X-ray Corner

Imaging of GI Motility Disorders

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Role of imaging in gastrointestinal motility disorders is to visualize anatomical abnormality, to determine its functional property, and to exclude other diseases that may mimic dysmotility. Conventional fluoroscopy is still a major investigative method because of its ability to assess both anatomical and functional property of the GI tract[1]. However, patients with dysmotility usually present with non-specific symptoms, such as abdominal pain, diarrhea, or constipation. Therefore, clue for diagnosis of GI motility disorders may be relied on plain radiographs, barium studies, or CT scan. This article will illustrate the combined imaging modalities of various GI motility disorders.

Esophagus (Case 1-3)

Case 1 (Figure 1): A 35-year-old man presents with chest pain. Plain chest radiographs, PA and lateral views, reveal a tubular-shaped posterior mediastinal mass displacing the trachea anteriorly. This lesion

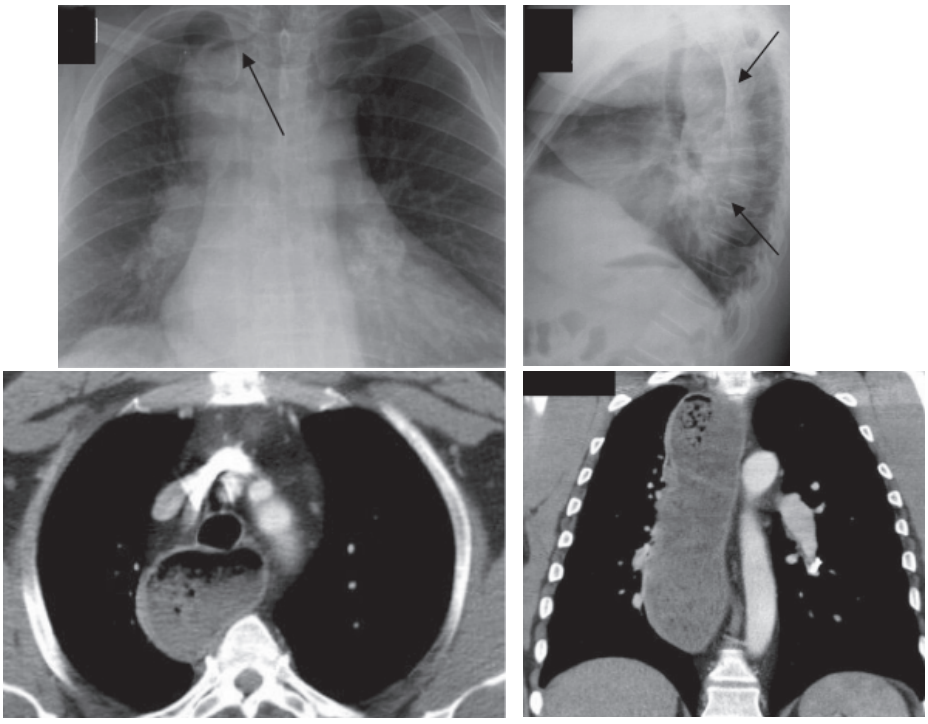

Figure 1. Achalasia cardia
Plain PA chest shows a crescent-shaped, air-fluid level. Plain lateral chest shows a tubular-shaped posterior mediastinal lesion, displacing the trachea anteriorly. Findings are indicative of dilated esophagus.
CT of the thorax confirms marked dilatation of the entire esophagus to GE junction without evidence of focal mass.

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contains a crescent of air-fluid level suggestive of a dilated esophagus. CT scan of the thorax confirms marked dilatation of the entire esophagus to the GE junction without evidence of focal mass or external compression. Findings are consistent with achalasia cardia, and esophageal manometry confirms the diagnosis.

Achalasia cardia is caused by failure of lower esophageal sphincter to relax, secondary to decrease or absence of myenteric plexus. Risk of squamous cell carcinoma is increased if left untreated[2].

Case 2 (Figure 2): A 65-year-old man presents with chest pain and dysphagia. Esophagogram shows non-peristalsis, tertiary contraction with compartmentalization of the lower esophagus, giving a classic "corkscrew appearance". Findings are consistent with diffuse esophageal spasm (DES), and esophageal manometry confirms the diagnosis.

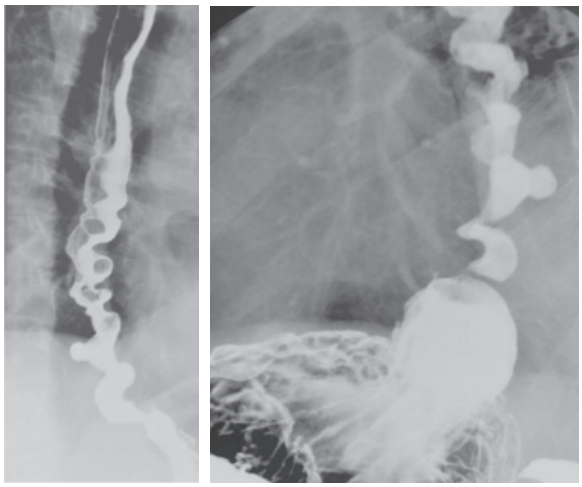

Figure 2. Diffuse esophageal spasm (DES)
Esophagogram shows non-peristalsis, tertiary contraction of the lower esophagus, giving the classic "corkscrew appearance".

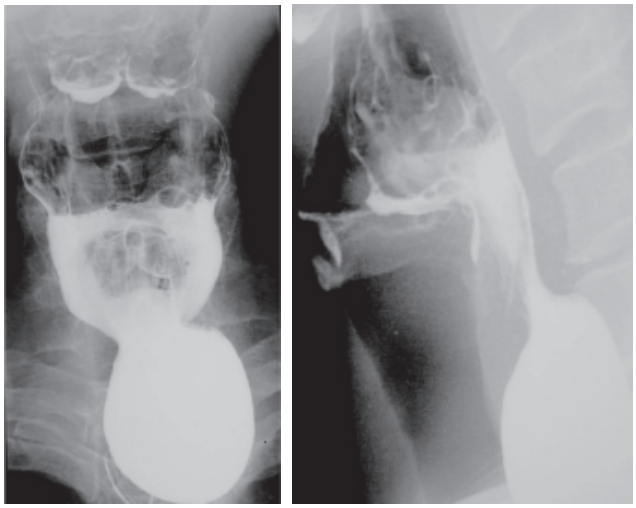

Figure 3. Zenker's diverticulum
Esophagogram shows posterior outpouching of the cervical esophagus at the cricopharyngeal junction.

DES is uncommon motility disorder of unknown etiology. There is hypertrophy of the smooth muscle of the esophagus, particularly the circular layer of the muscular propia, explaining the classic "corkscrew appearance"[3].

Case 3 (Figure 3): A 58-year-old female presents with the sensation of dysphagia around her throat. Esophagogram shows posterior outpouching of the cervical esophagus, at the level of cricopharyngeal muscle. Findings are typical of Zenker's diverticulum.

Zenker's diverticulum is a pulsion diverticulum through the Killian's triangle, which is a weakness point of the cricopharyngeal muscle[4]. Pathogenesis is unclear, and probably is associated with motility disorder that causes high pressure at the upper esophageal sphincter.

Stomach (No case example)

Gastroparesis is a condition commonly seen in diabetic patients. Pathogenesis is believed to relate to neuropathy of parasympathetic autonomic nervous system, leading to abnormal motility of the stomach[5]. Imaging shows dilated stomach containing significant food residue without evidence of mechanical obstruction. Nuclear scan confirms the diagnosis by showing delayed emptying time.

Small bowel (Case 4)

Case 4 (Figure 4): A 53-year-old female presents with chronic abdominal pain and distension. Small bowel obstruction is suspected. Small bowel follow-through study shows dilatation of the small bowel with very slow small bowel transit time. The dilated loops of small bowel show crowed valvulae conniventes, giving the finding of "hidebound pattern", consistent with scleroderma. CT of the abdomen confirms the findings of dilated small bowel with "hidebound pattern", and without evidence of mechanical obstruction. CT of the chest shows lung fibrosis and dilated esophagus. Combination of these findings gives rise to the diagnosis of intestinal pseudo-obstruction secondary to systemic sclerosis.

Systemic sclerosis is a multisystemic collagen

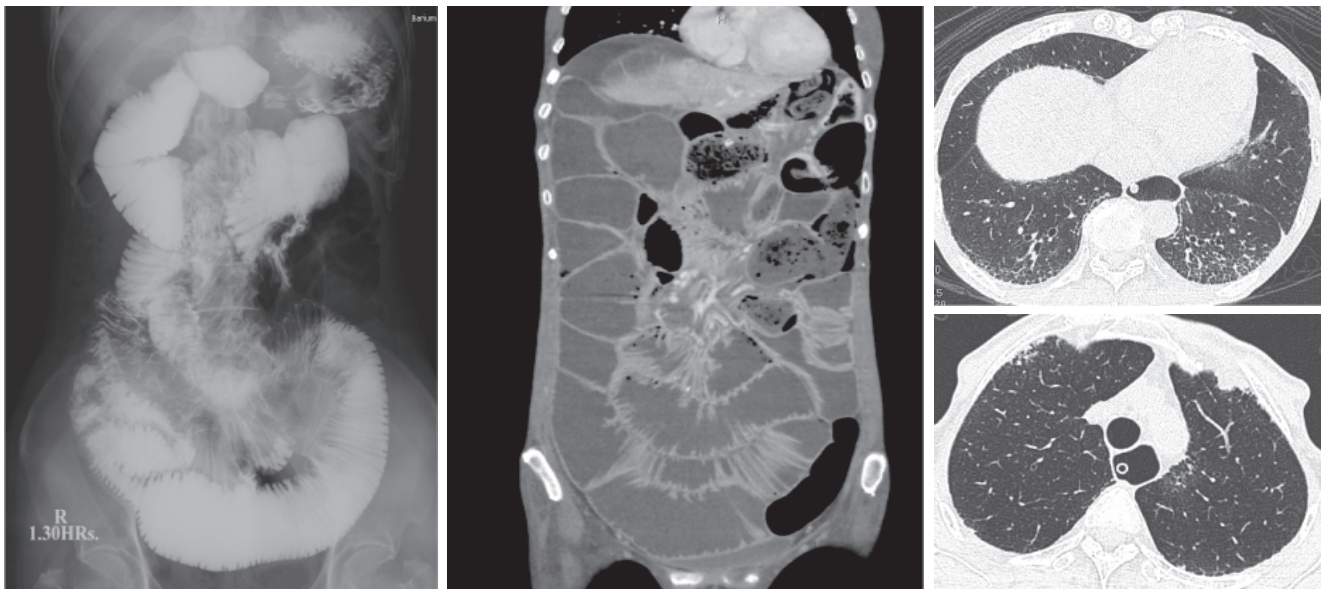

Figure 4. Intestinal pseudo-obstruction secondary to systemic sclerosis
SBFT study shows small bowel dilatation with crowded vulvulae conniventes (hidebound pattern), typical for scleroderma.
CT of the abdomen confirms the hidebound pattern and shows no mechanical obstruction.
CT of the chest shows lung fibrosis and dilatation of the esophagus.

deposition disorder. GI tract is involved in 90% of cases, and esophagus is most commonly affected[6]. Hidebound pattern is a classic finding of small bowel involvement[7]. Lung fibrosis is also a common manifestation of systemic sclerosis.

Colon (Case 5)

Case 5 (Figure 5): A 61-year-old male presents with chronic abdominal pain and constipation. Colonic obstruction is suspected. CT of the abdomen shows marked dilatation of the colon and the transitional zone is at the junction of the sigmoid and descending colon without any focal mass. Findings are suggestive of colonic pseudo-obstruction (Ogilvie syndrome). Colonoscopy confirms no mechanical obstruction and decompression of the colon via the scope is performed. Patient is clinically improved after decompression and treatment by laxative and motility agents.

Colonic pseudo-obstruction (Ogilvie syndrome) is of unknown pathogenesis. Certain conditions may lead to the imbalance of the autonomic nervous system supplying the colon[8]. Transitional zone is usually at the junction of sigmoid and descending colon where the mobile colon becomes fixed[9].

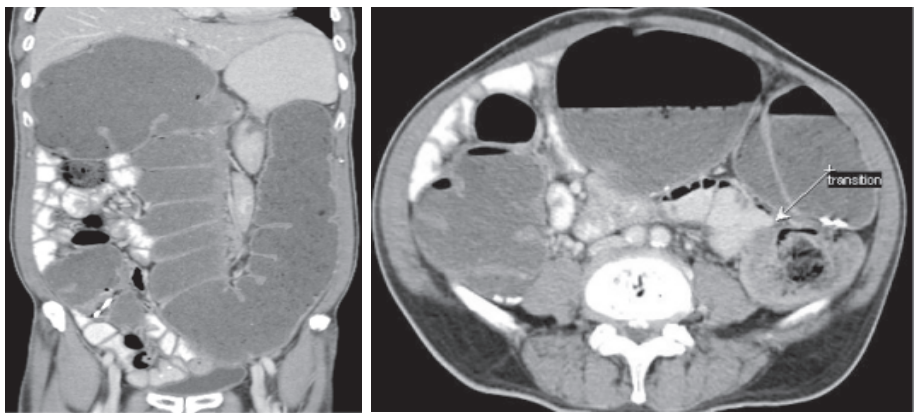

Figure 5. Colonic pseudo-obstruction (Ogilvie syndrome)
CT of the abdomen shows marked dilatation of the colon with transitional zone at the junction of sigmoid and descending colon, and without any focal mass.

CONCLUSIONS

1. Imaging plays an important role for diagnosis and assessing function in GI motility disorders.
2. The entire luminal tract could be involved.
3. Some diseases illustrating in this article are:
   a. Esophagus: achalasia cardia, diffuse esophageal spasm, Zenker's diverticulum
   b. Stomach: gastroparesis
   c. Small bowel: intestinal pseudo-obstruction secondary to systemic sclerosis
   d. Colon: colonic pseudo-obstruction (Ogilvie syndrome)

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