THE SURGICAL MANAGEMENT OF CORROSIVE STRICTURE OF THE ESOPHAGUS IN CHILDREN

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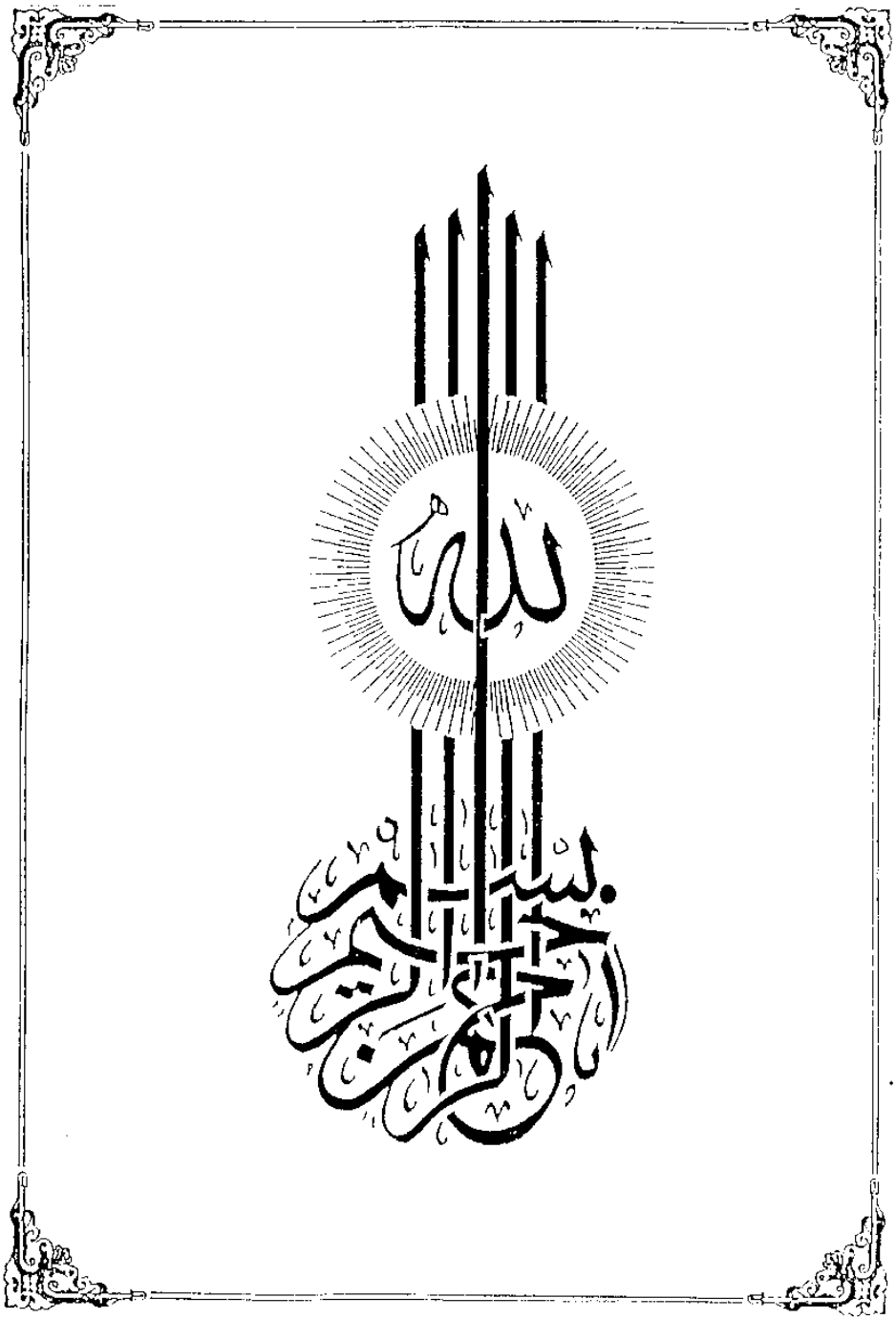

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INTRODUCTION

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Corrosive injuries of the esophagus, caused in [illegible] by ingestion, result in esophageal burn of [illegible] eventually leads to fibrosis and scarring. Many end up in stricture formation, and swallowing difficulty of even the saliva sometimes.

The ideal treatment to this problem is prevention, as in so many other medical catastrophes. In Egypt, because a socioeconomic factor is playing a leading role, potash is used as a home made soap ingredient and detergent due to it's easy availability and cheapness. Unfortunately, the effort of at least dispensing the harmful product in child safe containers has not been made yet. It has been shown in 1974 by Aschraft and Jndelle that only one out of 22 children could open such containers. This precaution together with their labelling with obvious signs would certainly help in dropping these accidents rates.

As early as 1921 this plea has been voiced by Jackson. Leating in 1954 wrote: "To those of us who have seen the ravages of esophageal burns, the thought cannot but occur that something should be done from a publicity and educational standpoint to overcome this danger".

This is more so as potash has an appearance attractive to children both in it's crystalline and liquid forms who resemble and may be mistaken for candy or milk.

Potash has been put as the fifth leading cause of poisening by the Alexandria University Hospital in 1967 who found that out of 2140 admittances for poisening 274 were due to potash ingestion (12.8%).

In 1983 The Poison Control Center of Ain Shams University admitted 2348 cases of which 1213 fell in the 0 - 15 years age group, 10.05% of these had ingested potash, thus putting potash as the third leading cause of non drug induced poisoning. This clearly shows that instead of dropping, the rate of potash ingestion amongst the population is increasing.

Other corrosive agents such as chlorine bleaching powders, drain cleaners, sulfuric acid, iodine, ammonia and tablets used for urine sugar analysis find their way to the hands and mouths of children as a result of parental ignorance, carelessness or even child abuse.

The problem of corrosive ingestion is complex, as the mouth cavity, glottis, pharynx, esophagus and stomach may be affected with varying degrees of burns. Skin affection is not uncommon due to spill of the liquid.

The goal of therapy should be directed towards rescucitation of the patient, prevention of chest infection, and trial to minimize subsequent esophageal scarring and stricture formation. It is agreed that washing away the corrosive, demulcents and steroid therapy will be beneficial to the acute case together with an intelligent and continued esophageal dilatation. The care of the lungs using antibiotics, humidifiers and physiotherapy together with raising the general condition of the patient are a sine qua non.

Later if stricture of the esophagus develops, an adequate solution should be thought for. In the majority of cases it is a major surgical procedure.

Studies comparing such procedures used in replacement of the esophagus, or it's bypass, are difficult to obtain as the extent of the injury varies wildly from one case to another, and, as no one center has had enough experience to give conclusive statistics. The abscence of control will jeopardise the conclusion.

In the essay we will try to focus on the formed esophageal stricture causing actual obstruction to swallowing and preventing the child's growth or even life. This mechanical problem has to be solved and the surgeon has to provide the solution.

This review will start by a reminder of the anatomy and embryology of the esophagus, then will proceed to look at the physiology of swallowing, the pathology of corrosive esophagitis will be more comprehensive including the causes, the scar formation and its complications. The clinical presentation and necessary investigation will lead us to the different surgical techniques applied and their comparison.

EMBRYOLOGY

EMBRYOLOGY OF THE ESOPHAGUS

The part of the foregut (proenteron) caudal to the esophagus and extending from the laryngotracheal groove above to the stomach below, remains as a splachnopleuric tube which elongates to form the esophagus. At the fifth week it is a short tube with the epithelium two cells thick. The luminal columnar cells develop cilia at approximately 10 weeks and does not differentiate into stratified squamous epithelium until the fifth month. Non striated circular and longitudinal muscle fibers appear at the ninth week. Striated muscles appear at the tenth week (Jit 1975). As the neck and thorax develop, the esophagus lengthens rapidly (Gray 1980).

ANATOMY

ANATOMY

The esophagus is a muscular tube begining in the neck at the lower horder of the cricoid cartilage, at the level of the sixth cervical vertebra. It descends through the superior and posterior mediastinal cavities lying in front of the vertebral column. It leaves the thorax by piercing the diaphragm at the level of the tenth thoracic vertebra to end at the cardiac orifice of the stomach at the level of the eleventh thoracic vertebra.

The length of the esophagus varies with the child's age; at the age of 9 days it is about 10 cms, at 12 months it is about 13 cms, at the age of 5 years it is about 16 cms and at 14 years it is about 20 cms. (Lerche 1950).

The esophagus is a midline structure deviating to the left in two areas: In the lower portion of the neck it projects about 0.5 cms to the left of the trachea then returns to the midline at the level of the fifth thoracic vertebra only to deviate to the left again at the level of the seventh thoracic vertebra to reach the esophageal opening of the diaphragm.

In the sagittal aspect the esophagus generally follows the curves of the vertebral column except in the lower esophageal area where it curves anteriorly as it deviates to the left to reach the hiatus.

The cervical portion of the esophagus is posterior to the trachea, in the groove between both structures, lies the recurrent laryngeal nerves, which are closer to the left side due to the esophageal deviation and their different origins. Posteriorly the esophagus rests on the vertebral column and the longus coli muscles and the prevertebral layer of the deep cervical fascia. Laterally lies the corresponding common carotid artery and posterior part of the thyroid lobe with it's inferior thyroid artery. On the left side the thoracic duct ascends for a short distance close to the edge of the esophagus.

The attachment of the cervical portion of the esophagus to the prevertebral fascia is loose while it's attachment to the trachea is variable, being quite firm in some subjects but more often consisting of loose areolar tissue. Various small muscle attachments between the esophagus and the trachea have been described in the cervical portion and lower down. (Postelthwait 1979).

From the thoracic inlet to the tracheal bifurcation at the level of the fifth thoracic vertebra, the esophagus remains in intimate relation to the trachea anteriorly and the prevertebral fascia posteriorly. On the left side and antero laterally is the left subclavian artery and posterior to which is the pleura which is in direct contact with the esophagus. The arch of the aorta crosses the left side of the esophagus, that is to say that the esophagus is behind and to the right. Just below the tracheal bifurcation the left main bronchus crosses the esophagus. The thoracic duct approaches the structures on the left side as the duct passes from it's posterior position at the level of the fifth thoracic vertebra. On the right side, the pleura is in close contact and just above the root of the right lung the azygos vein runs transversely to join the superior vena cava.

Below the level of the fifth thoracic vertebra as the esophagus descends in the posterior mediastinum, the gradual curve to the left and anteriorly begins to be more marked. Anteriorly the pericardium separates the esophagus from the left atrium, posteriorly a number of structures intervene between the esophagus and vertebral column; the azygos vein posteriorly and to the right, communicating branches from the hemiazygos to the azygos vein and the right intercostal arteries are present posteriorly. On the left side the esophagus is