treating epilepsy and trigeminal neuralgia. The measurement of plasma sodium concentrations, blood concentrations of the drug, and AVP (if the assay is available), may improve the management of an individual patient and prevent the rare complication of water intoxication.

[1] Rado, J P, *British Medical Journal*, 1973, **3**, 479.
[2] Thomas, T H, and Lee, M R, *Clinical Science and Molecular Medicine*, 1976, **51**, 525.
[3] Meinders, A E, Cjeka, V, and Robertson, G L, *Clinical Science and Molecular Medicine*, 1974, **47**, 289.
[4] Kimura, T, *et al*, *Journal of Clinical Endocrinology and Metabolism*, 1974, **38**, 356.
[5] Fichman, M P, Kleeman, C R, and Bethnine, J E, *Archives of Neurology*, 1970, **22**, 45.

(*Accepted 27 January 1977*)

University Departments of Medicine and Chemical Pathology, General Infirmary Leeds LS1 3EX

M G ASHTON, MB, MRCP, research assistant
S G BALL, MB, MRCP, MRC research training fellow
T H THOMAS, BSC, PHD, research fellow
M R LEE, DM, MRCP, consultant and senior lecturer in clinical pharmacology

Diabetes and appendicectomy: testing a hypothesis

So-called "pressure diseases" such as varicose veins, haemorrhoids, diverticular disease, appendicitis, and hiatus hernia may be associated with a fibre-deficient diet.[1 2] Some, however, are sceptical about these sweeping conclusions.[3] Burkitt[4] states that there is abundant epidemiological evidence relating appendicitis to both the removal of fibre from diet and the addition of sugar. Fibre deficiency may cause raised intraluminal pressure in the colon, particularly in the appendix when blocked with faecoliths from constipation. This may devitalise the mucosa, while excess sugar alters the faecal flora, probably causing the inflammatory process. The association between conditions attributed to low-residue diet and those, such as diabetes, attributed to excess consumption of refined carbohydrates, may be readily explained.[4] The removal of unabsorbed fibre from carbohydrate food may cause increased consumption of the refined product to satisfy appetite. Excessive consumption of refined carbohydrate and fibre depletion are therefore two sides of the same coin. Since an increased incidence of diabetes among patients with diverticulitis has been shown[5] it was suggested that the prevalence of appendicectomy among patients with maturity-onset diabetes should be greater than among a control group without maturity-onset diabetes.

This hypothesis prompted us to test the statement[2] that the causal relation of two or more diseases to a single common environmental factor may predispose people exposed to this factor to develop several of the diseases, and that these diseases would therefore be more frequently associated with one another in single patients than would otherwise be expected. We wanted to see if there was any association between appendicectomy and diabetes with reference to the fibre depletion and refined carbohydrate theory.

Patients and methods

We studied 104 men and 147 women with maturity-onset diabetes, aged 40 years and upwards, who had not been diagnosed as suffering from diabetes mellitus before the age of 40, and who had been consecutively admitted to the outpatient diabetic clinic in St Finbarr's Hospital, Cork. Controls were 104 men and 147 women matched with the diabetics for sex and age (±2 years) who had attended the accident and emergency department, St Finbarr's Hospital, or who had been admitted to the Orthopaedic Hospital, Cork, and in whom diabetes had been excluded. Subject to these criteria the controls were also taken consecutively. Patients and controls were matched for age and sex as these are two of the most important factors associated with the prevalence of appendicectomy and maturity-onset diabetes. Appendicectomy is commonest in young people, especially women, and maturity-onset diabetes is found more commonly in middle-aged and elderly women.

Analysis of paired samples—More correct estimates of risk and statistical significance may be obtained when using paired matched controls if the analysis maintains the pairing—that is, if each case is compared with the specific control that was paired with it. The basic difference introduced by matched-pair analysis is that pairs in which patient and control are similar with respect to the study factor are not considered, and estimates are based solely on pairs in which one member has and the other does not have the factor under study. We therefore used McNemar's marginal χ^2 test which takes account of the discordant pairs. Results are shown in the table.

Appendicectomy state of male and female diabetics and controls

Controls	Diabetics		Total pairs
	Appendicectomy	No appendicectomy	
Appendicectomy	8 (r)	48 (s)	56
No appendicectomy	34 (t)	161 (u)	195
Total	42	209	251

$$\chi^2 = \frac{(s-t)^2}{s+t} = \frac{(14)^2}{82} = 2{\cdot}4.$$

DF = 1; P > 0·05.

Comment

The mean age at appendicectomy in male diabetics was 31·5 years and 34·9 in the controls; in women it was 26·5 and 30·3 years, respectively. In both sexes more controls than diabetics had had an appendicectomy but the differences between the diabetics and controls were not significant, and the hypothesis that the prevalence of appendicectomy among patients with maturity-onset diabetes would be greater than among non-diabetic controls matched for age and sex was not sustained. Thus any difference that exists may be due to chance.

[1] Cleave, T L, Campbell, G D, and Painter, N S, *Diabetes, Coronary Thrombosis and the Saccharine Disease*, 2nd edn, Bristol, John Wright, 1969.
[2] Burkitt, D P, and Trowell, H C, *Refined Carbohydrate Foods and Disease*. London, Academic Press, 1975.
[3] Mendeloff, A I, *American Journal of Digestive Diseases*, 1976, **21**, 109.
[4] Burkitt, D P, *Cancer*, 1971, **28**, 3.
[5] Schowengerdt, C G, *et al*, *Archives of Surgery*, 1969, **98**, 500.

(*Accepted 24 January 1977*)

Department of Social Medicine, University College, Cork, and Department of Medicine, St Finbarr's Hospital and University College, Cork

J P CORRIDAN, MD, professor of social medicine
J P O'REGAN, MB, MRCP, registrar in medicine (present appointment: assistant professor of medicine, St Louis University Medical Center, Missouri, USA)
D J O'SULLIVAN, MD, FRCP, professor of medicine

Miliary Crohn's disease

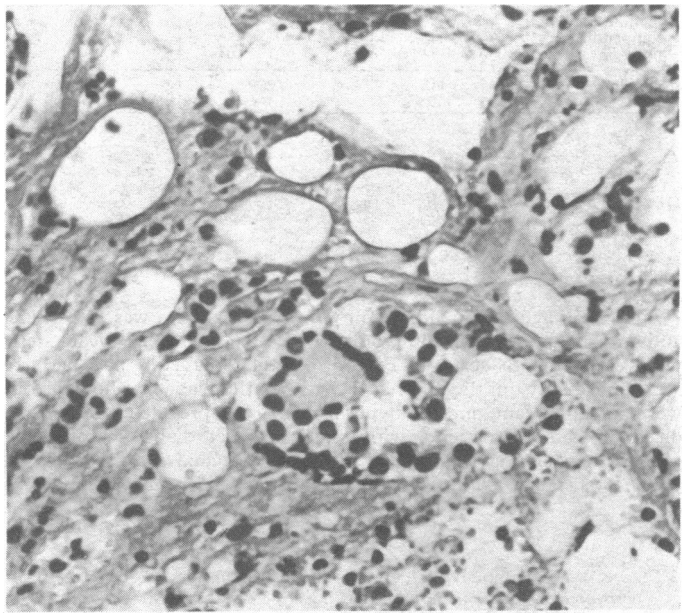
The diagnosis of Crohn's disease is difficult, particularly preoperatively.[1] Even the classic form of Crohn's disease requires differentiation from ileocaecal tuberculosis.[2] Previous reports have described five cases of Crohn's disease in which the dominant or sole pathological feature observed at laparotomy was peritoneal nodules resembling tuberculosis.[3–5] Heaton *et al*[3] named this form "miliary Crohn's disease". We present here the sixth case of this type.

Case report

A 23-year-old woman gave a two-year history of vague abdominal pain and intermittent diarrhoea without blood. She was admitted to hospital in

April 1969 because of severe pain in the lower abdomen. On admission she was afebrile and well-nourished. There was tenderness in the right iliac fossa, but no mass was palpated. Investigation disclosed hypochromic anaemia, normal white blood cell count, and normal chest radiograph. Sigmoidoscopy detected nothing abnormal and there were no perianal lesions.

One month later she underwent operation in the gynaecological department for suspected torsion of a left ovarian cyst. At laparotomy enlargement of mesenteric lymph nodes and many white nodules covering the serosal surface of the ileum were found. The bowel wall itself was not diseased. The nodules were macroscopically similar to tubercles. Some of them were taken for microscopical examination, which showed granulomatous reaction without caseation (see figure). No starch particles known to induce granulomatous peritonitis were shown in the biopsy material with the use of polarised light.



Histological specimen of serosal nodule showing granulomatous reaction without caseation.

A postoperative diagnosis of intestinal tuberculosis was made and treatment with streptomycin and isonicotinic acid hydrazide was started. Antituberculous chemotherapy was continued for three months but proved ineffective. Because of this, as well as negative results for tuberculin skin tests, and the absence of tubercle bacilli in stool culture, doubts arose about whether the diagnosis of tuberculosis was correct.

Radiological examination of the small intestine performed in November 1969 showed changes typical of ileal Crohn's disease. Several courses of oral corticosteroids (prednisone 40–15 mg daily) were given but her symptoms gradually worsened. The diagnosis of Crohn's disease was confirmed three years later after resection of the terminal ileum, which was found at operation to be the only affected segment of the bowel. Pathological study of the specimen showed noncaseating, sarcoid granulomas and fissures characteristic of Crohn's disease. At the second laparotomy serosal nodules were not seen. Four years later the patient remained well without specific treatment.

Discussion

In our patient intestinal tuberculosis was diagnosed at laparotomy. The diagnostic error was due to the peritoneal nodules that resembled tubercles and resulted in unnecessary treatment with antituberculous drugs. Identical errors occurred in two of three cases described by Heaton *et al.*[3] Final diagnosis in these cases was the result of radiological, microscopical, and bacteriological studies. In our patient the diagnosis of Crohn's disease was established after typical changes were found on radiological examination, which was performed several months after the first operation. Definitive confirmation of this diagnosis took place three years later as the result of pathological study of the resected ileum.

The young age of our patient at the onset of the illness and the evolution of the serosal lesions into typical Crohn's disease of the terminal ileum suggest that the miliary form is not distinct, but an early evolutionary phase of classic Crohn's disease, as has been emphasised by other authors.[3 5] Because of such cases it is important to draw the attention of surgeons to miliary Crohn's disease and to the necessity of distinguishing it from intestinal tuberculosis. To exclude tuberculosis it is essential to perform biopsies on the miliary lesions. The absence of caseation and acid-fast bacilli makes tuberculosis unlikely and suggests the diagnosis of Crohn's disease.

[1] Dyer, N H, and Dawson, A M, *British Medical Journal*, 1970, **1**, 735.
[2] Tandon, H D, and Prakash, A, *Gut*, 1972, **13**, 260.
[3] Heaton, K W, *et al*, *Gut*, 1967, **8**, 4.
[4] Manns, J J, *British Medical Journal*, 1972, **4**, 152.
[5] Daum, F, Boley, S J, and Cohen, M I, *Gastroenterology*, 1974, **67**, 527.

(*Accepted 27 January 1977*)

Departments of Gastroenterology and Pathology, Medical Centre of Postgraduate Education, Warsaw, Poland
W BARTNIK, MD, senior research assistant
J KRYŃSKI, MB, research assistant
E BUTRUK, MD, associate professor
J ORŁOWSKA, MB, senior research assistant

Malaria—the great mimic

Malaria in the United Kingdom is often diagnosed by epidemiological history and a high level of suspicion rather than by textbook signs. In view of the ever-rising trend of imported malaria in the United Kingdom—688 cases were notified in the first 32 weeks of 1976[1]—these facts must be constantly kept in mind. Various haematological abnormalities have been associated with malaria, though these have not been emphasised in the textbooks. Thrombocytopenia is a comparatively recent finding and is probably more common than is generally appreciated. Haemorrhage in disseminated intravascular coagulation (DIC) is a common feature but in its absence evidence of bleeding is extremely rare. Purpura as a presenting symptom of malaria has not, to our knowledge, been reported.

Case report

A Swiss seaman, aged 23, was seen on 13 May 1976. He complained of a rash over the lower parts of both legs and fever. During the previous two weeks, he had experienced bouts of evening fever with associated chills, accompanied by anorexia, headache, and bodyache, but recovered almost completely by the daytime. A week after onset he noticed a rash over both legs around the ankles, which worried him more than the fever. He had joined his ship at Lagos on 5 March 1976 and was anchored there for between four and six weeks before reaching London on 5 May 1976.

His general condition was satisfactory but hepatosplenomegaly was present. Profuse, discrete petechial rash covered both ankles and adjoining areas of lower legs and feet. The white cell count was $5{\cdot}0 \cdot 10^9$/l (5000/mm^3), platelets $50 \cdot 10^9$/l (50 000/mm^3). Blood film was positive for malaria parasites, identified as *Plasmodium malariae*. On admission to hospital on 15 May 1976 the clinical features were no different. There was no evidence of anaemia, jaundice, or DIC. He had not been taking antimalarial prophylaxis or any other medication. No relevant past or family history was obtained.

Investigations included: haemoglobin 12·4 g/dl; platelets 43×10^9/l (43 000/mm^3). Test results for blood urea, electrolytes, liver function, transaminases, and glucose-6-phosphate dehydrogenase were normal. Serum total proteins and albumin and globulin concentrations were normal, but gammaglobulin was increased; IgG concentration was normal, but IgA and IgM were raised to 4·19 and 4·60 g/l, respectively. Antibodies to smooth muscle and mitochondria were not detected, but antinuclear factor was present at a mildly positive titre of 1/20.

Antimalarial treatment and a short course of prednisolone were given. The blood film became negative by the ninth day and the platelet count was 203×10^9/l (203 000/mm^3). Clinical improvement was rapid and good but the purpura, though considerably improved, had not completely disappeared at discharge on 25 May.

Comment

Haematological changes in malaria are varied[2] and well known, though surprisingly thrombocytopenia in malaria has been recognised as a common haematological complication only lately. Beale *et al*[3] reported considerable thrombocytopenia in 32 out of 33 cases of