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ON THE IMPORTANCE OF THE GASTROSCOPE IN THE DIAGNOSIS OF GASTRIC DISEASES IN THE ARMY

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During and after the war of 1914-18 the medical officer faced several difficult problems involving soldiers who tended to suffer from epigastric distress.* It usually was easy for him to come to a quick and correct decision when a soldier reported off duty because of an external disease, injury, or wound. Such a decision, however, was sometimes difficult in internal diseases, especially when epigastric pain was supposedly present.

The duty of the medical officer at the front is obviously a twofold one: he must preserve the fighting strength of his battalion and he must give medical care to the sick soldiers of his unit. There is no army in existence in which soldiers will not try to escape front-line conditions by pretending to have a disabling internal disease. In these instances the medical officer is forced to rely almost entirely upon his objective findings.

When a soldier reported himself ill because of severe epigastric distress a most careful examination usually revealed nothing. However, some "stomach powder" or "stomach medicine" was given. A few days later the patient came back complaining that his pains were not relieved. Then another medicine was tried, and the man was sent back to duty. When he reported the third time the situation became difficult for the medical officer. He knew that a sick soldier was useless at the front, and therefore sent him to an army mobile hospital. Since time did not permit a thorough examination the patient was referred to a base hospital for internal diseases, where finally a complete check-up, consisting of stool examination for occult blood, gastric analysis, and especially an x-ray examination, became possible.

In the great majority of these cases nothing was found. The patient was pronounced healthy and was returned to the front. When he complained again of epigastric pain he was looked upon once and for all as a malingerer. As will be shown later, however, many of these men had real organic disease caused by the ordeals of trench service, the insufficient food, and the drinking of rainwater from

shell holes. A man with such an illness felt that he was treated unjustly. He put the blame on the medical officers, and developed, naturally enough, a severe psychoneurosis which surpassed all organic symptoms and became finally, under German law, a compensation neurosis.

Neurotic symptoms, even when caused by the war, were excluded from any compensation. If a pension had been paid for neurotic symptoms, compensation neuroses would have been cultivated to an unbearable extent. The most careful examinations failed to reveal anything in a great number of the patients who maintained that they were suffering from severe epigastric distress in the years following the war. Thus a psychoneurosis was diagnosed, and the grant of a pension was refused. However, often the medical officers themselves were not satisfied with these decisions. They knew that in many cases the patient had been a gallant soldier for three or four years, and they were reluctant to attribute the presenting symptoms to a compensation neurosis.

In 1921 the officers of the chief military pension hospital in Munich learned that the patients in the municipal hospital, Munich-Schwabing, were being examined with a new rigid gastroscope. They induced those patients who were suffering from epigastric distress to see me and to undergo this examination. From a psychological viewpoint it is interesting to note that none of these patients refused to comply with this suggestion. I was able to watch them over a long period of years, and one of them (see Case 2, below) was examined with the gastroscope no fewer than sixty-five times within ten years. It should be remembered that at that time the old rigid Schindler gastroscope was used; examination with this instrument was neither entirely safe nor very agreeable. The safe Wolf-Schindler flexible gastroscope, which permits a good view of the stomach without any real discomfort, was not invented until 1932.

It was possible to save thirteen case histories of patients examined in 1921 and 1922. I believe they will reveal evidence that, in time of war at least, gastroscopy will prove a valuable procedure for the Army. The recent development of x-ray relief technique with spot machines should not be overlooked, but the strongest possible emphasis should be laid on the fact that differentiation

* I can only refer to my own experience, acquired during one year of service in the German Army from 1912 to 1913, and four years' war service in the trenches and in army mobile hospitals, and to my post-war experience in cases submitted to me for expert testimony in that army. However, similar problems are probably found in the military organization of every nation.

between diffuse organic lesions of the stomach (chronic gastritis) and psychoneuroses is impossible even with the most refined x-ray technique.

Below are given records of cases of gastric disorder in which examination was carried out with the flexible gastroscope.

Chronic Gastritis

Case 1.—The patient, a carpenter aged 30, had been suffering from abdominal pain since the war. He complained of fullness in the epigastrium with belching since May, 1920. At that time he lost 6 kg. in two weeks. Physical examination revealed a tender spot in the back on the right side of the tenth thoracic vertebra. Sometimes the stool contained occult blood. Gastric analysis: free HCl, 20; total acidity, 33. Radiographs were negative. The man was an outspoken psychoneurotic individual. On gastroscopy in 1922 the whole gastric mucosa looked dull and spongy and was markedly reddened. Three ulcers lying in a row were seen on the anterior portion of the lesser curvature of the body. They were about the size

FIG. 1.—Chronic hypertrophic ulcerative gastritis (Case 1). Three shallow ulcers are seen lying in the swollen mucosa of the lesser curvature.

of a pea or bean, and were irregular in contour, with ragged edges. The ulcers were quite deep; their floor was yellowish grey and they were surrounded by a red halo. The diagnosis of severe hypertrophic ulcerative gastritis was made. This was the occasion when we first realized that ulcerative gastritis was a clinical entity, and we gave a description of it in 1922.

Case 2.—This thoroughly observed case has been published elsewhere (Schindler, 1936b). I shall quote only the summary here. The patient had had continuous gastric distress since the war. He applied for a pension, but with the usual methods nothing was found. The summary of the case history reads as follows:

"(1) A patient suffering from severe hypertrophic ulcerative gastritis was observed over a period of twelve years. (2) X-ray relief technique did not demonstrate the very marked changes of the mucosal relief. Sixty-five gastroscopies were performed. (3) Ulceration and extreme pain were present without interruption. (4) In spite of protracted careful observation, development of a gastritic ulcer into true gastric ulcer was not seen. (5) Coutard's method of high-voltage x-ray therapy caused severe acute purulent gastritis and subsequent regeneration of an essentially normal mucous membrane. The picture was seen for one year. The patient seemed to be cured, when atrophic gastritis developed as a late result of the therapy. (6) Radiotherapy by Coutard's method can be recommended only for the most severe cases of hypertrophic ulcerative gastritis which have been observed gastroscopically over long periods and which fail to respond to the usual methods of therapy (diet, rest in bed, silver, alkali, etc.)."

Case 3.—Gastroscopy in 1922. The patient complained of epigastric pain and vomiting aggravated by meals. Physical examination revealed tenderness in the epigastrium. No occult blood was found. Gastric analysis after an Ewald test meal: free HCl, 80; total acidity, 91. On x-ray examination the findings were not conclusive. By gastroscopy the pylorus was visible; no ulcer was seen. The mucosa of the lesser curva-

ture was velvety and nodular, and contained two small brown spots. The impression was that this was a case of chronic hypertrophic gastritis.

Case 4.—Gastroscopy in 1921. Since the war this patient, aged 28, had complained of epigastric pain, occurring two and a half hours after meals. His appetite was good. No vomiting, gross haemorrhage, anaemia, or loss of weight was noted. X-ray examination revealed nothing of significance. Gastric analysis after an Ewald test meal disclosed no free HCl, the total acidity being 17; no lactic acid or blood was present. A small amount of mucus was noted. Although the patient did not impress us as being a psychoneurotic individual, the physicians of the military hospital considered that the diagnosis of gastric neurosis with anacidity should be made, that no organic disease was present, and that the patient was not entitled to any pension. However, gastroscopic examination was asked for. On gastroscopy the entire stomach was seen. The mucosa everywhere was covered by flakes of mucus. Red patches were observed throughout the stomach. On the anterior wall and the greater curvature of the body some

FIG. 2.—Chronic superficial erosive gastritis (Case 4). Red patches, adherent flakes of mucus, and one dark red shallow erosion are present.

small dark red spots were found in which a marked defect of the epithelium was recognized. The gastroscopic diagnosis was that of chronic erosive gastritis. To-day we would call this picture a chronic superficial erosive gastritis.

Case 5 (Gross Haemorrhage in Superficial Gastritis).—This patient had had a well-observed gross gastric haemorrhage in 1916. Now he asked for a pension, complaining of a colic-like epigastric pain without definite relation to meals. The physical examination was essentially negative. X-ray examination did not reveal any disease. Gastroscopy on March 9, 1922, showed that the gastric mucosa was somewhat oedematous and was covered with adherent mucus. In the mid-portion of the lesser curvature two erosions were seen. The floor of each erosion was grey and the margins were dark red. The pyloric action was normal. The gastroscopic impression was that of a chronic superficial erosive gastritis.

Gross haemorrhage in erosive types of gastritis has been described repeatedly, especially in the past few years (Benedict, 1937). This is probably one of the earliest cases observed, although there was no direct evidence that the same disease was already present in 1916. Gross haemorrhage in superficial gastritis is rare; it is rather frequent, however, in hypertrophic ulcerative gastritis. It was more than likely that erosions like those observed in this case were the cause of the severe pain. To-day we know that recurrent ulcerations or erosions in chronic gastritis may cause pain as severe as in true gastric ulcer.

Case 6 (Gastritis in a Post-operative Stomach).—This patient, 37 years old, had been suffering from a duodenal ulcer since the war. He had had a gastro-enterostomy on August 16, 1921, but epigastric pain, vomiting, and loss of weight persisted. The stomach contents after an Ewald meal were reported normal. X-ray examination revealed spasm: the artificial stoma as well as the pylorus showed normal

function. Gastrosocopy in 1932 showed that the mucosa was loose and spongy, and in the lesser curvature creases and crevasses were found. The diagnosis of a severe chronic hypertrophic gastritis in a post-operative stomach was made.

The frequency with which a severe type of chronic gastritis is observed in post-operative stomachs led to a new classification of chronic gastritis. Chronic gastritis of the post-operative stomach now forms a special group (Schindler and Ortmayer, 1936; Schindler *et al.*, 1937). It was evident that the complaints of this patient were justified, although it seemed difficult to decide whether the inflammation preceded the operation or followed it.

Case 7 (Gastritis of the Post-operative Stomach caused by a Silk Suture).—This patient, aged 40, complained of epigastric distress, loss of weight, and vomiting for two years. A gastro-enterostomy was done on October 15, 1921, because of an obstructing duodenal scar. At first there was a definite improvement, but later the patient complained of colic-like pain in the epigastrium. Physical examination failed to reveal any cause. The stools did not contain occult blood.

FIG. 3.—Silk suture after gastro-enterostomy; this had cut through the gastric mucosa and was hanging freely in the cavity (Case 7). The marked superficial gastritis present in this area is not well demonstrated in the black-and-white illustration.

X-ray examination showed increased peristalsis; the barium emptied satisfactorily through the gastro-enterostomy stoma. By the Ewald test free HCl was 10 and total acidity 60. Gastrosocopy in 1922 showed that the gastric mucosa of the body was covered with much translucent shiny mucus. The mucosa of the lesser curvature was normal, but at the lesser curvature towards the pylorus (which remained invisible) a thick black suture was seen which had cut through the mucosa and was hanging freely in the gastric cavity. The gastro-enterostomy stoma was not found. The diagnosis was: "The silk suture had cut through the mucosa of the lesser curvature and was hanging freely as a foreign body in the gastric cavity. Severe superficial gastritis."

Silk sutures, if still covered by epithelium, are readily seen with the gastroscope and constitute innocuous foreign bodies. As soon as they cut through the mucosa, however, they cause friction and almost invariably gastritis, erosions, and even ulcers. Here again a definite disease not demonstrable by any other method was found gastroscopically. These findings justified the complaints of the patient and led to adequate treatment. Advice for re-operation was given.

Gastric Ulcer

Neither duodenal nor pyloric ulcer can be detected gastroscopically. They must be found by thorough x-ray examination. Gastric ulcer often is well observed by gastroscopy, and the healing process or mucosal complications may then be checked by repeated examinations. The advantage of gastroscopic diagnosis is not so outstanding in ulcer as it is in the diffuse inflammations.

Case 8.—This patient, a carpenter aged 40, was seen on October 10, 1921. He had epigastric distress and vomited

after meals. His appetite was fairly good. He complained that he had had similar pains during the war, but a diagnosis of severe psychoneurosis was made because no disease had been found and the patient was evidently a psychoneurotic. Physical examination revealed tenderness of the epigastrium. There was no occult blood in the stools. Gastric analysis after an Ewald test meal showed free HCl 8, total acidity 24.

FIG. 4.—Bleeding gastric ulcer (Case 8). This ulcer could not be demonstrated by x-ray examination.

Radiographs disclosed nothing pathological. By gastroscopy, at the lesser curvature towards the anterior wall a dark red ulceration with elevated borders was seen from the tangent. It was bleeding slightly. The condition was thought to be chronic gastric ulcer with fresh haemorrhage.

This bleeding gastric ulcer was not found by x-ray examination. It is doubtful whether it would be demonstrable even now by the refined relief technique. I have noticed that these "red" bleeding ulcers are not demonstrable by fluoroscopy or films even when the best technique is used, because the crater is filled with clotted blood and the barium cannot enter it.

Case 9.—This patient had suffered from epigastric pain since the war and had had several gross haemorrhages. On physical examination he had tenderness of the epigastrium. No occult

FIG. 5.—Benign gastric ulcer (Case 9). At the right side (1 to 3 o'clock) the dark cavity of the antrum is seen. A black pigment spot is lying in the mucosa proximal to the antrum. At 12 o'clock air bubbles and tiny mucosal haemorrhages are observed. At the centre of the visual field the ulcer is seen.

blood was present in the stools. Gastric analysis: free HCl, 71; total acidity, 86. Radiographs were negative. Gastroscopy in 1922 showed that the action of the pylorus was normal. In the lesser curvature of the body some small mucosal haemorrhages and some pigment spots were observed. Above the incisura angularis a crater-shaped ulcer was seen. Its floor was yellowish, its edge sharp. The ulcer was shallow towards the cardia but undermined and overhanging at the pyloric side. This overhanging edge cast a shadow on the floor of the ulcer. Impression: round gastric ulcer of the lesser curvature.

In this case one may safely assume that the ulcer would have been discovered by modern x-ray methods. It should be mentioned that in 1927 a resection was performed. The ulcer was found in the resected specimen. The patient died from the surgical intervention.

Tumour

Case 10.—This patient, a labourer aged 45, entered the hospital on July 6, 1922, for examination. The military hospital asked us for an opinion. The patient complained of epigastric distress dating back to 1916, when he had bacillary dysentery. He had since complained of "stomach pain" unrelated to meals. He had attacks of colic and vomiting, and lost weight although his appetite was good. Physical examination did not reveal any disease. The benzidine reaction in the stool was slightly positive. The fasting stomach contained 20 c.cm. of bile-stained gastric juice. After an Ewald test meal no free HCl was found; the total acidity was 18. Lactic acid was absent. The x-ray examination was negative. Gastroscopy revealed a most surprising picture. The mucosa of the lesser curvature was reddish grey, somewhat mottled. At the entrance of the antrum a spasm of the circular muscle fibres occurred, with the formation of thick elevated folds so that the cavity of the antrum became entirely shut off from the gastric cavity. When the spasm relaxed slowly a small, irregular, strawberry-like tumour was revealed on the posterior wall. The cavity of the antrum was exposed, and the moderately broad base of the tumour was well seen. The action of the pylorus was now observed. Then the spasm occurred again. The same course of events was observed several times, and one had the definite impression that the contracting muscle seized the tumour and tried to expel it through the pylorus. The gastroscopic impression was: slight atrophic gastritis of the lesser curvature; solitary benign mucosal tumour of the posterior wall of the antrum.

This patient was observed over a period of ten years and was examined with the gastroscope at medical meetings. The same picture was seen repeatedly.

The combination of dysentery with anacidity and atrophic gastritis is well known. Most pathologists assume that benign gastric tumours develop on the soil of chronic atrophic gastritis. Therefore a connexion between the benign tumour and the patient's war disease—dysentery—might be assumed. The benign tumour evidently caused the abnormal contractions of the muscular coat, which apparently were responsible for the pain.

Normal Mucosa

Case 11.—This patient, aged 30, was referred by the military hospital on October 29, 1921. He had had a gross gastric haemorrhage in 1913. Another melaena was observed on October 15, 1921. The patient was then sent to hospital and recovered quickly. Tarry stools were noted. An aspiration test was omitted. On x-ray examination an ulcer of the lesser curvature was suspected. A blood count gave 55 per cent. haemoglobin and 3,700,000 red cells. By gastroscopy the entire stomach and the activity of the pylorus were well seen. However, no ulcer was found.

In this case gastroscopy did not explain the severe haemorrhage. Gastric ulcer could be excluded with certainty. It is not impossible that a gastric erosion had healed completely between October 15 and October 29.

Case 12.—This patient, a carpenter aged 40, was referred by the military hospital on February 24, 1922, for gastroscopy. Since the war he had had epigastric distress and vomiting, not related to food. He said that once he had vomited some coffee-ground material. This, however, had not been observed. The physical examination was negative. No occult blood was found in the stools. Gastric analysis after an Ewald meal showed a complete absence of free HCl; the total acidity was 15; no pepsin was present and no lactic acid was found. On x-ray examination an ulcer of the duodenum was suspected, but it was mentioned that carcinoma could not be excluded. Gastroscopy showed spasms and normal mucosa. This case remained obscure.

Case 13.—This man, a driver aged 25, was referred by the military hospital on February 16, 1922; he had been complaining of epigastric distress since 1915. The pain began one to two hours after meals and was associated with vomiting and loss of weight. The patient's appetite was good. Physical examination did not reveal any disease, and the stools did not contain occult blood. Gastric analysis after an Ewald test meal revealed: free HCl, 63; total acidity, 72; no blood was found. An x-ray examination was negative. With the rigid Schindler gastroscope marked resistance at the oesophageal hiatus was observed and was finally overcome. A good view of the mucosa was obtained and marked spasm was found at the entrance of the antrum, which was not completely closed. Impression: spasm without organic lesion.

Discussion

The case reports of thirteen patients suffering from epigastric distress are presented to determine whether or not disease caused by military war service existed. In seven of these cases chronic gastritis was found. This condition caused superficial ulcerations in four instances and haemorrhage in one instance. In one of these cases gastritis of a post-operative stomach was found to be caused by a silk suture acting as a foreign body. In two cases overlooked ulcers were seen gastroscopically. In one case a benign tumour was found. In three cases in which the gastric mucosa was seen to be normal the diagnosis of gastric neurosis was made, although in one of them a duodenal ulcer might have been present. Thus the gastroscopic examination in ten out of thirteen cases gave a positive result, which was gratifying to both the patient and the medical staff.

Since 1922 x-ray technique has made great progress, especially in relief technique with spot machines. By using this method few gastric ulcers are overlooked: the diagnosis of duodenal ulcer can be made almost with certainty. However, it should be emphasized that the most refined x-ray study cannot make the diagnosis of chronic gastritis except in rare cases of polypoid chronic gastritis.

The differential diagnosis between psychoneurosis and chronic gastritis in patients suffering from epigastric distress is of great importance to the Army and probably to the Navy. The cases presented prove that this differential diagnosis is possible only by the use of the gastroscope. Since the invention of the flexible gastroscope the examination has become safe and easy, and can be carried out in all cases. The co-operation of the patient is indispensable, but in our experience every soldier who appears to be suffering from chronic epigastric distress is eager to undergo an examination which might reveal a definite organic lesion of his stomach. This is true of psychoneurotic patients as well. Most patients who refuse examination and fail to co-operate are malingerers. The severity of the clinical picture of chronic gastritis must be emphasized: pain secondary to ulceration, haemorrhage, and general weakness make these patients unfit for military service and partly or totally disable them from following their occupations.

Obviously it is impossible to have roentgenological spot machines or gastroscopes at army mobile hospitals or even in non-specialized military hospitals. Centralization in examining these cases becomes imperative. Either one special hospital for gastro-intestinal diseases or a gastro-intestinal department at a hospital for internal diseases is necessary. The regimental medical officers should be informed of its existence and should not hesitate to refer every soldier who complains of epigastric

distress for more than three months. In the organization of such a unit it should be borne in mind that for the adequate use of the x-ray spot machines and the interpretation of the pictures obtained training for at least two years is required. One should perform at least 1,000 examinations to become sufficiently experienced in interpreting the quickly changing gastroscopic pictures. About two years' training is required to attain this efficiency. A well-trained medical staff is as important as the instruments used. Two x-ray spot machines should be available so that the service may go on when one of them needs repair. For the same reason at least four gastroscopes should be on hand, two having a visual angle of 80 degrees and two with a visual angle of 50 degrees. Technical details on these points are given in my textbook on gastroscopy (Schindler, 1937).

Summary

I have reported thirteen case histories of patients of the post-war period who suffered from epigastric distress and who were referred by the local military hospital for gastroscopic examination. In ten of these organic disease (chronic gastritis, ulcer, gastritis caused by a silk suture, benign tumour) was found; in three cases no changes in the gastric mucosa were seen.

It has been emphasized that chronic gastritis is the most frequent gastric disease. In soldiers complaining of epigastric distress, especially in time of war, the differential diagnosis usually lies between chronic gastritis, psychoneurosis, and malingering. Only gastroscopy with the safe flexible gastro-scope permits an accurate diagnosis. Patients suffering from chronic gastritis are usually unable to perform military service and are often more or less disabled in any kind of work.

Suggestions are offered for the organization of military medical service for patients complaining of epigastric distress. Centralization seems to be imperative. The need for a sufficiently trained medical staff is emphasized.

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In the Hong Kong Annual Medical Report for 1938 it is stated that the year was marked by prevalence and persistence of infectious disease, chiefly small-pox and cholera. Hong Kong had an influx of poverty-stricken and starving refugees from the mainland—victims of the war. There was thus much overcrowding, and the low resistance of these people made them a ready prey to infection from the local carriers of cerebrospinal meningitis, so that this disease rapidly rose to epidemic proportions. Malaria, thanks to the maintained energies of the Malaria Bureau, yearly becomes less of a scourge, and no case of blackwater fever is recorded. Pulmonary tuberculosis killed 4,920 people in the year, causing one out of eight of all deaths. Dysentery was also rife. Scarlet fever remains a rarity in the colony. The death rate is estimated at 37 per 1,000; in 1937 it was 34.4. Every effort is being made to bring the sanitary inspectors under direct control of the health officers. Hitherto they have taken their orders from the chairman of the urban council—an unsatisfactory system which is described as being imperfect and inadequate. The health department under the D.M.S., Dr. Selwyn-Clark, is actively administered, but has to contend with various difficulties, such as overcrowding of hospitals, that retard its progress.

X RAYS IN DIAGNOSIS AND TREATMENT OF GAS GANGRENE

BY

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When gas gangrene can be diagnosed from the clinical findings the likelihood of cure is remote: cure is dependent upon early diagnosis. Bacteriological examination of the suspected tissues involves biopsy, which, apart from the possibility that it will spread the infection, results in a considerable loss of valuable time. By radiography it is possible within a few minutes and without any injury to the patient to detect the formation of gas in the tissues before it has produced any clinical signs. Indeed, Kelly, Dowell, Russum, and Colien (1938) urge that x-radiation is the application which offers the best therapeutic results; while in those cases which have progressed so far that gas crepitation is detected clinically we can obtain by radiography a good idea of the extent of the invasion and also a guide to the possibility of eradication by amputation.

Radiographic Appearances

The radiographic appearances are dependent upon the nature of the anaerobic bacterial invasion and the stage of the disease. In the penetrating wound the formation of gas bubbles around the foreign body will be the first indication of anaerobic infection; but it must be remembered that the foreign body, such as wood splinters, clothing, and other materials of this density, in or by which the organisms were introduced will not be revealed by the radiograph, so that the gas bubble may be the only evidence of the presence of foreign material. Such localized collections of gas were more frequently discovered during the radiographic examination of a wound a week or two after its production, and were usually associated with the *B. sporogenes* or *B. perfringens* (now classed by some authorities with *B. welchii*). Examples of such radiographs have been published previously (Brailsford, 1939). Radiographic localization of such small collections of gas, and surgical cleansing (including the employment of bipp) of the wounds which include them, resulted in the eradication of the infection (Brailsford, 1939).

Invasion of damaged tissues by *B. welchii* (*Vibrio septique*) occurring after abrasions of contused tissues, penetrating wounds, and sometimes subcutaneous and intramuscular injections results in an acute fulminating gas gangrene which presents a very different radiographic appearance, for most cases are not submitted for x-ray examination until there is clinical evidence of gas gangrene and the prognosis is extremely grave. When the organisms are introduced by abrasions gas bubbles first appear in the subcutaneous tissues. These may develop to a large size and later, by virtue of the gas pressure within, spread along these tissues to the extremity of the affected limb or on to the trunk. Often by the time the nature of the infection is suspected the invasion has passed beyond the bounds of the subcutaneous tissues, and the radiographs will reveal separation of the muscle fibres by the interspersation of linear accumulations of gas as in Figs. 1 and 2. An estimation of the extent of the invasion can be determined by a careful inspection of a radiograph large enough to well cover the affected area. The rapidity of the invasion of the tissues could be shown by the comparative examination of further radiographs after a short