Cystic fibrosis presenting as kwashiorkor in a Sri Lankan infant

M Mei-Zahav, M Solomon, A Kawamura, A Coates, P Durie

Growth failure is a common presentation of patients with pancreatic insufficient cystic fibrosis. However, full blown kwashiorkor is extremely rare. Cystic fibrosis is also considered to be rare in the South Asian population. This report describes a Sri Lankan infant with cystic fibrosis who presented with clinical features of severe kwashiorkor.

Protein energy malnutrition results in a group of disorders, including marasmus and kwashiorkor. Kwashiorkor, caused by decreased protein availability, results in oedema, muscle wasting, skin and hair changes, irritability, and anorexia. In developing countries it occurs mainly as a result of primary protein calorie malnutrition. However, in developed countries, it usually arises as a result of chronic disease rather than primary nutritional deprivation.

Cystic fibrosis (CF) frequently presents in infancy with failure to thrive. While a subset of children with CF present with oedema and hypoalbuminaemia, it has rarely been associated with full blown manifestations of kwashiorkor. CF is the most common inherited autosomal recessive disease in the Caucasian population, but is considered rare in the Indian subcontinent population. This report highlights the importance of considering CF in an infant of non-Caucasian origin presenting with severe kwashiorkor.

CASE REPORT

A 3 month old male, born at term to unrelated Sri Lankan parents, presented with severe malnutrition and respiratory distress. He was born to a normally nourished mother, following an uneventful pregnancy and delivery (birth weight 2.68 kg, 10th centile). He was exclusively breast fed during an uneventful neonatal period and appeared to be feeding well. In the second month of life he began to show growth failure, with no history of vomiting or diarrhoea. Two weeks later he developed a diffuse non-pruritic rash. His thick black hair, which was shaved at birth for cultural reasons, grew back with a silvery blonde appearance (fig 1A). He was noted to be irritable, and had a two week history of non-productive cough.

On examination he was alert but severely cachectic. He was dyspnoeic and tachypnoeic. His weight (3.245 kg), length (51.5 cm), and head circumference (37.5 cm) were below the third centile. His hair was sparse and silvery blonde and he had a diffuse scaly rash. Diffuse wheezing was heard over his chest. His liver was slightly enlarged, and pitting oedema was noted over his tibia. Laboratory tests revealed normocytic anaemia (88 g/l), mild neutropenia (880/mm$^3$) and hypoalbuminaemia (17 g/l). Cholesterol and zinc levels were low (1.66 mmol/l, 7.7 µmol/l, respectively). Serum vitamin E concentration was low (4.1 µmol/l) and vitamin A was borderline (0.9 µmol/l). Liver and renal function tests were normal. Chest xray examination showed hyperinflation with streaky opacities. A 72 hour faecal fat balance study collection showed fat losses to be 25% of fat intake. Faecal $\alpha_1$ antitrypsin clearance was normal, excluding a protein losing enteropathy. Skin biopsy showed non-specific hyperkeratotic changes. No hair shaft abnormalities were seen on electron microscopy. Two sweat tests failed to yield adequate sweat for analysis. Given the low probability of CF in this ethnic group and the atypical presentation, other causes of malassimilation, such as Shwachman-Diamond syndrome and enteropathies were considered, but further evaluation failed to identify a specific diagnosis.

Figure 1  [A] Hair changes at presentation. The hair had been cut at birth and grew back with a silvery blonde appearance. (B) The child presents with normal nutritional status at 26 months of age.
severely malnourished. Therefore, deficient nutrient intake with CF, pancreatic insufficiency alone hardly ever gives rise to pathogenesis is likely multifactorial. In this case nutrient revealed a splice mutation (1525-1 G → A) but failed to identify a mutation on the second allele.

Following initiation of enzyme replacement therapy, vitamins, and zinc supplements he started to gain weight, the rash disappeared, and his hair regained its normal dark colour. At 26 months of age, he is developing and growing normally, and has achieved the 10th–25th centile for weight and height (figs 1B, 2).

DISCUSSION
This severely malnourished patient had striking characteristics of kwashiorkor, with peripheral oedema, eczematous rash, and changes to the colour of his hair. While kwashiorkor has rarely been described as a presenting manifestation of CF, its pathogenesis is likely multifactorial. In this case nutrient malassimilation caused by pancreatic insufficiency almost certainly contributed to the problem, but in most children with CF, pancreatic insufficiency alone hardly ever gives rise to such severe malnutrition. Therefore, deficient nutrient intake must have played a significant role. In fact, when first admitted to hospital the patient was severely anorexic, with a daily energy intake of only 75 kcal/kg (0.31 MJ/kg) body weight.

Deficiencies of several micronutrients may have contributed to this patient’s clinical picture. Nutritional deficiencies of essential fatty acids, which are critical for normal growth and maintenance of cell integrity, can have severe consequences, including desquamating dermatitis and alopecia. Similarly, vitamin E deficiency can be associated with rash and seborrhoea in premature infants. Zinc deficiency, reported in malassimilation syndromes including CF, may cause an erythematous scaly rash and hair changes. However, the actual zinc status of our patient is uncertain because of the presence of hypoalbuminaemia. Copper and selenium deficiencies may also affect hair and skin pigmentation.

Malnutrition can result in false negative and false positive sweat chloride test results. Falsely negative sweat chloride tests are known to occur in patients with oedema caused by hypoalbuminaemia, and difficulties collecting adequate quantities of sweat are commonly experienced. In this case, failure to collect an adequate sweat sample played an important role in the delayed diagnosis. False positive tests are usually mildly increased and tend to revert to normal when nutritional status improves. Initial sweat tests in our patient were in the lower CF range (83 and 69 mmol/l). When the child’s nutritional status improved a third test (104 mmol/l) was similar to that observed in CF patients with pancreatic insufficiency.

CF is considered to be rare among individuals originating from the Indian subcontinent. There have been several reports describing CF among Asian-Indians who have immigrated to other countries. In a survey of 116 CF centres in the United States, Powers et al calculated that the incidence of CF among Asian-Indians living in the USA was 1:40 750. It has also been suggested that Asian-Indian patients with CF have a severe clinical course. Delayed diagnosis, as a result of inadequate awareness of the existence of CF in this ethnic population, may contribute to the poor overall prognosis in these patients.

While AF508 is the most common genetic mutation in the Caucasian CF population, it is less frequent in individuals of Asian-Indian origin. Our child carries a rare splice site mutation on one allele, which was not detected by routine genetic analysis. This mutation is predicted to cause defective protein production as a result of skipping of exon 10. The pancreatic insufficient phenotype suggests that this mutation and the unidentified mutation have severe functional effects.

Our case highlights the importance of considering the diagnosis of CF in the South Asian ethnic population. This diagnosis should be always considered in infants and children presenting with severe kwashiorkor.

ACKNOWLEDGEMENTS
This study was supported in part by a research grant from the National Institutes of Health (NIDDK. NIHSCOR 2P50 DK49096-07) and the Canadian Cystic Fibrosis Foundation.

Authors’ affiliations
M Mei-Zahav, M Solomon, A Coates, Division of Respiratory Medicine, The Hospital for Sick Children, Toronto, Ontario, Canada
P Durie, Division of Gastroenterology and Nutrition, The Hospital for Sick Children
A Kawamura, Department of Pediatrics, The Hospital for Sick Children

Correspondence to: Dr P Durie, Division of Gastroenterology and Nutrition, Department of Pediatrics, The Hospital for Sick Children, 555 University Avenue, Toronto, ON, MSG 1X8, Canada; peter.durie@sickkids.ca

Accepted 29 October 2002

REFERENCES
Cystic fibrosis presenting as kwashiorkor in a Sri Lankan infant

M Mei-Zahav, M Solomon, A Kawamura, A Coates and P Durie

Arch Dis Child 2003 88: 724-725
doi: 10.1136/adc.88.8.724

Updated information and services can be found at:
http://adc.bmj.com/content/88/8/724

These include:

References
This article cites 6 articles, 2 of which you can access for free at:
http://adc.bmj.com/content/88/8/724#BIBL

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections

- Malnutrition (176)
- Cystic fibrosis (182)
- Pancreas and biliary tract (269)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/