

CANCER OF THE STOMACH  
WITH SPECIAL REFERENCE TO  
EARLY DIAGNOSIS IN GENERAL PRACTICE.

THESIS

Submitted for the

M.D. EDINBURGH

by

DAVID TAYLOR MACKIE.

1931

M.B.Ch.B., M.R.C.P. Edinburgh.

-----



## Introduction.

Of all forms of carcinoma, cancer of the stomach is the commonest and causes the highest mortality. In the United States, according to Rehfuss (1), it is responsible for 38 per cent of all cancer deaths. Hurst (2) writes that in Great Britain 5 out of every 100 people dying after the age of forty are victims of cancer of the stomach, while it is responsible for one third of all the deaths from cancer. Wyard (3) and other authorities believe that the incidence of the disease is on the increase. The Registrar General's returns show an annual rise in the death rate from cancer, even when the increase in the population has been considered. This may be due in part to improved methods of diagnosis and to the generally improved health of the population whereby a larger proportion now reaches the ages at which cancer is commonest. Some authorities, hold, therefore, that the increase is more apparent than real. Walton (4) believes there has been no increase in cancer of the stomach since 1913, but that a large number of cases are prevented because they are operated upon while they are still benign ulcers.

All authorities are agreed, however, that the

mortality due to cancer of the stomach is far too high, and that this is accounted for chiefly by the failure to make a sufficiently early diagnosis. In many cases the patient does not consult until the disease has advanced beyond the operable stage; it is equally true that a larger number of patients have been treated for "indigestion" which has been due to early cancer of the stomach. The disease cannot be diagnosed in its early stage from symptoms alone; special methods of investigation are required, and these are not employed in general practice with the frequency they should be. The result is that the disease is rarely diagnosed in the operable stage. With the aid of modern methods of investigation, namely gastric analysis and radiology, early diagnosis is not only possible but is almost certain, and modern surgery can then eradicate the disease completely. If all individuals suffering from suspicious symptoms were thoroughly examined without delay many more cases could be operated upon with some hope of success. In all cases of indigestion in adults the possibility of cancer must be thought of. The problem before the general practitioner is not one of treatment, but of investigation; and until cancer can be definitely

ruled out any form of treatment is not justifiable. How great is the need for early and exhaustive investigation may be judged from a study of Walton's (4) 262 cases of cancer of the stomach, only nine of which have survived long enough to be regarded as probable cures.

In general practice stomach complaints are amongst the commonest met with, but the author has had only eleven cases of cancer of the stomach in a period of six years, an average of about two cases per annum. The difficulty is to pick out those two cases. To do so demands a careful study of and a thorough acquaintance with the earliest symptoms of the disease; it necessitates the investigation by gastric analysis of many suspicious cases, and the further investigation by radiology of all the probable cases. Gastric analysis is a most valuable aid in diagnosis and is a method of investigation easily carried out by the general practitioner who is prepared to spend the necessary time involved. The fight against cancer of the stomach is a fight for early diagnosis, and the onus rests upon the general practitioner. By investigating every suspicious case on the lines just mentioned, to be described in

more detail in a subsequent section, the general practitioner will have fulfilled his part in the campaign, and transfer to the specialist the onus of establishing the diagnosis. Cancer of the stomach would then be treated while it is still a local disease, not a general one, for at present the only hope of cure lies in early surgical removal.

The general practitioner who has been in the same practice for a number of years has one advantage over the specialist in so far as early diagnosis is concerned. He 'knows' the patient, that is to say, he is acquainted with his 'normal' state of health. A careful observer will note perhaps a change in temperament, a slight diminution in activity, or some slight alteration in complexion or expression. The patient may still appear to enjoy comparatively good health, there may be little or nothing to suggest gastric disease, but the doctor who has made a mental picture of the patient's normal has his suspicions aroused. He investigates.

The frequency with which patients treat "indigestion" with domestic remedies is known to every practitioner. The habit of taking patent tonics for being "run-down" or "off-colour" is also common.

The family doctor must try to educate his patients of the danger in doing so; such symptoms may be due to cancer of the stomach in its early stages. In this way the number of patients who consult with inoperable cancer will be diminished.

This thesis is an account of the author's experience in relation to the diagnosis of cancer of the stomach in general practice over a period of seven years. Within nine months cancer of the stomach in its advanced stage was witnessed in two cases; within two years a patient of twenty two years died of the disease (confirmed by operation) after a short illness. These cases made a lasting impression. They stimulated the resolve to be ever on the outlook for the insidious onset of the disease, and to cultivate an experience in the use of every form of investigation possible in general practice, with a view to making an early diagnosis. The end result is that cancer of the stomach has been diagnosed in the operable stage with gratifying results.

Etiology and Morbid Anatomy.

Etiology. Of the etiology of cancer of the stomach nothing definite is known; it is probably that of cancer as a whole. Of the predisposing causes there appears to be only one upon which authorities are agreed, namely irritation in some form - mechanical, chemical or biological. Gastric ulcer as a cause of the condition is upheld by one school and vigorously denied by another.

Age. The disease may occur at any age, but the majority of cases occur between 45 and 65. In my series the youngest patient was 22 years, the oldest 72 years. Eighty per cent of my patients were between 45 and 65 years of age.

Sex. Males are said to be more frequently affected than females. Of Walton's (4) 262 cases 191 were males. Thomson and Miles (5) found little difference in the sexes. In the writer's series 4 were females and 7 were males.

Race. The more highly civilized peoples are said to be more susceptible to cancer of the stomach; it is maintained that the disease is less common in negroes.

Heredity. It has been found difficult to

estimate the relationship of heredity in my series. People are vague about the cause of death of their relations. None of my series showed cancer of any form in relatives. Smithies (6) found a family or blood relationship in 8.5 per cent of his cases, and of these a history of cancer of the stomach in about half, i.e., 4.9 per cent of the total. Napoleon I, his father, brother, and two sisters are said to have died of the disease. A modern view is that there is some connection, i.e., chronic irritation acting on tissues predisposed by heredity.

Diet. There is no evidence that over-indulgence in any form of food plays a part in the causation of cancer of the stomach, although from time to time nearly every article of diet has been condemned. The theory that over-eating and 'bolting' of food exhausts the stomach and thereby predisposes the secreting cells to cancer has not been proved; but it is conceivable that coarse or imperfectly masticated food might, after prolonged indulgence, cause trauma to the gastric mucous membrane. Excessive protein eaters and vegetarians are alike afflicted by the disease, and in a large number of cases Smithies (6) failed to find either form of diet to be a factor in the causa-



tion of the disease. The same argument applies to alcohol; cancer of the stomach is found in chronic alcoholics but not in greater frequency than in life-long abstainers. That alcohol causes chronic gastritis is certain, and Hurst (2) believes that chronic gastritis is a precursor in 75 per cent of cases of gastric cancer. In the author's series no connection could be traced between the disease and diet or alcohol. Cancer of the stomach does not occur in alcoholics with sufficient frequency for alcohol to explain the disease in a manner applicable to all cases.

Gastric Ulcer. The association of cancer of the stomach with gastric ulcer is most important from every aspect - etiological, pathological and clinical. On this subject there is much diversity of opinion, one school asserting that the relationship not only exists but that it is present in a high percentage of cases while the other maintains that cancer is secondary to ulcer in a comparatively small number of cases.

In 1839 Cruveilhier first suggested such a relationship, and later Osler (7) found an ulcer history in only 2.6 per cent of his cancer cases. More recently MacCarty (8) put the incidence at 70 per cent, but this figure is generally regarded as too

high, e.g., by Thomson and Miles (5) and others. MacCarty based his conclusions on 3,374 cases of gastric lesions seen at operation, and states that he has never seen a small cancer (say 2 m.m. in diameter) that was not in the border of a gastric ulcer. His figures are based on histological evidence, and although at first sight convincing, the weight of pathological and clinical evidence is against the ulcer-cancer theory. The opposing views have arisen from a difference in the interpretation of the histological appearances; are isolated epithelial cells in the neighbourhood of an ulcer to be regarded as evidence of malignancy, or are they simply innocent cells that have been shut off by the scar tissue around the ulcer? Spilsbury (9) writes, "there are commonly found at the edge of the ulcer gland cells which have penetrated deeply into the scar tissue and are cut off from the (other) regenerating glands". Dible's (10) evidence is important; in 126 cases of gastric ulcer with no clinical suspicion of malignancy he found no microscopic evidence of cancer, i.e., no perforation of the muscular coat of the stomach. In cases with a clinical suspicion of malignancy 4 per cent of the ulcers showed <sup>CARCINOMA.</sup> He maintains that in an

ulcer which has been carcinomatous from the beginning the base as well as the edges are malignant, whereas in an ulcer which has become malignant the change is found in the edge only as the densely fibrous base resists invasion. On the other hand Moynihan (11) states that in two out of every three cases of carcinoma of the stomach on which he had operated there was a history of previous ulcer, while Mayo Robson (12) says that in 59.3 per cent of advanced cases of cancer in which he had performed gastro-jejuno-stomy the long history of painful dyspepsia suggested the possibility of antecedent ulcer.

Clinical data does not support the ulcer-cancer theory. In ulcer the history is long, in cancer it is short, therefore if cancer frequently developed from ulcer it (cancer) should be frequently preceded by a history of ulcer. Further, the after history of many ulcer cases should be that of malignancy. Clinically this is not supported. In Maclean's (13) series the average previous history in cancer cases was  $6\frac{1}{2}$  months, while for ulcers it was 7 years. Dible (10) found the same in his series of cases, and points out that 73 per cent of his chronic ulcers occurred in the lesser curvature, while the cancers

were nearer the pylorus. In the author's series the average previous history was four months.

Balfour (14) has investigated the after history of 1280 patients operated upon for gastric ulcer, in whom gastroenterostomy was performed, the ulcer being left. Of these less than 6 per cent finally died of cancer, but Balfour adds that some of the supposed ulcers may have been cancerous as the stomach was not opened for exposure of the ulcer at the time of the operation. Boyd (15) and Wyard (3) are of opinion that not more than 5 per cent of cancers develop from ulcers, while Maclean (13) writes that "ulcer plays but a trifling and altogether insignificant part in the etiology of cancer."

Hurst (2) believes that cancer never invades a healthy stomach, but that 75 per cent of cases are secondary to chronic gastritis, and 20 per cent are secondary to gastric ulcer. Whether or not a patient will develop cancer after chronic gastritis or chronic ulcer depends upon whether or not he has "a constitutional and perhaps inherited liability to the disease." Hurst attributes the onset of pernicious anaemia to chronic gastritis, and yet the association of cancer of the stomach with pernicious anaemia in

the same case is most unusual. In support of his gastritis-cancer theory Hurst quotes Orator, who found diffuse gastritis involving the whole stomach in 19 out of 20 "primary" cancers, whereas in ulcer-cancer the gastritis was limited more or less to the neighbourhood of the growth; but again clinical evidence does not support the gastritis-cancer theory, for the majority of cases give no history of previous digestive trouble. Hurst asserts, however, that chronic gastritis may be latent.

In none of the author's series was there anything to suggest either chronic gastritis or chronic gastric ulcer. Absence of previous digestive symptoms was the rule, and while the author has treated many cases of gastric ulcer not one has, during seven years, developed carcinoma. On clinical grounds, therefore, his experience does not support either the gastritic-cancer or ulcer-cancer theory, but is in accord with the findings of Maclean, Dible, Wyard and others.

#### Morbid Anatomy.

The relative frequency with which carcinoma affects different parts of the stomach is given as follows:-

Pyloric region.....	<del>cardia</del> .....	60%
Lesser curvature and	<del>cardia</del> .....	20%
Greater curvature.....		20%

In the writer's series the figures are:-

Pyloric region.....	6 cases.....	54.5%
Fundus.....	3 cases.....	27.3%
Cardiac end.....	1 case .....	9.1%
Unknown*.....	1 case .....	9.1%

(No operation and no X-ray investigation).

The pyloric region is therefore by far the commonest site. This is probably due to friction, which is greater here than in any other part of the stomach.

Different types of cancer are described, but they all arise from the cells of the mucous membrane, and differences in appearance depend upon the reaction of the host, and the resulting fibrosis. Where there is little fibrosis the growth is called medullary; massive fibrosis gives the scirrhou<sup>us</sup>~~sis~~ cancer, while with an extreme degree of fibrosis we find the condition of 'linitis plastica' or 'leather bottle stomach'. The tumour cells may form adenocarcinoma, or be arranged in solid masses; either variety may undergo gelatinous degeneration resulting in a colloid cancer.

The Medullary or Proliferating form usually takes the shape of a large, soft "cauliflower" mass, projecting into the lumen, sometimes causing mechanical obstruc-

tion on account of its size. It may be found in any part of the stomach, but is commonest at the pylorus. It ulcerates early and becomes infected, causing anaemia, cachexia and haemorrhage. It is relatively benign, lymph gland involvement is delayed, and the prognosis after removal is better than in the more infiltrating types.

The Sessile Ulcerated form is the most common cancer of the stomach, and occurs chiefly at the pylorus and lesser curvature. It does not project into the cavity to any extent, but occurs as an ulcer with raised and rounded edges. The malignant cells, found both in the edges and in the base of the ulcer, are usually arranged in solid masses or columns, replacing the mucosa, infiltrating the submucosa, and destroying the muscularis mucosae. Where the cancer developed secondary to a simple ulcer there is no such destruction of the muscular layer. On account of the abundant fibrous tissue this type is also called scirrhus<sup>us</sup>. There is early involvement of lymph glands and of the omentum, so that even with a comparatively small growth the prognosis may be bad.

The Infiltrating Form. In this type there is no tumour; it may be localised or diffuse. The local

form is seen at the pylorus, forming a dense ring of sclerotic tissue which by its contraction gives rise to an intense degree of stenosis and consequent dilatation of the stomach. On section the wall is thick and hard. The malignant cells are scanty, and small groups or columns are found in the abundant fibrous stroma.

The diffuse variety may involve the whole stomach with great diminution of the cavity. The cut surface shows glistening fibres like woven linen, hence the names "linitis plastica", leather-bottle stomach, cirrhosis of stomach and fibromatosis of stomach. There are probably two types, one carcinomatous the other a fibromatosis. The mucous membrane may be well preserved or extensively destroyed. The condition is relatively rare and most cases are undoubtedly carcinomatous. Walton (4) in his large series of cases found only four, and all of them were malignant; he regards the condition as an atrophic scirr<sup>us</sup>hosis cancer. The peritoneal surface is usually normal in appearance, but may show scattered white patches of infiltration. The malignant cells are few in number, and the condition is relatively benign, the lymph glands being little affected. The operation of



complete gastrectomy may affect a cure, but is attended with a high mortality.

The thickening stops abruptly at the pylorus and does not invade the duodenum. There is, however, no pyloric obstruction, the stomach behaving like a rubber tube, so that emptying is rapid.

Colloid Cancer. This is simply a gelatinous degeneration of the other varieties, the malignant cells being filled with a colloid material. The whole tumour may be converted into a gelatinous mass. It is a rare condition, occurring in about 5 per cent of cases, and the prognosis is unaffected. In my series there was one such case, and it had spread throughout the abdomen when the patient first consulted.

Methods of spread. Three routes are followed, but there are wide variations in the manner and rapidity of spread.

(1) In stomach wall, chiefly in the submucosa. The infiltrating type spreads throughout the stomach and stops short at the duodenum. The medullary form tends to spread deeply but not so widely.

(2) By the lymphatic vessels, the glands being involved sooner or later except in the leather-bottle

type. Great variations are found, e.g., a small growth with early glandular involvement, a large cancer with little or none. Hence the size of the tumour is no indication of inoperability. The supra-clavicular glands may be involved by way of the thoracic duct.

(3) By Metastasis. Secondary deposits may be found in any organ, but the liver is the most common site, involvement being either by direct extension or by the portal vein. The ovary also may be affected by direct extension; the malignant cells penetrate the stomach wall and falling downwards, over the bowels, finally take root and grow on the ovaries. The lungs (lymphatic spread), pancreas (direct spread), brain, spinal cord and bones (lymphatic spread) may all be the seat of metastases.

Symptoms, Signs and Prognosis.

The early symptoms of cancer of the stomach are generally vague and indeterminate, but they give, nevertheless, a peculiar impression which should arouse suspicion oftener than it does; an impression that all is not well with the patient. The person with a cough, a pain, or a bad headache usually consults at once. On the other hand, the patient suffering from the vague symptoms of early cancer of the stomach often makes his own diagnosis, e.g., "run-down", "off-colour", etc., and treats himself with various domestic remedies in the belief that he will regain his normal health. The slight disorder of health is to him, at first, not alarming; and it is usually after the elapse of two or three months, when the expected recovery has not materialised, that medical advice is asked. This is the type of case that the busy practitioner is apt to treat with a bottle of medicine; in many cases this is what the patient desires and is satisfied. A holiday may be ordered; the patient returns feeling better - but not cured. More definite gastric symptoms develop, suspicion is aroused, a correct diagnosis is made, but unfortunately often too late.

From an analysis of the present series of cases it would appear that in cancer of the stomach there is no symptom that is always present, and none that may not be absent. All the patients had vague symptoms for a month or two, but prior to that had enjoyed good health. There was, so to speak, a departure from the state of well-being normal to the individual. It may be that only on enquiry does the patient admit of any digestive symptoms, regarding them as secondary to his impaired health. This is in marked contrast to the "functional dyspeptic" who unmistakably complains of his stomach, and to the patient with a duodenal ulcer, whose story may closely simulate a text-book description of the disease.

When a patient comes complaining of this "vague unwellness", the doctor who knows his patient's normal will usually notice some slight alteration in appearance - there may be slight loss of weight, the complexion may have lost some of its normal colour although there is no obvious anaemia, and the expression may have become just a little anxious although the patient may say he is not over concerned about his state of health. It is difficult to

explain how the very early stages of the disease cause these signs and symptoms, but it is not surprising when we remember that the disease can kill in a few months.

Further questioning elicits the information that this vague lack of well-being has persisted in spite of the patient "being good to himself". There has been more resting, a more nourishing diet, and he may have given up the pursuit of some form of recreation from which he has not derived the usual enjoyment. The feeling of healthy tiredness has been replaced by fatigue.

Eventually symptoms develop that point to the stomach as the seat of the disease. According to Wyard (3) there are seven symptoms any one of which may be the first complained of. They are:-

- (1) Dyspepsia.
- (2) Pain.
- (3) Dysphagia.
- (4) Haematemesis.
- (5) Anorexia.
- (6) Wasting.
- (7) Tumour.

Reh fuss (1) describes four types of onset:-

- (1) Asthenia, slight gastric intolerance with distress and discomfort.
- (2) Inexplicable anaemia with anorexia for meat.
- (3) Sudden onset with pain and haemorrhage.
- (4) Anorexia, gastric distress, vomiting and loss of weight.

Spriggs (16) by noting the symptoms, not in their order of frequency, but in the order in which they first occurred, obtained the following list:-

- (1) Discomfort or pain in the abdomen, not related to food.
- (2) Loss of appetite and dislike of food.
- (3) Pain or discomfort after food.
- (4) Heartburn and eructation.
- (5) Flatulence.
- (6) Vomiting.
- (7) Regurgitation of mucus.
- (8) Weakness and constipation.
- (9) Loss of weight.
- (10) Dysphagia and inability to take solids.
- (11) Tumour.

These lists differ considerably. This is probably due to the fact that in their series the various observers have had different proportions of the various types of cancer of the stomach, for naturally the symptoms will vary with the nature of the lesion. Thus, in cancer of the cardia vomiting and dysphagia will be earlier than when the fundus is affected. Pain may be the first symptom when the pylorus is affected, and is due to the disease in its early stages irritating the muscularis mucosae and throwing the pyloric sphincter into spasm. Likewise this may cause early vomiting.

In the present series the following tables give (1) the number of times any symptom was the first complained of by the patient and (2) the relative

frequency of each symptom irrespective of its time of onset in the early stages.

Table 1.

Frequency of a symptom as a first complaint.

Discomfort	.....	4
Vomiting	.....	2
Anaemia	.....	1
Flatulence	.....	2
Pain	.....	1
Anorexia	.....	1
Total	.....	11 cases.

Table 11.

Frequency of occurrence of individual and early symptoms irrespective of time of onset.

Anorexia	.....	9
Discomfort	.....	7
Flatulence	.....	7
Vomiting	.....	5
Weakness	.....	5
Loss of Weight	.....	3
Pain	.....	2
Sleeplessness	.....	2
Anaemia	.....	1

It should be noted that table 11 refers to early symptoms. As a late symptom pain is invariably complained of.

We shall now consider the symptoms more fully, taking them in the order given in Table 11.

Anorexia. This is due to infiltration by malignant cells of the muscular coat, as the sensation of hunger depends upon the healthy tonus of the wall of the stomach. It will vary with the degree

of infiltration, and is therefore likely to be greater and also earlier with the infiltrating form of cancer than with the large medullary tumour. It will also vary according to the amount of associated gastritis. A minute ulcer on the cornea renders the eye intolerant of its normal stimulus (light) and interferes with the proper functioning of the organ; it seems reasonable to suppose, then, that a small cancer might also interfere with the function of the stomach and render it less tolerant of its normal stimulus (food).

Discomfort. This is variously described by patients, e.g., "a fullness", "a tightness", "as if wind under pressure could not escape", "as if the food did not digest and lay heavily in the stomach", "just an uncomfortable heaviness but not pain". This discomfort is usually worst after food and is often relieved by vomiting, but tends to be continuous. This is probably due to interference with the normal peristalsis of the stomach and to a general inhibition of its function arising from the presence of disease.

Flatulence. The onset is usually soon after meals and continues "off and on" for some time. The



writer has found that the desire to eructate and an inability to do so is sometimes described as flatulence. In the early stages of the disease this may be due to irritation of the cancer causing spasm of the stomach; the pressure of the stomach walls on the food gives the same feeling of distension as an accumulation of gas. It has been elicited, on enquiry, that more gas is "brought up" some time after a meal rather than immediately afterwards. Maclean (13) suggests that the absorption of gas liberated in the process of digestion may, in diseased conditions, be interfered with. Observations in the present series show that the degree of discomfort or distension bears no relation to the amount of gas eructated. Fermentation could hardly account for all the flatulence, since we are discussing it as an early symptom.

Vomiting was an early symptom in half of the cases. In one case, cancer of the cardia, vomiting was the first symptom, and occurred soon after food, the vomitus being small in amount and like white of egg. It was also an early symptom in three cases of cancer of the pylorus; in two of these the vomiting occurred very early and later disappeared for

a time, recurring finally in the obstructive form. The early vomiting was probably due to spasm of the pylorus. The remaining case with early vomiting was one of diffuse colloid cancer which rapidly spread throughout the whole abdomen.

Weakness, like vomiting, occurred early in half the series. It was probably associated with the general feeling of unwellness, and partly due to the diminished intake of food. Weakness is possibly the first stage of the cachexia that occurs as a late symptom in all untreated cases, and is probably a manifestation of the systemic disturbance caused by cancer of the stomach.

Loss of Weight. This was an early complaint in three cases, in the patient of twenty two, in case No. 6 (cancer of pylorus), and in case No.9. The last was operated upon early with an excellent result; the first two were not operated upon and both ran a rapid course. It would appear, therefore, that loss of weight is likely to be an early symptom in the more malignant forms of the disease. In every case of this series, however, there was some loss of weight when the patient first consulted, even although it was not complained of or noticed by the patient.

Sleeplessness. This was present in two cases. One patient, a ship Captain, admitted being worried about his condition - "afraid something serious might happen while he was at sea". He also had a pain below his heart, a symptom that often causes anxiety - whatever the cause. The other patient, a coal-trimmer, was not anxious about himself; he "just could not fall asleep on going to bed, but once over, could sleep soundly till morning". Sleeplessness was probably due, in this case, to the fact that the chief meal was taken in the evening, so that the symptoms may have been worst then.

Pain, as an early symptom, was found in only two cases. In case No.9 it was felt below the heart and radiated through to the back. It was never absent and was worst between meals; but at the time of examination it was only of ten days duration. The pain might have altered in character later had the patient not been operated upon early. Taking food seemed to relieve the pain - "it certainly did not make it worse". In this case the total acidity was very low, and there was no free HCL.

In case No.10, pain of fairly sudden onset was the very first symptom. It was felt in the pit of

the stomach, was "cramp-like", and came on after a meal, which was vomited later. It lasted for half an hour. This pain was probably due to a spasm of the pylorus. There had been no indiscretion of diet; and although there was no recurrence of actual pain until about four and a half months later, the patient suffered from a "constant heaviness" in the stomach which made him "conscious of his stomach" thereafter.

Pain occurred sooner or later in all the cases that were not operated upon, and was worst after food but never absent altogether.

Anaemia, as an early symptom, was found in one case. In fact the patient's complaint was "bloodlessness". This patient, however, had always been somewhat anaemic, and used to treat herself with Blaud's pills. On this occasion, however, the anaemia had grown gradually worse in spite of her own treatment for two months. On examination a considerable degree of anaemia was found, but occult blood was not detected in the faeces. The anaemia in this case was probably due to an inherent weakness in the blood forming organs which was accentuated by the onset of cancer. Boyd <sup>(15)</sup> ~~(13)~~ writes, "occasionally an anaemia will develop where it would

appear as if the neoplastic process exerted some inhibitory influence on blood formation in the bone marrow".

Six cases were seen in the early stages of the disease, and although only one complained of bloodlessness, in all of them an alteration in the complexion was noticed; the mucous membranes were still red and the haemoglobin not appreciably reduced. There was just a slight departure from the patient's normal colour, detectable by one familiar with the patient.

The late symptoms of cancer of the stomach are well known and are not mentioned here as they have no bearing on the main theme of the thesis, i.e., early diagnosis.

#### Physical Signs.

There are few physical signs in the early stages of cancer of the stomach; and early diagnosis cannot often be made thereby. Physical examination should be preceded by a dose of castor oil for two reasons:-

- (1) Constipation may cause distension and put the abdomen into a state of tension.
- (2) It permits of a satisfactory rectal examination being made.

The contour of the abdomen is noted and the presence of any prominence looked for. There may be slackness of the skin and some diminution of the panniculus adiposus. The abdominal wall is usually flaccid, and there may be deep tenderness over the stomach. A tumour may be felt, but a negative finding is no evidence that there is not a growth. Pyloric tumours are most easily palpated, and may be located as low as the umbilicus; tumours of the cardiac end are difficult to feel. The mobility or fixity of the tumour is noted. In the present series a tumour was just palpable in two early cases. In case No.1 the tumour, of size less than a hen's egg, could be felt at one time and not at another. In case No.4, a definite tumour the size of a hen's egg was felt in the epigastrium just above the umbilicus. In Cases No.5 and No. 11, the pyloric tumour was not palpable.

#### Prognosis.

Cancer of the stomach is fatal if not treated by radical operation, at present the only known curative treatment. This demands early diagnosis, which is therefore the most important factor influen-

cing prognosis. The malignancy of the growth, and the degree of perigastric lymphatic invasion are very important factors; the glands earliest infected are those along the lesser curvature, and if they alone are involved the disease can be completely eradicated. Wide spread glandular infection and evidence of metastasis in other organs indicate an unfavourable and practically hopeless prognosis.

The general health of the patient has a bearing on prognosis. In case No.4, radical operation could not be risked because of the degree of anaemia and weakness; a gastro-enterostomy was performed but the general health did not improve sufficiently thereafter and the radical operation was never carried out.

The size of the tumour need not necessarily influence the prognosis; a large growth with little lymphatic gland involvement can be successfully removed, while complete eradication is impossible with a small tumour if there be evidence of extensive spread or metastases. Thus lymphatic spread bears no relation to the size of the primary lesion in the stomach.

Age appears to affect prognosis, as the disease

seems to be more virulent in the younger patients.

Of surgically untreated cases in this series the duration of life was from  $3\frac{1}{2}$  months to 13 months, the average being between 7 and 8 months. The author has recently seen a patient with cancer of the stomach who has survived for two years since the onset of symptoms, and many other such cases have been recorded.

Of the two cases successfully operated upon both are alive and well, the one sixteen months and the other twenty one months after operation.

Hurst (2) writes, "it is indeed doubtful whether permanent cure occurs as the result of treatment in more than 1 or 2 per cent of all cases of cancer of the stomach".

Walton (4) says that "of the 262 patients with carcinoma of the stomach that have sought my advice, nine, and nine only have survived for a long enough time for me to regard them as probable cures."

The two cases in this series referred to above must therefore be regarded only as probable cures.



Diagnosis with special reference to General Practice.

The large majority of cases of cancer of the stomach are not diagnosed early enough to permit of complete surgical removal. It is true that in some instances the disease has spread beyond the stomach almost before gastric symptoms appear; but nevertheless, the patient and the doctor are jointly responsible for the low percentage of early diagnoses. Spriggs (16) writing on this subject, says, "if we look at the problem as a whole it is clear that the biggest part of it is outside our consulting rooms. The hiatus, the leak, the reason for the continued enormous mortality is at an earlier stage". Goldie (17) in an analysis of 137 cases of gastric cancer, found that the average duration between the earliest symptoms and a definite diagnosis was eight months. The average time between the earliest symptoms and the consulting of a physician was  $4\frac{1}{2}$  to  $5\frac{1}{2}$  months, which leaves the average time between consulting and a definite diagnosis of from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  months; that is to say more time was lost by the patient than by the doctor. In the present series, 6 consulted early and 5 late. Practically, this means an ultimate mortality of at least 50 per cent before the doctor has

had an opportunity of making a diagnosis. Early diagnosis must therefore involve something more than mere physical, chemical and radiological examination. Patients must be educated against the danger of treating themselves for "indigestion", for "being run down" or "off colour". The general practitioner by reason of the intimate relations existing between him and his patients, is in a position peculiarly favourable to do so. During the past five years such an effort has been made by the author. No matter how trivial or unsuspecting the form of dyspepsia complained of, the patient is warned that the same or even milder symptoms may occur again and be due to a more serious underlying cause. "Always consult a doctor for indigestion, or when you feel run down"; these words usually end the consultation. An adult who complains of being "off colour" is never treated without a thorough examination to determine the cause and is warned that his complaint may sometimes be a serious one. While making the daily round of visits a look-out is kept for such patients; for instance, if when in a home, the question "are the other members of the family well", elicits the information that "so-and-so" is "not right", that patient is asked to come for examination without delay. This campaign has brought

at least two patients with cancer of the stomach, the one early, the other late, but the latter had been having medical treatment for some months. Another patient was seen to be "off colour" while in attendance upon his wife. He had cancer, not of the stomach, but attributed the failing health to the fact that he was "getting older". The end result is that hundreds of cases of dyspepsia and a large number of people with vague illnesses have been examined; a considerable experience in gastric analysis has been acquired, and the picture of early carcinoma of the stomach has been impressed upon the mind of the author. Such a campaign need not create cancerophobia; it is carried on without the word cancer being used.

With regard to the second factor, namely loss of time by the doctor, it can be said of the author's series that all suspicious cases, and therefore all those that proved to be malignant, were submitted to X-ray examination or had the opinion of a consultant, not later than two weeks after first consulting. A week or a fortnight was usually required to make the fullest clinical examination possible in general practice. Cases that could be diagnosed with ease or with certainty were usually inoperable; it was those

which demanded the expenditure of considerable time and work to establish the probability of cancer of the stomach that were operated upon in the early stages. It seems reasonable to postulate, therefore, that to succeed in diagnosing early cancer of the stomach the general practitioner must be prepared to spend much time upon investigation rather than a few minutes on treatment.

Moynihan (18) may well be quoted here. He writes:- "It must be realised that certainty of diagnosis means improbability of cure. There are no symptoms pathognomonic of carcinoma (of the stomach) in any of its stages; the symptoms are only suggestive, not conclusive. When these symptoms appear in people of thirty-five or over, the case is not one for treatment but for investigation. The success of medical treatment in early cases of cancer of the stomach is one of the causes of the very high mortality of the disease. When carcinoma is present, a restriction of diet, a change of scene, and the administration of drugs will bring a measure of relief for a short time. It is not relief that is wanted. It is knowledge. We should seek not to subdue symptoms, but to evoke them. To treat - without the fullest inquiry is not justifiable".

Mindful of Moynihan's strictures, the author has dealt with all suspicious or probable cases of cancer of the stomach in the following manner:-

(1) A careful history is taken. The patient is allowed, and is given time, to tell his own story. This may take half an hour or longer.

(2) The history is carefully studied, then variously phrased questions are put to him.

(3) A close observation is made of the patient and there is looked for any slight alteration in complexion, in expression, in weight, or in his mentality. Later, his wife or other relative living in the house, is asked to give an opinion and is questioned.

(4) A general examination is made; this includes examination of the urine, the faeces, the rectum, the blood (haemoglobin, film, and counts), and in some cases the sputum, the Wassermann reaction and the blood pressure.

(5) If dyspeptic symptoms are present, especially if of recent origin, a gastric analysis is made at once.

(6) If there are no symptoms pointing to the stomach as the seat of disease, and if the general

examination fails to find an explanation of the symptoms, then a gastric analysis is made.

(7) If the gastric analysis reveals a suspicion of carcinoma, then the case is referred to the radiologist, the consultant, or to hospital.

It seems fair to claim that the general practitioner who faithfully carries out this system of investigation has discharged his part in the fight against cancer of the stomach, and has passed to the specialist the onus of establishing the diagnosis. Consultants have frequently acknowledged the great help afforded by a complete report accompanying the patient, and have always had the fullest investigation carried out, even to the extent, in one case, of exploratory laparotomy.

In a case where the general examination has at first failed to establish any cause of the illness, the writer has found the fractional test meal and examination of the faeces for occult blood of the greatest service. These aids have eliminated cancer of the stomach in suspicious cases much more frequently than they have enabled a tentative diagnosis of the disease to be made; but this is accounted for by the fact that the number of suspected cases far

exceeds the number of actual cancer cases. In two cases, however, they have led to an early diagnosis being confirmed by X-rays.

The technique followed in gastric analysis is that described by Maclean (13). A light supper with four charcoal lozenges is allowed on the preceding evening. At 9 a.m. the fasting contents are completely drawn off through a Ryle's tube and the stomach is then washed out with tepid water. With the tube left in position one pint of oat-meal gruel is given. Fractions are drawn off twenty, forty and sixty minutes afterwards. The resting contents and the volume of the meal remaining in the stomach at the end of one hour are measured. The tube is then withdrawn.

The free and total hydrochloric acid in each specimen and in the resting juice are estimated. Lactic acid is tested for in each specimen.

The character and odour of the resting juice are noted. If in passing the tube the patient should vomit, the vomitus is kept and examined. Its volume is also measured. A microscopic examination is made to determine the presence or absence of starch granules, blood, pus, undigested food, yeasts,

sarcinae, Boas-Oppler bacilli, and epithelial cells.

The fractional test meal has been used in investigating the cases of this series, but Maclean holds there is nothing whatever to be gained by employing this method; a small amount of free acid may be found in one or two fractions, "but in the majority of cases (of gastric cancer) no free hydrochloric acid is found in a sample removed one hour after ingestion".

All the above investigations can easily be carried out in general practice, at little expense, but they demand time.

The literature reveals a considerable diversity of opinion regarding the value of gastric analysis as an aid in the diagnosis of cancer of the stomach. Maclean holds very decided views. He writes, "any patient with a suspicion of gastric cancer whose test meal shows no (free) hydrochloric acid but a definite amount of lactic acid has got cancer. I feel certain that in some cases lactic acid is present in the gastric contents even before appreciable symptoms of dyspepsia manifest themselves". Wyard (3) on the other hand, says "test meals have, in my experience, proved extremely unsatisfactory from the



point of view of gastric cancer". Bennett (19) asserts that "gastric analysis finds perhaps its most useful application in the diagnosis of cancer of the stomach", and adds that "it is capable of detection by this method probably in as great a proportion of cases as when X-ray examination alone is made". Bennett puts more reliance upon the complete gastric analysis rather than upon the absence of free hydrochloric acid alone.

With regard to the finding of lactic acid in gastric analysis there is also a lack of agreement. Numerous theories as to its manner of production have been put forward, e.g., fermentation, production by tumour, secretion by the stomach. Dodds and Robertson (20) isolated lactic acid as a zinc salt from a case of carcinoma of the stomach, and chemical analysis, together with polarimetric observations proved it to be inactive. Inoculation of gruel with small quantities of the resting juice proved that large quantities of lactic acid were produced in so short a time as six hours. They concluded that in this case at least lactic acid arose through fermentation. Further, they found lactic acid in the

resting juice of 46 per cent of non-malignant cases in a total of 73 consecutive gastric analyses. Their opinion is that the finding of lactic acid is of little value in the diagnosis of cancer of the stomach.

Maclean emphatically declares that the fermentation theory is "utterly absurd", that lactic acid frequently occurs in a large amount at a very early stage of cancer, before there is any sign of obstruction, and that the size of the growth bears no relationship to the presence of lactic acid. Maclean finds that when a malignant stomach is washed out till the water contains no trace of lactic acid, a test meal given immediately afterwards often reveals the presence of considerable amounts of lactic acid in the first half hour.

The author's experience has been in agreement with Maclean's teaching. In a country practice it is not easy to send every case of suspected cancer for X-ray examination. The question of expense in a panel practice has to be considered. Short of radiology, there is no other means known to the author except gastric analysis, that is of any real value in helping to make a diagnosis of early gastric

cancer. It has been employed over a period of four years, and in every case except one in which a diagnosis of cancer of the stomach was made the disease was found at operation. In the one exception a radiological examination was made in hospital, but the surgeon had recourse to exploratory laparotomy before he could satisfy himself that cancer of the stomach was not present. Further, in no case in which the author took the responsibility of saying, as a result of gastric analysis, that cancer was absent, has the disease so far developed.

Assuming that gastric analysis is of no value in the diagnosis of gastric cancer, then the general practitioner must make his early diagnosis on clinical grounds. Granted the presence of a tumour, this can be done with some degree of certainty; and while the finding of a tumour is not incompatible with complete surgical removal, it at least means that the disease has been present for some considerable time, and, in a majority of cases, inoperable. Conversely, the absence of a tumour does not ensure the absence of cancer, which might be capable of diagnosis if the test meal were used. In that type of case with vague illness and indefinite gastric symptoms there may be no physical signs on abdominal examination, and other

diseases, at an early stage, may simulate carcinoma of the stomach. In some cases the symptoms are quite anomalous, with little or nothing to point to stomach involvement. The author maintains that the general practitioner who investigates all such cases by means of gastric analysis has a much better chance of diagnosing cancer of the stomach in its early stages than the one who does not. To wait for definite signs and symptoms to develop is to wait until it is too late. The result of the gastric analysis may not be "definite" or "characteristic", but no clinical investigation is capable of rule of thumb interpretation. By comparing the findings of gastric analysis and the history of the case with those of other cases that have been proved to be cancer by operation, the observer who practises gastric analysis can at least form a reasonable suspicion of carcinoma. Further, the value of the subsequent X-ray observations is greater when used in conjunction with clinical observations plus the results of gastric analysis, and the radiologist is greatly assisted in making his report.

In the author's series lactic acid was found in all the cases that were proved to be cancer, i.e.,

*(it was not tested for.)*

7 in number. In the remaining 4, <sup>v</sup>It was not present after washing out the stomach in any of the cases that proved to be innocent. In testing, Maclean's ferric-mercuric-chloride was used.

Free hydrochloric acid was absent in all <sup>(cancer)</sup>cases investigated by gastric analysis.

Occult blood in the faeces was found in only one of the early cases. While not in itself pathognomonic of cancer of the stomach, its presence in the faeces, in conjunction with absence of free hydrochloric acid and the presence of lactic acid in the test meal, adds to the likelihood of carcinoma. Wyard considers the benzidine test (that used by the author) to be valueless unless for four days previously the patient has been on a diet absolutely free from chlorophyll and haemoglobin. Maclean, on the other hand, holds that a more or less liquid diet tends to obviate internal bleeding, and that "the change in diet tends to defeat its own ends". In his opinion the amount of meat required to invalidate the test is so large that no patient with any dyspeptic trouble could consume it. The writer did not diet his patients, but few of them ate large

quantities of meat.

Tumour. A tumour was palpable in only two early cases. In one, the condition was at first thought not to be cancerous, but operation at a later date unfortunately proved that it was. The patient was only 22 years of age. In the other, the disease was at a sufficiently early stage to allow of complete removal, but the patient was too anaemic to stand the radical operation, and only a gastro-enterostomy was performed. In two other cases a tumour was found at operation, although it was not palpable through the abdominal wall.

Pain. The usual character of the pain in the early stages of gastric cancer has already been described in Section 3. The writer has had two cases of carcinoma resembling a clinical type described by Moynihan "in which there is a mimicry of the symptoms of duodenal ulcer. The only difference, and it is extremely significant, is the absence of "intervals". If the symptoms of duodenal ulcer appear for the first time in a man of middle age, are at once "classical", but do not improve under treatment, no "interval" occurring, grave suspicion of malignancy must be entertained." Cases Nos. 6, 9, and 11 were of this

clinical type. Case No.9 had been treated for duodenal ulcer before consulting the author, who also made a provisional diagnosis of ulcer, until the gastric analysis ruled out that condition.

X-rays in the diagnosis of cancer.

Radiology is beyond the scope of the general practitioner, and the author claims no practical knowledge of it, but all his suspicious cases are sent for X-ray investigation. There is general agreement as to their value. Rehfuss (1) places radiology first in the early recognition of gastric cancer, 96 per cent of all cases being capable of diagnosis thereby. He adds, "the X-ray never lies; the error is usually one in interpretation." True as this may be it is significant to read that Haudek (21) the renowned radiologist says, "In every case I personally take an accurate history of the illness, because it forms a frame into which the X-ray findings are fitted." Hence the value of careful and exhaustive clinical investigation by the family doctor. Haudek maintains that, "an experienced radiologist can establish at an early stage with a considerable degree of certainty whether a car-

cinoma is present or whether it can be definitely excluded," but he adds that, "the result of an X-ray examination depends far more on the skill of the investigator than on the quality of the apparatus." Screening and photography are both essential to detect cancer. Wherever the stomach wall is infiltrated there is a cessation of the peristaltic wave; a tumour shows as an irregular filling defect; obstruction at the pylorus is evident by delayed emptying of the stomach; infiltrating cancer at the pylorus may interfere with pyloric closure so that emptying may be quicker; the site of a small cancer is recognised by an alteration in the course of the mucosal folds.

As to results, Haudek writes:- "The number of really small carcinomata discovered by me in the earliest stage is very small. Much larger is the number of quite operable carcinomata. Most numerous of all my cancer cases have been those in which I was compelled to report inoperability." We must conclude, therefore, that for any further improvement in the mortality due to cancer of the stomach, we must still look to the disease being diagnosed or suspected at an earlier stage and with greater frequency by the general practitioner. We believe that investigation by



the general practitioner in the manner outlined above would enable the radiologist to pass on to the surgeon a higher percentage of operable cases.

Treatment.

The treatment of cancer of the stomach may be considered under two heads:-

(1) Curative, and (2) Palliative.

(1) Curative. The only hope of cure lies in early and complete surgical removal of the disease. Unfortunately this is seldom possible, as the disease is seldom diagnosed sufficiently early. Walton (4) had 9 cures out of 262 cases operated upon. Wyard (3) states that of 200 cases admitted to the Cancer Hospital in only 10 was resection attempted, "of whom one was alive and well 16 years later, but none of the others survived two years." Mayo (22) found that out of 651 resections of the stomach, 38.6 per cent were alive three years or more, and 26.5 per cent were alive five years or more after operation. Mayo's figures are regarded by Walton as too optimistic.

The radical operation involves complete and wide removal of the affected segment of the stomach together with all the associated and infected lymph glands. It should be carried out in all cases where this is possible, provided there is no evidence of metastasis or too extensive glandular involvement, and provided further that the patient is in a fit state of general

health to stand the operation. Enlargement of lymph glands does not always mean they are malignant, as infection of a carcinomatous ulcer by pyogenic organisms may cause enlargement without there being cancerous infiltration. Firm adhesions to neighbouring organs usually renders the radical operation impossible, but it is possible to remove along with the growth a superficial piece of the pancreas, or a segment of the colon. Mayo-Robson (23) records one case where "removal of the gall-bladder, a portion of the liver and pylorus, as well as a considerable area of parietal peritoneum and the overlying rectus muscle, was not only followed by recovery, but the patient is well over six years later." This is exceptional.

The extent of the disease in the stomach does not in itself contra-indicate the radical operation as the whole organ has been successfully removed, an anastomosis between the lower end of the oesophagus and the intestine being made.

Freedom from recurrence for four or more years is regarded as strong probability of cure. The fact that recurrence may occur is proof that removal of all visible evidence of cancer does not always mean

that the disease has been completely eradicated. For this reason Walton (4) now uses radium in conjunction with operative treatment after every radical operation, with a view to preventing or lessening the high recurrence rate. He places 12 m.g. around the coeliac axis and 8 m.g. around the head of the pancreas. The radium is left in situ for four days. It is too early to estimate the result of such treatment.

In patients too weak to stand the radical operation, a gastro-enterostomy may be performed first, and after a time the resection is carried out.

The mortality from the radical operation is estimated by different surgeons at from 14 to 20 per cent., and seems to depend upon the extent of lymphatic involvement. The chief causes of death are peritonitis, pneumonia, and gangrene of the colon.

(2) Palliative.

Palliative treatment may be surgical, medical or by means of X-rays and radium.

(a) Surgical treatment is carried out in nearly all cases unless there is evidence of a general dissemination of the disease as indicated by metastasis in the liver, peritoneum, lungs and other organs, by the presence of ascites, or involvement of the



cervical glands; and further, provided the patient is not too weak to stand the operation.

Although the operation holds out no hope of cure, many cases derive much comfort and happiness therefrom, and life may be prolonged for a number of years. Walton (4) gives the average expectation of life as 3 to 6 months in cases not operated upon; in the present series the average was 7 to 8 months. After operation life may be prolonged for as much as 3 to 4 years.

Where possible the tumour and all accessible lymph glands are removed and a gastro-enterostomy is performed; or a gastro-enterostomy alone may be performed, the nature and extent of the operation depending upon what the surgeon finds on opening the abdomen. Marked improvement in the general condition of the patient often results; weight increases, appetite improves and anaemia diminishes. There is sometimes an almost complete disappearance of the weakness. Great relief is given in cases of pyloric obstruction. In such cases, even if the tumour cannot be removed and is not yet causing obstruction, a gastro-enterostomy should be performed to overcome any subsequent obstruction. The short circuiting is

said to bring about a diminution in the size of the growth and in its activity. Similarly, in a malignant hour-glass stomach a short circuit may be established between the intestine (jejunum) and the proximal end of the stomach. In extensive carcinoma of the cardiac end of the stomach gastrostomy has been performed, but life under such conditions is so little to be desired that it is seldom performed unless there is some very special reason for prolonging life.

(b) Medical treatment, although by necessity only palliative, is important as much can be done to add to the patient's comfort, and so make life a little more tolerable. An effort should be made to prevent the patient becoming bed-ridden as long as possible, and an optimistic attitude should be adopted by the doctor throughout. In the terminal stages, when cachexia is marked, a water-bed adds greatly to the comfort of the patient, and a liberal use of eau-de-Cologne together with free ventilation of the sick room is desirable.

The presence of cancer entails a diminution of gastric function, and an effort is made to deal with this by suitable diet, drugs, and lavage.

Diet. Small frequent meals are usually best tolerated. In order to maintain the pleasure of eating and to stimulate the appetite - a difficult task - any nourishing article of food the patient likes is allowed provided it does not upset the stomach later. All food must be well chewed. In the author's opinion meat thoroughly masticated enters the stomach in a finer state of subdivision than does "minced meat", which is usually swallowed whole. Benger's food properly prepared is useful, but coarse or raw vegetables and raw fruit should be avoided. Soup is allowed if desired, but is given apart from meals, with a little dry toast.

Drugs are invariably required for the relief of symptoms. Where tolerated dilute hydrochloric acid (minims xx) with liquor strychninae (minim i) given in water thrice daily with meals is often helpful in improving digestion and relieving discomfort. An alkaline bitter containing a little nux vomica given before meals may lessen the anorexia. Chloretone, grains 2 to 5 in a cachet, is useful in treating nausea and vomiting. Where there is vomiting and pain the combination of bismuth and nepenthe often gives relief, while the latter affords some peace of mind. For flatulence charcoal lozenges are given,

often with marked effect. Medinal or a mixture of chloral and bromide combat sleeplessness. For the relief of pain in the later stages morphine is nearly always necessary, and most general practitioners give it in whatever amount is required. Wyard (3) says "morphine is rarely, if ever called for, and should never be given." It would seem unreasonable and inhuman to withhold morphia when all other drugs have failed to give relief. Large doses are ultimately required; the author has given hypodermically up to five grains daily, but he has recently seen a patient who consumed eighteen grains daily with no apparent harmful effects.

Lavage of the stomach is a rational form of treatment and is said to be of considerable value in cleaning the stomach, relieving pain, and diminishing flatulence, if thoroughly carried out daily. A solution of salt, sodium bicarbonate or neutral acriflavin  $\frac{1}{5000}$  are examples of the fluid used; the last named is said to mitigate the ill effects of secondary infection, namely, pain and flatulence. In the author's limited experience - only one case having been treated by lavage - it is disliked by the patient and causes considerable upset. As a



substitute the patient is given a large tumblerful of warm sodium bicarbonate solution in the morning, and vomiting is induced by the patient placing two fingers on the back of the tongue.

Injection of Colloids. The author used collosol selenium injections in one case with no apparent benefit. This may have been due to insufficient dosage. Wyard writes:- "To give 0.5 cc. intra-muscularly once a week is of no use whatever, but to give 5 to 10 c.c. intravenously every day often effects considerable improvement." Ten injections constitute a course, followed by a fortnight's rest, so that three courses are given in about three months. "Treated in this way I have seen many patients improve in a most extraordinary manner. Pain and vomiting cease, the patient puts on weight, appetite improves, anaemia diminishes. It has definitely and undoubtedly ameliorated the patient's condition and prolonged his life."

X-rays and Radium. Deep X-ray radiation has been suggested but the results so far have not been encouraging. The rays are said to diminish the activity of the cancer, but it is not known whether they act by killing the malignant cells, or by

stimulating the healthy tissue cells to combat the disease by shutting it off with a zone of fibrous tissue. On this subject Wyard (3) writes, "that although X-rays will in some circumstances bring about the death of a cell, they will in others stimulate it to greater activity, as is conclusively shown by the undoubted existence of X-ray cancer. It is possible, therefore, that X-ray treatment might increase the trouble rather than diminish it. I am of opinion that it is not a desirable method."

The treatment is very depressing. Moreover, the mucous membrane of the intestinal canal is very easily damaged by the X-rays, and cannot be exposed for any length of time to their action, without the risk of the patient being made seriously ill. Severe vomiting may result.

Radium has been used in gastric cancer, being applied either directly through an abdominal incision, or by the intra-gastric route. A method of intra-gastric radium treatment is described by Menees (24). The radium is placed inside a small rubber balloon provided with a long rubber tube through which runs a spiral wire attached to the radium. The balloon is swallowed, and is then in-

flated in order to outline the stomach. By means of the spiral wire the radium is placed against the cancerous area, the manipulation being done under radiographic control to ensure accurate *em-*placement of the element. The treatment is said to slow the rate of growth of the cancer and to relieve pain and haemorrhage.

Perhaps of more importance is the use of radium in conjunction with operative treatment described above.

Clinical.

The following is a clinical account of eleven cases of cancer of the stomach, and of eleven cases that were suspect, but which, on investigation, were found not to have the disease. Pathological reports and operation notes are given where available, also the result of gastric analysis where performed.

Case 1. E. McG., female, aet 22 years, domestic.

Complaint. Indigestion and discomfort in upper abdomen. Until a month ago had been quite well. The discomfort was gradual in onset - never actual pain. Used to be most marked after meals, but is now more or less constant. Does not awake her at night. Patient has lost weight and there is loss of appetite due to nausea. She gets tired eating before a meal is finished, and often has flatulence afterwards. No vomiting; she is easily tired.

Examination. Slight tenderness on deep pressure over the upper part of the left rectus. No tenderness over the appendix. Patient is somewhat anaemic and has obviously lost weight. Marked family history of tuberculosis. Condition therefore at first thought to be tuberculous, but there was nothing found to support this. Urine sugar free.

Three weeks later a small lump was felt in the left hypochondrium, but could not be palpated on the following day. A careful watch was kept for a week and it was observed that the lump was palpable at one time but not at another. The patient was sent to hospital for an opinion with the suggestion that there might possibly be cancer of the stomach. The opinion was in favour of a tuberculous condition.

In spite of rest and fresh air the patient continued to go down hill, and the lump became more easily palpable. Six weeks later patient was sent back to hospital and was admitted; she was operated upon but died in hospital soon afterwards. Cancer of the stomach was found.

Duration of symptoms = 14 weeks.

At this time the author had not begun the use of gastric analysis, so no figures are available.

Case 2. M. McL., female, aet 48, housewife.

Complaint. Troublesome flatulence and abdominal discomfort felt right across the abdomen from the umbilicus upwards. Loss of appetite and occasional vomiting - the vomitus was often dark brown in colour. Patient thought she had lost some weight; she was certainly getting weaker. Symptoms ascribed to con-

stipation, but had always been constipated.

History. Operation for gall-stones and appendicitis ten years ago. Marked degree of anaemia four years ago - recovered completely after nine months on iron and arsenic. Patient had been well until three months before consulting, and until two months ago she had had no indigestion.

Examination. Abdomen distended and somewhat doughy. Thin abdominal wall. Waves of peristalsis in small bowel visible. Some ascites. Liver not enlarged; no tumour felt in the stomach, but a peculiar resistance to palpation. Tenderness on deep pressure over the whole abdomen. A diagnosis of generalised abdominal tuberculosis or cancer was made, and the patient was sent to hospital. Patient vomited during the examination. The vomitus contained lactic acid but no free hydrochloric acid. An immediate operation was performed; surgeon reported as follows:- "In the deeper part of the incision nodules of malignant disease were observed involving the anterior abdominal wall. On opening the peritoneum the entire mesentery, mesocolon and a portion of the small intestine were observed to be studded by innumerable nodules of colloid carcinoma. There

was a large amount of free fluid present. The condition was inoperable."

The primary lesion was a colloid cancer of the stomach.

Died six weeks after operation. Great pain and incessant vomiting, black in colour.

Duration of symptoms = 19 weeks.

In this case no attempt was made to perform a gastric analysis; the patient was sent at once to hospital.

Case 3. H.M. Female, aet 63. Housewife.

Complaint. Vomiting and pain after food, loss of appetite and loss of weight. Flatulence.

History. Until a year ago was in excellent health. First symptom was vomiting of a "thin fluid like white of egg" after meals. This, at first, was preceded by flatulence, but there was no discomfort. This occurred at irregular intervals of a few days to a fortnight, and continued for six months, when the vomiting became more frequent and the vomitus more like that of an ordinary sickness. No pain. Loss of weight began about three months ago, and a doctor was consulted. Patient has been on treatment since, but with no improvement. The vomiting is now associated with pain.

Examination. An emaciated and slightly anaemic patient. Tenderness on deep pressure under the left costal margin, but no palpable tumour. Liver slightly enlarged. All other systems apparently healthy. Occult blood ++ in stools. On being questioned patient stated she could not now take any form of solid food - "it lay like a weight in the stomach and was soon vomited."

A test meal was arranged for the next morning, but on passing Ryle's tube it failed to pass beyond the first mark. About 15 c.c. of fluid, brown in colour, were withdrawn; contained blood and lactic acid but no free hydrochloric acid. The patient became sick and vomited the tube. A diagnosis of cancer of the lower end of the oesophagus and cardiac end of the stomach was made. The condition was almost certainly inoperable, and in any case, the patient refused to go to hospital. Died four weeks later. Pain was complained of only towards the end.

Duration of symptoms = 13 months.

Case 4. A. N. Female, aet 59. Housewife.

Complaint. "Bloodlessness, weakness and loss of appetite". Flatulence and a feeling of fullness after meals, with at times discomfort in the upper part of



the abdomen, but no pain. Has vomited after trying to take a "good meal", and now eats only small quantities at a time. Unable to say when symptoms began, but the daughter states her mother (the patient) has not been well for about two to three months. The symptoms have gradually grown worse and there is now some loss of weight. Patient ascribes all her symptoms to bloodlessness, and has been treating herself (Blaud's pills) for that. The vomit "is just ordinary vomit."

Examination. A thin woman, markedly anaemic, and slightly yellow in complexion. She comes to be treated for bloodlessness. Looks like pernicious anaemia or cancer of the stomach. A blood examination was made and patient was told to remain in bed next day for further examination.

Blood.

Reds.            3,150,000.      H<sub>G</sub> = 35 per cent.

Whites.           6,200.          C.I. = 0.6

Film.            No nucleated reds seen.

Abdominal Examination. A tumour about the size of a hen's egg felt in mid-line just above the umbilicus; not easily movable. Tenderness on deep pressure over the tumour. Patient was sent at once to hospital with a diagnosis of malignant stomach.

Test for occult blood in the faeces was negative, and the test meal readings were as follows:-

	<u>Free</u> <u>HcL.</u>	<u>Total.</u>	<u>Lactic</u> <u>Acid.</u>
Resting juice (48 c.c.)	-	17	+
Fraction after 20 mts.	-	11	-
" " 40 "	-	23	-
" " 60 "	-	17	+

Operation Notes. "On opening the peritoneum a hard malignant growth was seen at the pyloric end of the stomach, about the size of a small orange. There were enlarged glands in the anterior part of the stomach at the lesser curvature, but they were limited."

"A posterior gastro-enterostomy was performed in the usual way, and the stoma after completion was felt to admit the tips of three fingers. There were no metastatic growths in the liver or peritoneum."

"In view of the relative localised growth it was thought to remove it at a later date."

Two and a half months later the patient was sent back to hospital to report progress, and the surgeon reported as follows:- "She has undoubtedly improved considerably, but is still a very fragile party. To attempt to remove the entire growth would be attended with very considerable danger to life, but I think on the whole it would be warranted."

The patient, however, refused further operation; in another two months she began to fail again, and the tumour enlarged. Pain, vomiting and complete loss of appetite gradually manifested themselves, the liver enlarged slightly and the patient died six months after the operation.

Duration of symptoms = 9 months.

Case 5. W. S. Male, aet. 45. Coal-trimmer.

Complaint. This man consulted because a fellow workman had told him he had been warned not to allow "indigestion" to go on without consulting a doctor. His complaint was simply "indigestion". Asked what he felt wrong brought the answer "indigestion". On being questioned he said he could not eat such a good breakfast as he used to, but that he "managed his dinner all right", although he always suffered from flatulence after taking a good meal. He had neither pain nor discomfort, but just "a feeling as if the food was not digesting". He could not say he had lost weight but admitted feeling less fit for his work, adding, "of course, mine is hard work and I am not so young now". He thought it was about two months since the indigestion began.

A test meal was arranged for the following morning. He did not want to stay off work, and asked for a "bottle to cure him".

<u>Test meal.</u>	<u>Free HcL</u>	<u>Total</u>	<u>Lactic Acid.</u>
Resting contents (20 cc)	-	22	+
Fraction after 20 mts.	-	15	-
" " 40 "	-	21	-
" " 60 "	-	17	-

Occult blood found in faeces.

Examination (at his home). Wife states her husband has not been "up to the mark" for about two months or more. He is now more tired on returning from his work, and is more difficult to please with food. He often leaves some of his food now, and is inclined to be discontented. He often complains of being tired, and instead of getting up on Sunday mornings to go for a walk in the country (a habit of years) he lies till dinner time and takes no breakfast. He does not sleep so well, and he is getting thin.

On examination the upper part of the left rectus was more resistant than the right; it was thought there might be a tumour but of this one could not be certain. There was slight tenderness on deep pressure over the stomach. Liver normal.

Patient sent at once to hospital with a diagnosis of gastric cancer. Surgeon replied:- "As you suggest, the question of neoplasm must be gone into in his case, and accordingly I have arranged to have a barium series of photographs taken". Radiologist's report:- "Stomach of good position, tone and peristalsis with a large irregular filling defect in pre-pyloric region. 6 hours = large gastric residue, meal in terminal ileum. 24 hours = still considerable gastric residue - head of meal in mid-transverse colon. Examination indicates advanced medullary malignant condition in pre-pyloric region of the stomach".

Operation notes. "On opening the peritoneum a growth about the size of a hen's egg was felt in the last part of the stomach. It was decided to resect this. The upper part of the cut end of the stomach was sutured, leaving about a little over 2 inches at the lower end of the cut surface open. A loop of jejunum was brought up and approximated to this open surface. An anastomosis was done. On examining the stoma it was seen to admit a little over two fingers."

Patient was seen by the surgeon two months later who reported thus:- "He has improved so much that hardly any of us recognised him as the same patient.

His case was one that was ideal for operative treatment, in that although extensive, a complete removal of the disease and glands that were involved was carried out. At 45 naturally the prognosis is more serious than in an older person. I hope, however, and expect, that he will remain a credit to us both".

Resumed work as a coal-trimmer five months after operation and has been employed as such ever since. He is fit and well.

Weight record:-

				<u>Stones.</u>	<u>lbs.</u>
Before operation.	4.	4.	29.	8	12½
After operation.	15.	6.	29.	9	4
	15.	7.	29.	9	8
	9.	8.	29.	9	10½
	10.	12.	29.	9	10
	17.	6.	30.	9	10½
	12.	10.	30.	9	10.

Duration of symptoms = 2 to 3 months.

Case 6. T. M. Male, aet 50. Railway guard.

Complaint. "Discomfort in the stomach which comes on usually when hungry, i.e., about 2 hours after food. Has been troubled off-and-on for three months, and is getting worse". No previous stomach trouble. The

discomfort is now more frequent but is not continuous throughout the day. States he has lost some weight - "weighed about 11st. 10 lbs. six months ago, now only 10st. 6lbs." About six weeks ago he was sick and vomited several times - "brought up stuff like tarry water". No vomiting since, but during the past month the appetite has become impaired.

On being questioned about his general health he states that "he is not right". He feels his work tells on him now.

Examination. Deep tenderness over epigastrium; some resistance in upper parts of both recti. No tumour palpable. Liver normal in size. In appearance the patient would pass as a healthy man; but he has lost some of his ruddy complexion, his expression has altered somewhat - looks more serious, and there is some loss of weight. Tongue clean; bowels regular; stools dark in colour.

Symptoms suggested duodenal ulcer, but a suspicion of cancer of the stomach was aroused by the loss of weight, loss of appetite, and the alteration in complexion and expression. A test-meal was arranged for, but the patient was unable to swallow the tube and the examination was not carried out. The patient

was nervous about the tube swallowing - this was rather surprising as he was usually a calm individual.

Patient was sent at once to hospital for an opinion, and cancer of the stomach was suggested as a possible diagnosis.

Hospital report:- "X-ray examination showed a large stomach of steerhorn shape with active peristalsis, which was apparently somewhat spasmodic; after six hours there was no gastric residue and the meal was in the ileum; after 24 hours the meal was in the colon. No lesion was detected, although as the first part of the duodenum in this case runs straight backwards, it could not be well seen and there may have been some abnormality in the filling of the duodenal cap. A test meal showed an ordinary acidity at the end of one hour of free hydrochloric acid - 40, total acidity = 65."

"On the whole the examination is negative for any definite lesion of the nature of a gastric or duodenal ulcer, and I think the case might meantime be treated as one of gastritis. If he does not improve I shall arrange for his admission with a view to further observation and treatment."

With rest and dieting patient improved and put



on some weight. But after a month he returned to work and began to go speedily downhill. He was asked to return to hospital but refused. In another month a tumour could be felt above the umbilicus, probably pyloric, and vomiting was more frequent, again black in colour. Hospital again strongly advised and the possibility of complete relief by operation spoken of. Again the patient refused. Finally he had to give up work, and there was constant pain, vomiting and great weakness. In the end all food was vomited and the patient died about six months after first consulting.

Duration of symptoms = 8 - 9 months.

Case 7. G. H. L. Male, aet 72. Retired engineer.  
Complaint. "Flatulence, a heaviness after eating, and discomfort in the stomach". Had suffered from indigestion "off and on" for many years, but the constant discomfort is a new symptom. He "feels as if there was an obstruction". Former attacks of indigestion were associated with pain and they occurred at long intervals, often after a chill. These attacks were due to cholecystitis, and the patient was usually jaundiced. The present attack had lasted for three weeks; there was no pain and no

jaundice, but the "appetite was lost and he felt it was weakening him".

Daughter states this is the worst attack her father has ever had, in that it does not clear up and appears to be affecting his general health. An operation for removal of gall stones was advised fifteen years ago but patient refused. Patient has gone off meat food and lives chiefly on milk diet and fish.

Examination. Patient has lost weight and is anaemic, but not jaundiced. Urine free of bile, albumen, and sugar. Motions normal in colour; no occult blood found. Liver normal. No tenderness over gall bladder. Nothing palpable in stomach, but there is slight tenderness on deep pressure over the stomach. Bowels regular.

Patient refused to have a test meal examination, "he was afraid he couldn't stand it". A diagnosis of early carcinoma of the stomach was made, and the question of going into a Nursing Home was discussed with the daughter. Patient did not favour this and absolutely refused to have any operation.

In view of the possibility of pernicious anaemia a blood examination was made with the following result:-

Reds.....2,400,000 .....H<sub>6</sub>. 30 per cent.

Whites ..... 5,300 .....C.I. 0.6

Film showed no nucleated reds.

Under treatment with dilute hydrochloric acid the patient improved for about six weeks, but he then began to fail again and occult blood was found in the stools. Vomiting became troublesome; it was irregular in occurrence and only in small quantities. It was dark in colour. The discomfort increased to actual pain which "went through to the back". It was not relieved by vomiting. About ten weeks after consulting a definite tumour could be felt below the left costal margin, and loss of weight was marked. Later the liver enlarged and ascites developed. The patient died of cachexia  $7\frac{1}{2}$  months from the onset of the discomfort in the stomach.

Duration of symptoms =  $7\frac{1}{2}$  months.

Case 8. J.Y. Male, aet 64. Artist.

This case was seen only in the last stages, i.e., three weeks before death. History given by wife.

History. Patient had been in good health until about four months ago when he appeared to get depressed and said his stomach troubled him. He felt as if it were made of lead and that when he ate a

meal there was the feeling as if the stomach was tightly filled and he wanted to vomit. He used to make himself vomit by placing his fingers on the back of the tongue. This gave relief to the tightness but not to the load of the stomach. The vomiting increased both in frequency and in amount. The appetite became greatly impaired and only the lightest of foods could be taken. Nausea was almost constant. There was great loss of weight, but anaemia was not so marked. The vomit was dark in colour towards the end, and the odour was extremely foul.

Examination. Liver greatly enlarged and irregular. Abdomen thin walled and distended, with a considerable amount of ascites. A large fixed tumour felt above umbilicus. Stomach greatly dilated, and waves of peristalsis seen and felt. Currants given by the mouth were found in the vomit three days later. In a specimen of the vomit examined lactic acid was present, while free hydrochloric acid was absent.

A diagnosis of pyloric cancer causing obstruction, with secondary infection of the liver was made.

Duration of symptoms = 5 months.

Case 9. S. V. M. Male, aet 49. Ship Captain.

This man consulted while his ship was in dock for four days. Had received treatment in various European ports during the past three weeks.

Complaint. Loss of appetite, weakness, loss of weight, sleeplessness and pain in the left chest. The illness began about five weeks ago.

First symptom was a slight loss of appetite - "not so ready for a meal, less joy in eating it, and a want of that feeling of satisfaction afterwards". He had never had any indigestion before. He felt the cold more when on the bridge, and he felt less fit, but he attributed this to the lack of sufficient food. He had been put on a light diet, but there had not been much improvement. He was worried about a pain in his left chest "below the heart" which had been present for ten days. The pain radiated through to the back, it was worst about an hour after meals, but never entirely disappeared. There was no vomiting. Food seemed to relieve the pain a little he thought; it certainly did not make it worse.

A provisional diagnosis of duodenal ulcer was made, but when shown prescriptions it was revealed that a full alkaline treatment had been taken. A

test meal was therefore arranged for the next morning, with the following result:-

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic acid</u>
Resting contents = 40 cc.	-	6	+
Fraction after 20 mts.	-	9	-
" " 40 "	-	15	-
" " 60 "	-	21	-

The stomach was completely washed out before the meal was given.

There was no obvious anaemia, nor was occult blood found in the stools.

The possibility of gastric cancer was seriously considered and investigation in a Nursing Home was suggested. Abdominal examination revealed no definite physical signs. Investigation in this country was impossible, but the Captain agreed to take his ship to a port in Sweden (his own country) and then proceed to the Capital for investigation. He was given a sealed envelop with a full description of his illness and a diagnosis of cancer of the stomach was made. A letter from him was received three weeks later stating that he had had another test meal and had been X-rayed, and that the result was the same as mine. He was going into a home for operation.

Fourteen months later the Shipping Agent who had sent the Captain to me told me that he (the Captain) was quite well again and in command of his ship.

Case 10. W. S. Male, aet 52. Insurance Agent.

This man had been complaining of indigestion for six months and had been treated by another medical man during that time.

History. No indigestion until six months ago, when one day after eating his dinner he was seized with a pain in the pit of the stomach. The pain was fairly sudden in onset and lasted for about half an hour. It was "cramp-like" and felt "across" the stomach. The pain did not cause vomiting nor did it double him up. The dinner was vomited and the pain gradually subsided. Ever since "the stomach has not felt right". The sudden pain was not due to any indiscretion of diet - the patient simply could not explain it. The pain did not recur until  $4\frac{1}{2}$  months later, but there was "always a heaviness in the stomach" - slight at first, gradually getting worse, and never entirely gone. The appetite remained good until about three weeks before consulting the author.

Present condition. There is considerable loss of weight, but anaemia is not obvious - the patient is out of doors in the country all day. Pain in the upper abdomen is now constant, "not severe, more of a dull ache". Patient looks depressed, and says the pain in the stomach depresses him. The appetite is impaired, but he "sometimes feels like a good feed". He vomits after every meal except breakfast. The vomitus is very dark in colour, has a bad smell, and the patient says the food does not digest because in the vomitus he has seen bits of food eaten two days previously.

Examination. A thin abdominal wall with a slight fullness above and a little to the left of the umbilicus. On palpation a large irregular mass, about the size of an orange, was felt in this area. No visible peristalsis, but the stomach was felt to harden under the examining hand and the patient complained of pain.

A test meal was given next morning with results as follows:-



	<u>Free HcL.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting juice = 20 ozs.	-	5	+ +
Fraction after 20 mts.	-	9	+
" " 40 "	-	6	+
" " 60 "	-	5	+

The resting contents were foul smelling, greenish black in colour, contained much undigested food, and numerous Boas-Oppler bacilli on microscopic examination. The faeces contained occult blood.

A diagnosis of cancer of the pylorus causing incomplete obstruction was made and confirmed at hospital. Patient died six weeks after consulting.

Duration of symptoms =  $7\frac{1}{2}$  months.

Case 11. W.G.A. Male, aet 59. Railway Supervisor.

Complaint. "Pains in the stomach, a sour taste in the mouth, and loss of appetite". Says he "has gone off food altogether".

History. Patient was well and never had any indigestion until twelve months ago, when he had to undertake a fair amount of night duty. He attributes the onset of his indigestion to night work. The first symptom was "a giddy feeling and a sensation of flatulence" after meals. He felt he would like to eructate but could not. The appetite became impaired

and he began to lose weight. Three months ago he consulted a doctor who ordered a rest and tonics. He felt better for a time, but now he was worse than ever. He is not so able for his work and has lost two stones in weight.

Slight pains began five months ago. "At first the pains seemed to run right across the stomach" from left to right, and then he "felt a sour taste in the mouth". At first food relieved the pains, but they came on again soon after a meal. They were never completely away - there was always some discomfort. Now, "the stomach seems to rise up in knots during the cramp like pains". The pains are no longer related to food. There has never been any vomiting, but he "has often felt like it".

Wife states that the patient's appetite has been failing for six months. He can eat only a small meal now, he is irritable, difficult to please with food, and is very depressed - "can't raise a smile now". He will not touch meat, says he loathes it. Cold meals suit him better than hot ones.

Examination. A fairly well nourished man. Complexion rather pale and somewhat yellowish. Tongue dirty, breath foul, stools black. Liver apparently

not enlarged. Deep tenderness over upper part of left rectus, but no palpable tumour. The stomach was felt to contract during a "cramp like pain", but there was no visible peristalsis. A blood examination was made and a test meal was arranged for the next morning.

Blood examination.

Reds ..... 4,600,000.....Hb.....66%  
 Whites ..... 7,000.....C.1.....0.7  
 Film..... Normal in appearance.

Test meal.

While the tube was being swallowed patient vomited. This was kept, and along with the remainder of the resting contents, measured  $1\frac{1}{2}$  pints. The odour was repulsive. Charcoal eaten 12 hours before, and food eaten 24 hours before could be recognised. There was abundant mucus.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting juice ( $1\frac{1}{2}$ pints)	-	60	+++
Fraction after 20 mts.	-	26	+
" " 40 "	-	32	+
" " 60 "	-	17	+

The washing out of the stomach prior to giving the test meal occupied one hour five minutes. The high total acidity in the resting juice was due to

lactic acid.

Occult blood was found in the faeces.

A diagnosis of pyloric cancer was made. This was confirmed at operation in a nursing home three days later. A mass the size of a small orange, fairly freely movable, was felt in the pyloric end of the stomach, which was greatly dilated. The surgeon did not perform the radical operation because there was a mass of glands around the coeliac axis; a posterior gastroenterostomy was done. The patient made a good recovery, and continues to put on weight <sup>ten</sup>~~six~~ weeks after operation.

Cases Suspected of being Cancerous, but found not to be on Investigation.

Case 1. T.G. Male, aet 61 years. Grocer.

This patient did not consult; he was seen to be not well while in attendance upon his wife.

Complaint. Stated "he was not just feeling right".

There was loss of appetite and weight, weakness, and moderate anaemia. His voice appeared to have altered a little. His appearance suggested carcinoma of the stomach or pernicious anaemia.

History. Had been in good health for thirty years.

Examination. Abdominal and rectal examinations revealed nothing abnormal.

Lungs and urine healthy. Blood pressure 125/80.

Larynx apparently healthy (laryngoscopic examination).

Heart slightly dilated, poor first sound, and poor response to exertion.

Gastric Analysis.

	Free Hcl.	Total.	Lactic Acid
Resting Contents 20 c.c.	2	11	-
Fraction after 30 mts.	25	49	-
" " 60 "	21	52	-
" " 90 "	13	47	-

Blood Examination.

Reds ..... 4,200,000..... Hb..... 60%.

Whites ..... 5,400..... CI..... 0.7

Film showed no abnormal cells.

Wassermann Reaction. Negative.

A tentative diagnosis of cancer of the larynx was made, in view of the slight alteration in voice, and the opinion of a specialist was taken. I wrote, "I would be glad to have your opinion about the larynx and oesophagus. If you think an X-ray of the thorax necessary, please have it taken. I feel that the causal condition is either in the larynx or thorax". Specialist found nothing in larynx or oesophagus, and suggested a holiday with tonic treatment. A fortnight in Perthshire made no improvement, and thereafter the patient became very gradually weaker and lost more weight. Repeated examination of the lungs and abdomen failed to find the cause.

Two and a half months later the patient suddenly, i.e. within three hours, developed a complete paraplegia with loss of sensation from the level of the umbilicus downwards. Having been suspicious of the thorax all along, the spine was immediately

examined. A complete fracture-dislocation was found at the level of the 7th and 8th dorsal vertebrae.

Diagnosis. Malignant tumour of spinal column. As no other lesion was found the condition was regarded as primary. No autopsy granted.

Case 2. A.G. Male, aet 47 years. Potato Merchant.

Complaint. "Vomiting, giddiness, and flatulence after meals". The vomitus was watery, yellow in colour, and came on mostly after breakfast. There was no nausea. He sometimes vomited after the mid-day meal, but never after supper. No pain, but a heaviness in the stomach for about an hour after a "turn". Condition had been present for "over a month", but he might have freedom from vomiting for as long as a week. The appetite was not impaired; he was afraid to eat breakfast, but he always enjoyed a good supper. Weight had obviously gone down - by two stones, the patient stated, and the complexion was inclined to be sallow. No particular food was disliked, nor could any article or diet be blamed for causing the vomiting.

Examination. Some tenderness on deep palpation over the epigastrium; none over gall bladder or appendix. Urine sugar-free. Other systems healthy. A detailed examination of the nervous system elicited nothing abnormal. No wax in ears.

Wassermann Reaction. Negative.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting Contents (30 c.c.)	13	42	-
Fraction after 20 mts.	0	17	-
" " 40 "	0	18	-
" " 60 "	19	49	-

Cancer of the stomach seemed unlikely, but in view of the marked loss of weight, patient was sent to hospital for an opinion. Report:- "The history is certainly an unusual one and the possibilities are either a recurrent dilatation of the stomach, or that it is an example of a paroxysmal tachycardia with referred stomach symptoms. We are arranging for his admission for further investigation".

Patient had been seen during an attack of vomiting; the pulse was regular in rhythm and not unduly accelerated, i.e. 93.



A provisional diagnosis of nervous dyspepsia was made. Treatment with luminal and bromide gave excellent results; vomiting stopped and weight rapidly increased to normal. He is still well after nine months, and works hard.

Case 3. M.H.N. Female. Aet 63. Housewife.

Complaint. "Weakness". Patient stated she had gradually grown weaker during the past two months, until now "she is fit for nothing". The appetite is poor and she gets depressed. No previous indigestion.

Examination. Loss of weight and a sallow complexion. Anaemic. Tongue clean. A general examination revealed nothing abnormal beyond anaemia, a low blood pressure, and slight pigmentation of the skin over the abdomen and chest. Heart feeble.

Blood Examination.

Reds ..... 3,900,000 ..... Hb... 60%.

Whites ..... 4,200 ..... C.I... 0.8.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting Contents (15.c.c.)	-	10	-
Fraction after 20 mts.	-	13	-
" " 40 "	9	25	-
" " 60 "	11	32	-

Heart. Irregular and rather feeble. Blood pressure 120/70. The low blood pressure and the slight pigmentation of the skin, together with the myasthenia suggested Addison's Disease. Cancer of the stomach was also considered and the patient was sent to hospital for an opinion. Report:- "I can find really very little beyond what you mention. Blood pressure coming down because of her cardiac weakness. Pulse irregular but certainly not a fibrillation. I could feel nothing in the stomach. I could not satisfy myself that the pigmentation meant anything. She will have her stomach screened".

Radiologist's Report:- "Stomach of normal position and tone, no filling defect, duodenal cap slightly suspicious".

Physician's further report:- "This does not really take us much farther. Put her on big doses of hydrochloric acid".

Treatment on these lines was entirely satisfactory, along with digitalis for the cardiac weakness. Blood pressure rose to 137/80 at the end of one year. She is very fit after three years and has had no other illness.

Diagnosis. Anaemia, cardiac and general debility.

Case 4. M.F. Female. Aet. 66. Housewife.

Complaint. "Loss of appetite, vomiting, and inability to take solids". Vomiting has no relation to meals - it occurs at any time, but there is "a heaviness in the chest" after meals until she does vomit. The inability to take solids had been noticed for a month and it was getting worse.

Examination. A thin anaemic person with sallow complexion. Abdominal examination negative. History suggested a stricture of the oesophagus. A test meal was arranged for the following morning. The tube failed to pass into the stomach. About 10 c.c. of blood-stained fluid was withdrawn from the gullet.

The diagnosis of oesophageal stricture was confirmed by X-rays. Report:- "There is a very definite stricture a little below the bifurcation of the trachea. I am opposed to gastrotomy and the condition is too advanced for radium."

Case 5. I.B. Female. Aet 44. Housewife.

Complaint. "Feeling off colour and not able to take my food as I used to." Appetite had always been good until three weeks ago, but there had been

"indigestion" for a month before that, i.e. flatulence and discomfort after meals and a bad taste in the mouth. No pain and no vomiting. Symptoms used to be worst about an hour after meals, but since the loss of appetite the flatulence and discomfort were more or less constant. Stated she had lost weight.

Examination. Nothing definite except that the patient had lost some weight and some of her healthy colour. A test meal was given three days later, but this did not suggest cancer of the stomach.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting Contents. 40 c.c.	17	52	-
Fraction after 20 mts.	0	30	-
" " 40 "	3	65	-
" " 60 "	23	75	-

On being questioned patient admitted that she had worried about her daughter's illness, and that the bad harvest had caused financial difficulties.

Treatment with luminal before meals and an alkaline powder between meals effected a complete recovery, and patient is well four years later.

Diagnosis. Nervous dyspepsia.

Case 6. M.R. Female. Aet 49. Housewife.

Complaint. "Indigestion and feeling depressed".

The stomach had been troublesome for about 7 months, and it had got so bad that patient had not been out of doors for 2 months. Flatulence was the first symptom; it used to be only after food but now it was constant, and for over a month there had been occasional vomiting or a thin "watery fluid". Appetite became poorer, and now she was afraid to eat, because of the discomfort it caused. The discomfort varied; it was more or less constant but sometimes would disappear for a day or two. Weight was lost, and patient was worried about the indigestion. She was sure it was due to cancer.

Examination. Obvious loss of weight, and a greyish yellow complexion. Patient looked cancerous. Nothing much found on general examination, except marked "splashing" in stomach four hours after anything had been swallowed. Heart feeble, slightly dilated, with systolic mitral bruit. Father and brother had "dropped down dead". Knee and ankle jerks exaggerated.

A gastric analysis was performed next day.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting Contents (120 c.c.)	-	26	<u>+</u>
Fraction after 20 mts.	-	32	-
" " 40 "	-	61	-
" " 60 "	19	78	-

The resting contents contained much charcoal. The stomach was thoroughly cleaned by repeated washings before the test meal was given. At the end of two hours <sup>a third of</sup> ~~half~~ the meal was recovered from the stomach.

A diagnosis of pyloric stenosis (probably cancerous) was made and patient was asked to go to hospital for further investigation. She refused. She felt so much better with the washing out of the stomach that she asked for it to be continued. Gastric lavage was carried out daily for two weeks with considerable improvement. Appetite returned and food was enjoyed; complexion improved and depression greatly diminished. Patient herself continued the lavage at first daily, later every other day, and finally once weekly for 6 months thereafter. She is now quite well three years later; should there be any symptoms of indigestion

the patient at once uses her Ryle's tube.

A gastric analysis two months after the first gave the following result:-

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic</u>
			<u>Acid.</u>
Resting Contents (45 c.c.)	12	41	-
Fraction after 20 mts.	0	27	-
" " 40 "	16	46	-
" " 60 "	22	63	-

The stomach was empty after two hours.

This patient suffered from visceroptosis, a weak heart, and was very depressed. She had no teeth and did not use her false ones. She had been engaged in an unpleasant family dispute at law.

Diagnosis. Atony of the stomach due to general debility and nervous depression.

Treatment. Gastric lavage; nux vomica, soda, and a bitter; small frequent meals taken as dry as possible.

Case 7. J. McK. Male. Aet 54. Dairyman.

Complaint. "Weakness and not feeling right about the stomach". Stomach had given trouble for about five months, a "soreness" immediately after meals. Now getting thin and never feels hungry; very easily tired, and according to his wife, is

moody. States he is not fit to do the work he did a year ago. The discomfort now lasts for about two hours after food, but varies considerably. No flatulence, no heartburn, but he has vomited a few times. There is now a distaste for all kinds of food.

Examination. Thin and a little anaemic. Looks depressed and anxious. General examination negative. Deep palpation over the stomach elicits tenderness. A test meal was given next day.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic</u> <u>Acid.</u>
Resting Contents (20 c.c.)	-	12	-
Fraction after 20 mts.	-	26	-
" " 40 "	-	44	-
" " 60 "	-	52	-

Occult blood not found in stools.

A strong suspicion of cancer of the stomach was aroused, and patient was immediately sent to hospital.

Radiologist's Report:- "Stomach of good position, tone, and peristalsis. No lesion detected.

Duodenal cap regular, but emptied very slowly.

At 6 hours there was no gastric residue. Re-filled, no lesion could again be detected".



Surgeon's Report:- "Personally I feel that in his case the clinical indications are such as cannot be overlooked, and I would feel prepared to undertake an exploratory operation to determine whether an early carcinoma of the stomach may be present. You might let me know what you think on the matter".

I agreed.

Operation Report:- "After a very thorough and prolonged examination of all the intra-abdominal organs I failed to detect any organic lesion that would account for his ill health. I think it is quite probable that the operation may be followed by a very pronounced improvement in his case, and even a complete cure, partly by the mental effect."

"I certainly agree with you that for the early recognition of malignant disease of the stomach it is a class of case where the only means of exact diagnosis is by an early exploratory operation".

The patient made an excellent recovery. He is in perfect health twelve months after the operation and has no dyspepsia.

Diagnosis. The symptoms were probably due to overwork. For twenty years he had had no holiday and started work at 4 a.m. every morning. The

strain told in the end, and he persisted in carrying on too long.

Case 8. M.P. Aet. 53. Female. Housewife and dairymaid.

Complaint. "Loss of appetite". Patient had suffered from vague dyspepsia for 4 months, with discomfort after meals and a gradually increasing loss of appetite. There were no other symptoms. She had lost weight and the complexion was sallow.

Examination. Loss of weight, anaemia, and rather rapid pulse - 93 per minute at rest. No physical signs in abdomen. Patient admitted, on being questioned, that she had not been sleeping well since the onset of the indigestion.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting Contents (33 c.c.)	-	32	-
Fraction after 20 mts.	-	31	-
" " 40 "	15	43	-
" " 60 "	32	65	-

Patient was the wife of a ploughman and in addition worked as dairymaid at the farm. She had long hours - 4 a.m. till 9 or 10 p.m. Worried over her daughter of sixteen who had recently had

an illegitimate child. She had never had a holiday since being married.

Diagnosis. General debility and anxiety.

Treatment. Complete change, rest, and tonics. Slow but full recovery after  $3\frac{1}{2}$  months. Still well at end of  $2\frac{1}{2}$  years.

Case 9. K.S. Aet 70. Female. Leisured.

Complaint. "Troublesome vomiting, with abdominal discomfort and flatulence". Hardly a day without vomiting for five weeks; sometimes vomited several times in the day. Vomiting had no time relationship to the taking of meals. The discomfort was felt "all across the abdomen", and occasionally it amounted to pain. The pain lasted only a short time and had no relation to the vomiting, nor was it relieved by vomiting. There were "awful noises in the abdomen which were disconcerting".

Examination. A thin woman, somewhat greyish-yellow in appearance and a little anaemic, with a large distended abdomen. Nothing found in stomach and no "splashing". She stated she had been treated for a dilated stomach since the onset of the symptoms. Loud borborygmi heard. Peristalsis of small intestine palpable. The abdomen

was carefully watched in a good light, and after half an hour the ascending colon was felt and almost seen to contract <sup>strongly.</sup> ~~strangely~~. Deep palpation in the right hypochondrium elicited the presence of a small lump, about the size of a greengage.

Diagnosis. Malignant obstruction of the ascending or transverse colon.

Operation. A few days later, when a small carcinoma of the beginning of the transverse colon was found and successfully removed. Excellent recovery. Patient was very well when visited in Glasgow a year later. Not seen since.

Case 10. E.M. Male, aet. 63. Sailor.

Complaint. Flatulence, vomiting, a bad taste in the mouth and loss of appetite - duration two weeks. One day the vomit was dark in colour, and patient noticed the stools were black. He sent at once for advice.

History. This patient was known to suffer from emphysema and chronic bronchitis; his heart was not too good. There was no previous dyspepsia.

Examination. Patient looked ashen grey and anxious. He had lost weight. Liver enlarged; abdomen flaccid with nothing to be felt in stomach or bowels.

Heart feeble and dilated both to the right and left sides. Blood pressure 142/73.

The haematemesis and melena were thought to be due to the heart and lung conditions, but patient himself was sure he "had cancer in the stomach".

Treatment was directed to the heart, and when patient had sufficiently recovered a test meal was given.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting Contents (45 c.c.)	11	25	-
Meal withdrawn after one hour.	24	47	-

There was no recurrence of the haematemesis and melena. Patient regained his former state of health, and died 2 years later of lobar pneumonia.

Case 11. M.M. Female, aet 42. Housekeeper.

Complaint. "Abdominal pain, vomiting, and loss of appetite".

History. Stomach had been troublesome for about six years. Began with flatulence and a feeling of discomfort soon after eating. Later the discomfort was most marked between meals, but was not relieved by eating. At times she had complete freedom for

one, two, or even three months; but for the past nine weeks the symptoms had been constant and she was getting thin. The appetite, too, was now completely lost. Five years ago patient was sent to hospital because of gall-stones, but the diagnosis was not upheld. For a week there had been pain, which the patient now described as "agony", and "black stuff" had been vomited several times. The pain was not relieved by vomiting.

Examination. Abdomen flaccid, but tender on deep palpation over the upper parts of both recti. Some tenderness over gall-bladder, none over appendix.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting Contents (20 c.c.)	3	13	-
Fraction after 20 mts.	-	21	-
" " 40 "	-	28	-
" " 60 "	22	66	-

Treatment for gastric ulcer was instituted. Some relief afforded thereby, but distaste for food continued.

Three weeks later a second test meal was given.

Gastric Analysis.

	<u>Free Hcl.</u>	<u>Total.</u>	<u>Lactic Acid.</u>
Resting Contents (20 c.c.)	6	27	-
Fraction after 20 mts.	-	26	-
" " 40 "	9	72	-
" " 60 "	27	96	-

A week later the patient was seized with a severe pain "across the stomach".

Examination. Abdomen flaccid, but there was tenderness over the upper parts of both recti, a little more marked than at the previous examination. Pulse and temperature normal.

Sent at once to a nursing home, where a diagnosis of perforated gastric ulcer (into the lesser sac) was made, and an immediate operation was performed.

Result. Stomach, duodenum, and appendix all healthy. Numerous small stones found in a small gall-bladder. Cholecystotomy performed, and a good recovery resulted.

It is to be noted that a diagnosis of gall stones had been made five years previously, but was not upheld in hospital.

Summary and Conclusions.

(1) Cancer of the stomach is at once the commonest and causes the highest mortality of all forms of carcinoma.

(2) Failure to make an early diagnosis is the factor chiefly responsible for the continued high mortality. Improvement does not lie in more extensive operations.

(3) This failure is due to:-

(a) Time lost by the patient, i.e., delay between the onset of vague symptoms and the consulting of a doctor.

(b) Time lost by the doctor in the treatment of symptoms without investigating their cause.

(4) Patients must therefore be educated against the danger of treating themselves for indigestion or for vague ill-health. This can be done by the family doctor.

(5) The doctor must investigate first and treat last. This implies that in every case of dyspepsia or of vague ill-health the possibility of cancer of the stomach must be thought of and steps taken at once to exclude it by the use of clinical methods.

(6) Early diagnosis can be made by the joint use of clinical, radiological and if necessary surgical means.



(7) The greatest of these are the clinical, because they are the earliest. It follows, therefore, that in the fight against cancer the general practitioner must play a leading part.

(8) Investigation by means of gastric analysis is an invaluable aid to the diagnostician and is within the scope of every general practitioner.

(9) The routine investigation of all suspicious cases by this method would at least lead to a correct diagnosis being made, or a strong probability being aroused, within two weeks of the patient consulting.

(10) Cases would, as a result, be sent oftener and earlier for X-ray investigation, which, in the hands of the expert, is capable of making a correct diagnosis in 96 per cent of cases.

(11) Modern surgery has proved that it can cure; the above routine of investigation would afford it the opportunity. Mortality would be reduced and life prolonged.

.....oOo.....

Bibliography.

1. Rehfuess: The Diagnosis and Treatment of Diseases of the Stomach. W. B. Saunders Coy., 1927.
2. Hurst: Lancet ii. Nov. 16th 1929. p. 1023.
3. Wyard: A Handbook of Diseases of the Stomach. Oxford Univ. Press. 1927.
4. Walton: B.M.J., i., May 25th 1929. p. 939.  
Lancet 2. Sept. 1st, 1928. p. 438.
5. Thomson and Miles: Manuel of Surgery. Vol. 3. Oxford Univ. Press. 1926.
6. Smithies: Smithies and Ochsner, Cancer of the Stomach. W.B. Saunders Coy. 1916.
7. Osler: Osler and McCrae. Principles and Practice of Medicine. 10th edit., London 1925.
8. MacCarty: Journ. Cancer Research. March 12th 1928. p. i.
9. Spilsbury: Proc. Roy. Soc. Med., 1922, 15, Sect. of Med. 25.
10. Dible: Brit. Journ. Surg., 1925, 12, 666.
11. Moynihan: B.M.J., 1909, 1, 830.
12. Mayo-Robson: Med. Chir. Trans., 1907, 90, 228.
13. Maclean: Modern Views on Digestion and Gastric Disease. Constable. 1928.
14. Balfour: Ann. of Surg., 1919, 70, 522, and 1922, 76, 405.
15. Boyd: Surgical Pathology. W.B.Saunders Coy. 1929.
16. Spriggs: B.M.J. 2. Nov. 10th 1928. 838.
17. Goldie: Canad. M. A. J., May 20th 1929, 486.
18. Moynihan: Practitioner, 121, Sept., 1928. 137.
19. Bennett: Lancet 2. July 6th & 13th, 1929. 35, 82.

20. Dodds & Robertson: Q.J.M. 23, Jan. 1930. 175.  
Lancet 1. Jan 25th 1930, 171.
21. Haudek: B.M.J. 2. Aug. 3rd 1929, 173.
22. Mayo: Surg. Gyn. & Obst. 1918, 26, 367, and  
Ann. Surg. 1919, 236.
23. Mayo-Robson: Cancer of the Stomach. James Nisbet  
& Co. Ltd., 1907.
24. Menees: Journ. Amer. Med. Assoc. Vol. 86, No. 25,  
1904, June 19th, 1926.

.....oOo.....