

heard a loud splashing, gurgling sound. The passage of the œsophageal bougie will determine more accurately the locality. Conical bougies attached to a flexible whalebone stem are the most satisfactory, but the gum-elastic stomach tube may be used; a large one should be tried first. The patient should be placed on a low chair with the head well thrown back. The index finger of the left hand is passed far into the pharynx, and in some instances this procedure alone may determine the presence of a new growth. The bougie is passed beside the finger until it touches the posterior wall of the pharynx, then along it, more to one side than in the middle line, and so gradually pushed into the gullet. It is to be borne in mind that in passing the cricoid cartilage there is often a slight obstruction. Great gentleness should be used, as it has happened more than once that the bougie has been passed through a cancerous ulcer into the mediastinum or through a diverticulum. I have known this accident to happen twice—once in the case of a distinguished surgeon, who performed œsophagotomy and passed the tube, as he thought, into the stomach. The post-mortem on the next day showed that the tube had entered a diverticulum and through it the left pleura, in which the milk injected through the tube was found. In the other instance the tube passed through a cancerous ulcer into the lung, which was adherent and inflamed. Fortunately these accidents, sometimes unavoidable, are extremely rare. It is well always, as a precautionary measure before passing the bougie, to examine carefully for aneurism, which may produce all the symptoms of organic stricture. In cases in which the stricture is extreme there is always emaciation.

The prognosis in these cases is good so long as the stricture is dilatable. The persistent treatment of cicatricial stricture by gradual dilatation is very beneficial, and patients improve remarkably under this method. When extreme, the treatment by bougie is not possible, and the question of œsophagotomy or gastrotomy must be considered. Rectal alimentation should be employed whenever the patient is unable to take sufficient food by the mouth.

#### IV. CANCER OF THE ŒSOPHAGUS.

This is usually epithelioma. It is not an uncommon disease, and occurs more frequently in males than in females. The common situation is in the upper third of the tube. At first confined to the mucous membrane, the cancer gradually increases and soon ulcerates. The lumen of the tube is narrowed, but when ulceration is extensive in the later stages the stricture may be less marked. Dilatation of the tube and hypertrophy of the walls usually take place above the cancer. The cancerous ulcer may perforate the trachea or a bronchus, the lung, the mediastinum, the aorta or one of its larger branches, the pericardium, or it may erode the

vertebral column. In my experience perforation of the lung has been the most frequent, producing, as a rule, local gangrene.

**Symptoms.**—The earliest symptom is dysphagia, which is progressive and may become extreme, so that the patient emaciates rapidly. Regurgitation may take place at once; or, if the cancer is situated near the stomach, it may be deferred for ten or fifteen minutes, or even longer if the tube is much dilated. The rejected materials may be mixed with blood and may contain cancerous fragments. In persons over fifty years of age persistent difficulty in swallowing accompanied by rapid emaciation usually indicates œsophageal cancer. The cervical lymph glands are frequently enlarged and may give early indication of the nature of the trouble. Pain may be persistent or is present only when food is taken. In certain instances the pain is very great. I saw an autopsy on a case of cancer of the œsophagus in which the patient gradually became emaciated, but had no special symptoms to call attention to the disease. These latent cases are, however, very rare.

The *prognosis* is hopeless, and the patients usually become progressively emaciated, and die either of asthenia or sudden perforation of the ulcer.

In the *diagnosis* of the condition it is important, in the first place, to exclude pressure from without, as by aneurism or other tumor. The history enables us to exclude cicatricial stricture and foreign bodies. The sound may be passed and the presence of the stricture determined. As mentioned above, great care should be exercised.

**Treatment.**—In most cases milk and liquids can be swallowed, but supplementary nourishment should be given by the rectum. It may be advisable in some instances to pass a tube into the stomach and attempt to feed in this way. If the patient is willing to take the risk, œsophagotomy or gastrotomy may be performed in order to prolong life.

#### V. RUPTURE OF THE ŒSOPHAGUS.

This may occur in a healthy organ as a result of prolonged vomiting. Boerhaave described the first case in Baron Wassennar, who "broke asunder the tube of the œsophagus near the diaphragm, so that, after the most excruciating pain, the elements which he swallowed passed, together with the air, into the cavity of the thorax, and he expired in twenty-four hours." Fitz has reported a case and has analyzed the literature on the subject up to 1877. The accident has usually occurred during vomiting after a full meal or when intoxicated. It is, of course, invariably fatal.

Much more common is the post-mortem digestion of the œsophagus, which was first described by King, of Guy's Hospital. It is not very infrequent. In one instance I found the contents of the stomach in the left pleura. The erosion is in the posterior wall, and may be of considerable extent.



## VI. DILATATIONS AND DIVERTICULA.

Stenosis of the gullet is followed by secondary dilatation of the tube above the constriction and great hypertrophy of the walls. Primary dilatation is extremely rare. The tube may attain extraordinary dimensions—30 cm. in circumference in Luschka's case. Regurgitation of food is the most common symptom. There may also be difficulty in breathing from pressure.

Diverticula are of two forms: (a) Pressure diverticula, which are most common at the junction of the pharynx and gullet, on the posterior wall. Owing to weakness of the muscles at this spot, local bulging occurs, which is gradually increased by the pressure of food, and finally forms a saccular pouch. (b) The traction diverticula situated on the anterior wall near the bifurcation of the trachea, result, as a rule, from the extension of inflammation from the lymph glands with adhesion and subsequent cicatricial contraction, by which the wall of the gullet is drawn out.

## VI. DISEASES OF THE STOMACH.

## I. METHODS OF CLINICAL EXAMINATION.

The stomach normally occupies the left upper quadrant of the abdomen, one quarter of the organ only lying to the right of the median line; it is bordered above by the diaphragm and liver, below by the intestine and transverse colon; on the left it reaches the spleen, and on the right it touches the gall-bladder; anteriorly it lies against the ribs and the abdominal wall. The longitudinal axis extends from the left above downward and backward to the right.

The cardiac orifice is about opposite the sternal border of the sixth or seventh left costal cartilage. The highest point of the fundus reaches the level of the fifth rib, or even that of the fourth interspace, while the lowest point is 3 or 4 cm. above the navel. The pylorus lies on a level with the tip of the xiphoid cartilage at a point midway between the right sternal and parasternal lines; it is normally covered by the left lobe of the liver. With the stomach moderately filled with air the upper limit of resonance reaches the fifth interspace in the left mammary line, while the lower limit is several cm. above the navel.

The greatest vertical diameter of gastric resonance varies, according to Pacanowski, from 10 to 14 cm. in the male, and is about 10 cm. in the female.

Methods for determining the Position and Size of the Stomach.—

(1) Inflation by bicarbonate of soda and tartaric acid. Dissolve a teaspoonful of each separately in as small a quantity of water as possible,

and let the patient drink the one solution immediately after the other.

(2) Inflation by means of a bulb-syringe apparatus which can be attached to a stomach tube already introduced.

(3) As a makeshift the patient may be given 250 to 500 c. c. of water on an empty stomach in divided doses and the lower limit of the stomach determined by percussion after each drink. The normal stomach sinks gradually to a point a little above the navel, while the dilated and atonic stomach falls rapidly to a much lower level.

The first method is the simplest and most practical, and is generally one of the first steps in the physical examination; the tube is not introduced until the test-meal has been given. The method has the objection that the amount of air introduced cannot be so well regulated and that one may not in a given case fill the stomach to the entire capacity, while occasionally a spasmodic contraction of the cardia and pylorus may give the patient for a time some discomfort.

**Auscultation of the Deglutatory Murmurs.**—On listening at the tip of the xiphoid cartilage as the patient swallows a mouthful of water one hears normally two murmurs. (1) The primary murmur is heard synchronously with the act of deglutition and sounds as if water were injected into a space containing air. (2) The secondary murmur is heard up to twelve seconds later and is a coarser gurgling sound. It is well while listening to place one hand on the trachea, as the first murmur may be absent. In oesophageal and cardiac stenosis the second sound is delayed and altered in character.

The following description of methods is merely a rough summary. For fuller particulars see the works of Ewald, Boas, Leo, Wesener, etc.

**Examination of the Contents of the Stomach.**—Various forms of test-meals have been proposed. The simplest and most satisfactory is that of Ewald. His test breakfast (*Probefrühstück*) consists of one roll (*Brödchen*)—about thirty grammes of white bread—and one glass of water or a cup of tea without milk or sugar. One hour later the contents are to be expressed.

The contents should not be more than 20 to 40 c. c. The filtrate should be a clear yellow or yellowish-brown fluid. The fluid should contain free hydrochloric acid; it should not contain sufficient lactic acid to be recognized by the ordinary tests. Pepsin and pepsinogen, the curdling ferment and its zymogen, should be present.

Albuminoids should be almost entirely converted into peptones; propeptones, if present at all, should be recognizable only in traces. Starches should be so far converted into achroödextrin, dextrose, or maltose that the reaction for starch or erythrodextrin with Lugol's solution should be no longer present.

**Chemical Examination of the Gastric Contents.**

(1) *Acidity* may be determined by litmus paper.