

toma producing adrenocorticotrophic hormone and an ectopic hormone syndrome. Although tissue was not available from the recurrent tumour, it is likely that adrenocorticotrophic hormone secretion was the result of endocrine (islet cell) differentiation; this provides further evidence of the ability of this embryonic tumour to differentiate along both exocrine and endocrine lines.

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Intestinal disease in cystic fibrosis

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SUMMARY Three children with cystic fibrosis developed steatorrhoea unresponsive to changes in pancreatic supplements. The final diagnoses were chronic giardiasis, stagnant loop syndrome, and Crohn's disease. Refractory intestinal symptoms in cystic fibrosis merit further investigation.

It is still controversial whether the gastrointestinal manifestations of cystic fibrosis are primary or secondary,¹ although recent evidence shows that the basic defect in chloride transport is expressed in the intestinal epithelium.² Steatorrhoea, flatulence, abdominal pain, distal intestinal obstruction syndrome, and rectal prolapse are usually improved by adequate pancreatic supplementation, particularly with microsphere preparations.^{1,3} Occasionally, however, high doses of these supplements, with or without H₂ antagonists, are ineffective. This can be caused by incorrect use of the supplements, or poor compliance, but coeliac disease and cows' milk protein intolerance have also been described in association with cystic fibrosis.¹ Investigating three children who presented in this way showed further treatable intestinal pathology.

Case reports

CASE 1

A 16 year old girl in early puberty complained of varying bowel habit over several months, passing up

to five loose stools a day, often containing 'blobs of grease'. She also experienced rectal incontinence with laughter, and frequent abdominal pain after food. Her weight gain was poor, but this could not be explained by her chest disease. Stool microscopy showed fat globules but no parasites. At first poor compliance was suspected. A jejunal biopsy specimen, however, showed *Giardia lamblia* between the villi, and motile trophozoites were seen in the jejunal juice. After a three day course of high dose metronidazole she has been asymptomatic and her weight velocity has increased sharply.

CASE 2

A 7 year old boy had steatorrhoea, 8 g/day, despite a low fat diet (25 g/day) and up to 50 pancreatin microsphere capsules per day. His weight was between the 10th and 25th centiles, and height was on the 10th centile. Attempts to introduce a higher fat diet produced abdominal discomfort, distention, flatulence, and gross steatorrhoea. Cimetidine had no effect. As a neonate he had a Bishop Koop resection and ileostomy for meconium ileus, which was closed by clamping at 1 month. A year previously he had been admitted with subacute obstruction, which responded to conservative management. Concentrations of serum iron, plasma ferritin, and vitamin A were low, and prothrombin time, vitamin D, and plasma bile acid concentrations were normal. Xylose absorption and a jejunal biopsy specimen were also normal, but fasting breath hydrogen was increased. Barium enema

showed a persistent rounded filling defect near the caecal apex suggestive of a possible intussusception. A barium meal and follow through showed a dilated bowel loop running into a narrowed segment suggestive of a stagnant loop. At operation a stagnant loop was found and resected at the site of the previous operation. Over the next six months he tolerated a three fold increase in fat intake, with less than 10% steatorrhoea, and his weight increased to the 50th centile. He still has occasional abdominal pain and needs a high dose of supplements, but repeat breath hydrogen excretion and contrast studies are normal.

CASE 3

A 12 year old boy, treated for meconium ileus by a Bishop Koop ileostomy, presented with steatorrhoea. He complained of intermittent crampy abdominal pain, not always related to meals. He was otherwise asymptomatic, with weight and height following centiles between the 50th and 75th. Increasing his pancreatic supplement led to some reduction in his abdominal pain but shortly afterwards he was admitted with subacute obstruction, which resolved on conservative treatment. A jejunal biopsy specimen and breath hydrogen were normal on further investigation. Diatrizoic acid (Gastrografin) follow through showed a progressive distention in the distal ileum and a stricture in the ileocolic region. A barium enema showed free flow to the caecum, but no contrast entered the ileum. At operation an inflammatory mass affecting the caecum was found and a right hemicolectomy performed. The caecal wall was thickened and fibrous with a 1 cm constriction, and the findings on histology were those of Crohn's disease. His symptoms and steatorrhoea disappeared postoperatively but three months later recurred; barium studies showed an irregular stricture at the anastomosis, for which he is receiving prednisolone.

Discussion

We were surprised by the variety of intestinal pathology in these patients, who represent about 4% of our clinic. Many other patients have had symptoms of steatorrhoea that have responded to increased pancreatic supplements, and it was the failure of these three to do so that stimulated further investigation. In the latter two the extent of their problems was only fully realised after annual review.

Chronic giardiasis is a well recognised cause of steatorrhoea and failure to thrive in young children,

but not in patients with cystic fibrosis. A recent survey, using stool antigen counter immunoelectrophoresis, found an increased prevalence of infestation in patients, but did not report clinical symptoms.⁴ An adult patient with acute giardiasis has also been described who presented with vomiting, watery stools, weight loss, and hypoalbuminaemia.⁴ Formation of a stagnant loop at the site of a previous Bishop Koop ileostomy is again well known,⁵ but has not been described in patients with cystic fibrosis. There have been three case reports of Crohn's disease in association with cystic fibrosis: one in a child and two in adults.⁶ Two presented with subacute obstruction, and all developed further typical complications. Many symptoms and signs, such as abdominal pain, diarrhoea, finger clubbing, and weight loss are common to both diseases, so diagnosis rests on imaging techniques and histology. In our patient (case 3) diatrizoic acid (Gastrografin) was given for the dual purposes of treating subacute obstruction, which was believed to be due to the distal intestinal obstruction syndrome, and of imaging the bowel, as in neonates with meconium ileus.

Adequate management of gastrointestinal problems in cystic fibrosis improves the quality of life, and may, through better nutrition, improve their prognosis. The findings in our patients add to the list of gastrointestinal problems described in cystic fibrosis,¹ and show the importance of investigating steatorrhoea or abdominal pain, or both, that do not respond to manipulation of pancreatic supplements.

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