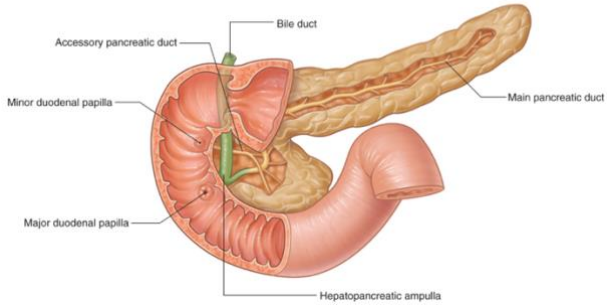
Duodenum

1. Functions

Integrator of Digestion



The Duodenum is the first part of the small intestine. It is connected to the distal stomach and receives partially digested food from the stomach, called chyme.

The duodenum is also connected to the gallbladder and the pancreas. It has small openings in its walls (the major and minor duodenal papilla) to allow ducts from the pancreas and gallbladder to empty their secretions into the duodenum to combine with the chyme for further digestion. More specifically, the pancreatic enzymes released into the duodenum can break down different components of food (proteins, carbohydrates, fats) and bile from the gallbladder can also help with fat breakdown.

It is also here in the duodenum that the pH begins to change from a previous acidic stomach environment to a more alkaline pH, to allow enzymes to work efficiently at breaking down food products. While a lot of the main drivers for digestion are coming from elsewhere, it is the duodenum that combines them all together for productive digestion.

The duodenum is also in tight communication with the stomach. It will send the stomach signals for when it is, or is not, an appropriate time to receive food. This communication utilizes hormones and the nervous system for a timely, integrated response.

Iron Absorption

Iron can be absorbed by the stomach, jejunum, and ileum, but it is mainly absorbed in the duodenum. Iron can exist in the ferrous (Fe2+) or ferric (Fe3+) form, but it is the ferrous form that is absorbed more efficiently. The duodenum has enzymes along the wall that help transform ferric to ferrous iron to be absorbed into the enterocytes.

2. Problems Caused by Removal

Removing the duodenum essentially removes the main area for digestion integration. That being said, the surgeon will reconnect the stomach, bile ducts, and any remainder of the pancreas (if any) to the jejunum (small intestine). The jejunum will now receive all incoming food, bile, and secretions to become the new area for digestion integration as well as being able to absorb a wide variety of the nutrients.

In regard to iron, the duodenum is the main organ for iron absorption, but other parts of the GI tract are able to absorb iron as well. Additionally, the body always has a constant storage of iron, so the body may not even absorb the iron we eat due to plentiful stores. That being said, Iron deficiency anemia is possible due to the removal of the duodenum. Iron deficiency anemia may also be more likely if a section of the stomach is also removed due to a decrease in the amount of stomach acid needed to liberate the iron from food.

See **Bottom of Stomach** section in regard to issues with gastric emptying.

3. Strategies for Mitigating Problems

The Jejunum will be taking over the role of the duodenum and will still be able to carry out digestion. However, in order to optimize digestion in the Jejunum, follow the strategies listed in all the other organ sections (taking pancreatic enzymes, eating smaller meals, etc.).

Your physician may check your iron levels post-Whipple to gauge whether or not you are iron deficient. Both oral and parenteral iron supplements are available depending on the extent of malabsorption severity.