Crohn's Disease

Description/Etiology
Crohn's disease (CD) is an incurable form of inflammatory bowel disease (IBD) that can affect any part of the GI tract from the mouth to the anus, extends through all bowel tissue layers, and can penetrate extraintestinal structures. CD impairs intestinal absorption of nutrients, causes growth impairment and delayed puberty in children, and impairs QOL.

The exact etiology of CD is unknown. Emerging evidence suggests that CD is a form of immunodeficiency in which defects range from disrupted mucosal barrier function to abnormal phagocyte biology; genetic, microbial, environmental, dietary, and psychosocial factors may be involved. CD can affect multiple parts of the GI tract simultaneously, which causes disconnected patches of ulceration between healthy mucosal areas that create a cobblestone appearance. It most commonly develops in the terminal ileum (also called regional enteritis) and the proximal colon (also called granulomatous colitis). The three types of disease activity that occur in CD are inflammatory, which is characterized by diarrhea, abdominal pain, and fever; penetrating, characterized by the development of abscesses, fissures, or fistulas that extend into the peritoneum; and stricturing, which leads to bowel obstruction.

Assessment—at diagnosis or serially to evaluate disease status—is arduous for patients with CD because symptoms are worsened by invasive examination and accurate diagnosis necessitates comparison of multiple clinical, radiologic, endoscopic, and histologic features. Disease location, activity, and severity determine the course of treatment, which usually begins with medication and lifestyle changes but ultimately involves surgery for sequelae resolution in most cases. Although the course of CD is often relapsing/remitting and patient response to treatment varies widely, most patients lead normal lives but have a slightly shorter life expectancy.

Facts and Figures
The incidence of CD has increased steadily during the past 50 years, especially in Northern Europe and North America, where it occurs most commonly. Increased incidence is documented in Ashkenazi Jews, White persons, and females. At least one surgical procedure is necessary in 49% of patients within 5 years of diagnosis, 61% within 10 years, and 70% within 15 years. In patients with CD, risk of colon cancer is 3% at 10 years and 8% at 30 years. CD is associated with a 50% increase in all-cause mortality.

Risk Factors
Risk factors for CD include being 10–40 years of age; consuming high amounts of cola, sucrose, meat, and fat; cigarette smoking, appendectomy, Salmonella or Campylobacter gastroenteritis, family history of CD, and certain genetic mutations (e.g., in the NOD2/CARD15, SLC22A4/SLC22A5, and DLG3 genes). Antibiotic use may be a risk factor for CD in children. Risk factors for postsurgical CD recurrence include smoking, penetrating disease, longer duration of disease, previous resection, family history of IBD, and disease extent > 100 cm.
Signs and Symptoms/Clinical Presentation

Depending on the area(s) of GI tract involvement, presentation includes chronic or nocturnal diarrhea, abdominal pain, fever, dehydration, anorexia, nausea, and fatigue. Rectal bleeding, abdominal mass or distention, cramping unrelieved by stool or flatus, steatorrhea (i.e., presence of excess fat in feces due to fat malabsorption), malnutrition, and vitamin deficiencies may be present. Extraintestinal manifestations can be the first indication of CD, including skin and/or oral lesions, iritis, amenorrhea, arthritis, multifocal osteomyelitis (i.e., autoinflammatory bone disease), sclerosing cholangitis (i.e., inflammation, scarring, and destruction of the bile ducts inside and outside of the liver), gallstones, and kidney stones.

Nutritional Assessment

› Patient Medical History
  • Obtain patient history, including assessing for/asking about
    – patient and family history of certain conditions known to affect, or be affected by, CD (e.g., colon cancer, steatorrhea, arthritis, kidney stones)
    – signs and symptoms (e.g., vomiting/diarrhea/constipation, pain, fatigue) that can indicate inadequate intake or absorption of nutrients or fluid and reduce appetite
    – recent unexpected weight loss
    – level and type of regular physical activity
  • CD onset is insidious; patients typically experience weight loss, malnutrition, and anemia because they limit food intake to avoid postprandial cramping
  • Patients with CD may show signs of malabsorption (e.g., pallor, muscle wasting, easy bruising)
  • For more information see Signs and Symptoms/Clinical Presentation, above

› Physical Findings of Particular Interest
  • Evaluate usual nutrition intake by asking the patient to complete a 24-hour dietary recall identifying foods generally consumed, including food preferences, cultural/religious beliefs concerning food and other related customary practices, and medically prescribed dietary interventions
  – In the outpatient setting a 24-hour dietary recall when combined with a 3-day diet history may be a useful tool for evaluating the patient’s dietary strengths and weaknesses (i.e., patient recall of all foods and beverages consumed in a 3-day period that includes 1 weekend day)
  – Assess for deficiencies of iron and vitamins, especially in children
  • Ask about personal habits, including alcohol, caffeine, and soda consumption; tobacco use; eating at night; and frequenting vending machines or fast food. Ask about use of any herbal or OTC supplements (e.g., fish-oil capsules, cranberry capsules, ginger) as well as prescription medications

› Anthropometric Data and Calculations
  • Calculate the patient’s BMI by dividing body weight (kilograms) by height (meters squared); or 703 multiplied by weight (pounds) and divided by height (inches squared)
    – Underweight: < 18.5; normal: 18.5–24.9; overweight: 25–29.9; obese: > 30
    – In patients over 65 years of age, evidence suggests that a slightly higher BMI (25–27) may help prevent bone deterioration and is associated with a lower risk of mortality
    – In some cases, body composition testing (e.g., dual-energy X-ray absorptiometry [DXA] scan, skin calipers) may be necessary
  • Significant undesirable weight changes are as follows: +/− 5% during a 30–day period or +/− 10% during a 180–day period
    – Weight loss of 10–20% in a 180-day period indicates moderate protein-calorie malnutrition
    – Weight loss of > 20% in a 180-day period indicates severe protein-calorie malnutrition
    – Fluid retention can impact weight variables and should be taken into account when considering the significance of weight changes
  • Estimate daily energy requirements in calories (kcal) by calculating the resting metabolic rate (RMR), also called basal energy expenditure (BEE), by use of the Harris-Benedict equation (for persons with a BMI < 30) or the Mifflin-St. Jeor equation (for obese persons), multiplied by the appropriate activity factors (AFs) and injury factors (IFs) as shown below
    – Lb/kg and in/cm conversion: 1 lb = 2.2 kg; 1 in = 2.54 cm
    – Harris-Benedict equation (for persons with a BMI ≤ 30):
      - Men: RMR = 66.5 + (13.8(weight in kg)) + (5.0(height in cm)) – (6.8 x age)
      - Women:RMR = 565 + 9.6(weight in kg) + 1.8(height in cm) – (4.7 x age)
Mifflin-St. Jeor Equation (for persons with a BMI > 30):
- Men: RMR = 10 (weight in kg) + 6.25 x (height in cm) x age + 5
- Women: RMR = 10 (weight in kg) + 6.25 x (height in cm) – 5 x age – 161
Daily kcal requirement = RMR x AF x IF
- AF: Confined to bed: 1.2; moderately active: 1.3; active: 1.4
- IF: Minor surgery: 1.2; skeletal trauma: 1.3; major sepsis: 1.6; severe burn: 2.1
To encourage weight gain or loss (of 1–2 lbs/week), add or subtract 500 kcal/day respectively and monitor for weight changes

Laboratory and Diagnostic Tests of Particular Interest to the Dietitian
- Complete blood count (CBC) with differential may indicate anemia and elevated white blood cell (WBC) count; serum electrolytes may show imbalance
- Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) may be elevated
- Serum levels of albumin; protein; vitamins A, B12, C, and D; selenium; zinc; and magnesium may be low; blood urea nitrogen (BUN) and creatinine may be elevated
- Stool examination results vary by disease site. Disease in the terminal ileum usually causes watery, bile-salt-induced diarrhea; colon involvement generally produces liquid and/or semi-formed stools containing blood and mucus; and small bowel disease may produce steatorrhea

Treatment Goals
- Promote Remission and Optimum GI Tract Function
  - Assess nutritional and metabolic status, weight, and overall health, including comorbid conditions
  - Review results of laboratory tests and diagnostic studies related to nutritional status and evaluate for deficiencies in nutrition; report findings to the treating clinician
  - Monitor weight fluctuation and encourage weight management
  - Promote resolution of inflammation, malnutrition, and dehydration with a diet specific to disease severity. Malnutrition is a serious potential complication in persons with CD. Treatment for under-nutrition is complicated due to the pathogenesis of CD. Nutrition counseling alone rarely is adequate to reverse poor nutritional status
  - Enteral nutrition (EN) is usually required with oral nutritional supplements or by tube feeding
  - Parenteral nutrition (PN) should be reserved for patients in whom EN has failed or is contraindicated. Patients with intractable vomiting, severe stenotic disease, short-bowelsyndrome, or perforated GI tract are candidates for PN
  - Many of the patients who require PN have experienced prolonged malnutrition, increasing their risk for refeeding syndrome (i.e., a metabolic malfunction resulting from a sudden increase in nutrition after a prolonged period of starvation). PN should be introduced slowly and feedings should be increased cautiously with close monitoring
  - Oral intake may include an elemental diet, or a diet low in residue, fiber, and fat and high in calories, protein, and carbohydrates. B12, folic acid, fat-soluble vitamins, and calcium may be ordered
  - Review diet history information to assess dietary intake and patterns and provide detailed patient education regarding the metabolic effect of CD, nutritional requirements and deficiencies, and the risks and benefits (see Red Flags, below) of all dietary management options. Emphasize the importance of
    - following a calorie-appropriate and nutrient-dense diet, when medically appropriate
    - the effect of diet, exercise, and other lifestyle factors on weight and related medical conditions
    - strategies for meal planning, grocery shopping, and food preparation
- Provide Emotional Support, Educate, and Identify Support Resources
  - Assess patient’s anxiety level and coping ability, and educate about ways to promote emotional well-being and improve quality of life (e.g., regular exercise, good nutrition, and joining a support group)
  - As appropriate, request referral to a social worker for identification of age-appropriate support groups and to a mental health clinician for counseling on strategies for coping with the ramifications of CD

Food for Thought
- In a study aimed at investigating factors associated with fiber intake and its relationship with flareups in patients with inflammatory bowel disease, investigators found that intake of dietary fiber was associated with reduced flareups in patients with Crohn’s disease but not those with ulcerative colitis(1)
- Many patients with CD use alternative and complementary therapies, which frequently include the use of probiotics (i.e., oral preparations of viable microorganisms that are considered to positively alter the normal intestinal flora). Although
Probiotics are generally considered safe, few clinical trials have been conducted to determine the effectiveness or safety of probiotic use in persons with CD. Currently, no significant benefit regarding the use of probiotics is documented for the treatment of CD. Probiotics should not be taken by patients who are critically ill, immunosuppressed, or have an indwelling catheter because of the risk of bacteremia and fungemia.

- Fecal microbiota transplantation, in which the gut microflora are altered by instillation of stool from a healthy donor to a recipient, may be a treatment option for patients with CD.
  - Researchers who conducted a study of 30 patients with refractory CD (the largest sample size studied to date) found that fecal transplantation resulted in clinical improvement in 83% of patients at 1 week and 67% at 6 months; the rate of clinical remission was 60% at both 1 week and 6 months (Cui et al., 2015).
  - Investigators who studied 105 children in whom CD was newly diagnosed reported that exclusive enteral nutrition was as effective as corticosteroids in induction of remission (Soo et al., 2013).
  - Researchers used an immunoglobulin G4 (IgG4) guided exclusion diet in an RCT to improve quality of life and symptoms in patients with CD. Verification of these findings is needed by larger RCTs.

Red Flags

- Patients with CD are at increased risk for leukemia and cancers of the small bowel, colon, lung, skin, bladder, pancreas, liver, testes, prostate, and kidney.
- Medications that are routinely prescribed to treat CD can cause life-threatening complications and other chronic disease conditions; NSAIDs and sugar substitutes are contraindicated in patients with CD.
- Narcotic analgesics and antidiarrheal agents may precipitate toxic megacolon.
- Risk of venous thromboembolism (i.e., deep vein thrombosis and pulmonary embolism) is increased in patients with CD, especially during periods of disease exacerbation.
- Extensive bowel resection can lead to short bowel syndrome, which is characterized by severe malabsorption of fluids, electrolytes, and nutrients; patients with short bowel syndrome may require antimotility drugs; frequent, small meals; and in-home total parenteral nutrition.

What Do I Need to Tell the Patient/Patient’s Family?

- Emphasize the importance of lifelong medical surveillance and prompt medical attention for new or worsening signs and symptoms; educate that acute exacerbation of manifestations, pain, diarrhea, surgery, and malabsorption complications are inevitable even with strict adherence to the prescribed treatment regimen.
- Advise that consuming certain foods and other substances (e.g., bulky grains, hot spices, alcohol, milk products) may worsen diarrhea and cramping.
- When medically appropriate, encourage the patient to eat a nutrient-dense diet that includes fatty fish and lean proteins, unsaturated fats (including omega-3), complex carbohydrates (e.g., whole grains), legumes, and a variety of fruits and vegetables. For more information on eating a balanced diet, see the United States Department of Agriculture (USDA) food guidance system, MyPlate, at https://www.choosemyplate.gov/.
  - Drink adequate water to prevent or relieve constipation (if medically appropriate).
  - Refrain from consuming sugar-sweetened beverages.
  - Follow dietary strategies for optimal health, including the following:
    - Consume meals containing a variety of at least 5 fruits and vegetables a day in order to supply ample vitamins, minerals, phytonutrients (i.e., beneficial plant-derived nutrients), and fiber. Eating a variety of deeply colored fruits and vegetables (e.g., spinach, carrots, and berries) should be emphasized.
    - Eat 25–30 g of fiber/day (food sources: oat bran, barley, nuts, seeds, beans, lentils, peas, fruits, and vegetables). At least half of all grains consumed should be whole grains.
    - Consume fish, especially oily fish, at least twice a week. Fish is a source of omega-3, an unsaturated fat that has many health benefits, including reduced risk for cardiovascular disease (CVD).
    - Ingest adequate calcium (at least 1,200 mg/day) to reduce risk for osteoporosis and CVD; good calcium sources are dairy products, fish with bones, broccoli, and legumes.
    - Reduce risk for CVD, cancer, diabetes mellitus type 2, and stroke by choosing unsaturated fats (including omega-3 fatty acid) and by limiting total fat intake to 30% or less of daily calories, limiting saturated fat (found in meat, whole milk, cream, butter, and cheese) to less than 10% of daily calories, and consuming less than 200 mg of cholesterol per day.
- Emphasize importance of portion size.
- Take supplemental vitamins as prescribed.
• Participate in regular moderate physical activity of at least 150 minutes each week, including strength training at least 2 days each week, if medically appropriate
• Recruit the help of family and friends to assist in meal planning, grocery shopping, and food preparation

Related Guidelines
• For guidelines on determining nutrient needs see Nutritional Assessment and Treatment Goals, above

References