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GastroEsophageal Reflux

**Essay Submitted For The Partial Fulfillment Of The
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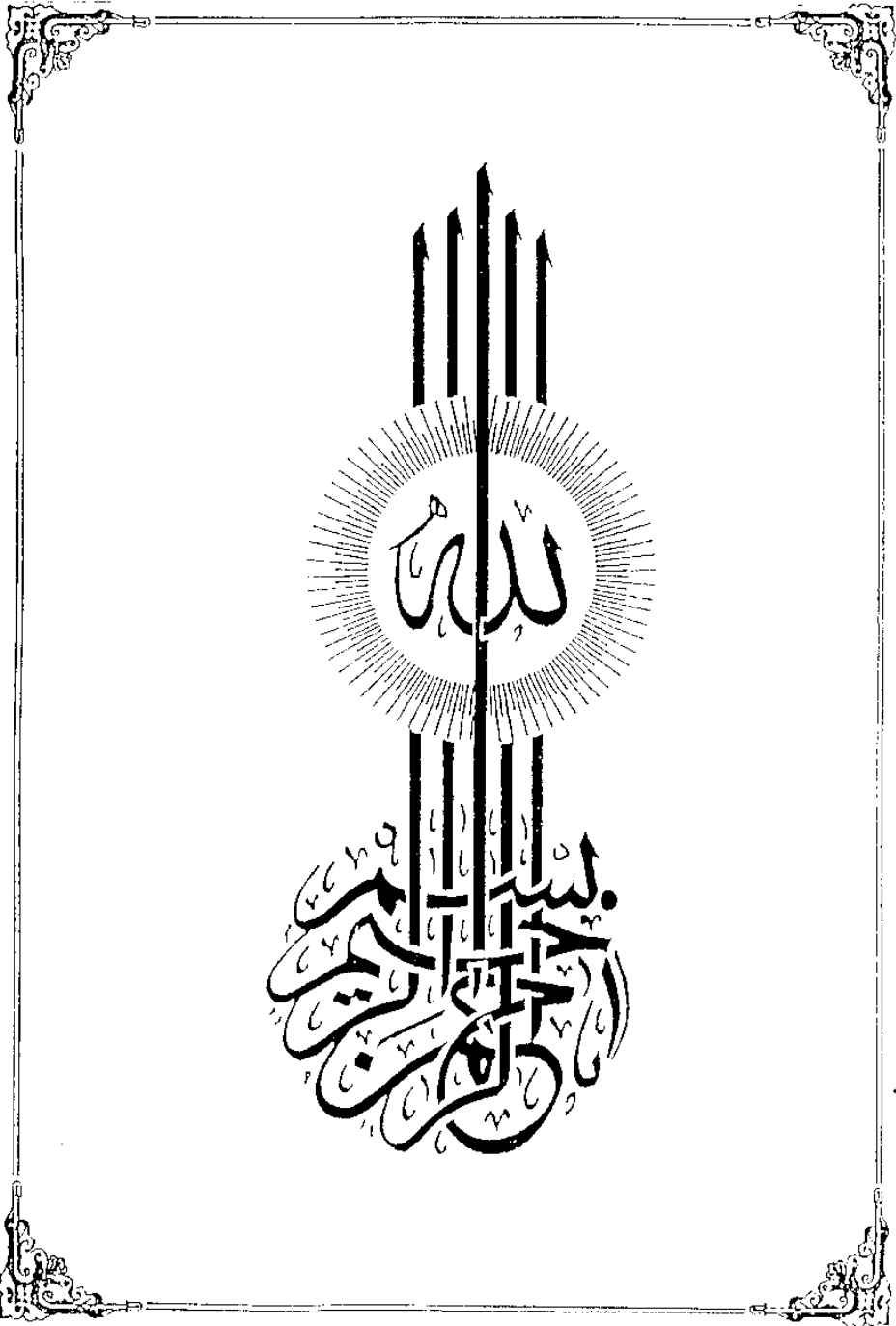
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Handwritten signature or scribble at the bottom center of the page.

Dedicated to my parents



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INTRODUCTION & HISTORY

Relsey, and Nissen and Rosetti.

From 1960's to the present, the greatest progress has been made in the diagnostic methods of GER. Recently esophageal manometry, esophagoscopy and esophageal biopsy, "Esophageal clearance", acidity test, 24 hour PH monitoring, scintiscan, alteration in gastroduodenal motility all are subjects of recent publications.

The esophagus being unique in all the GIT of having anatomic peculiarities like lack of seroza, segmental blood supply, and also specific functional physiology requiring sophisticated monitoring methods.

Pathophysiology of GER & reflux esophagitis are medical discoveries of the last century. This is also based mainly on the study of inflammation, ulceration and scarring occurring in the distal esophagus secondary to acid & Bile reflux. Association of such condition with hiatal hernia is to be marked.

It is therefore necessary to examine in some detail the features of patients who develop esophagitis- with or without - association of gastresophageal reflux (GER) & hiatal herniation (H.H.).

ANATOMY

A N A T O M Y

General morphology:

The esophagus is a muscular tube about 25 cm long , it serves as a conduit for the passage of food from the pharynx to the stomach. It originates at the level of the 6th cervical vertebra posterior to the cricoid cartilage. It reaches the abdomen through the esophageal hiatus; a noose of the diaphragmatic muscle, at the level of the 7th costal cartilage a thumb's breadth to the left of the sternum. This also levels with the 10th thoracic vertebra. (Brewer, 1980)

The anatomy of the lower esophagus : gastresophageal & (GE) - junction will be discussed in details:

The abdominal esophagus lies at the level of 11th to 12th thoracic vertebra, perhaps lower in tall, asthenic subjects and higher in short ones.

The abdominal esophagus varies in length between 1.5 cm - 3 cm according to :

- a- Esophagal muscle tone.
- b- stomach contents. (Hollander & Mayer, 1985)

The abdominal esophagus : then continues its oblique course. The angle of junction with the stomach

is known as the "Angle of His".

This angle amounts to 50-60° in the supine adult with the diaphragm in an intermediate position. This angulation is accentuated by the dome of the fundus which is about 5 cm high, therefore a rise in the fundic pressure can compress the adjacent esophageal part forming a "flutter valve-like effect. (Gould & Barnhard, 1957)

HISTOLOGY

Musculature

The esophageal musculature is mainly striated in the upper 1/3 giving way to smooth muscle below.

Oglesby (1975), described the presence of a localized thickening of the inner circular muscle layer of the esophagus at the lower 2-3 cm. Lieberman-Meffert (1979) reported that at the terminal part of the esophagus, the circular fibres are only present on the lesser curvature side of the stomach whereas oblique fibres are only found on the side of the greater curvature.

Beside the subtle increase of thickness of the

inner muscle segment that corresponds to the physiologic lower-esophageal sphincter, (LES) there is also an area of thickened muscle known as "the gastric sling fibres of Willis" or "Collar of Helvetius" that encircles the proximal part of the stomach at the gastroesophageal (GE-) junction. (Bombeck et al, 1966)

Mucosal lining

The esophagus is lined by stratified squamous epithelium which is replaced by special epithelium at the level of the hiatus similar to the gastric mucosa but without oxyntic and peptic cells. This specialized mucosa lines the lower 3 cm., the intrinsic plexus of which has no Meissner's network and the Aurbach's plexus is present only in the lower ^{rds} 2/3 .

The junction of the squamous with the columnar epithelium is inaccurate in identification of the LES (Higgs and Shorter ,1965).

Botha (1958) described an increase in the thickness of the muscularis mucosa in the lower region of the esophagus. The presence of this thickness was noticed by Dornhorst & Harrison (1954) and thought to be responsible for the formation of the mucosal valve, which is considered as being an important factor in the normal closure mechanism of the cardia. (Fig.1)

Blood supply:

The arterial supply to the esophagus is quite consistent i.e. segmental. The upper end is supplied by branches from the inferior thyroid artery. The thoracic portion receives elements from the bronchial arteries and ~~from esophageal branches originating directly from the~~ aorta. The intercostal arteries may also contribute.

The diaphragmatic and abdominal segments are nourished by the inferior phrenic artery and by esophageal branches of the left gastric artery.

(Shackelford, 1978)

There is neither marginal nor major esophageal vessels as encountered elsewhere in the gastrointestinal tract.

Venous drainage:

Begins as extensive submucosal venous plexus that connects, through the muscular layers, with a longitudinally oriented series of periesophageal veins.

Drainage from the cervical portion of the esophagus empties ultimately into the inferior thyroid vein and vertebral vein. Drainage from the thoracic portion is into the azygos on the left side and hemi-

azygos vein on the right side. The venous drainage of the lower esophagus passes into the esophageal branches of the "coronary vein", a tributary of the portal vein. When portal system is obstructed, as in liver cirrhosis, blood is shunted upward through the coronary veins and esophageal venous plexus to eventually pass by the azygos vein into the superior vena cava, and then the esophageal veins will be varicosed by the increased blood flow and pressure (Sigwarit et al, 1950)

Nerve Supply of the Lower Esophageal Sphincter (LES) : -

The lower esophagus is supplied by the esophageal plexus formed by the parasympathetic contribution in the form of the 2 vagi, and the sympathetic contributions is by the way of the grey rami that come from cell bodies in the upper four thoracic ganglia of the sympathetic trunk. The sympathetic contribution reaches the lower esophagus by forming peri-arterial plexus along the left gastric artery and the inferior phrenic artery. (Ahlman, 1979)

In the inferior esophageal sphincter there are both cholinergic and adrenergic receptors, but innervation is largely adrenergic and vagal stimulation results in relaxation of the sphincter. (Ellis et al, 1960)

Afferent visceral pain impulses pass along the sympathetic nerves which are closely related to somatic sensory nerve fibres of the phrenic and intercostal nerves in the posterior horn of the spinal cord. Afferent impulses from the esophagus may thus "overflow" into adjacent somatic neurones in the posterior horn to give referred pain to the neck, arm, chest or back. Some pain fibres must be carried in the vagus nerve. Therefore esophageal pain is referred to the ear.

Anatomy of GE junction:

The LES initially described by Fyke et al in 1956 as the principal barrier against gastro esophageal reflux (GER). This sphincter is found to be in most cadavers as in the most living subjects to be normally constricted.

Although no true anatomical sphincter guards the orifice, a slight thickening of the circular musculature of the distal esophagus has been described. (Oglesby, 1975)

Because the internal junction of the esophagus with the stomach does not coincide with the external junction, the site of the lower esophageal sphincter will differ:-

1- Histologically: it is the under surface of the projecting ridge of tissue where the transition from the squamous esophageal epithelium to the columnar gastric epithelium takes place, taken in consideration that the columnar epithelium may extend 1-2 cm of the distal esophagus. (Anson, 1966)

2- LES is rarely visible by esophagoscopy probably because of the limited diameter of the instrument, restricting observation of the dentate irregular "Z" line or the transition from the pale esophageal mucosa and the deep red gastric mucosa. This does not usually coincide with the anatomic border of the cardia that lies slightly above it, somewhere between that level and the hiatus of the diaphragm. (Fig.1)

A gradual but moderate thickening of both the circular and longitudinal muscles takes place in the lower end of the esophagus, commencing about 1-2 cm above the diaphragmatic hiatus and extending to the cardia. This region has been termed by Lerche the esophagogastric vestibule the upper part of which has been termed the "lower esophageal sphincter" LES.

(Madden, 1956)