

An endoscopic view of the small intestine, showing the mucosal folds and the lumen. The mucosa is pinkish-red and appears moist. The lumen is dark, suggesting the presence of fluid or a shadow from the endoscope. The overall appearance is that of a healthy, well-lubricated gastrointestinal tract.

**The GASTROLAB**

**Endoscopic Image JOURNAL**

**Nr 31 · December 8, 2024**

**Small Bowel**



## The GASTROLAB Endoscopy Image JOURNAL: A Pinnacle in Medical Imaging Excellence

Since its inception in early 2024, The GASTROLAB Endoscopy Image Journal stands as a pioneering publication in the realm of medical imaging. Released every Tuesday, this weekly magazine, accessible at [www.vpress.ovh/journal.htm](http://www.vpress.ovh/journal.htm), offers an unparalleled exploration of various themes, showcasing high-quality images focusing on specific aspects of the digestive tract or diseases.

### A Global Beacon of Endoscopic Excellence

With an ambitious vision, we aspire for The GASTROLAB Endoscopy Image JOURNAL to be recognized as the preeminent publication in its field worldwide. We invite collaboration from the esteemed medical community to contribute their exceptional endoscopic images, thereby fostering a collective effort to make this journal the most comprehensive of its kind globally.

We encourage individuals possessing noteworthy endoscopic images to submit them to [glabinfo@gmail.com](mailto:glabinfo@gmail.com). Please include a brief caption, a clear indication of permission for publication on our site, and specify whether a copyright sign and your email address should accompany the images. This ensures potential commercial publishers can seek permission directly from contributors for any intended use.

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For those seeking to publish images featured in our journal, we recommend reaching out to Science Photo Library

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the foremost provider of science images. Their expertise ensures proper dissemination and ethical usage of all images in this journal.

### Support Our Mission

If you wish to support The GASTROLAB Endoscopy Image Journal through advertisements or other means, kindly contact us at [glabinfo@gmail.com](mailto:glabinfo@gmail.com). Your support not only facilitates the continuation of this vital resource but also contributes to the success of budding endoscopists worldwide.

### A Noble Purpose

Under the editorial leadership of Hans Björknäs, our Editor-in-Chief, The GASTROLAB Endoscopy Image Journal seeks to be more than just a publication; it aims to be a catalyst for success. If this magazine aids even one young, aspiring endoscopist in their career journey, we consider our mission accomplished.

Join us in shaping the future of endoscopy imaging – together, let's create a benchmark of excellence in medical journalism.

Sincerely,

### Hans Bjorknas

Editor-in-Chief, The GASTROLAB Endoscopy Image Journal

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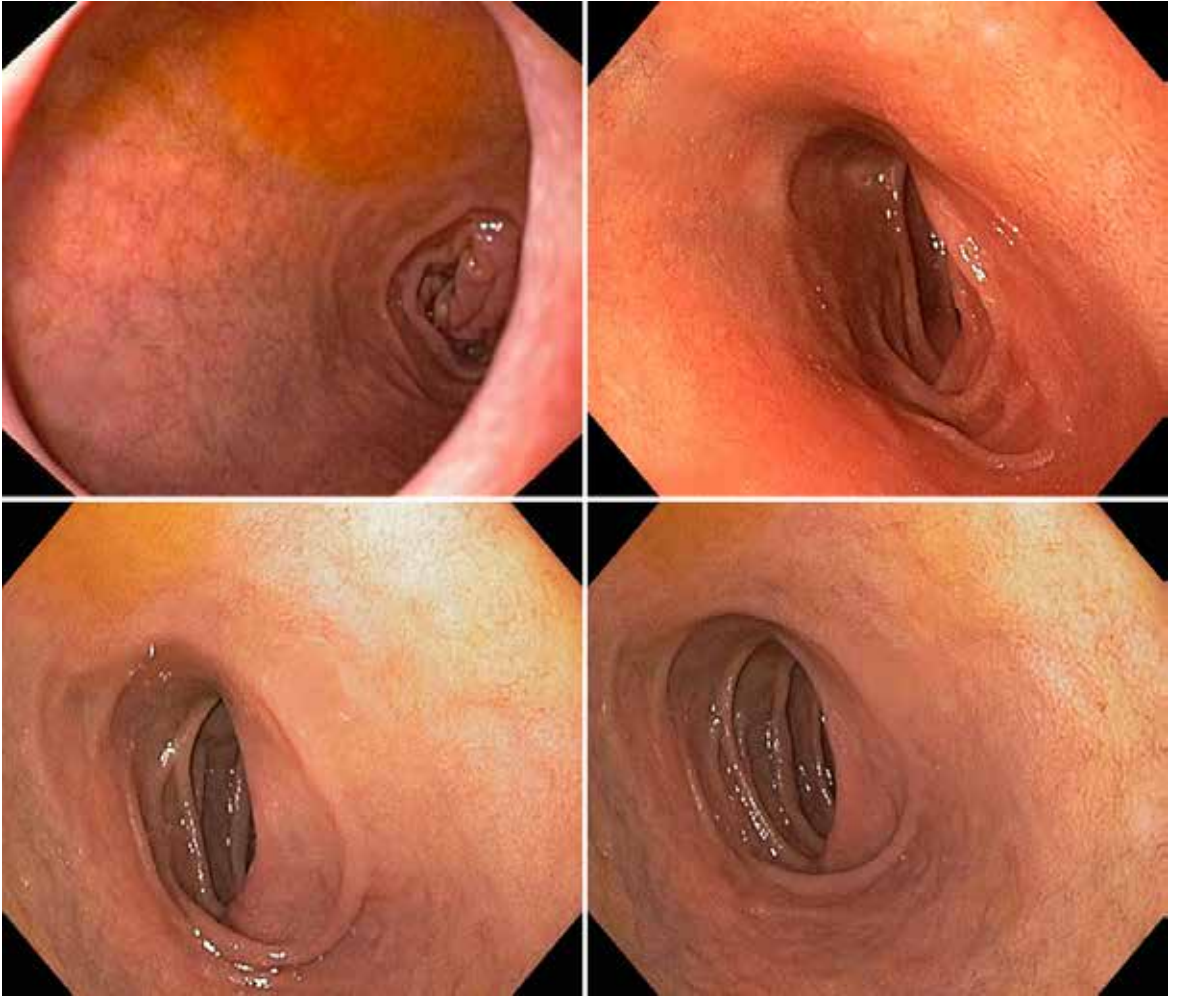
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*Collage: A normal duodenal bulb*

# The Small Bowel: Anatomy, Function, and Pathology

The small bowel, comprising the duodenum, jejunum, and ileum, is a vital component of the gastrointestinal (GI) system, serving as the primary site for nutrient digestion and absorption. Despite its essential roles, its complex anatomy and physiology present challenges in diagnosing and managing small bowel diseases. This article provides a comprehensive overview of the small bowel's anatomy and function, alongside common and rare diseases that affect this organ.

## Anatomy of the Small Bowel

The small bowel spans approximately 6–7 meters in length in adults and is divided into three distinct sections:

### 1. Duodenum

The duodenum, about 25–30 cm long, is the initial segment of the small bowel. It begins at the pylorus and curves around the pancreas in a C-shape, ending at the duodenojejunal flexure. It is retroperitoneal, except for its initial segment. The duodenum is subdivided into four parts:

Superior part: Adjacent to the pylorus.

Descending part: Contains the major duodenal papilla,

where bile and pancreatic enzymes enter via the ampulla of Vater.

Horizontal part: Crosses the abdominal aorta and inferior vena cava.

Ascending part: Joins the jejunum.

### 2. Jejunum

The jejunum constitutes the proximal two-fifths of the remaining small bowel. It lies predominantly in the left upper quadrant and has a thicker wall, larger diameter, and more prominent plicae circulares compared to the ileum.

### 3. Ileum

The ileum forms the distal three-fifths and is mainly located in the right lower quadrant. It has a thinner wall, fewer plicae circulares, and a greater number of lymphoid nodules (Peyer's patches).

The ileum ends at the ileocecal valve, which regulates the flow of contents into the large intestine and prevents reflux.

### 4. Terminal Ileum

The terminal ileum is the final segment, critical for absorbing vitamin B12 and bile acids. Its strategic location and function make it a key site for several diseases, including Crohn's disease and ileal resection syndromes.

## Physiological Functions

The small bowel plays a multifaceted role in digestion and absorption, achieved through its structural adaptations, including villi and microvilli, which increase the surface area exponentially.

### Digestion and Absorption:

The duodenum receives chyme from the stomach and mixes it with bile and pancreatic enzymes to initiate digestion.

The jejunum is primarily responsible for nutrient absorption, including carbohydrates, proteins, fats, and water-soluble vitamins.

The ileum absorbs vitamin B12, bile salts, and fat-soluble vitamins (A, D, E, K).

### Immune Function:

Peyer's patches in the ileum play a key role in gut-associated lymphoid tissue (GALT), contributing to immune surveillance.

### Hormonal Regulation:

The small bowel secretes hormones like secretin, cholecystokinin, and motilin, which regulate digestion and motility.

## Common Diseases of the Small Bowel

### 1. Celiac Disease

**Pathophysiology:** An autoimmune disorder triggered by gluten in genetically predisposed individuals, leading to villous atrophy and malabsorption.

**Clinical Presentation:** Diarrhea, weight loss, anemia, and fatigue.

**Diagnosis:** Serologic tests (anti-tTG antibodies) and confirmatory duodenal biopsy.

**Treatment:** Lifelong gluten-free diet.

### 2. Crohn's Disease

**Pathophysiology:** A chronic inflammatory bowel disease (IBD) that can affect any part of the GI tract but often involves the terminal ileum.

**Clinical Presentation:** Abdominal pain, diarrhea, weight loss, and complications like fistulas or strictures.

**Diagnosis:** Imaging (MRI enterography, CT) and endoscopy with biopsy.

**Treatment:** Immunomodulators, biologics, and surgical intervention for complications.

### 3. Small Bowel Obstruction

**Causes:** Adhesions (most common), hernias, malignancy, or volvulus.

**Clinical Presentation:** Crampy abdominal pain, vomiting, and absence of flatus.

**Management:** Conservative treatment with nasogastric decompression or surgical intervention for complete obstructions.

4. Infectious Enteritis  
**Pathogens:** Bacteria (*Salmonella*, *Campylobacter*), viruses (rotavirus), or parasites (*Giardia*).

**Clinical Presentation:** Diarrhea, abdominal pain, and systemic symptoms like fever.

**Management:** Supportive care and targeted antimicrobial therapy if indicated.

**Rare Diseases of the Small Bowel**

#### 1. Small Bowel Tumors

**Benign Tumors:** Adenomas, leiomyomas, and lipomas.

**Malignant Tumors:** Adenocarcinomas, lymphomas, and gastrointestinal stromal tumors (GISTs).

**Diagnosis:** Capsule endoscopy, enteroscopy, or imaging studies.

**Treatment:** Surgical resection and, for malignancies, adjuvant therapies.

#### 2. Meckel's Diverticulum

**Pathophysiology:** A congenital anomaly resulting from incomplete obliteration of the vitelline duct.

**Complications:** Bleeding, obstruction, or inflammation mimicking appendicitis.

**Management:** Surgical resection in symptomatic cases.

#### 3. Whipple's Disease

**Etiology:** Caused by *Tropheryma whipplei* infection.

**Clinical Presentation:** Malabsorption, arthritis, and neurological symptoms.

**Diagnosis:** Duodenal biopsy with periodic acid-Schiff (PAS) staining.

**Treatment:** Long-term antibiotic therapy.

#### 4. Intestinal Ischemia

**Pathophysiology:** Caused by reduced blood flow, often from mesenteric artery occlusion.

**Clinical Presentation:** Severe abdominal pain out of proportion to clinical findings.

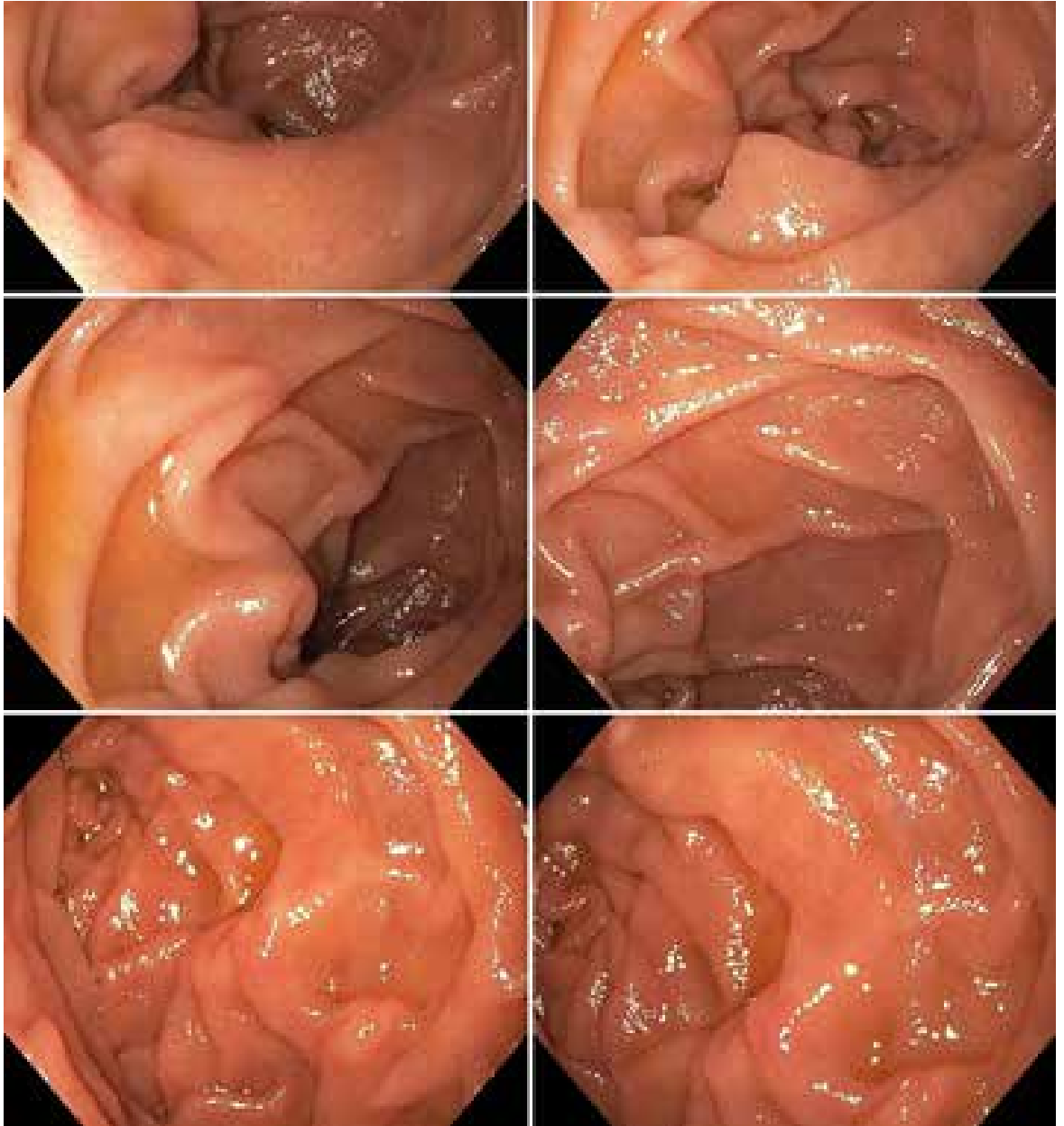
**Management:** Emergent surgical intervention and vascular restoration.

## Diagnostic and Therapeutic Challenges

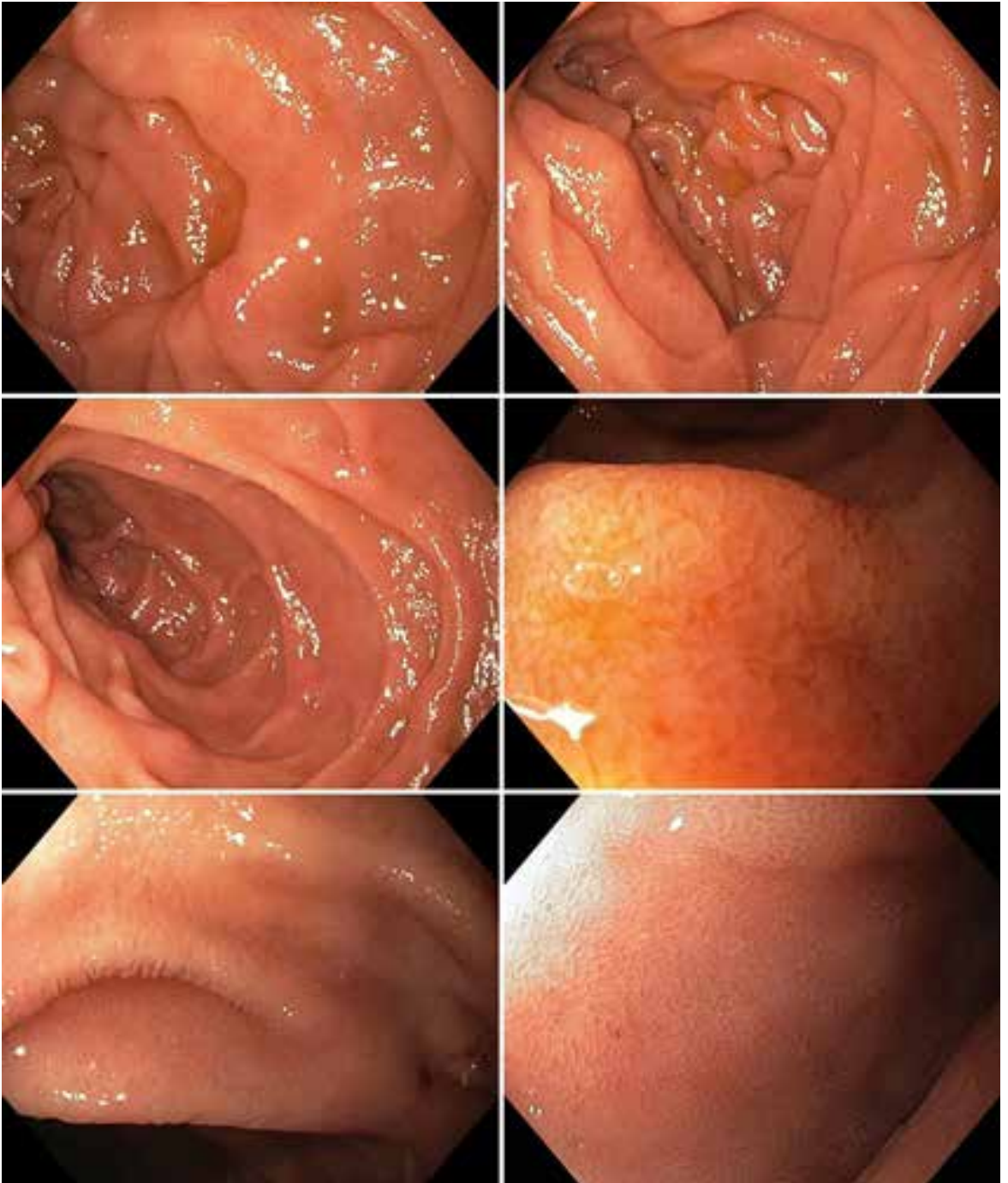
The small bowel's length and location pose diagnostic challenges. Non-invasive imaging modalities like CT enterography and capsule endoscopy have revolutionized its evaluation. However, therapeutic interventions often require surgical expertise or advanced endoscopic techniques such as balloon-assisted enteroscopy.

The small bowel, though less accessible than other parts of the GI tract, plays an indispensable role in maintaining overall health through digestion, absorption, and immunity. Advances in diagnostic techniques and therapeutic strategies continue to enhance our understanding and management of small bowel diseases. Early recognition and intervention are crucial to optimize patient outcomes in both common and rare conditions.

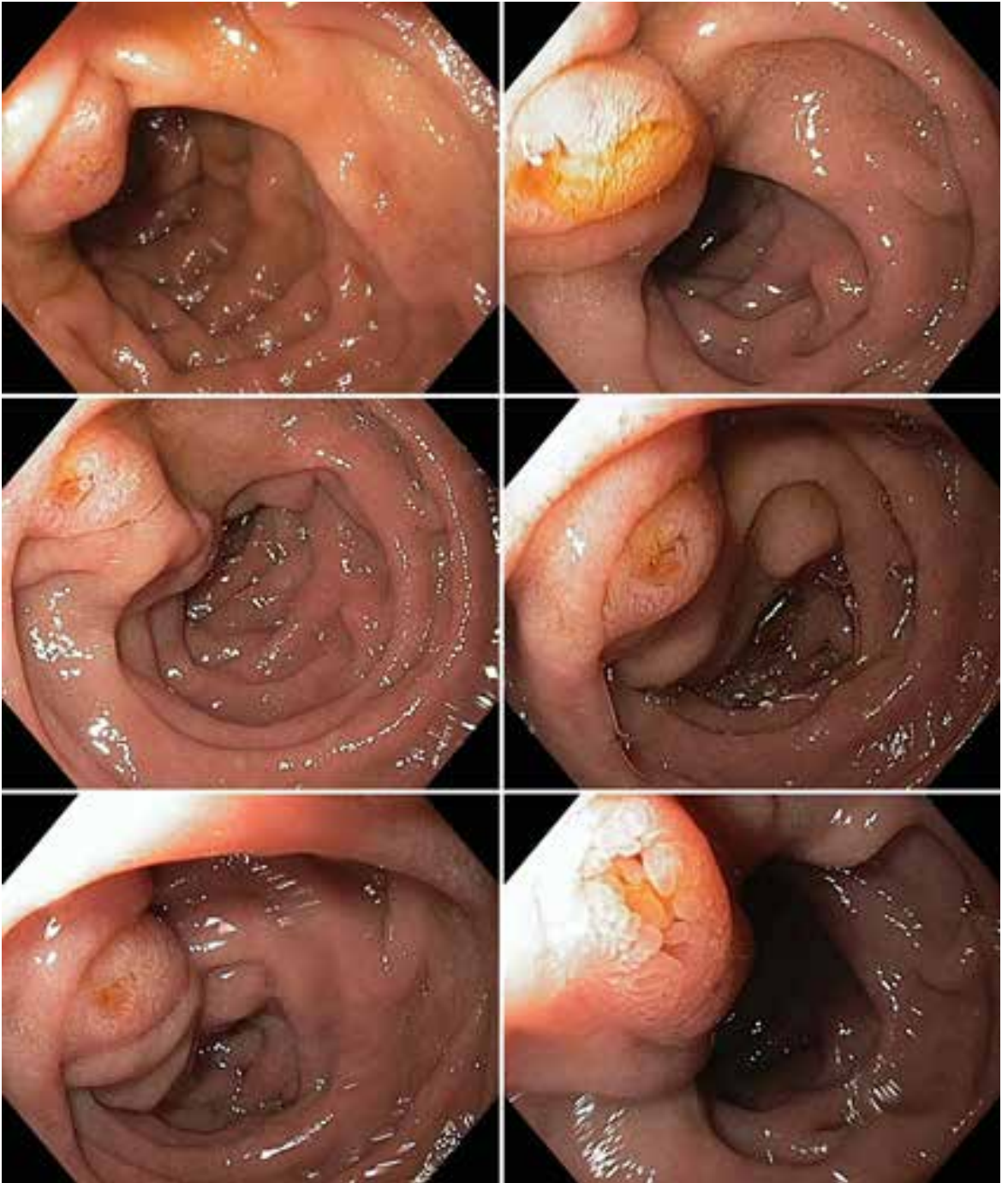
# Duodenum



*Collage: A normal descending duodenum*



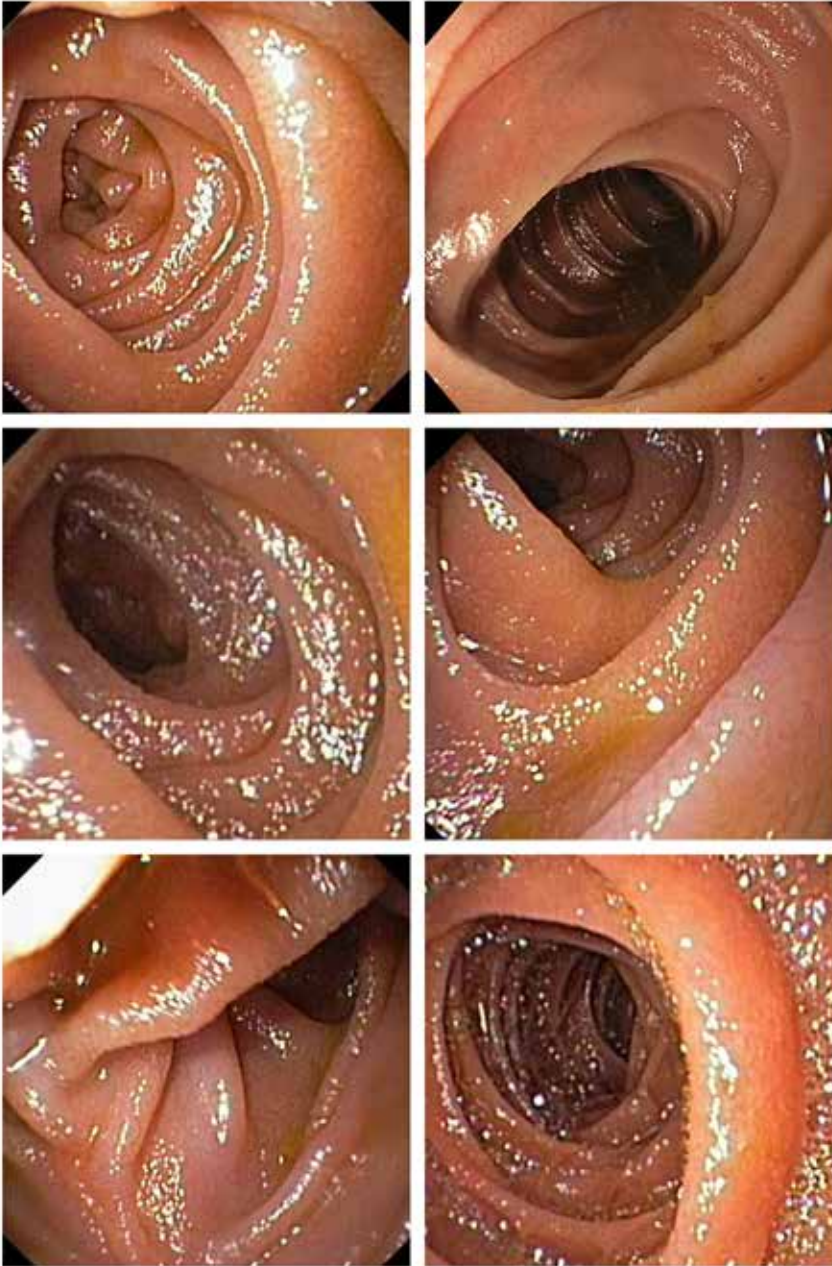
*Collage: A normal descending duodenum*



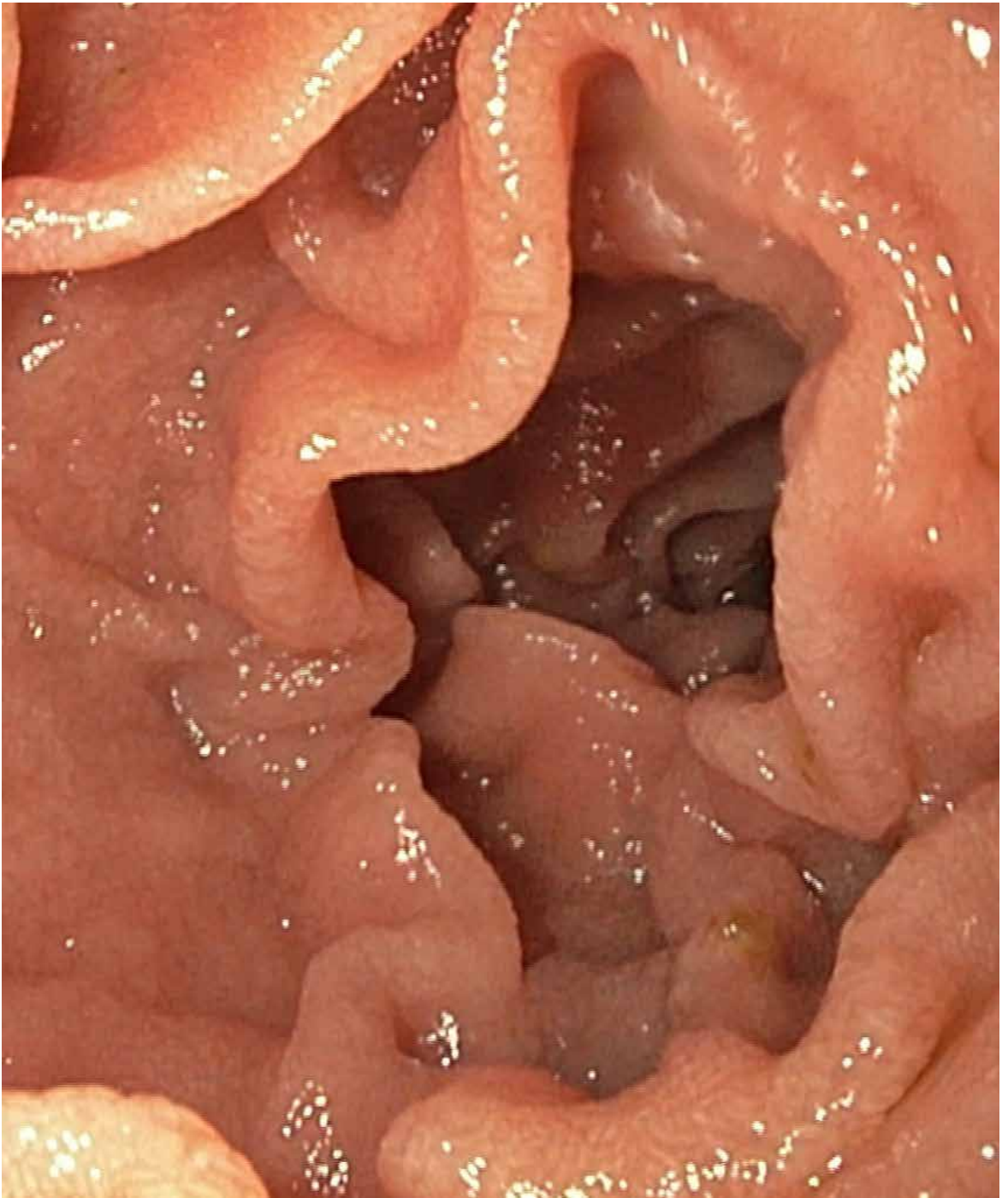
*Collage: Papilla of Vater (Major duodenal papilla)*



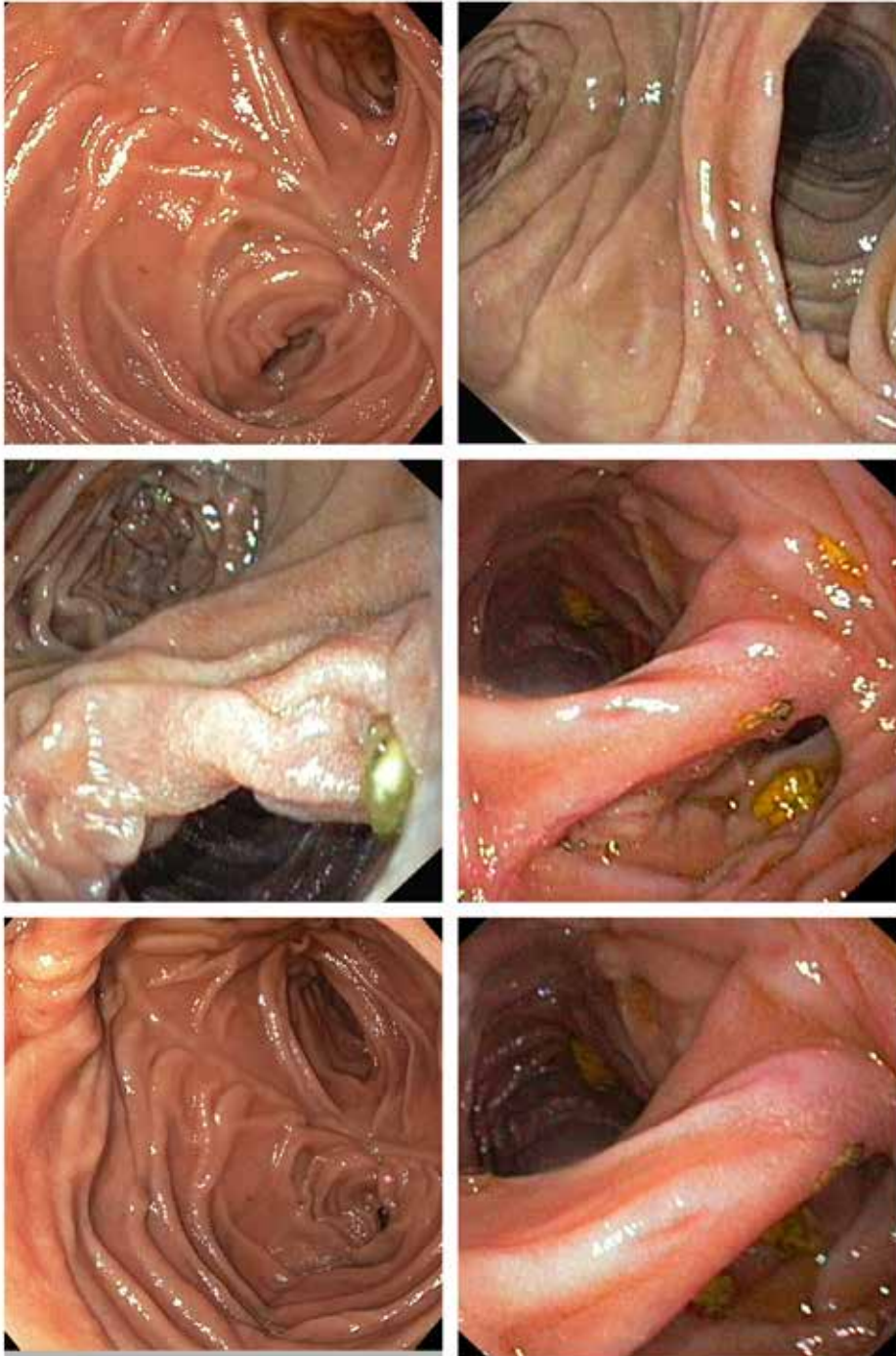
# Jejunum



*Collage: Jejunum*

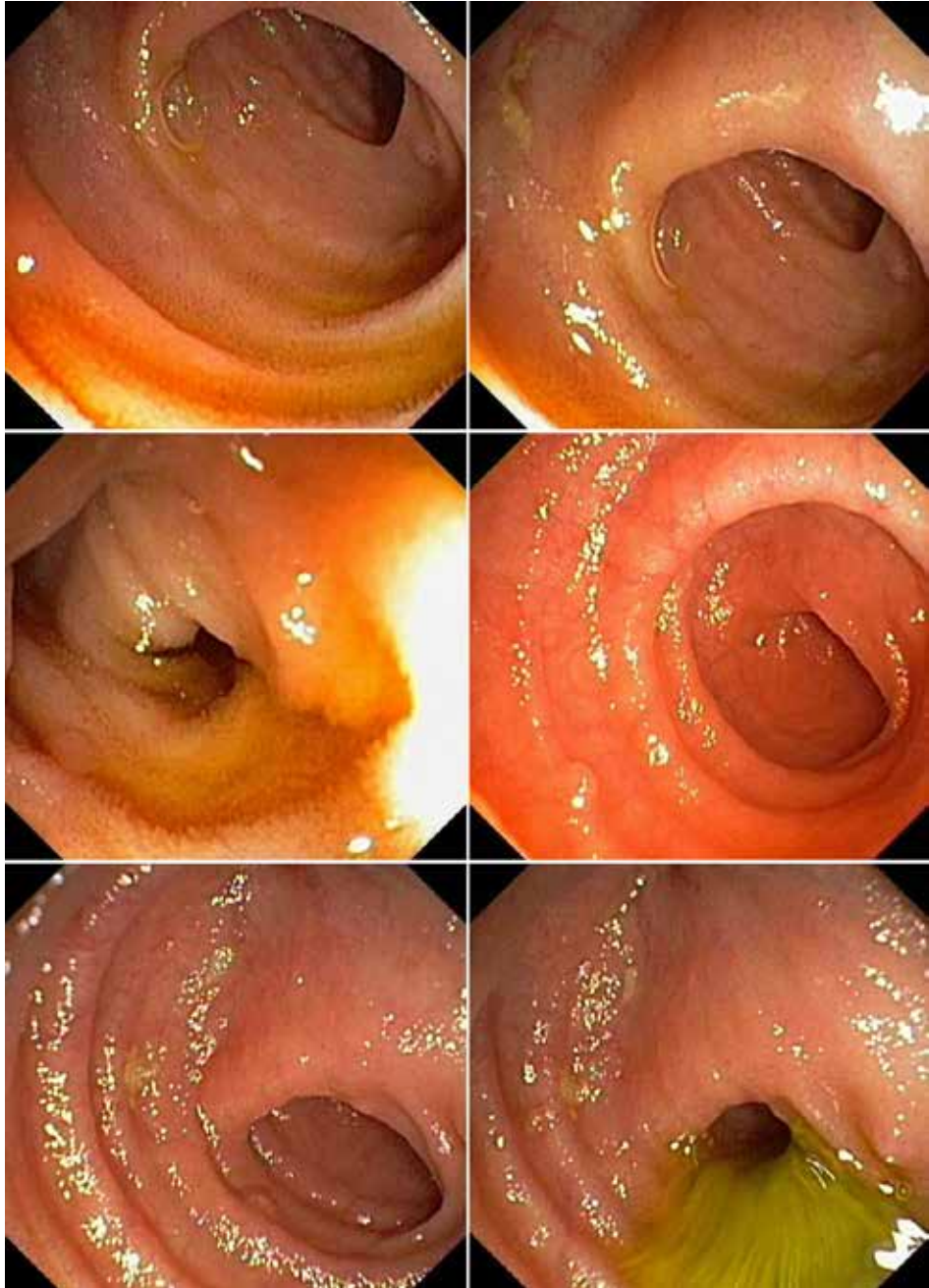


*Jejunum*



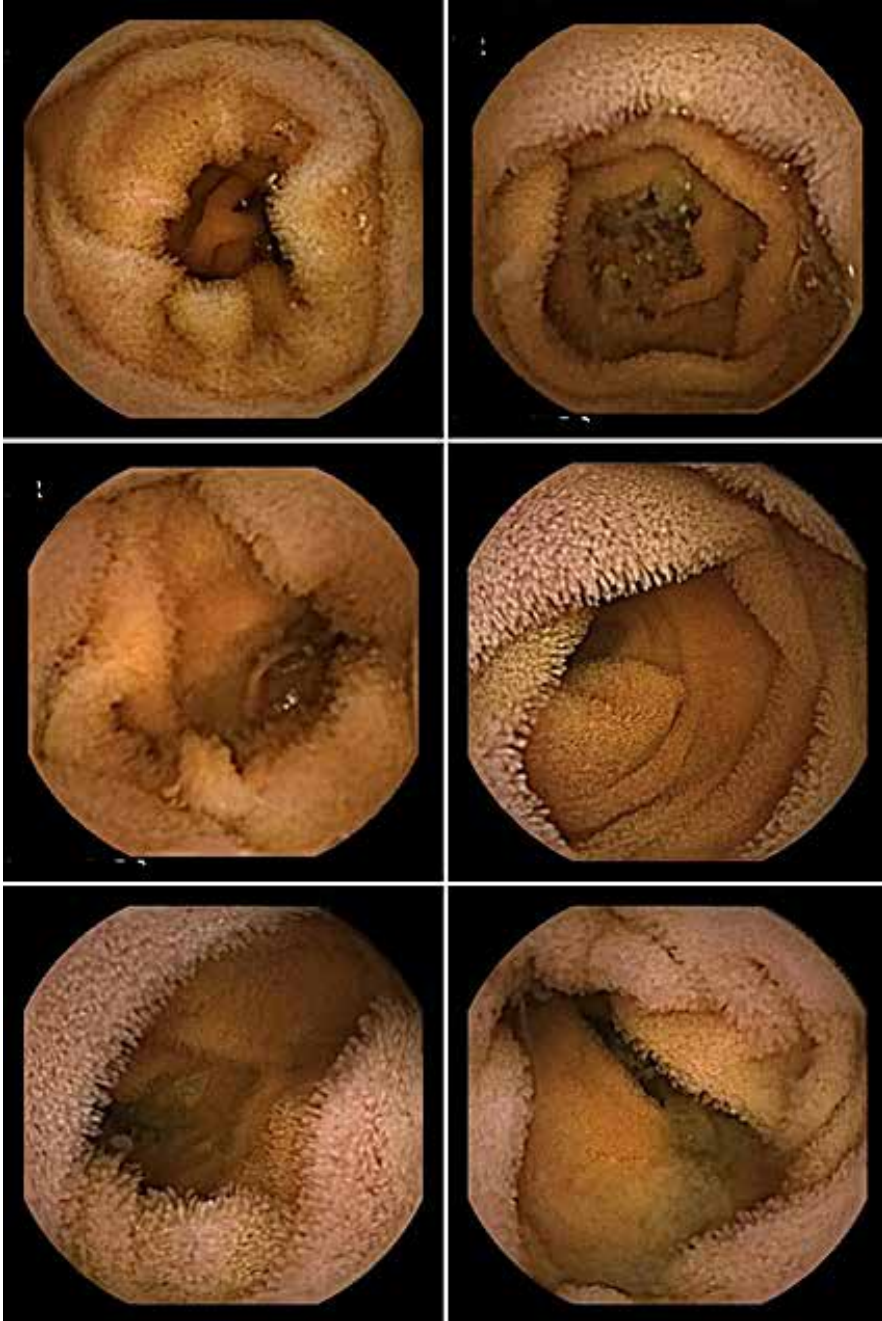
*Collage: Enteroanastomosis*

# Ileum

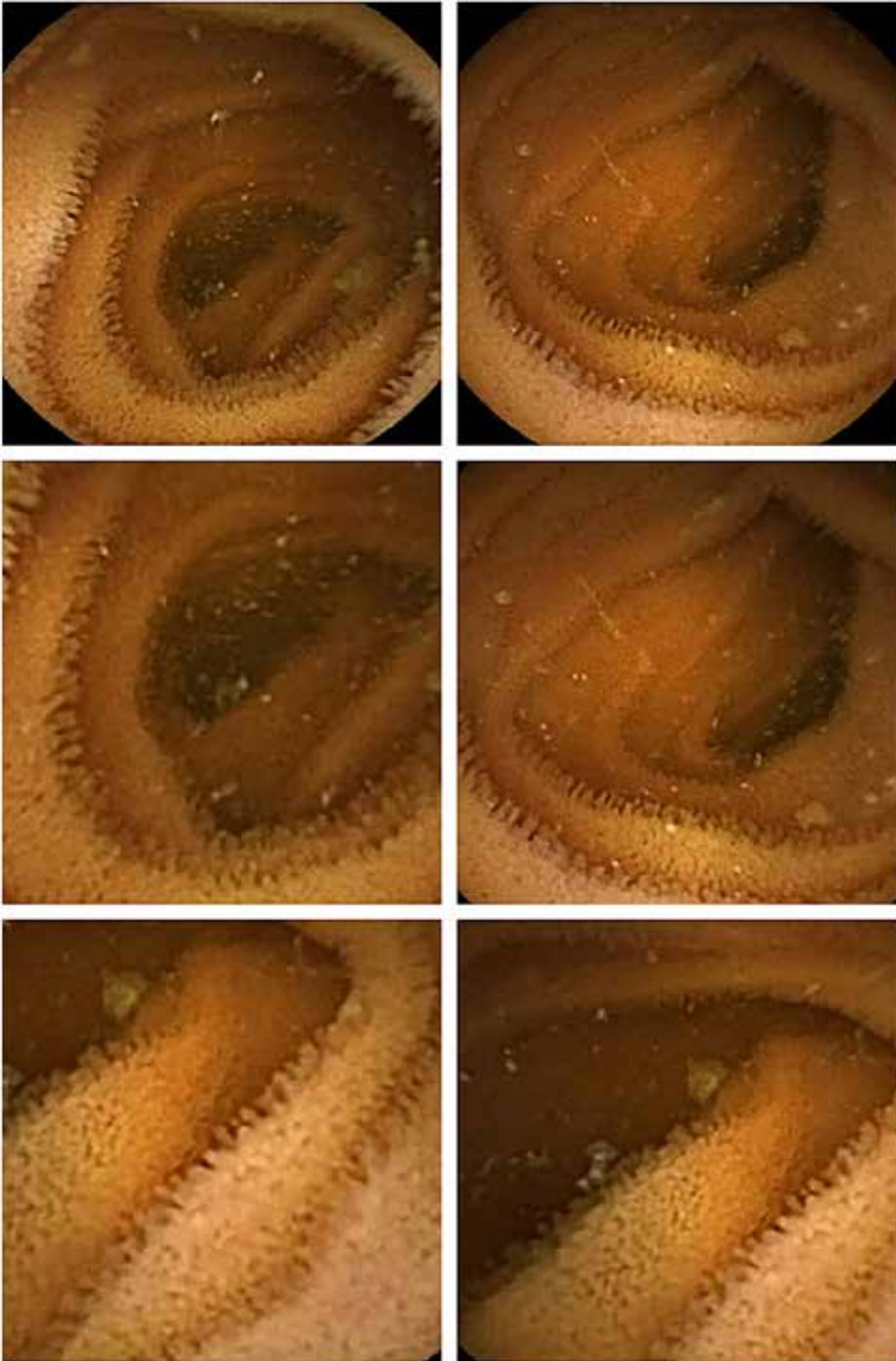


*Collage: Ileum*

# Capsule endoscopy

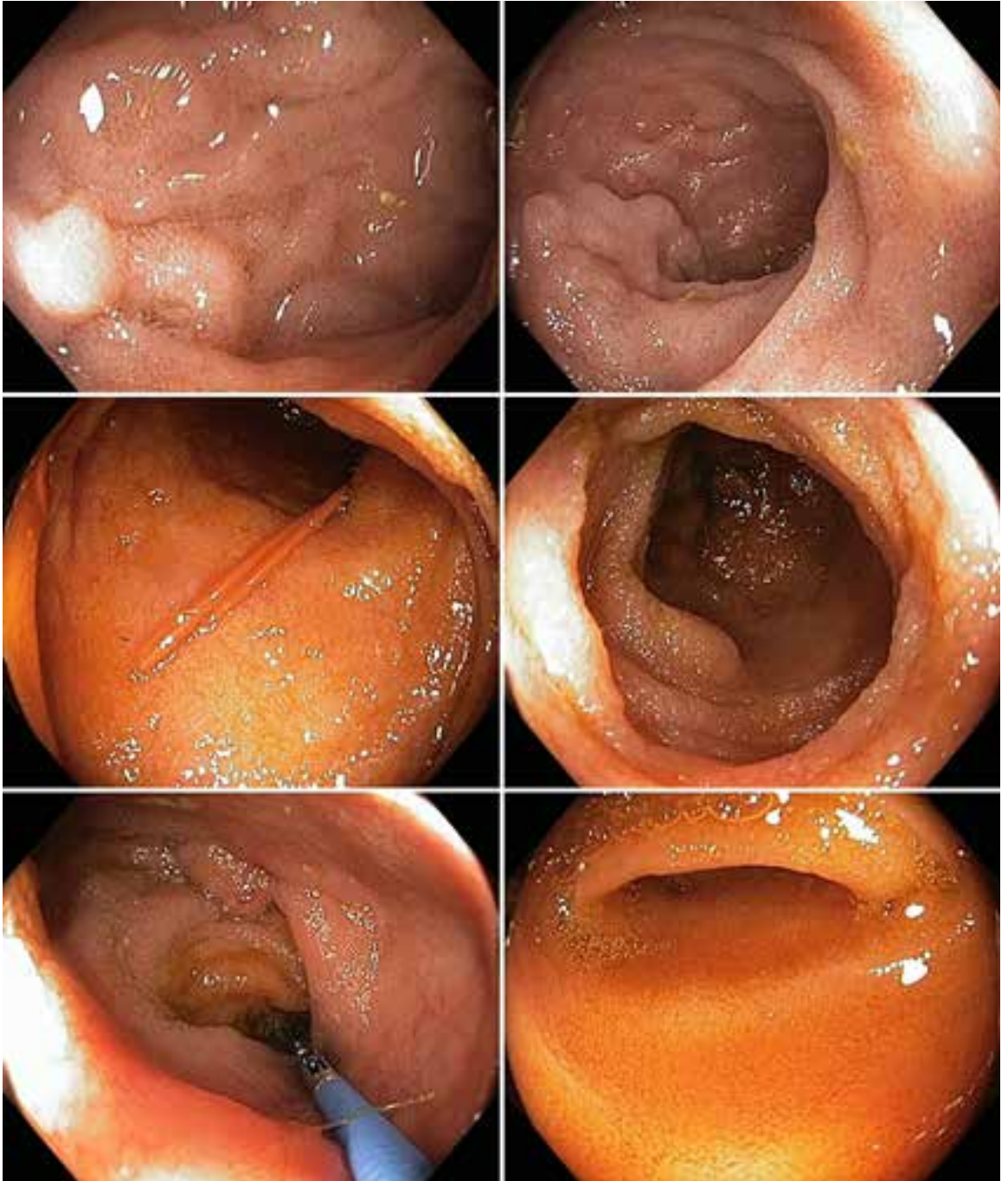


*Collage: Capsule endoscopy: A normal small bowel*



*Collage: Capsule endoscopy: A normal small bowel*

# Terminal Ileum

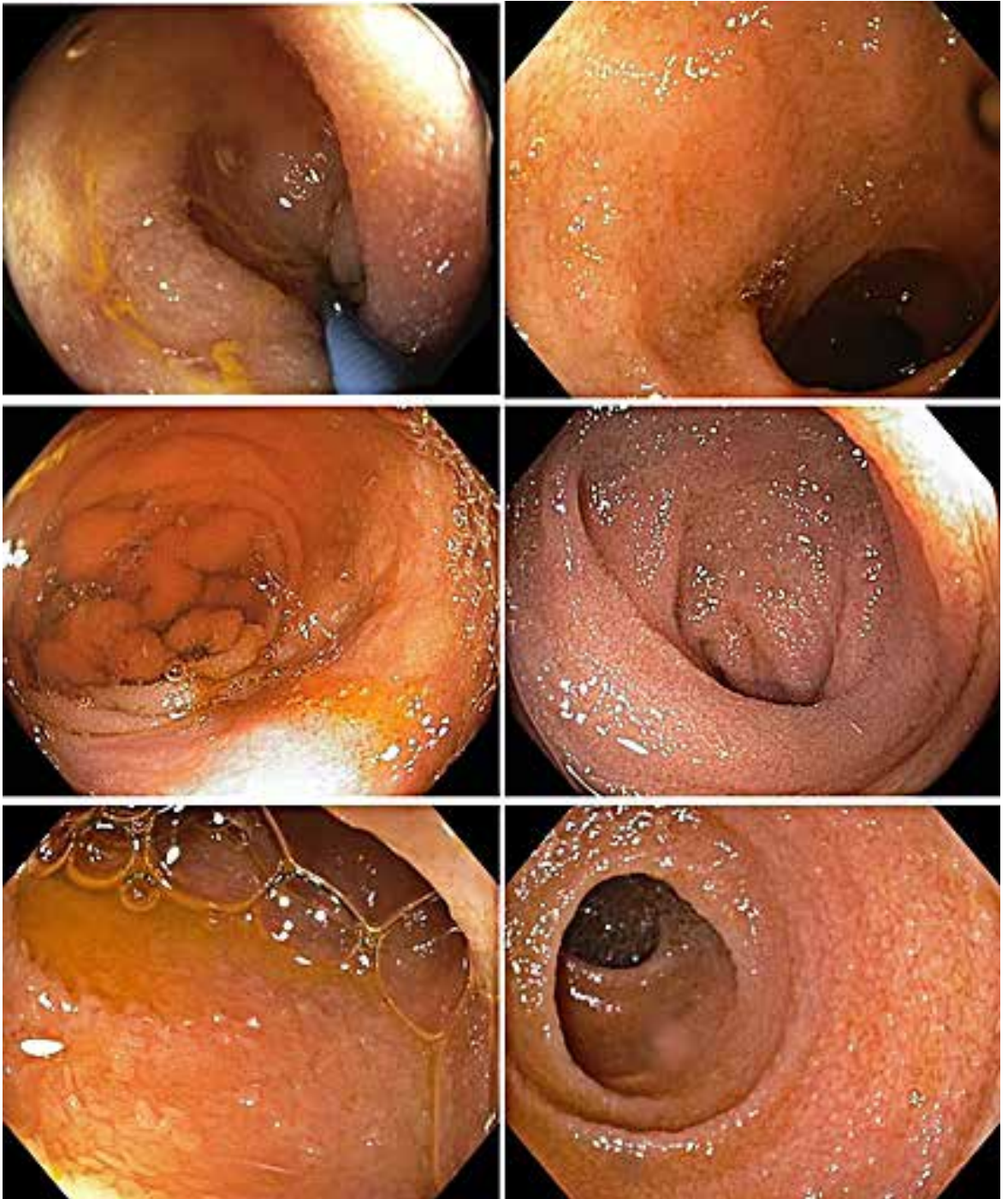


*Collage: A normal terminal ileum*



*Normal vikki in the terminal ileum*





*Collage: A normal terminal ileum*



*Collage: A normal terminal ileum*