Pediatric Glomerular Diseases (Review of histopathological subtypes)

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Summary:

Background: Glomerular injury can be caused by immunologic, infectious, toxic, metabolic and heamodynamic factors. The glomerular response to injury determines the pathology, which can be observed in renal biopsy. The purpose of this study was to analyze different histopathological subtypes of primary and secondary glomerular diseases in children.

Patients and methods: A retrospective study was done on 100 renal biopsy cases in children welfare teaching hospital between December 2003 and December 2007. Ultrasonically guided biopsies were taken and only light microscopy was used to examine the specimens.

Results: The study group included 100 cases with renal diseases, 83 (83%) cases of which having primary glomerular disease, the remainder 17 (17%) cases represented secondary glomerular disease. The patients age ranged between (1month-15 years).The frequency of the different entities of primary glomerular disease was: focal segmental glomerulosclerosis (FSGS %) 27 (27%), Minimal change disease22 (22%), Mesangioproliferative glomerulonephritis21 (21%), Mesangiocapillary Glomerulonephritis7(7%) and congenital nephrotic syndrome 6 (6%).patients with secondary glomerular diseases: 14 (14%) patients had Systemic Lupus Erythromatosis(SLE), 2(2%) Henoch-Schonlein Purpura and 1(1%) Amyloidosis .

Conclusion: The results of this study were comparable to other studies, with Focal segmental glomerulonephritis being the most common primary glomerular diseases and systemic lupus erythromatosis being the most common secondary glomerular diseases in children. Further study on a much larger scale with the utilization of immunoflourescent and electron microscopy with full serology and infectious screening is needed to provide deeper understanding of these different diseases.

Keywords: Glomerular diseases, renal biopsy, Children

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Introduction:

Glomerulonephritis (G.N) and glomerulopathy are the terms usually used interchangeably to refer to glomerular injury. (1) Glomerular diseases can be classified at various diagnostic levels in terms of clinical features, pathology, pathogenesis, etiology, and combinations. (2) Renal biopsy has proved itself relatively safe procedure, when aided by real time ultrasound and it became a crucial mean for establishing the most important knowledge of histopathology, pathogenesis and classification of renal disease. (3) The present study was done to collect and analyze different histopathological subtypes of primary and secondary glomerular diseases in children admitted to children welfare teaching hospital.

Patients and Methods:

A retrospective descriptive study was done on 100 Renal biopsies of patients with renal diseases admitted to Children Welfare Teaching Hospital from December 2003 to December 2007.Data were collected from patients files and laboratory records. The data included age, sex,clinical diagnosis of the patients and histopathological findings of their biopsies. The indications for percutaneous renal biopsies in these patients included: (4)

1- Nephrotic syndrome with onset age less than 6 months or more than 12 years
2- Nephrotic syndrome with macroscopic hematuria
3- Patients with persistent unexplained microscopic heamaturia for>6months and hypertension
4- Steroid resistant and frequently relapsing nephrotic syndrome before using cytotoxic therapy).
5-low plasma C3
6- Unexplained renal impairment.
7-Systemic disease with renal involvement

After taking the consent of patient's family, renal biopsies were done under ultrasound guide, patients were given valium (0.2mg/kg) & trucut needle gage 18 was used. A sample was taken, preserved in formalin 20% and sent for histopathological study by light microscopy. Following that the child monitored every 30 minute (for pulse and blood

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pressure) for 2 hrs then hourly for 24 hrs. No complications were detected after renal biopsy in our patients apart from mild pain at the site of biopsy. Statistical analysis included presentation of tables and data arranged in numbers and percentage.

Results:

One hundred patients were enrolled in this study. Seventy (70%) patients were males and 30(30%) were females, with male to female ratio of 2.3:1. The age ranged between 1 month-15 years, median age (7.5) Eight (8%) patients were below 1 year, 57(57%) patients were between 1 - 5 years, 20(20%) patients were >5 - 11 years, and 15(15%) patients were above 11 years. (Table 1)

Table (1): Distribution of patients according to age and gender.

Age	Male No.	Female No.	Total No.	Total %
<1 year	5	3	8	8
1-5years	40	17	57	57
>5-11years	15	5	20	20
>11years	10	5	15	15
Total	70	30	100	100

Eighty three (83%) patients were found to have primary glomerular diseases, Twenty seven (27%) of them had Focal segmental glomerulosclerosis, Twenty two (22%) Minimal change disease, Twenty one (21%) Mesangioproliferative glomerulonephritis, seven (7%) patients have Mesangiocapillary glomerulonephritis and six (6%) congenital nephrotic syndrome. Table (2)

Table (2): distribution of patients with primary glomerular diseases according to diagnosis and gender

Diagnosis	Male No. (%)	Female No. (%)	Total No. (%)
FSGS	22(70.4)	10(29.6)	32(32)
MCD	15(68.2)	7(31.8)	20(20)
MesPGN	17(81)	4(19)	18(18)
MCGN	6(85.7)	1(14.3)	7(7)
Congenital Nephrotic	5(83.3)	1(16.7)	6(6)
Total	62(62)	21(21)	83(83)

Table (3): Distribution of patients with secondary glomerular diseases according to the final diagnosis and gender.

Diagnosis	Male No. (%)	Female No. (%)	Total No. (%)
Lupus Nephritis	5(35.7)	9(64.3)	14(14)
HSP	2(2)	0	2(29)
Amyloidosis	1(1)	0	1(1)
Total	8(8)	9(9)	17(17)

Seventeen (17%) patients were found to have secondary glomerular diseases, Fourteen (14%) of them had lupus nephritis, crieteria have been developed for diagnosis of SLE the combination of clinical and laboratory manifestations, the presence 4 of 11 of these criteria has 98% sensitivity and 97% specifity. The extent of renal involvement may be out of proportion to findings on urinalysis; renal biopsy is useful to confirm the diagnosis of lupus nephritis and to guide treatment (5). Biopsy findings according to the World Health Organization classification, which was modified in 2004, correlate with morbidity and mortality (5). In our study, three patients had (Class I is minimal mesangial change), four patients had (Class II demonstrates mesangial proliferation.), two patients had Class III (focal proliferative glomerulonephritis), four patients had Class IV (diffuse proliferative glomerulonephritis) with increased risk for developing end-stage renal disease in adulthood; intravenous pulse cyclophosphamide can decrease this risk. No patient had Class V disease (membranous glomerulonephritis). One patient had (Class VI advanced sclerosing nephritis) suggesting progression to renal failure.

Three (3%) patients had different renal diseases as HSP in 2(2%) and Amyloidosis in 1(1%) patient. (Table 3) HSP is vasculitis of small vessels, the signs and symptoms of the vasculitic syndromes are nonspecific and tend to overlap. The major complications of HSP are renal involvement, Renal involvement, two basic types of glomerular lesion are observed in renal biopsy specimens;mesangial proliferation in one patient ,and epithelial crescent formation in other patient, the clinical presentation and biopsy findings enhances the reliability of prognostication.One patient 12 years of age female diagnosed at age of five years as pulmonary tuberculosis presented with nephrotic syndrome. The diagnosis of amyloidosis is established by biopsy demonstrating amyloid fibril proteins in renal tissue.

Discussion:

Studying glomerular disease worldwide has led to great understanding and appreciation of the epidemiology of these disease entities and recognition of various risk factors as well as plotting future plans for treatment and if possible the prevention of these conditions. (6) In this study, a total number of 100 biopsies were included; the mean age at biopsy was 7.5 years, with male predominance of 70 %. Eighty three (83%) patients had primary glomerular disease, 17(17%) patients had secondary glomerular diseases (like SLE, HSP and Amyloidosis) in contrast to the study done in King Hussein Medical Center in 2005, which showed (49.2%) of patients had primary glomerular diseases, and (50.8%) patients had secondary glomerular diseases. (7) Environmental factors such as antigen _ driven mechanism, allergens, genetic

background could be a potential mechanism for these figures. Recent studies in children show changing trend of histopathology with increase incidence of Focal segmental glomerulosclerosis accompanied by significant decline in incidence of Minimal changes disease. (8,9,10,11) in our study Focal segmental glomerulosclerosis (FSGS) was the most common primary glomerular disease found in 32(32%) patients and this is in consistent with global trend of increasing FSGS in childhood (8,9) As the etiology of FSGS is unknown, it is difficult to postulate a potential mechanism for this increasing incidence. Only seven (7 %) patients found to have mesangiocapillary GN, this agrees to the paucity of MCGN as a cause of childhood glomerular disease in international studies. (8, 10, 12) Lupus nephritis was the most common secondary glomerular disease found in 14 (14%) patients. These results are in agreement with the study done In Saudi Arabia, 2005 (12)

Conclusion:

The results of this study were comparable but not identical to other studies, with Focal segmental glomerulonephritis being the most common primary glomerular diseases and systemic lupus erythromatosis being the most common secondary glomerular diseases in children. Further study on a much larger scale with the utilization of immunoflourescent and electron microscopy with full serology and infectious screening is needed to provide deeper understanding of these different diseases.

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