MAYO CLINIC

Influence of Referral to a Combined Diabetology and Nephrology Clinic on Renal Functional Trends and Metabolic Parameters in Adults With Diabetic Kidney Disease

William P. Martin, MB BCh, MSc; Tomás P. Griffin, MB BCh, MSc; David W. Lappin, MB BCh, PhD; Damian G. Griffin, MB BCh, DM; John P. Ferguson, PhD; Timothy O'Brien, MD, PhD; and Matthew D. Griffin, MB BCh, DMed

Abstract

Objective: To examine the impact of a diabetes renal clinic (DRC) on renal functional and metabolic indices in adults who have diabetes mellitus (DM) and chronic kidney disease (CKD).

Patients and Methods: All patients evaluated at a DRC in a single tertiary referral center from January 1, 2008, to December 31, 2012, were identified. Serial renal and metabolic indices from January 1, 2004, to December 31, 2014, were recorded, and trends over time were analyzed by linear mixed-effects models.

Results: A total of 200 patients who had DM and CKD were identified and subdivided into 3 categories based on presumptive CKD etiology: 43 (21.5%) with type 1 DM (T1D) only, 127 (63.5%) with type 2 DM (T2D) only, and 30 (15.0%) with DM and an additional CKD etiology. Average annual absolute (mL/min per body surface area per year) and percentage (%/year) changes, respectively, in Chronic Kidney Disease Epidemiology Collaboration estimated glomerular filtration rate before vs after first DRC attendance were: −1.59 vs −3.10 (P=.31) and −1.22 vs −9.39 (P=.06) for T1D; −5.64 vs −3.07 (P=.004) and −10.88 vs −9.94 (P=.70) for T2D; and −6.50 vs +0.91 (P<.001) and −13.28 vs −2.29 (P=.001) for DM with an additional CKD etiology. Glycemic control worsened in those who had T2D, whereas trends in total cholesterol levels improved in those who had T1D.

Conclusion: After first DRC attendance, the absolute rate of estimated glomerular filtration rate decline remained similar for those who had T1D, but it slowed for those who had T2D or DM with additional CKD etiology. Thus, benefits of combined diabetology and nephrology consultation may vary for different diabetic subpopulations.

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From the Regenerative Medicine Institute (REMEDI) at CÚRAM Centre for Research in Medical Devices, School of Medicine, College of Medicine, Nursing and Health Sciences (W.P.M., T.P.G., T.O.B., M.D.G.), HRB Clinical Research Facility (J.P.F.), National University of Ireland; and Centre for Diabetes, Endocrinology and Metabolism (W.P.M., T.P.G., T.O.), Nephrology Services (W.P.M.,

Affiliations continued at the end of this article.

Diabetes mellitus (DM) is considered one of the primary challenges to health care delivery in the 21st century.[1] The International Diabetes Federation has estimated a global prevalence of 415 million cases of DM in 2015, with a projected rise to 592 million by 2035.[2] The increase in DM has been an important contributor to the increasing prevalence of chronic kidney disease (CKD).[3] A total of 43.9% of people who have end-stage renal disease in the United States have DM.[4]

Targeted control of blood pressure and glycemia can delay the onset of diabetic kidney disease (DKD) and slow its progression.[5] Diabetes renal clinics (DRCs), in which diabetology and nephrology care are delivered simultaneously to patients who have DM and CKD, hold promise in bridging the implementation gap between guidelines and clinical practice. Longitudinal studies examining the role of DRCs have revealed a reduction in the rate of renal functional decline, but the studies have been limited to subgroups of

patients who have rapidly progressing DKD and who attended DRCs serially.[6-10]

The primary aim of the current study was to determine the impact of DRC evaluation, at a single tertiary referral center in Western Europe, on renal functional and metabolic indices before and after attendance. The DRC cohort studied was stratified into 3 subgroups according to presumptive CKD etiology: type 1 DM (T1D) alone, type 2 DM (T2D) alone, and DM with an additional etiology for CKD.

PATIENTS AND METHODS

Study Design and Setting

All adults attending the DRC at Galway University Hospital in Ireland between January 1, 2008, and December 31, 2012, were identified from clinic lists, and the dates of first attendance were recorded. Clinical and laboratory information from January 1, 2004, to December 31, 2014, was extracted from paper and electronic medical records. The study was approved by the Galway University Hospital's Clinical Research Ethics Committee.

Diabetes Renal Clinic. The DRC at Galway University Hospital was established in 2004. Patients are jointly evaluated by a team consisting of either a consultant endocrinologist and specialist registrar in nephrology or a consultant nephrologist and specialist registrar in endocrinology. Individualized plans are agreed on for target-based control of blood pressure, glycemia, lipids, and albuminuria. Referral criteria include T1D or T2D under active management along with one or more of the following:

- Current estimated glomerular filtration rate (eGFR) between 60 and 30 mL/min per body surface area (BSA) and a trend of declining eGFR;
- A trend of increasing albuminuria;
- Clinical features not typical of DKD, for which kidney biopsy might be considered; and
- Difficult-to-control hypertension in the setting of CKD.

On the basis of the outcome of the initial evaluation, those determined to have stable CKD are referred to the general diabetes clinic for continued follow-up; those with progressive CKD stage 3 (30-59ml/min per BSA) are retained for ongoing DRC follow-up; and those with CKD stages 4 (15-29ml/min per BSA) and 5 (15ml/min per BSA) are referred to a CKD clinic run by the nephrology department, with separate DM follow-up in the general diabetes clinic.

Participants

A total of 208 patients who attended the DRC on at least one occasion between January 1, 2008, and December 31, 2012, were identified. Of these, 3 were excluded from the analysis on the basis of inappropriate referral, 2 were excluded because they were already receiving renal replacement therapy at the time of first DRC attendance, 2 were excluded because of pregnancy during follow-up, and 1 was excluded because of underlying Wolfram syndrome. The final study cohort consisted of 200 participants who were subdivided into 3 groups based on presumptive CKD etiology: T1D alone, T2D alone, and DM with an additional CKD etiology. The additional CKD etiologies consisted of atherosclerotic renovascular disease, hypertensive nephropathy, interstitial renal disease, obstructive nephropathy, glomerulonephritis, and autosomal dominant polycystic kidney disease. Criteria used to define the presence of specific additional CKD etiologies are presented in Table 1. Patients who did not meet these criteria were deemed to have CKD attributable to T1D or T2D alone.

Data Collection

Clinical Information. Clinical information was extracted for each participant from an electronic health record for patients with DM (DIAMOND, Hicom, Woking, United Kingdom),[11] as well as from hospital discharge and outpatient records entered into medical charts. Clinical indices were assigned to a specific date. If the exact date of commencement/onset was not available (eg, prescription of certain medication classes, presence of macrovascular or nonrenal microvascular complications of DM), the indices were recorded as being either present or absent before the end of longitudinal follow-up in 2014. Results of the first renal ultrasonography, renal arterial imaging, and histopathological diagnoses obtained from kidney biopsy were recorded when present.