

M. Sc. THESIS

**HIGHLY SELECTIVE VAGOTOMY  
IN THE TREATMENT OF CHRONIC DUODENAL ULCER**

by

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A-M

**ABU-BAKR MOHAMED ABDEL-HAMEED**

**M.B., B.Ch. (Ain Shams)**

Thesis submitted in Partial fulfillment of the  
requirements for the Master Degree in Surgery



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Faculty of Medicine  
Ain Shams University



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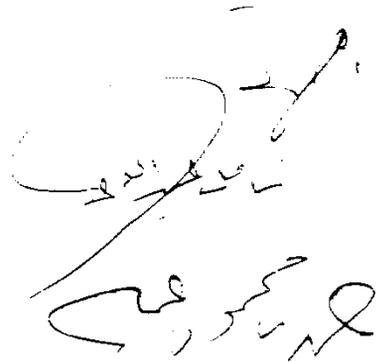
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I - INTRODUCTION

## INTRODUCTION

Chronic duodenal ulcer is a common disease in Egypt. The pattern of its surgical treatment underwent continuous change from one decade to another. Originally, simple gastrojejunostomy did not stand the test of time as it was followed by a cumulatively high incidence of stomal ulceration. Gastrectomy prevailed in the thirties and forties. Though recurrence after it was much less, other troublesome postoperative side effects including loss of weight and anaemia appeared, in addition to the higher mortality. Vagotomy, reintroduced in the forties by Dragstedt, had obvious advantages, mainly the minimal mortality. However, it was soon realised that this operation must be combined with a drainage procedure, as vagal denervation of the stomach impaired gastric emptying. These drainage procedures varied from gastrojejunostomy and pyloroplasty to antrectomy. But side effects like dumping, bile vomiting and worst of all diarrhoea, appeared. The frequency of incompleteness of the truncal vagotomy further complicated the picture. In order to overcome the incompleteness of vagotomy and avoid diarrhoea, selective vagotomy was reintroduced in the sixties (Burge et al, 1964, Griffith, 1966), after being reported by Franks-son and Jackson in 1948, independently, and earlier by Latarjet. Although followed by a low recurrence rate, this difficult operation did not gain popularity. It still interfered with the antral-pyloro-duodenal mechanism, and drainage must be added. With the dawn of the seventies, highly selective vagotomy had to come in the historical sequence of refinement of the surgical treatment of duodenal ulcer. Here, we have an operation, which unlike its predecessors, does not resect or bypass the antral-pyloro-duodenal segment or denervate more than is necessary (the corpus and fundus region). Theoretically, this operation looks ideal and is very appealing and practically its early results are very encouraging.

Many controlled trials are now in progress in various parts of the world to evaluate this method in relation to other operations used. This retrospective study reports the long-term results of this operation in Egypt.

## II - LITERATURE REVIEW

### A - SURGICAL ANATOMY

- 1 - The Stomach
- 2 - The Vagus Nerve
- 3 - The Left Gastric Artery
- 4 - Microanatomy

### B - SURGICAL PHYSIOLOGY

- 1 - Introduction
- 2 - Composition of Gastric Juice
- 3 - Stimulation of Gastric Secretion
- 4 - Inhibition of Gastric Secretion
- 5 - Hormones Influencing Gastric Secretion
- 6 - Gastric Motility
- 7 - Gastric Mucosal Barrier
- 8 - Physiological Effects of Vagotomy
- 9 - Gastric Function in Duodenal Ulcer Patients

## SURGICAL ANATOMY

### The Stomach

- cardia
- pylorus
- peritoneal connections
- incisura

### The Vagus Nerve

- abdominal course
- anterior vagus nerve
- posterior vagus nerve

### The Left Gastric Artery

### Microanatomy

- blood supply of the stomach
- innervation of the stomach
- gastric mucosa
- gastric glands
- renewal of surface epithelium
- gastric musculature

## THE STOMACH

It is developed from the embryologic foregut, and divided traditionally into 3 gross anatomic areas; fundus, corpus, and antrum. The cardia marks its proximal end, and the pylorus its distal end. Being positioned early in the course of food down the body and equipped with a most enriched vascularity, the stomach is noted for its motor and secretory functions.

### The Cardia (Gastro-oesophageal Junction)

The cardia lies to the left of the median plane one inch from the sternum at the level of the seventh costal cartilage, and 4 inches posterior to the anterior abdominal wall. At the cardia, the right margin of the oesophagus is continuous with the lesser curve of the stomach, while the left one forms an acute angle with the stomach fundus "angle of His" before it is continuous with the greater curve. Although it is habitual to say that there is no anatomical sphincter similar to the pylorus in the oesophagogastric junction area, and that it is rather functional, there is now sound evidence that a true anatomic sphincter exists. By gross and histologic examination of the distal thoracic and abdominal oesophagus, a real thickening of the lower oesophageal circular muscle, 2-4 times that of the muscle proximally, was revealed (Bombeck et al, 1966). At rest, this sphincter exhibits tone, as is shown by the presence of a zone of elevated pressure (Thomas and Earlam, 1973). This high pressure zone disappears during swallowing, but reforms again after that and during digestion to prevent reflux of gastric contents into the oesophagus. Maintenance of this high pressure zone not only depends on neurogenic mechanisms, but also on other factors like the hormone gastrin (Makhlouf, 1974).

### The Pylorus (Gastroduodenal Junction)

It lies about 0.5 inch to the right of the median plane opposite the level of the lower border of the first lumbar vertebra (transpyloric plane).

when the stomach is empty. It is usually recognised by a circular groove on its external surface called the pyloric constriction, as well as by the presence of the prepyloric vein of Mayo. This vein was reported to drain into the right gastric vein (Last, 1977), or the right gastroepiploic vein (Griffith, 1969). However, our own peroperative observation is that it is really 2 veins; the upper smaller one drains into the right gastric vein, and the lower larger one drains into the right gastro-epiploic vein. The pyloric sphincter is primarily a thickening of the circular muscle coat of the stomach, and is enhanced by curling back of many of the longitudinal fibres. It begins gradually on the gastric side "antrum", and ends abruptly on the duodenal side. The pyloric canal is held closed by the tone of this sphincter, thus preventing reflux of duodenal contents, except when it relaxes to allow the stomach to expel a jet of its contents into the duodenum (Fisher and Cohen, 1973).

#### The Peritoneal Coverings and Connections

The stomach is completely invested in peritoneum, which passes out in a double layer from its lesser curvature as the lesser omentum and from its greater curvature as the greater omentum. The space between the two anterior and posterior layers of omental peritoneum contains the nerves and vessels destined to supply the stomach, invested in a connective tissue layer which is thicker and more friable in obese subjects due to deposition of fat. The double layer of the lesser omentum encloses branches of the left and right gastric vessels, as well as branches of the abdominal vagi invested by a layer of connective tissue (the substance of the lesser omentum). The vessels lie nearer to the lesser curve, and the nerves farther away on their right. As both nerve and vascular branches run together, division of the smaller vessels will imply division of the corresponding nerves (Fig. 1). The anterior and posterior

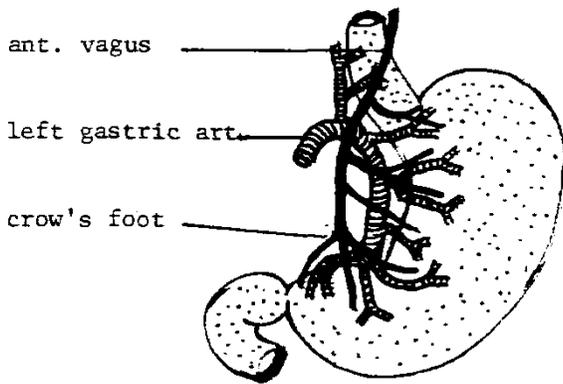


Fig. 1. RELATION OF BRANCHES OF VAGAL NERVES AND GASTRIC VESSELS TO EACH OTHER. TERMINAL CROW'S FOOT DISTRIBUTION

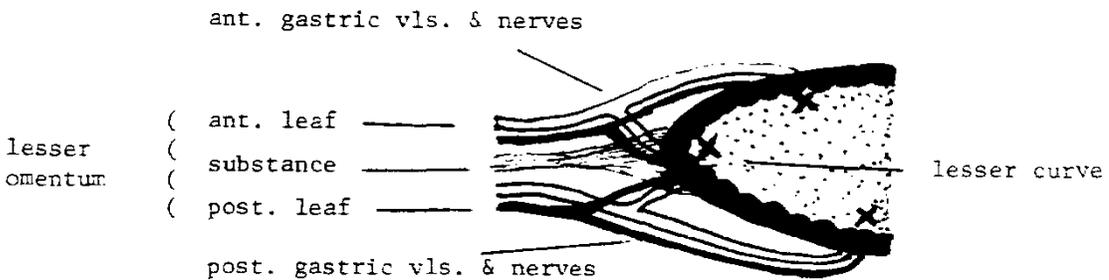


Fig. 2. ATTACHMENT OF LESSER OMENTUM LAYERS TO DIFFERENT LEVEL POINTS ON LESSER CURVE

layers of the lesser omentum are not attached to the lesser curve at the same level but on different lines on its anteroposterior convexity (Fig. 2). This means that it is not safe to divide them in one go, and each layer has to be detached separately to avoid injury to the lesser curve.

#### The Incisura Angularis

This constant notch in the lower part of the lesser curve marks a change in direction of the stomach at the arbitrary junction of the stomach body and antrum. However, this external demarcation does not necessarily coincide with lines of separation of the fundic gland from the pyloric gland mucosae. Nevertheless, most surgeons consider this landmark when deciding on the distal limit of proximal gastric vagotomy. At the incisura, the nerves of Latarjet end in 3-4 major terminal branches in a fanwise manner likened to a "crow's foot" (Fig. 1). The first on the left turns back to supply the body of the stomach (the heel of the crow's foot). This must be severed in the highly selective vagotomy operation to prevent recurrence (Robinson, 1976). The other 2-3 terminal branches proceed to supply the antrum and pylorus.

#### THE VAGUS NERVE

The tenth cranial nerve is a mixed nerve and carries parasympathetic supply to most of the gut, including the stomach. It originates from 3 vagal nuclei in the medulla oblongata; 2 motor and one sensory. The nucleus of the tractus solitarius as well as part of the dorsal nucleus receive sensory fibres from the digestive and respiratory tracts mainly. The dorsal nucleus and the nucleus ambiguus supply motor and secretomotor fibres to the muscles and glands of the pharynx, larynx, palate and gut, from the oesophagus to the middle of the transverse colon (Last, 1977).