STUDY OF DIFFERENT TYPES OF VAGOTOMY IN TREATMENT OF PEPTIC ULCER

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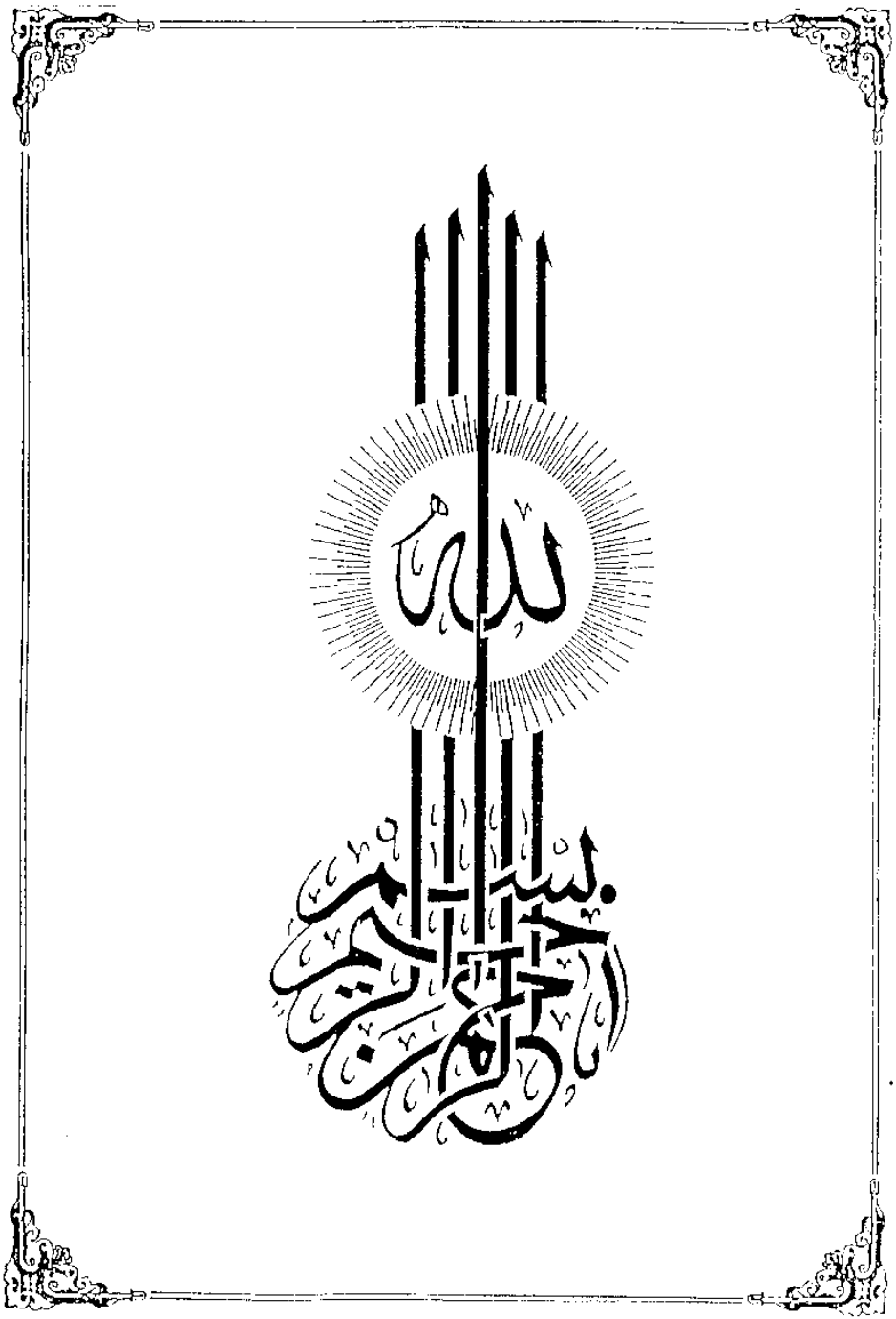

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Introduction

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Duodenal ulceration received little attention until the First World War, when an increase in the incidence of perforations of duodenal ulcers in young and middle aged men was noted. Since then, duodenal ulceration emerged to take a place among many common diseases of our day.

Duodenal ulceration is a chronic disease of the first part of the uodenum. It occurs four times more often in men than in women appearing at any age, but most frequently between the age of 20 and 60. It is caused by an abnormal reaction of the duodenal mucosa to acid and pepsin. Attempts of treatment aim to counteract this effect of acid.

Medical treatment succeeds in treating about 50 per cent of cases only. Surgical treatment is therefore becoming more important. Many surgical procedures have been advocated to treat chronic duodenal ulcer. Different centers utilise different operations

such as partial gastrectomy, truncal vagotomy, selective and highly selective vagotomy. It is the aim of this thesis to review and compare the relative merits and demerits of these various procedures.

Physiology of Gastric Secretions

PHYSIOLOGY OF GASTRIC SECRETIONS

The Mucosa:

The surface area of the gastric mucosa in man is about 800 sq. cm. (Konturek, 1979). Over the body of the stomach, the mucosa is thrown into numerous folds, an arrangement which increases the secretory surface area. The surface of the antrum is almost completely flat. The superficial lining is made up of columnar epithelial cells that invaginate below the surface to form pits or fovolae, cell which communicate with the gastric glands. There are three specific types of glands, each lining a separate region of the stomach: the cardiac, parietal and pyloric.

The cardiac gland area is a small ring about 1-3 cm. wide around the gastro-oesophageal junction. It consists of tubular, highly-branched and coiled glands containing mucous cells and few or no peptic or parietal cells. Cardiac glands secrete mucoubstances and small amounts of electrolytes.

The parietal (oxyntic) gland area occupies the fundus and the body of the stomach. It comprises 75 to 80 per cent of the total gastric mucosal area.

It contains at least five types of secretory cells. The mucosal surface and foveolae are lined by surface mucous cells. At the junction of the body of the gland with the gastric pit, mucous neck cells are found. In the upper portion of the gland, the predominant cell type is the parietal (oxyntic) cells. This is a larlge, pyramidal-shaped cell with its base on the basement membrane. It has a centrally placed nucleus surrounded by a finely granular eosinophilic cytoplasm rich in mitochondria. Parietal cells produce hydrochloric acid and the intrinsic factor. The parietal cell secretion passes into canaliculi which start at the base of the cells and after tortuous course open into the apical cell surface (Konturek, 1979). These intracellular canaliculi are lined with microvilli and surrounded by the cytoplasm with numerous tubovesicular structures. The microvillous membrane and the tubovesicular appartus undergo marked changes in the transition from the resting to active

secretory state. These changes include a marked increase in the number, size and complexity of the microvilli combined with a marked decrease in the number of tubovesicles. Thus with the onset of gastric acid secretion, the tubovesicles are transformed into the microvillous membrane resulting in a marked increase in the area of the secretory membrane (Helander and Hirschowitz, 1974).

At the cellular level there is still controversy whether the parietal cell has one rleceptor, paracrine histamine, as the final common-path mediating all cellular stimuli, or whether there are as well as second receptor, neurocrine acetylcholine or third receptor, endocrine gastrin (Baron et al., 1980).

In the lower half of the parietal gland tubules, peptic cells are present in big numbers. They are columnar or cuboidal and show numerous large granules, precursors of the enzyme pepsin, localted in the apical portion of cytoplasm.

It has been demonstrated by immunochemical studies that there are four types of pepsinogen-producing cells. Two of these, the peptic cells and mucous neck cells present in the parietal and mucous neck cells present in the parietal gland area, have been shown to contain group I pepsinogen and group II pepsinogen, while the peptic cells in the pyloric glands and Brunner's glands contain onty group II pepsinogen (Samloff and Leibman, 1975). In addition, the parietal glands contin true argentaffin and argyrophilic cells. The pyloric glands are located in the pyloric portion of the stomach and extend into the body, especially along the lesser curvature for a variable distance. Between the parietal and pyloric gland areas there is atrasitional zone of gastric and pyloric glands, which may be the site of gastric ulceration (Konturek, 1979).

The pylroic mucosa has much deeper pits than other gastric region. The pyloric glands are composed of cells resembling the mucous neck cells.

They may contain very few or no parietal cells and alkaline mucus and some electrolytes.

In the middle third of the glands and to some extent in the neck region, G-cells are found.

The G-cells has a pyramidal form with a narrow pole. At the base of the cells, numerous granules are present in which gastrin is stored. In ordinary duodenal ulcer patients the number of G-cells appear to be within normal limits, but they show greater number of empty granules suggesting greater functional activity than normal (Konturek, 1979).

The superficial duodenal mucosa resembles the rest of the mucosa of the small gut. The characteristic feature is the presence of Brunner's glands. They empty their secretions into the crypts of Leiburkun via the small secretory ducts. The viscous mucoid alkaline secretion protect the mucosa against the corrosive action of gastric juice.

Composition of Gastric Juice:

The cells of stomach secrete about 3 liters of gastric juice per day.

The gastric juice is a mixture of two components; an acidic components contining acid and water produced by the parietal cells and an alkaline component which is identical with the interstitial fluid and secreted by other cells such as surface epithelium, neck cells and peptic cells.

Gastric juice components are divided into organic and inorgnic. The organic constituents include mucus, pepsinogen, intrinsic factor and blood group substances.

The inorganic constituent is hydrochloric acid. Mucus is secred chiefly by the prepyloric glands and the surface epithelial cells by a poorly defined mechanism.

Mucus secretion is increased in duodenal ulcer closely with hydrochloric acid and pepsin secretion.

Pepsinogen is secreted from the fundic chief cells. it is formed by the coupling of the active molecule of pepsin with a peptide, the pepsin inhibitor.

Below a pH of 5, dissociation of the pepsin inhibitor liberates the active pepsin.

Pepsin's activity is maximal at a pH of 1.8 but decrease above. They are classified in Arabic numbers from I (which migrates fastest to the anode on electrophoresis, and is particularly elevated by vagal stimulation) to 7 (Slowest migrator). These are divided into two groups, Group I including fundic pepsinogens 1-5 and group II including antro-duodenal pepsinogen 6 and 7.

The strongest stimuli for pepsin secretion include feeding, cholinergic stimulation induced by insulin hypoglycaemia, ang gastric distension which evokes local cholinergic stimuli. Increased pepsin secretion by cholinergic stimulation is mediated by acetylcholine released from cholinergic nerve endings on the peptic cells acting synergistically with circulating gastrin. Histamine is also a potent stimulus of pepsin secretion. The output of pepsin from the peptic cells usually parallels the output of acid. Because of the higher volume of secretion