ORIGINAL ARTICLE

PAEDIATRIC RENAL BIOPSIES IN EAST BOHEMIA. SINGLE CENTRE EXPERIENCE IN THE YEARS 1997–2008

Sylva Skálová[1], Miroslav Podhola[2], Pavel Rejtar[3]

Charles University in Prague, Faculty of Medicine and University Hospital Hradec Králové, Czech Republic: Department of Paediatrics[1], Fingerland's Institute of Pathology[2], Department of Radiology[3]

Summary: This report analyses data on 177 renal biopsies (RB) performed in 174 children in the East Bohemian region throughout 1997–2008. The primary aim was to evaluate the diagnostic benefit of the procedure, the secondary aim was to assess the safety of RB and prevalence of clinical complications. The patients' mean age at the time of RB was 12.77 ± 4.17 years; range 1 to 19 years; male to female ratio 1.17:1. Haematuria was the most common indication for RB. All RBs were performed by a single consultant nephrologist. 27 biopsies in 27 patients (15.3 %) in 1997 were performed under X-ray control, the remaining 150 RB (84.7 %) under ultrasound guidance. The mean annual number of RBs performed in 1997–2001 was significantly higher than in the 2003–2008 period (21.6±5.5 versus 9.9±1.2; p=0.0003). All samples were diagnostic. The mean number of glomeruli was 23.5±11.4 (range 4–55) per sample. The RB resulted in information yielding a definite diagnosis and/or prognosis in 173 children (99.4 %). The most frequent diagnoses were IgA nephropathy (n=41; 23.5 %), mesangioproliferative glomerulonephritis (n=31; 17.8 %) and thin basement membrane glomerulopathy (n=22; 12.6 %). No major complications were encountered and only minor complications occurred in 43 cases (24.2 %), not requiring medical intervention. In conclusion, the present practice of RB in children is safe, with high clinical benefit.

Key words: *Nephropathy; Renal biopsy*

Introduction

Renal biopsy (RB) is a decisive diagnostic procedure in patients with renal disease. The indications for RB have changed over the years. The policy and threshold for performing may vary considerably among different centers and nephrologists. In general, there are five categories of indications (7, 9–10, 12, 16–18, 26, 27, 32, 33, 35): glomerular hematuria; non-nephrotic range protenuria; nephrotic syndrome; acute nephritic syndrome; acute or subacute renal failure of undetermined origin. In paediatric patients these indications further include: persistent hematuria of unknown origin; persistent proteinuria of unknown origin; steroid-resistant nephrotic syndrome; acute renal failure of unknown origin; familial nephritis; rapidly progressive glomerulonephritis; "atypical" acute glomerulonephritis; suspected tubulointerstitial nephritis; nephropathies in systemic diseases (Lupus erythematosus, Henoch-Schoenlein purpura) (7, 12, 18, 19, 26, 27, 35). In paediatric nephrotic syndrome (NS) the indications are: congenital NS (occurring under 6 months of age); corticoresistant NS; corticodependent NS prior to cyclosporine A therapy; NS patients > 12 years of age; atypical signs (macroscopic hematuria, hypertension, acute renal failure, abnormal laboratory results such as low C3 complement serum levels) (7, 12, 17, 18, 26, 27, 33, 35).

Several epidemiological data concerning RB in children have been published (1–8, 14–16,19–32, 35). In Czech Republic, a central registry incorporating both adults and children has been established in 1993. By the year 2000 it comprised 4004 biopsy records of 3874 patients from 28 centres and reported a total number of 710 paediatric RB in patients < 15 years of age (i.e. 17.7 % of all biopsies performed in the Czech Republic), and when patients aged <18 years were included, the number of paediatric biopsies rose to 1073 (26.4 %) in the year 2000 (31) and to 1327 in 2002 (23). Analyses of paediatric RB from this register have been reported (23, 24, 31).

This paper analyses data on RB in children collected at the Department of Paediatrics, University Hospital in Hradec Králové, Czech Republic, from January 1, 1997 to December 31, 2008. The primary aim was to evaluate the diagnostic benefit of the procedure, the secondary aim was to assess the safety of RB and prevalence of clinical complications, and the changes in diagnostic distribution and RB indications throughout one decade.

Patients, materials and methods

The patients came from East Bohemia with a total population of 1,069,102 (2008 census), out of which 207,385 are children and adolescents under 18 years of age (13).

A total of 177 RB were performed on native kidneys in 174 paediatric patients between January 1, 1997 and December 31, 2008. Three re-biopsies were done for therapeutic/diagnostic reasons at different time points of follow-up. All biopsies were performed at the Department of Paediatrics in Hradec Kralove by a single consultant nephrologist. The patients' mean age at the time of RB was 12.77 ± 4.17 years; range 1 to 19 years; male to female ratio 1.17:1. Isolated haematuria and haematuria with proteinuria were the two most common indications for biopsy. All patients underwent routine pre-biopsy assessment including medical history, physical examination, blood pressure measurement, laboratory exams including blood count and platelet count, coagulation profile, blood group. 27 biopsies in 27 patients (15.3 %) in 1997 were performed under X-ray control with the use of intravenous pyelography and implementing Franklin's modification of Vim-Silvermann needle. The remaining 150 biopsies (84.7 %) in 147 patients were performed under ultrasound guidance, utilising single use biopsy guns in 141 biopsies (79.6 %), in particular Speed cut biopsy gun (Gallini) in 1998–2002, and subsequently, from 2003 onwards, Monopty device gun (Bard). TruCut needle was also used in 9 biopsies (5.1 %). The biopsy needle was 7–10 cm in length, the diameter used was 18G (narrow one) in children under 2 years of age and 14G (broader) in older ones. The use of 18G needle required repeated (at least two) punctures to collect adequate amount of kidney tissue. General anaesthesia was a rule in all children under 12 years of age, while local anaesthesia was used in children above this age. However, general anaesthesia was also necessary in 18 patients exceeding 12 years of age. Premedication with diazepam and pethidine hydrochloride or application of midazolame was performed prior to 107 RB (60.5 %; mean age of patients 15.4 ± 1.6 years, range 12–19 years) who underwent the biopsy under local anaesthesia with 1% trimecain, while in 70 RB (39.5 %; mean age of patients 8.6 ± 3.6 years, range 1–16 years), general anaesthesia was necessary. The following data were evaluated: clinical symptoms prior to biopsy, clinical and histological diagnosis; presence of haematuria (microhaematuria or macrohaematuria) before and after biopsy; presence of arterial hypertension defined on the basis of Second Task Force on Blood Pressure Control in Children (34) before and after biopsy or permanent treatment with antihypertensive medication; clinical complications after renal biopsy (with serious complications defined as: arterio-venous fistula, presence of hypovolaemic shock and need for blood transfusion). All biopsies were performed on an in-patient basis, close post-biopsy monitoring involved blood pressure control, blood count, urine assessment and renal ultrasonography 24 hours after the RB. Histological evaluation by light microscopy and immunofluorescence was performed routinely, combined with electron microscopy in all cases. Histological classification of renal diseases used the WHO recommendations

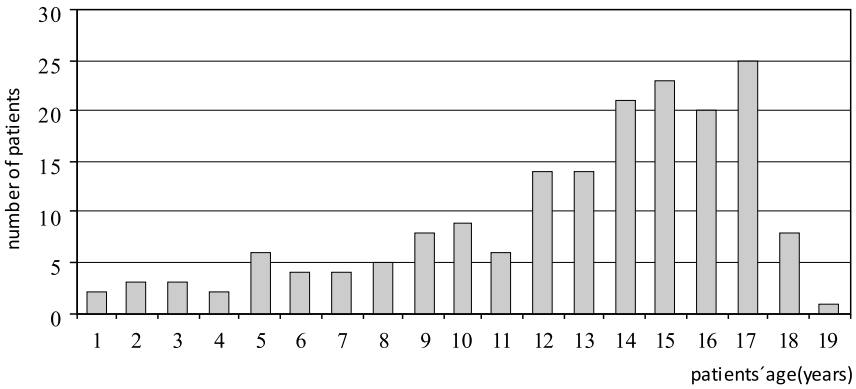

Fig. 1: Age distribution of patients.

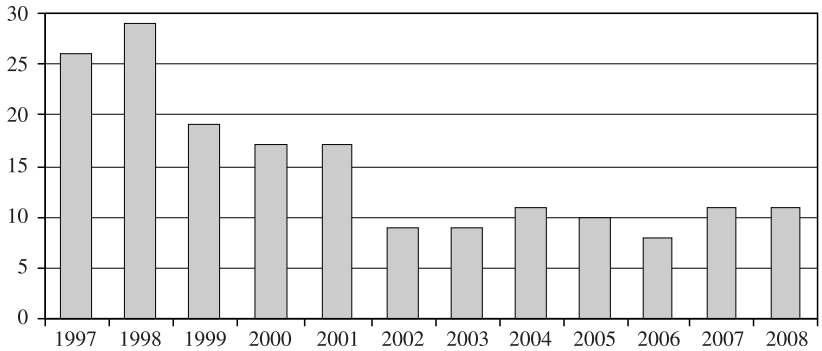

Fig. 2: Annual numbers of renal biopsies. Re-biopsies included.

(11). For statistical evaluation, unpaired t-test was used where applicable.

Results

The largest amount of biopsies was performed in children aged 12–17 years (Fig. 1) especially in 1997–1998, while a decline in the number of achieved biopsies has been observed since the year 2002 (Fig. 2). The mean annual number of biopsies performed in 1997–2001 was significantly higher than in the 2002–2008 period (21.6 ± 5.5 versus 9.9 ± 1.2; p = 0.0003).

Haematuria was found in 151 children (86.8 %) prior to RB; this consisted of microscopic haematuria in 98 cases (56.3 %) and macroscopic haematuria in 53 (30.5 %). Proteinuria was present in 81 children (46.5%) prior to RB, with the following pattern: < 1 g/24 hours once (0.6 %), 1–3 g/24 hours in 50 cases (28.7 %), 3–10 g/24 hours in 22 cases (12.6 %) and above 10g/24 hours in 8 cases (4.6 %). Isolated haematuria was present in 93 patients (53.5 %), this comprised of microscopic haematuria (n= 56; 32.2 %) and macroscopic haematuria (n= 37; 21.3 %); isolated proteinuria was present in 26 patients (14.9 %), while in 55 patients (31.6 %) there was an overlap of both haematuria and proteinuria. The clinical symptoms/indications throughout the years 1997–2008 are presented in Tab. 1, with isolated haematuria being usually the most frequent indication for RB, followed by haematuria with proteinuria. Arterial hypertension and/or permanent treatment with antihypertensive medication was present in 33 children (19.0 %) prior to biopsy; all children with hypertension were adequately treated at the time of RB. 176 bioptic samples (99.4 %) were diagnostic. The mean number of glomeruli obtained was 23.5 ± 11.4 (range 4–55) per sample. The RB resulted in information yielding a definite diagnosis and/or prognosis in 173 children (99.4 %), however this did not always result in a substantial change in therapeutic strategy. The most frequent diagnosis was IgA nephropathy, followed by mesangioproliferative glomerulonephritis, thin basement membrane glomerulopathy (TBM), Alport's syndrome and

Tab. 1: Clinical symptoms/indications prior to renal biopsies. Re-biopsies excluded.

Symptom	Year; number of patients/year; % per annual number of patients (in parenthesis)											
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Isolated microscopic hematuria	8 (30.8)	13 (44.8)	8 (47)	2 (11.7)	5 (29.4)	2 (22.2)	5 (55.6)	2 (18.2)	4 (40)	0	7 (63.6)	0
Recurrent macroscopic hematuria	7 (26.9)	5 (17.2)	5 (29.4)	4 (23.5)	4 (23.5)	4 (44.4)	2 (22.2)	3 (27.3)	2 (20)	1 (12.5)	0	0
Proteinuria	3 (11.5)	2 (6.9)	2 (11.7)	3 (17.6)	3 (17.6)	2 (22.2)	0	3 (27.3)	0	2 (25)	1 (9.1)	5 (50)
Proteinuria and hematuria	8 (30.8)	9 (31)	2 (11.7)	8 (47)	5 (29.4)	1 (11.1)	2 (22.2)	3 (27.3)	4 (40)	5 (62.5)	3 (27.3)	5 (50)
Total	26	29	17	17	17	9	9	11	10	8	11	10

Tab. 2: Diagnostic distribution of renal biopsies. Re-biopsies excluded.

Diagnosis	Number of patients	Percentage (%)	Mean age at biopsy (years ± SD)
IgA nephropathy	41	23.5	14.4 ± 2.7
Mesangioproliferative glomerulonephritis (GN)	31	17.8	12.9 ± 4.1
Thin basement membrane glomerulopathy (TBM)	22	12.6	14.1 ± 2.1
Alport's syndrome	18	10.3	14.5 ± 2.7
Minimal change disease (MCD)	17	9.8	6.5 ± 3.7
Henoch-Schoenlein purpura	10	5.7	10.9 ± 4.8
IgM nephropathy	7	4.0	9.2 ± 6.3
Membranoproliferative GN	6	4.0	12.3 ± 3.6
Lupus nephritis	6	3.4	14.7 ± 2.8
Focal segmental glomerulosclerosis (FSGS)	5	2.8	12.3 ± 5.5
Tubulointerstitial nephritis	4	2.3	12.3 ± 6.3
Membranous nephropathy	2	1.1	12.5
Acute postinfectious nephropathy	2	1.1	10.5
Wegener granulomatosis	1	0.6	15
Normal finding	1	0.6	18
Non-diagnostic	1	0.6	13
Total	174	100	—

minimal change disease (MCD) (Tab. 2). The three re-biopsies were performed in patients with Wegener's granulomatosis, lupus nephritis and IgA nephropathy, respectively. The annual numbers and percentage of each group of nephropathies are presented in Tabs. 3a, b. Clinical symptoms with respective diagnostic distribution are presented in Tab. 4. The most frequent diagnoses in patients with isolated microscopic haematuria were: TBM, mesangioproliferative glomerulonephritis and Alport's syndrome; in patients with recurrent macroscopic haematuria: IgA nephropathy, mesangioproliferative glomerulonephritis and Alport's syndrome; in children with isolated proteinuria: MCD, IgM nephropathy and Henoch-Schoenlein purpura; in subjects with both proteinuria and haematuria: IgA nephropathy, Henoch-Schoenlein purpura, mesangioproliferative glomerulonephritis and lupus nephritis, respectively (Tab. 4).

Tab. 3a: Annual incidence of renal diseases in biopsy specimen. Re-biopsies excluded.

Diagnosis	Year											
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
IgA nephropathy	5	8	3	6	5	4	2	4	0	2	1	1
Mesangioproliferative GN	8	8	4	2	5	1	0	1	0	2	0	0
Thin basement membrane glomerulopathy (TBM)	2	2	2	0	1	1	4	1	3	0	6	0
Alport's syndrome	1	2	5	3	0	0	0	2	3	1	0	1
Minimal change disease (MCD)	1	0	2	2	3	2	0	0	1	1	1	4
Henoch-Schoenlein purpura	1	1	0	3	1	0	1	1	2	0	0	0
IgM nephropathy	2	5	0	0	0	0	0	0	0	0	0	0
Membranoproliferative GN	3	0	1	0	0	0	0	0	0	1	0	1
Lupus nephritis	0	1	0	1	1	1	0	0	0	1	0	1
Focal segmental glomerulosclerosis (FSGS)	0	0	0	0	1	0	1	1	0	0	1	1
Tubulointerstitial nephritis	0	0	0	0	0	0	0	1	1	0	1	1
Membranous nephropathy	2	0	0	0	0	0	0	0	0	0	0	0
Acute postinfectious nephropathy	1	0	0	0	0	0	0	0	0	0	1	0
Wegener granulomatosis	0	1	0	0	0	0	0	0	0	0	0	0
Normal finding	0	1	0	0	0	0	0	0	0	0	0	0
Non-diagnostic sample	0	0	0	0	0	0	1	0	0	0	0	0
Total	26	29	17	17	17	9	9	11	10	8	11	10

Tab. 3b: Annual incidence of renal diseases in biopsy specimen. Expressed in %. Re-biopsies excluded.

Diagnosis	Year											
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
IgA nephropathy	19.2	27.6	17.6	31.6	29.4	44.4	22.2	36.4	0	25	9.1	9.1
Mesangioproliferative glomerulonephritis (GN)	30.7	27.6	23.5	10.5	29.4	11.1	0	9.1	0	25	0	0
Thin basement membrane glomerulopathy (TBM)	7.6	6.9	11.8	0	5.9	11.1	44.4	9.1	30	0	54.5	0
Alport's syndrome	3.8	6.9	29.4	15.8	0	0	0	18.2	30	12.5	0	9.1
Minimal change disease (MCD)	3.8	0	11.8	10.5	17.6	22.2	0	0	10	12.5	9.1	36.4
Henoch-Schoenlein purpura	3.8	3.4	0	15.8	5.9	0	11.1	9.1	20	0	0	0
IgM nephropathy	7.6	17.2	0	0	0	0	0	0	0	0	0	0
Membranoproliferative GN	11.5	0	5.9	0	0	0	0	0	0	12.5	0	9.1
Lupus nephritis	0	3.4	0	5.3	5.9	11.1	0	0	0	12.5	0	9.1
Focal segmental glomerulosclerosis (FSGS)	0	0	0	0	5.9	0	11.1	9.1	0	0	9.1	9.1
Tubulointerstitial nephritis	0	0	0	0	0	0	0	9.1	10	0	9.1	9.1
Membranous nephropathy	7.6	0	0	0	0	0	0	0	0	0	0	0
Acute postinfectious nephropathy	3.8	0	0	0	0	0	0	0	0	0	9.1	0
Wegener granulomatosis	0	3.6	0	0	0	0	0	0	0	0	0	0
Normal finding	0	3.6	0	0	0	0	0	0	0	0	0	0
Non-diagnostic sample	0	0	0	0	0	0	11.1	0	0	0	0	0

Tab. 4: Clinical symptoms and diagnostic distribution. Number of patients and percentage (in parenthesis).

Diagnosis	Symptom			
	Isolated microscopic hematuria	Recurrent macroscopic hematuria	Isolated proteinuria	Proteinuria and hematuria
IgA nephropathy	5 (2.9)	22 (12.6)	1 (0.6)	13 (7.5)
Mesangioproliferative GN	14 (8.0)	9 (5.2)	1 (0.6)	7 (4.0)
Thin basement membrane glomerulopathy (TBM)	21 (12.0)	1 (0.6)	0	0
Alport's syndrome	11 (6.3)	5 (2.9)	0	2 (1.1)
Minimal change disease (MCD)	0	0	13 (7.5)	4 (2.2)
Henoch-Schoenlein purpura	0	0	2 (1.2)	8 (4.6)
IgM nephropathy	0	0	3 (1.7)	4 (2.2)
Membranoproliferative GN	1 (0.6)	0	0	5 (2.9)
Lupus nephritis	0	0	0	6 (3.4)
Focal segmental glomerulosclerosis (FSGS)	0	0	2 (1.1)	3 (1.7)
Tubulointerstitial nephritis	0	0	3 (1.7)	1 (0.6)
Membranous nephropathy	0	0	1 (0.6)	1 (0.6)
Acute postinfectious nephropathy	1 (0.6)	0	0	1 (0.6)
Wegener granulomatosis	1 (0.6)	0	0	0
Normal finding	1 (0.6)	0	0	0
Non-diagnostic sample	1 (0.6)	0	0	0
Total	56	37	26	55

Accordingly, the patients with IgA nephropathy presented most frequently with macroscopic haematuria, and proteinuria with haematuria, while subjects with mesangioproliferative glomerulonephritis had isolated microscopic haematuria or recurrent macroscopic haematuria, followed by proteinuria with haematuria. Children with TBM presented with isolated microscopic haematuria, while subjects with Alport's syndrome had isolated microscopic or recurrent macroscopic haematuria. Patients with MCD presented with isolated proteinuria and proteinuria with haematuria (Tab. 4).

Concerning the indications for RB, there was an apparent drop in the percentage of patients with macroscopic haematuria since 2006 and with isolated microscopic haematuria in the years 2006 and 2008, respectively. Furthermore, there was a rising tendency in the percentage of biopsied patients indicated for proteinuria with haematuria since 2004 and a similar trend in the amount of subjects with isolated proteinuria since 2004, with the exception of years 2005 and 2007, respectively (Tab. 1).

With regard to histologic diagnosis, there was a drop in percentage of IgA nephritis since 2005, with the exception in 2006, and in mesangioproliferative glomerulonephritis since 2003, except for the year 2006. We observed an increase in percentage of TBM since 2003, with the exception of years 2006 and 2008, respectively (Tabs. 3a,b).

The changes in percentage of remaining histological diagnoses are difficult to assess and interpret due to low patient numbers. Similarly, the 2006 results are difficult to assess and interpret due to low number of RB performed that year.

Regarding the age, the patients with MCD and IgM nephropathy were significantly younger at the time of renal biopsy when compared to all other diagnoses ($p = 0.0001$), with the exception of Henoch-Schoenlein purpura patients, who were also significantly younger than the children with IgA nephropathy, TBM and Alport's syndrone ($p = 0.04$ and $p = 0.01$), respectively. Otherwise, there were no significant age-dependent differences among the various groups sorted by respective diagnoses.

No major complications were encountered and only minor complications occurred in 43 cases (24.2 %), not requiring medical intervention. The most common complication was asymptomatic perirenal haematoma detected by ultrasound 2–3 days after renal biopsy (n=33; 18.6 %). Macroscopic hematuria on day 1–3 post biopsy was present in 8 children (4.5 %). Perirenal hematoma accompanied by abdominal pain occurred in 2 patients (1.1 %). Blood transfusion was never necessary.

Discussion

This report provides information about the occurrence of renal diseases diagnosed by renal biopsy at a single centre during a period of 12 years covering the population of a region with 207,385 children and adolescents. Male predominance in biopsy-proven kidney diseases corresponds with the data published by other authors (1, 6, 8, 10, 25, 30, 31). The patients' mean age of 12.77 ± 4.17 years at the time of RB is very similar to most other observations, where the mean age ranged from 9 to13 years (1, 7, 12, 15, 20, 23, 30, 35). The significantly lower age of patients with MCD and IgM nephropathy was related to the onset of NS, in particular steroid-dependent nephrotic syndrome.

According to the Czech registry, the number of RB in children aged < 15 years in the Czech republic before the year 2000 was high (17.7 % of all biopsies) when compared to results from other countries (5.7 % in Italy in 1992–94, 7.0 % in Spain between 1994–99, 5.2 % in Australia 1995–97) (8, 12, 30), apparently indicating more liberal criteria for RB among Czech paediatric nephrologists at that time (31). However, higher proportions of paediatric biopsies have also been reported in Asia, with 40.5 % out of all renal biopsies, in Korea (10) and in Japan with 20 % (22, 31). Our results indicate that the number of RB at our site has decreased significantly after the year 2001. The reason why number of performed RB has declined in recent years, could be attributed to the generally acknowledged fact that RB is often not performed when the likelihood of a therapeutic consequence is low (e.g. steroid-sensitive and steroid-dependent nephrotic syndrome, microscopic hematuria, intermittent isolated haematuria, post-infection glomerulonephritis). At our site there was a significant drop in the number of RB, mostly due to retraction of biopsies in patients with isolated haematuria.

Concerning the diagnostic distribution of RB, our results are similar to those of the Central Czech Registry. IgA nephropathy, followed by mesangioproliferative glomerulonephritis, TBM, Alport's syndrome and minimal change disease (MCD) (Tab. 2) were the most frequent diagnoses in our centre, while in the Central Czech Registry the most common in 1994–2000 and 1994–2002 were IgA nephropathy (19.2 % and 24.7 %), MCD (17.6 % and 19.6 %) and TBM glomerulopathy (12.3 % and 11.6 %), respectively (23, 31). The clinical signs/symptoms prior to RB in children of the Central Czech Registry between 1994 and 2002 were not much different from those in our centre: microscopic haematuria in 60.2 %, macroscopic haematuria 14.2 %, proteinuria in 65 % (23). Concerning diagnostic distribution, somewhat similar results come from the Italian registry (12), where the most common finding was IgA nephropathy (18.8 %), followed by MCD (11.6 %), Henoch-Schoenlein purpura (11.6 %), mesangioproliferative glomerulonephritis (9.5 %), focal segmental glomerulosclerosis (FSGS) (8.5 %) and TBM (5 %), in spite of the fact, that most children presented with proteinuria (54 %), followed by isolated haematuria (19.4 %). However, other reports from various paediatric nephrology centres have a different diagnostic distribution of histopathological findings. In Australian report, the most common diagnosis was lupus nephritis, followed by IgA nephropathy and FSGS. In China, the most frequent histopathologic finding was mesangioproliferative glomerulonephritis (51.8 %), IgM nephropathy (8.3 %), MCD (8 %) and IgA nephropathy (7.4 %) (14). In Hong-Kong the most common was lupus nephritis (23 %), MCD (14 %), TBM (12 %) and IgA nephropathy (12 %) (35). Croatian report states mesangioproliferative glomerulonephritis (27.7 %), IgA nephropathy (13.8 %), Henoch-Schoenlein purpura (10.8 %) (6). In India, the most common was FSGS (38 %), MCD (32 %), membranoproliferative GN (15 %) and mesangioproliferative GN (11 %) (25). Another Indian paper, dealing with steroid-resistant NS reported MCD (52.1 %) as the most common histopathology finding (28). In Korea, the most frequent diagnosis was MCD (24.8%) followed by IgA nephropathy (10.3 %) (10). In yet another Korean report the most common was TBM (27.5 %) and IgA nephropathy (26.2 %) (27). In Saudi Arabia the most common are MCD (23–25 %), mesangioproliferative glomerulonephritis (15.7–24 %), and FSGS (14.8–24%) (1, 4). Spanish Registry presents MCD (24.2 %) as the most common finding, followed by IgA nephropathy (19.5 %) and FSGS (15.2 %) (30). The Turkish report states membranoproliferative GN (11.1 %), mesangioproliferative GN (10.7 %) and FSGS (7.3 %) (15). In these reports, the main indications for RB were nephrotic syndrome/proteinuria and glomerulonephritis, while isolated haematuria was an indication to a less extent. In a paper from USA, adolescents who presented with gross haematuria had predominantly a histopathologic diagnosis of IgA (52 %) and those with NS had MCD (31 %), mebranous glomerulonephritis and FSGS (in 18.5 % each) (19).

Therefore, the reason why the spectrum of histological diagnoses in Czech Republic differs from reports from other countries is most probably due to more liberal approach to RB in the earlier years (1997–2001). As isolated haematuria was the most frequent indication for RB, there was, consequently, a high number of histologicaly confirmed IgA nephropathies. This is also reflected by the fact that the drop in number of RB in patients with isolated haematuria at our site was followed by a decrease in number and percentage of IgA nephropathies and an increase in TBM.

We recorded similar (3, 15, 22) and even lower rates of post-biopsy complications compared with the experience of other authors (2, 6, 7, 28, 32).

In conclusion, the current practice of RB is safe with high clinical benefit, yielding a definite diagnosis and/or prognosis in sick children. The indications for RB might differ and change throughout the time.

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Corresponding author:

Sylva Skálová, M.D., Ph.D., Department of Paediatrics, University Hospital,
Sokolská 581, 500 05 Hradec Králové, Czech Republic; e-mail: skalova.s@seznam.cz