A BRASH Decision

Mitchel Capella, MD; Sepehr Sadeghi, MD; Alissa Jeanfreau, MD

Introduction:

BRASH syndrome is an acronym for Bradycardia, Renal failure, AV nodal blockade, Shock, and Hyperkalemia. It is a rarely reported syndrome, more commonly affecting the elderly and those with chronic conditions such as hypertension (HTN), diabetes, heart disease, and chronic kidney disease. It carries a reported in-hospital mortality of 5.7%. Those on potassium sparing medications may be at higher risk. Patients can have substantial hemodynamic instability but may not have remarkable labs, such as severe hyperkalemia or kidney injury, making diagnosis and recognition challenging.

Case:

A 93-year-old female with a history of paroxysmal atrial fibrillation, coronary artery disease, HTN, and hyperlipidemia was brought into the hospital after she was found to be weak, confused, and lightheaded. Of note, her home medications include metoprolol succinate and losartan. On arrival to the hospital, she was noted to be severely bradycardic with her heart rate as low as 35 beats per minute (bpm), hypotensive with blood pressure (BP) of 78/54 mmHg, and mildly hypothermic with temperature between 35.4°C-36.1°C. Her labs were significant for an acute kidney injury (AKI) with creatinine (Cr) of 1.6 mg/dL from a baseline of around 1.1 mg/dL, hyperkalemia with potassium (K+) of 6.0 mmol/L, mild transaminitis, and a significant lactic acidosis. TSH and troponin were within normal limits. Her heart rate was unresponsive to atropine, and she was started on an epinephrine drip, as well as norepinephrine transiently for additional BP support. Blood and urine cultures were obtained with the induction of broad-spectrum antibiotics and IV fluids. Her echocardiogram was unrevealing for a source of her shock. Her hyperkalemia was managed with IV calcium, inhaled beta agonists, and insulin with resultant K+ of 5.4 and subsequently 4.9 over the course of multiple hours. Over this same time, her shock resolved with total recovery of her mental status and withdrawal of hemodynamic support. A CT scan of her head, chest, abdomen, and pelvis, blood and urine cultures, and urinalysis were unrevealing for a source of infection.

Discussion:

Given her bradycardia, AKI, use of an AV nodal blocker, shock with multiorgan failure, and hyperkalemia, BRASH was determined to be her most likely diagnosis. Particularly in the context of severe refractory bradycardia out of proportion to her mild hypothermia, rapid recovery, and comprehensive workup unrevealing for an infectious source. With prompt

recognition and action taken to break the self-perpetuating cycle of hyperkalemia and bradycardia, she had a rapid resolution of her multiorgan failure shock. She will avoid the use of AV nodal blockers and potassium retaining agents, such as losartan, moving forward.

Citations:

1. Majeed H, Khan U, Khan AM, Khalid SN, Farook S, Gangu K, Sagheer S, Sheikh AB. BRASH syndrome: a systematic review of reported cases. Curr Probl Cardiol. 2023;48(6):101663. doi:10.1016/j.cpcardiol.2023.101663.
2. Farkas JD, Long B, Koyfman A, Menson K. BRASH Syndrome: Bradycardia, Renal Failure, AV Blockade, Shock, and Hyperkalemia. J Emerg Med. 2020;59(2):216-223. doi: 10.1016/j.jemermed.2020.05.001. PMID: 32565167.