Summary

" Idiopathic steatorrhoea " can now be classified into the pancreatogenous, hepatogenous, and enterogenous groups. The last named can be further differentiated into gluten-induced enteropathy, tropical sprue, or one of the anastomotic syndromes.

Steatorrhoea is taken to mean the passage of loose, bulky, pale, fatty, offensive stools. The steatorrhoeic stool has an increased water content, increased dry weight, normal amount of pigment, which is paler than normal, increased amount of long-chain fatty acids, and increased short-chain volatile fatty acids. The long-chain fatty acids may be of dietary or non-dietary origin, or both. The non-dietary fat may be excreted, or it may be synthesized in the intestine. Increased activity of intestinal organisms may play an important part in the stool changes. Steatorrhoea is, usually, secondary to defective intestinal absorption.

The dietary regime is planned to reduce bacterial activity in the intestine. Specific measures in appropriate cases include replacement of pancreatic enzymes or bile salts, a gluten-free diet, folic acid therapy in early sprue, antibacterial therapy in more chronic cases, and corrective surgery. Cortisone is helpful in some cases of idiopathic steatorrhoea.

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A three-and-a-half year study of the physical and mental health of children in Florence is being carried out jointly by Harvard University and the University of Florence. A third interim report was published in November, 1954, at Florence, and describes three projects. The first was to study the influence of a mid-morning half-hour rest, and the second that of a mid-morning snack. Variations of physiological constants were noticed in the course of the morning, but were not affected by a mid-morning rest, while children who had a snack did not have the fall of blood pressure and pulse which appeared in the control children. A decoding test showed that a rest and snack avoided the loss of concentration noticeable at 12.30, when neither was available. The third project was a comparison between classes attending three State elementary schools, one for boys, one co-educational, and one founded by Professor Codignola to provide a less formal education designed to develop initiative. The pupils of the last, though from bad environments and with lower intelligence levels initially, were plainly superior to those of the other two in both intelligence and personality development in the higher classes.

STEATORRHOEA

A REVIEW OF 40 PATIENTS, WITH PARTICULAR REFERENCE TO DIAGNOSIS

BY

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It is generally agreed that the amount of fat in the faeces should not be greater than 10% of the amount of fat ingested each day (Cooke *et al.*, 1946). Steatorrhoea is the term used when this amount is exceeded.

It is convenient to classify steatorrhoea into two main groups : (1) *Primary steatorrhoea,* in which no aetiological factor for the steatorrhoea can be found during life and in which no abnormal underlying disease is found in those cases that come to laparotomy or necropsy. This includes idiopathic steatorrhoea and tropical sprue in adults and coeliac disease in children. Many authors, including Thaysen (1932) and Cooke *et al.* (1953), consider that these three conditions are all manifestations of the same disease process, the aetiology of which is unknown. (2) *Secondary steatorrhoea,* in which a definite lesion that might well cause faulty fat absorption is diagnosed during life, and can always be found at laparotomy or necropsy. This group can be readily subdivided into two : (*a*) cases in which the clinical picture is suggestive of idiopathic steatorrhoea—for example, pancreatitis, post-operative blindloop syndrome ; and (*b*) cases with steatorrhoea, but with some other clinically obvious mechanism of disease process—for example, biliary cirrhosis or following pancreatectomy. This subdivision is important, as a differential diagnosis must be made between idiopathic steatorrhoea and cases in group 2*a*.

It was decided to study all the adult cases of steatorrhoea admitted to the Central Middlesex Hospital during the years 1949–54 inclusive, in order to find out the relative frequency of primary and secondary steatorrhoea and to review the diagnostic features. Previously most authors have tended to consider one particular group of steatorrhoea rather than all cases (Thaysen, 1932 ; Stefanini, 1948 ; di Sant'Agnese, 1953 ; Cooke *et al.*, 1953).

We have reviewed the notes of 40 patients admitted during the past six years : the majority of them have been seen personally at some time by one or other of us (Table I). It will be seen that 12 cases have been classified with reasonable certainty as idiopathic steatorrhoea, one case as tropical sprue, and 23 as secondary steatorrhoea ; in 4 patients there was insufficient evidence to allow a definite classification into one or the other type.

Idiopathic Steatorrhoea

In establishing that a case of steatorrhoea is in fact idiopathic there are certain characteristic symptoms, signs, and *x*-ray and laboratory findings the assessment of which is necessary before making a final diagnosis.

Weight loss, lassitude, and abdominal discomfort or even pain are frequent symptoms. In contrast to this the weight

TABLE I.—*Details of 40 Cases of Steatorrhoea*

	No. of Cases
Primary Steatorrhoea	
Idiopathic steatorrhoea	12
Tropical sprue	1
Secondary Steatorrhoea	
(*a*) Clinical picture suggestive of idiopathic steatorrhoea:	
Pancreatic disease:	
Chronic pancreatitis	4
Carcinoma of pancreas	1
Abdominal reticulosarcoma	1
Diverticula of small intestine	1
Intestinal cul-de-sac syndrome	1
Whipple's disease*	1
(*b*) Primary disease clinically obvious:	
Post-gastrectomy:	
Unassociated with gastrocolic fistula	7
Associated ,, ,,	2
Chronic obstructive jaundice:	
Primary biliary cirrhosis	1
Crohn's disease	1
Following jejunostomy	1
Following partial pancreatectomy	1
Thyrotoxicosis	1
Type of steatorrhoea not known	4
Total cases of steatorrhoea	40

* For full description see Avery Jones and Paulley (1949).

is often steady in steatorrhoea due to chronic pancreatitis, in the absence of overt diabetes mellitus (see Case 15). Diarrhoea, although common, is not invariably present, and is often intermittent: Cases 11 and 12, described below, illustrate this. The symptoms of anaemia may be prominent, as may soreness of the tongue if glossitis is present.

A history of childhood diarrhoea may also be of help in confirming the diagnosis. It is important to ask about previous operations in order to differentiate steatorrhoea due to a blind loop of intestine or following a partial gastrectomy.

On clinical examination the patient with idiopathic steatorrhoea is frequently wasted and malnourished, with pigmentation of the skin and glossitis. Hypotension is a common finding, as is abdominal distension. Oedema of the ankles and ascites may occur if the anaemia and malnutrition are severe. In some cases the finger-nails may show koilonychia or clubbing. Examination of the temperature chart will often show a low-grade intermittent pyrexia.

Anaemia is almost invariably found at some stage of the disease, and is often severe. In 10 of our 12 cases the haemoglobin was less than 10 g. per 100 ml., and in three cases less than 5 g. per 100 ml. It is often macrocytic, and so the bone marrow is frequently megaloblastic, and may be indistinguishable from that of pernicious anaemia.

The oral glucose-tolerance curve after the ingestion of 50 g. of glucose is characteristically flatter than normal, and a maximal rise of less than 40 mg. per 100 ml. above the fasting level is often, though not invariably, found. The fractional test meal is of little help in the diagnosis, as any type of curve may be present, although the occurrence of free acid may be helpful in excluding pernicious anaemia in certain cases. The serum calcium level tends to be lowered, and in cases with severe diarrhoea, especially if there is a large volume of fluid stools, the serum potassium may also be low, though this did not occur in any of our cases.

Pancreatic steatorrhoea can best be excluded by the finding of trypsin in the duodenal contents obtained by intubation. This was done in only one of our cases. However, Cooke *et al.* (1953) point out that there are clinical similarities between those cases of idiopathic steatorrhoea that have the presence of pancreatic enzymes proved by duodenal intubation and those in whom this test is not performed. Moreover, in our three fatal cases, which had been diagnosed clinically as idiopathic without pancreatic enzyme studies, no pancreatic or other aetiological factor was present. The nitrogen balance is not a reliable means of distinguishing between these two types of steatorrhoea, as Comfort *et al.* (1953) have shown that nitrogen absorption may be as deficient in idiopathic steatorrhoea as it is in pancreatic steatorrhoea.

It has been pointed out by Wollaeger and Scribner (1951) and by Taylor (1954) that there is a delayed water diuresis in idiopathic steatorrhoea. It is also found in other types of steatorrhoea, but apparently not so constantly, and in other conditions such as renal disease and pernicious anaemia. It shows itself as a nocturnal diuresis, the volume of urine being greater by night than by day. It is suggested that this abnormality is due to delayed absorption of water in the presence of food in the small intestine. While not a diagnostic test, if it is absent it may well be useful in excluding idiopathic steatorrhoea.

Finally, a barium-meal examination of the small bowel may show certain abnormalities in cases of steatorrhoea, including dilatation of the small bowel, thickening of the mucosal folds, and segmentation of the barium. French (1952) suggests that the cause of these abnormalities in idiopathic steatorrhoea is hypersecretion of mucus due to excess of fatty acids in the small bowel. While in itself not a diagnostic feature of idiopathic steatorrhoea, since this "deficiency pattern" may be found in secondary steatorrhoea as well as in other diseases, it often provides useful confirmation. Moreover, it may help to exclude steatorrhoea secondary to a small-bowel lesion.

Tables II and III show the main characteristics of the present series of idiopathic cases. Clearly not all the typical features are found in any one patient, and a diagnosis has to be made by weighing up carefully all the available evidence.

TABLE II.—*Idiopathic Steatorrhoea*

	No. of Cases
Mode of presentation:	
Diarrhoea	10
Macrocytic anaemia	1
Nocturnal incontinence	1
Other symptoms:	
Appetite—poor	7
,, good	3
,, not known	2
Lassitude and weakness	6
Weight loss	10
Abdominal pain or discomfort	6
Symptoms of anaemia	6
Childhood diarrhoea	2
Physical signs:	
Abdominal distension	7
Pyrexia (often intermittent)	7
Malnourishment	5
Glossitis	5
Blood pressure less than 110 systolic	5
Skin pigmentation	4
Oedema or ascites	4
Clubbing or koilonychia	3
Total cases	12

TABLE III.—*Laboratory and X-ray Findings in Idiopathic Steatorrhoea*

	No. of Cases
Anaemia:	
Macrocytic	6
Hypochromic	3
None	1
Type not known	2
Bone marrow:	
Megaloblastic	7
Not known	5
Fat absorption less than 90%	12
Undigested meat fibres in faeces	0
,, ,, ,, ,, ,, not known	6
Serum calcium:	
Less than 4 mEq/litre	4
More ,, 4 ,,	6
Not known	2
Oral glucose-tolerance test:	
Less than 40 mg. rise from fasting level	8
More ,, 40 ,, ,, ,, ,, ,,	3
Not known	1
Fractional test meal:	
Histamine-fast achlorhydria	2
Hypochlorhydria	4
Normal	3
Hyperchlorhydria	1
Not known	2
Abnormal excretion of water	2
Not known	10
Barium-meal examination of small bowel:	
Abnormal	7
Normal	1
Not known	4
"Osteoporosis"	5
,, not known	7
Total cases	12

Malabsorption of fat is the one constant feature, and the only reliable way of determining this is by means of the three- or four-day fat balance.

It is important to note that diarrhoea is not always a presenting symptom, as is shown in the following two case histories. It may be absent, or have been present intermittently for years and so be regarded by the patient as a "normal" bowel habit. Cooke *et al.* (1953) found that diarrhoea was absent in 20% of their cases.

Case 11

A man aged 36 first attended hospital complaining of nocturnal incontinence of urine: no cause was found. He was next seen two years later complaining of breathlessness, palpitations, and swelling of his ankles. He then admitted that he had had intermittent diarrhoea since childhood. He had been in hospital at the age of 5 for three years with "tuberculous peritonitis," and had also had rickets as a child: in 1939 femoral osteotomy was performed for knock-knee.

On examination he was pale, the fingers were clubbed, and the skin flexures were pigmented; the tongue was smooth, the abdomen was distended, and the ankles were oedematous. Retinal haemorrhages were present; the blood pressure was 120/70. A four-day fat balance showed only 69% absorption. The haemoglobin was 3.7 g. per 100 ml.; M.C.V., 100 cubic microns; M.C.H.C., 31%. The bone marrow was megaloblastic. *X*-ray examination of his knees and wrists showed evidence of old rickets: a plain *x*-ray picture of his abdomen did not reveal any calcified glands. Water-excretion studies showed that he had a nocturnal diuresis, the volume of his night urine being greater than that of his day urine, probably accounting for his nocturnal incontinence. He was treated with folic acid and a high-protein, low-fat diet, and when seen a year later was very well and had no further nycturia or incontinence.

Comment.—This patient illustrates well the abnormal water excretion that occurs in idiopathic steatorrhoea. It is unusual for it to play so prominent a part in the symptomatology that the patient's main complaint is of nocturnal incontinence.

Case 12

A woman aged 65 noticed increasing breathlessness on exertion, with substernal pain; for three weeks she had had swelling of her ankles. Her bowels were open regularly only if she took aperients, though these sometimes caused diarrhoea. Her appetite was poor, but her weight was steady.

Examination revealed that she was very anaemic, with skin pigmentation, a palpable spleen, and oedema of her ankles. Her blood pressure was 125/60 and she ran a low-grade pyrexia. Her haemoglobin was only 3.1 g. per 100 ml.; M.C.V., 109 cubic microns; M.C.H.C., 26%. The bone marrow was megaloblastic and a fractional test meal showed a histamine-fast achlorhydria. A diagnosis of pernicious anaemia was made, and she was treated with injections of vitamin B_{12} and intravenous iron, with a good reticulocyte response. One week after her discharge she developed diarrhoea, with loose watery motions that were difficult to flush away. She was readmitted to hospital, where a four-day fat balance showed only 83% absorption: barium-meal examination of the small bowel showed some clumping of barium, while an oral glucose-tolerance test revealed a maximal rise of only 34 mg. above the fasting level of the blood sugar.

Comment.—It is doubtful whether the correct diagnosis would have been made if the patient had not conveniently developed diarrhoea soon after her discharge from hospital. The anaemia, bone-marrow findings, histamine-fast achlorhydria, and response to treatment were in every respect compatible with a diagnosis of pernicious anaemia.

Secondary Steatorrhoea

It will be seen from Table I that the cases of secondary steatorrhoea outnumber those of the idiopathic type by almost two to one. In fact, there are probably more cases of secondary steatorrhoea admitted to hospital than are diagnosed as such. For instance, most cases of carcinoma of the pancreas come to laparotomy without a preliminary fat balance, and this probably applies to other cases of secondary steatorrhoea, such as regional ileitis. The following cases of secondary steatorrhoea illustrate some of the features important in the differential diagnosis from idiopathic steatorrhoea:

Steatorrhoea Secondary to Chronic Pancreatitis

Case 15.—A man aged 34 had suffered from intermittent attacks of fatty diarrhoea for eight years; his weight was steady and his general health excellent. A four-day fat balance showed only 68% absorption and a nitrogen balance only 71% absorption. His stools contained undigested meat fibres, and trypsin was absent from a sample of duodenal juice. An oral glucose-tolerance test was normal, a plain *x*-ray picture of his abdomen showed widespread pancreatic calcification, and there was segmentation with loss of mucosal pattern on barium-meal examination of the small bowel. Unlike most cases of idiopathic steatorrhoea, there was no anaemia and his nutrition was good. The patient's sister, aged 30, gave a history of "mucous colitis" in the past, although for the last five years she had been perfectly well, with no diarrhoea. She was investigated and also found to have widespread pancreatic calcification, steatorrhoea, absent trypsin in the duodenal juice, and, unlike her brother, impaired carbohydrate tolerance. These two cases clearly show that steatorrhoea *per se* is not necessarily a harmful condition.

Steatorrhoea Secondary to Abdominal Reticulosarcoma

Case 29.—A man aged 60 had a three-months history of a dry skin and a two-months history of diarrhoea and weight loss; his appetite was good but his energy was poor.

On examination he was wasted, with a dry scaly skin, an atrophic red tongue, and angular stomatitis; the abdomen was distended and his blood pressure was 125/70. *X*-ray examination of the chest showed bilateral pulmonary tuberculosis and the sputum was positive for tubercle bacilli. A four-day fat balance showed 55% absorption; the oral glucose-tolerance test was normal; the haemoglobin was 9.9 g. per 100 ml.; M.C.V., 112 cubic microns; M.C.H.C., 35%. Marrow puncture was unsuccessful and the barium-meal examination of the small bowel was normal. He became confused and delirious soon after admission but responded to intensive vitamin therapy. Some weeks later he relapsed and died after appearing to develop signs of Wernicke's encephalopathy. Post-mortem examination confirmed that he had bilateral apical pulmonary tuberculosis; the brain was normal. The mesenteric, retroperitoneal, and parapancreatic lymph nodes were infiltrated with reticulosarcoma and there was one small tumour in the ileum, the remainder of the small intestine being normal.

Comment.—It seems likely that the reticulosarcoma was the primary cause of the steatorrhoea. However, a diagnosis of idiopathic steatorrhoea seemed reasonable at the time considering the general picture, the multiple vitamin deficiencies, and the macrocytic anaemia, together with the absence of any symptoms or signs indicating a primary aetiological cause for the steatorrhoea.

Steatorrhoea Secondary to a Large Intestinal Cul-de-sac

Case 36.—In 1920 a woman, now aged 61, underwent an operation for the removal of Fallopian tubes with abscess formation. In 1946 she had a laparotomy for intestinal obstruction, due to adhesions. These were divided and a side-to-side anastomosis was done in the portion of bowel above and below the obstruction. She remained well until 1952, when she started to lose weight and feel weak. Later she developed numbness and tingling of the hands and feet, a sore ulcerated tongue, and, three months before her admission in 1954, diarrhoea with pale bulky stools, swelling of the legs, and abdominal distension. She also noticed some

unsteadiness when she walked. On examination she was pale but fairly well nourished; her tongue was smooth, the lower abdomen was distended, and there was oedema of the ankles. The blood pressure was 100/60 and there were signs of a sensory peripheral neuritis.

A four-day fat balance showed 78% absorption; the haemoglobin was 8.2 g. per 100 ml.; M.C.V., 133 cubic microns; M.C.H.C., 33%. The bone marrow was partly normoblastic and partly megaloblastic. A fractional test meal showed a histamine-fast achlorhydria, and a glucose-tolerance test was normal. A barium-meal examination showed distension of the small bowel with delay in transit. An injection of 1,000 μg. of vitamin B_{12} raised the haemoglobin to 10.9 g. per 100 ml. She was then given chlortetracycline, 250 mg. four-hourly for ten days; the diarrhoea diminished, and the reticulocyte count rose from 1% to 12% by the eighth day of treatment. She resembled the cases described by Naish and Capper (1953) in whom the anaemia and steatorrhoea were secondary to a stagnant loop of small intestine. At laparotomy there was a greatly dilated blind loop of gut 3 ft. (90 cm.) from the ileocaecal valve, and a resection was done. She made a complete symptomatic and haematological recovery.

Steatorrhoea Secondary to Multiple Jejunal Diverticula

Case 37.—A woman aged 79 presented with weight loss, anorexia, and a history of intermittent attacks of diarrhoea for several years. The stools were formed, pale, and bulky. Ten years previously a macrocytic anaemia had been diagnosed at another hospital and she had had regular injections of liver ever since.

On examination her general condition was good and her blood pressure was 170/95. A barium-meal examination showed multiple large jejunal diverticula. A single 24-hour stool contained 20.7 g. of fat; the haemoglobin was 14 g. per 100 ml.; M.C.V., 112 cubic microns; M.C.H.C., 31%. It seems likely that the steatorrhoea, macrocytic anaemia, and jejunal diverticula are associated. A similar case has recently been reported by Dick (1955). He suggests that stagnation and infection of the diverticula may play some part in the causation of the steatorrhoea and anaemia.

Discussion

The differential diagnosis of the cause of steatorrhoea is of primary importance so far as the treatment of the condition is concerned, for in certain cases of secondary steatorrhoea surgical treatment may be curative. In cases of secondary steatorrhoea with some clinically obvious mechanism of disease process, as in chronic obstructive jaundice, the treatment is that of the primary disease and not of the steatorrhoea, which is merely a symptom; moreover, the differential diagnosis of such conditions from idiopathic steatorrhoea is not difficult.

However, those cases of secondary steatorrhoea with a clinical picture similar to that of idiopathic steatorrhoea, such as the post-operative blind-loop syndrome or pancreatitis, must clearly be differentiated from this condition. The main points of differential diagnosis have already been considered, but certain diagnostically helpful points will be mentioned briefly again. Idiopathic steatorrhoea often presents a definite clinical picture, the correct diagnosis being suggested on these grounds alone. Thus steatorrhoea in a patient who is otherwise fit and well nourished is more suggestive of chronic pancreatitis than of idiopathic steatorrhoea, as in Case 15. Previous history of abdominal operations (Case 36), a history of childhood diarrhoea (Case 11), the presence of a small-bowel lesion on barium-meal examination (Case 37), and tests of pancreatic function (Case 15) may also be useful.

Finally, if there is still some doubt about the aetiology, together with a reasonable chance of a correct diagnosis leading to successful treatment, a laparotomy should be considered: Case 29 partially fits into this category, but a correct diagnosis would only have enabled palliative therapy to be carried out.

Summary

Forty cases of steatorrhoea are reviewed. Of these, 13 were primary steatorrhoea, 23 secondary, and in 4 cases it was not possible to be certain of the type.

The diagnosis of steatorrhoea is discussed, and the importance of excluding an underlying aetiological lesion is emphasized.

Our thanks are due to Dr. F. Avery Jones, under whose care most of the patients were, for his encouragement and advice. Permission to publish cases under their care was kindly given by Drs. R. A. J. Asher, K. P. Ball, and T. D. Kellock.

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FUNCTIONAL UTERINE BLEEDING*

BY

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Three years ago I was lucky enough to be enabled to visit Canada and the U.S.A. through a grant from my hospital, and it was whilst working in the Royal Victoria Hospital, Montreal, under the ægis of Dr. Newel Philpot that I began to appreciate the importance of the Papanicolaou smear in the routine examination of patients attending the out-patients department and the well women's clinic.

I decided to try, by the use of this technique in my own clinics, to get some rational basis for treatment in cases of uterine bleeding which could not be explained on routine clinical findings, and, further, to check the results of therapy by a series of such smears. I believe I am right in saying that, at the outset, vaginal smears were used to gain some information about ovarian function from the assessment of the cornification, etc., and that cancer detection was a later development.

Through a research fellowship established shortly after my return home, and through the work of my colleague Dr. Mary Egerton, the holder of this fellowship, it has been possible to examine and follow-up a number of patients during the past two and a half years, and it is largely because of this work that I would discuss some aspects of the problem.

Definition

By functional uterine haemorrhage I understand bleeding from the uterus for which no cause can be found in the general condition of the patient, on clinical examination of the pelvic organs, or on curettage of the cavity. This last proviso requires some amplification. I am confident that, in general, a diagnosis of functional bleeding should not be

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