

Short reports

Congenital renal abnormalities in the Laurence-Moon-Biedl syndrome

The Laurence-Moon-Biedl syndrome (LMBS) has 5 classical signs, pigmentary retinopathy, polydactyly, hypogenitalism, obesity, and mental retardation (Warkany *et al.*, 1937), but a wide range of additional signs occur (Bell, 1958) and renal abnormalities have been encountered frequently at the infrequent necropsy (McLoughlin and Shanklin, 1967). Uraemia is the commonest cause of death in LMBS (Ammann, 1970) but the end-stage kidney obscures the nature of the renal lesion (except in obstructive uropathy). Recent reports of cystic disease (Alton and McDonald, 1973; Labrune *et al.*, 1973; Hurley *et al.*, 1975) have aroused interest and we now report 2 more such cases.

Case reports

Case 1. A 10-year-old boy had extra toes removed in infancy and was later found to have visual difficulty, retarded development, and obesity. LMBS was diagnosed and he was referred for renal assessment when he developed polydipsia and polyuria. His weight was 50 kg (97th centile), height 146 cm (75th centile), and blood pressure 120/60 mmHg.

Intravenous urogram (IVU) (Fig. 1) showed normal sized symmetrical kidneys. A band-like filling defect was noted in the lower part of the right renal pelvis and thought to be an extrinsic vascular impression. The parenchyma was mostly normal, but in the upper poles on both sides there were translucencies, mainly medullary, which suggested small cysts of about 1 cm diameter. Nearly all the calyces were slightly blunted and lacked normal papillary configuration. In the upper pole of the left kidney there were a number of small cystic spaces in communication with the calyces; one space was large enough to be a calyceal diverticulum, but others were smaller and resembled the spaces seen in sponge kidney.

Renal function tests were normal apart from a mild defect of concentrating capacity. Excessive thirst and polyuria were not confirmed. There was no evidence of urinary tract infection.

Serum Na was 141 mmol/l (141 mEq/l), K 3.8 mmol/l (3.8 mEq/l), bicarbonate 25 mmol/l (25 mEq/l); urea 4.5 mmol/l (27.1 mg/100 ml); creatinine 80 μ mol/l (0.9 mg/100 ml); Ca 2.72 mmol/l (10.9 mg/100 ml), P 1.28 mmol/l (3.96 mg/100 ml), and alkaline phosphatase 57 U/l. Urine: there was no glycosuria and no aminoaciduria, and the phosphate excretion index was 0.12 (normal). 24-hour urine Ca excretion was normal at 0.025 mmol/kg (normal <0.1 mmol/kg). After overnight fasting urine osmolality was 634 mOsm/kg and plasma osmolality 290 mOsm/kg. After pitressin injection the urine osmolality rose to 674 mOsm/kg and plasma osmolality to 295 mOsm/kg. Urine pH after NH₄Cl load was 4.75 with a plasma standard bicarbonate of 21 mmol/l. Glomerular filtration rate (GFR) measured by the single injection 51-chromium edetic acid method was 92.4 ml/min per 1.73 m² (normal range 89-165).

Case 2. A 2-year-old girl born with 6 fingers on her left hand and 6 toes on each foot, was first investigated when 8 months old for failure to thrive. She had a high blood urea and IVU was thought to be abnormal. She later became obese and LMBS was diagnosed. Blood urea remained high and she was referred for renal assessment. Weight 19.75 kg (>90th centile), height 93.5 cm (<3rd centile), and blood pressure 90/60 mmHg.

IVU showed bilateral calyceal cysts or diverticula. Hardly any of the calyces showed a normal configuration, but were blunted, giving the impression of flat papillae. On retrograde examination (Fig. 2) there was unusually pronounced backflow which seemed to be confined to the medullary region of the kidney. Renal function tests showed a low GFR and poor concentrating ability and the urine was infected with *E. coli*.

Serum Na was 148 mmol/l (148 mEq/l), K 4.4 mmol/l (4.4 mEq/l) bicarbonate 19 mmol/l (19 mEq/l); urea 6.2 mmol/l (37.3 mg/100 ml); creatinine 110 μ mol/l (1.24 mg/100 ml); Ca 2.6 mmol/l (10.4 mg/100 ml), P 1.7 mmol/l (5.3 mg/100 ml), and alkaline phosphatase 225 U/l. There was an occasional trace of sugar in the urine but no generalized aminoaciduria. Osmolality rose from 264 to 284 mOsm/kg after water deprivation inducing a 3% weight loss (a full water deprivation test could not

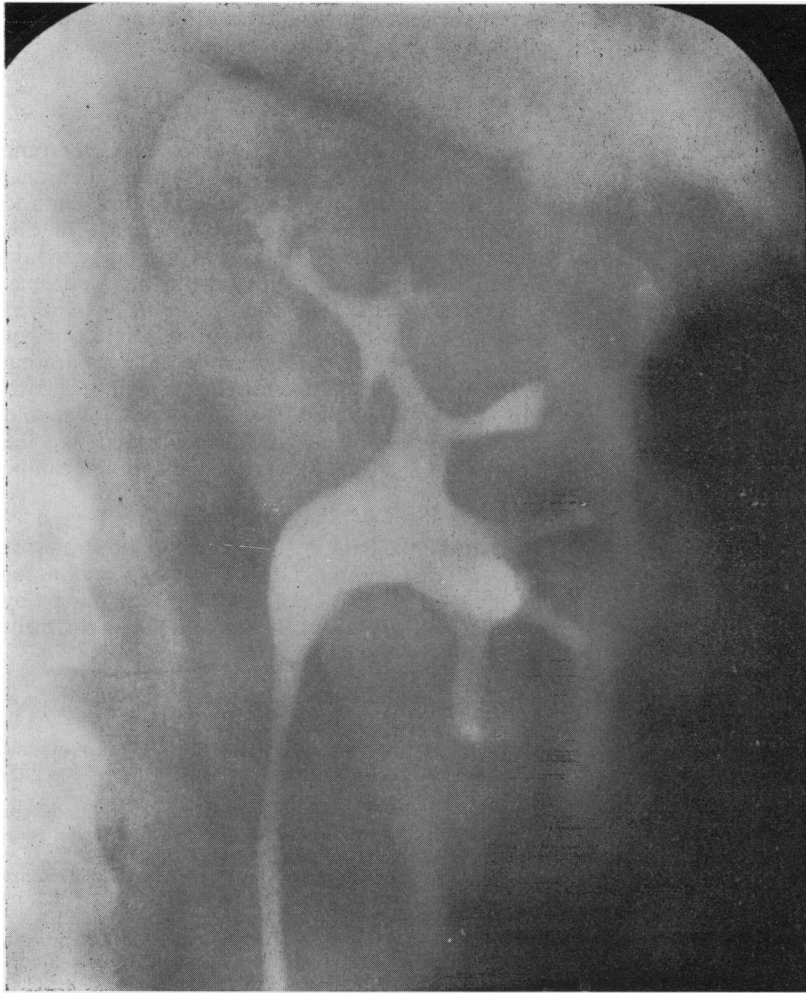


Fig. 1 Case 1. Urogram of left kidney showing abnormal blunted calyces in the middle and lower groups. In the upper group of calyces there is some blunting and ill-defined papillary cavities superiorly. A blind-ending track runs downwards and medially. The pelvis and upper ureter are normal and there is a normal thickness of parenchyma.

be tolerated, and for the same reason no acidification tests were performed). GFR was 50.2 ml min per 1.73 m².

Discussion

Uraemia is the commonest cause of death in LMBS but its cause remains obscure. In collected necropsy reports chronic pyelonephritis, glomerulonephritis, and lower urinary tract obstruction are recorded as the causes (McLoughlin and Shanklin, 1967), and urinary tract infection and hypertension were major problems during life (Ammann, 1970). In 1970, Magro and Peres reported 3 LMBS children with renal dysplasia who had no clinical evidence of renal disease. Labrune *et al.* (1973) described radiological appearances similar to those found in children with

renal dysplasia in 5 of 9 symptomless subjects. Alton and McDonald (1973) described 5 more LMBS patients with cystic spaces communicating with the collecting system. As in our patients, these spaces were frequently joined to the upper and lower calyceal groups, and the ureters and bladder appeared normal in all.

Progressive renal failure is a recognized complication of many forms of cystic kidney, but little is known of the natural history of the cystic lesion of LMBS. Certainly renal failure may be apparent if there is gross disorganization, and there is a predisposition to urinary infection which may lead to chronic pyelonephritis and progressive renal failure. Hurley *et al.* (1975) suggest that there may be a progressive glomerulonephritis in LMBS but data are insubstantial. Alton and McDonald repeated their



Fig. 2 Retrograde pyelogram with some over-filling and extravasation into the renal substance. Medially in the upper pole there is a calyceal cyst and the calyces all show some blunting, even allowing for the over-filling.

patients' IVUs after 5 years and found no evidence of deterioration.

For the moment it appears that cystic dysplasia may well be the commonest renal manifestation of LMBS and because of the risk of infection causing further renal damage the affected children should be identified early. An IVU should be included in the routine assessment of a suspected case of LMBS, as well as urine culture and determinations of blood electrolytes, urea, and serum creatinine. If renal abnormalities are found, a test of concentrating capacity should be performed with due care, and if a failure to concentrate is shown the parents should be advised to maintain adequate fluid intake and seek medical help early if the child vomits or has diarrhoea. Urine cultures should be checked at 3-monthly intervals and renal function and blood pres-

sure measured annually. Urine infections should be managed with long-term antibiotic prophylaxis.

Summary

Two children with Laurence-Moon-Biedl syndrome had radiographic evidence of cysts in the renal medulla, and one had impaired renal function and infection. The frequency of cystic disease in this syndrome implies that intravenous urography should be carried out on all patients with this syndrome. Children with renal abnormalities should be followed to avoid further damage from urinary infection, or from dehydration in those with a concentrating defect. Regular renal function tests should be carried out on other children, and full investigation should follow if abnormalities are found in order that the natural history of the often fatal renal lesion can be clarified.

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