

Hypertension and Cardiovascular Risk in Chronic Kidney Disease

La hipertensión arterial y el riesgo cardiovascular en la enfermedad renal crónica

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Over 80% of patients with chronic kidney disease suffer from hypertension. (1) Although this complication is observed in kidney disease patients who still have normal renal function, undoubtedly its prevalence increases significantly as glomerular filtration rate decreases (2). It is not surprising that among the mechanisms postulated for this hypertensive condition, sodium retention by the diseased kidney is the most frequent and important one. This saline expansion leads to a state of generalized vasoconstriction, and the consequent rise in blood pressure is then derived from increased peripheral vascular resistance. The overall mechanism was explained and called by Guyton pressure diuresis. (3) This process aimed at normalizing both extracellular and circulatory volume, involves the sympathetic nervous system (4) the renin-angiotensin system (5) and also the sclerosing stimuli generated by hypertension and several other diseases, such as diabetes, polycystic disease and a great diversity of glomerular diseases. (6) It is important to note that hypertension may induce kidney disease, and vice versa kidney disease may cause hypertension, thus generating a vicious circle where hypertension causes renal injury, and this in turn acts exacerbating hypertension.

Other mechanisms involved include endothelial alterations with deficient nitric oxide synthesis (7) and/or excessive superoxide release. In this regard, the dominant oxidative stress increases the activation of growth factors and fibrosis mediators such as TGF- β and PAI-1. On the other hand, there are other potential reasons for blood pressure elevation. For example, kidney disease patients often show increased central blood pressure (8) and absence of normal nocturnal blood pressure decline (non-dippers) (9). The best explanation for these manifestations is the presence of generalized vascular disease, mainly in the large vessels. If this hypothesis were confirmed, it could clarify the high cardiovascular morbidity and mortality in patients with chronic kidney disease. This is precisely the conclusion pointed out by the interesting study reported in this issue of the Journal by Sarcona and

Diaz. (10) Effectively, the authors, using ambulatory blood pressure monitoring (ABPM), evaluated pulse pressure, the incidence of the “non-dipper” pattern and blood pressure variability in patients with chronic kidney disease. The study is particularly interesting not only because its findings could be strongly related with the high cardiovascular risk present in chronic kidney patients, but also because it might explore the potential mechanisms of hypertension and of kidney disease progression. Indeed, high pulse pressure, as well as the non-dipper pattern and blood pressure variability correlate with greater cardiovascular risk and are also potential markers of vascular stiffness. (11-13). The importance of these concepts stems from the high increase in cardiovascular risk in patients with chronic kidney disease, the restrictions in protection with the current strategies employed and the need to better define the specific risks of this population.

Sarcona and Díaz clearly show an increased pulse pressure, thus adding an important piece to our pathophysiological interpretations of the mechanisms that make chronic kidney disease a dreaded cardiovascular risk factor.

Unfortunately, the authors fail to show significant differences between groups in the other two parameters studied: non-dipper pattern and blood pressure variability. However, and despite the differences in glomerular filtration rate between both groups are small, the inherent variability of the MDRD study abridged formula as glomerular filtration rate estimation might indicate the need to study a greater number of patients. These acknowledged difficulties in the estimation of glomerular filtration rate are the result of the complex pathophysiology of chronic kidney disease, and also of serum creatinine variability according to muscle mass, hydration status, physical activity close to sample collection, antihypertensive drugs used, etc. It is possible that the overall authors' hypothesis can be demonstrated by increasing the number of patients with chronic kidney disease. This possibility is taken into account in the text by the authors. If we accept that elevated pulse pressure is

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an indicator of “central” vascular disease, it is highly probable that there is also great variability, as was undoubtedly considered by the authors. In other words, if there is aortic stiffness, it is very likely that baroreceptor activity is also altered producing exaggerated hemodynamic responses in the presence of moderate or even mild humoral or hemodynamic changes. This might be a purely mechanical effect of aortic wall stiffness, but it could also be the result of an inhibitory effect upon the baroreceptors induced by the “inflammation” that accompanies the atherosclerotic process.

The authors’ hypothesis will certainly generate new research to identify the predictive role of pulse pressure, the non-dipper pattern and blood pressure variability in patients with chronic kidney disease. Indeed, the evaluation of these patients with indisputable and high cardiovascular risk would greatly benefit with the confirmation of these parameters as risk markers.

Conflicts of interest

None declared

(See author’s conflicts of interest forms in the web / Supplementary Material).

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