

I seem to have been only a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.

Sir Isaac Newton, 1642–1727, *Brewster's Memoirs of Newton*,
vol ii, ch 27

MOTILITY STUDIES AFTER OESOPHAGEAL SURGERY

THESIS

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By

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We are like dwarfs seated on the shoulders of giants. If we see more and further than they, it is not due to our own clear eyes or tall bodies, but because we are raised on high and upborne by their gigantic bigness.

**Bernard of Chartres
Chancellor in 1119**

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LIST OF ABBREVIATIONS

- LES : Lower Esophageal Sphincter.
LESP : Lower Esophageal Sphincter Pressure.
UES : Upper Esophageal Sphincter.
DS : Dry Swallow.
WS : Wet Swallow.
OV : Esophageal Varices.
DM : Diabetes Mellitus.
P.H. : Portal HYPertension.

-ooOoo-

TO MY PARENTS
TO MY WIFE KITY
AND
TO MY KIDS, KHALID,
HOSAM EL-DIN, SARA
AND AHMED.

**INTRODUCTION AND
AIM OF THE WORK**

The esophagus is analogous to the heart. It is a pumping chamber with an inlet valve (cricopharyngeus) and an outlet valve (lower esophageal sphincter). Its muscular architecture is similar (long inner and outer spirals), and it is affected by similar drugs (e.g., the calcium antagonists and nitrates). Likewise, the esophagus is investigated in a way similar to the way in which the heart is investigated, with contrast radiology and pressure studies. Each gives different but complementary information. Perhaps one should bear in mind that in cardiology more emphasis is now being placed on the radiologic studies than on pressure and saturation data (Dussek, 1987).

However, as a result of the introduction of new investigative technique (esophageal manometry), new insights into the normal and abnormal function of the esophagus have become available that permit the surgeon to design the operative management of patients with esophageal disease along physiological rather than anatomical lines (Ellis, 1980). One of the major roles of the new technique is to evaluate the effects of surgery on the esophageal function and to quantify the therapeutic and adverse effects (Hurwitz et al., 1979).

Different motility laboratories clearly produce different in what is normal, and for this reason, it is important that each laboratory should develop its own control studies to the population that it will study (Durancau et al., 1983). In this work the normal motility pattern of Egyptians will be explored before preceeding in postoperative patients.

The aim of this work is to study the effects of various forms of surgical interventions in which the esophagus is either completely or partially resected (and in this case, it is rather the function of its substitute organ that is evaluated).

REVIEW OF LITERATURE

ANATOMIC STUDIES

- Embryology.
- Anatomy of the esophagus.
- Muscles of the esophagus.
- Lymphatic system.
- The innervations of the esophagus.
- Mucous membrane.
- The hiatus.

The esophagus is a deceptively simple tube, extending from the hypopharynx through the thorax to the stomach. Its function is to convey food from the oral cavity to the stomach, and occasionally to return stomach content in the opposite direction. Peristalsis is necessary for the movement of the bolus and protective barriers are needed at the points of entry and exit.

Embryology:

According to Gibbon and Camishon (1962). The esophagus developed from the primitive foregut. By the third week of the embryonic life, the esophagus appears as a short narrow tube between the primitive pharynx and the stomach. During the fourth week, the embryonic esophagus elongates rapidly as the stomach descends in the thorax to enter the abdomen before the lateral diaphragmatic components fuse with the septum transversum. Failure of the stomach to reach the abdomen before fusion of the lateral septa with the septum transversum results in that rare abnormality, the congenitally short esophagus. During the seventh week the epithelium lining the esophagus proliferates, and vacuoles appear. Thus, irregular channels appear in the esophagus, but normally the lumen never becomes

totally occluded as it does for a time in the lower vertebrates. [By the tenth week the vacuoles disappear, and a single lumen is restored]. Failure of the embryonic development at this stage of partial, transient occlusion may result in the formation of esophageal webs, stenosis duplication or atresia.

In the 2.5 mm embryo a ridge appears in the ventral aspect of the foregut just caudal to the pharyngeal pouch. In the 3 mm embryo this laryngotracheal ridge becomes pinched off from the foregut and primitive esophagus from below upward and from side to side, remaining attached at the larynx, trachea and lungs developed. Failure of completion of this process of separation of the lung bud from the gut results in congenital tracheoesophageal fistula. The esophagus never acquires a typical mesentery or serosal tissue.

Gross anatomy:

The adult pharynx becomes continuous with the esophagus at the level of the lower border of the sixth cervical vertebra (or the inferior margin of the cricoid cartilage). The esophagus lying posteriorly

in the mediastinum then traverse the thorax to pierce the diaphragm at the esophageal hiatus and joins the stomach at about the level of the tenth or eleventh dorsal vertebra. The esophagus is fixed only at its upper and lower ends, so that lateral displacement does not easily cause dysphagia. During swallowing the posterior aspect of the inlet of the esophagus may move from the distance of one cervical vertebra. The configuration of the rest of esophagus, being a relatively thin-walled, soft tube. In the cervical region, the esophagus is flattened, whereas in the lower thoracic region it is more rounded.

The average length of the esophagus as measured from the upper incisors to the cardia is 40 cm in male, and 37 cm in the female, but it may be somewhat shorter or considerably longer. Lerche (1950) found that in men the length of the esophagus ranges from 23 to 30 cm averaging 25 cm; in women the range is 20 to 24, averaging 23.2 cm. The distance from the incisor to the cricopharyngeus is 14.9 cm in men and 13.9 cm in women (Fig. 1). The diameter of the esophagus has been recorded to be as follows: lower border of cricoid, 2.3 cm transverse and 1.7 cm sagittal ; at aortic arch crossing, 2.4 cm transverse and 1.9 cm