A medical technologist obtained the following blood-gas results from a well-iced arterial specimen: pH = 7.14, PCO₂ = 51 mm Hg, PO₂ = 83 mm Hg, and HCO₃ = 10 mmol/L.

QUESTIONS

1. Are these results acceptable? Why?
2. Because of the above discussion, the specimen is re-examined, and small clots are noted. A repeat blood-gas specimen is obtained, and analysis yields the following data: pH = 7.23, PCO₂ = 22 mm Hg, PO₂ = 85 mm Hg, and HCO₃ = 10 mmol/L. Are these results now consistent with any acid-base disorder?
3. A half hour later a request for a stat lactic acid is received. The result is 21 mmol/L. Is this result consistent with all results listed above?

Questions to Consider

1. Are each of the individual results consistent with an acidosis or alkalosis?
2. Does any individual result indicate the type of acidosis or alkalosis likely to be present in this patient, i.e., metabolic or respiratory?
3. In combination, are these results consistent with a metabolic or respiratory alkalosis or acidosis?
4. What type of acid-base disorder does this patient have?
5. What other laboratory results do you think may be abnormal in a patient with these blood-gas results?

Answer:

1. Because the results do not coincide with the combination of results expected for acid-base disorders, these results are likely to be erroneous and should be repeated. Erroneous results can be caused by a clot over one of the electrolytes or bubbles in the sample or improper sample processing. If blood gas results do not overtly fall into a recognizable pattern indicative of a metabolic or respiratory acidosis or alkalosis, the results must be questioned. A call to the attending physician might be useful in resolving the problem.

2. Yes. These results are consistent with a metabolic acidosis.

3. Yes (p. 473). A lactic acidosis is often associated with tissue hypoxia (low PO₂ in peripheral tissues) either caused by poor circulatory perfusion or poor pulmonary function (p. 473). In this situation, the latter seems to be the cause.

Answers to Questions to Consider

1. The pH of 7.14 obviously indicates acidosis (pH < 7.4). The pCO₂ of 51 mm Hg can indicate a respiratory acidosis or a metabolic alkalosis. The bicarbonate of 10 mmol/L could indicate a metabolic acidosis or a compensated respiratory alkalosis (Table 25-4, p. 473).

2. No. A single acid-base parameter cannot indicate whether an acid-base disorder is of metabolic or respiratory origin and, except for the pH, can not even indicate whether it is an acidosis or an alkalosis (p. 469-475).

3. The pH and bicarbonate results could indicate a metabolic acidosis; however, the pCO₂ is not consistent with this combination. A pH of 7.14 and pCO₂ of 51 mm Hg could be associated with severe respiratory acidosis, but the bicarbonate values would not be as low as reported, unless there were a mixed respiratory-metabolic acidosis, such as a severe lactic acidosis combined with a respiratory acidosis. However, in combination, these data do not obviously fit any acid-base disorder.
4. These results are usually associated with a metabolic acidosis, with partial compensation (p. 471-473).

5. Frequently seen causes of metabolic acidosis and the associated abnormal lab values are (pp. 471-473 [Table 25-5]):
   - **ketoacidosis**: increased glucose, ketones, anion gap, hematocrit, and BUN
   - **renal acidosis**: increased anion gap, BUN, and creatinine diarrhea: normal anion gap, increased chloride
   - **lactic acidosis**: increased anion gap and lactic acid
   - **drug intoxication**: some positive result on a drug screen, such as salicylate, and an increased anion gap
   - **D-lactic acidosis (very rare)**: acidosis, normal L-lactic acid levels, and an increased anion gap.