Clinical, Radiologic, and Manometric Characteristics of Chronic Intestinal Dysmotility: The Stanford Experience

LUCILENE ROSA-E-SILVA, LAUREN B. GERSON, MARTA DAVILA, and GEORGE TRIADAFILOPOULOS
Division of Gastroenterology and Hepatology, Stanford University School of Medicine, Stanford, California

Background & Aims: **The clinical spectrum of chronic intestinal dysmotility (CID) is not well known. We determined the spectrum of motor abnormalities, underlying pathology, clinical course, and response to treatment of adults with CID at a tertiary referral center.** ***Methods:*** **This was a descriptive retrospective analysis of a CID cohort conducted at a tertiary referral gastrointestinal (GI) motility center. A total of 113 referred patients underwent gastroduodenal manometry, other motility studies as appropriate, and radiologic and/or endoscopic assessment to exclude mechanical intestinal obstruction.** ***Results:*** **Common symptoms included abdominal distention, abdominal pain, nausea, and constipation. The course was chronic with intermittent symptoms. Gastroduodenal manometry was abnormal in all patients; a pattern suggestive of a neuropathic process was the most common. Other GI motility studies showed delayed gastric, gallbladder, and colonic transit, nonspecific esophageal dysmotility, sphincter of Oddi hypertonicity, and poor rectal balloon sensation/expulsion. Treatment involved nutritional support, prokinetics, analgesics, antinausea agents, and laxatives, with variable response and high morbidity, multiple emergency admissions, need for nutritional support, and poor response to surgery. Nearly 40% of the patients underwent abdominal surgery.** ***Conclusions:*** **Patients with CID have a chronic course and high morbidity. Because any segment of the GI tract may be involved in CID, functional assessment of the entire GI tract is recommended. CID presents several unmet clinical needs even in tertiary centers with expertise.**

Chronic intestinal dysmotility (CID) is a clinical syndrome characterized by recurrent symptoms and signs of bowel obstruction in the absence of a mechanical occlusion but in the absence of continual bowel dilatation. Although the spectrum of this condition in children has been reported,[1–4] the clinical spectrum of adult CID is not well known.[5–16] A single center study from Italy presented data on the natural history of chronic intestinal pseudo-obstruction,[13] including the need for total parenteral nutrition, surgery, and transplantation. The present study investigated the manifestations and management of CID in a US center.

CID can be classified as either a primary (idiopathic) or a secondary disorder, resulting from conditions that affect the enteric neuromusculature, such as scleroderma, diabetes mellitus, amyloidosis, and others.[14–16] CID may involve either the entire gastrointestinal (GI) tract or isolated segments to a variable extent and magnitude.[17–19] Gastroduodenal manometry is useful in CID[11,20–24] by showing 1 or more abnormalities in small bowel motor motility, such as absent phase III of the migrating motor complex (MMC), postprandial low-amplitude contractions, bursts of sustained uncoordinated phasic activity, and clusters of contractions. Additional examinations, including esophageal, anorectal, and sphincter of Oddi manometry as well as gastric and gallbladder scintigraphy and colonic transit time, can be performed to assess the extent of GI tract involvement in this disorder.

Our aim was to assess the spectrum, underlying pathologies, clinical course, and response to treatment of a large cohort of CID adults evaluated at a US tertiary referral motility center.

Materials and Methods

Patients

We reviewed the medical records of 113 patients with the diagnosis of CID. All patients had recurrent symptoms suggestive of bowel obstruction in the absence of a mechanical occlusion. The manometric criteria for the diagnosis of CID as originally proposed by the Mayo Clinic[11] (see below) were fulfilled by all 113 patients (19 male, 94 female; median age, 43 years [range, 18–80 years]). These patients were evaluated and managed at the Stanford Hospital GI Motility Center between 1999 and 2004. The study was approved by Stanford University's Institutional Review Board for Human Subjects Research.

Abbreviations used in this paper: **CID, chronic intestinal dysmotility; CT, computed tomography; GI, gastrointestinal; LES, lower esophageal sphincter; MMC, migrating motor complex; NSAID, nonsteroidal anti-inflammatory drug; PEG, polyethylene glycol; TPN, total parenteral nutrition.**

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CID was diagnosed by a combination of clinical, radiologic, surgical, and motility examinations,[11,12,25,26] with symptoms suggestive of subobstruction and manometric abnormalities required for entry into this series. Plain or contrast radiography showing dilatation of all or part of the small intestine in the absence of demonstrable mechanical obstruction, air–fluid levels, impaired gastric emptying, and markedly decreased small intestinal transit time were considered consistent with the diagnosis of CID.

Data retrieved from the patients' medical records included demographics, age at symptom onset, family history, underlying pathologies, presenting symptoms, the presence of any extraintestinal manifestations, results of diagnostic examinations (plain/contrast radiography, abdominal ultrasound, abdominal computed tomography [CT], and endoscopy), and previous therapeutic interventions (including nutritional, pharmacologic, surgical, and endoscopic).

Assessment of Symptoms and Response to Therapy

We semiquantitatively assessed our patients' symptoms in terms of frequency and severity, using a GI questionnaire that was previously used and validated in our center.[27] According to this scoring system, symptom frequency and severity range from 0 to 3, with 0 representing no occurrence, 1 representing mild symptoms $< 50\%$ of the time, 2 representing moderate symptoms 50%–75% of the time, and 3 representing severe symptoms 75%–100% of the time. We report the median score for each symptom in our patients.

In addition, the patients were classified as either "responders" or "nonresponders" to therapy. Responders were classified as "good" if they experienced significant relief of their symptoms and continued therapy over multiple visits throughout their follow-up care, or as "partial" if they initially responded to therapy but on subsequent assessment had discontinued therapy. Nonresponders were those who experienced no relief of symptoms early after initiation of therapy.

Gastroduodenal Motility Studies

All patients underwent gastroduodenal manometry after an overnight fast. This study was carried out using an 8-lumen perfusion catheter introduced using combined endoscopic and fluoroscopic guidance. Briefly, a proximal enteroscopy was performed, and a super-stiff guide wire (Boston Scientific, Natick, MA) was placed into the proximal jejunum. The endoscope was then removed, and, under fluoroscopy, the motility catheter was thread over the guide wire to reach beyond the ligament of Treitz. The catheter extruding from the patient's mouth was perfused with water at a rate of .1 mL/min by a pneumohydraulic pump and then connected to a transducer (Medtronic, Minneapolis, MN), which recorded pressure profiles from the distal antrum, pylorus, and the duodenal C-loop up to the ligament of Treitz. Pressure activity was recorded continuously in each patient for 3 hours before (fasting period) and 2 hours after (fed period) ingestion of a mixed solid–liquid meal.[28]

Tracing analysis was performed visually and semiquantitatively. The mean fasting cycle duration and the site initiation of phase III were determined. The presence of abnormal patterns was identified as follows, consistent with several studies on manometry of neuropathic and myopathic dysmotility reported in the literature[9,11,20]:

- Fasting state, consisting of (1) bursts of phasic activity of abnormal duration ($>$ 2 minutes), amplitude ($>$ 20 mm Hg), and frequency (10–12/minute) that are nonpropagating and distinct from phase III; (2) sustained ($>$ 30 minutes) poorly coordinated phasic activity, isolated to 1 or more segments of the intestine; (3) low-amplitude contractions (typically $<$ 10 mm Hg in the small bowel); (4) lack of propagation, as well as incomplete or retrograde propagation of phase III complexes covering a distance of at least 30 cm; (5) prolonged ($>$ 3 minutes) increase in basal tone ($>$ 30 mm Hg) during phase III activity.
- Fed state, consisting of (1) persistent fasting pattern after a meal; (2) low-amplitude waves in the antrum ($<$ 40 mm Hg)[28] and small bowel ($<$ 10 mm Hg)[28]; (3) bursts of nonpropagating phasic contractions; (4) premature return of phase III within 90 minutes after a meal; (5) broad-based clusters of contractions occurring in the presence of increased tone (minute contractions).

Low contractility during fasting (phases II and III) and postprandial was considered suggestive of myopathy.[28] The following abnormalities were considered suggestive of neuropathy:

- Enteric neuropathy, marked by abnormal configuration or absent propagation of the MMC phase III and sustained, poorly coordinated phasic activity.
- Central nervous system–enteric nervous system dysregulation, marked by altered MMC periodicity, lack of postprandial pattern, and clusters of contractions, as suggested in a consensus document from experts in the field.[29]

Other Motility Tests

Depending on patients' symptoms, additional studies were performed to detect the extent of the GI tract involvement. Such studies included esophageal manometry (in 35 patients), gastric scintigraphy (in 70 patients), gallbladder scintigraphy (in 13 patients), sphincter of Oddi manometry (in 6 patients), colonic transit time (in 36 patients), and anorectal manometry (in 22 patients). Conventional methods, as reported in the literature, were used for all such studies.[30–33]

Results

Clinical Presentation

The median age of symptom onset was 37 years (range, 8–77 years). Figure 1 shows the distribution of GI symptoms at presentation. The median scores for each