THE SPECTRUM OF RENAL BIOPSY FINDINGS IN PATIENTS WITH DIABETES MELLITUS

Gnanapriya Vellaisamy[1], Dheepa Senthilkumar[1], Renuka Malipatel[1], Anuradha Ananthamurthy[1], Prashanth G Kedlaya[2]

[1]Department of Pathology, [2]Department of Nephrology, St. Johns Medical College and Hospital, Bangalore, Karnataka, India

Introduction

- Diabetic nephropathy (DN) is one of the most common cause of End Stage Renal Disease (ESRD)
- Renal disease is more complex and diverse in Type II diabetics; Undergo renal biopsies if there is an atypical course
- Prevalence of Non-Diabetic renal disease (NDRD) ranges from 27-79% in Type II diabetic patients(1)
- Diagnosing NDRD is important as it leads to a specific change in therapy. However, the utility of pathological diagnosis in predicting the prognosis of Type II diabetics is still questionable

Aim

- To assess the frequency of Diabetic nephropathy (DN), Diabetic Nephropathy with superimposed Non-Diabetic Renal Disease (NDRD) and Non-Diabetic Renal Disease among patients who underwent renal biopsy
- To correlate the various clinical parameters and laboratory data with the subgroups and classes of DN

Methods

- This is a combined retrospective and prospective study for a period of 5 years
- The biopsies were divided into three subgroups: DN, DN with superimposed NDRD and NDRD
- DN was classified into four classes according to Tervaret classification
- Relevant statistical analysis was used. P value less than 0.05 is considered as statistically significant

Table 1. Frequency of DN with superimposed NDRD & NDRD alone

DN with superimposed NDRD	Frequency (n)	Percentage (%)
Membranous nephropathy	2	6.45%
Immune complex mediated Membranoproliferative glomerulonephritis	1	3.22%
Infection related glomerulonephritis	4	12.9%
IgA dominant post infectious glomerulonephritis	2	6.45%
IgA nephropathy	5	16.12%
FSGS	3	9.67%
Collapsing glomerulopathy	2	6.45%
Acute pyelonephritis	1	3.22%
Tubulointerstitial nephritis	11	35.48%
NDRD alone	**Frequency (n)**	**Percentage (%)**
Membranous nephropathy	4	16.7%
Immune complex mediated Membranoproliferative glomerulonephritis	3	12.5%
Infection related glomerulonephritis	3	12.5%
IgA nephropathy	6	25%
FSGS	4	16.7%
C3 glomerulopathy with granulomatous TIN	1	4.2%
Immune complex mediated glomerulonephritis with crescents	1	4.2%
Thrombotic microangiopathy (TMA)	1	4.2%
Class III Lupus nephritis	1	4.2%

Table 2. Correlation between the patients of DN, DN with superimposed NDRD and NDRD with various clinical and laboratory parameters

Parameters		DN alone (n= 53)	DN with superimposed NDRD (n=32)	NDRD alone (n=24)	Overall (n=109)	p value
Age (years)		56.06±8.7	52.8 ±11.98	53.2 ±11.4	54.5±10.3	0.387
Sex	Males	45(84.9%)	25(78.1%)	15(63%)	85 (78%)	0.089
	Females	8(15.1%)	7(21.9%)	9(37.5%)	24 (22%)	
Duration (years)		8.8 ±4.6	8.9±7.35	6.8±4.9	8.40±5.64	0.007
HbA1C(%)		8.2±2	6.94±1.58	7±1.44	7.56 ±1.89	0.057
Hypertension		37(69.8%)	26(81.3%)	19(79.2%)	82(75.2%)	0.437
DR		15(28.3%)	6(18.8%)	4(16.7%)	25(22.9%)	0.711
eGFR (mL/min/1.73m^2)		37.7±30.3	28.6±25.8	58.6±40.2	39.6±30.1	0.002
24 hour urine protein (mg)		3939.04 ± 1325.5	4047.3± 1491.8	2909.4± 1988.5	3744.13 ± 1589.85	0.012
Serum creatinine (mg/dL)		3.71±3.49	4.38±3.48	2.27±2.48	3.59±3.35	0.06
Serum albumin (g/dL)		2.77±1.28	2.69±1.21	3.07±1.02	2.81±1.21	0.466
UPCR		7.85±6.95	8.2±5.89	5.99±6.17	7.55±6.48	0.404
FBS (mg/dL)		148.4±51.8	118.9±34.4	122.2±35.4	133.9±45.8	0.005
Hematuria		18(33.96%)	13(40.63%)	8(33.33%)	39(35.8%)	0.926
Pyuria		12(22.64%)	10(31.25%)	10(41.7%)	32(29.4%)	0.087
Proteinuria: <3500mg/24 hour		17(32.1%)	8(25%)	13(54.2%)	38(34.9%)	0.126
Proteinuria: >3500mg/24 hour		36 (67.9%)	24 (75%)	11 (45.8%)	71(65.1%)	

Table 3. Correlation of the Classes of DN with various clinical and laboratory parameters

Parameters		Class IIA(n=9)	Class IIb (n=3)	Class III (n=25)	Class IV (n=16)	p value
Age(years)		59.67 ± 7.7	49 ± 9.8	56.96 ± 9.1	53.94 ± 7.7	0.1
Sex	Males	9(100%)	3(100%)	19(76%)	14(88%)	0.288
	Females	0	0	6(24%)	2(12.5%)	
Duration (years)		8.22 ± 4.4	2 ± 1.7	9.52 ± 5.3	9.38 ± 3.1	0.057
HbA1C(%)		8.49 ± 1.3	9.2 ± 2.01	8.02 ± 1.92	8.09 ± 2.63	0.78
DR		2(22.2%)	1(33.3%)	9(36%)	3(18.6%)	0.323
Hypertension		6(66.7%)	1(33.3%)	17(68%)	13(81.3%)	0.396
eGFR (mL/min/1.73m^2)		35.3±27.7	83.5± 47.2	46.5±27.3	16.7± 16.1	<0.001
24 hour urine protein (mg/24 hours)		4111± 1441.41	3606.53 ± 856.9	3595.62 ± 1467.51	4440.07 ± 966.66	0.23
Proteinuria		7(77.8%)	2(66.7%)	14(56%)	13(81.3%)	0.23
Serum creatinine (mg/dL)		3.2 ± 2.46	1.34 ± 0.92	2.29 ± 2.01	6.65 ± 4.31	<0.001
Serum albumin (g/dL)		2.52 ± 1.63	4.03 ± 0.58	2.61 ± 1.25	2.91 ± 1.14	0.28
UPCR		6.67 ± 4.45	7.72 ± 5.67	5.94 ± 3.65	11.6 ± 10.5	0.0078
FBS (mg/dL)		146.8±76.7	161.7±38.1	148.8±36.4	146.2±61.9	0.97
Serum cholesterol (mg/dL))		169.3±61.9	234±92.6	196.6±76.7	208.4±53.5	0.439
Hematuria		2(22.22%)	1(33.33%)	10(40%)	5(31.25%)	0.635
Pyuria		0	1(33.33%)	6(24%)	5(31.25%)	0.1

Results

- In this study of 109 Type 2 Diabetic patients, 48.6% had DN alone, 29.4% had DN with NDRD and 22% had NDRD alone
- 52.8% had Diabetes for > 10 years in DN group whereas the duration was < 4 years in NDRD group in 41.7% individuals
- The most common indication for renal biopsy was nephrotic syndrome(35.8%)
- Class III DN(47.2%) was the most common class
- The most common DN with superimposed NDRD and NDRD were tubulointerstitial nephritis(34.4%) and IgA nephropathy(25%) (Table 1)
- Long duration of Diabetes, low eGFR and increased 24-hour urine protein were found to be significant in the DN with superimposed NDRD group (Table 2)
- Low eGFR, increased UPCR and raised serum creatinine were significantly higher in class IV DN as compared to the other class (Table 3)
- IFTA score was significant in DN group as compared to others (p value 0.02) whereas hyalinosis was more commonly seen in mixed group (p value 0.002)
- Higher score of IFTA and globally sclerosed glomeruli were more commonly seen in class IV DN (<0.001 and <0.001)
- 30 patients out of 72(27.5%) were dialysis dependent during follow up
- The mean duration of follow up was 18.8±18.8 months
- The renal outcome between the subgroups and classes of DN were not statistically significant with p value of 0.586 and 0.135 respectively

Discussion & Conclusion

- This was a comprehensive study of renal biopsies in diabetic patients
- Similar to other studies, IgA nephropathy and Tubulointerstitial nephritis were the most common renal disease in NDRD and mixed group respectively(2,3)
- DN with NDRD had a longer duration of diabetes, low eGFR and heavy degree of proteinuria
- Frequently, more than one disease process is discovered in a diabetic renal biopsy. Hence, biopsy is an invaluable tool in detecting non-diabetic renal changes, helps in guiding management decision and assessing the prognosis

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