New Onset Diabetes Mellitus in Glomerular Diseases Treated with Immunosuppressants

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Introduction and Objectives

Glomerulonephritis (GN) is a common cause of chronic kidney disease (CKD) and end stage renal disease (ESRD), and its treatment may include diabetogenic immunosuppressants (IS) such as glucocorticoids. Moreover, glucose homeostasis is altered in CKD via increased insulin resistance and blunted insulin secretion, further predisposing CKD patients to immunosuppressant-induced diabetes mellitus (DM).[1] Few studies have assessed the incidence of DM in GN. We aimed to study the epidemiology and risk factors for DM requiring anti-diabetic medications in patients treated with IS for GN.

Methods

This was a single-centre retrospective cohort study of adults with biopsy-proven GN diagnosed between 1st January 2011 and 31st July 2015 and treated with immunosuppressants.

Patients <21 years old and those with pre-existing DM and previous kidney transplant were excluded.

The outcome of interest was new onset DM, defined as the need for oral hypoglycemic agents (OHGA) or insulin after IS treatment. Factors investigated include patient demographics, baseline comorbidities and metabolic profile, as well as post-biopsy medications. Data was retrieved from electronic medical records.

Results

Among 327 patients with GN treated with IS, majority were female (64.8%), with ethnicity make-up of 249 Chinese (76%), 49 Malay (15%) and 10 Indian (3.1%) patients. The most common GN diagnoses were lupus nephritis (34.3%), minimal change disease or focal segmental glomerulosclerosis (23.9%), IgA nephropathy (12.8%), and membranous nephropathy (10.7%). The median (IQR) pre-biopsy fasting glucose was 5.2 (4.8, 5.9) mmol/L. Table 1 shows the demographic, comorbidity and treatment data for these patients.

The median follow up duration was 31.4 (14.4, 52.5) months. Twenty-four (7%) patients had new-onset DM at 2.6 (1.6, 12.0) months from the start of IS therapy: 21 required only OHGA, 2 required both OHGA and insulin, and 1 received only insulin. The median duration from the start of IS to OHGA was 2.6 (1.6, 11.9) months while the median duration from the start of IS to insulin therapy was 12.7 (8.1, 13.9) months.

Table 1: Factors associated with new onset DM after IS treatment

	All (n=327)	Did not require anti-diabetic treatment (n=303)	Required anti-diabetic treatment (n=24)	p-value*
Demographics				
Male, n (%)	115 (35)	103 (34)	12 (50)	0.11
Chinese, n (%)	249 (76)	230 (76)	19 (79)	0.72
Age at diagnosis, years	45 (33, 58)[a]	45 (33, 56)	60 (43, 67)	**0.002**
Pre-biopsy comorbidities and metabolic profile				
Hypertension, n (%)	119 (36)	110 (36)	9 (38)	0.90
Hyperlipidemia, n (%)	66 (20)	59 (20)	7 (29)	0.28
IHD, n (%)	6 (1.8)	5 (1.7)	1 (4.2)	0.37
eGFR, ml/min/1.73m^2	65 (32, 103)	70 (33, 104)	48 (26, 71)	**0.04**
UPCR, g/g	4.14 (2.04, 8.63)	4.14 (2.03, 8.51)	5.09 (2.06, 10.14)	0.50
Impaired fasting glycemia, n (%)	18 (5)	13 (6)	5 (24)	**0.01**
Post-biopsy medications				
Prednisolone, n (%)	317 (97)	293 (97)	24 (100)	1.00
Prednisolone dose, mg/day	45 (30, 60)	45 (30, 60)	55 (40, 60)	**0.03**
CNI, n (%)	61 (19)	53 (17)	9 (38)	**0.03**
MMF, n (%)	155 (47)	144 (48)	11 (46)	0.86
Azathioprine, n (%)	79 (24)	71 (23)	8 (33)	0.27
Cyclophosphamide, n (%)	71 (28)	61 (20)	10 (42)	**0.01**

**univariate analysis*
[a]Continuous variables are presented as median (IQR)
IHD = ischemic heart disease, eGFR = estimated glomerular filtration rate calculated by CKD EPI equation, UPCR = urine protein-creatinine ratio, CNI = calcineurin inhibitor, MMF = mycophenolate mofetil or mycophenolate sodium

Multivariate analysis found that pre-biopsy fasting glucose [adjusted OR 2.16 (95% CI: 1.37, 3.42), p=0.001], prednisolone dose [1.05 (1.01, 1.08), p=0.006], calcineurin inhibitors [7.31 (1.84, 29.07), p=0.005] and cyclophosphamide [5.24 (1.50, 18.23), p=0.009] were independently associated with DM.

Conclusion

Patients treated with IS for GN, especially those with impaired fasting glucose and receiving calcineurin inhibitors, cyclophosphamide or higher prednisolone dose, should be monitored closely for new-onset DM.

References

1. Adrogué, Horacio J. 1992. “Glucose Homeostasis and the Kidney.” *Kidney International* 42 (5): 1266–82.

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