Introduction

Intra-operative Pulmonary Embolism (PE) is reported with tourniquet use in lower extremity orthopedic surgeries. Routinely, end-tidal CO2 (EtCO2) is used in these cases to monitor gas exchange. Presented is a case of acute PE following tourniquet release in which the diagnosis was made using EtCO2 monitoring and arterial blood gas (ABG) sampling. This case reminds us how important it is to have an understanding of basic physiology of ventilation and perfusion in order to make correct clinical diagnosis.

Case

A 44-year-old male presented to the emergency room after a fall and suffered a stage 4 tibial plateau fracture. The patient was taken to the operating room (OR) for an external fixation of patient’s left leg to stabilize the fracture and two days later went back to the OR for internal fixation of the fracture. During the case, the patient had an intra-operative tourniquet placed over the left knee for hemostasis during the repair. Immediately after the tourniquet release, the patient’s saturations dropped to 83%. The patient’s heart rate went from 85 to 115 beats per minute however the blood pressure remained stable. The oxygen saturation was increased by bag mask ventilation and increasing the FiO2 from 40% to 100%. The patient was then placed back on volume control ventilation with settings of tidal volumes of 800 mL, a rate of 12, PEEP of 5, and FiO2 40%. There was continuous EtCO2 monitoring throughout the case, which was 35 mmHg prior to tourniquet release.

Discussion

Normal physiologic changes with tourniquet release show that EtCO2 and PaCO2 increase within one minute and do not return to normal for 13 minutes. The blood pH decreases maximally in 4 minutes due to an increase in PCO2 as well as a metabolic acidosis from lactic acid formation. In an area of lung that does not have adequate perfusion, the measured alveolar CO2 would be low and alveolar O2 concentrations would be high, thus creating a physiologic dead space. In our patient, we see an acute formation of physiologic dead space with his EtCO2 decreasing instead of increasing and he has a large A-a gradient which left only one possible explanation in such an acute setting, a large PE.

Conclusion

The combined use of EtCO2 and an ABG was able to demonstrate an acute physiologic dead space quickly narrowing the diagnosis to an acute PE.

References: 1Patel et al. Changes in End Tidal CO2 and Arterial Blood Gas Level After Release of Tourniquet. SMJ1987 vol.80, No2, 213