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Plasma sodium levels predict exercise capacity in postoperative adults with congenital heart disease.

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Objectives: Hyponatremia is closely associated with an adverse outcome in adults with congenital heart disease (ACHD) and may be a reflection of the activated neurohormones.
However, its association with exercise capacity remains unclear in those patients.
Methods: We prospectively studied 292 consecutive clinically stable postoperative ACHD patients, including 181 patients with biventricular and 112 with Fontan circulation (18 to 62, median 25 years) between December 2005 and October 2013. We measured plasma sodium (Na) levels and compared those with neurohormonal factors (plasma levels of brain natriuretic peptide, norepinephrine, and plasma renin activity; BNP, NE, and PRA, respectively), hemodynamics (central venous pressure; CVP, cardiac index; CI and systemic ventricular ejection fraction; SVEF) and the diuretic dose (furosemide dose/kg/day). We also measured peak oxygen uptake (pVO2, ml/kg/min) during cardiopulmonary exercise testing and expressed as %predicted value: %).
Rsults: Hyponatreimia (≤ 137 mEq/L) was observed in 59 patients (20.2% of the total patients) and was associated with high levels of BNP, NE, PRA, impaired hemodynamics (low SVEF and high CVP), and high dose of diuretic use ($P < 0.05$). The Na levels were positively correlated with %pVO2 ($r = 0.32$, $p < 0.0001$).
Conclusions: Hyponatremia is relatively common in ACHD and predicts the low exercise capacity. Thus, hyponatremia is a simple and useful marker of evaluating heart failure severity in ACHD that reflects the neurohumoral activation, impaired hemodynamics and lower exercise capacity.