



Short Bowel Syndrome and Crohn's Disease



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Short Bowel Syndrome (sometimes referred to as SBS) is a disorder that affects people who have had large portions of their small intestine surgically removed as a result of a digestive illness, such as Crohn's disease. Approximately 10,000–20,000 people in the United States have short bowel syndrome.

The bowel consists of two parts, the small and large intestines. The large intestine, also known as the *colon*, is about five feet long. It is the thicker, lower end of the digestive tract. Its main purpose is to absorb water and electrolytes from solid waste before the waste is eliminated from the body. The body can safely live without some (or all) of the colon. The small intestine makes up the narrower portion of the bowel and is approximately 23 feet in length for a full-grown adult. Nearly all digestion of food and absorption of nutrients takes place in the small intestine. Because of its essential function in nutrition, losing portions of the small bowel to surgery can have significant negative effects.

The small intestine has three sections—the duodenum, the jejunum, and the ileum. Each segment performs a specific role in the digestion and absorption of nutrients. When large amounts of the small intestine are removed the body is unable to absorb adequate amounts of water, vitamins, and other nutrients from food in order to stay healthy and survive. The effects of short bowel syndrome can range in seriousness from mild to life-threatening.

Crohn's disease is one of the two major inflammatory conditions that affect the gastrointestinal (GI) tract.

Causes of Short Bowel Syndrome (SBS)

Crohn's disease is one of two major inflammatory conditions that affect the gastrointestinal (GI) tract. Together with ulcerative colitis, they are commonly known as inflammatory bowel diseases, or IBD. The major cause of short bowel syndrome for Crohn's disease patients is the surgical removal of large amounts of the small intestine. In others, short bowel is present at birth. It is also possible for a person with a small intestine of normal length to develop SBS if injury, disease, or other conditions prevent it from working as it should.

Surgery for Crohn's Disease

Crohn's disease can affect any part of the gastrointestinal tract, from the mouth to the anus. When medications are no longer effective at controlling the inflammation and managing the symptoms of Crohn's disease, or when complications develop, treatment sometimes includes the removal of affected sections of the small intestine. This type of operation is known as a *resection*. This surgical resection can result in a diminished surface area, thereby reducing the body's ability to effectively absorb fluid and nutrients. Most people can adapt to losing short segments of their small bowel.

Surgery is also sometimes necessary to treat complications that arise from chronic inflammation and scarring. Examples include *stricture* (a narrowing of the intestinal wall), *perforation* (when the intestinal wall is punctured or torn), or *hemorrhage* (excessive bleeding). Other complications can include the development of an *abscess* (a localized collection of pus and/or infection) or a *fistula* (an abnormal pathway leading from one part of the intestine to another part, to another organ in the body, or sometimes outside the body through the skin).

After a diseased part of the intestine is removed, the two remaining ends are sewn together. This is called an *anastomosis*. Although resection may provide symptom relief

for many years, the disease can recur at or near the site of the anastomosis, generally concentrating around areas of scar tissue.

Another type of surgery for Crohn's disease is called a *stricturoplasty*. This is an operation performed to open up a blockage, or *stricture*. The goal of this procedure is to widen the narrowed section of intestine without removing



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it. Surgeons make an incision along the length of the affected portion of intestine, then pinch it closed in the opposite direction (perpendicular to the original incision), and seal it shut. The result is a widened, but slightly shortened area with no loss of intestinal length. There are some situations in which stricturoplasty cannot be performed. In these cases, the doctor and patient must discuss other options.

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About two-thirds to three-quarters of people with Crohn's disease will eventually undergo surgery at some point in their lifetime. Of those, about half will require multiple surgeries to remove additional sections of the small intestine as a result of the disease and other complications from previous surgeries.

In addition to Crohn's disease, there are other causes of short bowel syndrome. These include:

- **Radiation damage.** Radiation therapy may damage the small intestine (*radiation enteritis*).
- **Volvulus.** This is a twisting or tangling of the small intestine that restricts blood flow, thereby damaging intestinal tissue. Surgery is required to remove permanently damaged tissue.
- **Vascular injury or disease.** If the blood vessels of the small intestine are injured or diseased, blood flow may be impaired.
- **Adhesions.** Scar tissue can form outside the bowel, causing periodic blockages that require surgical management.
- **Chronic pseudo-obstruction.** This is a nerve and muscle disorder that impairs intestinal contractions, resulting in malabsorption of nutrients and other complications.
- **Bypass surgery** to treat obesity.
- **Intestinal cancer.** Surgical resections may be necessary to remove tumors.
- **Trauma.**
- **Congenital defects.**

Signs and Symptoms

Patients with short bowel syndrome can experience a variety of symptoms. All of these are related to their body's inability to absorb enough nutrients, fluids, electrolytes, vitamins, and minerals from the food they eat. Particular nutritional deficiencies can be linked to the specific section of the small intestine that is damaged, surgically removed, or working inadequately:

- **Duodenum:** The upper section of the small intestine, where iron, calcium, and magnesium are absorbed.
- **Jejunum:** The middle section of the small intestine, where the absorption of proteins, fat, carbohydrates, vitamins, and minerals occurs.
- **Ileum:** The lower section of the small intestine, where vitamin B12 and bile acids are absorbed. Bile acids help the body absorb fat-soluble vitamins (A, D, E, and K).
- **Colon:** The presence or absence of the colon will have an impact on SBS. Although the colon is not generally thought of as part of the GI tract where nutrients are absorbed, in SBS, it may be able to recover 10%–20% of malabsorbed carbohydrates. This may provide a critical caloric buffer for some patients. Additionally, the colon may be able to absorb significant amounts of water and electrolytes.

The most common symptom of short bowel syndrome is *chronic* (long-term) diarrhea. This, in turn, can cause malnutrition, dehydration, and weight loss. These problems can become life-threatening if not treated properly.

Other symptoms of short bowel syndrome may include:

- Abdominal pain and cramping
- Bloating
- Heartburn
- Flatulence (intestinal gas)
- *Steatorrhea* (oily and/or foul-smelling stool)
- Fatigue
- Weakness
- Bacterial infections
- Food sensitivities

Additional signs of nutrient and vitamin deficiencies caused by SBS include:

- *Anemia* (low blood counts)
- Easy bruising
- *Osteoporosis* (thinned/fragile bones) and bone pain

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Making the Diagnosis

The most significant indicator that points toward short bowel syndrome is a history of surgical resection of the small intestine. A medical history of digestive ailments also may indicate that the small intestine is not working properly. The following tests are commonly used to confirm a diagnosis:

- **Blood tests.** These can reveal anemia and assess the levels of vitamins, minerals, electrolytes, and other chemicals linked to metabolism and digestion. Elevated liver enzymes and low potassium levels may also point to SBS.
- **Physical examination.** *Jaundice* (yellowing of the skin), loss of muscle mass, skin rashes, and scaly skin (due to vitamin A deficiency) can be indicators of SBS. Also, vitamin deficiencies may cause reduced feeling in hands and feet.
- **Stool examination.** Testing solid waste can determine whether a person is absorbing the amount of dietary fat and carbohydrates necessary for proper nutrition.

Complications

Short bowel syndrome can be accompanied by a number of complications. These include:

- **Kidney stones.** Decreased absorption of fats, calcium, and bile salts in the bowel can cause kidney stones, which are known to decrease urine flow from the kidneys to the bladder, impair kidney function, and cause pain.
- **Electrolyte abnormalities.** *Electrolytes*—such as potassium, sodium, and magnesium—are minerals that control important functions in the body. Unbalanced electrolytes can result in irregular heartbeat, muscle weakness, headache, and nausea.
- **Vitamin and mineral deficiencies.** Short bowel syndrome can affect the amount of vitamins that the body absorbs, sometimes with serious consequences. For instance, a lack of vitamin B12 can result in damage to the brain and nerves in the spinal cord, while a deficiency in vitamin E can cause swelling and poor muscle coordination. Too little vitamin C can lead to problems with the gums and skin. Reduced absorption of vitamin

fractures. In addition, the diarrhea commonly associated with short bowel syndrome can result in low mineral levels such as zinc and magnesium, sometimes leading to skin rashes, muscle cramping, and irregular heart rhythms.

- **Acidosis.** *Acidosis* is an unusually high level of lactic acid in the bloodstream. People with short bowel syndrome may be unable to digest carbohydrates well. Undigested carbohydrates create lactic acid. When the body absorbs more lactic acid than it can use and dispose of, acidosis may result. Symptoms include confusion, blurred vision, and slurred speech.
- **Bacterial overgrowth.** In contrast to the large intestine, which is rich in bacteria, the small intestine normally hosts a minimal amount of bacteria. In people with short bowel syndrome, those bacteria may multiply by feeding on unabsorbed nutrients. Patients who have had their *ileocecal valve* surgically removed (typically during a resection procedure) may be at heightened risk for developing small bowel bacterial overgrowth. This valve, which connects the small and large intestines, normally prevents the flow of bacteria from the large intestine to the small intestine, and without it, the movement of bacteria goes unchecked. Symptoms of small bowel bacterial overgrowth include diarrhea, bloating, nausea, and vomiting.
- **Gastric hypersecretion.** Acid production is increased in patients with short bowel syndrome. High levels of stomach acid can raise the amount of secretions entering the shortened bowel, and interfere with normal absorption.

Impact of SBS on Children

In children, as in adults, short bowel syndrome is the result of too little intestinal surface to absorb nutrients from food. Typically, an affected child was either born with an abnormally short intestinal length, or much of the small intestine was surgically removed to correct another condition such as *necrotizing enterocolitis* (intestinal infection and inflammation).

In either case, this can reduce the child's ability to extract sufficient nutrients from food. Because children are still

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