Occasional Review

Steatorrhoea in the elderly

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Steatorrhoea which may occasionally present in middle or old age, is a treatable cause of diarrhoea. The possible causes based on a pathophysiological classification are innumerable.¹ We therefore thought it pertinent to analyse our experience of patients who presented over the age of 50 to find out the most likely cause in practice and assess the most useful diagnostic clinical and laboratory features.

Patients

We reviewed all patients aged over 50 with steatorrhoea who had presented to this department in the past ten years. Those with inflammatory bowel disease and several patients with coeliac disease who did not have faecal fat concentrations estimated were excluded from the analysis.

Methods

The faecal fat excretion was measured by Van de Kamer's method² on a three- or five-day stool collection when the patient had been on a 100 g fat diet for at least 48 hours. Steatorrhoea was defined as more than 5 g of faecal fat a day on a 100 g fat diet.

The Lundh test³ was performed and tryptic activity was assayed by a modification of Wiggins's method.⁴ A value of less than 4 units/ml/minute was considered to indicate pancreatic insufficiency.

Jejunal biopsies obtained just distal to the duodenojejunal junction by using the Crosby capsule were examined under the dissecting microscope and histologically.⁵ All patients with postgastrectomy steatorrhoea had jejunal biopsies to exclude coexistent coeliac disease. Other tests of absorption and nutritional state were performed with varying frequency over the decade as fashions changed.

Results

Of the 47 patients who were over 50 when steatorrhoea was diagnosed for the first time, 16 had coeliac disease and 14 had pancreatic insufficiency (see table). A possible cause for pancreatic insufficiency was found in eight of the 14 patients. Three gave a history of chronic alcoholism, one had definite surgical trauma to the pancreas, but only four had carcinoma of the pancreas.

Eight patients had steatorrhoea after a partial gastrectomy. The three postgastrectomy patients who had a faecal fat excretion greater

Causes of steatorrhoea in 47 patients

	Age		Total
	<65	>65	
Coeliac disease	12	4	16
Pancreatic insufficiency:			
Carcinoma	4	0	4
Other	3	7	10
Postgastrectomy	6	2	8
Jejunal diverticula	1	1	2
Tropical sprue	0	2	2
"Collagen" disease	1	0	1
Diabetes mellitus	1	0	1
Scleroderma	1	0	1
Whipple's disease	1	0	1
Undetermined	1	0	1

than 12 g a day, however, had an additional reason for malabsorption—either a gastroduodenal fistula, bacterial overgrowth in the afferent loop, or extrahepatic biliary obstruction.

Only two patients with jejunal diverticula had documented steatorrhoea, but at least six other such patients admitted for the investigation of a classic history of pale, floating, bulky, offensive motions, which were difficult to flush, failed to have steatorrhoea confirmed biochemically, possibly because their diarrhoea had settled before being investigated. The intermittent nature of fat malabsorption in bacterial overgrowth with jejunal diverticula is shown in the following case.

Case report—A 72-year-old man had a six-year history of bouts of steatorrhoea lasting about three weeks and occurring about twice a year. His appetite was reduced and he had lost about 6 kg in weight. The serum B₁₂ concentration was low (120 ng/l) and absorption of B₁₂ with intrinsic factor as measured by a whole body counter was impaired. Results of the jejunal biopsy and Lundh test were both normal, but multiple jejunal diverticula were seen on the barium examination of the small bowel. The faecal fat estimation on his first admission when he was asymptomatic, however, was normal. He was readmitted during a typical attack of diarrhoea and on this occasion the result of the faecal fat estimation was 26 g/24 hours. Subsequently his attacks of diarrhoea have been easily controlled with a broad-spectrum antibiotic.

Clinical presentation

The commonest cause of steatorrhoea varied with age, being coeliac disease in those under 65 but pancreatic insufficiency in the geriatric age group (see table). Pancreatic insufficiency was the most frequent cause of steatorrhoea in the men (nine out of 30), whereas 10 of the 17 women had coeliac disease.

Eleven of 17 patients with coeliac disease had had symptoms for more than two years before diagnosis, and four had had a history of anaemia as children. All patients with pancreatic insufficiency except one had complaints of less than two years' standing (fig 1). While almost all patients with coeliac disease (14 of 16) gave a history of diarrhoea, only seven had classic steatorrhoea stools. Every patient with pancreatic insufficiency complained of diarrhoea, which suggested steatorrhoea in all but three. Characteristically, the diarrhoea began suddenly and was rapidly disabling in the group with idiopathic pancreatic insufficiency as shown by the following case.

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FIG 1—Duration of symptoms in three of major disease categories.

Case report—An 84-year-old woman whose previous bowel habit had been normal over a two-day period began to pass 20 motions daily that were greasy, foul smelling, and difficult to flush away. She lost 20 kg in weight over the next six months. There was no relevant past history and she denied excessive alcohol intake. The jejunal biopsy result was normal, but the Lundh test result was reduced at 2 tryptic units/ml/min, and the faecal fats were raised at 13 g/24 hours. At follow-up nine months later, the patient's diarrhoea had resolved, and she had gained weight with dietary fat restriction.

Pain in the epigastrium sometimes radiating to the back was relieved by change in posture in all the four patients with pancreatic carcinoma but in only four of the 10 with non-neoplastic pancreatic insufficiency. Similar pain was rare in other patients, being found in two of those with coeliac disease and one patient with partial gastrectomy. Anorexia and general malaise were found in most (12 of 16) patients with coeliac disease but in only four of 10 patients with non-neoplastic pancreatic insufficiency.

Investigations

While certain investigations were helpful in differentiating coeliac disease and pancreatic insufficiency, others were not.

HELPFUL

Half the patients with coeliac disease had a haemoglobin concentration of less than 10 g/dl while patients with pancreatic insufficiency all had values above this level. The red cell or serum folate concentration was abnormally low in all patients with coeliac disease but only in two of eight patients with pancreatic disease.

Serum xylose concentrations two hours after a xylose test meal were decreased in six of nine coeliac patients tested, but in none of the four patients with pancreatic insufficiency. Urinary concentrations were more often abnormally low (in 12 of 13 coeliacs and in two of five patients with pancreatic insufficiency), but serum concentrations were normal in three of these coeliac patients and in the two patients with pancreatic insufficiency with low urinary xylose.

The glucose tolerance test result was diabetic in nine of 12 patients with pancreatic insufficiency tested but was normal or flat in eight of nine patients with coeliac disease and nine of ten patients with other causes of steatorrhoea.

Steatorrhoea was more severe in patients with pancreatic insufficiency (mean 18.3 g a day) compared with those with coeliac disease and previous partial gastrectomy (means 11.2 and 11.0 respectively), but there was some overlap.

Pancreatic calcification was seen on a plain film of the abdomen only in non-neoplastic pancreatic insufficiency where it was present in half the cases. Barium examination of the small bowel was mainly useful in showing jejunal diverticula but showed malabsorption pattern

in 13 of 16 patients with coeliac disease and two of those with pancreatic insufficiency.

UNHELPFUL

The erythrocyte sedimentation rate, which was usually normal, and the serum albumin concentration, which was below 30 g/l in only eight patients, were unhelpful in determining the cause of the steatorrhoea.

Discussion

Despite the multiplicity of potential diagnoses, in practice only coeliac disease and pancreatic insufficiency were common causes of steatorrhoea in this series—though bacterial overgrowth in jejunal diverticula is probably also an important but intermittent cause of steatorrhoea in the elderly. The periodic and variable malabsorption in bacterial overgrowth emphasises the importance of timing the investigation of such patients. Thus the typical triad of vitamin B₁₂ malabsorption, steatorrhoea associated with bile-salt deconjugation, and disordered amino-acid metabolism may occur together or independently, perhaps depending on the type and strain of organisms predominating at the time. It is often only possible to know if diarrhoea is caused by bacterial overgrowth by investigating patients during a symptomatic relapse. Otherwise erroneous conclusions that may lead to inadequate management can result.

Our finding that if severe steatorrhoea is found after gastric surgery another cause must be looked for has been noted by others.⁶ Minor steatorrhoea is common after a partial gastrectomy.⁷ Coeliac disease was the commonest cause of steatorrhoea in our patients, thus emphasising again that this life-long disease may first present in an older group.⁸ In our patients the frequency of coeliac disease as a cause of steatorrhoea was less than in other series of adults,⁹ partially because faecal fat concentrations have recently not been routinely estimated in such patients while in others steatorrhoea was not present.

Another reason, however, is that pancreatic insufficiency was a common cause of steatorrhoea in our elderly patients in contrast to a previous study in which steatorrhoea was not attributed to pancreatic insufficiency.¹⁰ Surprisingly, carcinoma of the pancreas was not the most common cause of pancreatic insufficiency in our series and in many the cause is unexplained. Some studies have suggested that pancreatic function deteriorates slightly with age.¹¹ As a considerable reduction in pancreatic exocrine function is needed before steatorrhoea occurs,¹² however, atrophy of the pancreas due to normal aging is unlikely to explain the severe failure of pancreatic function in our patients.

Coeliac disease and pancreatic insufficiency could often be distinguished clinically and by simple laboratory tests. The patients with coeliac disease often had symptoms for many years before diagnosis¹³ and felt generally unwell at the time of presentation. On the other hand, patients with pancreatic disease generally had short histories and usually were free of constitutional symptoms. Patients with pancreatic insufficiency, however, often had a characteristic pancreatic pain, which was rare in other diseases associated with steatorrhoea. Patients with pancreatic disease often experienced a sudden onset of disabling diarrhoea. As expected¹⁴ anaemia was common in coeliac disease and often quite severe compared to pancreatic disease. Haemoglobin values of less than 10 g/dl occurred in none of our patients with pancreatic insufficiency nor in any of those in a previous series.¹⁴ Malabsorption of folic acid is almost invariable in coeliac disease¹⁵ and as in our series, nearly all untreated patients have a low red cell or serum folate concentration.¹⁶

Impaired xylose absorption was present in most coeliac patients, but is said to be rare in pancreatic disease¹⁷—and indeed this was our experience. In assessing xylose absorption in the elderly, the serum xylose concentration is preferable, as urinary xylose excretion decreases with age,¹⁸ probably owing to impaired renal function.¹⁹

A glucose tolerance test now unfashionable, was valuable in that the result was diabetic almost exclusively in patients with pancreatic disease, and occurred in most of these patients thus confirming previous reports.^{20 21}

The faecal fat contents were higher in the patients with pancreatic disease. Other workers have also shown that steatorrhoea, when present in pancreatic insufficiency, tends to be more severe than in other conditions.²²

Pancreatic calcification seen on plain x-ray film of the abdomen appeared only in patients with benign pancreatic insufficiency. As in other studies,²³ in most of our patients with coeliac disease, the findings on barium small bowel follow-through was compatible with malabsorption, but the value of this was limited as it was also similarly abnormal in 25% of patients with pancreatic steatorrhoea.

Although sometimes helpful, none of these differences in clinical features and basic investigations are absolute. Since it is important to establish clearly the diagnosis of coeliac disease or pancreatic insufficiency to treat patients correctly, we would recommend that patients should be investigated according to the accompanying flow chart (fig 2).

FIG 2—Flow chart for investigating steatorrhoea.

A jejunal biopsy examination is essential in investigating any patient with steatorrhoea other than a patient after gastrectomy who has only a minor degree of fat malabsorption. This procedure is mandatory since coeliac disease is clinically curable by life-long dietary gluten exclusion. The jejunal biopsy can be performed in outpatients and is usually diagnostic, although it must be remembered that occasionally the coeliac lesion may be patchy.²⁴ A definite diagnosis of pancreatic insufficiency is less important in that in most cases it can be symptomatically relieved by simple dietary fat restriction. A diagnosis of pancreatic insufficiency, however, should be documented by an outpatient Lundh test. If the latter is not available a diabetic glucose tolerance test will usually confirm the diagnosis of pancreatic insufficiency. Furthermore, test of pancreatic function may in the future be "tubeless", by measuring the excretion of products of pancreatic enzymatic action on synthetic peptides given by mouth.²⁵ It must be remembered that coeliac disease can be complicated by secondary pancreatic dysfunction.²⁶

If pancreatic insufficiency is present the doctor must then decide whether to investigate if carcinoma is causing the malabsorption. Tests for this include endoscopic retrograde cholangiopancreatography and arteriography, although interpre-

tation of the findings may be difficult. In fact, differentiation between carcinoma of the pancreas and chronic pancreatitis may be difficult, even at laparotomy. From our experience with the elderly, we would suggest investigation for malignancy if pain is an important problem: all our patients with malignancy had pain, furthermore this pain may be quite severe. Thus the doctor's pattern of analgesic prescription (such as opiates) might differ according to whether the underlying cause of the pain was cancer or chronic pancreatitis. The question of radical surgery may be raised if cancer is present, although the results are usually unrewarding.

If neither coeliac disease nor pancreatic insufficiency is found, diverticula (if seen on a small-bowel follow-through) should be assumed to be a site of bacterial overgrowth and should be treated with broad-spectrum antibiotics. If no cause for steatorrhoea has been found, rarer causes of steatorrhoea should be searched for.

In conclusion, a jejunal biopsy and Lundh test, together with a barium follow-through to exclude diverticula of the small bowel, will correctly diagnose the cause of steatorrhoea in most elderly patients. Such procedures may be instrumental in restoring severely disabled patients to a normal active life.

Dr H L Price is a Canadian Medical Research Council Fellow.

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Is there any hazard from the long-continued ingestion of 1 g of ascorbic acid a day as an effervescent solution? Is the vitamin value inactivated by placing the tablet in hot water?

There is as yet no certain evidence that long-continued ingestion of large doses of vitamin C is harmful, either in tablet form or as an effervescent solution. Although natural vitamin C is destroyed by boiling, it is unlikely that tablets would be inactivated in hot water used for drinking. Vitamin C may be sterilised by boiling at 98-100°C without losing its activity provided an antioxidant is added.