It is possible that the higher mortality for cases which were given glucose is not connected with the action of glucose on carbohydrate metabolism, which is probably beneficial, but on its interference with the process of cellular rehydration. The maintenance of hyperglycaemia induces an intense and prolonged glycosuria and, associated with it, a proportional diuresis. The urinary output bears a linear ratio to the glucose output (Franks *et al.*, 1947). The urinary output in our Group A cases was 43.3% of the total intake, and the fluid intake in these cases was 43% more than in the cases not given glucose.

The administration of glucose in the first four hours of treatment, by maintaining a heightened blood sugar, serves to increase water excretion, to worsen the state of cellular dehydration, and to add to the circulatory collapse and shock. This process may be of no great consequence in the milder cases, but where the clinical state of the patient is poor it may cause death.

The results of this study indicate that glucose should not be administered in the early stages of the treatment of diabetic coma. The withholding of glucose for at least the first four to six hours of treatment ensures rapid rehydration and decreases the mortality significantly in serious cases of coma with circulatory collapse.

Summary

A clinical study of 28 consecutive cases of diabetic coma treated with and without the early administration of glucose is described.

Ten cases received glucose and 18 only saline in the first four to six hours of treatment. The two groups of cases were comparable.

There was a mortality of 40% in the glucose cases and of 11% in the saline cases.

The results of this study indicate that the administration of glucose to serious cases of diabetic coma in the early stages of treatment interferes with rapid rehydration and increases the mortality significantly.

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SUBACUTE PANCREATITIS

BY

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The most commonly recognized types of pancreatitis are the acute haemorrhagic form, with its dramatic clinical picture and high mortality rate, and the chronic type, with a long-drawn-out history of dyspepsia associated with general ill-health. Of the other degrees of pancreatitis, there is the variety which gives rise to a prolonged illness, with abscess formation, and the low-grade pancreatitis which may later progress to pseudocyst formation.

All these types are well known, but there remains another degree of the condition—subacute pancreatitis—which is not so widely recognized. Subacute pancreatitis is a fairly rapidly developing inflammation of the pancreas, generally associated with much oedema, which, though presenting as a surgical emergency, does not produce the same urgent clinical picture as is presented by the haemorrhagic form. There is a marked tendency to recurrence, and the initial attack is generally followed by several similar attacks over a period of time, producing the syndrome of recurrent pancreatitis. During one year at the General Hospital, Birmingham, there were 19 cases of subacute pancreatitis, of which 13 were recurrent attacks.

Pathology : Clinical Picture

At operation the gland is found to be enlarged and oedematous. The enlargement is sometimes very gross, and in three cases abdominal palpation revealed a mass which was found at operation to be an enlarged pancreas. In one instance the oedematous pancreas produced pyloric obstruction. The surface of the gland may present petechial haemorrhages and the peripancreatic lymph nodes are enlarged. There may be some free fluid in the peritoneum, but it is not blood-stained as in haemorrhagic pancreatitis. In two cases there was fat necrosis in the omentum.

The clinical findings are shown in Tables I and II. The patient, usually middle-aged and obese, develops upper abdominal pain which, though not severe at first, gradually increases in intensity over several hours until it is unbearable. The pain may be situated in the epigastrium or in the right or left hypochondrium. In some cases it is felt right across the abdomen under the subcostal margin. The pain, which may continue unabated for several hours, does not vary in intensity. When asked to describe the pain the patient generally states that it is deep-seated and boring in nature and that it passes through to the back. Vomiting occurs early, and when the stomach contents have been emptied incessant retching adds to the patient's distress. The temperature is normal, but the pulse rate is generally raised. There is some tenderness and guarding in the upper abdomen, and this may be present anywhere in the subcostal region. There is tenderness in one or both loins and in the costovertebral angles posteriorly. There are some inconstant signs, such as jaundice, due to obstruction of the common bile duct by the swollen pancreas, and occasionally glycosuria. In cases presenting recurrent attacks the clinical picture is similar, but vomiting is not severe, and the tenderness, when present, is only slight.

Laboratory Investigations

Only two of the multitude of investigations described for pancreatitis have proved of use in establishing the diagnosis—estimation of the level of the serum lipase and serum

TABLE I.—*Summary of Clinical Findings in Patients Suffering from an Initial Attack of Subacute Pancreatitis*

Case	Onset	Pain		Vomiting	Tenderness	Guarding	Jaundice	Glycosuria	Serum Amylase	Treatment
		Situation	Type							
1	Gradual; 24 hours	Epigastrium and through to back	Constant and deep-seated	Severe	Generalized: especially marked in epigastrium	Epigastrium	Nil	++	Urinary diastatic index 100 units	Conservative
2	Gradual; 48 hours	Epigastrium, right hypochondrium and through to back	"	"	Right and left hypochondria, costovertebral angles posteriorly	Right and left hypochondria	Slight	Nil	438 units; two months later 61 units	"
3	Gradual; 5 days	Epigastrium, right and left hypochondria	"	Very severe	Left hypochondrium and left costovertebral angle	Nil	"	"	32 units	Laparotomy
4	Gradual; 4 days	Epigastrium and right hypochondrium	"	"	Right hypochondrium and right costovertebral angle	Right hypochondrium	Nil	"	51 "	"
5	Gradual; 4 days	Epigastrium and left hypochondrium	"	Severe	Right hypochondrium, right and left costovertebral angles	Nil	Severe	"	190 "	"
6	Gradual; 8 hours	Left hypochondrium	"	Vomiting at onset severe, retching afterwards	Left hypochondrium and epigastrium	Nil	Slight	"	439 units; one month later 46 units	Conservative

TABLE II.—*Summary of Clinical Findings in Patients Suffering from a Recurrent Attack of Subacute Pancreatitis*

Case	Duration of Attacks	Pain		Vomiting	Jaundice	Glycosuria	Serum Amylase	Findings at Laparotomy
		Situation	Type					
7	5 years	Right hypochondrium and epigastrium	Constant and deep-seated	Severe	Slight	++++	36 units	Enlarged hard pancreas. Areas of fat necrosis in omentum
8	3 "	Epigastrium	"	"	Nil	Nil	164 "	Enlarged firm pancreas. Areas of fat necrosis in omentum
9	3 "	Subcostal; through to back	"	Occasionally	"	"	59 "	Enlarged hard pancreas
10	3 "	Subcostal	"	Severe	"	"	245 units (during attack); 39 units three weeks later	Enlarged pancreas
11	6 "	"	"	Never	"	"	258 units during exacerbation	"
12	" Years "	Epigastrium	1½ hrs. after meals, constant for 2 hrs.	"	"	"	Not tested	Enlarged pancreas. Irregular "bosses"
13	2 years	Left hypochondrium	1 hr. after meals, constant for 2 hrs.	Severe	"	"	"	Enlarged pancreas. Areas of fat necrosis in omentum
14	18 "	Left hypochondrium and epigastrium	Constant and deep-seated	"	"	"	42 units	No laparotomy
15	15 "	"	"	Occasionally	Severe	+++	Diastatic index urine, 6	Patient died. Enlarged fibrosed pancreas
16	10 "	"	"	"	Nil	Nil	Not tested	No laparotomy
17	2 "	Right hypochondrium and right costovertebral angle	"	Severe	"	"	59 units	Enlarged pancreas
18	2 "	Epigastrium	"Dragging"	Occasionally	"	"	504 units in exacerbation	"
19	3 "	Subcostal	Constant and deep-seated	"	"	"	217 units in exacerbation	No laparotomy

amylase. Several estimations of the serum amylase have been made both in normal subjects and in patients suffering from various abdominal lesions. Somogyi (1932) stated that the normal limits were 80 to 180 units. Lewison (1941) gave 40 to 175 units as the normal range, and our results are more in keeping with those of Lewison than with those of Somogyi.

In the initial attacks the serum amylase is raised above normal and remains elevated until the symptoms have abated. In recurrent attacks the serum amylase is generally below normal, presumably because repeated attacks are associated with fibrosis of the gland and diminution of acinar tissue. Occasionally during an exacerbation the blood amylase is raised above normal and then settles to a subnormal limit later. This was found in three of the cases in this series.

The diastatic index of the urine follows the changes in the serum amylase level and is dependent upon the renal threshold for amylase being exceeded.

Diagnosis

The main features of subacute pancreatitis are: the deep-seated severe pain, which is of gradual onset and long duration, is situated anywhere in the subcostal region, and passes through to the back; the constant nature of the pain; the incessant vomiting and retching; the tenderness in one or both costovertebral angles; and, finally, the elevation of the serum amylase.

Differentiation from Perforated Gastric Ulcer

The clinical picture is as clear-cut as that produced by an acute appendicitis. An acute exacerbation of symptoms in a patient suffering from a chronic peptic ulcer may give rise to confusion, but the history and a normal serum-amylase level should make the diagnosis obvious. The dramatic picture presented by a perforated gastric ulcer differentiates it readily from subacute pancreatitis, though occasionally confusion may occur, as in the following case.

A man was admitted to the General Hospital on July 2, 1946, complaining of severe epigastric pain. He gave a history of attacks of pain in the left hypochondrium over the previous twelve years. The pain was of a constant nature and would continue unabated for 48 hours, uninfluenced by food and unrelieved by alkalis. Forty-eight hours before admission he had what he described as "a characteristic attack." The pain was continuous and constant for 24 hours and then subsided. Twelve hours later the pain recurred and gradually intensified to agonizing severity. He vomited twice at the onset of the pain, after which retching was incessant. On examination he was slightly jaundiced; there was epigastric distension, with generalized abdominal tenderness and guarding, but no rigidity. No tenderness was felt in the costovertebral angle. The serum amylase was 54 units, the blood sugar 270 mg. per 100 ml., and there was heavy glycosuria. A diagnosis of recurrent pancreatitis was made, but the patient was subsequently proved to be suffering from a perforated duodenal ulcer.

This case is unusual, however, and the differentiation of the two conditions should not prove difficult. Confusion has arisen with coronary occlusion, cholangitis, and

intestinal obstruction: however, in each case the history and signs differ in many points from those presented by subacute pancreatitis, and the serum-amylase level is within normal limits.

Confusion with Acute Cholecystitis

The condition most likely to give rise to confusion is acute cholecystitis, especially when subacute pancreatitis is associated with pain and tenderness in the right hypochondrium. The differential points to be borne in mind are the incessant retching which accompanies subacute pancreatitis, the tenderness in the costovertebral angles, and the rise in the serum-amylase level. Acute cholecystitis is often associated with a rise in temperature; this is not seen in subacute pancreatitis.

Undoubtedly many cases of subacute pancreatitis are incorrectly diagnosed as acute cholecystitis. Many of these cases are later subjected to an interval operation, and at laparotomy nothing abnormal is found. In such instances cholecystectomy may be performed with minimal pathological justification. On the other hand, evidence of a chronic cholecystitis may be found, and it has been stated that chronic cholecystitis is an aetiological factor in subacute pancreatitis. In such instances it is probably advisable to remove the gall-bladder, but it must be borne in mind that if the original condition was subacute pancreatitis and not acute cholecystitis, then the symptoms are apt to reappear.

Recurrence of symptoms after cholecystectomy is a condition so well known that a name has been given to it—the post-cholecystectomy syndrome. This syndrome may be produced by a stone in the common bile duct or by attacks of pancreatitis. This latter condition, though not generally recognized, is much more frequent than is commonly acknowledged. The following is a typical case.

This patient, aged 67, was admitted to the General Hospital suffering from jaundice. A cholecystectomy was performed in 1930, and since that date the patient had had attacks of pain situated in the epigastrium and left hypochondrium which would continue unabated from two to eight hours. Vomiting and retching and occasionally jaundice were associated with the attacks. During the month before admission the patient had had several such attacks and had become progressively more jaundiced. There was marked glycosuria and the diastatic index of the urine was 6 Wohlgemuth units. Death occurred shortly after admission, and necropsy revealed an enlarged fibrosed pancreas with dilated ducts.

Confusion with Gall-stone Colic

When subacute pancreatitis is associated with jaundice the condition may be confused with gall-stone colic. A careful consideration of the history and physical findings taken in conjunction with the level of the serum amylase should differentiate the two conditions. In this respect the following case of subacute pancreatitis is of interest.

Case 5 (see Table I).—This patient, a young woman, was admitted to the General Hospital on Sept. 19, 1945, with a history of attacks of epigastric pain over the previous ten days, increasing in severity. The pain was constant in nature and was associated with severe vomiting. Four days before admission the patient became jaundiced. On examination she was deeply jaundiced; the abdomen was flaccid, with guarding and tenderness in the right hypochondrium and tenderness in the costovertebral angles posteriorly. A radiograph revealed a shadow in the gall-bladder area which was reported as being possibly due to a gall-stone. The serum amylase was 190 units. A pre-operative diagnosis of cholecystitis was made, but laparotomy revealed a normal gall-bladder with no evidence of calculi. The pancreas was swollen, congested, and oedematous, and the peripancreatic lymph glands were enlarged. The patient made an uneventful recovery. Four weeks later the blood amylase was 80 units.

Treatment

The treatment of subacute pancreatitis is conservative. Rest in bed should be enforced until symptoms have subsided. Large doses of morphine may be necessary in the first few hours to give the patient relief from pain, but apart from this no other special medical treatment is indicated. When there is a history of recurrent attacks of subacute pancreatitis the gall-bladder should be investigated, and if there is any evidence of chronic cholecystitis cholecystectomy should be performed, as it is very probable that the diseased gall-bladder is acting as the focus of infection for the recurrent attacks of pancreatic inflammation.

Typical Case Reports

The following two cases are reported in full as being typical of the conditions described.

Subacute Pancreatitis (Case 6)

A middle-aged man was admitted to the General Hospital on Dec. 28, 1945, complaining of severe pain in the left loin and left hypochondrium. The pain was described as being deep-seated and passing through to the back. It later radiated to the right hypochondrium. The patient vomited at the onset of the attack and had suffered from severe retching throughout.

On examination he was jaundiced and was tender on deep palpation in the left hypochondrium, the epigastrium, the left loin, and the left costovertebral angle. The serum amylase was 439 units and the serum bilirubin 6 mg. per 100 ml. He settled down on conservative treatment, and a month later his blood amylase had fallen to 46 units.

Recurrent Pancreatitis (Case 7)

A man was admitted to the General Hospital on Nov. 20, 1941, complaining of intermittent attacks of epigastric pain over the previous eight weeks. The pain was continuous and was unrelated to food. The attack immediately before admission had continued for four days, during which time he had vomited incessantly. A diagnosis of subacute intestinal obstruction was made. A laparotomy was undertaken, but failed to reveal any abnormality. The patient made an uneventful post-operative recovery.

On Nov. 21, 1942, he was readmitted complaining of an exactly similar attack of only two hours' duration. A diagnosis of perforated gastric ulcer was made, but laparotomy revealed no abnormality in the stomach. The pancreas was swollen greatly and was very hard. He again made an uneventful post-operative recovery.

On May 5, 1944, a similar attack occurred and the patient was readmitted to hospital. A diagnosis of subacute obstruction due to severe constipation was made. It was noticed that he was suffering from severe diabetes.

On April 12, 1946, he was readmitted after an exactly similar attack. On examination he was tender in the epigastrium, in the left hypochondrium, and in both costovertebral angles. The blood sugar was 235 mg. per 100 ml. and the blood amylase was 36 units. The patient progressed well on conservative treatment and was discharged in ten days.

I am convinced that Case 7 was a clear-cut instance of recurrent pancreatitis. The low level of the serum amylase is in keeping with the fibrosis which must have occurred in the pancreas.

Conclusion

Subacute pancreatitis has a clinical picture as clear-cut as that presented by a perforated gastric ulcer. The diagnosis, though it may readily be made by consideration of the history and physical signs, is confirmed by the changes in the serum-amylase level.

The possibility of subacute pancreatitis must always be borne in mind when diagnosing an abdominal emergency, especially acute cholecystitis. Confusion of the condition with cholecystitis accounts for many of the cases of recurrence of symptoms following cholecystectomy. This error

in diagnosis would largely be obviated if serum-amylase investigations were more often employed in elucidating obscure cases of upper abdominal pain.

Subacute pancreatitis is not a rare condition, and its diagnosis depends largely on being aware of the existence of this clinical syndrome.

Summary

Subacute pancreatitis is a clinical entity readily differentiated from acute haemorrhagic pancreatitis and other abdominal emergencies.

Patients suffering from this condition present as an acute abdominal emergency but settle down on conservative treatment.

The condition is very apt to recur. Of the 19 cases presented 13 were recurrent attacks.

It is suggested that estimation of the serum-amylase level should be more widely employed to differentiate this condition from other acute abdominal lesions.

I would like to thank Professor F. A. R. Stammers for his help in presenting this paper.

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REPORT ON AN OUTBREAK OF INFLUENZA IN THE ARMY

BY

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During the months of January and February, 1949, several Army units in Mid-West District, which comprises the whole of Wales and the adjoining English counties, reported that cases of influenza were occurring among their personnel. The first cases to be diagnosed as influenza occurred on Jan. 19 in units stationed at Malvern. The second unit affected was a Boys' Battery of the Royal Artillery, near Rhyl, on Jan. 24. On Jan. 31 cases were reported at Lichfield and on the following day at Donnington. Oswestry garrison were the next victims, on Feb. 7, and by Feb. 21 cases were also being reported from Nesscliffe, near Shrewsbury, Wrexham, and Tonfanau, on the Welsh coast. A total of 646 cases were notified from all Army units in Mid-West District from the start of the outbreak on Jan. 19 to Feb. 21.

Features of the Outbreak

It had been previously impressed upon all ranks that if an epidemic of influenza did occur it was of prime importance to report sick early. Nearly all soldiers affected attended their medical officer within a few hours of experiencing their first symptoms. It is interesting to note that, in one instance only, a soldier remained in his barrack room for over 24 hours before reporting sick. Eighteen out of twenty of his comrades in the same hut developed influenza later.

The main features were a sudden onset with frontal headaches, a transient sore throat without lymph-node enlargement or tenderness, a slight cough, and a feeling of general weakness and lassitude, coupled with aches and pains in the arms and legs and in the lumbar region. Mild rigors preceded the rise in temperature, which was in the neighbourhood of 103° F. (39.4° C.), although a few cases did develop temperatures of 105° F. (40.6° C.). Circumoral pallor, injection of the conjunctivae, and profuse nasal discharge were absent. Epistaxis occurred in a few cases at Lichfield, but was not a common feature. The temperature gradually

dropped, and by the fourth day of the disease most patients were afebrile. Chest complications did not occur and after-effects were absent amongst the great majority of male patients. In the few cases occurring in the W.R.A.C. or A.T.S., however, lassitude and post-influenzal depression were noted.

Patients were treated in camp reception stations until their temperature subsided, and were then transferred to barrack accommodation for a convalescent period of two days before starting duty. The average duration of the illness from the initial symptoms until return to full duty was between six and eight days.

Treatment.—This was of a palliative nature. Warmth, rest in bed, and plenty of fluids by mouth were the main principles adopted. Salicylates and Dover's powder were given during the pyrexial period, and codeine if the cough proved troublesome.

Laboratory Investigations

When it was obvious that a definite outbreak had occurred each garrison was visited and throat washings in 10–15 ml. of sterile saline were taken from selected cases. Febrile patients or cases in the early stages of the illness were chosen so far as was possible. The washings were packed in ice and delivered within six hours to the Central Public Health Laboratory, Colindale, and the National Institute for Medical Research, Hampstead, where they were examined for the presence of virus. Broth was not added to the washings: the addition of 5 ml. would have improved the chances of recovering the virus.

The first of the paired sera required for the Hirst and complement fixation tests was taken at this visit. This was held in the refrigerator at 2–3° C. until the second of the pair was taken, on the twelfth to fourteenth day of the disease.

The sera were examined by Dr. A. P. Goffe at the Central Public Health Laboratory, Colindale; the results are indicated in brief in the tabulated schemes which follow.

TABLE I.—Cases at Rhyl (all males)

Case No.	Age in Years	Symptoms					Temperature on Day of Disease
		Shivering	Head-ache	Sore Throat	Cough	Muscle Pains	
1	16½	++	+	+	+	+	100.8° F.; 1st (38.2° C.)
2	15½	++	+	+	+	—	101.6° F.; 1st (38.7° C.)
3	20	++	++	+	+	±	97.0° F.; 3rd (36.1° C.)
4	17½	++	+	—	+	+	98.0° F.; 4th (36.7° C.)
5	16½	—	++	+	+	±	97.8° F.; 3rd (36.5° C.)
6	16	+	++	++	+	—	98.0° F.; 4th (36.7° C.)

Saline Washings.—Report on Feb. 2, 1949: Type A virus isolated in two cases from washings taken on Jan. 28, 1949.

Hirst Test.—Four cases showed fourfold rise of antibody inhibiting fowl red-cell agglutinin (A PR 8) in second serum. Two cases in which the first serum (taken on the fourth day of illness) showed a high titre (1 in 48) had a twofold rise on the 14th day in antibody to A PR 8 agglutinin.

C.F.T.—Second sera showed 16- to 64-fold rise in complement-fixing antibody to Type A strain antigen.

Result.—Influenza type A.