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Technical report

A BRIEF GUIDE TO THE ANATOMICAL DISSECTION OF THE STOMACH

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ABSTRACT

The purpose of this article is to write a short guide on the macroscopic anatomy of the stomach, describing its structures, its relationships within the abdominal cavity and the dissection methods used during the internship performed by a group of students from the University of Palermo, Palermo, Italy, at the University of Malta, Msida, Malta, during the Summer of 2018. Indeed, they had the opportunity to spend a period of two weeks at the department of Anatomy in the Maltese University for studying and practicing on some corpses, with the aim of improving their anatomical knowledge.

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1. Introduction

Taking into account the importance of the study of human anatomy through a direct approach, a group of students from the University of Palermo, Palermo, Italy – selected according to their university career and their level of knowledge of English language – had the opportunity to participate to a two weeks long project of anatomical dissections at the University of Malta, Msida, Malta. With the support of local anatomical demonstrators, the group has been guided to the discovery of the complex and fascinating structures of the human body, paying particular attention to some anatomical districts. This article follows a series of papers on this topic (1-6).

2. Material and methods

For the study of anatomical structures, anatomical atlases were used to ease the identification of the components (7-11). During the first week, the anatomy of abdomen was analyzed, instructing the students about the dissection methods on the corpse of a woman of about 70 years.
A scalpel was used to perform the primary incision of the soft tissue of the abdominal thoracic wall, using a variant of the classical “y incision”.

The cut has been realized making a first incision on the high part of the chest with a transversal incision from the acromial process to the contralateral, with concavity upwards, and the second incision went from jugular notch to pubic tubercle. During the first cut is important to avoid the opening of the peritoneal cavity, that will be opened subsequently with another incision following the linea alba from the xiphoid process to the pubis, carving from sheath rectus abdominis to the transversus abdominis fascia. Once the peritoneal cavity has been opened, it was possible to identify the parts of the stomach.

3. Results

The stomach is a saccular dilatation, located at the level of the supramesocolic space; it follows the esophagus and continues with the duodenum. The shape varies according to the filling and functional conditions.
It is constituted by different parts: the cardia, which corresponds to the passage from the esophagus to the stomach; the fundus, that is the part above the cardia, which is surmounted by the diaphragmatic dome.
The narrow right extremity of the sack ends towards the duodenum with a narrowing called pylorus. The part interposed between the fundus and the pylorus is the body.

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In the stomach two faces are distinguished, one ventral and one dorsal, separated by two margins, one on the right, called lesser curvature (which is placed in relation with the left lobe of the liver through the small omentum) and one on the left called greater curvature. They are not real margins (which can only be seen through an X-ray), but rounded edges that mark the passage from the anterior wall to the posterior wall.

The frontal face, in its rightmost portion, comes into contact with the lower part of the left lobe of the liver and in small part with the right lobe, while in the leftmost portion it is covered by the diaphragmatic dome which separate the stomach from structures that are above the diaphragm. In the anteroinferior portion, the stomach is in contact with the costal insertions of the transversus abdominis muscle and inferiorly it will take further contact with the posterior (internal) surface of the anterior abdominal wall. The front face, also called the anterior wall, is completely covered with visceral peritoneum. It is in contact with the parietal peritoneum, which covers the posterior surface of the anterior abdominal wall. The posterior wall is related to different organs, that are retroperitoneal because they are only minimally coated, on their anterior surface, by parietal peritoneum. Later the stomach contacts the body and the head of the pancreas, with the left adrenal gland, with the front face of the left kidney and with the splenic artery and vein.

Figure 1. The splanchnic cavity and some details of its organs (particularly, the stomach. 1) Liver; 2) Cardias of stomach; 3) Fundus of stomach; 4) Body of stomach; 5) Pylorus of stomach; 6) Lesser omentum; 7) Lesser curvature of stomach; 8) Greater curvature of stomach.

The lower portion of the posterior wall rests on the stomach bed, constituted by the transverse mesocolon and the gastric face of the spleen, where the stomach can slip when it fills. The posterior wall is covered almost entirely by peritoneum (for this reason the stomach is considered an intraperitoneal organ), except for a very small posterolateral portion at the level of the cardia, and it makes contact with the left pillar of the diaphragm. At the level of the upper portion of the rear wall there is a recess, which partly constitutes the lesser sac. In addition to the continuity with the esophagus and duodenum, the peritoneal laminae, that derives from the dorsal mesogastrium, give stability through various ligaments: the phrenic-gastric ligament, the gastro-lienal ligament, the gastro-colic ligament (these depart from the great curvature) and the hepato-gastric ligament, which connects the liver to the small curvature.

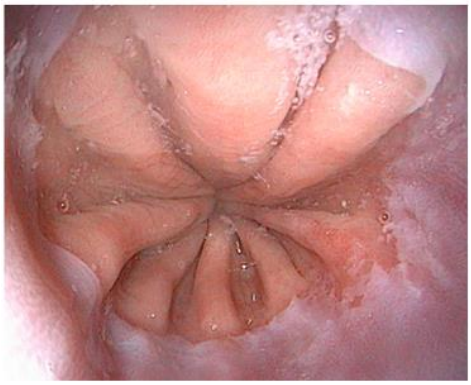

Figure 2. Z Line: endoscopic image showing the squamo-columnar junction between esophagous and stomach. Photo from the personal endoscopic archive of Giovanni Tomasello.

Stomach vascularization depends on the celiac artery (or celiac trunk). This large uneven branch belongs to the visceral branches of the aorta and originates from the anterior wall of the abdominal aorta, just below the origin of the small lower phrenic arteries. Below the origin of the celiac trunk we will have instead the origin of the superior mesenteric artery.

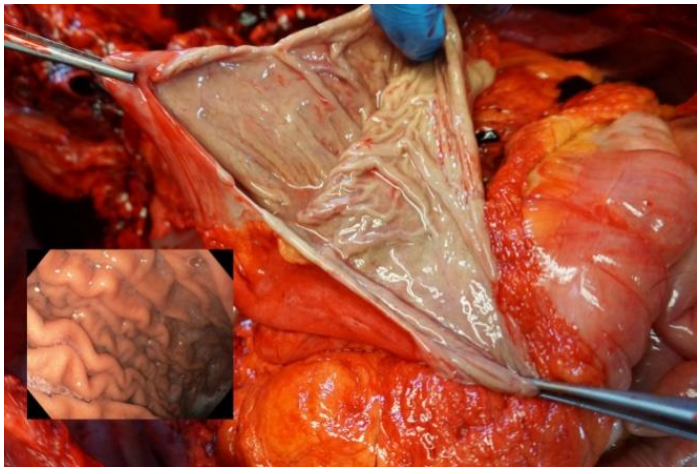

Figure 3. Focus on the inner surface of the stomach body, showing rugae. The inset is an endoscopic image from the personal endoscopic archive of Giovanni Tomasello..

The trunk consists of 1) Left gastric artery. 2) Common hepatic artery, from which the gastro-duodenal artery and the right gastric artery branch arise, which, anastomosed to the left gastric artery, constitutes the arterial arch of the small curvature of the stomach. 3) Splenic (or lienal) artery, which in its terminal portion emits the left gastro-epiploic branch which, anastomosed to the right gastro-epiploic artery, constitutes the arterial arch of the large curvature.

Another group of arteries that supply the left lateral portion of the gastric fundus are the short gastric arteries which, moving from the most distal portion of the splenic artery, lead to the bottom of the stomach and run along the thickness of the gastro-lienal ligament. Venous drainage follows the course of arterial vasculature.

The innervation of the stomach has a sympathetic and a parasympathetic component. The sympathetic component comes from the celiac ganglia that are located at the level of the origin of the celiac trunk. The sympathetic nerve fibers originate from these ganglia and will be distributed inside the stomach. The parasympathetic component comes from the vagus nerve. The posterior vagal trunk is derived from the left vagus while the anterior vagal trunk is derived from the right vagus. These trunks will branch to the inside of the gastric wall and at the level of the submucosa and at the level of the muscularis they will constitute submucosal plexus and enteric plexus. Following a series of images regarding the stomach from an endoscopic perspective.

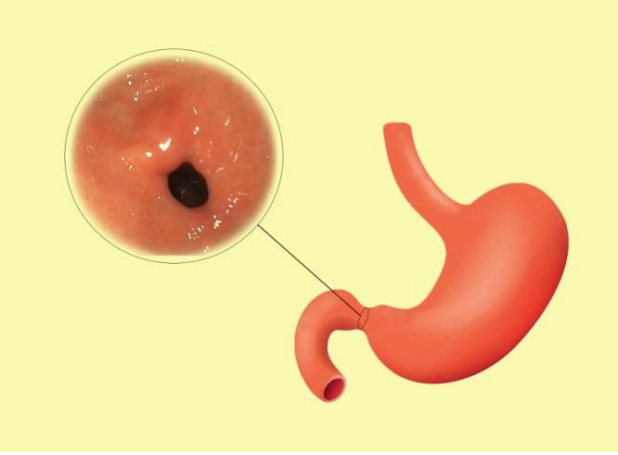

Figure 4. Endoscopic image showing the pylorus. Photo from the personal endoscopic archive of Giovanni Tomasello.

4. Discussion and conclusions

International elective experiences during the medicine degree course are strongly encouraged (12-15). This article demonstrates how the practical approach linked with the theoretical one is a great help in enhancing skills and knowledge in the anatomical field. The use of anatomical atlases facilitated the recognition of structures, such as vascular structures, otherwise difficult to identify properly. In conclusion, we hope that such projects can become an indispensable experience accessible to all students of the faculty of medicine and surgery worldwide.

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