Pancreatitis in childhood

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Summary

Follow-up of 25 cases of pancreatitis in childhood ascertained from the Hospital Activity Analysis in Newcastle and Wales showed that the majority of the children thrived after their illness. Only one child died. Only 2 children developed diabetes mellitus and 3 had significant malabsorption.

There were 13 idiopathic cases (9 acute, 4 chronic relapsing), 3 of which were obese girls of pubertal age. It is speculated that obesity, puberty and female sex together may predispose to acute pancreatitis.

Introduction

Pancreatitis has been thought to be a rare condition in childhood, and there have been few studies into its aetiology and sequelae. Dobbs reported a case in 1935 and reviewed the literature at that time. In addition there have been 3 series reflecting surgical experience in large teaching centres (Hendren, Greep and Patton, 1965; Fonkalsrud *et al.*, 1968; Moosa, 1973). However, some aetiological factors (notably hereditary) have not been enquired into, and there has been little attempt to find the prevalence of pancreatitis in children in a population, nor to see whether children thrive after the illness. Because of their background, children 15 years and under who had had pancreatitis were studied in 2 areas in Britain, the Newcastle Regional Hospital Board Area (now the Northern Regional Health Authority Area) in England and in Wales. These children were studied for aetiology, complications and progress after their illness.

Methods

The record numbers of children (of 15 years and under) from the Newcastle Region and Wales were obtained from the Hospital Activity Analysis in both areas. Nine Newcastle cases were ascertained from 1968 to 1973 and analysis of these cases was published in 1975 (Sibert, 1975a). Three further cases were ascertained between 1973 and 1975 and were added to the series. In Wales, 13 cases were ascertained from 1970 to 1975. The child population

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(0-14 years) of the Newcastle Regional Board Area was 765 000 in 1973 (H.M. Stationery Office, 1973) and in Wales 642 100 in 1974 (Digest of Welsh Statistics, 1975). After a preliminary check to exclude age and diagnosis miscoding, the consultant concerned was contacted and permission asked to visit the patient and study the case notes.

Children who were included in the study of pancreatitis has been diagnosed by one of the following criteria:

1. Evidence of pancreatitis at laparotomy.
2. A raised serum amylase of more than 4 s.d. above the laboratory's mean when other causes of hyperamylasaemia had been excluded. (Several different types of unit had been used in the various laboratories, including international units, Somogyi units, Street Close units, and Wohlgemuth units.)
3. Proved pancreatic insufficiency and upper abdominal pain when cystic fibrosis had been excluded.

A full family history was taken, relations contacted and records obtained. The children were examined and measured for height and weight. Blood was taken for serum calcium and lipoprotein electrophoresis. Complications of pancreatitis were searched for; however, it was not considered ethically justified to perform duodenal intubation on symptomless children. This and pancreatic stimulation by Lundh meal was therefore reserved for children with abnormal motions suggestive of pancreatic insufficiency.

After an overnight fast the duodenum was intubated with a double lumen tube under X-ray control. A standard meal was given by oral gastric tube and duodenal juice aspirated by continuous suction over a 2-hr period (Levin, Young and Bouchier, 1972). The tryptic activity was measured by the rate of hydrolysis of *p*-toluene-sulphonyl-L-arginine methyl ester (TAME).

Results

General

Twenty-five children were studied (13 boys and 12 girls). The youngest patient was 6 weeks old.

Brief details of these cases are shown in Table 1. There were 19 cases of acute pancreatitis, 4 of which had the possibility of previous attacks. There were 6 cases of chronic relapsing pancreatitis. Fifteen cases were diagnosed at laparotomy, 10 by elevation of the serum amylase and one on evidence of pancreatic insufficiency. The frequency of detection of pancreatitis in childhood as judged by hospital admissions was approximately 1/250 000 children per year in Wales and 1/400 000 children in Newcastle.

Aetiology

Aetiological factors of the 25 cases are shown in Table 2. There were no cases due to gall stones, lipoprotein abnormality, or drugs. Three of the 4 idiopathic chronic relapsing pancreatitis children had family histories of abdominal pain which were suggestive but by no means diagnostic of hereditary pancreatitis.

There were 3 obese girls at puberty who developed serious acute pancreatitis, without gall stones or other aetiological factors. They were Cases 7 and 8 Wales, and Case 10 Newcastle.

One boy aged 14 years (Case 12 Wales) had an attack of acute pancreatitis after drinking a bottle of wine brought home by his father on a rare family visit.

TABLE 2. Aetiological factors in 25 cases of pancreatitis in childhood

Factors	No. of cases
Idiopathic (acute)	9 (4 of whom had the possibility of previous attacks)
Idiopathic (chronic relapsing)	4
Trauma	3
Mumps	3
Hereditary	2 (possibly in 5 other cases)
Hyperparathyroidism	1
? Secondary to measles	1
Alcohol	1
Diabetes mellitus	1

Progress and complications

Of the 25 children in the whole series only one died, a 13-year-old girl with acute pancreatitis. The majority of the children have thrived since their illness, the only children who did not do well initially were 3 children with chronic relapsing pancreatitis from Wales. However, these patients are now doing well and are pain-free, 2 after pancreatic surgery and one spontaneously.

Three of the 4 idiopathic chronic relapsing pancreatitis children had what had been thought by

their doctors to be clinically significant pancreatic insufficiency. Case 2 Wales had a Lundh meal in Cardiff with a mean tryptic activity of 21.2 $\mu\text{mol/ml/m}$ in the duodenal juice (normal range 27–80 $\mu\text{mol/ml/m}$). Case 9 Wales had a marginally raised faecal fat excretion of 5.6 g/day. Case 7 Newcastle had a Lundh meal in Newcastle, this showed an abnormal result and the patient's motions have become normal in appearance on pancreatic replacement. None of the acute pancreatitis children had abnormal motions. Diabetes mellitus followed pancreatitis in 2 cases (one following pancreatic surgery). The commonest complication was pseudocyst of the pancreas which occurred in 6 cases. A haemorrhagic pleural effusion was found during an exacerbation of pain in one chronic relapsing pancreatitis child. One child had a pancreatic fistula following a traumatic pancreatitis.

Discussion

Pancreatitis in childhood has a varied aetiological background. A list of causes described in the literature is shown in Table 3.

There were no cases secondary to drugs, choledocal cysts or lipoprotein abnormalities in this series. Many cases of mumps pancreatitis are mild, and may not be admitted to hospital. Therefore the incidence of mumps pancreatitis has probably been underestimated.

Obesity, puberty and female sex may predispose to acute pancreatitis; 3 of the children had this combination of factors. The work of Weetman and Baehner (1974) who found that acute pancreatitis with L-asparaginase therapy was commonest in adolescent girls may be relevant. Moreover, acute pancreatitis has been found in women following pregnancy (Joshe, 1955) and following oral contraceptive usage (Davidoff, Tishler and Roscoff, 1973).

Of the 6 children with chronic relapsing pancreatitis, 2 had hereditary pancreatitis definitely, and 3 others had suggestive family histories of abdominal pain. Although hereditary pancreatitis is inherited in a dominant manner, the penetrance of the gene is incomplete and its expression is extremely variable (Sibert, 1977). It may well be that most, if not all, cases of so-called idiopathic chronic relapsing pancreatitis in childhood have a hereditary basis. Certainly, with such children, any family history of abdominal pain should be investigated in detail.

Children under 10 years of age are likely to have some definite aetiological factor for their pancreatitis. All 5 cases from Newcastle and 2 of the Welsh cases under 10 years of age had a known cause for their disease. Moreover, it is possible that the other Welsh cases had hereditary pancreatitis. Older

TABLE 1. (a) NEWCASTLE

No.	Sex	Age at presentation (years)	Diagnosis	Aetiology	Complications	Type	Prognosis
1	M	6 weeks	Laparotomy	Mumps	Nil	Acute	Thriving
2	F	2	Laparotomy	Trauma	Pseudocyst	Acute	Poor social circumstances, growth appropriate
3	F	2	Laparotomy	Hereditary	Nil	Chronic relapsing	Thriving between attacks; obese
4	M	5	Amylase lipase	Mumps	Nil	Acute	Thriving
5	F	6	Laparotomy	? Measles	Nil	Acute	Thriving
6	M	10	Laparotomy	Trauma	Pancreatic fistula? Pseudocyst	Acute	Thriving
7	M	10	Pancreatic insufficiency	Idiopathic	Malabsorption	Chronic relapsing	Well between attacks on pancreatic replacement
8	F	13	Amylase	Idiopathic	Pseudocyst	Acute	Died
9	M	14	Laparotomy	Idiopathic	Pseudocyst	Acute	Well
10	F	14	Laparotomy	Idiopathic (?obese + puberty)	Pseudocyst	Acute	Still obese
11	M	15	Amylase	Idiopathic (? familial)	Nil	Acute	Well
12	F	15	Amylase	Hyperparathyroidism second day to renal failure	Nil (from pancreatitis)	Acute	On renal dialysis

(b) WALES

1	F	2	Laparotomy	Idiopathic (? familial)	Nil	Acute	Thriving
2	M	3	Laparotomy	Idiopathic	Pleural effusion, pancreatic insufficiency	Chronic relapsing	Well; occasional abdominal pain
3	F	5	Amylase	Hereditary	Nil	Chronic relapsing	Well; occasional abdominal pain
4	F	6	Amylase lipase	Mumps	Nil	Acute	Thriving
5	M	7	Amylase + laparotomy	Idiopathic	Nil	Chronic relapsing	Well since pancreatic jejunostomy
6	M	10	Amylase	Idiopathic	Nil	Acute	Thriving
7	F	10	Laparotomy	Idiopathic (?obese + puberty)	Nil	Acute	Thriving
8	F	12	Laparotomy	Idiopathic (?obese + puberty)	Diabetes mellitus	Acute	Still obese; well; controlled diabetes
9	M	12	Amylase + laparotomy	Idiopathic	Diabetes mellitus, pancreatic insufficiency	Chronic relapsing	Well since he was 16 years old
10	F	14	Laparotomy	Idiopathic	Pseudocyst	Acute	Well
11	M	14	Amylase	Idiopathic	Nil	Acute	Well
12	M	14	Amylase	Alcohol	Nil	Acute	Well
13	M	15	Amylase	? Diabetes mellitus	Nil	Acute	Well

TABLE 3. Causes of pancreatitis in childhood

Idiopathic infections:	<ul style="list-style-type: none"> – Mumps – Congenital rubella – Coxsackie B – Reye's disease 	Candel and Wheelock, 1946 Burnell and Moniff, 1972 Fechner, Smith and Middelkamp, 1963 Morens, Hammer and Heicher, 1974
Trauma		– Adams, Elabate and Schwartz, 1966
Hereditary		– Kattwinkel <i>et al.</i> , 1973; Sibert, 1975b, 1977
Drugs and toxins:	<ul style="list-style-type: none"> – Corticosteroids – L-asparaginase – Chlorthiazide – Scorpion venom 	Baar and Wolff, 1957; Riemenschneider, Wilson and Vernier, 1968 Weetman and Bachner, 1974 Shanklin, 1962 Bartholomew, 1970
Hyperlipoproteinaemia (types I and V)		– Fredrickson and Levy, 1972
Hypercalcaemia		– Daum, Rosen and Boley, 1973
Structural abnormalities of the pancreatic ducts		– Hendren <i>et al.</i> , 1965
Gall stones		– Hendren <i>et al.</i> , 1965
<i>Ascaris lumbricoides</i> infection		– Stein, 1963
Choledocal cyst		– Karjoo <i>et al.</i> , 1973
Cystic fibrosis		– Shwachman, Lebenthal and Khan, 1975
Diabetes mellitus		– Malone, 1974
Malnutrition		– Collins, 1958
Syndrome of pancreatitis and partial lipodystrophy		– Smith <i>et al.</i> , 1975
Alcohol		– Schmidt <i>et al.</i> , 1964

children with idiopathic acute pancreatitis probably represent one end of the age spectrum of the disease as it occurs in adults.

The immediate prognosis in children with idiopathic acute pancreatitis seems, from the relatively small numbers in this series, at least no worse, than in adults. One child died in this series, and all the remaining children are now thriving and, indeed, obesity is a problem with some. The only children who did not do well initially are the 3 children from Wales with idiopathic chronic relapsing pancreatitis; however, they are now pain-free. Two improved after surgery, and one improved spontaneously. The incidence of complications in pancreatitis in children is also encouragingly low.

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