Intensive Care Med (2010) 36:372
DOI 10.1007/s00134-009-1682-2

Marcio Manozzo Boniatti
Paulo Ricardo Cerveira Cardoso
Rodrigo Kappel Castilho
Silvia Regina Rios Vieira

Reply to Dubin

Accepted: 9 September 2009
Published online: 24 October 2009

This reply refers to the comment available at: doi:10.1007/s00134-009-1680-4.

Sir: We would like to thank Dr. Dubin and colleagues for their comments about our recent article [1]. However, we disagree with most of their statements. First of all, the greater sensitivity of Stewart's method using the strong ion difference (SID) compared to the use of base excess (BE) cannot be explained by the use of different cutoff points. We agree that to diagnose metabolic acidosis, we would need a 5 mmol/l reduction in BE and only 2 mmol/l in SID, which means a greater sensitivity for the last criterion. However, if this were the explanation, it would be enough to change the cutoff point of BE, and all cases diagnosed using the SID criterion would also be identified using the BE criterion. But this is not so. In our cases, of the 34 patients with BE between −1.9 and +1.9 mmol/l, most ($n = 27$, 79.4%) still had SID <38 mmol/l (data not shown). And we go even further. The best performance is not limited to identifying cases that have not been diagnosed by the traditional evaluation; there is also a better determination of the magnitude of the disorder. In the case of patient 2 of our article [1], if we were to reduce the cutoff point of BE to −2 mmol/l, we would identify metabolic acidosis in this patient. However, the reduction of the base buffer (BB) would be only 3.2 mmol/l; using the criterion of SID the reduction is at least 11 mmol/l. This is a large difference. Independently of the cause of the disorder, the aggressiveness of management will be different.

Another point raised by Dr. Dubin and colleagues concerns the diagnosis of the examples mentioned in our article [1]. These are not patients with primary respiratory alkalosis with SID reduction by renal compensation. Dr. Dubin and colleagues repeat the evaluation used in their article [2]. They evaluate the physiological response to the acid–base disorders by calculating the expected values for PCO_2 or HCO_3^- in the cases of a metabolic or respiratory primary change, respectively. We do not agree with this methodology. The interpretation of the physiological responses is very complex in critically ill patients. These responses are derived from studies with animals or healthy patients. Diagnosing a new disorder, only when the response is different from the expected value sounds simplistic to us. We prefer the methodology already described by Dr. Fencl [3], in which the disorders are explained by a change in at least one of the three independent variables [PCO_2, SID and total weak acid concentration (A_{tot})]. In our two examples, one patient was admitted due to septic shock and the other during the postoperative period for neurosurgery, and both were on mechanical ventilation. Again, these are not patients with respiratory alkalosis as a primary disorder. They are patients with primary metabolic acidosis (low SID) with compensatory hypocapnia determined by the parameters of mechanical ventilation. Dr. Dubin and colleagues stated that: "compensatory responses never overcorrect the pH." This does not apply when the response is determined by our interventions.

We agree that there is a good relationship between BE and SID, and this is not new information. A change in BE is essentially the same as the change in SID only if A_{tot} remains unaltered. This is extremely uncommon in critically ill patients. For this reason, we firmly believe that we should use the criterion of SID at the bedside in intensive care units. BE is good; SID is better. We can improve our diagnostic capacity, not only identifying more cases, but also being more precise in determining the magnitude of the disorder.

References

1. Boniatti MM, Cardoso PR, Castilho RK, Vieira SR (2009) Acid–base disorders evaluation in critically ill patients: we can improve our diagnostic ability. Intensive Care Med 35:1377–1382
2. Dubin A, Menises MM, Masevicius FD, Moseinco MC, Kutscherauer DO, Ventrice E, Laffaire E, Estenssoro E (2007) Comparison of three different methods of evaluation of metabolic acid–base disorders. Crit Care Med 35:1264–1270
3. Fencl V, Jabor A, Kazda A, Figge J (2000) Diagnosis of metabolic acid–base disturbances in critically ill patients. Am J Respir Crit Care Med 162:2246–2251

M. M. Boniatti (✉) · P. R. C. Cardoso · R. K. Castilho · S. R. R. Vieira
Hospital de Clínicas de Porto Alegre-Critical Care, Ramiro Barcellos, Porto Alegre 90670090, Brazil
e-mail: marciobt@terra.com.br
Tel.: +55-51-99729424
Fax: +55-54-32126253