Letter to the Editor

Recurrent hypokalemia in a child

To the Editor:

Severe hypokalemia is a medical emergency that could lead to cardiac arrest if untimely recognized. Here, we present a practical approach to hypokalemia. A 1-year-6-month-old girl with proper growth and development had recurrent vomiting and hypokalemia in the past 2 months. Laboratory studies demonstrated serum Na⁺ of 132 mmol/L, K⁺ of 1.9 mmol/L, Cl⁻ of <80 mmol/L, HCO₃⁻ of 42.9 mmol/L, blood urea nitrogen of 22.3 mg/dL, creatinine of 0.33 mg/dL, and osmolality of 271 mOsm/KgH₂O. Urine analysis showed K⁺ of 122.5 mmol/L, creatinine of 61 mg/dL, osmolality of 809 mOsm/KgH₂O, and trans-tubular potassium gradient (TTKG) of 22 on admission and Na⁺ of 64, K⁺ of 19.6, and Cl⁻ of <15 mmol/L on the second hospital day. Electrocardiography revealed a prolonged QTc interval (Fig. 1a, 530 ms, corrected by Fridericia’s formula). Abdominal ultrasound revealed gastric outlet obstruction. Further panendoscopy showed an edematous, erythematous, and fragile tissue surface of an antral web (Fig. 1b). Laparoscopic antrectomy and gastro-duodenostomy were consequently performed. Her hypokalemia, volume depletion, and long QTc responded to intravenous fluid hydration and potassium supplementation 24 h after admission. The resolution of vomiting without any recurrence of hypokalemia was achieved postoperatively.

Hypokalemia-induced long QT syndrome, resulting from gastric outlet obstruction, is rare but requires timely recognition. The primary cause of this gastric outlet obstruction was the antral web, with a concurrent overlying ulcer, which resulted in rapid fibrosis and stricture during its healing process, leading to near-total obstruction. The surgical intervention should be considered in cases with clinical complications; however, conservative treatment might be considered for those with acceptable feeding amounts and growth status without acute gastrointestinal bleeding signs.

The approach to identifying the etiology of hypokalemia (Fig. 1c) could be initiated by evaluating the acid–base status. Normal acid–base status indicates intracellular K⁺ shifting. The etiologies can be subdivided into gastrointestinal loss and renal wasting by calculating the TTKG or urine K⁺/Cr ratio in hypokalemic cases with metabolic acidosis. The etiology of hypokalemia with metabolic alkalosis can be divided into low and high-renal K⁺ excretion. Those with metabolic alkalosis and high-renal K⁺ excretion can be approached by measuring the blood pressure and determining the serum renin, aldosterone, cortisol, and adrenocorticotropic hormone (ACTH) levels. Those with metabolic alkalosis and normal blood pressure can be further subdivided into high urine Na⁺ and Cl⁻, low urine Na⁺ and Cl⁻, high urine Na⁺ and low Cl⁻, and low urine Na⁺ and high Cl⁻ by measuring the urine Na⁺ and Cl⁻ levels. So far, two patients with antral web having complicated hypokalemia were reported in Taiwan and other countries. Here, hypokalemia, metabolic alkalosis, high-renal K⁺ excretion, and normal blood pressure with high urine Na⁺ and low Cl⁻ pointed to the increased urinary bicarbonate wasting. The underlying antral web caused surreptitious vomiting, concomitant metabolic alkalosis, gastrointestinal potassium wasting, and associated urinary cation loss. The onset and resolution of hypokalemia and metabolic alkalosis due to the presence and resolution of gastric outlet obstruction were responsible for the hypokalemia.

Declaration of competing interest

The authors have no conflict of interest relevant to this article.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pedneo.2022.07.008.

References


https://doi.org/10.1016/j.pedneo.2022.07.008
1875-9572/Copyright © 2022, Taiwan Pediatric Association. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Please cite this article as: C.-M. Tang, P.-J. Yeh, J.-J. Ding et al., Recurrent hypokalemia in a child, Pediatrics and Neonatology, https://doi.org/10.1016/j.pedneo.2022.07.008


Ching-Min Tang
Pai-Jui Yeh
Department of Pediatrics, Chang Gung Memorial Hospital at Linkou, 5, Fu-Hsin St. Kuei-Shan, Taoyuan, Taiwan

Jhao-Jhuang Ding
Department of Pediatrics, Tri-Service General Hospital, National Defense Medical Center at 325, Sec 2, Chenggong Rd., Neihu District, Taipei City 11490, Taiwan

*Corresponding author. Min-Hua Tseng, Chang Gung Memorial Hospital at Linkou, 5, Fu-Hsin St. Kuei-Shan, Taoyuan, Taiwan.

E-mail address: doc31089@gmail.com (M.-H. Tseng)

Apr 28, 2022