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Dilated cardiomyopathy associated with haemolytic uraemic syndrome

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SUMMARY In two children with the haemolytic uraemic syndrome dilated cardiomyopathy occurred in the absence of hypertension, or fluid or electrolyte disturbance. These cases presented with acute left ventricular failure. Echocardiography showed left ventricular dilatation and reduced contractility. There was also ventricular wall thickening, which persisted. Twelve other children with haemolytic uraemic syndrome had prospective echocardiography. Eleven of them showed no evidence of cardiomyopathy and in one transient dilatation and reduced contractility developed without clinical signs.

Dilated cardiomyopathy is a rare but important extrarenal manifestation of the haemolytic uraemic syndrome and is best demonstrated by echocardiography.

Extrarenal manifestations of haemolytic uraemic syndrome are increasingly recognised and are responsible for much of the mortality and long term morbidity of the disorder.[1] The following cases establish that congestive cardiomyopathy can be a complication of the haemolytic uraemic syndrome. This complication is readily confirmed by echocardiography.

Patients and methods

CASE 1

A 21 month old girl was admitted after nine days of bloody diarrhoea. Examination showed slight peripheral oedema; the heart rate was 110 beats/min, the respiratory rate 30 per minute, and blood pressure was 125/80 mm Hg. Haemolytic uraemic syndrome was diagnosed on the basis of the following features: microangiopathic anaemia (haemoglobin 8 g/dl with schistocytes and burr cells), thrombocytopenia (platelet count 100 × 10^9/l), and oliguric renal failure (plasma creatinine 783 μmol/l). Peritoneal dialysis was performed from the third to twenty first day after admission. Apart from the admission measurement blood pressure remained in the normal range without treatment. On the fifty sixth day left ventricular failure developed. An electrocardiogram and a chest *x* ray were performed for the first time at this stage of the illness; the former showed non-specific transient T wave changes and the *x* ray showed global cardiomegaly and pulmonary oedema. Echocardiography showed a dilated left ventricle with increased mural thickness and global functional impairment. The ventricular septal thickness measured 0·7 cm (normal (mean (SD)) 0·47 (0·09) cm) and the left ventricular posterior wall 0·66 cm (normal 0·45 (0·09) cm). She was treated with frusemide and digoxin. Subsequently the blood pressure rose to 140/90 mm Hg and was satisfactorily controlled thereafter with methyldopa.

Histological examination of a renal biopsy specimen obtained on the fifty second day showed total sclerosis in 60% of glomeruli, atrophy of the capillary tufts in many of the remainder, and considerable tubular atrophy. Intimal proliferation and medial hypertrophy were seen in small and medium sized arteries.

At one year follow up the child had stable chronic renal failure and moderate proteinuria. The figure shows echocardiographic measurements over this period. The left ventricular diastolic dimension returned to normal but left ventricular function remained abnormal and mural thickness continued to be above the normal range. The chest *x* ray was normal. Digoxin was discontinued after a year and she continued to be treated for hypertension.

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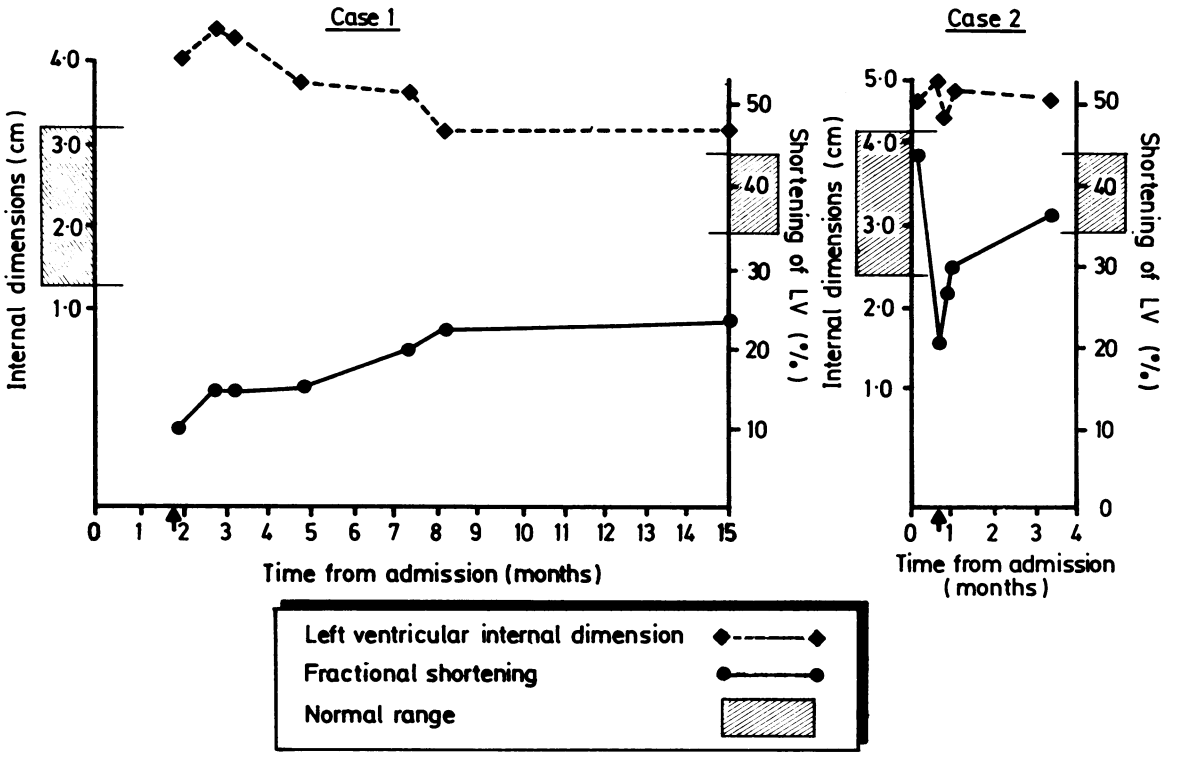

Figure *Left ventricular (LV) dimension and fractional shortening derived from serial echocardiograms in cases 1 and 2. Arrow indicates onset of pulmonary oedema.*

CASE 2

An eight year old boy presented with headaches, lethargy, and vomiting for two weeks and bruises and haematuria for three days. On examination his pulse was 120 beats/min, blood pressure 120/65 mm Hg, and he had a purpuric rash. Haemolytic uraemic syndrome was diagnosed because acute renal failure, microangiopathic anaemia, and thrombocytopenia were present. Over the next 14 days he progressed to end stage renal failure and was thereafter maintained on chronic peritoneal dialysis. On the sixteenth day his blood pressure was labile between 115/80 and 150/110 mm Hg. This was promptly treated with a β blocker. About this time a transient left partial hemiparesis developed and he had two focal convulsions.

The echocardiogram on admission showed slight ventricular dilatation, consistent with anaemia, and slight fluid overload but normal function. The electrocardiogram showed voltage changes consistent with left ventricular hypertrophy. On the twenty first day after admission acute pulmonary oedema developed. Serial echocardiograms showed slight dilatation of the left ventricle but there was a considerable reduction in ventricular function (figure). These abnormalities persisted despite a change in the antihypertensive treatment from a β blocker to captopril. Throughout this period his fluid and electrolyte balance was well controlled by peritoneal dialysis. Unlike case 1 his left ventricular contractility returned to normal within four months.

In both cases serological tests for eleven common viruses, including six types of Coxsackie B, were negative.

After our experience with case 1, all patients with haemolytic uraemic syndrome underwent prospective echocardiography during their acute illness. In addition to the two cases described above, twelve other children were examined. Eleven had no evidence of cardiomyopathy. In one child minor and transient dilatation and a reduction in contractility developed without clinical signs.

Discussion

As in other forms of acute renal failure, the cardiac complications of haemolytic uraemic syndrome are usually secondary to volume overload, hypertension, and hyperkalaemia. Although hypertension was seen in cases 1 and 2 it was unrelated to the onset of car-

diac dilatation. It occurred after demonstration of poor left ventricular function in case 1 and was transient and not severe in case 2. Cardiomyopathy is not a feature of acute renal failure but it may be seen in end stage disease. Myocarditis has been described in two children with haemolytic uraemic syndrome whose illness appeared to be precipitated by Coxsackie B infection.[2] In our patients none of these recognisable factors offers an explanation for the cardiomyopathy and although myocarditis is unlikely it cannot be entirely excluded. Although we could not rule out the possibility that a separate disease process was responsible for the cardiomyopathy, the temporal relation with haemolytic uraemic syndrome suggested that this disease was a more probable cause.

Extrarenal manifestations in haemolytic uraemic syndrome are becoming more clearly defined.[3 4] Some histological studies have identified microvascular obstruction caused by endothelial swelling and intravascular thrombus with local myocardial ischamia.[1] It appears from our experience and a past report,[5] however, that previously unexplained left ventricular failure may occur several weeks after the resolution of the blood film abnormalities. It is therefore difficult to relate the cardiomyopathy to the acute microvascular obstruction.

In cases 1 and 2 echocardiography showed that myocardial impairment improved slowly with time and that ventricular dilatation and hypertrophy persisted. Furthermore, echocardiography was capable of identifying cardiac abnormalities in the absence of either physical or radiological signs and is therefore the investigation of choice. Despite the rarity of cardiac involvement, routine echocardiographic screening of children with haemolytic uraemic syndrome should be performed because of the important clinical implications for the management of hypertension and for prognosis.

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