

TO STUDY THE PLASTICITY OF THE BASINS OF THE BRANCHES OF THE ARTERIES OF THE STOMACH AND DUODENUM IN AN EXPERIMENT

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Resume: This article describes the studied plasticity of the basins of the branches of the arteries of the stomach and duodenum in an experiment. To clarify this issue, we initially studied the branching basins of individual arteries of these organs on angiograms of 5 intact stomachs and 12 duodenum of a dog. Each main artery of these organs has its own branching zone, where blood flow is carried out mainly by this artery.

Keywords: experiment, dogs, gastric arteries, duodenum 12, angiogram, indigocarmine, great vessels.

К ИЗУЧЕНИЮ ПЛАСТИЧНОСТИ БАСЕЙНОВ ВЕТВЛЕНИЙ АРТЕРИЙ ЖЕЛУДКА И 12-ПЕРСТНОЙ КИШКИ В ЭКСПЕРИМЕНТЕ

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Резюме: Данная статья описывает изучено пластичности бассейнов ветвлений артерий желудка и 12-перстной кишки в эксперименте. Для уточнения данного вопроса мы первоначально на ангиограммах 5 интактных желудков и 12-перстной кишки собаки изучали бассейны ветвления отдельных артерий

этих органов. Каждая магистральная артерия названных органов имеет свою зону ветвления, где кровоток осуществляется преимущественно данной артерией.

Ключевые слова: эксперимент, собаки, артерий желудка, 12-перстной кишки, ангиограмма, индигокармин, магистральных сосудов.

Introduction. In recent years, the issue of chemotherapy for malignant tumors, particularly those of the abdominal cavity, through regional infusion and perfusion has garnered significant attention from both clinicians and researchers [3,4]. The administration of medicinal substances into the artery supplying the affected area allows for a high concentration of the drug in the blood, which directly contacts the tumor cells or inflammatory focus. Currently, a large number of studies are dedicated to catheterizing major arteries of the head, trunk, and limbs for chemotherapy of tumors of various locations [1,2]. The development of regional infusion and perfusion techniques is closely linked to the study of vascular branching patterns and the possibility of isolating these vessels to prevent leakage of the perfusate. Such studies have been conducted for several organs [5]. However, research on the in vivo study of the branching zones of major arteries of the stomach and duodenum is scarce and contradictory.

Study Objective. We investigated the plasticity of the branching basins of the arteries of the stomach and duodenum in experimental settings.

Materials and Methods. To address this issue, we initially studied the branching basins of individual arteries of these organs using angiograms of five intact stomachs and duodenum from dogs. Subsequently, in experiments on 18 dogs, the branching zones of individual arteries of the stomach and duodenum were identified in vivo by separately injecting a 5% indigo carmine solution into the arteries. Data from acute and chronic experiments were compared with postmortem angiograms of the stomach and duodenum of five dogs under normal conditions.

Results. The branching basins of the major vessels of the stomach and duodenum were studied with other arteries and veins preserved, which naturally resisted the spread of the injected indigo carmine, thereby limiting its distribution to natural boundaries. To identify the branching zones of the major arteries of the stomach in dogs, indigo carmine was injected into the left gastric artery in four dogs, the left gastroepiploic artery in four dogs, the right gastric artery in three dogs, and the right gastroepiploic artery in four dogs. The injection of a 5% indigo carmine solution into the cranial pancreaticoduodenal artery was performed in six dogs, the caudal pancreaticoduodenal artery in six dogs, and the second branch of the cranial mesenteric artery in six dogs. After the procedure, the dogs were kept alive. When injecting the indigo carmine solution into the left gastric artery, the solution stained the cardia area, partially the fundus, the lesser curvature, and the lesser omentum up to the pyloric region, as well as two-thirds of the anterior and posterior walls of the stomach. When injected into the right gastric artery, the solution primarily spread to the pyloric region of the stomach along its lesser curvature, including the anterior and posterior walls of the organ. The solution injected into the right gastroepiploic artery spread along the greater curvature of the stomach from the initial part of the duodenum to the transition of the stomach body to the pyloric region, covering the anterior and posterior walls of the organ and the right half of the greater omentum. Due to the small caliber of the short arteries supplying the fundus of the stomach, the indigo carmine solution was injected into the splenic artery. Before injection, the splenic artery was ligated at the hilum of the spleen. In this case, the indigo carmine solution spread to the fundus of the stomach, covering one-third of the anterior and posterior surfaces of the organ and the left half of the greater omentum, reaching the transition of the stomach body to the pyloric region. Thus, despite the presence of numerous intra-organ anastomoses between the terminal branches of the major arteries of the stomach, each major artery has its own branching zone where blood circulation is primarily maintained by that artery under normal conditions. The major arteries of the stomach, through multiple

branching, form a network of "terminal" arteries in which blood does not significantly mix under normal conditions. Blood from each major artery of the stomach primarily flows into the corresponding branching zones of that artery. The lack of blood mixing in the branching zones of the major arteries of the stomach may be explained by the roughly equal pressure in the branches of these arteries under normal conditions. The areas of the vascular bed of the stomach wall with the highest number of anastomoses between the branching basins of the major arteries are typically referred to as zones of adjacent blood supply. These adjacent blood supply zones were stained with the indigo carmine solution in all cases, regardless of which artery the solution was injected into. Comparing the experimental data with postmortem angiograms of the stomach confirms the zonal nature of blood circulation in the stomach wall, which is due to the presence of multiple blood supply sources. The numerous arterial anastomoses between the terminal branches of the major arteries of the stomach create optimal conditions for rapid collateral blood flow from one artery to the preserved branching basins of other major arteries after their extra-organ segments are occluded. The results of in vivo injection of indigo carmine into the major arteries of the duodenum, compared with postmortem angiograms, show that each artery of the duodenum has its own branching zone where it primarily maintains blood circulation under normal conditions.

Conclusion. 1. Each major artery of the studied organs has its own branching zone where blood flow is primarily maintained by that artery.

2. Comparison of postmortem angiograms and in vivo arterial injections of the stomach and duodenum establishes that the primary arteries of the stomach, in terms of the extent of the occupied zone, are the left gastric and left gastroepiploic arteries, while for the duodenum, they are the cranial and caudal pancreaticoduodenal arteries. These findings may be of interest for performing regional infusion and perfusion of the stomach and duodenum.

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