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Air Bubbles Produced During Rapid Blood Warming with Inline Blood Warmer Leading to Panic of Air Embolism

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Received: 5 August 2016 / Accepted: 24 October 2016 / Published online: 3 November 2016
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A 67 year male receiving chemotherapy for AML was being transfused one unit of SAGM-PRBC. An alarm of air entering patient's venous access was raised by attending nurse. The treating physician and transfusion services were alerted. The transfusion was stopped and source for air was investigated. There were no leakage in bag, tubing of blood transfusion set. The interesting observation was that there were no visible bubbles when blood entered to inline blood warmer but there were frequent areas of air trapped (approx. 1–2 ml of volume) within tubing set after blood warmer. This most likely can be attributed to the solubility

differences of various gases at 4 and 37 °C. The Bunsen solubility coefficients of gases existing in stored blood at 4 °C changes when blood is rapidly warmed towards 37 °C [1]. Among three major soluble gases (oxygen, carbon dioxide and nitrogen), nitrogen gas solubility coefficient is very low so that it forms the major part of bubbles formed [1]. Kuzukawa et al. [2] also find that composition of bubbles formed during warming was of $84.6 \pm 1.2\%$ of nitrogen, $4.0 \pm 1.0\%$ of oxygen, $10.4 \pm 0.9\%$ of carbon dioxide, and $1.1 \pm 0.1\%$ of argon. Air bubbles can thus be formed in intravenous tubing and can be infused into the patient along with the blood. Infused air bubbles can cause various clinical problems [1]. Blood warmers are rarely needed during routine transfusions. However, they are used when rapid transfusion of components is required, especially in trauma or surgery settings [3]. Large quantity of infused air may cause obstruction of the outflow tract of the right ventricle followed by reduction of pulmonary blood flow, and circulatory collapse [4]. Kuzukawa et al. [2] had proposed reservoir to eliminate air entering patient circulation.

Compliance with Ethical Standards

Conflict of interest None.

References

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