Gastrointestinal Malabsorption

Gastrointestinal malabsorption is a failure to fully absorb nutrients from the gastrointestinal tract. The digestion and absorption of nutrients within the gastrointestinal tract requires a complex interaction between motor, secretory, digestive and absorptive processes that are vulnerable to various potential disturbances which may lead to global or specific malabsorption syndromes[1].

The outcome is malnutrition. Malnutrition may also be caused by inadequate diet with or without malabsorption. See also the separate Malnutrition article.

Clinical features

Malabsorption, from whatever cause, may be accompanied by:

- Changes in weight and growth:
  - Inadequate absorption of calories will lead to unintentional weight loss in adults or faltering growth in children.

- Gastrointestinal symptoms:
  - Chronic diarrhoea is common. Chronic diarrhoea may be defined as the abnormal passage of three or more loose or liquid stools per day for more than four weeks and/or a daily stool weight greater than 200 g/day.
  - Steatorrhoea is often present. There is excessive fat in the stools and they become pale, bulky and offensive in smell. Stools float and are difficult to flush away. They often leave a greasy rim around the pan.

- Family history:
  - Some diseases associated with malabsorption are found more frequently in families - eg, coeliac disease, Crohn's disease, cystic fibrosis and disaccharidase deficiencies (lactase). It is therefore important to explore the family history carefully.

- Signs of deficiencies may be apparent. There may be:
  - Non-anaemic iron deficiency.
  - Iron-deficiency anaemia.
  - Folate deficiency or vitamin B12 deficiency.
  - Bleeding, resulting from low vitamin K.
  - Oedema, which occurs in protein/calorie malnutrition.

There may also be clinical features associated with the particular cause of malabsorption. The most common causes in the UK are coeliac disease, Crohn's disease and chronic pancreatitis.

However the malabsorption of simple carbohydrates is the most common type of non-immune-mediated food intolerance, affecting 20-30% of the European population[2].

Aetiology

Mucosal causes

- Coeliac disease usually presents in childhood but can present later. It is due to allergy to gluten in the diet that results in subtotal villous atrophy. This considerably reduces the surface area available for absorption. A diet strictly free of gluten will reverse the process. Nowadays, about one child in four with coeliac disease is diagnosed by targeted screening rather than presenting with malabsorption[3].
- Lactose intolerance.
- Cow's milk protein allergy.
- Soya milk intolerance.
- Fructose intolerance and malabsorption: simultaneous consumption of glucose reduces fructose malabsorption[4].
- Infection:
  - Giardiasis.
  - Whipple's disease.
  - Intestinal tuberculosis.
  - Tropical sprue.
  - Traveller's diarrhoea.
  - Diphyllobothriasis (tapeworm can cause vitamin B12 malabsorption).
  - Ancylostomiasis (hookworm).
  - Strongyloidiasis (nematode).

- In patients with an inflammatory bowel disorder and malabsorption, an immune deficiency, including HIV enteropathy, should be considered[5, 6].
- Intestinal lymphangiectasia and other causes of lymphatic obstruction include lymphoma, tuberculosis and cardiac disease.
Intraluminal causes

- Pancreatic insufficiency\[^7\]:
  - Cystic fibrosis
  - Chronic pancreatitis
  - Carcinoma of pancreas
  - Zollinger-Ellison syndrome

- Bile acid malabsorption: defective secretions of bile salts, due to cholestatic jaundice or disease of the terminal ileum.
- Drugs.

Structural causes

- Intestinal hurry:
  - Post-gastrectomy
  - Post-vagotomy
  - Gastrojejunostomy

- The **blind loop syndrome** involves disturbance of normal gut flora with malabsorption.
- Fistulae.
- Diverticulae and strictures.
- Crohn's disease.
- Amyloidosis.
- Short bowel syndrome.
- Eosinophilic gastroenteropathy.
- Mesenteric arterial insufficiency.
- Radiation enteritis.

Causes outside the gut

- Hyperthyroidism.
- Hypothyroidism.
- Addison's disease.
- Diabetes mellitus.
- Hyperparathyroidism.
- Hypoparathyroidism.
- Carcinoid syndrome.
- Widespread skin disease (rapid cell turnover may also affect gut mucosa).
- Collagen diseases.
- Eating disorders.
- Factitious diarrhoea due to purgative abuse.

In the elderly, causes of malabsorption are as in the young but pancreatic insufficiency can occur without obvious cause and intestinal overgrowth can occur without anatomical abnormality of the bowel\[^8\].

Investigations

The World Gastroenterology Organisation has produced guidelines for the investigation of malabsorption\[^9\].

Blood tests

- FBC.
- Plasma viscosity, ESR, CRP.
- Vitamin B12 level.
- Red cell folate.
- Iron status (usually ferritin but can be iron and iron-binding capacity).
- Clotting screen for vitamin K deficiency.
- Serum albumin.
- Calcium (corrected for albumin level).
- Anti-endomysial, anti-reticulin and alpha-gliadin antibodies (coeliac screen).
- LFTs.
- Serum magnesium.

Iron deficiency causes a microcytic blood picture. Folate or vitamin B12 deficiency causes megaloblastic anaemia but the picture may be mixed.

Patients with unexplained iron deficiency merit screening for coeliac disease\[^10\].

Stool

- Faecal microbiological assessments may be indicated.
- Sudan stain for fat globules.
- Tests for secretory function - eg, elastase or chymotrypsin in stool.
Imaging and endoscopy

- Abdominal ultrasound (gallbladder, liver, pancreas, intestinal wall, adenopathy).
- Barium follow-through may show structural abnormalities.
- Ileocolonoscopy including biopsies of colon and ileum.
- CT; MRI of pancreatic duct-systems or endoscopic retrograde cholangiopancreatography (ERCP).

Breath hydrogen tests
Take samples of end-expired air; give glucose; take more samples at half-hourly intervals. If there is bacterial overgrowth there is an increase in exhaled hydrogen one hour after ingestion.

Management
Nutritional support may be required.

Management otherwise depends upon the cause. For example:

- Coeliac disease requires a strict gluten-free diet.
- Pancreatic insufficiency requires the oral administration of enzymes with food.
- Blockage of the flow of bile requires surgery.
- Crohn's disease usually responds to steroids.
- Blind loop syndromes may require further surgery.
- Where bile salts are not reabsorbed, it may be necessary to give resins to bind them.\[11\].
- If there is folate deficiency and possibly B12 deficiency too, it is imperative to give an injection of vitamin B12 before starting folate supplementation. Otherwise, there is a risk of precipitating subacute combined degeneration of the cord.
Complications

Complications are related to the underlying disease.

- Lassitude is common. Children will have **stunted growth**.
- Untreated coeliac disease may result in small bowel adenocarcinoma or lymphoma.
- Infertility is common, especially in coeliac disease.
- Anaemia may occur.
- Rickets, osteomalacia or **osteoporosis** may occur.

**Historical note**

Before it was superseded by endoscopy, small bowel biopsy was performed with the Crosby capsule: this is swallowed on the end of a tube and is monitored by X-ray screening until it reaches the jejunum. It is fired by suction, and a biopsy is caught in its jaws. It is then pulled back up.

**Further reading & references**

- *The Management of Adults with Coeliac Disease; British Society of Gastroenterology (2010)*
- *NDR (Nutrition and Diet Resources) UK*

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