intestinal local immunity may have provided enough protection to prevent diarrhoea.

It has been suggested that there are subtypes of this virus, which might explain the variety of clinical courses.⁸ We ourselves have suggested that immunological responses of this illness might differ from those in most other common viral infections, with individual differences in the acquisition of local immunity within the intestine.⁹

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Primary vesicoureteric reflux in neonates with imperforate anus

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SUMMARY Cystography, performed in 26 out of a total of 33 consecutive neonates with imperforate anus, revealed primary vesicoureteric reflux in 12 cases. The reflux was usually pronounced, and was particularly common in females and in infants with urinary tract infections. The incidence of reflux was unrelated to the severity of the anorectal anomaly, and reflux was often demonstrated in patients in whom an intravenous pyelogram had shown an undilated upper renal tract.

Primary vesicoureteric reflux (VUR) is the most common anomaly of the upper renal tract in childhood¹ and it was expected that this condition might often be found in infants with an imperforate anus, in whom the incidence of upper renal tract anomalies is such that a neonatal intravenous pyelogram (IVP) is generally considered mandatory. In four major series in which the genitourinary tract anomalies associated with imperforate anus were described, Singh *et al.*² and Hasse³ mentioned VUR but gave no statistics, while Wiener and Kiesewetter⁴ listed only 11 examples in a series of 200 cases. Smith⁵ was the only one to advocate a micturating cystourethrogram (MCU) as a routine in neonates with imperforate anus; he found 13 examples of VUR in

195 cases. At this hospital it was not formerly the practice to perform an MCU routinely in patients with imperforate anus, but when we did perform one in response to a particular indication (unexplained urinary tract infection, upper tract dilatation on IVP, to demonstrate a rectourethral fistula, etc.), VUR was often revealed, and reimplantation of refluxing ureters was virtually the only urological surgery undertaken in these patients. As a result, it is now our practice to perform an MCU in any new case of imperforate anus.

Case material and findings

33 new patients with imperforate anus presented as neonates in the 3-year period January 1976 to December 1978. Three died before their renal tracts had been investigated, and 4 had IVPs only. The remaining 26 had both IVPs and MCUs before being discharged from hospital. The radiological findings in these cases are shown in Table 1, and the comparison between the MCU and clinical findings in Table 2. Generally VUR of grades I and II only took place during voiding, and grade III during both filling and emptying of the bladder. Only one patient had a sacral deficiency likely to produce neurogenic bladder dysfunction; his MCU showed no reflux. It is too

early to assess the progress of the VUR or its effects on the kidneys, but 3 patients with grade III reflux showed early renal scarring when reinvestigated between 1 and 2 years of age. All 3 had had urinary tract infections which had apparently been adequately controlled with antibiotics: 2 have undergone reimplantation of their refluxing ureters.

Table 1 Radiological findings (IVP and MCU) in 26 patients with imperforate anus

MCU findings				
VUR unilateral	8 (3 with solitary kidney)			
VUR bilateral	4			
Total	16 refluxing pyelons			
	2 grade I*			
	3 grade II*			
	11 grade III*			
Comparison between IVP and MCU findings				
IVP				
Normal bilateral	19	MCU VUR	9	
		No VUR	10	
Normal solitary functioning kidney	2	VUR	2	
		No VUR	—	
Solitary functioning kidney with ureteric dilatation	3	VUR	1	
		No VUR	2	
Unilateral pelviureteric obstruction	1	VUR	—	
		No VUR	1	
Horseshoe kidney	1	VUR	—	
		No VUR	1	

*Grade I reflux into ureter only, grade II complete reflux without dilatation, grade III complete reflux with dilatation of pelvicalyceal system.

Table 2 Correlation between MCU and clinical findings

		Male n=17 (5)	Female n=9 (7)	Total n=26 (12)
Urinary tract infection*	None	12 (1)	2 (2)	14 (3)
	Present	5 (4)	7 (5)	12 (9)
Anorectal anomaly	High	8 (2)	4 (2)	12 (4)
	Low	9 (3)	5 (5)	14 (8)
Birthweight	> 3 kg	11 (3)	4 (4)	15 (7)
	< 3 kg	6 (2)	5 (3)	11 (5)
Major associated anomaly†	None	12 (3)	8 (6)	20 (9)
	Present	5 (2)	1 (1)	6 (3)

Figures in brackets indicate numbers with vesicoureteric reflux.

*Excludes urinary tract infections occurring in the presence of a rectourethral fistula, †3 tracheo-oesophageal fistula and oesophageal atresia, 1 duodenal atresia, 1 colonic atresia, 1 oesophageal atresia, duodenal atresia, malrotation and subglottic stenosis.

Discussion

On the basis of this fairly small series, the following features emerge: (1) primary VUR is a common abnormality of the upper renal tract in patients with imperforate anus, occurring in 12 (45%) of the 26 cases fully investigated; (2) when present, VUR tends to be quite severe (grade III); (3) the demon-

stration of normal upper tracts without ureteric dilatation on IVP does not exclude the presence of VUR of any degree; (4) VUR is more common in females; (5) although VUR is more likely to be present when there is a urinary tract infection which cannot be explained by the presence of a rectourethral fistula, the absence of such infection does not exclude the presence of reflux; (6) there is no correlation between the incidence of VUR and the type of anorectal anomaly, the birthweight, or the presence or absence of other associated major congenital abnormalities.

Whether routine screening of these cases for VUR is justified depends not only on the incidence of reflux, but whether this is likely to be a cause of long-term renal damage. It is generally accepted that renal scarring rarely occurs except in the presence of more severe (grade III) VUR.⁶ It has also been stated that VUR in the absence of urinary tract infection does not cause renal damage.⁷ Whatever the mechanism of reflux pyelonephritis, there is evidence that the damage usually occurs in the first few years of life.⁸

From these findings, we recommend an MCU be done in addition to an IVP in all neonates with anorectal anomalies. Even if this policy is not adopted, the demonstration of 2 normal kidneys on a neonatal IVP should not induce a false sense of security about the continued normality of the upper renal tracts, and, at the very least, these patients should be closely monitored for urinary tract infections in their early years and an MCU performed, should one be found.

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