Introduction

Ureteric and/or pelvicalyceal calcification are only infrequently visualised in children. Schistosomiasis and tuberculosis are leading causes in adults worldwide, but this complication is relatively rare in children. We report a 12-year-old boy who had bilateral pelvicalyceal and ureteric calcification on computed tomography (CT). He eventually underwent unilateral nephrectomy; however, no calcification was seen and later follow-up CT also revealed disappearance of the calcification in the remaining kidney.

Case report

A 12-year-old boy was admitted with a history of bladder exstrophy and epispadias complex. He had had a bladder closure operation in Spain shortly after birth. This was complicated post-operatively by chronic pericarditis requiring pericardectomy, and a stroke that resulted in right-hand weakness. He had two unsuccessful urethroplasties when aged 1 and 3 years. Ultrasound (US) and CT prior to referral to our institution described normal appearances of the kidneys and ureters and a bladder of small capacity.

On presentation, he was generally fit and well but suffering from urinary incontinence. Urine culture revealed Proteus mirabilis (10^4 organisms/ml). Bladder augmentation with bladder neck repair and manufacture of a Mitrofanoff conduit were performed. Post-operatively, he developed fluctuating pyrexia due to bladder leak, which was successfully repaired. Plasma creatinine levels, which had been normal, rose to 200 μmol/l. Urine microscopy revealed a white cell count of 4000/ml with no growth from several blood and urine cultures. This was not unexpected, because the child had been on a variety of broad-spectrum antibiotics, including amikacin, vancomycin and ciprofloxacin, since the initial operation.

US carried out in the first post-operative week showed a normal left kidney and a minimally dilated right pelvicalyceal system. Hyperechoic debris was noted in the right ureter. During the following month, there was increasing bilateral pelvicalyceal dilatation (renal pelvis AP diameter: right 33 mm, left 30 mm) and the mucosa became increasingly echogenic and thickened (5 mm). Unenhanced abdominal CT, performed 6 weeks post-operatively, showed significant pelvicalyceal dilatation and eggshell-like circumferential increased attenuation (126 HU) throughout the walls of both renal collecting systems and both upper ureters (Fig. 1a, b). This was thought to represent fine calcification. The bladder was collapsed but there was no bladder calcification. Faint ureteric calcification was visible on a plain abdominal radiograph. No metabolic abnormality was found.

Bilateral nephrostomies were performed. Contrast medium injected into the renal pelvis confirmed bilateral obstructed ureters at the pelvi-ureteric junction. The nephrostomies improved renal function. Internal J-J ureteric stents were inserted with extreme difficulty due to transmural oedema along the lengths of both ur-

Abstract A 12-year-old boy was shown on CT to have unexplained pelvicalyceal and ureteric calcification which resolved over a 16-month period.

Reversible ureteric and pelvicalyceal calcification in a 12-year-old boy

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eters. The right stent insertion required open operation but there was no obvious intramural calcification at open surgery. By the time of discharge, renal function had returned to normal.

Three months later, renal function had deteriorated despite continued drainage with J-J stents. Right renal biopsy showed tubular interstitial renal damage with perirenal fibrosis. Over the next 6 months at least one proven urine infection (mixed growth of *Staphylococcus aureus* and *Pseudomonas aeruginosa*) was documented. $^{99m}$Tc-MAG 3 renography demonstrated only 12% function in the left kidney.

One year later, the child was readmitted for an operation to close the bladder neck. At this stage left renal function was still poor (GFR 29 ml−1/min−1/m²) and he had recurrent proven urine infections. Post-operative US revealed a left perirenal collection and left nephrectomy was eventually performed. Histology of this kidney showed chronic pyelonephritic scarring but no calcification. He made an uneventful recovery and remains well. Repeat CT, performed 16 months after the initial CT demonstrating widespread calcification, showed only a small focus of calcification in the right kidney immediately adjacent to the right renal pelvis (Fig.1c). There was no ureteric calcification.

**Discussion**

In developed countries, renal pelvic and ureteric calcification are rare in childhood. Tuberculosis and schistosomiasis are two of the important infective causes worldwide. Schistosomiasis causes ureteric calcification in 16–34% of cases. This is either linear, which is virtually always associated with bladder calcification, or punctate, in association with ureteritis calcinosa [1]. Tuberculosis typically produces irregular or homogeneous calcifications, especially in the lower third of the ureter. Chronic dilatation of the renal pelvis secondary to pelvi-ureteric junction obstruction has been shown to cause eggshell calcification in a few cases [2]. The severe dilatation is thought to cause intermittent haemorrhage into the renal pelvic wall, which subsequently calcifies [2]. Ureteric necrosis causing ureteric calcification has been described in association with vasculitides, such as dermatomyositis, and also as an unusual complication of cystoplasty for leukoplakia of the bladder [3, 4].

In this patient, significant pyuria, bilateral hydronephrosis and ureteric obstruction secondary to debris...