Malabsorption Syndromes

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KEYWORDS

• Malabsorption • Digestion • Celiac disease • Short bowel syndrome • Maldigestion

KEY POINTS

- Several conditions of the small bowel can be responsible for malabsorption syndromes.
- Understanding multiple diagnostic modalities prevents delayed diagnoses.
- Adequate and early treatment positively affects prognosis.

BACKGROUND

The gastrointestinal (GI) system is responsible for the motility, secretion, regulation, and digestion of nutrients consumed in the diet. Vital to maintaining adequate health is the GI system's multifaceted and complex ability to digest and absorb fluids, electrolytes, macronutrients, and micronutrients.[1] Normal nutrient absorption requires 3 steps[2,3]:

- Luminal and brush border processing
- Absorption into the intestinal mucosa
- Transport into the circulation.

An impairment in intestinal absorption and functioning is known as intestinal insufficiency or deficiency. The European Society for Clinical Nutrition and Metabolism defines intestinal insufficiency or deficiency as a decrease in gut absorptive function not requiring intravenous supplementation for health and/or growth maintenance.[4,5] Malabsorption is impaired absorption of nutrients caused by any disruption in the process of normal absorption. Impaired digestion of nutrients within the intestinal lumen or at the brush border membrane can also interfere with nutrient absorption. This is known as maldigestion. Malabsorption and maldigestion differ pathophysiologically (**Table 1**) but the processes of digestion and absorption are interdependent. Therefore, in clinical practice, malabsorption refers to deficiencies in the process of both absorption and digestion.[3,6]

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Table 1
Examples of maldigestion and malabsorption

	Malabsorption	Maldigestion
Etiologic factors	Impaired absorption of digested food caused by alterations of intestinal mucosa	Impaired breakdown of food in intestinal lumen
Examples	Crohn disease Celiac disease Lactose intolerance Small intestine resection Small intestinal bacterial overgrowth Whipple disease Radiation enteritis Pernicious anemia	Pancreatic insufficiency Gastric resection (bariatric) Bile acid deficiency Cirrhosis

Although malabsorption disorders can originate from the liver, pancreas, stomach, or intestines, this article reviews common disorders of the small bowel that result in malabsorption.

ETIOLOGIC FACTORS

Malabsorption can result from congenital defects in the membrane transport system of the small intestine epithelium, from acquired defects, or from surgery.[7] A defect in any of the 3 phases of normal absorption can result in malabsorption, and these defects may exist concurrently.[3] Malabsorption may be either global or partial (isolated). Global malabsorption results from diseases with diffuse small bowel mucosal involvement or reduced absorptive surface, leading to impaired absorption of almost all nutrients.[1] Partial or isolated malabsorption results from diseases that interfere with the absorption of specific nutrients.[3]

TYPES OF MALABSORPTION DISORDERS

Luminal and Brush Border Processing Phase

Diseases affecting the luminal phase of the absorption process cause most acquired cases of malabsorption. These include diseases affecting the absorptive surface (Table 2), as well as diseases causing digestive enzyme deficiencies.

Short bowel syndrome

Short bowel syndrome is a result of a reduction in intestinal length, usually because of surgery, and is a clinical cause of malabsorption. These intestinal resections lead to decreased absorption of macronutrients and/or water and electrolytes because of insufficient small bowel length. The length and absorptive capacity of the remnant bowel is also contributory.[8] Total small bowel length of less than 200 cm in adults is defined as short bowel syndrome and generally requires nutritional or fluid supplementation.[4,5] Although a universal definition in children has not been developed, short bowel syndrome is assumed when there is a need for intravenous supplementation or when there is a residual small bowel length of less than 25% expected for gestational age.[4,5] The most common causes of short bowel syndrome in adults are Crohn disease, mesenteric ischemia, radiation enteritis, and postoperative complications. In children, intestinal volvulus, malformations, and necrotizing enterocolitis are characteristic.[7,9]

More than 90% of dietary nutrients are absorbed in the jejunum. The ileum compensates but there are permanent changes in enzyme secretion, which may lead to rapid