



CONSIDERATIONS ON THE ANATOMICAL STRUCTURE, FUNCTIONAL CHARACTERISTICS AND COMPONENT PARTS OF THE SMALL INTESTINE

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ABSTRACT

This article talks about the anatomical structure and functional features of the small intestine. It shows the anatomical and functional characteristics of the small intestine, the state of pathological processes in the intestine, its topographical location, and the process of functioning with other organs. In addition, information is provided on the division of the small intestine into components, the balance and forms of the functional process in it.

Introduction

The small intestine is part of the digestive system, and is one of the sections of the gastrointestinal tract (gastrointestinal tract). The small intestine extends from the stomach to the large intestine. Its initial section, the duodenum, due to its anatomical and physiological characteristics, is usually considered separately from the rest of the small intestine. This part starts from the duodenum with the so-called duodenojejunal or duodenojejunal flexure. The small intestine is separated from the next section of the gastrointestinal tract, the large intestine, by a muscular formation - the ileocecal valve or Bauhin valve. The small intestine consists of three membranes:

- *External*, connective tissue or serous.
- *Medium*, muscular. It is represented by two layers of muscles - the outer, longitudinal, and the more developed inner circular or circular.
- *Internal*, mucous with submucosal layer. The mucosa is uneven and forms many circular folds.

Its surface is covered with tiny outgrowths, intestinal villi. The density of the fibers is several tens per 1 mm². There are also depressions, crypts, into which the excretory ducts of the digestive glands are torn off. Due to the uneven relief, the area of the mucous membrane increases by 300-500 times. The small intestine located in the abdominal cavity is fixed to its posterior wall through the mesentery - paired layers of the peritoneum. Along the mesentery, blood and lymphatic vessels and nerves approach the small intestine.

Material and methods



The mesenteric part of the small intestine combines the jejunum (Latin - jejunum) and the following ileum (Latin - ileum). Moreover, the jejunum accounts for 3/5, and the ileum accounts for 2/5 of the total length of the mesenteric part. But there are no clear anatomical landmarks between them. As the jejunum passes into the ileum, the diameter and thickness of the intestinal tube decreases and the density of the villi decreases.

The jejunum lies in the form of 6-7 vertical loops, and is projected onto the peri-umbilical region and onto the left lower part of the abdomen. 7-8 loops of the ileum lie vertically and are projected onto the abdominal wall on the right. The small intestine borders along its entire length with the large intestine and its mesentery, pancreas, both kidneys, urinary, and in women - with the uterus and appendages.

The main function of the small intestine is digestive. Digestion of food has a dual character: cavity and parietal. Cavity digestion is carried out under the influence of gastric juice, duodenum, pancreas, and bile. All of these, together with food, enter the lumen of the small intestine from the stomach and duodenum. During cavity digestion, polymers and large molecular compounds - proteins, fats, carbohydrates - are broken down into smaller, intermediate ones - oligomers and dimers.

The glands of the small intestinal mucosa secrete lipases, peptidases, sucrases, and many other enzymes. These enzymes break down intermediate products into final monomer compounds - amino acids, fatty acids, glucose. All these products are absorbed by the villi of the mucous membrane. This is how parietal digestion occurs. Most medications are also absorbed in the small intestine. Thanks to the contractile activity (motility) of smooth muscles, food is mixed in the lumen of the small intestine, and its further movement towards the large intestine.

In addition to digestive enzymes, biologically active substances are synthesized in the small intestine - vasointestinal polypeptide, secretin, and some others. With their help, the function of the small intestine and other digestive organs - the stomach, pancreas, gall bladder - is regulated.

In addition to digesting and moving food, the small intestine performs a protective function. In its submucosal layer there are whitish formations Peyer's patches. These accumulations of lymphoid tissue are elements of the immune system.

The small intestine is the longest section of the gastrointestinal tract, responsible for selective fermentation and absorption of nutrients and water coming from outside. It is also called the small intestine in contrast to the large intestine, which has a larger outer diameter and lumen throughout. In this article, we will look at what parts of the small intestine exist, how their work is structured, and what diseases gastroenterologists most often encounter.

The length of the small intestine of an adult, according to anatomists, ranges from 4.72 to 10.5 meters, most often 7-8 meters. Representatives of peoples who traditionally eat mainly plant foods (for example, Indians) have a longer small intestine than people who eat mainly meat and fish (for example, representatives of the peoples of the Far North). All other things being equal, the male intestine is longer than the female intestine.

The intestine begins at the exit from the pylorus of the stomach. The sharply acidic environment of the stomach and the alkaline environment of the intestines are separated by



the sphincter. The small intestine has many bends and, ultimately, passes into the cecum - the initial part of the large intestine. They are separated by the ileocecal valve.

Throughout its entire length, the small intestine is a smooth muscle hollow formation, the walls of which consist of several layers:

embossed mucous membrane;

submucosal fat layer;

two layers of muscle fibers-internal circular and external longitudinal.

Outside, the intestine either comes into contact with the walls of the peritoneum, or is connected to the mesentery - a special tissue generously penetrated with nerve fibers, blood and lymphatic vessels. A constant exchange of information passes through the nerves. Receptors in the walls of the gastrointestinal tract report to the digestive centers about the composition of the food mass (chyme), and in response, commands are received to release the corresponding enzymes, accelerate and slow down peristalsis.

Results and discussion

Through the blood vessels flowing into the portal vein, the products of fermentation of proteins and carbohydrates enter the body from the intestine. It is curious that the products of fat breakdown do not pass through the blood, but through the lymph.

Thus, they bypass the liver, which stores lipids in its fat depot. In addition to fermentation and absorption, the functions of the small intestine include transporting chyme as it is processed towards the large intestine. Depending on the type of food and the performance of the gastrointestinal tract, its passage takes from four to eight hours.

There are two types of contractions of the smooth muscle tissue of the walls. The fibers of the inner muscle layer contract transversely approximately 12-13 times per minute, preventing the chyme from remaining at rest. The fibers of both layers also contract in waves along the intestinal tube, giving the mass a forward movement "out". Innervation of peristalsis is provided by the vagus nerve and abdominal ganglia and occurs without the participation of consciousness. It is impossible to speed up or slow down the digestion process in the parts of the small intestine through the effort of thought.

Under a microscope, the inner surface of the small intestine resembles a fantastic alien landscape, dotted with longitudinal and transverse folds, finger-shaped and leaf-shaped suction villi, crypt voids where the mouths of the digestive glands emerge. The contractions of smooth muscles, reminiscent of miniature earthquakes, add additional surrealism to the picture.

Due to its complex topography, the absorption surface area of the small intestine is approximately 500 times greater than the internal surface area of a conventional hollow tube of comparable diameter and length.

Sections of the small intestine and their functions. The small intestine is anatomically divided into three unequal parts:

duodenum

jejunum

ileum



The length of the duodenum (20-30 cm) is negligible compared to the length of the underlying sections, but it sets the tone for the entire work of the small intestine. In the jejunum and ileum, mainly absorption of digestive products and local secretory activity occur.

The name duodenum (digiti) was given by Renaissance physicians who calculated that the length of the organ is approximately equal to the sum of the diameters of the twelve thumbs of a human hand. Food from the stomach that has undergone primary acid lysis enters the duodenum. Here the chyme lingers for about half an hour. The internal "laboratory" studies its composition and gives an order for the isolation of certain digestive enzymes contained in bile, pancreatic secretions and secretions of local digestive glands of the intestine.

In most people, bile and pancreatic juice mix in the bile duct and enter the duodenum through the papilla of Vater. In a number of people, the additional Santorini duct is also involved, through which only pancreatic enzymes flow. Due to the highly aggressive environment in the duodenum, its walls have thicker and coarser epithelium. The valve between the pyloric part of the stomach and the duodenum does not close tightly, especially in people who eat predominantly plant foods, which allows endoscopic examination of this part of the intestine. But it becomes difficult to move further due to the Creutz sphincter, intestinal loops and its gradual narrowing.

The middle section is separated from the duodenum by the Creutz fold. The lumen and outer diameter of the jejunum are 1-2 cm smaller than the size of the duodenum, but that is not why they called the jejunum. While dissecting the bodies, anatomists found this part of the intestine empty, which is how the name came about. The length of the jejunum is approximately 40% of the small intestine, but chyme passes through it the fastest - in about 1-1.5 hours. The loops are located to the left of the midline of the body.

Ileum is the distal part of the small intestine, which passes into the cecum of the large intestine. Its functions are the same as those of the jejunum, but the digestion processes take longer, the body strives to squeeze out everything that is possible from the chyme. This section contains the most pinpoint digestive glands.

There is no anatomical distinction between the two sections; the division is conditional based on localization in the abdominal cavity. The ileum is located to the right of the midline of the body. It is separated from the large intestine by the ileocecal sphincter (Bauhinian valve), which does not allow the contents of the large intestine, rich in pathogenic microflora and toxins, to pass upward.

Inflammatory lesions of the small intestine are collectively called enteritis. They can be infectious or non-infectious in nature. The most characteristic symptoms of enteritis:

flatulence

diarrhea

moderate aching or cramping pain, the localization of which depends on which part of the small intestine is affected.

If problems are associated with the duodenum and jejunum, pain is felt in the left and upper abdomen; if the ileum is affected, then pain is felt on the right.

Conclusion



The small intestine is a favorite place for parasitism of round and tape helminths. Helminthiasis leads to persistent dysfunction of the small intestine. In addition to damage to the mucous membranes, anemia, weight loss and intoxication, uninvited guests can cause obstruction and intestinal obstruction, which will require urgent surgical intervention.

The environment of the small intestine is less aggressive compared to the environment of the stomach. Malignant neoplasms in this part of the gastrointestinal tract are less common and in the vast majority of cases affect the duodenum.

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