Anatomy of the stomach

Vishy Mahadevan

Abstract

The stomach is the widest part of the alimentary canal. Continuous proximally with the abdominal oesophagus and distally with the duodenum, the stomach is ensleeved in peritoneum. The principal functions of the stomach are: (i) to act as a receptacle and reservoir for ingested food and to release the food into the duodenum in small and physiologically appropriate amounts; (ii) to secrete hydrochloric acid and proteolytic enzymes that initiate protein digestion and neutralize harmful bacteria in the ingested food; and (iii) to churn the ingested food and soften it with the help of gastric juice to produce a liquefied mixture termed chyme. Embryologically, the stomach is derived entirely from the foregut and this is reflected in the stomach deriving its blood supply wholly from the coeliac axis. The past two decades have seen a dramatic decline in the need for surgical intervention in acid-peptic disease in the developed world. This has been due largely to the advent of proton-pump inhibitors and to the discovery of a medically treatable microbial cause for most cases of peptic ulcer disease. In the present day, operations for gastric neoplastic disease and bariatric surgery collectively account for most of the major gastric surgical procedures in adults. This article describes in detail the surgically relevant topographical anatomy of the stomach, including its blood supply and lymphatic drainage.

Keywords Antrum; fundus; gastric blood supply; lesser sac; lymphatic drainage; pylorus; stomach bed

External features

The stomach lies largely in the left hypochondrial region under cover of the lower part of the rib cage. The lower and distal parts of the stomach, however, lie in the epigastric and upper umbilical regions of the abdomen. The stomach is a distensible organ. In the adult, it has an average capacity of 1.5 litres. The stomach is approximately J-shaped, although in certain individuals it may lie transversely when it is known as a steer-horn stomach. The size, shape and position of the stomach can vary considerably, depending on the posture of the individual and on the state of fullness of the stomach.

The empty stomach appears flattened. It presents anterior and posterior surfaces, which are demarcated from each other by the greater and lesser curvatures (Figure 1). The lesser curvature forms the upper right border of the stomach while the greater curvature forms the lower left border. The stomach has two openings or orifices. The proximal one is termed the cardiac orifice through which the stomach communicates with the oesophagus. The distal orifice is the pyloric orifice through which the stomach communicates with the duodenum. The regions of the stomach adjacent to the cardiac and pyloric openings are known as the cardia and pylorus, respectively. The main parts of the stomach are the fundus, body and pyloric part.

The various parts of the stomach (Figure 1) have significant physiological and histochemical differences and these are taken into account by the endoscopist, radiologist and surgeon in the diagnostic interpretation of gastric pathologies and their management.

The fundus of the stomach is the part which projects upwards above the level of the cardiac orifice. Lying to the left of the abdominal oesophagus, it makes contact with the left dome of the diaphragm. Two-thirds of the way from the cardiac orifice along the lesser curvature of the stomach is a distinct notch, the angular notch (incisura angularis). The body of the stomach extends from the cardiac orifice to the level of the angular notch. It is the largest and most distensible part of the stomach and is the part that contains in its inner lining, the parietal cells which secrete hydrochloric acid (HCl). The pyloric part of the stomach extends from the angular notch to the gastro-duodenal junction. It comprises the pyloric antrum proximally and the pyloric canal distally. The distal end of the pyloric canal features a very distinct ring of sphincter muscle, which is situated immediately proximal to the pyloric orifice, and can be easily felt. This sphincter is greatly thickened in the condition of infantile hypertrophic pyloric stenosis. The position of the pyloric sphincter is indicated by the presence of a fairly constant vein, the prepyloric vein (of Mayo) that runs vertically on the anterior surface of the pylorus.

The pyloric antrum produces the hormone gastrin, which is responsible for the hormonal phase of gastric acid secretion.

Attached along the lesser curve is the lesser omentum, a double-layered peritoneal sheet that extends from the lesser curvature of the stomach to the visceral surface of the liver. At the lesser curvature the two leaves of the lesser omentum diverge; the anterior leaf covering the anterior wall of the stomach and the posterior leaf adhering to the posterior wall. At the greater curvature the two leaves meet to form the greater omentum. The greater omentum hangs down like an apron from

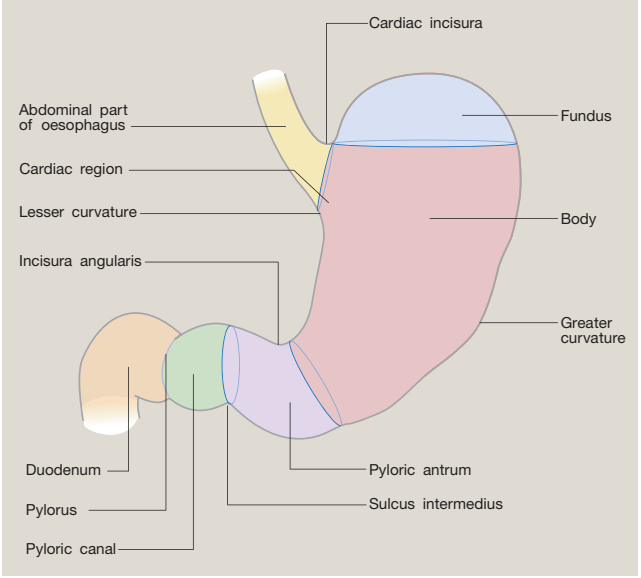

Figure 1 The borders and regions of the stomach (viewed from the front)

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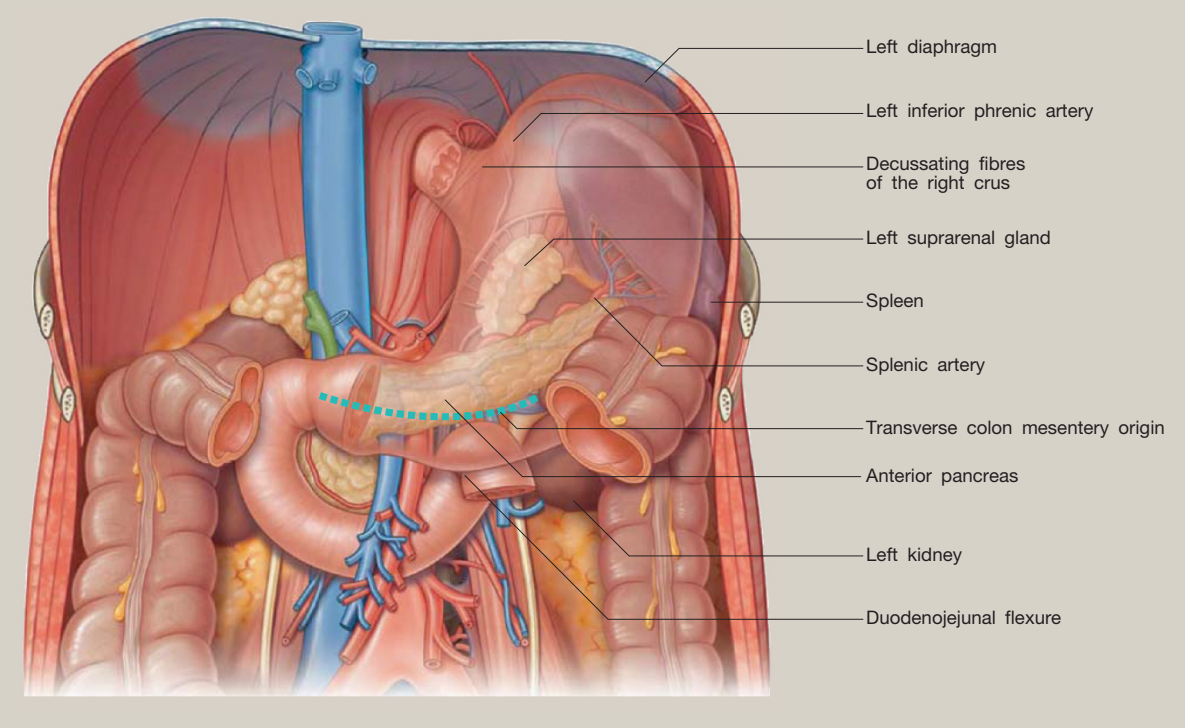

Figure 2 Posterior topographical relations of the stomach

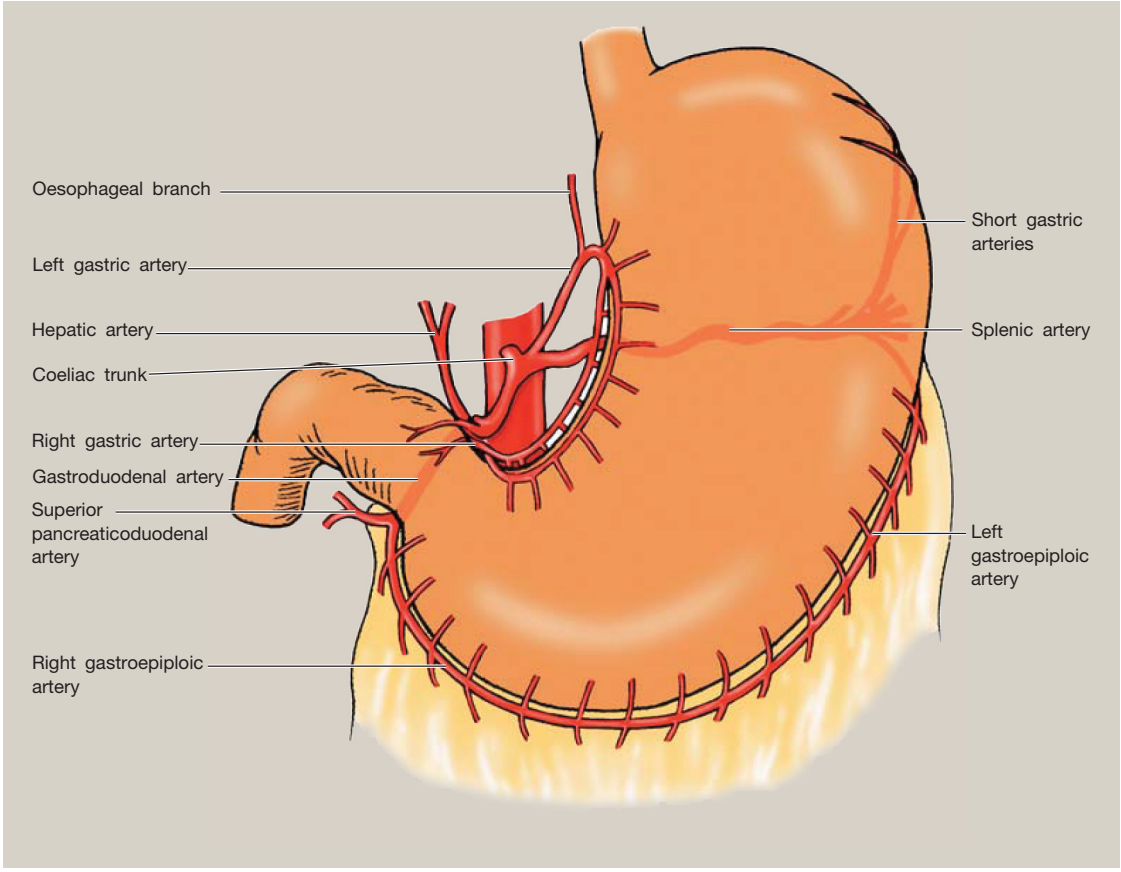

Figure 3 Arterial supply of the stomach

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