Chronic pancreatitis:
medical aspects

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Two DISTINCT features characterize the pathological entity of chronic pancreatitis, acinar destruction and fibrous tissue formation, the final stage of which is a destroyed and densely sclerotic pancreas. Some degree of dilatation and stricture of the pancreatic ducts is often present, in some cases associated with pancreatic calculi. Sarles and his colleagues (Sarles, Muratore & Sarles, 1961; Sarles *et al.*, 1965) have shown that both aetiologically and pathologically chronic pancreatitis differs from and is a most infrequent sequel to acute pancreatitis. Not only can a pathological distinction between these entities be made but the prognosis differs in the two since in the absence of complications such as pseudocyst or abcess restitution of both structure and function frequently follow elimination of the cause in acute pancreatitis whereas chronic pancreatitis is a self perpetuating and often progressive disease.

Howat (1966) has published a working classification of pancreatitis (Table 1).

TABLE 1	
Acute pancreatitis	Acute pancreatitis With oedema With oedema and local fat necrosis Acute haemorrhagic pancreatitis Haemorrhagic Necrotic or gangrenous Suppurative
Relapsing pancreatitis	Relapsing acute pancreatitis Relapsing chronic pancreatitis
Chronic pancreatitis	Chronic pancreatitis Localized Diffuse Diffuse with calcification (obstructive chronic pancreatitis)
Pancreatic atrophy	

It is particularly important to distinguish relapsing chronic pancreatitis from relapsing acute pancreatitis. Not only can the distinction be made on an anatomical basis, but also in the clinical assessment of patients the distinction remains

valid since the permanent pancreatic dysfunction which is a feature of chronic pancreatitis can be assessed by pancreatic function tests (Burton *et al.*, 1960a; Howat, 1963, 1965). It is important to differentiate these two conditions in clinical practice since the management and prognosis of relapsing chronic pancreatitis and relapsing acute pancreatitis differ in important respects.

Incidence

Chronic pancreatitis is an uncommon disease. In a series of fifty-four cases observed in Manchester Royal Infirmary cases are found equally in males and females (Fig. 1). It can present throughout life.

FIG. 1. Age of onset and sex distribution of chronic pancreatitis in North West England. Open columns, male; solid columns, female.

The population falls into two main groups, a younger age group in the third decade in which women with calcified pancreatitis are well repre-

sented (Fig. 2) and an older age group in the fifth and sixth decades, possibly over-estimated since this peak may include a few cases more properly described as pancreatic atrophy.

FIG. 2. Age and sex distribution of calcified pancreas in North West England. Open columns, male; solid columns, female; stippled columns, chronic alcoholism.

TABLE 2
Aetiological factors of chronic pancreatitis
(fifty-four cases: seventeen with pancreatic calculi)

Biliary tract disease	
Gallstones	3
Post-cholecystectomy	5
Vaterrian stenosis	3
Papilloma of ampulla	1
Stricture of pancreatic duct	2
Peri-vaterrian diverticulum	1
Trauma	1
Hyperparathyroidism	2
Steroid therapy	1
Chronic alcoholism	11
No cause found	28

Aetiology

The incidence of chronic alcoholism as a factor which causes chronic pancreatitis varies in different countries. A decade ago it was relatively insignificant in Britain but it has become more prominent in recent years as a determining cause of chronic pancreatitis in males, but not in females. The incidence of biliary tract disease is probably exaggerated in Table 2 since it is not

known in all cases why cholecystectomy was performed. In twenty-eight of the fifty-four cases no cause was demonstrated; in the group no familial cases or cases secondary to hyperlipidaemia were detected.

TABLE 3
Painless chronic pancreatitis (seven cases)

Emaciation	7
Steatorrhoea	7
Diabetes	6
Calcification	3
Jaundice	0
Duodenal ulcer	2
Metabolic bone disease (one gastroenterostomy for duodenal ulcer)	3
Thrombosis inferior vena cava	2

Clinical features

In those rare cases in which chronic pancreatitis is painless (Table 3) it is only in the late stages when pancreatic insufficiency becomes manifest that symptoms obtrude. As the disease progresses, glycosuria and hyperglycaemia become permanent features and the stools are fatty and contain excess nitrogen. They may be associated with pancreatic calculi (Table 4). Asthenia, food intolerance and emaciation supervene, and frequently in a patient demoralized by a long and painful illness addiction to alcohol and opiates is difficult to control.

TABLE 4
Calcified pancreas (eighteen cases; seventeen with calculi, one calcified cyst)

Pain	16
Diabetes mellitus	9
Steatorrhoea	7
Pancreatic cyst	1
Duodenal ulcer	4
Osteomalacia	1
Addiction to opiates	1
Jaundice	2

Pain

Typically the course of chronic pancreatitis is punctuated by painful episodes (Table 5). The pain in chronic pancreatitis may be characteristic or it may prove to be confusing to the clinician, this largely because of its variable site and character. A full description of pancreatic pain has already been given (Howat, 1963). Certain features call for comment. Back pain is by no

means an invariable feature. During an attack or in subsequent attacks pain may be experienced at a different site, a concept which conflicts with our preconceived notions of the stereotyped character of visceral pain, and frequently leads to suspicion of psychoneurotic illness. The characteristic feature is its persistence and duration. The pain, which is caused by oedema and inflammation in the gland usually continues for over 48 hr and not uncommonly for 7–10 days. Soluble alkalies and vomiting do not relieve it; relief is obtained from analgesics. Pancreatic pain tends to be aggravated in the supine position, which leads the patient to adopt postures and situations which may be quite typical to obtain temporary ease, such as flexing the spine or supporting his elbows on his knees, splinting his upper abdomen with his forearm and hand or even the knee-chest position. To some a hot water bottle is very comforting. An attack may be precipitated by a heavy meal with alcohol in the preceding 24 hr. Alcohol in even small amounts is a hazard in chronic pancreatitis, as are opiates such as codeine. During relapses glycosuria and steatorrhoea may be recognized as transient phenomena which tend to become permanent with the passing of time. Painful eructation is a very characteristic symptom of involvement of the tail of the pancreas (Howat, 1963).

TABLE 5

Chronic pancreatitis (symptoms in fifty-four cases: twenty-six males, twenty-eight females)

Pain	47
Diabetes	25
Steatorrhoea	18
Jaundice	9
Calcification	18

Complications

Not only is it necessary to be aware of the aetiological factors which may lead to chronic pancreatitis, but a recognition of the complications may provide a clue to the diagnosis (Table 6). In this table the incidence of duodenal ulcer

TABLE 6

Complications of chronic pancreatitis (fifty-four cases)

Abscess	2
Cyst formation	1
Duodenal ulcer	5
Duodenal stenosis	1
Metabolic bone disease	3
Deep vein thrombosis	2
Addiction to pethidine	2

is low, since the exact findings at operation on several patients who had undergone past gastric surgery without relief of symptoms were not available, they have been excluded in this analysis.

Pancreatic insufficiency

Should chronic pancreatitis be suspected search must be made for evidence of persisting pancreatic insufficiency. The other causes of pancreatic insufficiency must be kept in mind (Table 7).

TABLE 7

Causes of pancreatic insufficiency

Fibrocystic disease of pancreas (mucoviscidosis)
Primary (congenital) atresia of pancreas
Granulomata
Reticuloses
Atrophy of pancreas (lipomatosis)
Cancer of pancreatic duct
Cancer of ampulla of Vater
Cancer of pancreas
(Haemochromatosis)

Radiography as a rule is less helpful though calcification may be present in a plain film of the upper abdomen and distortion of organs and structures contiguous to the pancreas may be revealed by techniques such as barium meal and selective abdominal aortic aortography. A reduced incorporation of ^{75}Se selenomethionine into pancreatic proteins has been demonstrated soon after severe acute pancreatitis but more experience of the normal is necessary before scans obtained in chronic pancreatitis can be interpreted with certainty.

In the later stages of chronic pancreatitis and certainly when steatorrhoea is present, fat balance studies, tolerance tests and test meals such as the Lundh meal are adequate to reveal the functional changes of relatively advanced pancreatitis as is an abnormal glucose tolerance test. However, it seems to be important to make a diagnosis as early as possible in the disease. In the earlier stages significant elevations of serum amylase and lipase may be found during exacerbations of pain or after stimulating the pancreas with secretin and pancreozymin (Burton *et al.*, 1960b). The evocative test is best combined with an oral glucose tolerance test; the combined test indicated pancreatic involvement in forty-three of forty-nine patients (87%) who had chronic pancreatitis and in a similar percentage of patients with primary cancer of the pancreas. The evocative test however is not a specific test of pancreatic disease and false positives are encountered particularly in hepatic and biliary

TABLE 8
Secretin-pancreozymin test

	Cases	Decreased			
		Post secretin			Post pancreozymin
		Volume	Max.HCO ₃	HCO ₃ output	Amylase output
Acute pancreatitis	40	2(4)*	6	7(7)*	3(1)*
Chronic pancreatitis	30	17	27	28	24

*The figures in parentheses refer to significantly increased values sometimes obtained in active pancreatitis.

disease and in other conditions affecting the upper abdomen. The most sensitive index of pancreatic insufficiency is the secretin or secretin-pancreozymin tests (Table 8) in which the duodenum is intubated and duodenal contents are quantitatively aspirated free from acid chyme and test meals.

The characteristic response in chronic panc-

FIG. 3. Secretin-pancreozymin test in relapsing chronic pancreatitis: (a) without duct obstruction, and (b) with duct obstruction. 1, Volume (ml); 2, max.HCO₃ concentration, mm (%); 3, HCO₃ post secretion output (m-moles); 4, amylase post pancreozymin output (units).

reatitis is a reduced maximal bicarbonate concentration and reduced bicarbonate output following a standard submaximal dose of secretin and in some cases a reduced enzyme output following pancreozymin is obtained (Fig. 3). When duct obstruction is present, either due to stone or stricture or cancer blocking the pancreatic duct a diminished volume results. This important finding is a major factor in determining whether operation is indicated in chronic pancreatitis. It has not yet been proved that maximal stimulation of the pancreas with secretin adds additional information commensurate with the added cost and discomfort to the patient.

The secretin-pancreozymin test interpreted in its clinical context distinguishes chronic pancreatitis from acute pancreatitis, above all the relapsing forms. In chronic pancreatitis it also indicates the presence of obstructive pancreatitis. This essential information is not only important in diagnosis but also provides a guide to the treatment and prognosis of the individual patient.

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