a far less daunting procedure for the patients.

EUS signs for chronic pancreatitis can be conventionally divided into parenchymal and ductal criteria as followings.

### Parenchymal signs

- Calcification with shadowing
- Echogenic foci without shadowing
- Echogenic strands
- Lobulation
- Cystic change

## Ductal signs

- Main pancreatic ductal stone
- Dilation or irregular contour of main pancreatic duct
- Increase echogenicity of the main pancreatic ductal wall
- Side branches dilation

Based on the results of 2 prospective studies, when more than 2 criteria were found, chronic pancreatitis is likely and having more than 6 criteria is generally accepted as suggestive evidences for the diagnosis of moderate to chronic pancreatitis.<sup>1, 2</sup> This system is currently recognized as the conventional criteria for the diagnosis of chronic pancreatitis.

Later on, an international consensus has weighted each EUS criterion of chronic pancreatitis to major or minor criteria in order to make a more solid diagnosis and standardize terminology. Major criteria included 1) echogenic foci with shadowing and main pancreatic duct calculi and 2) lobularity with honeycombing. Minor criteria included cystic changes, dilated main pancreatic duct  $\geq 3$  mm, irregular pancreatic duct contour, dilated side branches  $\geq 1$  mm, hyperechoic ductal wall, strands, non-shadowing hyperechoic foci, and lobularity with noncontiguous lobules. This consensus has been known as the Rosemont classification and used for diagnosis of chronic pancreatitis in several institutions.<sup>3</sup> This patient was diagnosed as chronic pancreatitis based on EUS findings that full of almost all major and some minor criteria.

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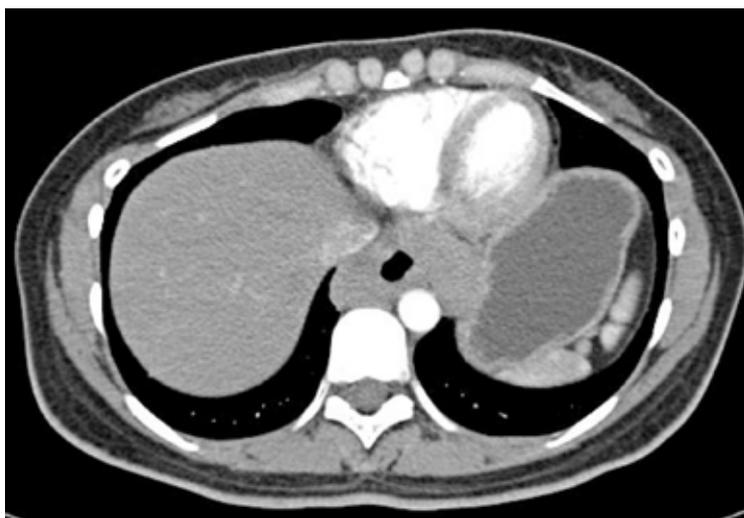
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## Case 10

Sasipim Sallapant, M.D.

Pradermchai Kongkam, M.D., M.Sc.

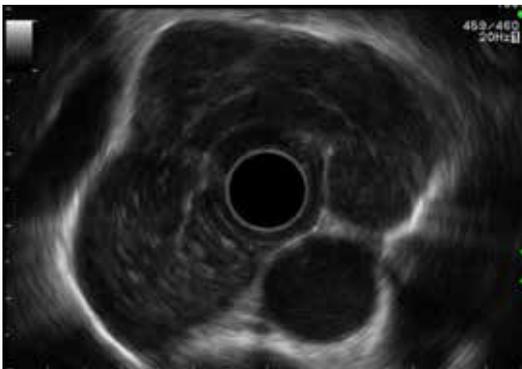
A 31-year-old female patient with ovarian mass underwent a pre-operative evaluation. CT abdomen incidentally demonstrated thickening esophageal wall. CT chest and upper abdomen showed asymmetrical circumferential and lobulated thickening of distal esophageal wall measuring about 62x27 mm in maximum thickness (Figures 1 and 2). Upper endoscopy revealed bulging distal esophageal wall. The endoscope was able to pass into the stomach without any difficulty. EUS revealed a heterogeneous hypoechoic mass occupying approximately 80% of the esophageal circumference. The tumor was located at 34-38 cm from the incisors. It originated from the 4<sup>th</sup> layer of the esophageal wall (Figures 3 and 4).



*Figure 1* Thickening distal esophageal wall noted by cross-sectional imaging of CT scan.



*Figure 2* CT upper abdomen showed asymmetrical circumferential thickening of the distal esophagus to EG-junction, up to 2.7 cm in maximum thickness and 6.2 cm in length. The stomach is unremarkable. No lymphadenopathy, no ascites.



*Figure 3* The EUS image revealed a heterogeneous hypo-echoic mass occupying about 80% of the esophageal circumference.



*Figure 4* The mass arising from the 4<sup>th</sup> layer of esophageal wall.

Impression: Esophageal Leiomyoma

## Discussion:

Benign esophageal tumor is rare. Among them, leiomyoma is the most common one. Majority of leiomyoma is located between mid to distal esophagus. Larger tumor cause more symptoms. About 70% of the tumor originated from muscularis propria.<sup>2</sup> A large study using EUS for management of esophageal leiomyoma recruiting 229 patients fulfilled with EUS criteria for diagnosis of esophageal leiomyoma. It demonstrated

that only 2 patients complained of dysphagia, retrosternal burning or chest distress. Majority of lesions located between mid to distal esophagus. Lesions originated from the muscularis mucosa (78.6%), submucosa (7%) and muscularis propria (14.4%).<sup>5</sup> In our patients, although the lesion was relatively large, the patient did not complain of dysphagia.

Esophageal leiomyoma is much more common than esophageal stromal tumors. It is difficult to use endosonographic findings alone in order to differentiate between these two tumors. Immunohistochemical analysis is the most important factor to discriminate esophageal leiomyoma from esophageal stromal tumors.<sup>1</sup> In lesions larger than 2 cm in diameter, they mostly are heterogeneous masses. In our patient, the lesion is also heterogeneous. Based on frequency of the esophageal tumors, our case is most likely esophageal leiomyoma.<sup>6</sup>

Esophageal leiomyoma is mostly asymptomatic, however, in symptomatic patients, the tumors should be removed. Leiomyoma originating from muscularis propria should be removed by surgery whereas those originating from muscularis mucosa can be removed by endoscopy. Nevertheless, recently, endoscopic removal of tumors originating from muscularis propria is feasible in some series.<sup>3, 4</sup>

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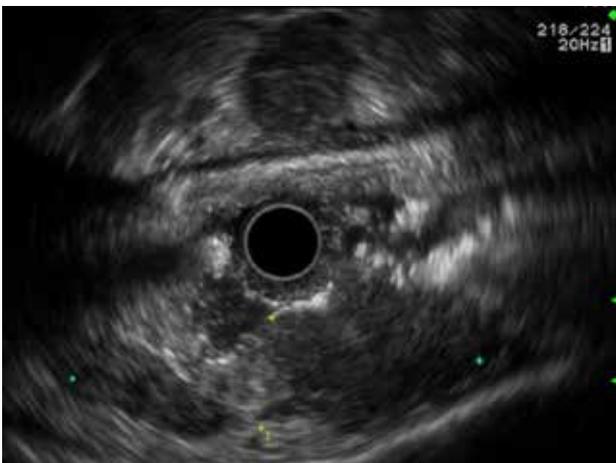
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## Case 11

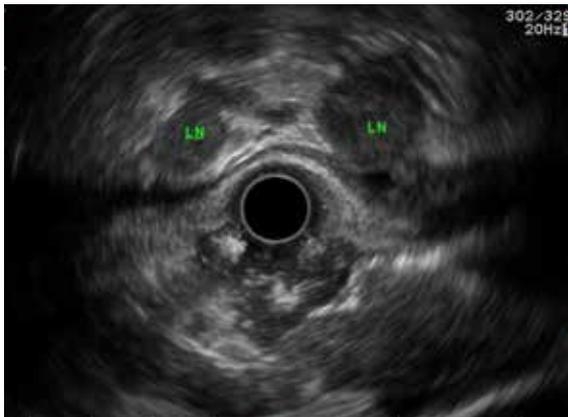
Khin San Aye, M.D.

Pradermchai Kongkam, M.D., M.Sc.

A 73-year-old male patient presented with chronic epigastric discomfort for 4 months. He had lost his weight for 5 kgs in the last three weeks. CT scan revealed asymmetrical thickened gastric wall at gastric cardia and fundus. Multiple large regional lymph nodes were identified. This was suggestive for adenocarcinoma of the stomach. Endoscopic ultrasound was scheduled for an evaluation of gastric mass. The procedure was performed by a linear EUS probe. It revealed a hypoechoic mass (60 x 17 mm in diameter) infiltrating the whole layer of gastric wall. It occupied about 75% of circumference. Hyper-echoic masses were seen on surface of the mass. (33 x 10 mm in diameter) (Figure 1). It was consistent with necrotic debris. Multiple hypoechoic round lymph nodes were seen around the mass and one of them measured 24 x 22 mm (Figure 2). Multiple round hypoechoic pancreatic masses likely metastasis, were also noted (Figure 3).



**Figure 1** A hypoechoic mass (60 x 17 mm in diameter) infiltrating whole layer of gastric wall, occupying about 75% of circumference.



**Figure 2** Multiple dark round lymph nodes seen around the mass.



**Figure 3** Multiple round hypoechoic masses in body of the pancreas (likely metastasis).

## Diagnosis:

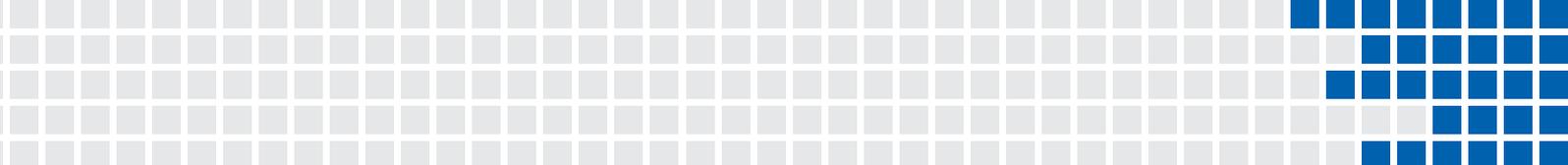
Gastric cancer

## Discussion:

Gastric cancer is the second leading cause of death from malignant disease worldwide and most frequently discovered in an advanced stages. Because curative surgery is regarded as the only option for cure, early detection of resectable gastric cancer is extremely important for good patient outcomes.<sup>1</sup>

Endoscopic ultrasound has a sensitivity superior to that of CT for the initial staging of gastric tumors. EUS is becoming increasingly useful as a staging tool when the CT scan fails to find evidence of T3, T4, or metastatic disease. The correct prediction values of T and N stage range between 78-88% and 64-82%, respectively.<sup>2</sup>

The distinction between early and advanced gastric carcinoma before resection is clinically important. Patients with inoperable, locally advanced gastric cancer should be treated with palliative chemotherapy and may be reassessed for surgery if a favorable response is achieved. Institutions that favor neoadjuvant chemoradiotherapy for patients with locally advanced disease rely on endoscopic ultrasound data to improve patient stratification.<sup>3</sup>



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## Case 12

Wiriyaporn Ridditid, M.D., M.Sc.

Kessarinn Thanapirom, M.D.

Pradermchai Kongkam, M.D., M.Sc.

A 49-year-old male patient presented with progressive epigastric pain, radiating to his back, for 3 weeks. He was diagnosed as advanced hilar cholangiocarcinoma with lungs, liver and adrenal glands metastasis since 6 months ago. Physical examination revealed icteric sclera with hepatomegaly. EUS was done for celiac plexus neurolysis. Injections of 10 cc of normal saline, 10 cc of 2.5% marcaine and 10 cc of absolute alcohol were performed around celiac branch area (Figure 1). No immediate complication was noted. After the procedure, his blood pressure was dropping for a few minutes then it returned to normal range after resuscitation. .



*Figure 1 Alcohol injection around right celiac branch area, post injection.*

**Diagnosis:** Celiac plexus neurolysis for abdominal cancer pain in patient with metastatic hilar cholangiocarcinoma

## Discussion:

Currently, celiac plexus neurolysis (CPN) has been increasingly used for relieving abdominal cancer pain.<sup>1</sup> A recent systemic review of CPN for upper abdominal cancer showed significant improvement in pain, with a decrease in opioid consumption and side effects.<sup>1</sup> This can be performed not only percutaneously under CT or fluoroscopic guidance, but also endoscopically under EUS guidance. A recent randomized controlled trial of 96 patients (EUS-CPN in 48 versus conventional pain management in 48) showed greater pain relief in the EUS-CPN group at 1 month and significantly greater at 3 months.<sup>2</sup> Morphine consumption tended toward lower at 3 months in the neurolysis group.<sup>2</sup> However, the technique of alcohol injection during EUS-guided CPN for cancer pain has not been clear regarding the number of injections.

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## Case 13

Wiriyaporn Ridditid, M.D., M.Sc.

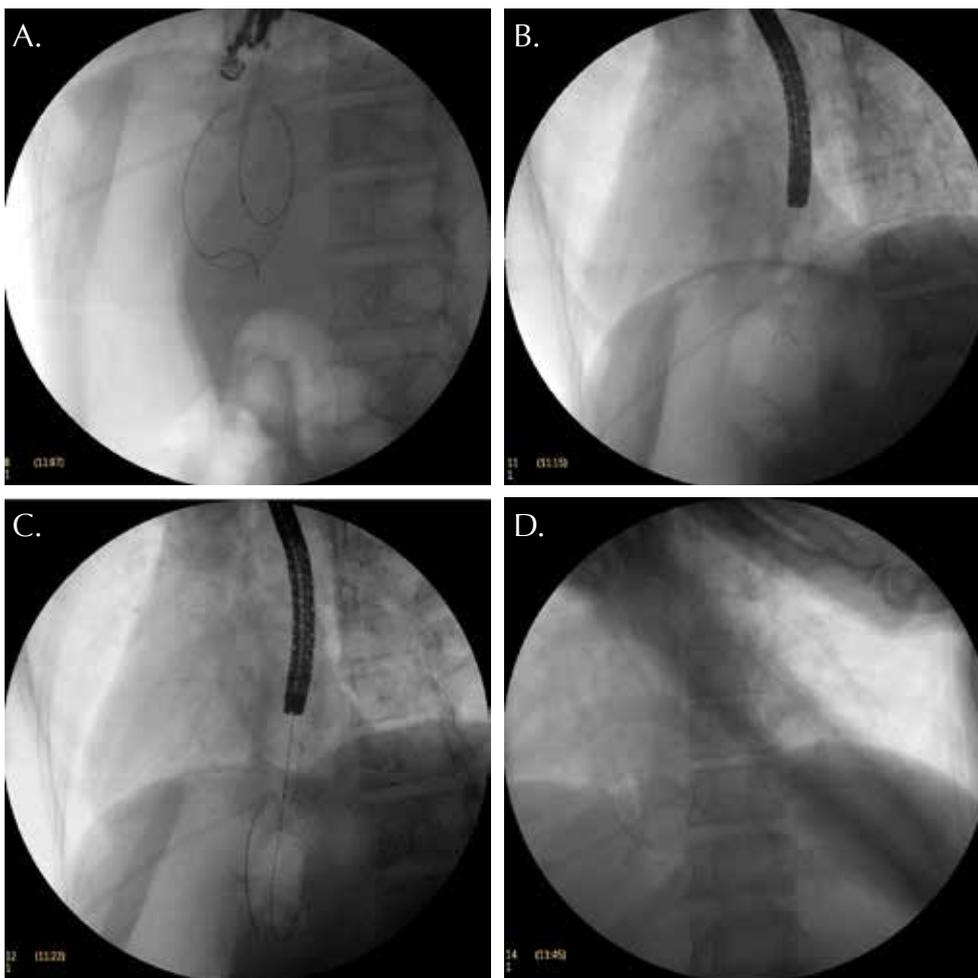
Kessarinn Thanapirom, M.D.

Pradermchai Kongkam, M.D., M.Sc.

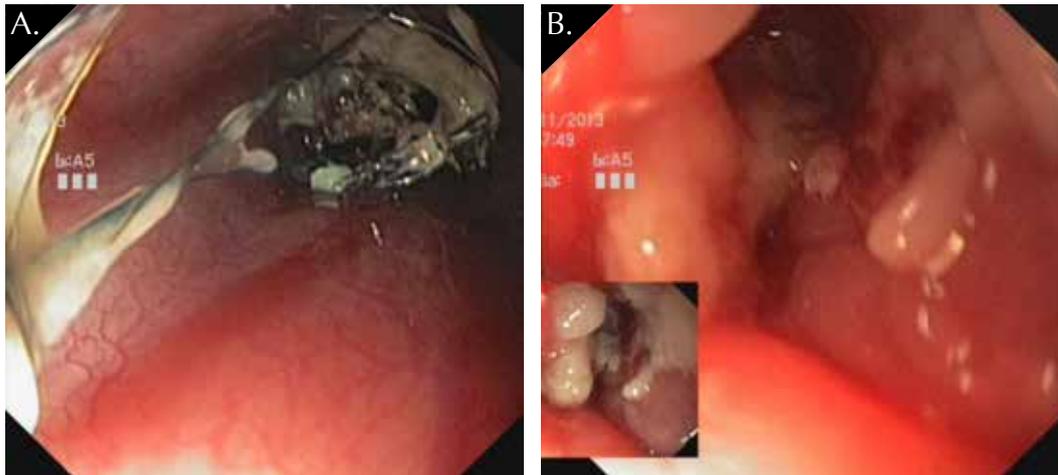
A 47-year-old female patient presented with epigastric pain and fever for 2 weeks. She was admitted to an outside hospital. CT scan of the upper abdomen showed a large pancreatic pseudocyst measuring 5 cm x 8 cm x 8 cm at pancreatic body and tail. After receiving an empiric antibiotic, fever improved, however, her pain still persisted. Then, she was referred for further management. She also has a history of chronic alcohol use. Physical examination revealed mild tenderness at the upper quadrant area. EUS demonstrated a large pseudocyst measuring 56 mm x 78 mm in diameter with internal echogenic material (Figure 1A). A 19G needle was used for puncturing into the pseudocyst. Serosanguinous fluid was aspirated (Figure 1B). A double anchored metallic stent 14 mm x 30 mm (NAGI-Stent, Taewoong Company, Seoul, Korea) was successfully placed into the pseudocyst (Figures 2A and 2B). However, due to difficult location of the punctured site, the distal tip of the stent was left at the esophagogastric junction after deploying. To prevent aspiration, a nasogastric tube was placed through the stent into the cyst (Figures 2C and 2D). Three days later, a follow-up CT scan showed a complete resolution of the pancreatic pseudocyst. Subsequently, the metal stent was successfully removed under endoscopic and fluoroscopic guidance (Figures 3A-3B). No post-procedural complication was observed.



**Figures 1** A) A large pseudocyst measuring 56 mm x 77 mm at the pancreatic body and tail, with internal heterogenous content seen under EUS. B) Serosanguinous fluid was aspirated from the pseudocyst.



**Figures 2** A) and B) A double anchored metallic stent placement (NAGI-Stent, Taewoong Company, Seoul, Korea) C) and D) A nasogastric tube placement through the stent into the cyst preventing aspiration.



**Figure 3 (A-B): Successful metallic stent removal.**

## Diagnosis:

Large pancreatic pseudocyst post with double anchored metallic stent placement for drainage

## Discussion:

The placement of plastic stent is technically difficult for pseudocyst drainage due to the need to access the cyst cavity for multiple times. So, a single fully covered metallic stent insertion has been proposed.<sup>1</sup> However, high rate of stent migration has been reported.<sup>1,2</sup> A new fully covered metallic stent (NAGI-Stent, Taewoong Company, Seoul, Korea) has been recently developed to prevent migration.<sup>3,4</sup> The design of the “NAGI” stent, with acute angled flare ends, provides a decrease in the migration rates due to better anchoring in the gastric and pseudocyst wall. In addition, a retrieval string at the distal end of the stent allows easy stent removal. However, the data of its feasibility and safety for pseudocyst drainage has been reported in a few cases.<sup>3,4</sup> Comparative studies among multiple plastic stents, a single fully covered metallic stent and a double anchored metallic stent are required to confirm the appropriate management for pseudocyst drainage.

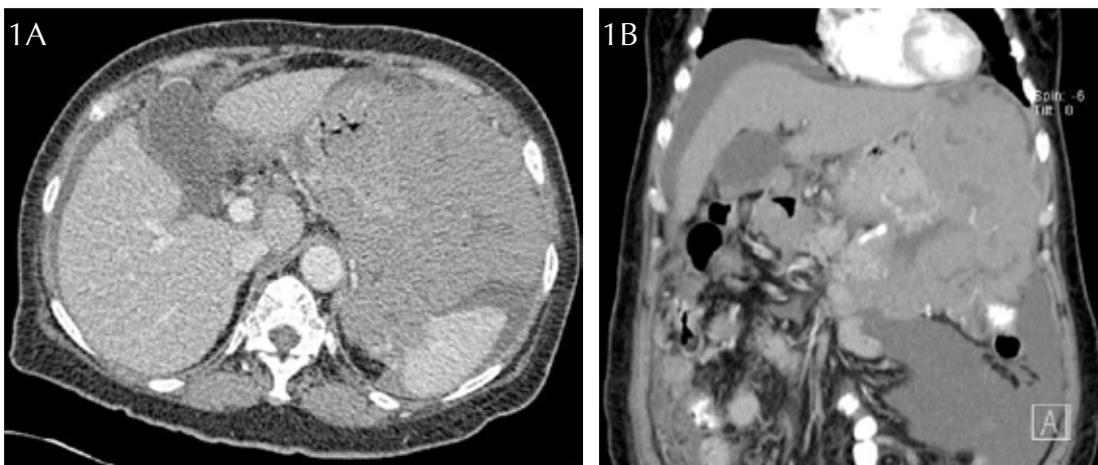
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## Case 14

Tanyaporn Chantarojanasiri, M.D.  
Pradermchai Kongkam, M.D., M.Sc.

A 72-year-old female patient presented with abdominal bloating and weight gain for 2 weeks. CT scan of the abdomen found markedly thickened wall of the stomach. The upper endoscopy showed partially distensible friable gastric mucosa with esophageal varices. EUS showed circumferential thickening gastric wall with lymphadenopathy, ascites and omental cake. There was also a heterogeneous hypoechoic mass extending from gastric mucosa through serosa measuring about 5 cm in thickness. EUS-guided fine needle aspiration was performed with a 22G Procore needle. The cytopathology revealed round-cell tumor with positive staining of CD20, Ki67 (>90%) but negative staining of CD3, AE1/AE3. It was compatible with aggressive B-cell non-Hodgkin lymphoma.



**Figures 1A and 1B** Markedly thickening of gastric wall with a huge mass extending from gastric wall demonstrated by CT scan.



**Figure 2** The Endoscopic ultrasound showed thickening gastric mucosa with ascites.



**Figure 3** Heterogeneous hypoechoic mass extending from gastric mucosal layer through serosa.

## Diagnosis: Gastric lymphoma

### Discussion:

Gastric lymphoma is the most common manifestation of gastrointestinal lymphoma, comprise about 70%. Endoscopic findings of gastric lymphomas range from slight irregularities to large ulcerative or polypoid mass.<sup>1, 2</sup> On endoscopic ultrasound, gastric lymphoma typically shows a hypoechoic lesion localized to 2<sup>nd</sup> or 3<sup>rd</sup> layer but it can extended through the entire wall.<sup>2</sup>

EUS is one the most accurate method for local staging of gastric lymphoma. However, the data was conflicting. In earlier studies the accuracy was 80-92% for T stage and 77-90% for N stage based on TNM staging.<sup>1</sup> On the contrary, in the subsequent studies the accuracy was only 53% based on Ann Arbor staging.<sup>2, 3</sup> The role of EUS to follow-up after treatment is also controversial.<sup>1, 3-5</sup> In most studies, endosonographic remission is significantly delayed when compared with histology.<sup>4, 5</sup> However, false negative remission on EUS were seen in some patients.<sup>6</sup> When compared between low-grade and high-grade lymphoma, there were correlation between endosonographic and histologic remission in MALT lymphoma but not in high grade lymphoma.<sup>5</sup> The role of EUS-guided fine needle aspiration for the diagnosis of relapsed gastric lymphoma is not yet validated.<sup>1, 5</sup>

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## Case 15

Tanyaporn Chantarojanasiri, M.D.  
Pradermchai Kongkam, M.D., M.Sc.

A 66-year-old male patient presented with jaundice. Past medical history was significant for polycystic kidney disease. CT scan demonstrated a cystic lesion at the head of pancreas with upstream dilatation of the common bile duct and intrahepatic bile ducts. Endoscopic ultrasound was performed with a linear echoendoscope. It showed a multiloculated and septated pancreatic cyst measuring about 69 x 43 mm in diameter at the head of pancreas. It demonstrated an intra-cystic mural nodule measuring 15 mm in diameter. The lesion was macro-cystic with mixed solid-cystic cyst. Main pancreatic duct measured 3 mm in diameter at the body and tail of pancreas. The diagnosis of intraductal papillary mucinous neoplasm was made and the patient was sent for surgical resection.



*Figure 1* A multi-loculated cyst with macro-cystic appearance.



*Figure 2* Internal echogenic mural nodule seen from cystic wall (arrow).

**Diagnosis:** Intraductal papillary mucinous neoplasm (IPMN)

## **Discussion:**

Intraductal papillary mucinous neoplasms (IPMNs) of the pancreas develop from epithelial cells in the main pancreatic duct (MPD), namely main duct IPMNs (MD-IPMNs), or branch duct, specifically branch duct IPMNs (BD-IPMNs). The imaging and endoscopic feature varied among different type of IPMN. In classic MD-IPMN, the pancreatic duct is markedly dilated, often larger than 1 cm in diameter, with tortuosity and sometimes appears cystic. Solid part and calcification can also be demonstrated.<sup>1</sup> Endoscopic ultrasound can provide morphological details of dilated pancreatic ducts and solid component. In addition, it can provide fluid sampling or fine needle aspiration or biopsy of the solid components.<sup>1, 2</sup> Cyst fluid analysis is recommended in cases with small BD-IPMNs without worrisome features.<sup>2</sup> The aspirated fluid is typically viscous. The analysis may show elevated CEA in two-third of the cases but the level does not correlate well with the degree of dysplasia.<sup>1</sup> In comparison with other modalities, EUS is the most effective method to determine malignant characteristics and detect concomitant pancreatic ductal adenocarcinoma in patients with IPMNs.<sup>3</sup>

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## Case 16

Wiriyaporn Ridditid, M.D., M.Sc.

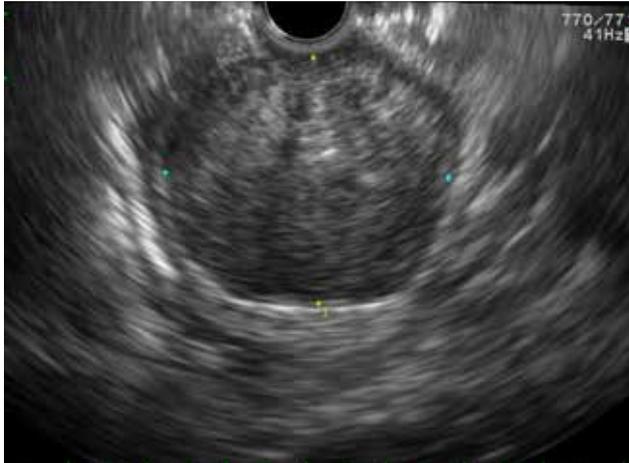
Kessarinn Thanapirom, M.D.

Pradermchai Kongkam, M.D., M.Sc.

A 58-year-old female patient presented with epigastric pain for 2 weeks. Physical examination was unremarkable. She denied history of alcoholic drinking or smoking. EGD showed mildly bulging gastric wall at the lesser curve of gastric body. A subepithelial lesion without ulcerative lesion was suspected (Figure 1). CT scan of the upper abdomen showed an enhancing solid mass measuring 46 mm x 45 mm in diameter with central calcification at lesser curve of stomach. EUS revealed a heterogenous hypoechoic mass measuring 36 mm x 31 mm in diameter at lesser curve of gastric body (Figure 2). The mass originated from the fourth layer of the gastric wall. No perigastric lymph node was noted. Core biopsy was performed by using a 19G needle and the tissue was sent for histopathology. No post-procedural complication was observed. Histopathology showed spindle cell neoplasm.



**Figure 1** Subepithelial lesion seen during EGD.



**Figure 2** A heterogenous hypoechoic mass measuring 36 mm x 31 mm in diameter at lesser curve of gastric body, which originated from the fourth layer of the gastric wall.

**Diagnosis:** Gastrointestinal stromal tumor

## Discussion:

Currently, EUS has been accepted as a useful tool for diagnosing gastric submucosal lesion. For differentiating between a submucosal and an extraluminal compression, the sensitivity and specificity of endoscopy were 87% and 29%, respectively, whereas those of EUS were 92% and 100%, respectively.<sup>1</sup> It can identify the originating layer of intramural lesions. Also, this allows tissue samples to be obtained from the lesions in the GI tract. The sensitivity, specificity, and diagnostic accuracy of EUS-FNA in diagnosing GI tract neoplastic lesions were 89%, 88% and 89%, respectively.<sup>2</sup> However, regarding small gastric subepithelial lesions, EUS alone had an accuracy rate of 30.8% and 66.7%, respectively, for the diagnosis of neoplastic and non-neoplastic lesions.<sup>3</sup> Due to its low accuracy of EUS for these groups, endoscopic submucosal resection is required to confirm the diagnosis.

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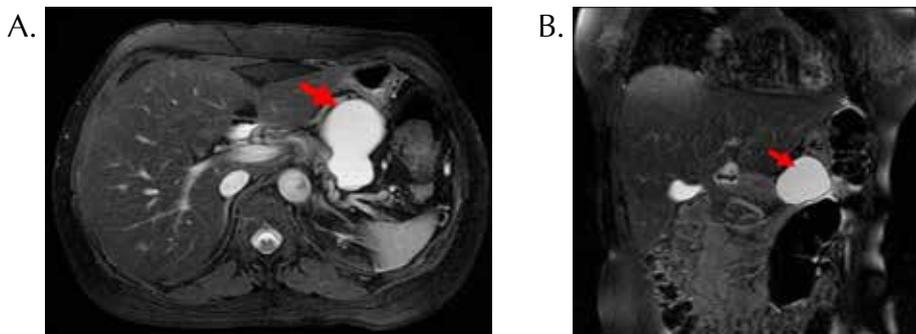
## Case 17

Wiriyaporn Ridditid, M.D., M.Sc.

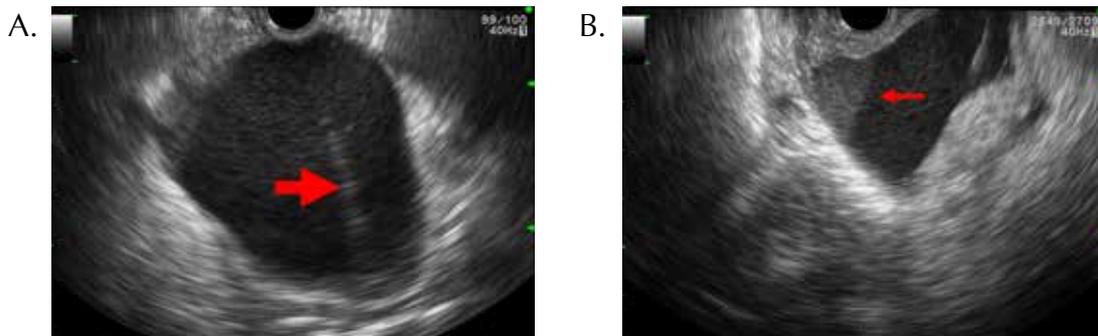
Kessarinn Thanapirom, M.D.

Pradermchai Kongkam, M.D., M.Sc.

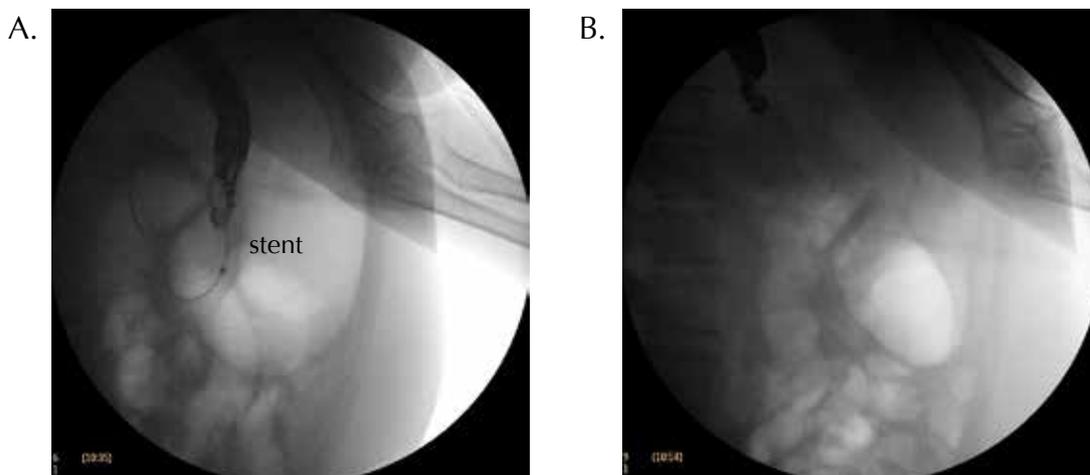
A 54-year-old female patient presented with episodic pain at epigastric area. She also had a significant weight loss during the last 3 months. She has a history of chronic alcohol use. Physical examination was unremarkable. MRI of the upper abdomen showed a 5.4 cm x 6.2 cm cystic lesion at the anterior aspect of body/tail of pancreas and a 1.0 cm x 0.4 cm cystic lesion in the tail of pancreas and a 1.0 cm x 0.4 cm cystic lesion in the tail of pancreas with evidence of chronic pancreatitis and no demonstrable connection with pancreatic duct, these were suggestive of pancreatic pseudocysts (Figures 1A and 1B). EUS demonstrated a pseudocyst measuring 51 mm x 54 mm in diameter with internal echogenic material and two layers of content (Figures 2A and 2B). A 19G needle was used for puncturing into the pseudocyst. Thin, turbid fluid was aspirated. A double anchored metallic stent 14 mm x 30 mm (NAGI-Stent, Taewoong Company, Seoul, Korea) was successfully placed into the pseudocyst (Figures 3A and 3B). No post-procedural complication was observed. Three days later, the stent was successfully removed following the resolution pancreatic pseudocyst seen on a follow-up CT scan.



**Figures 1(A-B)** A cystic lesion at the body and tail of pancreas with no pancreatic duct communication seen on axial and coronal view of MRI (arrows).



**Figures 2 (A-B)** A pseudocyst measuring 51 mm x 54 mm in diameter with internal echogenic material (thin arrow) and two layers of content (thick arrow).



**Figure 3 (A-B)** Successful double anchored metallic stent (NAGI-Stent) placement.

## Diagnosis:

Pancreatic pseudocyst with double anchored metallic stent placement for drainage

## Discussion:

Equal efficacy of endoscopic and surgical cystogastrostomy for pancreatic pseudocyst drainage was shown in a recent randomized trial. However, endoscopic treatment was associated with shorter hospital stays and lower costs.<sup>1</sup> A meta-analysis demonstrated that EUS-guided versus conventional transmural methods were comparable regarding

the treatment outcomes in draining pancreatic pseudocyst.<sup>2</sup> Various techniques have been described for EUS-guided drainage, including multiple plastic stents and fully covered self-expanding metal stent placement. Although the insertion of metallic stent provides faster drainage due to its larger diameter than do plastic stent and reduction in the number of procedures, this may have higher migration rate.<sup>3</sup> Recently, a new fully covered metallic stent (NAGI-Stent, Taewoong Company, Seoul, Korea) has been developed to prevent migration with promising outcomes.<sup>4,5</sup> The design of the “NAGI” stent, with acute angled flare ends, provides a decrease in the migration rates due to better anchoring in the gastric and pseudocyst wall.

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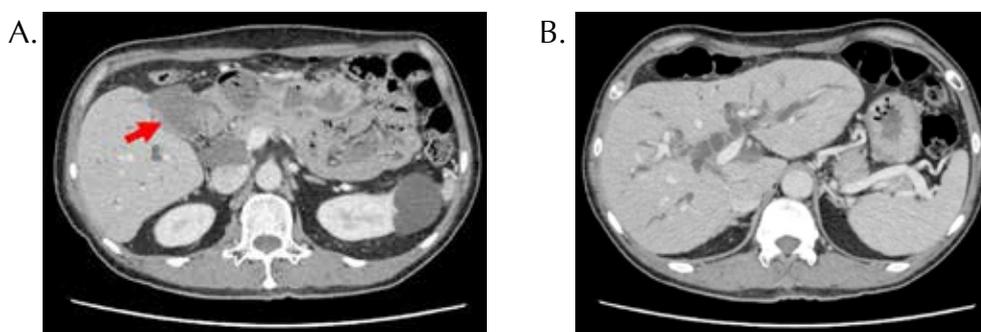
## Case 18

Wiriyaporn Ridditid, M.D., M.Sc.

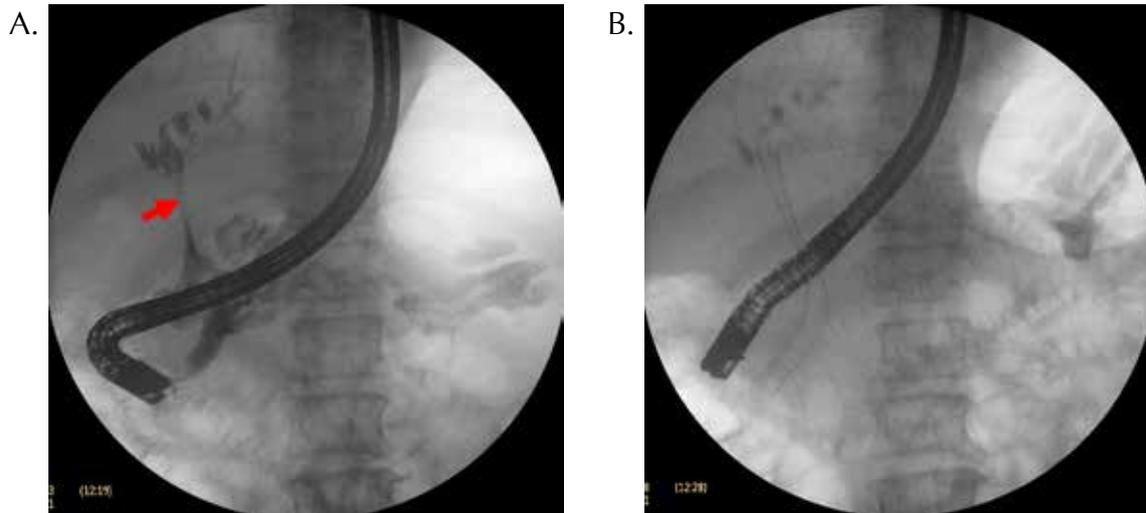
Kessarinn Thanapirom, M.D.

Pradermchai Kongkam, M.D., M.Sc.

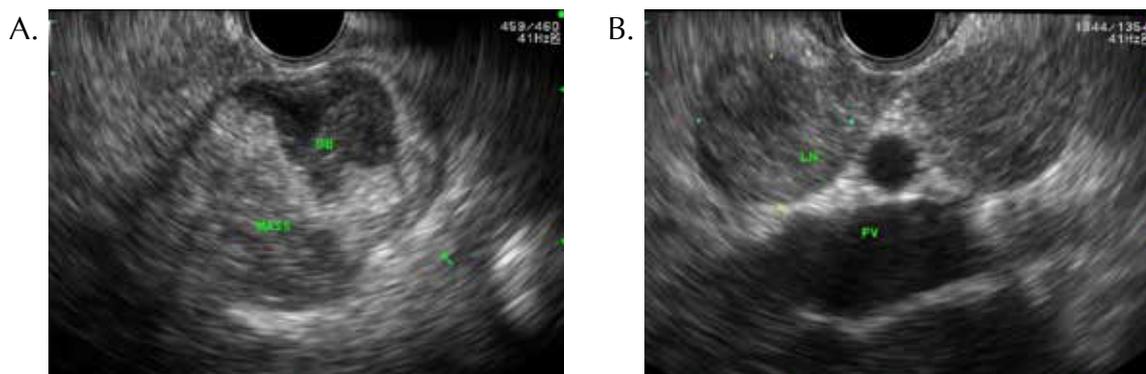
A 64-year-old male patient presented with painless jaundice and weight loss for a month. Physical examination revealed moderately icteric sclera without hepatomegaly. He denied a history of alcoholic drinking or smoking. CT scan of the upper abdomen showed enhancing soft tissue gallbladder mass with irregular contour abutting hepatic segment V and IVb without intervening fat plane. There is irregular thickened enhancing soft tissue lesion involving gallbladder neck, common hepatic duct, cystic duct and proximal common bile duct, causing diffuse intrahepatic ducts dilatation (Figures 1A and 1B). Several matted necrotic peripancreatic, periportal and hepatoduodenal nodes suggested nodal metastasis. ERCP revealed a long stricture at common hepatic duct (Figure 2A). An uncovered metallic stent (Wallstent) was placed. (Figure 2B) Subsequent EUS demonstrated a solid-cystic gallbladder mass measuring 37 mm x 26 mm with multiple dark, round perigallbladder lymph nodes (Figure 3). A 25G needle was used for aspiration from solid mass and lymph nodes, then it was sent for cytopathology. Histopathology confirmed as adenocarcinoma of the gallbladder.



**Figures 1(A-B)** Enhancing gallbladder mass (arrow) with suspected invasion hepatic invasion, together with irregular thickened enhancing soft tissue lesion involving gallbladder neck, cystic duct and proximal common bile duct, causing bilateral intrahepatic ducts dilatation.



**Figures 2** A) A long stricture at common hepatic duct seen on cholangiogram (arrow) B) Successful uncovered metallic stent placement.



**Figures 3** A) A solid-cystic gallbladder mass measuring 37 mm x 26 mm seen on EUS B) Multiple dark, round perigallbladder lymph nodes.

**Diagnosis:** Unresectable gallbladder adenocarcinoma

### Discussion:

Mostly, patients with gallbladder cancer present at the late stage. Obtaining histopathology and tumor staging are essential to determine the appropriate treatment. For pre-operative evaluation, ERC is initially performed particularly in patients with biliary obstruction. However, due to its extraductal lesions, it is difficult to get tissue for diagnosis during ERC. EUS-FNA is an alternative tool for the workup of gallbladder

tumors. A few publications have been reported for EUS-FNA in gallbladder lesions.<sup>1-3</sup> A recent study compared the diagnostic value and safety of EUS-FNA with ERC in patients with suspected gall bladder carcinoma.<sup>2</sup> Of 83 patients with gall bladder cancer, the sensitivity of ERC with cytopathologic sampling was 47.4% whereas EUS-FNA provided 94.8% in diagnostic sensitivity.<sup>2</sup>

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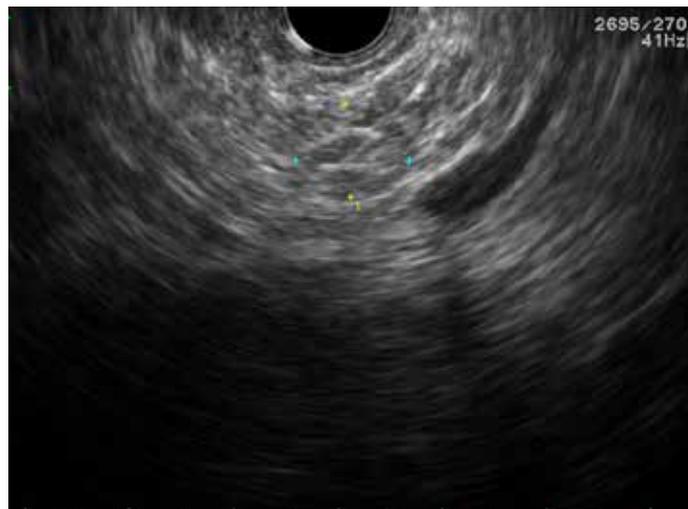
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## Case 19

Khin San Aye, M.D.

Pradermchai Kongkam, M.D., M.Sc.

A 44-year-old male patient presented with seizure due to profound hypoglycemia. CT of the upper abdomen demonstrated submucosal arterial enhancing lesion at the gastric body. No pancreatic mass was found. Endoscopic ultrasound was scheduled to search for pancreatic neuroendocrine tumors, in particular insulinoma. EUS revealed a homogenous hypoechoic mass measuring 11 x 9 mm in diameter at the neck of pancreas (Figure 1). EUS-FNA was performed with a 22G needle. Cytopathology demonstrated round-cell tumor consistent with neuroendocrine tumor.



**Figure 1** A heterogeneous hypoechoic mass at the pancreatic genu.

## Diagnosis:

Insulinoma

## Discussion:

Insulinomas, the most common functioning endocrine neoplasms of the pancreas, are characterized clinically by hypoglycemic symptoms resulting from neuroglycopenia and catecholamine response.<sup>1</sup> Approximately 5% to 10% of patients with insulinomas have multiple endocrine neoplasia type 1 (MEN 1), and these patients frequently have multiple lesions.<sup>2</sup>

More than 90% of insulinomas are benign tumors, being treatable by surgical operation. While in the past, preoperative localization of insulinoma could be problematic and blind pancreatic resections were performed, high-resolution imaging techniques and endoscopic ultrasound currently allow high preoperative detection rates, which is essential in planning the most appropriate surgical strategy.<sup>3</sup>

Endoscopic ultrasound (EUS) is currently the test of choice in most Western centers, with reported detection rates of 86.6%-92.3% because most functioning tumors are small. EUS-guided FNA is becoming increasingly popular, and it seems likely that it will eventually become the standard tool for the diagnosis and staging of functioning pancreatic neuroendocrine tumors.<sup>4</sup>

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## Case 20

Khin San Aye, M.D.

Sutep Gonlachanvit, M.D.

Pradermchai Kongkam, M.D., M.Sc.

A 47-year-old male patient presented with melena. Upper endoscopy revealed a polypoid lesion with a small ulcer in the duodenum bulb (Figure 1). Endoscopically, the lesion was diagnosed as duodenal polyp. EUS demonstrated a hyperechoic mass measuring 21 × 13 mm in diameter and the lesion was originating from 1<sup>st</sup> and 2<sup>nd</sup> layer of intestinal wall (Figure 2). This confirmed the safety of endoscopic removal.



**Figure 1** A polypoid lesion in duodenal bulb.



**Figure 2** A duodenal polyp arising from 1<sup>st</sup> and 2<sup>nd</sup> layer of mucosa.

## Diagnosis;

Duodenal polyp

## Discussion;

Duodenal polyps are a rare finding in patients presenting for gastroscopy, being found in 0.3–4.6% of cases. Several types of polyps can occur in the duodenum and most of them are non-neoplastic. Non-neoplastic duodenal polyps include Brunner's gland hyperplasia, ectopic gastric mucosa, and hyperplastic polyps.<sup>1</sup>

Brunner's gland hyperplasia and hamartomas were often encountered in the bulb of the duodenum. Although most duodenal polyps had a benign clinical course, some of them can transform to tumors including adenomas or carcinoid tumors. Therefore, early diagnosis and treatment are important for these cases.<sup>2</sup>

Role of EUS in the assessment of duodenal polyps has been determined for confirming the diagnosis and determining the layer of origin. Any polyp that not extend beyond the 3<sup>th</sup> layer by EUS is consider resectable by endoscopy. Endoscopic treatment of duodenal polyps provides a challenge since the risk for perforation is very high.

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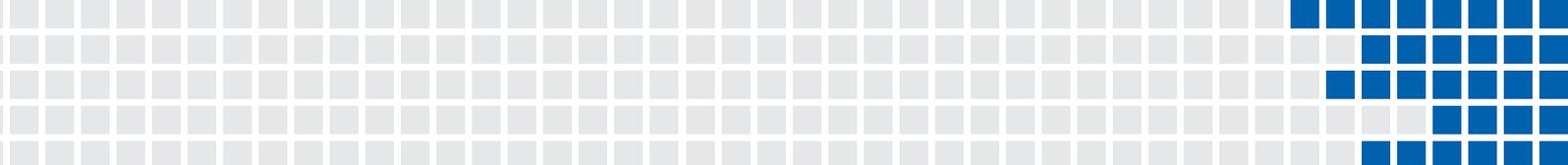
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