The use of sodium–chloride difference and chloride–sodium ratio in the evaluation of metabolic acidosis in critically ill patients

Jan Havlin · Karel Matoušovic · Otto Schuck ·
Jiri Charvat · Miroslava Horackova

Received: 19 July 2012 / Accepted: 4 September 2012 / Published online: 22 September 2012
© Springer-Verlag 2012

Sir,

We read the study of Kurt et al. [4] and we believe that sodium–chloride difference (Diff(NaCl)) and Cl-Na ratio cannot be considered as an alternative method for assessment of unmeasured anions or tissue acids (TA). Significant correlation between Cl-Na ratio and TA is not an unexpected result because metabolic acidosis (MAC) is generally caused either by loss of bicarbonate (insufficient renal synthesis of HCO_3^- compensated by an increase of Cl^-) or by retention of acids (chlorides remain unchanged), frequently by both. The correlation is a weak evidence that one method can replace another. The confidence interval is not specified but at first glance it is apparent that variability is too high (Fig. 1e). Cl-Na ratio cannot be reliably used as a bedside method as it cannot exclude the accumulation of TA in individual case. Cl-Na ratio indicates only approximately whether MAC with unchanged Cl^- is associated with retention of acids and MAC with hyperchloremia with insufficient synthesis of bicarbonate. Therefore, this examination must always be complemented by AG(corr) which is an adequate alternative to TA [1, 2]. In the study, we miss a control group and normal values of Na^+ , Cl^- , Cl-Na ratio and Diff(NaCl) related to age and its variance. Therefore, the incidence of hypochloremic MAC cannot be evaluated.

We support the use of Diff(NaCl) for detection of disturbances in sodium chloride metabolism, even if the isolated concentrations of Na^+ and Cl^- are still within normal limits [3]. We believe that Cl-Na ratio adds supplementary data to levels of Diff(NaCl) in its pathological range (otherwise the Cl-Na ratio is also within normal limits) as it may clarify whether the change in Diff(NaCl) is mainly due to dilution/contraction or due to primary ion imbalance. Theoretically, the Cl-Na ratio remains unchanged in case of pure dilution/contraction whereas Diff(NaCl) decreases with dilution and increases with contraction.

References

1. Corey HE (2006) The anion gap (AG): studies in the nephrotic syndrome and diabetic ketoacidosis (DKA). *J Lab Clin Med* 147:121–125
2. Figge J, Jabor A, Kazda A et al (1998) Anion gap and hypoalbuminemia. *Crit Care Med* 26:1807–1810
3. Havlin J, Matoušovic K, Schuck O (2009) Pathophysiology of metabolic acidosis in patients with reduced glomerular filtration rate according to Stewart–Fencl theory. *Vnitr Lek* 55(2):97–104
4. Kurt A, Ecevit A, Ozkiraz S, Ince DA, Akcan AB, Tarcin A (2012) The use of chloride–sodium ratio in the evaluation of metabolic acidosis in critically ill neonates. *Eur J Pediatr* 171(6):963–9

J. Havlin · K. Matoušovic · O. Schuck · J. Charvat · M. Horackova
Department of Medicine, 2nd Medical Faculty of Charles
University and Faculty Hospital Motol,
V Úvalu 84,
150 06, Prague 5, Czech Republic

J. Havlin (✉)
Hlubočepská 49,
Prague 5 152 00, Czech Republic
e-mail: havlin.jan@post.cz