 CHAPTER 23

Diarrhea

DEFINITION

• Diarrhea is an increased frequency and decreased consistency of fecal discharge as compared with an individual’s normal bowel pattern. Frequency and consistency are variable within and between individuals. For example, some individuals defecate as many as three times a day, while others defecate only two or three times per week. Most cases of acute diarrhea are caused by infections with viruses, bacteria, or protozoa and are generally self-limited.

PATHOPHYSIOLOGY

• Diarrhea is an imbalance in absorption and secretion of water and electrolytes. Diarrhea may be associated with a specific disease of the GI tract or with a disease outside the GI tract.
• Four general pathophysiologic mechanisms disrupt water and electrolyte balance, leading to diarrhea. These four mechanisms are the basis of diagnosis and therapy. They are (1) a change in active ion transport by either decreased sodium absorption or increased chloride secretion; (2) a change in intestinal motility; (3) an increase in luminal osmolarity; and (4) an increase in tissue hydrostatic pressure. These mechanisms have been related to four broad clinical diarrheal groups: secretory, osmotic, exudative, and altered intestinal transit.
• Secretory diarrhea occurs when a stimulating substance (e.g., vasoactive intestinal peptide [VIP], laxatives, or bacterial toxin) increases secretion or decreases absorption of large amounts of water and electrolytes.
• Poorly absorbed substances retain intestinal fluids, resulting in osmotic diarrhea.
• Inflammatory diseases of the GI tract can cause exudative diarrhea by discharge of mucus, proteins, or blood into the gut.
• Intestinal motility can be altered by reduced contact time in the small intestine, premature emptying of the colon, and by bacterial overgrowth.

CLINICAL PRESENTATION

• The clinical presentation of diarrhea is shown in Table 23-1.
• Many agents, including antibiotics and other drugs, cause diarrhea (Table 23-2). Laxative abuse for weight loss may also result in diarrhea.

DESIRED OUTCOME

• The therapeutic goals of diarrhea treatment are to manage the diet; prevent excessive water, electrolyte, and acid–base disturbances; provide symptomatic relief; treat curable causes of diarrhea; and manage secondary
TABLE 23-1  Clinical Presentation of Diarrhea

**General**
Usually, acute diarrheal episodes subside within 72 hours of onset, whereas chronic diarrhea involves frequent attacks over extended time periods.

**Signs and symptoms**
- Abrupt onset of nausea, vomiting, abdominal pain, headache, fever, chills, and malaise.
- Bowel movements are frequent and never bloody, and diarrhea lasts 12–60 hours.
- Intermittent periumbilical or lower right quadrant pain with cramps and audible bowel sounds is characteristic of small intestinal disease.
- When pain is present in large intestinal diarrhea, it is a gripping, aching sensation with tenesmus (straining, ineffective and painful stooling). Pain localizes to the hypogastric region, right or left lower quadrant, or sacral region.
- In chronic diarrhea, a history of previous bouts, weight loss, anorexia, and chronic weakness are important findings.

**Physical examination**
Typically demonstrates hyperperistalsis with borborygmis and generalized or local tenderness.

**Laboratory tests**
- Stool analysis studies include examination for microorganisms, blood, mucus, fat, osmolality, pH, electrolyte and mineral concentration, and cultures.
- Stool test kits are useful for detecting GI viruses, particularly rotavirus.
- Antibody serologic testing shows rising titers over a 3- to 6-day period, but this test is not practical and is nonspecific.
- Occasionally, total daily stool volume is also determined.
- Direct endoscopic visualization and biopsy of the colon may be undertaken to assess for the presence of conditions such as colitis or cancer.
- Radiographic studies are helpful in neoplastic and inflammatory conditions.

TABLE 23-2  Drugs Causing Diarrhea

**Laxatives**
- Antacids containing magnesium
- Antineoplastics
- Auranofin (gold salt)
- Antibiotics
  - Clindamycin
  - Tetracyclines
  - Sulfonamides
  - Any broad-spectrum antibiotic
- Antihypertensives
  - Reserpine
  - Guanethidine
  - Methyldopa
  - Guanabenz
  - Guanadrel
  - Angiotensin-converting enzyme inhibitors
- Cholinergics
  - Bethanechol
  - Neostigmine
- Cardiac agents
  - Quinidine
  - Digitalis
  - Digoxin
- Nonsteroidal antiinflammatory drugs
- Misoprostol
- Colchicine
- Proton pump inhibitors
- H₂-receptor blockers
disorders causing diarrhea. Clinicians must clearly understand that diar-
hea, like a cough, may be a body defense mechanism for ridding itself of
harmful substances or pathogens. The correct therapeutic response is not
necessarily to stop diarrhea at all costs!

TREATMENT

GENERAL PRINCIPLES

- Management of the diet is a first priority for treatment of diarrhea (Figs.
  23-1 and 23-2). Most clinicians recommend stopping solid foods for 24
  hours and avoiding dairy products.
- When nausea or vomiting is mild, a digestible low-residue diet is adminis-
  tered for 24 hours.
- If vomiting is present and is uncontrollable with antiemetics, nothing is
taken by mouth. As bowel movements decrease, a bland diet is begun.
  Feeding should continue in children with acute bacterial diarrhea.
- Rehydration and maintenance of water and electrolytes are the primary
treatment measures until the diarrheal episode ends. If vomiting and
dehydration are not severe, enteral feeding is the less costly and preferred
  method. In the United States, many commercial oral rehydration prepara-
tions are available (Table 23-3).

PHARMACOLOGIC THERAPY

- Various drugs have been used to treat diarrhea (Table 23-4). These drugs
  are grouped into several categories: antimotility, adsorbents, antisecretory
  compounds, antibiotics, enzymes, and intestinal microflora. Usually, these
  drugs are not curative but palliative.
- Opiates and opioid derivatives delay the transit of intraluminal content or
  increase gut capacity, prolonging contact and absorption. The limitations
  of the opiates are addiction potential (a real concern with long-term use)
  and worsening of diarrhea in selected infectious diarrheas.
- **Loperamide** is often recommended for managing acute and chronic
diarrhea. Diarrhea lasting 48 hours beyond initiating loperamide warrants
  medical attention.
- Adsorbents (such as **kaolin-pectin**) are used for symptomatic relief (see
  Table 23-4). Adsorbents are nonspecific in their action; they adsorb
  nutrients, toxins, drugs, and digestive juices. Coadministration with other
drugs reduces their bioavailability.
- **Bismuth subsalicylate** is often used for treatment or prevention of
diarrhea (traveler’s diarrhea) and has antisecretory, antiinflammatory, and
  antibacterial effects. Bismuth subsalicylate contains multiple components
  that might be toxic if given in excess to prevent or treat diarrhea.
- **Lactobacillus** preparation is intended to replace colonic microflora. This
  supposedly restores intestinal functions and suppresses the growth of
  pathogenic microorganisms. However, a dairy product diet containing 200
to 400 g of lactose or dextrin is equally effective in recolonization of
  normal flora.
FIGURE 23-1. Recommendations for treating acute diarrhea. Follow these steps: (1) Perform a complete history and physical examination. (2) Is the diarrhea acute or chronic? If chronic diarrhea, go to Fig. 23-2. (3) If acute diarrhea, check for fever and/or systemic signs and symptoms (i.e., toxic patient). If systemic illness (fever, anorexia, or volume depletion), check for an infectious source. If positive for infectious diarrhea, use appropriate antibiotic and symptomatic therapy. If negative for infectious cause, use only symptomatic treatment. (4) If no systemic findings, then use symptomatic therapy based on severity of volume depletion, oral or parenteral fluid/electrolytes, antidiarrheal agents (see Table 23-4), and diet. (RBC, red blood cells; WBC, white blood cells.)
FIGURE 23-2. Recommendations for treating chronic diarrhea. Follow these steps: (1) Perform a careful history and physical examination. (2) The possible causes of chronic diarrhea are many. These can be classified into intestinal infections (bacterial or protozoal), inflammatory disease (Crohn’s disease or ulcerative colitis), malabsorption (lactose intolerance), secretory hormonal tumor (intestinal carcinoid tumor or vasoactive intestinal peptide-secreting tumors), drug (antacid), factitious (laxative abuse), or motility disturbance (diabetes mellitus, irritable bowel syndrome, or hyperthyroidism). (3) If the diagnosis is uncertain, selected appropriate diagnostic studies should be ordered. (4) Once diagnosed, treatment is planned for the underlying cause with symptomatic antidiarrheal therapy. (5) If no specific cause can be identified, symptomatic therapy is prescribed. (RBC, red blood cells; WBC, white blood cells.)
• **Anticholinergic drugs**, such as atropine, block vagal tone and prolong gut transit time. Their value in controlling diarrhea is questionable and limited by side effects.

• **Octreotide**, a synthetic octapeptide analog of endogenous somatostatin, is prescribed for the symptomatic treatment of carcinoid tumors and VIP-secreting tumors. Octreotide is used in selected patients with carcinoid syndrome. Octreotide blocks the release of serotonin and other active peptides and is effective in controlling diarrhea and flushing. Dosage range for managing diarrhea associated with carcinoid tumors is 100 to 600 mcg/day in two to four divided doses, subcutaneously for 2 weeks. Octreotide is associated with adverse effects such as cholelithiasis, nausea, diarrhea, and abdominal pain.

### EVALUATION OF THERAPEUTIC OUTCOMES

• Therapeutic outcomes are directed to key symptoms, signs, and laboratory studies. The constitutional symptoms usually improve within 24 to 72 hours.

• One should check the frequency and character of bowel movements each day along with the vital signs and improving appetite.

• The clinician also needs to monitor body weight, serum osmolality, serum electrolytes, complete blood cell count, urinalysis, and cultures (if appropriate). With an urgent or emergency situation, evaluation of the volume status of the patient is the most important outcome.

• Toxic patients (those with fever, dehydration, and hematochezia and those who are hypotensive) require hospitalization; they need IV electrolyte solutions and empiric antibiotics while awaiting cultures. With quick management, they usually recover within a few days.
### TABLE 23-4 Selected Antidiarrheal Preparations

<table>
<thead>
<tr>
<th>Category</th>
<th>Drug</th>
<th>Dose Form</th>
<th>Adult Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimotility</td>
<td>Diphenoxylate</td>
<td>2.5 mg/tablet; 2.5 mg/5 mL</td>
<td>5 mg four times daily; do not exceed 20 mg/day</td>
</tr>
<tr>
<td></td>
<td>Loperamide</td>
<td>2 mg/capsule; 1 mg/5 mL</td>
<td>Initially 4 mg, then 2 mg after each loose stool; do not exceed 16 mg/day</td>
</tr>
<tr>
<td></td>
<td>Paregoric</td>
<td>2 mg/5 mL (morphine)</td>
<td>5–10 mL 1–4 times daily</td>
</tr>
<tr>
<td></td>
<td>Opium tincture</td>
<td>5 mg/ml (morphine)</td>
<td>0.5 mL four times daily</td>
</tr>
<tr>
<td></td>
<td>Difenoxin</td>
<td>1 mg/tablet</td>
<td>Two tablets, then one tablet after each loose stool; up to 8 tablets/day</td>
</tr>
<tr>
<td>Adsorbents</td>
<td>Kaolin-pectin</td>
<td>5.7 g kaolin + 130.2 mg pectin/30 mL</td>
<td>30–120 mL after each loose stool</td>
</tr>
<tr>
<td></td>
<td>Polycarbophil</td>
<td>500 mg/tablet</td>
<td>Chew 2 tablets four times daily or after each loose stool; do not exceed 12 tablets/day</td>
</tr>
<tr>
<td></td>
<td>Attapulgite</td>
<td>750 mg/15 mL; 750 mg/tablet</td>
<td>1,200–1,500 mg after each loose bowel movement or every 2 hours; up to 9,000 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600 mg/tablet; 300 mg/tablet</td>
<td></td>
</tr>
<tr>
<td>Antisecretory</td>
<td>Bismuth subosalicylate</td>
<td>1,050 mg/50 mL; 262 mg/15 mL; 524 mg/15 mL; 262 mg/tablet</td>
<td>Two tablets or 30 mL every 30 minutes to 1 hour as needed up to 8 doses/day</td>
</tr>
<tr>
<td></td>
<td>Enzymes (lactase)</td>
<td>1,250 neutral lactase units/4 drops; 3,300 FCC lactase units per tablet</td>
<td>3–4 drops taken with milk or dairy product; one or two tablets as above</td>
</tr>
<tr>
<td></td>
<td>Bacterial replacement</td>
<td>(Lactobacillus acidophilus, L. bulgaricus)</td>
<td>Two tablets or 1 granule packet 3–4 times daily; give with milk, juice, or water</td>
</tr>
<tr>
<td>Octreotide</td>
<td></td>
<td>0.05 mg/mL; 0.1 mg/mL; 0.5 mg/mL</td>
<td>Initial: 50 mcg subcutaneously 1–2 times per day and titrate dose based on indication up to 600 mcg/day in 2–4 divided doses</td>
</tr>
</tbody>
</table>

FCC, Food Chemical Codex.

See Chap. 38, Diarrhea and Constipation, authored by William J. Spruill and William E. Wade, for a more detailed discussion of this topic.