Anatomic Study of Gastric Vascularization and Its Relationship to Cervical Gastroplasty

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The aim of this study was to perform an anatomic study of the stomach and its vascularization, evaluating the frequency of communication between the right gastroepiploic artery (RGEA) and the left gastroepiploic artery (LGEA), as well as their relationship to the length of the stomach without extramural (direct) vascularization in cervical gastroplasty. Forty-two fresh human cadaveric specimens were studied, and the presence of communication between the RGEA and the LGEA was observed in 26 of the dissected stomachs (61.9%). When communication was present (group 1), to a total length of 49.60 cm of greater curvature length, it was verified that approximately 16.48 cm of this curvature lacked direct extramural vascularization (33.20%). When there was non-communication (group 2), to a greater curvature length of approximately 45.41 cm, it was found that 18.96 cm of this curvature (gastric fundus) lacked direct extramural vascular perfusion (41.76%). Results obtained in both groups were tested for statistically significant differences by the Pearson correlation test ($P < 0.05$). A P value of 0.05 or less was considered statistically significant. It can be concluded that the presence of communication between the RGEA and the LGEA increases extramural vascularization in the great gastric curvature. (J GASTROINTEST SURG 2005;9:132–137)

KEY WORDS: Cadavers, cervical gastroplasty, anatomy

Several surgical procedures are employed for the treatment of benign and malignant esophageal diseases. Currently, esophagectomy still represents one of the greatest challenges in digestive tract surgery.[1]

Mobilization of the stomach through the mediastinum with cervical anastomosis is a common procedure following esophagectomy. This procedure requires ligation of the left gastric artery, the left gastroepiploic artery (LGEA), and the short vessels of the gastric fundus. The blood supply of the gastric fundus is maintained up to the level of resection of the lesser curvature, mainly by the right gastroepiploic artery (RGEA) and partially by the right gastric artery.[2] However, the gastric fundus, which is used for the anastomosis, might present reduced vascularization, representing a possible risk of late ischemia not detected during the operation.[3,4] Fistulas of the esophagogastric anastomosis occur in 3.5% to 21.5% of the cases and are currently responsible for 9% to 50% of operative deaths.[5–7] Therefore it is an important prognostic factor in postoperative recovery after esophagectomy.

According to some investigators,[8,9] communication between the RGEA and the LGEA occurs in approximately 35% of cases, and indirect communication of the two arteries through branches of the epiploic arteries in almost 5% of cases. Sixty percent of patients would thus lack communication between these arteries, increasing the possibility of ischemia and fistulas.

Because of the high postoperative mortality rate following esophagectomy with gastric pull-up, the identification of communication between the RGEA and the LGEA could identify those patients with better vascularization of the stomach and thus reduce the occurrence of fistulas. The aim of this study was to

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analyze the occurrence of communication between the RGEA and the LGEA in a random sample of fresh adult cadavers and its relation to the percentage of the length of the greater curvature of the stomach lacking extramural (direct) vascular perfusion.

MATERIAL AND METHODS

This study was approved by the Research and Ethics Committee of the University of São Paulo Medical School. Forty-two adult cadavers were studied 4 to 8 hours after death. Twenty-eight were male and 14 were female. The mean age of the cadavers was 55 years (range 42 to 80 years) and mean weight was 62.3 kg (range 51 to 82 kg). The cadavers did not have any gastrointestinal diseases or abdominal surgical procedures during life.

Through a midline laparotomy, the vessels of the greater gastric curvature (both the RGEA and LGEA) were identified and dissected from their origins in the gastroduodenal artery and the splenic artery, respectively. The presence or lack of communication between the two arteries was analyzed. Communication was considered to be present only in cases where the RGEA continued until the LGEA in the gastric fundus. We considered there to be a lack of communication when we observed the entrance of the RGEA in the stomach without any direct branch to the LGEA. Communications through arteries outside the arcade were not considered (Fig. 1).

The following measurements were taken:

1. Length of the greater curvature of the stomach (from the gastroesophageal junction to the pylorus)
2. When communication between the RGEA and the LGEA was identified (group 1), the length of the greater gastric curvature of the stomach from the first branch of the LGEA to the gastroesophageal junction was measured (see Fig. 1, *distance A*)
3. When communication between the RGEA and the LGEA was absent (group 2), the length of the greater gastric curvature of the stomach from the last branch of the RGEA to the gastroesophageal junction was measured (see Fig. 1, *distance B*)

Three different measurement techniques were adopted. First, the vessels of the greater curvature were identified without dissection, and measurements were taken using a thread and a simple ruler before the stomach was removed. Second, measurements were taken after the removal of the entire stomach, again using a thread and a ruler. The third and last measurements were taken using digital picture analysis software (University of Texas Health Science Center at San Antonio [UTHSCSA] Imaging Tools) after the removal of the stomach.

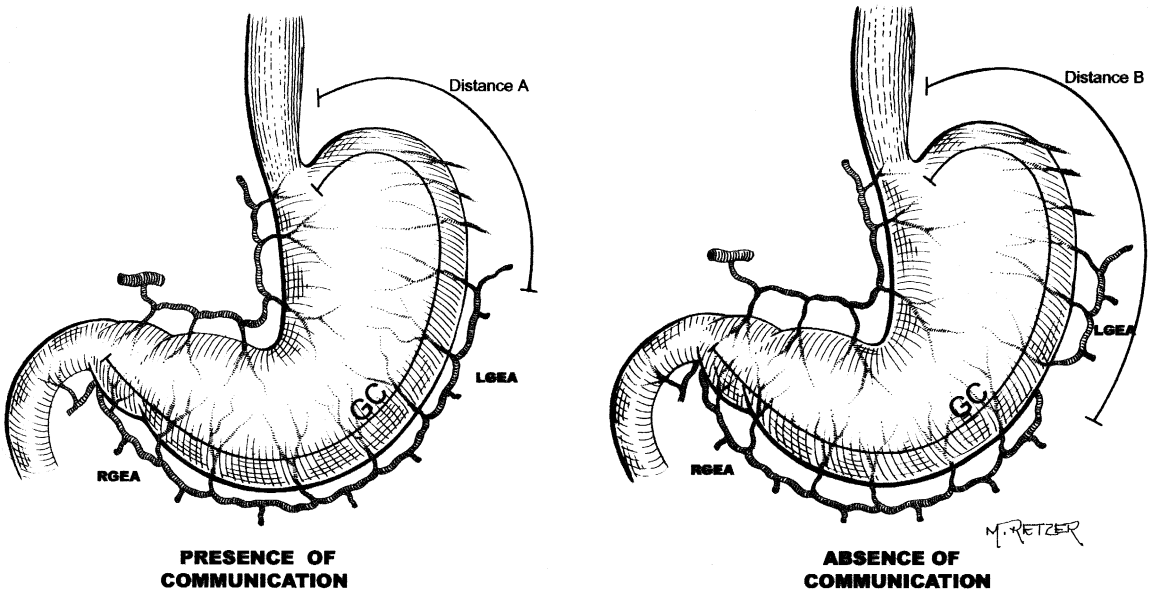

Fig. 1. Presence (**A**) and absence (**B**) of communication between the right gastroepiploic artery (*RGEA*) and the left gastroepiploic artery (*LGEA*). Distance A = measurement, in centimeters, from the first branch of the LGEA to the gastroesophageal junction in centimeters; distance B = measurement, in centimeters, from the last branch of the RGEA to the gastroesophageal junction in centimeters; GC = measurement of the greater curvature (extension of the pylorus to the gastroesophageal junction), in centimeters.