

## Brash Syndrome: A Rare Presentation of Hyperkalemia

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### Abstract

Brash syndrome stands for Bradycardia, Renal Failure, AV Node Blocker, Shock and Hyperkalaemia, and is a rare complication of patients suffering from chronic kidney disease, who are usually on dialytic support. These patients are usually on AV node blockers (either calcium channel blockers or beta blockers) and renal failure causes the accumulation of these medicines plus hyperkalaemia.<sup>1</sup> Here we present a case of a patient who was diagnosed with Brash syndrome, was treated medically and was discharged. The purpose of this article is to highlight BRASH syndrome, recognise it and improve its medical management.

**Keywords:** Brash Syndrome, AV Node Blockers, Hyperkalaemia

**Key Message:** Brash syndrome is a rare complication seen in patients with hyperkalaemia and can be misdiagnosed as a heart block. It is pertinent for the emergency physician to check for hyperkalaemia in patients presenting with heart blocks so as to avoid fatal complications.

## INTRODUCTION

Brash syndrome is a rare complication seen in patients where standard Acls guidelines may fail to treat patients. Bradycardia, renal failure, atrioventricular (AV) nodal blocker medications,

shock, and hyperkalaemia (Brash) is a recently described syndrome by Josh Farkas in the year 2016.<sup>2</sup> The syndrome comprises of severe bradycardia and hypotension due to the synergistic overlap of both AV nodal blocker and hyperkalaemia secondary to underlying kidney failure. It may be triggered by risk factors that increase potassium, including fever, sepsis, medications, tumourlysis, kidney disease, diabetes, and hypovolemia. The investigations are centred on the entire metabolic panel and electrocardiogram. In cases where the patient presenting with profound bradycardia and shock and not responding to initial treatment, a diagnosis of BRASH syndrome should be kept in mind.<sup>2</sup> Here we present a case of a 72 year old male, who presented to the Emergency department with severe bradycardia (subsequently a heart block) and was found to be in hyperkalaemia.

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## CASE REPORT

A 72-year-old male patient, known case of Hypertension and chronic kidney disease, presented to the emergency department with complaints of generalised weakness along with body ache and pedal oedema for 10 days. The patient also reported intermittent bouts of shortness of breath. On primary survey, the patient was found to be in bradycardia with a heart rate of 40 bpm with a blood pressure of 110/80 mmHg. ECG was suggestive of bradycardia with a rate of 40 with PR prolongation, concomitant with a first degree heart block. In view of chronic kidney disease and currently not on any treatment or dialytic support, a venous blood gas was also done to rule out dyselectrolytemia and / or acid- base disorders.

Venous blood gas was suggestive of metabolic acidosis with a pH - 7.25, and Hyperkalaemia of 6.5 along with a strong ion deficit of 20 meq. Immediate anti hyperkalaemia measures in the form of intravenous calcium gluconate (10 ml of 10%) along with a neutralising drip of insulin dextrose (10 units of insulin in 100 ml of 25% dextrose), sodium bicarbonate were given to the patient but no change in the heart rate and rhythm was noted. A repeat venous blood gas after initial hyperkalaemia management still showed high potassium levels of 6.2. Anti hyperkalaemia measures were repeated and Nephrology consult was taken for recurrent hyperkalaemia. Plan for Hemodialysis made for recurrent Hyperkalaemia.

Cardiology consult taken for a possible first degree heart block. The cardiology team advised for conservative management and an emergent use of Atropine if vitally unstable. Initial blood investigations showed creatinine - 15.01, sodium - 113mEq/L and a potassium - 6.0 mEq/L.

The patient was advised admission under nephrology and was shifted to the Intensive care unit (ICU) for immediate dialytic support after hyperkalaemia management and resuscitation. The patient was dialysed, managed conservatively for bradycardia and was discharged with a stable heart rate after 7 days.

## DISCUSSION

Hyperkalaemia affects the myocardial tissue, producing abnormalities in the ECG, such as P-R prolongation, tall and peaked T waves, reduced amplitude and increased duration of P wave, and atrial and ventricular arrhythmias, including variable degree heart blocks. Elderly patient are

prone to develop hyperkalaemia due to reduced glomerular filtration rate and other pre existing medical issues.<sup>3</sup>

The presence of hyperkalaemia lead to a reduction in the resting transmembrane potential and a decrease in the rate of rise of the action potential. This ultimately reduces myocardial cell conduction velocity, with an increased repolarisation rate.<sup>4</sup>

With shortening action potentials due to rising potassium levels, the conduction velocity decreases and the PR interval gets prolonged. Electrocardiographic findings comprise of changes in the underlining atrioventricular junctional rhythm along with acceleration of junctional pacemaker which ultimately lead to conduction delays in the His Purkinje system with generation of heart blocks.<sup>5</sup>

The management of BRASH requires a cohesive approach which is not just directed at treating hyperkalaemia but also correcting other parameters like bradycardia, under perfusion/ hypoperfusion.<sup>2</sup>

Treatment strategies aim at correcting hyperkalaemia by using intravenous calcium to stabilise the myocardium along with nebulised Albuterol if electrocardiographic changes and hemodynamic instability present.<sup>6</sup> Insulin is indicated for moderate/severe hyperkalemia, or sicker patients overall, with the dose being -5 units IV insulin with 2 ampules of D50W (100 ml total). Re dosing may be required as effects of potassium stay longer than usual.<sup>7</sup>

The definitive management being haemodialysis for resistant hyperkalaemia not responding to previous treatment strategies.

## CONCLUSION

BRASH syndrome can be easily misdiagnosed as a heart block or cardiogenic shock following. A myocardial infarction and focus on life threatening hyperkalaemia may just lead to the patient. Losing his/her life due to a reversible cause. Therefore, a bizarre rhythm with even more bizarre. Electrocardiographic findings, along with shock, should be investigated for Hyperkalaemia. Induced cardiac insult, to ensure a quick and safe recovery of the patient, BRASH, although New, but never unheard can be one of the reversible causes of high mortality of patients in the ED, and is easily recognisable and treated.

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