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المحاضرة السادسة- المرحلة الثانية
الطب الباطني- تقنيات التخدير

ABG
EXAMPLES

As we mentioned in the lecture before

PaCO2 represents a respiratory problem

HCO3 represents a metabolic problem

Then ask yourself the following questions to help you start interpreting the values

Question 1: Is this acidosis or alkalosis?

Question 2: Is this a respiratory or metabolic problem?

Question 3: Is it uncompensated, partially, or fully compensated?

- **Example 1:**
- Step 1: **pH < 7.35 → acidotic.**
- Step 2: **CO2 > 45 → acidotic.**
- Step 3: HCO3 is normal.
- Step 4: CO2 matches pH, because both are acidotic. Therefore the imbalance is respiratory acidosis.

pH	7.27	acidotic
CO2	53	acidotic
pO2	50	low
O2 sat.	79%	low
HCO3	24	normal

- Step 5: HCO3 is normal, therefore there is no compensation. If the HCO3 is alkalotic (opposite direction) then compensation would be present.
- Step 6: PaO2 and O2 sat are low indicating hypoxemia.
- Full diagnosis: Uncompensated respiratory acidosis with hypoxemia.
- This patient has an acute respiratory disorder.

- **Example 2:**
- Step 1: **pH > 7.45 → alkalotic.**
- Step 2: **CO2 < 35 → alkalotic.**
- Step 3: HCO3 is normal.
- Step 4: CO2 matches pH, because both are alkalotic. Therefore imbalance is respiratory alkalosis.

pH	7.52	alkalotic
CO2	29	alkalotic
pO2	100	normal
O2 sat.	98%	normal
HCO3	23	normal

- Step 5: HCO3 is normal, therefore there is no compensation. If the HCO3 is acidotic (opposite direction) then compensation would be present.
- Step 6: PaO2 and O2 sat are normal indicating normal oxygenation.
- The full diagnosis for this blood gas is: Uncompensated respiratory alkalosis.

- **Example 3:**
- Step 1: **pH < 7.35 → acidotic.**
- Step 2: CO2 is normal.
- Step 3: **HCO3 < 22 → acidotic.**
- Step 4: HCO3 matches pH, because both are acidotic. Therefore the imbalance is metabolic acidosis.

pH	7.18	acidotic
CO2	44	normal
pO2	92	normal
O2 sat.	95%	normal
HCO3	16	acidotic

- Step 5: CO2 is normal, therefore there is no compensation. If the CO2 is alkalotic (opposite direction) then compensation would be present.
- Step 6: PaO2 and O2 sat are normal indicating normal oxygenation.
- Full diagnosis: Uncompensated metabolic acidosis.

- **Example 4:**
- Step 1: **pH > 7.45 → alkalotic.**
- Step 2: CO2 is normal.
- Step 3: **HCO3 > 26 → alkalotic.**
- Step 4: HCO3 matches the pH, because they are both alkalotic. Therefore the imbalance is metabolic alkalosis.

pH	7.60	alkalotic
CO2	37	normal
pO2	92	normal
O2 sat.	98%	normal
HCO3	35	alkalotic

- Step 5: CO2 is normal, therefore there is no compensation. If the CO2 is acidotic (opposite direction) then compensation would be present.
- Step 6: PaO2 and O2 sat are normal.
- Full diagnosis: Uncompensated metabolic alkalosis.

- **Example 5:**
- Step 1: **pH < 7.35 → acidotic.**
- Step 2: CO2 < 35 → alkalotic.
- Step 3: **HCO3 < 22 → acidotic.**
- Step 4: HCO3 matches pH, because both are acidotic. Therefore imbalance is metabolic acidosis.

pH	7.30	acidotic
CO2	30	alkalotic
pO2	68	low
O2 sat.	92%	low
HCO3	14	acidotic

- Step 5: CO2 is alkalotic and goes the opposite direction of the pH, so there is compensation. Because the pH is not in the normal range the compensation is called partial.
- Step 6: PaO2 and O2 sat are low indicating hypoxemia.
- Full diagnosis: Partially-compensated metabolic acidosis with hypoxemia.

- **EXAMPLE 6:**
- pH = 7.55, **Alkalosis**
- pCO2 = 14 mmHg, **CO2 is also Alkalotic**
- Bicarb = 10 meq/L **Bicarb is Acidotic**

- Since CO2 matches pH, disorder is RESPIRATORY, that is, **RESPIRATORY ALKALOSIS.**
- Since Bicarb goes in opposite direction to pH, it is compensatory. But compensation is only partial,since pH is not in normal range.

- **EXAMPLE 6:**
- pH = 7.55,
- pCO2 = 14 mmHg,
- Bicarb = 10 meq/L

Respiratory Alkalosis + Metabolic Acidosis (MIXED DISORDER)

- Fall in pCO2 = 40-14 = 26
- Expected fall in Bicarb = 0.2 x 26 = 5.2 meq/L
- However,actual fall in Bicarb = 24-10 = 14

- Since actual fall in Bicarb is more than expected, there is Metabolic Acidosis also.

PH 7.30 === acid ▸

PCO2 22 === alkaline ▸

HCO3 18 ===acid ▸

Is this partially compensated metabolic acidosis ??? ▸

Answer is NO ▸

EXAMPLE 7

A patient has the following ABG results

PH 7.43

PCo2 28mmhg

HCO3 18mEq/l this is known as

A partially compensated respiratory alkalosis

B fully compensated metabolic acidosis

C partially compensated respiratory acidosis

D fully compensated respiratory alkalosis

Now we are dealing with normal PH ,

so what are the causes of normal PH ???

Answer Q 7 is D

respiratory alkalosis, fully compensated by the means of metabolic acidosis.

EXAMPLE 8

A patient has the following arterial blood gas results: blood pH 7.37, $PaCO_2$ 33 mmHg, and HCO_3 17 mEq/L. This is known as:

A. Partially compensated respiratory alkalosis

B. Fully compensated metabolic acidosis

C. Partially compensated respiratory acidosis

D. Fully compensated respiratory alkalosis

- The blood pH is normal, but it falls on the acidotic side.
- Our metabolic system is also acidotic but our respiratory system is alkalotic.
- The problem is with the metabolic system and the respiratory system is trying to balance out the blood's acidotic state by decreasing the carbon dioxide level ($PaCO_2$) to make things more alkaline, which will help increase the blood's pH from it's acidotic state….which is has and this is why we have full compensation rather than partial

Answer Q8 is B ▶

metabolic acidosis, fully compensated by the means of respiratory alkalosis ▶

Good luck