VAGOTOMY
A METHOD FOR TREATMENT OF CHRONIC DUODENAL ULCER

THESIS

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By
El Saïd Shawki Saïd El Asioty
M. B., B. Ch. (Ain Shams)

Supervised by
Prof. (associate) **Dr. SHAMEL ABDALLA ALI**
Prof. (associate) of Surgery, F.R.C.S.

Faculty of Medicine
Ain Shams University

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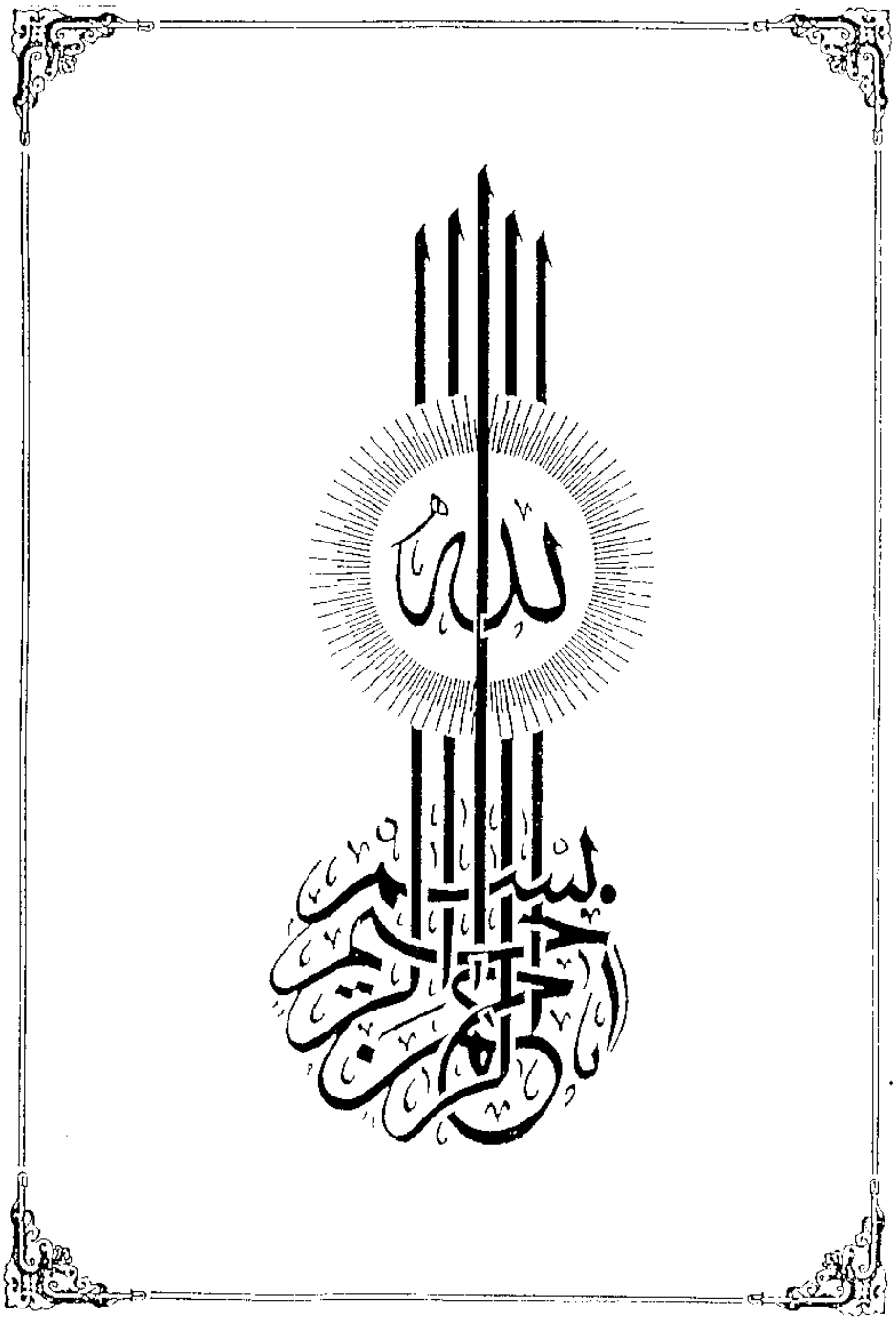

C O N T E N T S

INTRODUCTION

A number of surgical procedures have been advocated from time to time for treatment of chronic duodenal ulceration. At the present time several procedures still enjoy a substantial support by different surgeons. These procedures include subtotal gastrectomy, truncal vagotomy or selective vagotomy with a drainage operation, truncal vagotomy with anterectomy and recently vagotomy of the parietal cell mass without a drainage procedure (proximal gastric vagotomy).

This work presents a study of 30 patients with chronic duodenal ulcers, with no evidence of stenosis, managed by two different methods of vagotomy. An attempt was made to evaluate the results of truncal vagotomy and drainage versus proximal gastric (parietal cell) vagotomy, over a period of several months following surgery. The anatomy of the abdominal vagi and gastroduodenal segment, as well as, the physiological aspects of gastric acid secretion and pathogenesis of duodenal ulceration were also revised.

REVIEW OF LITERATURE

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Anatomy of the Stomach and Duodenum

The stomach is divided into fundus, body or corpus and the pyloric antrum. The fundus is that part above the oesophageal inlet and we can define it as the stomach dome. The body of the stomach is that part lying between the fundus and the pyloric antrum. The pyloric antrum could be defined as that part of the stomach at the pyloric sphincter. We cannot accurately delinate the cardia, corpus or antrum because there is no landmarks in the gross configuration of the stomach. The incisura angularis ventriculi on the lesser curvature separates the corpus from the antrum in the dissecting laboratory, but in the operating theatre this landmark either cannot be found or can be only vaguely located.

The duodenum begins at the pylorus and ends at the duodenojejunal junction just to the left of the second lumbar vertebra. The duodenum is divided into four parts, superior, descending, transverse and ascending.

The majority of the first portion is occupied by the slightly dilated duodenal bulb whose mucosa is characterized by lack of plicae circulares (circular folds). The common bile duct enters the pancreas immediately posterior to the duodenal bulb and lies within the head of pancreas. The common bile duct and the main pancreatic duct open into the medial wall of the mid portion of the second part of the duodenum at the duodenal papilla (ampulla of Vater). The fourth part ascends to the duodenojejunal flexure, which is suspended from the posterior body wall by the ligament of Treitz.

Arterial blood supply of the stomach and duodenum

Six vessels provide the main blood supply to the stomach. The left and right gastric arteries supply the area of the lesser curvature. The left and right gastroepiploic arteries supply the greater curvature, the short gastric arteries (vasa brevia) supply the fundus of the stomach. The gastroduodenal artery sends branches to the area of the pylorus.

The left gastric artery

It arises from the celiac trunk and ascends to the lesser curvature. Michels (1955), reported that in 25% of cases a large left hepatic branch may arise just before the left gastric artery reaches the lesser curvature and runs within the lesser omentum to the hilus of the liver. During the embryonic life a hepatic branch developed from the left gastric artery and runs across the lesser omentum to connect the left gastric artery with the hepatic arteries in the hilus of the liver. Ligating the left gastric artery proximal to the origen of this left hepatic branch (if present) may cause left lobar hepatic necrosis. The left gastric artery, as it reaches the lesser curvature, bifurcates into ascending oesophageal branch or branches and descending gastric branch which turns forward running down the lesser curvature giving anterior and posterior branches supplying the anterior and posterior aspects of the lesser curvature, respectively. These branches accompanied the terminal vagal branches from the nerves of Latarjet.

The right gastric artery

It arises from the hepatic artery, passes towards the lesser curvature and is parallel to it. It gives anterior and posterior branches supplying both surfaces of the stomach.

The right gastroepiploic artery

It arises from the gastroduodenal artery or occasionally from the superior mesenteric artery. It runs close to the greater curvature within the gastrocolic ligament. It supplies the anterior and posterior aspects of the stomach by anterior and posterior branches.

The left gastroepiploic artery

It arises from the splenic artery, within the gastrosplenic ligament, supplying the greater curvature of the stomach.

The vasa brevia

They are usually five to seven branches arise from the splenic artery or its terminal branches, occasionally they arise from the left gastroepiploic artery. The vasa brevia run through the gastrosplenic ligament to reach the greater curvature from the level of the spleen to

the cardia, some may reach the oesophagus.

The gastroduodenal artery

It usually arises from the hepatic artery or from one of its two branches then descends behind the most proximal part of the duodenum. The gastroduodenal artery gives the superior posterior pancreaticoduodenal (retroduodenal) artery which descends close to the common bile duct to the posterior part of the head of pancreas and posterior part of the duodenum. This artery is relatively large and its injury by careless duodenal mobilization can cause brisk haemorrhage. The gastroduodenal artery, after sending off its retroduodenal branch, curves anteriorly to run forward and medial to the duodenum where the head of pancreas becomes closely attached to the duodenum. It terminates by dividing into right gastroepiploic and superior anterior pancreaticoduodenal arteries. The latter, anastomose with the inferior anterior pancreaticoduodenal artery which is a branch of the superior mesenteric artery, forming anterior pancreaticoduodenal arcade. The posterior pancreaticoduodenal arcade is formed by

the anastomosis between the superior posterior pancreaticoduodenal artery and the inferior posterior pancreaticoduodenal artery, which is a branch of the superior mesenteric artery. The anterior and posterior pancreaticoduodenal arcades supply the head of pancreas and the anterior and posterior aspects of the duodenum by specific pancreatic and duodenal branches. The anastomosis in the pancreaticoduodenal arcades represents the most important route of collateral circulation between the celiac and superior mesenteric arteries. It also explains the futility of ligating the gastroduodenal or superior pancreaticoduodenal arteries to control bleeding from duodenal ulcer.

The arteries supplying the stomach send specific branches that penetrate the muscular coat of the stomach close to the lesser and greater curvatures. These branches ramify throughout the entire submucosa and anastomose frequently with each other to form the submucosal plexus. This plexus consists of both the arteries and their venous counterparts. Independent

branches from the submucosa supply the mucosa everywhere except in the lesser curvature which receives a delicate branches directly from the right and left gastric arteries. This distinctive circulation of the lesser curvature mucosa has been related to its frequent ulceration. The submucosal plexus contains many arteriovenous shunts. Peters and Womack (1958), showed that these shunts close to supply a maximum blood to the mucosa for the secretion of gastric juice and open to divert blood from the mucosa at rest. Such ample submucosal anastomosis, between different arteries supplying the stomach, permits extensive devascularization of the stomach without causing necrosis and is responsible for the viability of a small gastric cuff supplied only by descending oesophageal arteries after 90 to 95% resection in which all the extrinsic vessels are ligated. Ischaemic necrosis of the gastric reminant is extremely rare, however, it may occur in senile patients with atherosclerotic occlusion of the vasa brevia and left gastroepiploic arteries (Jackson, 1959). This submucosal vascular anastomosis explains

the futility of controlling haemorrhage from gastric ulcer by ligating the extrinsic gastric arteries.

Mucosa

The œsophagus is lined by stratified squamous epithelium. The fundus and corpus are lined by the gastric mucosa which contains acid secreting parietal cells, pepsin secreting chief cells and mucous cells. The mucosa lining the antrum is generally refered to as the pyloric glands, a term that consider the antrum plus the pylorus as one pyloric part of stomach, where acid cells are scarce or absent. Beyond the gastroduodenal junction, Brunner's glands identify the proximal duodenum. Brunner's glands represent a distal extension of the pyloric glands and extend distally from the pylorus as a continuous dense sheet to the major duodenal papilla (outlet of the common duct and the pancreatic duct of Wirsung). Beyond this papilla, Brunner's glands gradually disappear. They are not found in the jejunum. These glands secrete an alkaline mucous that resist acid-peptic ulceration. Thus the proximal duodenum possesses an intrinsic resistance

to ulcer greater than the jejunum (Griffith and Harkins, 1956). The distal extent of Brunner's glands is the limit of the foregut histologically. On the basis of gross anatomy we may consider the distal foregut as the free, mobile, expansile, proximal duodenum that is suspended by the hepatoduodenal ligament. The mucosal oesophago-gastric junction is readily seen, through an opened stomach, as a sharp line on the gross mucosal surface. Microscopic section through this junction reveals an abrupt transition from stratified squamous epithelium to gastric mucosa with mucous glands underlying both types of epithelium. The corpus antrum boundary cannot be accurately located by gross inspection of the mucosa. However, this boundary is roughly located where the rugal folds of corpus flatten out into the smooth mucosa of the antrum. Microscopically, the parietal cell mass gives way to the antral glands either abruptly or by a gradual transition that rarely exceeds 1-1.5 cm. of mucosa. The gastroduodenal junction usually located within the pyloric sphincter but it may be either immediately proximal or