GASTRO-OESOPHAGEAL REFLUX PATHOPHYSIOLOGY AND TREATMENT

ESSAY

SUBMITTED FOR PARTIAL FULFILMENT FOR THE MASTER DEGREE IN GENERAL SURGERY

BY

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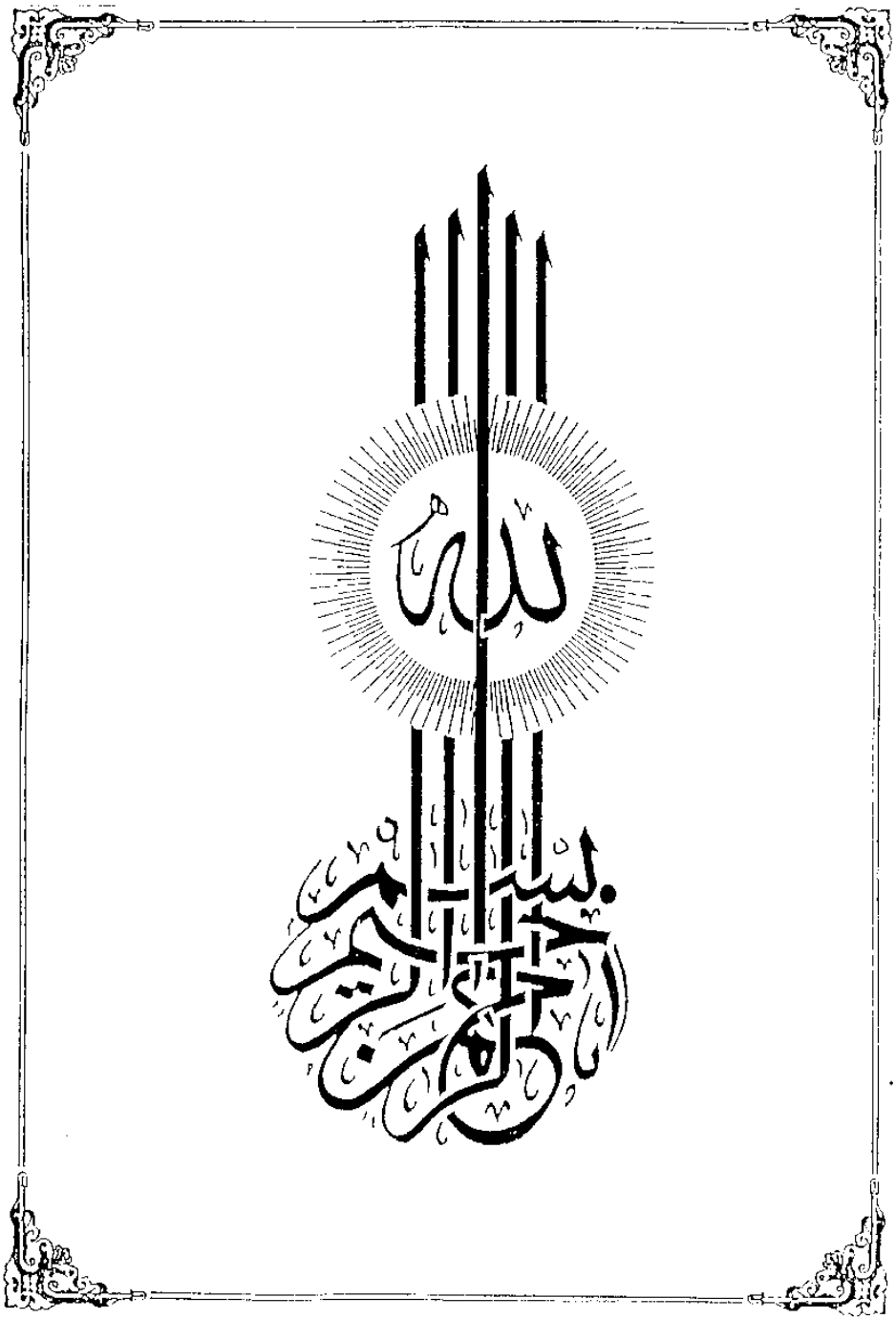

"وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا"

صدق الله العظيم

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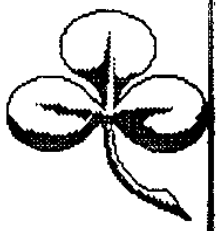

INTRODUCTION

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Gastro esophageal reflux is a common condition. Only 1/4 of the total number of patients seeks medical advice:

A number of anatomical factors are thought to play a role in the maintenence of the competence of the Lower oesophageal sphincter .

Yet other patho-physiological factors contribute to the condition as the oesophageal acid clearance. A highly successful first line medical treatment is always available. Surgery is preserved for resistant cases or when complications are present .

ANATOMY OF THE ESOPHAGUS AND GASTRO ESOPHAGEAL REGION

The esophagus is a fibromuscular tube extending from the crico pharengeal sphincter opposite the cricoid cartilage at the levels of the 6th cervical vertebra to the cardiac orifice of the stomach at the level of 10th thoracic vertebra and 7th costal cartilage. It is about 10 inches "25cm" long in adult *(Last, 1986).*

There are 3 physiological constriction in the tube at distance 15, 25 and 40 cm from upper incisor teeth corresponding to the crico pharyngeal constriction, the aortic and bronchial constrictin and the diaphragmatic constriction *(Rains and Mann, 1988).* Fig.(1) .

1- Thoracic Esophagus :-

It peirces the diaphragm 2.5 cm to the left of the midline opposite the body of the 10th thoracic vertebra behind the 7th costal margin in frant. Perforations of the lower third of the esophagus are therefore more likely to result in left sided pleural effusion *(Last, 1986)*.

2 - Abdominal Esophagus :-

The abdominal portion distal to hiatal orifice, measures between 3 and 6 cm in length to the lesser curve of the stomach and from 2 to 3 cm to the level of the greater curvature *(Schortz and Ellis, 1985)*.

The length varies according to the tone of its muscle and the degree the distension of the stomach *(Last, 1986).*

The abdominal esophagus grooves the pasterior surface of the left lobe of the liver and is covered by peritoneum in its front and left side only.

3 - Blood Supply of The Esophagus :-

Arterial supply on the whole, blood supply of the esophagus is poor. The upper part is supplied by the infertor thyroid arteries. The main extent by the esophageal branches of the aorta and by some elements of the bronchial arteries, the lower part by the gastric and inferior phrenic arteries the aortic branches are distributed in a segmental pattern and so wide mobilization of the esophagus may affect its blood supply especially in its thoracic part. Besides these vesseles being cylinder and tenuous make it possible to mobilize the intra tharacic esophagus by blind digital dissection from the suprasternal notch above to the esophageal hiatus below *(Decker and du plessis, 1986)* . Fig . (2) Fig. (3) Fig. (4) .

Venous Drainge :- Fig. (5)

Subepithelial and submucous venous channels course longitudinally to empty above into the hypopharyngeal and below into the gastric veins, these channels also penetrate the esophageal muscle from which they receive branches and form a periesophageal plexus, the longest trunk of

which accompany the vagus, nerves ending at the coronary vein which is a tributary of the portal vein *(Pyne and Ellis, 1987).*

4 - Lymphatic Drainage :-

The lymphatic drainage of the esophagus is longitudinal rather than segmental the lymphatic vessels in the submucosa may run for considerable distance up and down the esophagus before penetrating the muscle layer to form the lymphatics in the adventitia. The adventitial lymphatics on the other hand usually drain into the adjacent lymph nodes. Fig (6,7)

5 - Nerve Supply :-

The vagi are the motor nerves of the esophagus. Afferent visceral pain impulses pass along sympathetic nerves which are closely Related to the somatic sensory fibres of the phrenic and intercostal nerves in the posterior part of the spinal cord.

II - Structure of The Esophagus :-

The wall is composed of an inner circular layer of muscle and an outer longitudinal layer without a surrounding serosal covering and for this reason, does not heal as readily after injury or surgical anastomosis as other portion of the gestrointestinal tract *(Way, 1988)*

The upper third of nuscle layers consists of striated muscle and the lower two thirds of smooth muscles. There is a short transition zone of both striated and smooth muscle between these segments. On the whole, the muscle layer of the esophagus are friable and this, is a factor that anastomasis of the esophagus to another portion of gastrointestinal tract is prone to leake ***(Decker and du Plessis, 1986).***

Accessory slips of smooth muscular fibres sometimes pass between the esophagus and the root of the left bronchus, trachea, pericardium or aorta and help to fix the esophagus to the neighbouring structures ***(Harwick et al., 1973).*** Fig. (9 & 10) there is a prominant submucusa containing mucous glands, blood vessels, Meissner's plexus of nerves and a rich network of lymphatic vessels.

The mucosal lining consists of stratified squamous epithelium with scattered mucous glands throughout, although ectopic islands of gastric mucosa have identified particularly in the proximal portions of the esophagus. The distal 1 or 2 cm of the esophageal lumen is lined by columnar epithelium, the columnar squemous junction lying not at the true esophageal junction but within the lower esophagus ***(Payne and Ellis, 1987).***

The mucosa is easily stripped away from the muscle layer this feature is evident during circumferential myotomies to lengthen a shortened

esophagus after tracheo-esophageal fistula repair and duing modified Heller's cardiomyotomy for achalasia or diffuse spasm of the esophagus *(Decker and du Plessis, 1986).*

III- Anatomical Factors Preventing Gastroesophageal Reflux :-

a) The gastro - Esophageal sphincter

Measurements of the thickness of the muscle layer of the distal esophagal wall have demonstrated a subtle increase in the segment that corresponds to the physiologic esophageal sphincter Fig. (11) . Also, an area of thickened muscle known as the gastric sling fibres of willis can be demonstrated partially encircling the proximal part of the stomach at the stomach at the esophago-gastric junction area due to increased thickness of the inner circular muscle *(Payne and Ellis, 1987)* Fig.(12)

There are also extra muscle bundles immediately below the mucosa. This zone is called "the esophageal vestibule" which is also called the ring of walf while the lower end of the vestibule is called the constrictor cardia *(walf and Lazzer 1974).*

b) The intra-abdominal segment of the esophagus :

Internally the gastro-esophageal mucosal junction lies just below the diaphragm but externally the esophagus and stomach join more distally. The intra-Abdominal segment of the esophagus is flaccid and is compressed on all sides, like a flutter valve, by an increase in intra-

abdominal pressure. Structures which hold the cardio esophageal junction in place are thus inportant to prevent reflux ***(Decker and du Plessis, 1086).***

c) The phreno-esophageal membrane or laimer-bertelli membrane:-

This described by laimer in 1983 and is composed of mature callagen fibers. It holds the cardio-esophageal junction in place and so its important role is to maintain the normal anatomic relationship ***(Bremner, 1979).*** Fig. (13)

This structure is a continuation of the transversalis fascia of the abdominal parieties. At lower margin of the esophageal hiatus the membrane divides into a thin elongated ascending leaf which attaches in a circumferential fashion into the lower thoracic esophagus 2-3 cms above the esophageal hiatus forming a tent like structure and into a shorter and thicker descending leaf which merges with the peritoneal covering of the stomach ***Fransen and Vabembois, 1974).***

A contribution to this structure is provided by the fascia arising from the upper surface of the diaphragm ***(Payne and Ellis, 1987).*** The membrane is elastic and allows a fair degree of mobility of the cardia which is necessary in vomiting ***Decker and du Plessis, 1987)*** Fig. (14)

d) The diaphargmatic hiatus :-

It probably supports the sphincter. In the most common, the right crus side. The second common type is quite similar but a slip of muscle from the left cruss passes behind the esophagus to form part of the right margin of the hiatus ***(Payne and Ellis, 1987).*** The width of the hiatus varies between 1,8 and 2,5 cm Fig. (15)

e) The pleura above and the peritoneal reflexion bellow:

They give extra support to the terminal esophagus ***(Decker and du Plessis, 1986).*** Fig. (16).

*** Embryology :**

The esophagus develops from the narrow part of the foregut that succeeds the pharynx. It is at first a short tube, but when the heart and diaphrogm descend, it elongates rapidly. This elongation is accompanied by a temporary obliteration of its lumen followed by recanalization and differentiation. The endodermal epithelium of the esophagus is at first composed of cells, many of which are ciliated later these cells are gradually replaced by stratified squamous epithilium probably by metaplasia. The visceral mesoderm in which the esophagus is embedded differentiates into muscular and connective tissue. The muscular tissue of the upper two thirds of the esophagus becomes mainly striated while in the lower one-third like that of the rest of the gut, it is mainly smooth ***(Hamilton and Massman, 1972).***