the absolute risk reduction (ARR) (I 100 mg − I 50 mg), the ratio of the bleeding incidences of the 50-mg rt-PA and 100-mg rt-PA groups), the absolute risk reduction (ARR) (I 100 mg − I 50 mg, the difference between the bleeding incidences of the 100-mg rt-PA and 50-mg rt-PA groups), and the number of patients needed to treated (NNT) (the number of patients needing to be treated with 50 mg rt-PA to reduce one patient from bleeding complications). Importantly, the degree of benefits differs among patients with different body weights. AR% is relatively lower (26%) and NNT is higher (20) in patients with body weight ≥ 75 kg. The similar trend is also observed in patients with different BMI: the AR% is largest and NNT is smallest in patients with the lowest BMI. These data suggest that patients with PTE with lower body weight or BMI will benefit more with 50 mg rt-PA treatment than patients with higher body weight or BMI.

Finally, we thank Dr Pena again for his evaluation of our study. We look forward to more studies that validate our data in terms of therapeutic efficacy and bleeding complication reduction.

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Table 1—Assessment of the Effect of 50 mg vs 100 mg Recombinant Tissue-Type Plasminogen Activator Treatment on Bleeding Complications

<table>
<thead>
<tr>
<th>Incidence of Bleeding Complication, %</th>
<th>100 mg rt-PA, I 100 mg</th>
<th>50 mg rt-PA, I 50 mg</th>
<th>RR, I 100 mg/100 mg</th>
<th>ARR, I 100 mg − I 50 mg</th>
<th>AR%</th>
<th>NNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>All participants</td>
<td>32</td>
<td>17</td>
<td>0.53</td>
<td>0.15</td>
<td>47</td>
<td>7</td>
</tr>
<tr>
<td>Body weight tertiles, kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65</td>
<td>41.2</td>
<td>14.8</td>
<td>0.36</td>
<td>0.26</td>
<td>63</td>
<td>4</td>
</tr>
<tr>
<td>65-74</td>
<td>40.0</td>
<td>26.7</td>
<td>0.67</td>
<td>0.13</td>
<td>33</td>
<td>8</td>
</tr>
<tr>
<td>≥75</td>
<td>19.0</td>
<td>13.6</td>
<td>0.72</td>
<td>0.05</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>39.1</td>
<td>11.4</td>
<td>0.29</td>
<td>0.28</td>
<td>72</td>
<td>4</td>
</tr>
<tr>
<td>≥25</td>
<td>25.9</td>
<td>22.2</td>
<td>0.56</td>
<td>0.04</td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>

ARR% = attributable risk percentage; ARR = absolute risk reduction; I = incidence; NNT = number needed to treat; RR = relative risk; rt-PA = recombinant tissue-type plasminogen activator.

50 mg rt-PA in reducing bleeding complications. Without accurate data of the bleeding complications in PTE thrombolytic therapy in China, we are currently unable to provide AR% for the Chinese population.

Inspired by Dr Pena’s calculation, we performed additional analyses of the relative risk (RR) (I 50 mg/I 100 mg, the ratio of the bleeding incidences of the 50-mg rt-PA and 100-mg rt-PA groups), the absolute risk reduction (ARR) (I 100 mg − I 50 mg, the difference between the bleeding incidences of the 100-mg rt-PA and 50-mg rt-PA groups), and the number of patients needed to treated (NNT) (the number of patients needing to be treated with 50 mg rt-PA to reduce one patient from bleeding complications); which is the reciprocal of the absolute risk difference; or 1/ARR(1/(I 100 mg − I 50 mg))/Table 1).

In our study, the overall AR% is 47% and NNT is seven, indicating that seven patients need to be treated with 50 mg rt-PA to prevent one patient from bleeding complications. Importantly, the degree of benefits differs among patients with different body weights. AR% is relatively lower (26%) and NNT is higher (20) in patients with body weight ≥ 75 kg. AR% is increased (33%) and NNT is decreased (eight) in patients with body weight of 65 to 74 kg, and the AR% is highest (63%) and NNT is lowest (four) in patients with body weight < 65 kg. The similar trend is also observed in patients with different BMI: the AR% is largest and NNT is smallest in patients with the lowest BMI. These data suggest that patients with PTE with lower body weight or BMI will benefit more with 50 mg rt-PA treatment than patients with higher body weight or BMI.

Finally, we thank Dr Pena again for his evaluation of our study. We look forward to more studies that validate our data in terms of therapeutic efficacy and bleeding complication reduction.

REFERENCES

Hyperchloremic Metabolic Acidosis Following Resuscitation of Shock

To the Editor:

Successful resuscitation of patients with shock often requires infusion of large volumes of crystalloid. Although “dilution acidosis” has been described in animal models and in human anecdotes, systematic examination of this phenomenon was only recently reported in children with shock. After receiving Institutional Review Board approval, we examined the medical records of adults admitted with a primary diagnosis of shock to Bridgeport Hospital during 19 months. Ninety-eight patients required > 1 L of normal saline (NS) administered in ≤ 1 h. Of these, 59 had sufficient data to enable computation of acid-base status, and 17 (28.8%) developed hyperchloremic metabolic acidosis (HMA) in the first 24 h. All arterial blood gases were analyzed for acid-base status by a blinded senior nephrology fellow using a nomogram-based, acid-base calculator (http://www.medcalc.com/acidbase.html). Anion gap (AG) acidosis was defined as metabolic acidosis with AG > 12 mEq/L after correction for serum albumin. When metabolic acidosis was present with AG ≤ 12 mEq/L, patients were categorized as having HMA. When AG was > 12 mEq/L, the “delta-delta” (ie, measured AG sufficient to explain the drop in bicarbonate from 24 mEq/L) was computed to ascertain whether HMA coexisted with the AG acidosis. There was no significant difference in the presence of chronic kidney disease or diabetes in patients with or without HMA. A total of 94.1% of patients had septic shock. Overall, the amount of NS administered in the 24 h ranged from 3 to 11.5 L for the HMA group compared with 0.3 to 17.2 L for the non-HMA group (median 6 vs 3 L, P = .002) (Table 1). Patients with HMA received fluids at a higher rate (276.2 vs 183.5 mL/h, P = .002). An infused volume of ≥ 4 L NS predicted HMA with a sensitivity of 82% and a specificity of 64%. In multiple logistic regression models, HMA at 24 h was highly associated with infused NS ≥ 4 L (OR, 13.9; 95% CI, 2.3-85.2).

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Table 1—Acid-Base Data of Patients Who Developed vs Those Who Did Not Develop Hyperchloremic Metabolic Acidosis During the First 24 h of Resuscitation

<table>
<thead>
<tr>
<th>Acid-Base Data</th>
<th>HMA at 24 h</th>
<th>No HMA at 24 h</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine, mg/dL</td>
<td>2.1</td>
<td>2.7</td>
<td>.6</td>
</tr>
<tr>
<td>$\text{HCO}_3^-$, mEq/L</td>
<td>16.2</td>
<td>20.1</td>
<td>.01</td>
</tr>
<tr>
<td>Chloride, mEq/L</td>
<td>118.2</td>
<td>108.9</td>
<td>.001</td>
</tr>
<tr>
<td>pH</td>
<td>7.33</td>
<td>7.35</td>
<td>.46</td>
</tr>
<tr>
<td>AG, mEq/L</td>
<td>11.5</td>
<td>17.0</td>
<td>.0001</td>
</tr>
<tr>
<td>Total administered fluid, L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>7.9</td>
<td>7</td>
<td>.5</td>
</tr>
<tr>
<td>Median</td>
<td>7.8</td>
<td>5.1</td>
<td>.04</td>
</tr>
<tr>
<td>Administered saline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean, mL</td>
<td>6.6</td>
<td>4.4</td>
<td>.03</td>
</tr>
<tr>
<td>Median, mL</td>
<td>6</td>
<td>3.3</td>
<td>.002</td>
</tr>
<tr>
<td>Rate, mL/min</td>
<td>276.2</td>
<td>183.5</td>
<td>.002</td>
</tr>
</tbody>
</table>

AG = anion gap; $\text{HCO}_3^-$ = bicarbonate; HMA = hyperchloremic metabolic acidosis.

Age, diuretic use, chronic kidney disease, lactic acidosis, and bicarbonate infusion were not associated with HMA.

HMA has been described in dog models and in human anecdotes since 1900. Stewart and Ronikie described the effects of large-volume resuscitation, and Winters et al proposed that HMA may be caused by dilution of bicarbonate. HMA has long been appreciated after resuscitation of patients with diabetic ketoacidosis and was recently reported in children with meningococcal septic shock. Ketoacidosis differs somewhat in that urinary ketone excretion contributes (with dilution) to the development of HMA.

In conclusion, this limited retrospective study suggests that HMA is common during resuscitation of patients with a primary diagnosis of shock, and that HMA is associated with volume of infused saline. The limitations of this retrospective, medical records review preclude precise estimates of frequency and risk of this phenomenon, but the findings suggest hypotheses for a prospective study.

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Questions in the Role of Chest CT Scanning in TB Outbreak Investigation

To the Editor:

The study by Won Lee and colleagues from South Korea in the recent issue of CHEST (May 2010) has generated a number of important issues and questions that need to be highlighted. The authors have diagnosed active pulmonary TB (PTB) in about 21% of patients, and it is really hard to believe this unusually high rate of active disease, especially when all the patients are young soldiers who are immunocompetent and healthy.

It is quite surprising that none of the 18 cases of active PTB that were diagnosed using high-resolution CT (HRCT) scans showed positive acid-fast staining of the sputum specimens. Among the nine cases of active PTB diagnosed on the basis of CT scanning alone, two patients had neither any symptoms nor a positive sputum test result for acid-fast bacilli culture. Did these soldiers really have active PTB? How often do we see patients with active PTB who have no symptoms? Was administering a full course of antitubercular treatment for 6 months to these patients justified?

The authors have claimed symptomatic or radiographic improvement in all cases of active PTB. Therefore, in those nine patients with normal chest radiographs and active PTB, follow-up HRCT scans of the thorax must have been done to assess radiologic improvement. How do we view this very high dose of radiation exposure in these young soldiers? It is well known that radiation exposure in these young soldiers is a concern.

References


