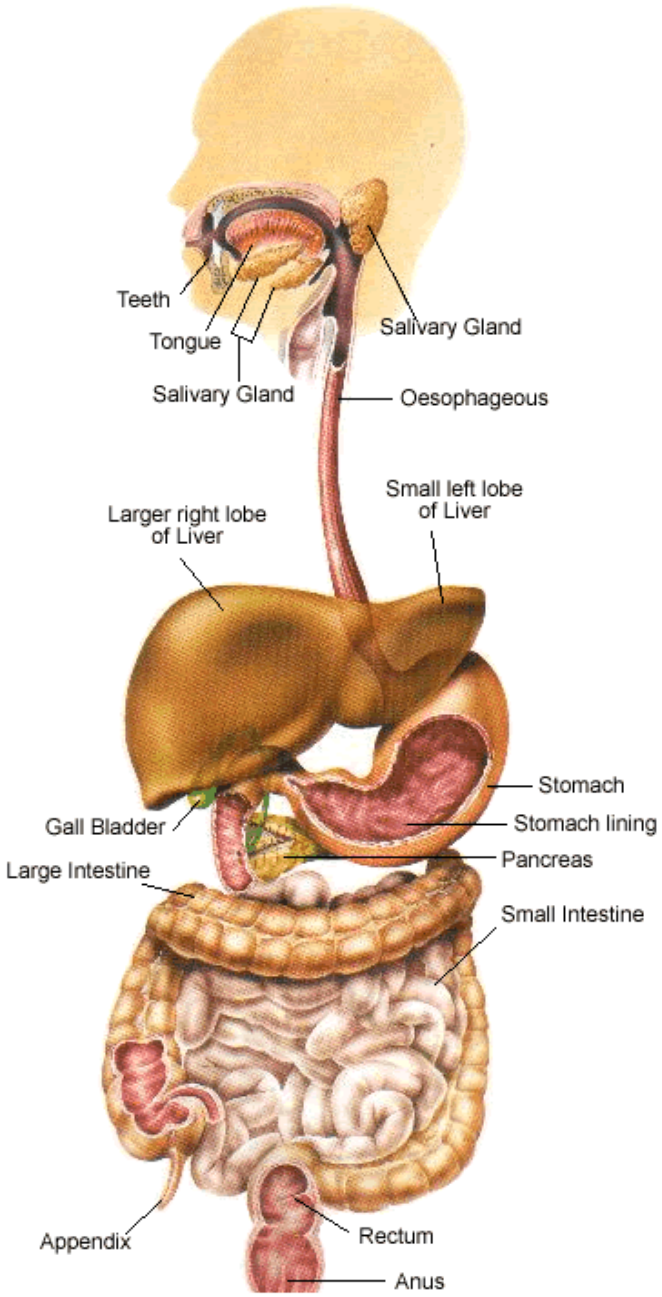
Lesson 12

Medications the Affect the G.I. System

Food provides us with fuel to live, energy to work and play, and the raw materials to build new cells. All the different varieties of food we eat are broken down by our digestive system and transported to every part of our body by our circulatory system.

The main part of the digestive system is the digestive tract. This is like a long tube, some nine metres in total, through the middle of the body. It starts at the mouth, where food and drink enter the body, and finishes at the anus, where leftover food and wastes leave the body



Mouth

Teeth bite off and chew food into a soft pulp that is easy to swallow. Chewing mixes the food with watery saliva, from 6 salivary glands around the mouth and face, to make it moist and slippery.

Oesophagus

The oesophageus, or gullet, is a muscular tube. It takes food from the throat and pushes it down through the neck, and into the stomach. It moves food by waves of muscle contraction called peristalsis.

Stomach

The stomach has thick muscles in its wal. These contract to mash the food into a sloppy soup. Also the stomach lining produces strong digestive juices. These attack the food in a chemical way, breaking down and dissolving its nutrients.

Pancreas

The pancreas, like the stomach, makes powerful digestive juices called enzymes which help to digest food further as it enters the small intestines.

Gall Bladder

This small baglike part is tucked under the liver. It stores a fluid called bile, which is made in the liver. As food from a meal arrives in the small intestine, bile flows from the gall bladder along the bile duct into the intestine. It helps to digest fatty foods and also contains wastes for removal.

Small Intestines

This part of the tract is narrow, but very long - about 20 feet. Here, more enzymes

continue the chemical attack on the food. Finally the nutrients are small enough to pass through the lining of the small intestine, and into the blood. They are carried away to the liver and other body parts to be processed, stored and distributed.

Liver

Blood from the intestines flows to the liver, carrying nutrients, vitamins and minerals, and other products from digestion. The liver is like a food-processing factory with more than 200 different jobs. It stores some nutrients, changes them from one form to another, and releases them into the blood acccording to the activities and needs of the body.

Large Intestine

Any useful substances in the leftovers, such as spare water and body minerals, are absorbed through the walls of the large intestine, back into the blood. The remains are formed into brown, semi-solid faeces, ready to be removed from the body.

Rectum and Anus

The end of the large intestine and the next part of the tract, the rectum, store the faeces. These are finally squeezed through a ring of muscle, the anus, and out of the body.

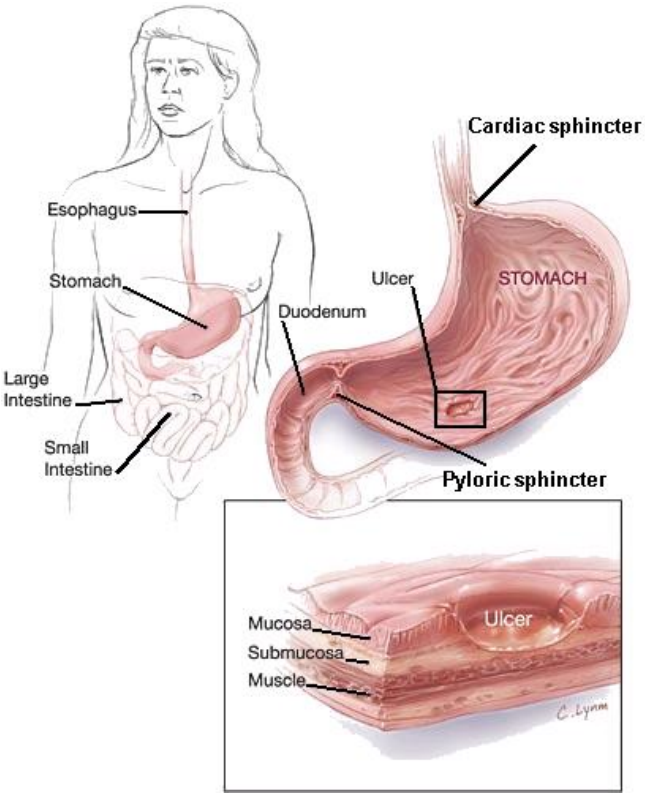
HELICOBACTER PYLORI AND PEPTIC ULCER DISEASE

What is peptic ulcer disease (PUD)?

The term PUD generally refers to spectrum of disorders that includes gastric ulcer (GU), pyloric channel ulcer, duodenal ulcer (DU) and postoperative ulcers at or near the site of surgical anastomosis.

CAUSES OF PEPTIC ULCER DISEASE

- So what causes PUD? Numerous factors blamed in the pathogenesis of PUD. Many of these factors may be acquired during life, although some of these these may already be predetermined. Historically, stomach acid has been the most common factor blamed. No Acid No ulcer- is an old axiom which may be questionable in the nineties. As a group, patients with duodenal ulcer have high acid secretion. Increased acid secretion causes changes in the wall of duodenum (gastric metaplasia) setting the stage for invasion by HP.



- In early nineteen eighties, Warren and Marshall published their findings about organism known as Helicobacter

pylori (HP) and linked them to gastritis and PUD. Until then, HP was considered to be an artifact of the stain when stomach biopsies were looked at under the microscope.

- It is now believed that ulcer results from a complex interplay of acid and chronic inflammation induced by HP infection even though exact mechanism has not been elucidated. HP is associated with most cases of duodenal ulcer (DU). Other causes of DU are non-steroidal anti-inflammatory drugs like aspirin, motrin etc. and tumors like Zollinger Allison syndrome. A majority of gastric or stomach ulcers are also associated with HP.
- However, only a subset of infected persons develop peptic ulceration. Reasons not known. It may be due to variation in host factors, bacterial factors or both.

Error! Unknown switch argument.DIAGNOSIS OF PEPTIC ULCER DISEASE

- Let us now go on to the diagnosis of PUD. Until early 1900s, the diagnosis was made on clinical grounds. By 1912, Friedenwald published the first case series of 1000 cases of peptic ulcer. He claimed he had exercised the greatest care to eliminate all cases in which there was the slightest doubt. However, he did not provide any diagnostic clues as to how he distinguished between his 500+ cases of DU from 400+ cases of GU or how he diagnosed 1000 cases of PUD from his pool of 12000 pts with dyspepsia.

- By 1925, fractional test meal was being widely used for diagnosis. Barium contrast studies were also in vogue by 1925 overtaking the rigid gastroscopes which were awkward to use. By 1950s flexible endoscopies revolutionized the direct visualization of ulcer disease.
- However, the not so unreasonable approach these days to treat first and ask later has brought the ulcer field back to the status of 80 years ago when Friedenwald published his first series of carefully diagnosed ulcer disease.
- How to diagnose HP? HP may be presumed to be present in any pt with Duodenal Ulcer (DU) on endoscopy. However many experts recommend documentation by microscopic examination of biopsy or urease test.

Error! Unknown switch argument.TREATMENT OF PEPTIC ULCER DISEASE

- The foundations of ulcer therapy were laid in ancient times when powdered coral, sea shell or chalk was used to treat dyspepsia long before it was realized that PUD was causing the pain. By late 18th and early 19th century as PUD was beginning to be appreciated, newer therapies emerged. These included changing of environment, and various kinds of diets including mercury, silver, alkalis etc. There after came an era when vomiting and blood letting, applying leaches to the abdomen were practiced enthusiastically.
- **Histamine-2 (H2) blockers** (Tagamet, zantac, axid, pepcid etc.) started coming in 1970s. Carafate (sucralfate) is also effective therapy.
- **Proton pump inhibitors (PPI)** e.g. Prilosec, Prevacid are the exciting new class of drugs that profoundly inhibit acid secretion. They have been shown to be very effective in ulcer healing.
- **Antacids** are effective ulcer healing agents but the low cost related to it may be deceptive because of frequent dosing required.

Principal causes of peptic ulcer

The second major cause of ulcers include a class of drugs known as **NSAIDs** (**Non Steroidal Anti-inflammatory Drugs**) which include:
Aspirin, **Motrin**, **Advil**, **Ibuprofen**, and **naproxen sodium**.
NSAIDs cause ulcers by interfering with the stomach's ability to protect itself from acidic stomach juices.
Normally the stomach has three defenses against digestive juices:

1. the **mucus** that coats the stomach lining and shields it from stomach acid
2. the chemical **bicarbonate** that neutralizes stomach acid
3. the **blood circulation** to the stomach lining that aids in cell renewal and repair.

The use of NSAIDs over a prolonged period of time causes an irritation of the stomach lining.
*A new class of anti-inflammatory medications known as **COX 2 inhibitors** (**Celebrex**, **Vioxx**) does not seem to pose the same risk of ulcer formation.*

Common Medications:

Antacids

Brand names: Gaviscon, Maalox, Mylanta, Rolaids, Tums

Why is this drug prescribed?

Available under a number of brand names, antacids are used to relieve the uncomfortable symptoms of acid indigestion, heartburn, gas, and sour stomach.

Most important fact about this drug

Do not take antacids for longer than 2 weeks or in larger than recommended doses unless directed by your doctor. If your symptoms persist, contact your doctor. Antacids should be used only for occasional relief of stomach upset.

How should you take this medication?

If you take a chewable antacid tablet, chew thoroughly before swallowing so that the medicine can work faster and be more effective. Allow Mylanta Soothing Lozenges to completely dissolve in your mouth. Shake liquids well before using.
--If you miss a dose...
Take this medication only as needed or as instructed by your doctor.

--Storage instructions...
Store at room temperature. Keep liquids tightly closed and protect from freezing.

What side effects may occur?

When taken as recommended, antacids are relatively free of side effects. Occasionally, one of the following symptoms may develop.

- *Side effects may include:*
  Chalky taste, constipation, diarrhea, increased thirst, stomach cramps

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Why should this drug not be prescribed?

Do not take antacids if you have signs of appendicitis or an inflamed bowel; symptoms include stomach or lower abdominal pain, cramping, bloating, soreness, nausea, or vomiting.
If you are sensitive to or have ever had an allergic reaction to aluminum, calcium, magnesium, or simethicone, do not take an antacid containing these ingredients. If you are elderly and have bone problems or if you are taking care of an elderly person with Alzheimer's disease, do not use an antacid containing aluminum.

Special warnings about this medication

If you are taking any prescription drug, check with your doctor before you take an antacid. Also, tell your doctor or pharmacist about any drug allergies or medical conditions you have.
If you have kidney disease, do not take an antacid containing aluminum or magnesium. If you are on a sodium-restricted diet, do not take Gaviscon without checking first with your doctor or pharmacist.

Possible food and drug interactions when taking this medication

If antacids are taken with certain other medications, the effects of either could be increased, decreased, or altered. It is especially important to check with your doctor before combining antacids with the following:

Cellulose sodium phosphate (Calcibind)
Isoniazid (Rifamate)
Ketoconazole (Nizoral)
Mecamylamine (Inversine)
Methenamine (Mandelamine)

Sodium polystyrene sulfonate resin (Kayexalate)
Tetracycline antibiotics (Achromycin, Minocin)

Special information if you are pregnant or breastfeeding

As with all medications, ask your doctor or health care professional whether it is safe for you to use antacids while you are pregnant or breastfeeding.

Recommended dosage

ADULTS

Take antacids according to the following schedules, or as directed by your doctor.

Gaviscon and Gaviscon Extra Strength Relief Formula Chewable Tablets
Chew 2 to 4 tablets 4 times a day after meals and at bedtime or as needed. Follow with half a glass of water or other liquid. Do not swallow the tablets whole.
Gaviscon Extra Strength Relief Formula Liquid
Take 2 to 4 teaspoonfuls 4 times a day after meals and at bedtime. Follow with half a glass of water or other liquid.
Gaviscon Liquid
Take 1 or 2 tablespoonfuls 4 times a day after meals and at bedtime. Follow with half a glass of water.

Maalox Antacid Caplets
Take 1 caplet as needed. Swallow the tablets whole; do not chew them.
Maalox Heartburn Relief Chewable Tablets
Chew 2 to 4 tablets after meals and at bedtime. Follow with half a glass of water or other liquid.

Maalox Heartburn Relief Suspension, Maalox Magnesia and Alumina Oral Suspension, and Extra Strength Maalox Antacid Plus Anti-Gas Suspension
Take 2 to 4 teaspoonfuls 4 times a day, 20 minutes to 1 hour after meals and at bedtime.
Maalox Plus Chewable Tablets
Chew 1 to 4 tablets 4 times a day, 20 minutes to 1 hour after meals and at bedtime.
Extra Strength Maalox Antacid Plus Anti-Gas Chewable Tablets
Chew 1 to 3 tablets 20 minutes to 1 hour after meals and at bedtime.
Mylanta and Mylanta Double Strength Liquid and Chewable Tablets Antacid/Anti-Gas
Take 2 to 4 teaspoonfuls of liquid or chew 2 to 4 tablets between meals and at bedtime.

Mylanta Gelcaps
Take 2 to 4 gelcaps as needed.
Mylanta Soothing Lozenges
Dissolve 1 lozenge in your mouth. If needed, follow with a second. Repeat as needed.

Rolaids, Calcium-Rich/Sodium Free Rolaids, and Extra Strength Rolaids
Chew 1 or 2 tablets as symptoms occur. Repeat hourly if symptoms return.
Tums, Tums E-X, and Tums Anti-Gas Formula
Chew 1 or 2 tablets as symptoms occur. Repeat hourly if symptoms return. You may also hold the tablet between your gum and cheek and let it dissolve gradually.
CHILDREN

Do not give to children under 6 years of age, unless directed by your doctor.

Overdosage

Any medication taken in excess can have serious consequences. If you suspect an overdose, seek medical attention immediately.
Symptoms of antacid overdose may include:

- *For aluminum-containing antacids (Gaviscon, Maalox, Mylanta)*
  Bone pain, constipation (severe and continuing), feeling of discomfort (continuing), loss of appetite (continuing), mood or mental changes, muscle weakness, swelling of wrists or ankles, weight loss (unusual)
- *For calcium-containing antacids (Mylanta, Rolaids, Tums)*
  Constipation (severe and continuing), difficult or painful urination, frequent urge to urinate, headache (continuing), loss of appetite (continuing), mood or mental changes, muscle pain or twitching, nausea or vomiting, nervousness or restlessness, slow breathing, unpleasant taste, unusual tiredness or weakness
- *For magnesium-containing antacids (Gaviscon, Maalox, Mylanta)*
  Difficult or painful urination, dizziness or light-headedness, irregular heartbeat, mood or mental changes, unusual tiredness or weakness

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Antiemetics

These drugs relieve nausea and vomiting.

Compazine
Metoclopramide
Ondansetron
Perphenazine
Phenergan
Prochlorperazine
Promethazine
Reglan
Tigan
Trilafon
Trimethobenzamide
Zofran

Phenergan

Pronounced: FEN-er-gan
Generic name: Promethazine hydrochloride

Why is this drug prescribed?

Phenergan is an antihistamine that relieves nasal stuffiness and inflammation and red, inflamed eyes caused by hay fever and other allergies. It is also used to treat itching, swelling, and redness from hives and other rashes; allergic reactions to blood transfusions; and, with other medications, anaphylactic shock (severe allergic reaction).
Phenergan is also used as a sedative and sleep aid for both children and adults, and is prescribed to prevent and control nausea and vomiting before and after surgery and to prevent and treat motion sickness. It is also used, with other medications, for pain after surgery.
Antihistamines work by decreasing the effects of histamine, a chemical the body releases in response to certain irritants. Histamine narrows air passages in the lungs and contributes to inflammation. Antihistamines reduce itching and swelling and dry up secretions from the nose, eyes, and throat.

Most important fact about this drug

Phenergan may cause considerable drowsiness. You should not drive or operate dangerous machinery or participate in any hazardous activity that requires full mental alertness until you know how you react to Phenergan. Children should be carefully supervised while they are bike-riding, roller-skating, or playing until the drug's effect on them is established.

How should you take this medication?

Take Phenergan exactly as prescribed.
--If you miss a dose...
If you are taking Phenergan on a regular schedule, take the forgotten dose as soon as you remember. If it is almost time for your next dose, skip the one you missed and go back to your regular schedule. Never take 2 doses at once.
--Storage instructions...
Tablets should be stored at room temperature, away from light. Suppositories should be stored in the refrigerator, in a tightly closed container.

What side effects may occur?

Side effects cannot be anticipated. If any develop or change in intensity, inform your doctor as soon as possible. Only your doctor can determine if it is safe for you to continue taking Phenergan.

- *Side effects may include:*

Abnormal eye movements, agitation, asthma, blood disorders, blurred vision, changes in blood pressure, confusion, disorientation, dizziness, double vision, dry mouth, excitement, faintness, fatigue, fever, hallucinations, hives, hysteria, impaired or interrupted breathing, insomnia, irregular heartbeat, lack of coordination, lack of energy, loss of movement, nasal stuffiness, nausea, nervousness, nightmares, protruding tongue, rapid heartbeat, rash, rigid muscles, ringing in the ears, sedation (extreme calm), seizures, sensitivity to light, sleepiness, slow heartbeat, stiff neck, sweating, swollen face and throat, tremors, unnaturally good mood, vomiting, yellow skin and eyes

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Why should this drug not be prescribed?

Do not take Phenergan if you have ever had an allergic reaction to it or to related medications, such as Thorazine, Mellaril, Stelazine, or Prolixin. Phenergan is not for use in comatose patients, and should not be used to treat asthma or other breathing problems.

Special warnings about this medication

If you are taking other medications that cause sedation, your doctor may reduce the dosage of these medications or eliminate them while you are using Phenergan.
If you have a seizure disorder, Phenergan may cause your seizures to occur more often.
Phenergan can cause a serious--even fatal--decline in the breathing function. Avoid this medication if you have chronic breathing problems such as emphysema, or if you suffer from sleep apnea (periods during sleep when breathing stops).
Phenergan can also cause a potentially fatal condition called Neuroleptic Malignant Syndrome. Symptoms include high fever, rigid muscles, sweating, and a rapid or irregular heartbeat. If you develop these symptoms, stop taking Phenergan and see your doctor immediately.

Use Phenergan cautiously if you have heart disease, high blood pressure or circulatory problems, liver problems, the eye condition called narrow-angle glaucoma, peptic ulcer or other abdominal obstructions, or urinary bladder obstruction due to an enlarged prostate.
Phenergan may affect the results of pregnancy tests and can raise your blood sugar.
Some people have developed jaundice (yellow eyes and skin) while on this medication.
Tell your doctor if you have any uncontrolled movements or seem to be unusually sensitive to sunlight.
Remember that Phenergan can cause drowsiness.
Phenergan should not be given to children under two years of age, and should be used with caution in older children, due to the danger of impaired breathing. Large doses have been known to cause hallucinations, seizures, and sudden death, especially in children who are dehydrated. Drugs such as Phenergan are not recommended for the treatment of vomiting in children unless the problem is severe. Phenergan should also be avoided if the child has the serious neurological disease known as Reye's syndrome or any disease of the liver.

Possible food and drug interactions when taking this medication

Phenergan may increase the effects of alcohol. Do not drink alcohol, or at least substantially reduce the amount you drink, while taking this medication.
If Phenergan is taken with certain other drugs, the effects of either could be increased, decreased, or altered. It is especially important to check with your doctor before combining Phenergan with the following:

Certain antidepressant drugs, including Elavil and Tofranil
Drugs that control spasms, such as Cogentin
Drugs that reduce bone-marrow function (certain cancer drugs)
MAO inhibitors such as the antidepressants Nardil and Parnate
Narcotic pain relievers such as Demerol and Dilaudid
Sedatives such as Halcion, Dalmane, and Seconal
Tranquilizers such as Xanax and Valium

Special information if you are pregnant or breastfeeding

The effects of Phenergan during pregnancy have not been adequately studied. If you are pregnant or plan to become pregnant, inform your doctor immediately. Although it is not known whether Phenergan appears in breast milk, there is a chance that it could cause a nursing infant serious harm. The use of Phenergan is not recommended during breastfeeding.

Recommended dosage

Phenergan is available in tablet, syrup, and suppository form. The suppositories are for rectal use only. Phenergan tablets and suppositories are not recommended for children under 2 years of age.
ALLERGY

Adults
The average oral dose is 25 milligrams taken before bed; however, your doctor may have you take 12.5 milligrams before meals and before bed.
Children

The usual dose is a single 25-milligram dose at bedtime, or 6.25 to 12.5 milligrams 3 times daily.
MOTION SICKNESS

Adults
The average adult dose is 25 milligrams taken twice daily. The first dose should be taken one-half to 1 hour before you plan to travel, and the second dose 8 to 12 hours later, if necessary. On travel days after that, the recommended dose is 25 milligrams when you get up and again before the evening meal.
Children
The usual dose of Phenergan tablets, syrup, or rectal suppositories is 12.5 to 25 milligrams taken twice a day.
NAUSEA AND VOMITING

The average dose of Phenergan for nausea and vomiting in children or adults is 25 milligrams. When oral medication cannot be tolerated, use the rectal suppository. Your doctor may have you take 12.5 to 25 milligrams every 4 to 6 hours, if necessary.
For nausea and vomiting in children, the dose is usually calculated at 0.5 milligram per pound of body weight and will also be based on the age of the child and the severity of the condition being treated. Phenergan and other anti-vomiting drugs should not be given to children if the cause of the problem is unknown.
INSOMNIA

Adults
The usual dose is 25 to 50 milligrams for nighttime sedation.
Children
The usual dose is 12.5 to 25 milligrams by tablets or rectal suppository at bedtime.
Older Adults
The dosage is usually reduced for people over 60.

Overdosage

Any medication taken in excess can have serious consequences. An overdose of Phenergan can be fatal. If you suspect an overdose, seek medical treatment immediately.

- *Symptoms of Phenergan overdose may include:*
  Difficulty breathing, dry mouth, fixed and dilated pupils, flushing, heightened reflexes, loss of consciousness, muscle tension, poor coordination, seizures, slowdown in brain activity, slowed heartbeat, stomach and intestinal problems, very low blood pressure, writhing movements

Children may become overstimulated and have nightmares. Older adults may also become overstimulated.

Laxatives

Laxatives are drugs that facilitate the passage and elimination of feces from the colon and rectum. They are indicated for the treatment of simple constipation and to clean the intestine of any irritant or toxic substances (catharsis). Laxatives may also be used to soften painfully hard stools and to lessen straining of certain cardiac patients when defecating. They are contraindicated in certain inflammatory conditions of the bowel, bowel obstruction, and abdominal pain of unknown origin, and should not be used in the presence of nausea and vomiting. Laxatives are classified as irritant, bulk, emollient, or stool softeners. Frequent or prolonged use of any laxative may result in dependence.

Mineral Oil

ACTION AND USE.— Mineral oil is an emollient laxative used to lubricate the fecal mass. It is often used in combination with an irritant agent such as phenophthalein.
USUAL DOSE.— 15 to 45 ml at bedtime.

Glycerin Suppositories

ACTION AND USE.— These are widely used in children. They promote peristalsis through local irritation of the mucous membrane of the colon. children sizes. Insert 1 suppository rectally as needed. Retain for 15 minutes; it does not need to melt to produce laxative action.

Bisacodyl (Ducolax)

ACTION AND USE.— Bisacodyl is a rela- tively non-toxic irritant cathartic that reflexively stimulates the colon on contact. It usually produces softly formed stools in 6 to 12 hours and is normally taken at bedtime. It is often used as a preparatory agent prior to some surgeries and radiological examinations.
USUAL DOSE.— 10 to 30 mg in one dose for adults. It is available in tablets and suppositories.

Magnesium Citrate (Citrate of Magnesia)

ACTION AND USE.— Magnesium citrate is a saline irritant laxative that also inhibits the ab- sorption of water from the intestine. It is preferred by radiology departments for use prior to special x-rays.
USUAL DOSE.— 200 ml in one dose is the official recommendation. Magnesium citrate is most often provided to the patient in a kit containing 10 fluid ounces of magnesium citrate, 2 tablets of phenophthalein (a contact irritant) and a suppository of either glycerin or bisacodyl.

Antidiarrheals

Kaolin Mixture with Pectin (Kaopectate)

ACTION AND USE.— Kaolin mixture with pectin is used in the symptomatic treatment of diarrhea. The pectin portion absorbs excess fluid and consolidates the stool. The kaolin portion ad- sorbs irritants and forms a protective coating on the intestinal mucosa.

USUAL DOSE.— 30 ml after each bowel movement.

Diphenoxylate Hydrochloride (Lomotil)

ACTION AND USE.— Diphenoxylate hydro- chloride is used for the symptomatic treatment of diarrhea. It works by direct action on the smooth muscles in the intestine reducing peristalsis and intestinal motility. Because diphenoxylate is a chemical analog of meperidine hydrochloride, it is classed as a schedule V narcotic. To prevent abuse, a sub-therapeutic amount of atropine is added.

USUAL DOSE.— 1 or 2 tablets four times daily until symptomatic control is achieved, then the dose is reduced.