

Original article

The prevalence, characteristics and metabolic consequences of renal insufficiency in very old hospitalized diabetic patients

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Abstract

Aims. – We aimed to characterize the determinants and characteristics of renal disease in very old diabetic patients in geriatric care.

Methods. – Consecutive diabetic patients (96 women, 38 men) admitted to a geriatric service were studied. Glomerular filtration rate (GFR), albuminuria, vascular and general comorbidities, glycaemic control, malnutrition (using the Mini-Nutritional Assessment [MNA], serum albumin and cholesterol levels), haemoglobin and inflammation (CRP levels) were assessed.

Results. – (a) 51.2 and 12.4% patients had moderate or severe renal insufficiency. The prevalence of normo-, micro- and macroalbuminuria was 45.0, 38.9 and 16.0% in the whole population, and was similar in patients with or without moderate renal insufficiency. Renal insufficiency was associated with previous stroke ($P=0.024$), heart failure ($P=0.024$), and atrial fibrillation ($P=0.008$), and possibly myocardial infarction ($P=0.059$, Mann-Whitney test). (b) Albuminaemia was associated with albuminuria, MNA scores, haemoglobin, total and HDL-cholesterol and CRP. However, in multiple linear regression analysis CRP was the only robust determinant of albuminaemia ($P<0.0001$). (c) Renal insufficiency was not associated with the MNA, serum albumin, haemoglobin and cholesterol levels.

Conclusion. – Renal insufficiency often occurs without albuminuria, suggesting aetiologies distinct from classical diabetic nephropathy, and is strongly associated with vascular comorbidities. Hypoalbuminaemia is more strongly associated with inflammation than with albuminuria and malnutrition. Malnutrition, hypoalbuminaemia, low cholesterol levels and anaemia are not associated with renal insufficiency, likely due to the very high prevalence of these abnormalities in the whole population. These features must be taken into account when organizing the global care of elderly diabetic patients.

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Keywords: Renal insufficiency; Nephropathy; Albuminuria; Diabetes; Elderly

Résumé

Caractéristiques et conséquences métaboliques des atteintes rénales des diabétiques âgés en milieu hospitalier.

Objectifs. – Déterminer les déterminants et les caractéristiques des atteintes rénales chez le sujet diabétique âgé en milieu gériatrique.

Méthodes. – Nous avons étudié 134 patients diabétiques âgés (96 femmes, 38 hommes) consécutivement admis dans un service de gériatrie. Nous avons déterminé le taux de filtration glomérulaire, l'albuminurie, les co-morbidités vasculaires et générales, le contrôle glycémique, l'état nutritionnel (Mini Nutritional Assessment [MNA], albuminémie et cholestérolémie), l'hémoglobine et l'état inflammatoire (protéine C-réactive [CRP]).

Résultats. – (a) 51,2 et 12,4 % des patients avaient une insuffisance rénale modérée ou sévère. La prévalence de normo-, micro- et macroalbuminurie était 45,0, 38,9 et 16,0 %, similaire entre patients avec ou sans insuffisance rénale modérée. L'insuffisance rénale était associée aux co-morbidités vasculaires (infarctus du myocarde ($P=0,059$), accident vasculaire cérébral ($P=0,024$), insuffisance cardiaque ($P=0,24$) et fibrillation auriculaire ($P=0,008$, test de Mann Whitney); (b) L'albuminémie était corrélée à l'albuminurie, au MNA, au cholestérol total et HDL et à la CRP. En analyse multivariée, la CRP était le principal déterminant de l'albuminémie ($P<0,0001$); (c) l'insuffisance rénale n'était pas associée au MNA, à l'albuminémie, à l'hémoglobine et au cholestérol total et HDL.

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Conclusions. – L'insuffisance rénale est souvent trouvée sans microalbuminurie, ce qui suggère des étiologies distinctes de la néphropathie diabétique classique, et fortement associée aux co-morbidités cardiovasculaires. L'hypoalbuminémie est plus souvent due à l'inflammation qu'à l'albuminurie ou la malnutrition. La malnutrition, l'hypoalbuminémie, l'hypocholestérolémie et l'anémie ne sont pas associées à l'insuffisance rénale, en raison de la haute prévalence de ces anomalies dans l'ensemble de cette population. Ces particularités doivent être prises en compte dans la prise en charge globale du sujet diabétique âgé.

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Mots clés : Insuffisance rénale ; Néphropathie ; Albuminurie ; Diabète ; Sujets âgés

1. Introduction

Clinical diabetes care in the elderly is compounded by co-existing pathologies. Given their high cardio-vascular (CV) risk, a high prevalence of vascular complications must be expected. Furthermore, diabetes in very old patients is associated with a high prevalence of common geriatric syndromes, including functional and cognitive impairments and malnutrition [1]. Optimal care of very old diabetic patients should integrate screening and treatment of both diabetic complications and common geriatric syndromes. This integrated approach implies that the management of renal disease and other conventional diabetic complications must be adapted to age and comorbidities.

Diabetic nephropathy is the leading cause of end-stage renal disease in industrialized countries. It is characterized by albuminuria leading to hypoalbuminaemia and/or chronic renal failure [2]. Microalbuminuria is considered as an early stage of diabetic nephropathy in type 1 diabetes, and as a risk factor for both renal insufficiency and CV disease in type 2 diabetes [3–5]. However, in elderly diabetic patients, the prevalence of renal disease from causes other than diabetic nephropathy may become substantial [6]. Chronic renal insufficiency is highly prevalent in several populations of community-dwelling elderly subjects [7,8], and occurs without albuminuria in approximately 50% in both diabetic and non-diabetic patients [8]. The prevalence of renal disease and the relative contribution of diabetic nephropathy in very old subjects have not been reported.

Chronic renal insufficiency is associated with metabolic abnormalities such as hypoalbuminaemia, anaemia, low total and HDL cholesterol levels and decreased muscle mass. Such abnormalities may occur and progressively worsen when the creatinine clearance decreases below 50–60 ml/min/1.73 m² [9–11]. It is unclear whether these abnormalities can be attributed to renal insufficiency *per se* in an elderly population where malnutrition, inflammation or associated chronic diseases are highly prevalent.

In the present study, we investigated the prevalence and clinical features of renal insufficiency in very old diabetic patients admitted to a geriatric service. We also studied the associations of renal insufficiency with comorbidities and malnutrition.

2. Patients and methods

2.1. Study setting and patient selection

The Geneva geriatric hospital (Hôpital des Trois Chêne) admits patients >65 years old for acute disorders,

comprehensive geriatric evaluations or rehabilitation. All diabetic patients admitted to the recruiting units (160 beds) underwent a systematic evaluation of their nutritional and cognitive status, their comorbidities and their renal function status. Admitting physicians were asked to perform a Mini Mental State Examination [12] and the short form Mini Nutritional Assessment (MNA; see <http://www.mna-elderly.com/> and [13]), and to order biological tests, including serum creatinine and urinary albumin and creatinine. Patients were then seen within one week at a specialized diabetes consultation where data were collected and completed, and diabetes treatments were reviewed and discussed with the patients. The structure of this consultation and its findings regarding glycaemic control have been reported [14]. For the present analysis, patients with recent onset diabetes (<3 months), steroid-induced or postpancreatectomy diabetes, admitted for end-of-life care, undergoing haemodialysis, or presenting with an indwelling bladder catheter were excluded. Patients in whom urinary albumin measurements had not been performed further excluded.

2.2. Clinical parameters

The following data were collected from patients, relatives, referring physicians, visiting nurses or previous medical charts:

- sociodemographic data (age, sex, education level, marital status, place of living at the time of admission);
- drug prescriptions on admission (corresponding to their most recent outpatient treatments);
- hypertension and vascular comorbidities (stroke, heart failure, myocardial infarction, atrial fibrillation).

Arterial hypertension was defined by a previous physician diagnosis or by current treatment (in patients with heart failure, hypertension was defined only by a previous diagnosis). Stroke was defined as an acute or previous event with motor sequelae. Previous myocardial infarction and coronary artery bypass surgery were considered as a single category. Heart failure was defined by a previous diagnosis with ongoing therapy or a diagnosis made by the admitting physicians. The presence of atrial fibrillation was determined on the EKG at admission.

Comorbidities were assessed with the cumulative Illness Rating scale (CIRS), obtained from the medical charts after discharge. This scale has previously been validated in our hospital, and shown to predict length of stay,

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