To shave or not to shave: air embolism following central venous catheter laceration

A 72-year-old man undergoing an abdominoperineal resection of the rectum had a 14 G central venous catheter (CVC) inserted preoperatively via the jugular route. An epidural was inserted for postoperative pain relief and surgery proceeded uneventfully under general anaesthesia.

Postoperatively, after three uneventful days in a high-dependency unit, he was discharged to the ward. The next day he felt well enough to wash and dress himself. However, while shaving with a safety razor he suddenly felt unwell and collapsed. There was no palpable pulse and cardiopulmonary resuscitation was commenced immediately. An initial rhythm of asystole was noted. On closer inspection, there was a small laceration on his neck adjacent to the CVC with a defect in the CVC itself (Figure 1). Suspecting an air embolism, the patient was placed in a left lateral Trendelenberg position and an unsuccessful attempt was made to aspirate from the catheter. The CVC was immediately removed and alternative venous access established. Intravenous adrenaline 1:10000 was administered as 1 ml boluses while cardiopulmonary resuscitation continued. Within 30 seconds of administration of adrenaline there was a return of circulation and spontaneous ventilation with recovery of consciousness soon after. A bedside echocardiogram was performed which showed the presence of echogenic bubbles in all four heart chambers, suggesting an anomalous communication between left and right chambers. A full neurological examination was performed which identified that the patient had developed slurring of speech and slight right-sided weakness. However, over the next 24 hours, the patient made a full recovery without any demonstrable neurological deficit.

Figure 1: Showing defect in the central venous catheter after removal from the patient’s internal jugular vein.

Venous air embolism is an uncommon, but well described, potentially lethal complication of central venous cannulation. Air is most likely to enter during deep inspiration, when the patient is upright, as a favourable pressure gradient exists for air to enter the circulation. Air embolism caused by laceration of a CVC with a razor, however, is a very uncommon complication, with only one other case reported1. Venous air emboli can paradoxically enter the arterial circulation through a patent foramen ovale and cause major harm2. Probe patent foramen ovale can be found in at least 25% of the general population. The estimated volume of venous air thought to be lethal in humans3 is between 300 and 500 ml, entering at a rate of 100 ml/s. Flanagan et al4 have demonstrated that these conditions can be reproduced through a 14 G cannula and a pressure gradient of only 5 cmH₂O.

Sudden neurological or cardiac events after manipulation of a CVC should call attention to a possible paradoxical air embolus. To prevent such events, any manipulation of CVCs should be undertaken in the supine position. If the patient is breathing spontaneously, the removal should occur during exhaling5.

This case serves to emphasise the need for continued vigilance when nursing patients with an indwelling CVC. Central venous access represents a sustained risk for the patient in the postoperative period and should not remain in situ for longer than is absolutely necessary6. We would also question whether it is safe practice to allow patients with a jugular CVC in situ to shave or be shaved by nurses, even with a safety razor. Although postoperative air embolism is a rare complication of CVC placement, a high index of suspicion is necessary to reduce morbidity and mortality.

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References

Low dose sugammadex followed by an anticholinesterase

Sugammadex (Bridion, Schering-Plough, Kenilworth, NJ, USA), despite an effect relatively specific to amino steroid muscle relaxants7, offers the first real advance in the pharmacological reversal of non-depolarising neuromuscular blockade (NMB) in over 50 years. However, a thoughtful approach to its