Journal of Pediatric Urology (2011) 7, 638—643

Journal of Pediatric urology

Evolution and prognosis value of intrarenal reflux

J. Boubnova [a,*], A. Sergent-Alaoui [b], G. Deschênes [c], G. Audry [a]

[a] Armand-Trousseau Children's Hospital, Pediatric Surgery Department, 26, av. du Dr Arnold Netter, 75012 Paris, France
[b] Armand-Trousseau Children's Hospital, Nuclear Medicine, 26, av. du Dr Arnold Netter, 75012 Paris, France
[c] Robert-Debré Hospital, Pediatric Nephrology Department, 48 bd Serrurier, 75019 Paris, France

Received 19 January 2010; accepted 27 September 2010
Available online 14 October 2010

KEYWORDS
Intrarenal reflux;
Pyelotubular reflux;
Vesicoureteral reflux;
Urinary tract infection;
DMSA scan

Abstract *Purpose:* The aim of this study was to evaluate the prognostic significance of intrarenal reflux (IRR) regarding urinary tract infection (UTI), renal scarring and spontaneous resolution after 3 years of follow up.
Patients and methods: 33 patients (42 refluxing units) with IRR were compared to 27 children (44 refluxing units) with high-grade vesicoureteral reflux (VUR) without IRR (controls) matched for gender, age and VUR grade. All patients received antibiotic prophylaxis during observation and antireflux surgery was performed in children with recurrent UTI. DMSA scan was performed at study entry, and 18 and 36 months.
Results: DMSA scores at entry showed a higher proportion of moderate and severe damage in the IRR group (25/42) compared to the control group (16/44) (Chi squared, $P < 0.03$). During follow up the incidence of UTI was similar in the two groups, as well as the stability of DMSA scintigraphy and the rate of spontaneous disappearance of the reflux. A similar proportion of patients underwent surgery (18/33 patients with IRR and 13/27 control patients; Chi squared, not significant).
Conclusions: Under medical management, the prognosis for IRR is not different from high-grade VUR without IRR. The presence of IRR does not justify more aggressive management than a high-grade VUR without IRR.

Introduction

Intrarenal reflux (IRR) consists of an opacification of the renal parenchyma on voiding cystography. It is observed principally in newborns and infants, and accompanies high-grade vesicoureteral reflux (VUR) [1]. The incidence of IRR varies from 2% to 10% of VUR cases in the literature [2—5]. This condition was first studied in 1975, its high associated risk of renal scarring was underlined [6], and the presences of IRR lead to earlier surgery [7]. In 1985, the international

Abbreviations: IRR, intrarenal reflux; VUR, vesicoureteral reflux; UTI, urinary tract infection; 99 m-Tc DMSA scan, technetium dimercaptosuccinic acid scan; CI, confidence interval.

* Corresponding author.
E-mail address: julia.boubnova@gmail.com (J. Boubnova).

1477-5131/$36
doi:10.1016/j.jpurol.2010.09.015

Table 1 Scintigraphic score.

Scintigraphic score		Description
Score 0	Normal	No abnormality
Score 1	Mild damage	Limited focal defect and normal function
Score 2	Moderate damage	1—2 renal scars and decreased function 30%—45%
Score 3	Severe damage	Multi-scarred kidney and/or decreased renal function <30%

classification of VUR grading [8] was agreed, with five grades based on the filling and dilatation of the ureter, the renal pelvis and the calyces during VUR. IRR was not included in the grading, but only cited below with a recommendation to note the extent of intrarenal re-flow. Recent publications do not specifically mention IRR. Great progress has been made in the comprehension of the natural history of VUR, particularly concerning the chances of spontaneous cessation even for high-grade VUR. The current recommendation for VUR is a conservative attitude under antibiotic prophylaxis, although the management of VUR in the presence of IRR remains controversial. The aim of this study is to evaluate IRR specifically in terms of urinary tract infection (UTI) occurrence, renal scarring and spontaneous resolution of reflux, at the time of diagnosis and after 3 years of medical treatment.

Patients and methods

This multicenter, prospective observational case-control study was conducted by *Section Française d'Urologie Pédiatrique*. Two groups of patients aged from 0 to 2 years were followed for 3 years. The inclusion period was between January 2002 and December 2005. In the 'IRR' group the reflux was intrarenal. In the 'Control' group the reflux was of high grade (3—4—5) but not intrarenal. A total of 60 patients were studied: 33 patients were included in the 'IRR' group and 27 children in the 'control' group. The two groups were matched for age, gender and distribution of VUR grade. All patients received urinary antibioprophylaxis during observation. Antireflux surgery was performed in children who had recurrent febrile UTIs (two or more). Three check-ups (at entry, and follow up of 18 and 36 months) were performed, including recording of clinical data about the occurrence of febrile UTI, a voiding cystography and a renal DMSA scintigraphy. In the case of spontaneous or after-surgical disappearance of the reflux, only clinical data were retrieved.

DMSA scan was scored for each refluxing renal unit from 0 (normal) to 3 (severe) (Table 1). For 46 patients, the results of the scan were reviewed by a single nuclear medicine physician; for 14 patients the original scan images could not be reviewed and data supplied by the referent physician were used.

The significance level for statistical analysis was fixed at $P < 0.05$.

Results

The sex ratio was comparable between the two groups: 18 boys/15 girls in the IRR group and 18 boys/9 girls in the Control group (Chi squared, NS). The median age at study entry was 3.6 months in the IRR group and 3.0 months in the Control group; the distribution of age at diagnosis is represented in Fig. 1.

The circumstances of diagnosis were studied. In the IRR group, the reflux was more frequently revealed by febrile UTI (21 vs 10 patients) while in the Control group the reflux was more frequently diagnosed antenatally (17 vs 11 patients). This was significantly different between the two groups (Fig. 2, Chi squared, $P < 0.03$).

The cystographic features were studied for each refluxing renal unit; 42 renal units with intrarenal reflux were compared to 44 refluxing renal units with high-grade reflux (3—5) but without intrarenal opacification. The distribution of grades 3, 4 and 5 was comparable between the two groups of renal units studied (Fig. 3, Mann—Whitney *U*-test, NS). The side of the reflux was not significantly different between the two groups of renal units: 21 right and 21 left refluxing units in the IRR group and 23 right and 21 left high-grade refluxing units in the Control group.

The scintigraphic data were reviewed for each refluxing unit and scored as normal, or mild, moderate or severe damage (Table 2). In the IRR group, the proportion of abnormal (32) versus normal (10) scintigraphies was significantly higher than in the Control group (21 normal and 23

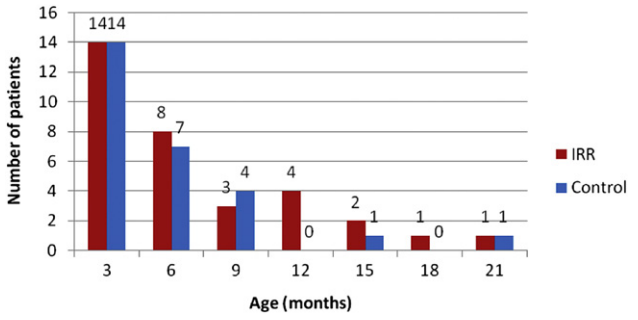

Figure 1 Distribution of age at diagnosis.

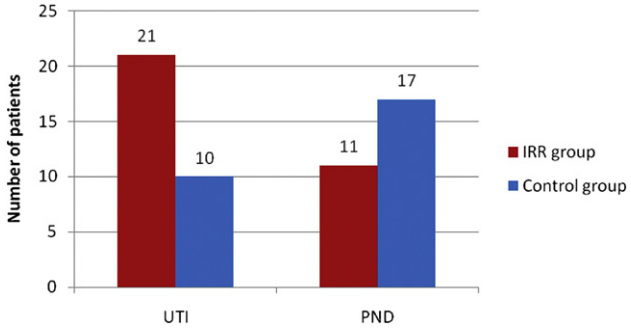

Figure 2 Circumstances of diagnosis of VUR.