

RADIOLOGICAL MANIFESTATIONS OF THE
STRICTURES OF OESOPHAGUS

ESSAY

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(RADIO - DIAGNOSIS)



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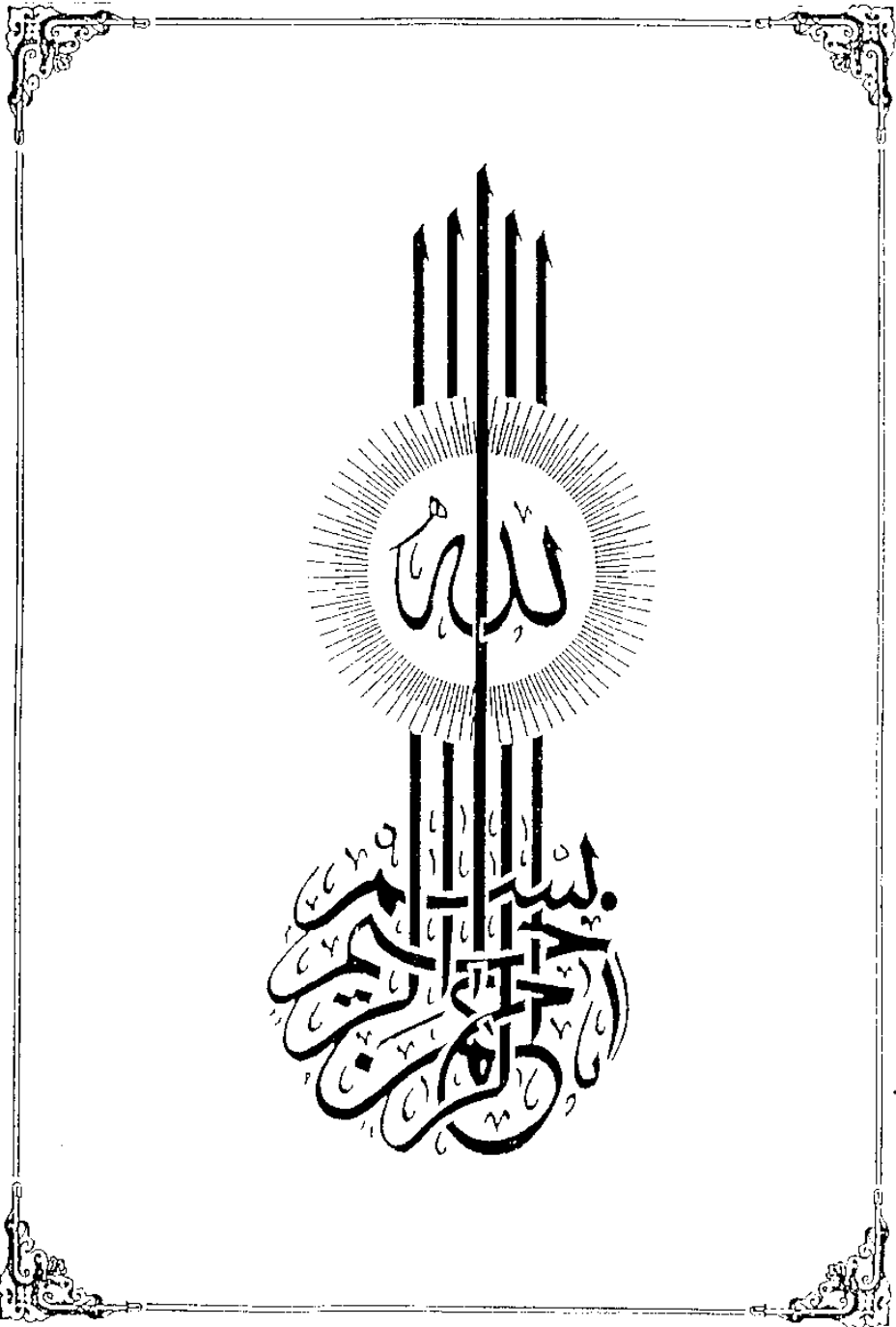
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INTRODUCTION

AND THE AIM OF THE WORK

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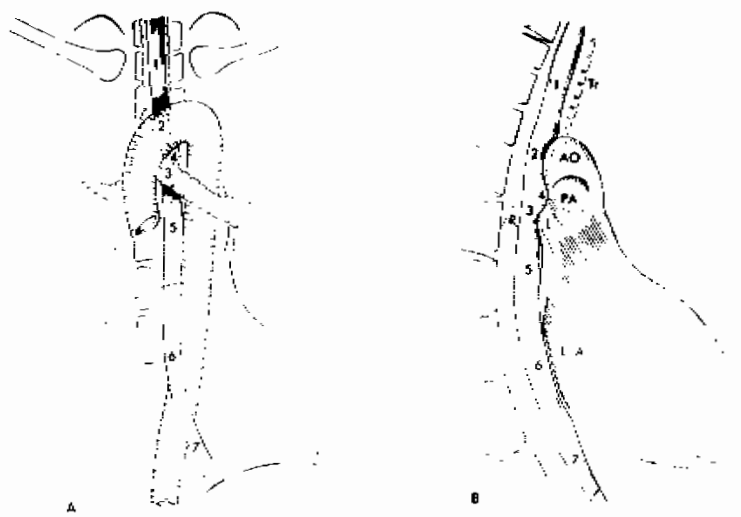
Strictures of the esophagus are important causes of dysphagia, which is a major presenting symptom in several conditions and disorders. It is therefore essential that a proper diagnosis is needed to differentiate precisely the exact nature and aetiology of strictures of the esophagus.

The aim of this work is to study the radiological manifestations of the various causes of strictures of the esophagus and their differentiation.

A correlation between the pathology of these conditions and their radiological manifestation also discussed.

" RADIOLOGICAL ANATOMY "

THE ESOPHAGUS NORMAL ANATOMY



A. (Antero-posterior view)

(1) para-tracheal segment, (2) Aortic segment
(3) bronchial segment (4) interaorticobronch-
ial triangle (5) interbronchial segment.
(6) retrocardiac segment, (7) epiphrenic seg-
ment.

B. (Right-anterior oblique view)

Tr. trachea, (R) right and (L) left main bro-
nchi. P.A, Pulmonary artery (PA), left auricle
(L.Au), and the different segments of the
paratracheal.

(1) aortic (2) bronchic (3) interaorticobron-
chial (4) interbronchial (5) retrocardiac
(6) and epiphrenic (7) esophagus.

Quoted from (Margulis, A.R., and Burhenne, H.J
(Eds.) Alimentary tract Roentgenology. St. Louis
C.V. Mosby Co., 1967)

RADIOLOGICAL ANATOMY OF THE ESOPHAGUS

The esophagus is muscular tube which extends from the pharynx at the inferior border of the cricoid cartilage opposite the six cervical vertebra to the cardiac orifice of the stomach, opposite the 11th thoracic vertebra.

The general direction of the oesophagus is vertical but it presents two slight curves in its course. At the base of the neck it takes a gentle curve to the left returning to the middle opposite the bifurcation of the trachea at the level of the fifth thoracic vertebra, then takes a second deviation to the left to enter the esophageal hiatus in the diaphragm. As the esophagus passes through the diaphragm it makes a sharp change of direction anteriorly and to the left. The length of the esophagus varies between 25-30cm and the breadth state varies between (12-30 mm during its distended state.

(Meschan, 1975).

In cross section it appears as a flattened tube with a stellate lumen.

Relations of The Oesophagus :

In The Neck :

Anteriorly : it is connected with the posterior-aspect of the trachea by areolar connective tissue.

Laterally : it is related to the lateral lobes of the thyroid and carotid sheaths.

The recurrent laryngeal nerves is present in a groove between the trachea and the esophagus.

Posteriorly : it is related to the vertebral column.

In the Thorax : The trachea lies anterior to the esophagus as far as T₅ (level of bifurcation of trachea).

The arch of aorta passing back till it reaches the vertebral column (crosses to the left side of the esophagus causing slight deviation of the esophagus to the right.

The thoracic aorta lies first to the left of the esophagus then posterior to it and finally passes posteriorly and to the right of it.

Below the level of bifurcation of the trachea, the esophagus is crossed by the left bronchus.

The rest of the thoracic esophagus lies in the posterior mediastinum, close to the posterior surface of the pericardium.

It is in close relation to the left atrium.

(Enlarged left atrium causes deviation of the esophagus posteriorly).

The esophagus is separated from the vertebral column by the azygos vein; thoracic duct, lower thoracic aorta.

The left vagus nerve winds anteriorly, the right vagus winds posteriorly forming the anterior and posterior esophageal plexuses, then descends in the esophageal sheath through the diaphragm to reach the stomach.

The esophagus is connected with the esophageal orifice of the diaphragm by a strong fibrous capsule.

Any defect in the supportive tissue causes hiatal protrusion of the stomach.

In The Abdomen :

The abdominal esophagus is about 1-3cm in length it runs in the esophageal groove on the posterior surface of the liver. (Left lobe). (Shanks and Kerely, 1969).

NORMAL SITES OF NARROWING OF
OESOPHAGUS

There are four definite constrictions in the normal esophagus :

- (1) At its begining opposite the cricoid cartilage.
- (2) At the level of the aortic knob.
- (3) Opposite the crossing of the left bronchus.
- (4) When it passes through the diaphragm.

N.B. : The upper two constrictions are narrower,so when there are obstruction by a foreign body it occurs usually at the level of one of the first two constrictions.

The cardiac sphincter is not a true sphincter like the pyloric sphincter, its sphincteric action is due to the contraction of the diaphragm.

i.e. during inspiratory movement there is a momentary delay of the bolus of food at this level,however the recent trend is to believe that the cardiac sphincter is independent of the diaphragmatic contractions and has an action of its own. (Meschan, 1975).

STRUCTURE OF THE OESOPHAGUS

The mucous coat :

It is thick and has a reddish colour above and it is pale below, it is disposed in longitudinal folds and very smooth in contrast with the mammillated gastric mucous membrane.

The radiographic picture of the rugal pattern consists of parallel lines through the oesophagus which become more closely approximated as the distal funnel end of the oesophagus is reached just above the cardiac

The oesophagus is lined by stratified squamous epithelium and this gives place to the mucosal junction with the stomach. The mucosal junction is never a straight line but it is wavy or zigzag, the so called (Z lines). The serrations of the Z line vary from a few millimeter to two cm. but mostly not more than 0.5 cm.

(Lodge and Steiner, 1975)

Barrett's epithelium :

It is a columnar epithelium that may exist in the upper and lower part of the oesophagus.

The Submucosa :

It is lax, thus allowing the mucosa to have a considerable range of movement, except at the gastro-oesophageal junction.

It contains the large blood vessels and nerves as well as mucous glands.

The muscle layer :

There are two layers of muscle in the oesophagus. An outer longitudinal and an inner circular, these are continuous with the corresponding layers in the stomach

In the upper segment, six cm long, is composed of striated muscle. The next part contains only plain muscle. Just at the gastrooesophageal junction there is a specialized slightly oblique layer of fibres internal to the circular muscle layer which completely encircle the oesophagus.

They pass around the incisura between the stomach and the oesophagus on the greater curvature side, and then downward on each surface of the stomach to the lesser curvature, where they finally become parallel to the circular muscle fibres of the stomach. These fibres have been called the constrictor cardiae. Just below

these fibres are the sling fibres of the stomach which pass from the incisura on the greater curvature side downwards and medially to the anterior and posterior aspects of the lesser curvature along which they run.

The sling fibres and constrictor cardiae together form a sphincter at the gastro esophageal junction capable of keeping the mucosal folds in tight apposition. (Meschan, 1975).

The adventitia (Serous layer).

It consists of high proportion of elastic fibres which lie chiefly in a longitudinal direction.

(Bavelander and Ramely, 1974)

Basic anatomic concepts regarding the lower oesophagus

Great interest and considerable confusion have arisen in relation to that segment of the oesophagus. Just above the diaphragm and extending to the stomach (Wolf, 1973). Fluoroscopy has shown that the junctional area between the oesophagus and stomach is mobile and undergoes changes in position shape, and architecture according to changes in body position, intra-abdominal pressure, and swallowing movements of the patient. (Adler, 1962).

The Phrenic Ampulla : is the name given to a temporary dilatation which occurs in that portion of the oesophagus that lies just above the oesophageal orifice of the diaphragm when peristalsis is unable to force the oesophageal contents through the contracted hiatus. It is rather bulbous, varies in size, and causes confusion radiologically with a hiatal hernia of the stomach through the diaphragm.

The oesophageal ampulla appears as a segmented ovoid structure 3 to 5 cm in length and 2 to 4 cm in diameter and it is separable from the stomach pattern below.

The hiatal herniation of the fundus through the diaphragm has considerably more variation in size, and its rugal pattern can usually be more closely identified with that of the contiguous portion of the stomach (Meschan, 1975).

The vestibule :

It is the term given by Lerche 1950 to the fusiform expansion of the distal oesophagus. Its upper end which may be contracted or relaxed is the inferior oesophageal sphincter of Lerche (which is anatomic sphincter demonstrated by Lerche). The lower end is