

Implementation of recommendations in the diagnosis of vesicoureteric reflux after urinary tract infections in Swiss children

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Summary

Background: Efforts are now routinely made for early detection of vesicoureteric reflux after urinary tract infections in order to limit secondary renal damage.

Methods: The age at diagnosis of reflux after urinary tract infections was analysed in 162 Swiss patients (46 boys and 116 girls) referred by primary care physicians to the Division of Paediatric Nephrology, University of Bern, Switzerland between 1978 and 1999. The figures noted in Switzerland were also compared with those noted in 102 Australian patients (35 boys and 67 girls) reported by Lenaghan in 1976.

Results: In Switzerland the median age at diagnosis was 23 months in 74 subjects diagnosed between 1978 and 1988 and 10 months in 88 subjects diagnosed between 1989 and 1999. The difference

was statistically significant in girls but not in boys. In Australia the median age at diagnosis was 15 months for boys and 78 months for girls; in Switzerland, the corresponding figures were 12 and 29 months (between 1978 and 1988), respectively 5 and 14 months (between 1989 and 1999). The difference between Australia and Switzerland was statistically significant in girls but not in boys.

Conclusions: In Switzerland vesicoureteric reflux is now detected earlier than in the past. This trend is more marked in girls than in boys but the detection of reflux is still earlier in boys than in girls.

Key words: children; reflux nephropathy; urinary tract infection; vesico-ureteral reflux; voiding cystourethrography

Introduction

It was said in the 1970s that in children with urinary tract infections the early detection of vesicoureteric reflux and subsequent management could avoid or at least reduce acquired renal damage [1–6]. Since then considerable efforts have been made to ensure that every child is investigated for the presence of reflux following the first diagnosed urinary tract infection [7–10].

However, it is unclear whether and to what extent the current recommendations for the detection of reflux are put into practice and how this influences the age of diagnosis. This study concentrates on this question on the assumption that the early detection of reflux represents a prerequisite for the conservation of renal function.

Patients and methods

The study group consisted of 162 Swiss outpatients (46 male and 116 female subjects born between 1970 and 1999) with primary vesicoureteric reflux (88 unilateral and 74 bilateral) diagnosed by means of voiding cystourethrography after urinary tract infections. Primary care physicians had referred the patients to the Division

of Paediatric Nephrology at the University Children's Hospital in Bern between 1978 and 1999. As patients referred from other hospitals or directly from our hospital were not included, the study population reflects the attitude of primary care physicians towards detecting the condition following urinary infections in the region of

Bern. The vesicoureteric reflux had been graded according to the International Reflux Study Committee [7].

The age at diagnosis of the 74 Swiss patients with reflux detected between 1978 and 1988 was compared with that of the 88 patients with reflux detected between 1989 and 1999. In addition the age at diagnosis in the 162 Swiss children was compared with that described by Lenaghan *et al.* in their classic 1976 report [3] concerning 102 Australian patients (35 males and 67 females).

Nowadays, widespread ultrasound screening examinations of the foetus have often led to the recognition of reflux even in non-infected subjects. Furthermore, there is increasing awareness of the genetic origin of vesicoureteric reflux.

For this reason, screening for reflux of the asymptomatic siblings of children with reflux is often proposed. In the present survey, however, only patients investigated for vesicoureteric reflux following urinary tract infections were included [11–13].

Results are given as median and interquartile range. Considering that the Kolmogorov-Smirnov normality test for deviations concluded that the study populations are unlikely to follow a Gaussian distribution, the non-parametric Kruskal-Wallis test and Dunn's post test were used to analyse the results. Statistical significance was set at $p < 0.05$.

Results

The Swiss and the Australian groups of patients were similar in terms of the relative frequencies of female patients (72% and 66%) and bilateral reflux (60% and 66%). Both in Switzerland (8 [3–23] versus 21 [9–37] months; $p < 0.001$) and in Australia (15 [5–29] versus 78 [42–105]

months; $p < 0.01$) reflux was detected earlier in boys than in girls; in Swiss children the mentioned tendency was statistically significant both between 1978 and 1988 ($p < 0.05$) as well as between 1989 and 1999 ($p < 0.05$). Table 1 and figure 1, a cumulative frequency distribution polygon, depict the age at diagnosis of vesicoureteric reflux in the Swiss patients and in the historical group of 102 Australian patients reported by Lenaghan. In Swiss girls the median age at diagnosis was 14 months between 1989 and 1999 and 29 months between 1978 and 1988 ($p < 0.01$), while the median age at diagnosis was 78 months before 1976 in Australia ($p < 0.01$ compared with Swiss children with reflux detected between 1978 and 1988, and between 1989 and 1999 respectively). In Swiss boys the median age at diagnosis was 5 months between 1988 and 1998 and 12 months between 1978 and 1988 (difference not significant), while the median age at diagnosis was 15 months before 1976 in Australia (the difference was not statistically significant compared with Swiss children).

In Swiss children the grades of reflux were I–II in 71 renal units, III in 114 and IV–V in 51. As reflux was graded on the basis of the calibre of the refluxing ureter in Australia, whereas the classification devised by the International Reflux Study was used in Switzerland, no direct comparison of reflux severity can be made. However, assuming that a dilated ureter indicates International Reflux Study grade III or higher, the percentages are similar in Australia and Switzerland (42% and 40%).

Figure 1

Cumulative frequency distribution polygon for the age at the time of diagnosis of vesicoureteric reflux in children with urinary tract infections. Swiss children with reflux detected between 1978 and 1988 and between 1989 and 1999 as well as Australian children (redrawn from [3]) with reflux detected before 1976 are depicted separately.

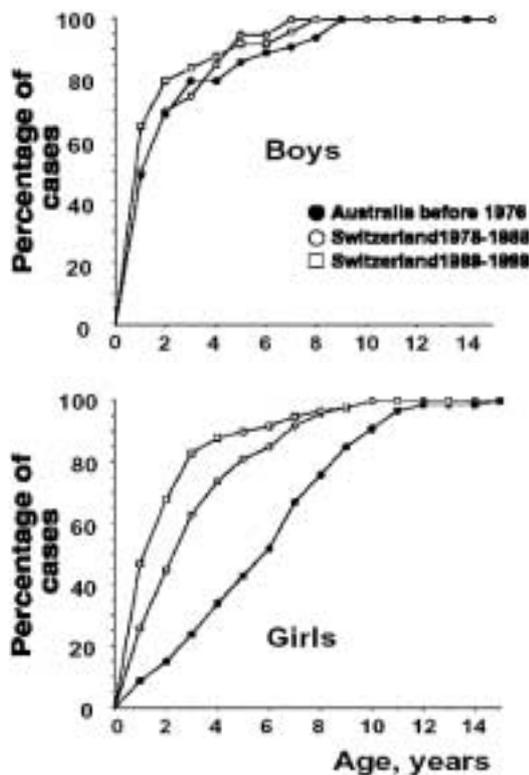


Table 1

Age at diagnosis of 162 Swiss (46 boys and 116 girls) and 102 Australian (35 boys and 67 girls, diagnosis before 1976; from reference 3) children with vesicoureteric reflux detected after urinary tract infections. Results are given as number of patients and median and interquartile range of the age.

	Switzerland		Switzerland		Australia	
	before 1976	1989–1999	1989–1999	1978–1988	1978–1988	1978–1988
	n	age (months)	n	age (months)	n	age (months)
All children	88	10* [4–21]	74	23 [9–44]	102	54 [16–94]
Girls	62	14** [8–23]	54	29 [12–54]	67	78 [42–105]
Boys	26	5 [4–17]	20	12 [5–31]	35	15 [5–29]

* $p < 0.005$ and ** $p < 0.01$ versus Switzerland between 1978–1988 and Australia before 1976.

Discussion

Early diagnosis and treatment is considered best practice in reducing the risk of renal damage caused by vesicoureteric reflux [7-10]. The present analysis in children referred to a Swiss centre confirms that primary vesicoureteric reflux is now detected earlier in girls with urinary tract infections, as recently noted in a more heterogeneous setting that included both children referred by primary care physicians as well as children referred from hospital physicians [14]. A similar, statistically not significant tendency was noted in boys. It is therefore concluded that in Switzerland available recommendations for the detection of reflux are often put into practice by primary care physicians. Furthermore, both the Swiss and the historical Australian studies indicate that vesicoureteric reflux is detected earlier in boys than in girls. This difference is related to the fact that the peak incidence of urinary tract infections is during the first year of life in boys and later in girls and to the belief that in girls urinary tract infections are common even in the absence of urinary tract malformations [7-13]. It has been recently documented that in boys vesicoureteric reflux is usually severe and often linked with renal damage even in the absence of urinary tract infections [11-13]. On the contrary, in girls with vesicoureteric reflux innate damage has seldom been noted, and so urinary tract infections may play a crucial causative role in the development of renal injury [11-13]. New scars rarely occur after diagnosis and when a child benefits from the care of an experienced centre [7-10], which suggests that the early detection of reflux and its current management may be critically important especially in girls.

It is still debated whether or not the currently advocated detection and treatment of reflux following urinary tract infections has been accompa-

nied by a reduction in the incidence of reflux-induced end-stage kidney disease, probably due to the lapse of time between diagnosis and evaluation of renal function [15].

For the past years practice recommendations have been widely advocated as a means of ensuring consistent care. Despite the theoretical appeal of recommendations, voluntary adherence to recommendations is often poor. The encouraging results of the present survey confirm the assumption that recommendations are likely to be followed when they are easy to implement and not too complex [16].

The lapse of time between the first recorded infection and the diagnosis of reflux as well as age at diagnosis of the first infection were not addressed in the present, retrospective study. As a consequence earlier detection of reflux than in the past does not necessarily reflect a shortened interval between the first infection and the diagnostic cystography.

In brief, the present analysis suggests that vesicoureteric reflux is now detected earlier than in the past by Swiss primary care physicians, which is a prerequisite for reducing the incidence of renal consequences of the disease. We believe that dialysis and transplant registries will reflect the beneficial effects of the new diagnostic and therapeutic policy in just a few years, especially in the case of female subjects.

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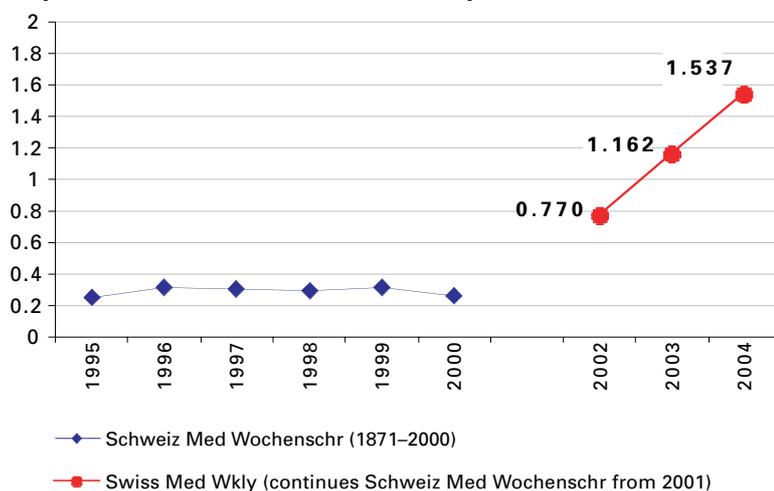
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