When the tumour is cystic, following evacuation of the contents of the cyst, care must be taken to remove the nodule in the cyst wall, as otherwise

the symptoms will recur, either from refilling of the cystic cavity or from progressive growth of the angioblastoma.

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OESOPHAGEAL HIATUS HERNIA

A Clinical Study of Forty-Five Cases

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Oesophageal hiatus hernia may be defined as a transdiaphragmatic evisceration of some part of the abdominal contents into the thoracic cavity. The herniation occurs through the oesophageal hiatus and the organ that is most commonly involved is the stomach. It is now well established that herniation through the oesophageal hiatus of the diaphragm is not infrequent. The complex symptomatology presented by this anatomical variant may, however, render difficulty in its diagnosis.

The symptoms for which the patients may seek advice may be divided into the following groups:

1. A syndrome of 'dyspepsia.'
2. Pain in the chest stimulating myocardial infarction.
3. Acute gastrointestinal haemorrhage with haematemesis, melaena or both.
4. Symptoms of anaemia probably due to chronic gastrointestinal haemorrhage.
5. A combination of any or all of the above groups.

In addition to the above groups there is a frequent association of other pathological conditions with hiatus hernia. These include cholecystitis with or without cholelithiasis, diverticulosis of the large or small intestine, and chest signs possibly due to aspiration of oesophageal contents.

This report concerns the clinical study of 45 cases of oesophageal hiatus hernia that presented as in and out patients at the Johannesburg General Hospital over a period of 12 months ending March 1949.

Of the 45 cases, 33 were females and 12 males, giving a ratio of females to males of 3 to 1. The age incidence varied from 35 to 89 years (Table 1).

Hiatus herniae of infancy and childhood and traumatic herniae are not included in this study.

In this series the cases are divided into categories according to the following classification introduced by Akerlund (1926):

1. Congenital short oesophagus with partial thoracic stomach.
2. Paraoesophageal hiatus hernia. A portion of the cardiac end of the stomach herniates through the oesophageal hiatus of the diaphragm. The oesophagus is of normal length and in its normal position.
3. Oesophagogastric hernia. Both the cardiac end of the stomach and the lower oesophagus herniate through the oesophageal hiatus.

The term 'sliding hernia' is used to designate those cases in which the stomach returns to its normal sub-diaphragmatic position when the patient is erect. Sliding herniae are only demonstrable with the patient supine or in the Trendelenburg position. The term 'congenital short oesophagus' may be a misnomer, although instances of true congenital shortening of the oesophagus are well known (Gross, 1946). In this series, however, instances of short oesophagus were found in elderly patients, the oldest being 89 years of age. Although it is possible that the shortened oesophagus was present from birth, there are other causal factors to be considered. A paraoesophageal or oesophagogastric hernia may, for instance, be associated with post-ulcerative fibrosis, which may shorten the oesophagus in a manner indistinguishable radiologically from a congenital short oesophagus. Allison (1948) has produced evidence to show that short oesophagus is usually an acquired condition, due to defects in the diaphragm which

FIG. 1.—Case 1. Thoracic stomach with volvulus. The major part of the stomach is above the diaphragm.

FIG. 2.—Case 1. Thoracic stomach with volvulus. The stomach is partially filled with barium. The position of the oesophagus is also seen.

FIG. 3.—Case 1. Large oesophageal hiatal hernia showing gas above the diaphragm in a roentgenogram of the thorax.

allow herniation of the stomach. Smithers (1945) has suggested that after hiatal insufficiency has occurred, shortening of the oesophagus may be produced from contraction of its longitudinal musculature, after the development of oesophagitis from irritation of the oesophageal mucosa by gastric juice or any other cause.

An accurate history is the basis of a correct diagnosis of hiatus hernia. The presenting syndromes have been outlined. The symptoms are

commonly of many years' duration and may be referred to the gastrointestinal tract, the cardiovascular system or the haemopoietic system. In the majority of cases physical examination is of no diagnostic help.

The size of the hernia bears little relationship to the severity of symptoms (Dugan, 1948; Ellison, 1949; Goldner and Levy, 1947; Radloff and King, 1947; Trueman, 1947). Case 1 is an example of a thoracic stomach with volvulus, yet this patient complained only of some epigastric pain and vomiting which had been present off and on for three years (Figs. 1 to 3). In contradistinction, Case 32 is an example of a paraoesophageal hernia about the size of a walnut, which presented with a severe acute chest pain simulating myocardial infarction.

Dyspepsia as a Symptom of Hiatus Hernia

Dyspepsia was the commonest symptom complex to be encountered in this series, 25 of the series of 45 patients presenting in this way. Of these 25 cases, 19 were females and six males, and their ages varied from 42 to 80 years, 19 patients being over the age of 60 years (Table 1).

The main symptom was epigastric pain or discomfort of a burning or gripping quality. The pain radiated across the abdomen, commonly to the right hypochondrium and also posteriorly to the left lower chest. Pain may on occasion be noted in either shoulder area. The relation of pain or discomfort to meals is of special importance (Adams and Lee, 1946; Harrington, 1945; Kirklin and Hodgson, 1947). The occurrence of pain soon after meals commonly makes the patient

TABLE I
SUMMARY OF 45 CASES OF HIATUS HERNIA

Case No.	Initials	Age	Sex	Presenting Feature	Type of Hernia	Gall Bladder X-ray	Barium Enema	Associated Peptic Ulcer	Chest Pathology
1	S.L.	58	F	Dyspepsia	Short oesophagus with volvulus	—	Normal	Not found	—
2	L.D.	60	F	"	Paraesophageal	—	—	Gastric ulcer	—
3	R.M.	68	M	"	"	—	—	Not found	—
4	J.M.	68	F	"	Short oesophagus	†Cholecystitis	—	Ulcer in hernia	—
5	E.Z.	65	F	"	*Sliding paraesophageal	—	—	Not found	—
6	M.C.	76	F	"	Short oesophagus	—	—	"	—
7	L.D.	80	F	"	Paraesophageal	—	—	Gastric ulcer	—
8	W.X.	62	F	"	"	—	Diverticulosis	Not found	—
9	F.C.	70	F	"	"	Cholecystitis	—	Duodenal ulcer	—
10	F.P.	66	F	"	"	—	—	Ulcer in hernia	—
11	E.L.	72	F	"	"	—	Normal	Not found	—
12	E.W.	78	F	"	Short oesophagus	—	—	"	—
13	R.W.	42	M	"	Sliding paraesophageal	—	Diverticular of bowel and duodenum	"	†X-ray positive
14	G.V.	44	M	"	"	—	Normal	"	Asthma
15	C.T.	75	F	"	"	—	—	"	—
16	W.C.	74	M	"	Paraesophageal	Cholecystitis	—	"	—
17	C.L.	72	F	"	Sliding paraesophageal	Cholecystitis and stones	Normal	"	—
18	R.P.	65	F	"	Paraesophageal	Cholecystitis	Diverticulosis	"	X-ray positive
19	M.D.	70	F	"	"	—	—	"	—
20	M.P.	42	F	"	Sliding paraesophageal	—	—	"	—
21	S.Z.	65	F	"	Paraesophageal	—	—	"	—
22	L.P.	73	F	"	"	—	—	"	—
23	M.M.	58	F	"	"	—	—	"	—
24	A.C.	65	M	"	"	—	—	"	—
25	I.S.	50	M	"	"	—	—	"	—
26	A.O.	72	M	Anaemia	Short oesophagus	Cholecystitis	—	"	—
27	A.F.	59	F	"	"	—	—	Gastric ulcer	—
28	F.O.	70	F	"	"	Normal	—	Not found	—
29	J.L.	61	M	"	"	—	Normal	"	—
30	R.A.	36	F	Cardiac ischaemic-like pain	Paraesophageal	Cholecystitis and stones	Normal	"	—
31	M.W.	55	F	"	Sliding paraesophageal	—	Normal	"	—
32	E.D.	46	F	"	"	Cholecystitis	—	"	—
33	L.S.	48	F	"	"	Normal	—	"	Asthma
34	M.H.	62	F	"	"	—	—	"	—
35	R.C.	54	F	"	Short oesophagus	Cholecystitis	Normal	"	—
36	B.G.	35	F	"	Paraesophageal	—	Normal	"	—
37	P.T.	47	F	"	Sliding paraesophageal	Cholecystitis	Normal	"	—
38	M.B.	62	F	"	Short oesophagus	Cholecystitis and stone	—	"	—
39	M.W.	72	M	Acute gastro-intestinal blood loss	Paraesophageal	Cholecystitis	Diverticulosis	Ulcer in hernia	X-ray positive
40	M.B.	80	F	"	Short oesophagus	—	—	Not found	—
41	I.K.	62	F	"	"	Normal	—	Duodenal ulcer	—
42	D.M.	45	F	"	Paraesophageal	—	—	Not found	—
43	A.R.	73	F	"	Sliding paraesophageal	—	—	Two ulcers in hernia	—
44	M.W.	60	F	"	Short oesophagus	—	—	Not found	X-ray positive
45	C.H.	89	F	"	"	—	—	Not found	—

* The term sliding is used to describe hernias that are only demonstrable in the Trendelenburg position.

† The diagnosis of cholecystitis was radiological and was made on the non-filling of the gall bladder on two occasions.

‡ See text.

afraid to eat. Within a varying period after food, commonly a matter of a few minutes, or occasionally as long as an hour, the pain or discomfort is experienced. Certain factors relieve or prevent the pain. The act of vomiting, eructation of gas, or the ingestion of alkali may give relief. The assumption of an erect posture or walking soon after meals may also relieve the pain. Ingestion of small meals or the eating of meals in an erect position may prevent the onset of pain or discomfort. It was noted that pain was more severe if patients had their meals in bed, thereby adopting a position of flexion of the trunk.

As in peptic ulcer, so in hiatus hernia, the mechanism of production of pain or discomfort is uncertain. The pain may be associated with overdistension of the herniated portion of the stomach by ingested food or gas (Kirklin and Hodgson, 1947). Ulceration of the herniated portion of stomach may be the source of pain. Cholecystitis, with or without cholelithiasis, is not uncommonly associated with hiatus hernia and may play some part in the production of pain directly or by reflex effect on the hernia. Peptic ulcer in the lower oesophagus or in the abdominal portion of stomach or duodenum may be present simultaneously with hiatus hernia and cause pain (Brick, 1949; Jankelson and Morein, 1940).

Clinical observation in this series showed that factors which are associated with, or produced an emptying of the herniated portion of stomach relieved the pain. These factors include the act of vomiting, eructation of gas and the ingestion of small meals. In those patients who experienced severe abdominal pain after having their meals in bed, the assumption of the crouching position appears to limit the available space on which the distending hernia might encroach. Assuming the erect posture relieves patients whose hernia is of a sliding type, presumably due to the reduction of the hernia by this manoeuvre.

Because of the similarity of the clinical picture of gastric ulcer and the dyspeptic syndrome of hiatus hernia, it is difficult to determine whether the symptoms are due to the hernia or to an associated gastric ulcer. In patients with a hiatus hernia and duodenal ulcer, it is sometimes possible to distinguish two definite phases of symptoms, the first being associated with the hernia and the second with the duodenal ulcer.

The following case is a common example of the dyspeptic group:

Case No. 12

E.W., a 78 year old housewife, was admitted because of abdominal pain and vomiting of three weeks' duration. The pain, described as 'gripping' in character, was situated in the epigastrium, and

radiated to the right hypochondrium. It also radiated around the abdomen to the lower left chest posteriorly. The pain appeared a few minutes after the ingestion of food. A noticeable feature was the greater severity and frequency of the pain when the patient had her meals in bed. During the three weeks prior to admission, she had been afraid to eat because she anticipated the pain soon after food. Soon after the onset of the pain the patient would vomit, the vomiting being preceded by nausea, and the act of vomiting soon relieved the pain. The patient volunteered that the pain was relieved by assuming the erect position or taking a short walk soon after its appearance. Ingestion of bicarbonate of soda resulted in the eructation of much gas and the relief of pain. The patient had been suffering from similar but milder attacks for years. Two years prior to admission she was admitted to hospital on account of an acute right hypochondrial pain associated with vomiting. The attack was unlike the present attack and was diagnosed as cholecystitis on the radiological evidence of a non-filling gall bladder, as shown by two cholecystograms.

Other than some epigastric guarding and tenderness, physical examination revealed no abnormal physical signs.

Barium meal investigation showed a hiatus hernia with the fundus of the stomach folded back upon itself as it entered the thorax (Figs. 4 and 5). The oesophagus was of normal length and no oesophageal ulcers were demonstrated. Examination of the colon showed no evidence of diverticulosis. The gall bladder did not fill on two cholecystographic examinations, but no opaque biliary calculi were visualized.

Pain Resembling Cardiac Ischaemia

In the present series eight cases presented with an acute pain in the chest resembling myocardial infarction. The acute episode occurred in a younger age group. In the total series of 45 cases, 30 patients were over the age of 60 years, while in the eight cases presenting with pain resembling cardiac ischaemia all were under 62 years and four were under the age of 50. Seven of the eight patients who presented with this syndrome were females.

The differential diagnosis of myocardial infarction and hiatus hernia may, at the outset, be difficult or impossible (Branwood, 1949; Nazum, 1947). The situation, radiation, intensity and character of the pain is in many cases identical with that of myocardial ischaemia. The associated general symptoms and signs of acute peripheral vascular failure may be present in both conditions. In some of the cases of hiatus hernia the pain was relieved by vomiting or belching.

FIGS. 4 and 5.—Case 12. Oesophageal hiatal hernia in a female aged 78 years who complained of upper abdominal pain which appeared a few minutes after the ingestion of food.

The absence of physical signs such as a falling blood pressure, pericardial rub, gallop rhythm and arrhythmias does not exclude myocardial infarction.

The eight patients with this syndrome were treated provisionally for myocardial infarction. Serial electrocardiograms, standard and unipolar, were carried out daily, as were erythrocyte sedimentation rates and white cell counts. When these investigations proved normal the patients were subjected to barium meal examination.

The previous history was helpful in half the cases. In four cases the acute onset of pain was the first symptom referable to the hiatus hernia, and in four patients there was a previous history of typical dyspepsia which suggested the correct diagnosis. In one patient (Case 36) there was also a past history of repeated haematemesis, as well as the typical dyspeptic history.

The acute episode of pain may be preceded by chest pain clinically indistinguishable from angina pectoris. The angina occurs after meals or on exertion or on lying down with a full stomach (Bloom, 1947; Polley, 1941; Ritchey and Winsauer, 1947).

Case No. 31

M.W., a 55 year old married clerk, was admitted because of chest pain. A week before admission he experienced a discomfort under the sternum described as a 'heaviness and tightness.' This episode occurred in his office at 9 a.m., half an

hour after breakfast, lasted for a quarter of an hour and was dismissed as 'indigestion.' Four days later he experienced a second attack of pain and discomfort similar to the first, but much more severe. On this occasion the pain was described as agonizing, and radiated down both arms as far as the wrists. At the same time the patient perspired profusely and experienced severe breathlessness described as a 'marked inability to get sufficient air.' He was also very restless. This episode, which occurred about 15 minutes after a large Sunday midday meal, lasted for 30 minutes. A similar attack of pain occurred on the day before admission, again about 15 minutes after a midday meal.

Physical examination revealed a hypersthenic male in no apparent distress. The pulse rate was 100 per minute and the blood pressure 140/90 mm. Hg. The temperature was 98° F. No significant physical signs were elicited on complete examination.

On the second day in hospital an episode of pain was observed soon after the patient had completed his breakfast. He was noted to be orthopaedic and perspiring profusely. The pulse rate rose to 110 per minute and the blood pressure was unchanged. No other abnormal physical signs were noted.

Serial, standard and unipolar electrocardiography was normal, as well as daily white cell counts and erythrocyte sedimentation rates.

Two weeks after admission a hiatus hernia was

FIGS. 6 and 7.—Case 31. Oesophageal hiatal hernia in a male aged 55 who complained of symptoms resembling myocardial infarction. The hernia reduced itself spontaneously when the patient was in the erect position. Cholelithiasis was also demonstrated in this patient. Note the H-shape of the segment of stomach passing through the diaphragm.

demonstrated on barium meal. The oesophagus was of normal length and herniated back into the chest along with the stomach (Figs. 6 and 7). The hernia reduced itself spontaneously in the erect position. Cholecystography revealed several translucencies within the gall bladder shadow, suggesting non-opaque calculi. Barium enema examination was normal.

Acute Upper Gastrointestinal Haemorrhage and Hiatus Hernia

A sudden haematemesis or melaena or symptoms produced by acute blood loss may be the first indication of the presence of hiatus hernia (Mendelson, 1946; Rennie *et al.*, 1949). Eight cases in this series presented with this picture, the ages varying from 45 to 89 years. Six of these patients were females.

The differentiation from other causes of upper gastrointestinal haemorrhage is usually difficult. The typical dyspeptic syndrome may precede the acute episode. Commonly the first indication as to the true diagnosis is obtained on X-ray examination of the stomach.

Case No. 40

M.B., an 80 year old widow, presented with a history of vomiting of blood of 16 hours' duration. Similar episodes of haematemesis had occurred three years, and again nine months, previously. There were no symptoms between the attacks.

The estimated amount of blood lost by vomiting in the 16 hours prior to admission was about 2 pints. The patient also complained of a constant ache in the middle of her back, in the lumbar region, since the onset of the present episode.

A barium meal examination after her first haematemesis revealed a paraoesophageal hiatus hernia, about two-thirds of the stomach being visualized above the diaphragm. An ulcer was radiologically demonstrated in the herniated portion.

On examination the pulse rate was 120 per minute and of good volume. The blood pressure was 190/100. Examination of the blood showed a haemoglobin of 9 gm. per cent., red cell count of 3,770,000 per c.mm., and a white cell count of 4,800 per c.mm.

The patient was transfused with 2 pints of whole blood. She had a sudden profuse haematemesis two days later, however, and lapsed into coma. Examinations revealed the presence of marked peripheral vascular failure and evidence of bilateral basal pneumonia. The patient died within 12 hours.

At autopsy an indolent ulcer 1 cm. in diameter was found in the region of constriction of the stomach by the diaphragm. A bleeding, sclerotic vessel was seen at the base of the ulcer.

Chronic Blood Loss as a Presenting Feature of Hiatus Hernia

Four patients presented with symptoms of anaemia of gradual onset. The evidence that bleeding via the gastrointestinal tract was the cause of the anaemia was the repeated presence of occult blood in the stools after a suitable chlorophyll-free diet. No lesion apart from the hernia was demonstrated in the gastrointestinal tract except in Case 27, where a gastric ulcer in the abdominal portion of the stomach was visualized.

Other factors may play a part in the causation of

TABLE 2
BLOOD PICTURES OF PATIENTS PRESENTING WITH CHRONIC ANAEMIA

Case No.	Hb. (G. Per cent.)	Red cell count in millions	White cell count	Polys. Per cent.	Monos. Per cent.	Lymph. Per cent.	Eosin. Per cent.	Bas. Per cent.	M.C.V.	M.C.H.	M.C.H.C. Per cent.
26	6.2	1.81	5,800	65	2	30	3	—	95	26	30
27	6.6	2.32	4,500	75	2.5	21.5	1	—	90	27	31
28	7.3	2.4	5,700	70	3	26	1	—	94	33	35
29	8.8	2.74	5,600	60	7	28	3	2	93	32	34.5

anaemia associated with hiatus hernia. These include disturbances of digestion and absorption as well as secondary changes in gastric function, which may induce anorexia and deficiency in food intake (Codounis, 1949; Ritchey and Winsauer, 1947). The consistent presence of occult blood would indicate that the major cause of the anaemia is due to chronic haemorrhage. The site of haemorrhage may be from an ulcer in the hiatus hernia, or from erosion of the mucous membrane of the stomach at the point of constriction by the diaphragm (Murphy and Hay, 1943; Sahler and Hampton, 1943; Schwartz and Blumenthal, 1949). Coexistent peptic ulcers in the abdominal portion of the stomach or duodenum may be present and cause the bleeding. These cases are discussed later.

The symptoms due to chronic haemorrhage were those of anaemia and consisted of weakness, lassitude, fatigue, dyspnoea, giddiness and fainting after effort. In two of the four cases of this group a characteristic previous history of hiatus hernia dyspepsia was obtained. In one case a history was obtained of intermittent dark stools for one month prior to admission. The positive physical signs consisted only of a pallor of the skin and mucous membranes.

Barium meal examinations in these cases revealed that all four herniae were associated with a shortened oesophagus. Ulceration of the mucous membrane of the stomach was demonstrated in Case 27. The blood picture on admission is shown in Table 2. It is noted that the anaemia is normochromic and normocytic.

Case No. 29

J.L., a 61 year old clerk, was admitted because of generalized weakness of six weeks' duration.

He was well until two and a half months before admission when, as the result of a fall, he fractured the shaft of the right humerus. The fracture was reduced and the patient treated in the out-patient

FIG. 8.—Case 29. Oesophageal hiatal hernia with shortened oesophagus in a male aged 61 who presented with anaemia.

department. After the accident he lost all desire for food. For six weeks he had suffered from weakness, whereas previously he had been very active, walking for long distances and even dancing. He served in the armed forces until the age of 59 years. He emphatically denied any discomfort or pain in relation to his meals. He also denied any history of nausea or vomiting. On examination, the striking feature was the pallor of the skin and mucous membranes. Except for signs of a recently-healed fracture, there were no other abnormal physical signs. Examination of the peripheral blood on admission showed the following: Haemoglobin, 8.8 gm. per cent.; erythrocytes, per c.mm., 2,740,000; leucocytes, per c.mm., 5,600. The differential count showed a normal distribution. The anaemia was normochromic and normocytic.

FIGS. 9 and 10.—Case 15. Paraoesophageal hiatus hernia with associated duodenal diverticula.

Both the benzidine test and spectroscopic examination for blood gave positive results after a chlorophyll-free diet.

Preliminary screening of the chest showed what appeared to be a fusiform rounded opacity arising from the diaphragm, immediately posterior to the heart. A subsequent barium meal showed this to be a large hiatus hernia of the irreducible type, with an associated short oesophagus (Fig. 8). A small portion of the herniation was reduced when the patient maintained the erect position for some time.

Examination of the gastric juice showed a histamine fast achlorhydria. The blood picture rose to normal limits on oral iron therapy. Barium enema and cholecystography were negative.

Discussion on Complicated Cases

In most cases of hiatus hernia the diagnosis is established on the history and fluoroscopic visualization of the hernia. Associated features of cholecystitis, diverticulosis and chest signs will be discussed later and may serve to explain some of the complex symptomatology.

It is well to remember that many patients with hiatus hernia fall into the older age group where multiple pathology is not uncommon. Even with the knowledge that the patient has a radiologically proved hiatus hernia, with or without cholecystitis,

diverticulosis or chest signs, each new symptom, especially if it be acute, should be evaluated on its own merits. If the patient presents with an acute chest pain simulating myocardial infarction, the new syndrome should be carefully investigated before it is regarded as a symptom of hiatus hernia. One patient who was known to have a hiatus hernia with diverticulosis returned to hospital because of a recent change in bowel habit and occasional passage of bright red blood in the stools. The new symptoms might have been explained on the basis of diverticulosis with some super-added infection, but sigmoidoscopic examination revealed the presence of a carcinoma of the large bowel.

Case No. 15

C.T., a 75 year old housewife, gave a history of left-sided abdominal pain of one month's duration. The pain which came on immediately after food, was cramp-like in nature and lasted for from one to four hours. There was also an accompanying nausea but she had only occasionally vomited small amounts of 'acid' tasting material.

For seven years prior to the development of the above complaints, she had been suffering from constipation. Recently bright red blood had also been noted in the stools. She had suffered from attacks of bronchial asthma for the last ten years.

FIGS. 11 and 12.—Case 5. Barium filled stomach with patient erect. No abnormality seen.

Physical examination was negative except for some tenderness in the right hypochondrium.

Examination of the blood showed a haemoglobin of 14.6 gm. per cent., red cell count of 4,420,000 per c.mm., and a white cell count of 7,500 per c.mm. with a normal differential count.

FIGS. 13 and 14.—Case 5. Patient in Trendelenburg position. Para-oesophageal hernia present in this position only.

Barium meal examination in the prone and supine position showed the presence of a para-oesophageal herniation of the stomach which reduced itself in the erect position. Multiple large diverticula of the duodenum were also noted (Figs. 9 and 10). On outlining the large bowel with

barium, a number of large diverticula which were tender to palpation were noted in the pelvic colon. The symptoms improved on a low residue diet, alkalization and antispasmodics.

The patient was readmitted one month later because of a recurrence of symptoms. Physical examination was again negative. On sigmoidoscopic examination, a bleeding ulcerating area of $1\frac{1}{2}$ in. x $1\frac{1}{2}$ in. was visualized when the sigmoidoscope was passed for a distance of 18 cm. A biopsy of the ulcer showed the presence of a papillary adenocarcinoma.

Radiology in Hiatus Hernia

Although the true diagnosis may be suggested by the history, confirmation of the diagnosis of hiatus hernia depends on its demonstration radiologically.

The technique used in this series does not differ much from routine barium meal examination. A thicker barium paste than usual was used to allow a longer period for visualization of the oesophagus. All patients were screened in the erect and prone or Trendelenburg positions, as suggested by Morrison, 1925; Clerf and Manges, 1934; Ritvo, 1930; and Harrington, 1943. If these various positions are not used, the demonstration of a sliding hernia may be impossible because it may only be visualized in the prone or Trendelenburg positions (Figs. 11 to 14).

The features studied were the barium-filled oesophagus and stomach, and their relation to the diaphragm, and the duodenum and small intestine. The types of herniae encountered in this series were paraoesophageal hiatus herniae and those associated with a short oesophagus. In cases of paraoesophageal hernia the lower oesophagus remains in its normal position and a portion of the cardiac end of the stomach herniates through the diaphragm alongside the oesophagus. Examination of the barium-filled oesophagus with the patient in both oblique and lateral positions reveals that the oesophagus is of normal length and lies alongside the hernia. In patients with shortening of the oesophagus, the barium-filled oesophagus enters the apex of the thoracic stomach.

It is necessary to exclude other lesions at the lower end of the oesophagus such as diverticula, cardiospasm and phrenic ampullae. The differentiation of phrenic ampullae from small hiatus herniae may at times be difficult. Phrenic ampulla, which is a dilatation of the lower end of the oesophagus in relation to respiratory excursions, is regarded as non-pathological and non-symptom producing. When the barium-filled oesophagus and diaphragmatic respiratory movements are visualized, a phrenic ampulla is seen during inspiration (Bloom, 1947) and lengthens during this

phase of respiration. The flow of barium is normal during expiration. If the act of inspiration is maintained, some regurgitation of barium up the oesophagus may occur. In cases of hiatus hernia, regurgitation of barium up the oesophagus is prevented by some sphincteric action of the muscle at the junction of oesophagus and stomach. The mucosal pattern of the herniated portion of stomach in diaphragmatic hernia assists in the diagnosis. It has been suggested that if the mucosal pattern of the segment passing through the diaphragm shows four or more linear striations, it is probably stomach and not oesophagus. This sign may at times be misleading. In studying the mucosal pattern, it was found that greater reliability could be attached to the shape of the edges of the structure passing through the diaphragm. If the structure passing through the diaphragm is the stomach, it was noted that the mucosal pattern was H-shaped, the side of the H being slightly curved (Figs. 6 and 7).

The presence of a hiatus hernia may occasionally be suggested on an ordinary postero-anterior film of the chest. A shadow behind the heart or a gas bubble above the diaphragm may be seen. Instances of both these signs are given in Fig. 3. Confirmatory evidence of the presence of the hernia must, however, depend on barium meal studies.

Demonstration of ulceration of the mucous membrane of the herniated portion of stomach is not easy on account of the surrounding bony cage of the thorax, which renders manipulation of the barium-filled stomach difficult. Visualization of ulceration depends on the position of the ulcer and on its chance filling with barium. In this series it was possible to demonstrate ulcers in the herniated portion of stomach in three patients (Cases 4, 10 and 44). In the latter case two ulcers were visualized. In a fourth patient who came to autopsy after a profuse haematemesis (Case 40), an ulcer was found in the lesser curvature of the stomach at the point of constriction by the diaphragm. It is also noteworthy that in three further cases (Cases 2, 7 and 27) gastric ulcers were demonstrated in the abdominal portion of the stomach (Fig. 15). In two patients (Cases 9 and 42), duodenal ulceration was found immediately prior to admission to hospital. Because of the frequency of co-existence of hiatus hernia and gastric ulceration, it is interesting to consider the possible aetiological factors in the production of ulceration in these cases. An obvious suggestion is that the mechanism of ulceration in the hernia itself is mechanical. Intermittent or continual constriction of the cardiac portion of the stomach by the surrounding diaphragm might interfere with the local blood supply with a resultant necrosis and ulcera-

FIG. 15.—Case 2. Paraoesophageal hiatus hernia with a gastric ulcer in the abdominal portion of the stomach. Hernia not shown in this film.

FIG. 16.—Case 18. Roentgenogram of thorax in a patient with a paraesophageal hiatus hernia, cholecystitis and diverticulosis of the large bowel. Note the lung markings in the right para-cardiac region.

tion. The findings in the only case of this series that came to autopsy supports this contention. In this case an indolent ulcer was found in the cardiac portion of the stomach at the point of constriction by the diaphragm. Death was due to acute massive bleeding from this site. It is not known whether other aetiological factors that allegedly produce ulceration in a non-herniated stomach also play some part in the production of ulcers in a herniated one.

Other Disorders Associated with Hiatus Hernia

It has already been pointed out that gastric and duodenal ulceration may be found in association with hiatus hernia. Reports in the literature have also noted that cholecystitis with or without cholelithiasis, as well as diverticulosis are not uncommonly associated with transdiaphragmatic herniation of the stomach (Bloom, 1947; Gilbert *et al.*, 1946; Polley, 1941; Radloff and King, 1947; Rennie *et al.*, 1949; Weintraub and Truggle, 1941).

In this series it was possible to carry out radiological studies of the gall bladder in 15 cases and barium enema examinations in 12 cases. Cholecystography and colon contrast medium radio-

graphy were carried out in the same patient in nine instances. In three instances the presence of hiatus hernia, cholecystitis and diverticulosis was demonstrated. Gall bladder examination in these three cases revealed the presence of cholelithiasis in one case and a non-filling gall bladder in the remaining two cases.

Cholecystography in 15 cases of this series revealed a normally concentrating gall bladder in four instances. In the remaining 11 cases the presence of gall stones was shown in three cases, and a failure of concentration of the dye in the gall bladder on two occasions occurred in eight cases. Of the 12 barium enema examinations that were done, seven revealed a normal colon and in five cases diverticula of the large bowel were visualized. In one case diverticula of the large bowel were associated with multiple diverticulosis of the duodenum (Figs. 9 and 10).

A noteworthy association of symptoms and signs referable to the lungs has been found in this series. A history of the onset of bronchial asthma from one to ten years prior to admission was obtained in nine cases. In between the asthmatic attacks these patients intermittently produced non-purulent, mucoid sputum varying from $\frac{1}{2}$ to 4 oz. daily. The physical signs consisted of expiratory rhonchi with or without diminished air entry at both bases posteriorly. In five cases radiological abnormalities were noted on routine radiographs

of the chest. These abnormalities consisted of a diffuse irregular loss of translucency situated at the base of both lung fields, mainly in the paracardiac regions. This finding was associated with an increase in the lung markings in these areas, the markings assuming a parallel pattern or 'tram lining' (Fig. 16). Since bronchoscopic and bronchographic examinations were not performed in these cases, additional information as to the nature of these pulmonary lesions was not obtained.

Belcher (1949), describing the pulmonary complications of dysphagia, includes one case of a child aged six with a short oesophagus associated with bilateral bronchiectasis. This author has pointed out that oesophageal lesions may be associated with aspiration into the lung with resultant pneumonitis, pulmonary abscess or fibrosis. A case of bronchial asthma in association with diaphragmatic hernia has been reported by Rau (1949). In this patient surgical reduction of the hernia appeared to relieve the asthma.

Conclusion

Hiatus hernia is characterized by its complex symptomatology referable to many systems of the body. The commonest group of symptoms may be described as a 'dyspepsia' consisting of epigastric pain or discomfort related to meals, and relieved by factors which apparently decrease the size of the hernia. The clinical picture may appear more bizarre because peptic ulcer or cholecystitis with or without cholelithiasis may co-exist.

Acute blood loss, as evidenced by haematemesis or melaena, may be the first indication of the existence of hiatus hernia and its differentiation from other causes of upper gastrointestinal haemorrhage is commonly difficult without later X-ray studies.

Hiatus hernia may present with the symptoms of anaemia, probably due to chronic blood loss from erosion of the mucous membrane of the stomach at the point of constriction by the diaphragm, or from co-existent peptic ulceration.

An acute episode of pain with similar clinical features to myocardial infarction or angina pectoris may be the first presenting symptom or punctuate the natural course of the illness.

The simultaneous presence of chronic lung disease has been found in some patients of this series and has presented with the symptoms of bronchial asthma. Another abnormality found is

diverticulosis of the colon and occasionally of the duodenum.

Because of the protean symptomatology, hiatus hernia may masquerade as many upper abdominal or intrathoracic diseases. This is commonly misleading and each new episode in patients with this disease should be evaluated on its own merits and not ascribed to one of the many variant symptoms of hiatus hernia.

Final evidence of the presence of hiatus hernia depends on barium meal studies which must be carried out with the patient erect as well as in the prone position.

Summary

1. A clinical study of 45 cases of oesophageal hiatus hernia is presented.

2. The presenting symptoms consisted of: (a) A syndrome of 'dyspepsia.' (b) Pain in the chest simulating myocardial infarction. (c) Acute gastrointestinal haemorrhage. (d) Symptoms of anaemia probably due to chronic gastrointestinal haemorrhage. (e) A combination of any or all of the above groups.

3. Multiple pathology is not uncommonly associated with hiatus hernia. This includes cholecystitis with or without cholelithiasis, diverticulosis or chest signs possibly due to aspiration of oesophageal contents.

4. The finding of a hiatus hernia may at times be misleading and direct attention away from a more important intrathoracic or intra-abdominal condition.

5. Radiological examination of the oesophagus, stomach and duodenum with the patient erect as well as prone is essential in all suspected cases.

6. Gastric or duodenal ulceration is not uncommon in patients with hiatus hernia. Gastric ulcers may be supra- or infra-diaphragmatic or at the point of constriction of the stomach by the diaphragm.

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SYPHILIS OF THE ORAL CAVITY*

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The structures of the oral cavity may be affected with syphilis in any of the various stages of that disease. No decade of life is immune, from infancy to senility. A study of the characters of the various lesions and of their course provides an epitome of the habitual behaviour of this exquisitely chronic infection. From various observations upon the lesions of the mouth, tongue and throat we can learn much of the natural history of the disease.

Primary Infection in the Oral Cavity

Chancre of the Lip

It is by no means rare for infection with syphilis to occur in the lip, a chancre in this situation being the most frequent of all the primary lesions which occur in extra-genital locations. It may be seen in the adult or in the child, and upon the upper or lower lip. The chancre is usually an isolated ulcer, situated on the free edge of the lip, presenting the familiar features of a genital chancre, such as indolence, painlessness and slow growth with increasing induration. Because of exposure to the air, the formation of a firm dry crust is more frequently seen than in a genital chancre. Adenitis of the regional lymphatic glands—sub-mental or sub-maxillary—is well marked. Occasionally the glandular swelling is especially large, densely hard and fixed; simulation of an epithelioma of the lip may then be very close, but the age of the patient, the lack of pain and the absence of a pearly, rolled edge to the ulcer are helpful distinguishing features.

A secondary syphilitic rash is often present in these cases because the lesion has usually been regarded as trivial for some weeks before medical

advice is sought. *S. pallida* can be found, by dark ground microscopy, in the exudate from the lesion as readily as from a genital chancre, but when the lesion has been present for four or five weeks and is regressing the number of spirochaetes present is small and their recognition not easy. For some weeks, when the number of spirochaetes is large, the lesions are highly infectious. Schamberg reports a veritable epidemic of chancre of the lip resulting from a party given for adolescents at which the main recreations were kissing games, unfortunately a youth was present who had a chancre of the lip, and of the 12 maidens who attended the party seven subsequently developed a chancre of the lip.

Without appropriate treatment a chancre of the lip may persist for many weeks but, eventually, it will heal and absorb leaving only a minute scar. the glandular swelling, however, regresses much more slowly and may be palpable many weeks after the chancre has vanished.

Chancre of the Tongue

A chancre elsewhere in the oral cavity is much less frequent than one on the lip. They are occasionally seen on the tongue or the tonsil, and rarely on the gum or in the pharynx. In former times when syphilis was more prevalent and when catheterization of the Eustachian tube with unclean instruments was frequently performed, a chancre of the orifice of the Eustachian tube was a not uncommon event.

A chancre of the tongue is more frequent in men than in women, and in middle-aged or elderly men gives rise to a suspicion of a malignant growth, especially when the sub-maxillary lymphatic glands are enlarged and hard, as they often are. The chancre is usually single and situated on the anterior half of the dorsum of the tongue. It may occur as a smooth circular erosion if seen at

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