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# *Control del volumen extracelular y de la presión arterial en hemodiálisis de larga duración*

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Extra-cellular volume (ECV) represents 24% of body weight in adults The determinant compound of ECV is sodium. It is subject to wide and instantaneous variations, essentially due to changes in salt ingestion. The kidney is the key organ of sodium and ECV regulation. The decline in renal function affects the sodium (or ECV) balance. It is often challenged by an excessive salt intake, so that a defect of kidney function leads to a positive sodium (or ECV) balance and high blood pressure. Guyton has experimentally described the mechanisms of HTN in renal failure: ECV expansion, rise of cardiac output (CO), increased organ perfusion, increase of peripheral resistance (TPR) by protective pre-arteriolar vasoconstriction, with sustained hypertension (HTN)[1]. Hence almost all patients with renal failure are hypertensive when starting dialysis.

Soon after dialysis treatment was developed, it became clear that high blood pressure was a serious problem. According to Scribner, adequate control of the extra-cellular volume was the key to treat HTN in dialysis patients[2]. In the first 10 years of dialysis, the consensus was that the control of HTN was achieved in a large majority of patients by UF and a low salt diet[3,4] and the normalization of ECV by dialysis treatment was defined by Thomson et al. as the «dry weight»[5]. In our experience, dry weight is the post dialysis body weight that allows the pre-dialysis BP to remain normal, without the need for antihypertensive drugs, despite the interdialytic weight gain. At her/his dry weight, the patient has no clinical signs of fluid overload or dehydration[6]. This definition points to BP as the key indicator of ECV. Normal blood pressure is the goal but also the best indicator of its single most determinant factor, the ECV.

In the early 90's, Cheigh et al[7] in the United States reported that HTN was not controlled in dialysis patients. It was confirmed by subsequent studies. At the same time, we have reported in a cross sectional ambulatory BP monitoring study[11] or prospective data[12] the adequate BP control in patients treated with long hour HD treatment, despite the worsening comorbidity of ESRD patients. In this last study[12], it is shown that 6 months in average are necessary to stabilize blood pressure at a normal level in a cohort of 61 patients beginning dialysis treatment, whereas antihypertensive drugs are tapered and stopped. It can be speculated, but it remains to be confirmed, that this delay is necessary to correct the cardiovascular remodelling induced by chronic ECV overload during the predialysis period. This hypothesis would also explain that acute ECV overload induced by interdialytic weight gain is not associated with HTN in these patients after 6 months of HD treatment.

In our opinion, one of the reasons of the HTN current burden in HD patients relies on the neglect of ECV overload as the primary mechanism of HTN in dialysis patients. Forgetting of the dry weight quest and low salt diet recommendation seem usual, whereas the easy temptation of prescribing antihypertensive medication whose effectiveness may be doubtful in this setting is frequent. The other reason is the reduction of dialysis time inducing high UF rate and inadequate vascular refilling, leading to cramps and hypotension episodes jeopardizing the target dry weight achievement. Charra has described this phenomenon as the «vicious circle of short dialysis»[13]. Oskahya et al[14] have confirmed that low salt diet, tapering of antihypertensive drugs, and aggressive UF policy may normalize blood pressure in patients treated with short dialysis session. This experience strengthens the idea that the will of the nephrologist is essential in obtaining the normalization of ECV and blood pressure. Reducing UF rate and intradialytic events, long hour dialysis is an easier way to achieve the normalization of ECV.

In conclusion, long hour HD treatment reduces greatly the side effects of ECV correction and allows for an easy normalization of BP in this setting. The experience of other centers treating patients with sequential long hour dialysis[15] confirms that it is a «method effect» rather than a «center effect».

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