Massive Air Embolism After Central Venous Catheter Removal

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A 66-year-old patient had a left central venous catheter in place for 8 days. The catheter, which had to be removed, was withdrawn while the patient was in a 180° supine position during a Valsalva maneuver, with positive pressure during removal. A massage at the site of puncture was performed for 3 minutes, and a compressive plaster was applied. Several minutes after removal, the patient, still supine, needed to cough. He immediately became sweaty and breathless, with progressive improvement after 5 to 10 minutes.

However, after 20 minutes, the patient was still coughing and became more breathless and somnolent, with an O₂ saturation of 93% despite O₂ administration of 10 L/min. A strange sound marked by the heart beat was perceived by the medical staff and even heard by the patient. This burbling noise ("bruit de rouet" or "bruit de moulin,"* so called as an analogy to the sound produced by a waterwheel1) was described many years ago and is specifically related to massive air embolism. To the best of our knowledge, this typical sound has only been described as being heard by a stethoscope.

In our patient, massive air embolism in the right heart cavities was confirmed by transthoracic echocardiography (Figure 1A and Data Supplement Movie), which was performed immediately. Firm pressure was applied to the infusion site, and the patient was laid on his left side. Echocardiography was repeated 45 minutes later (Figure 1B). The ECG showed signs of right heart strain (Figure 2). The patient improved slowly until his condition normalized completely after 7 hours.

This case of real-time documentation of air embolism after central venous catheter removal illustrates the potentially life-threatening consequences of this apparently benign procedure.² Air aspiration through the residual perfusion channel during or after central venous catheter removal is a probably not-so-rare and well-known complication.³ This is, to the best of our knowledge, the first real-time documentation of air arrival in the right side of the heart.

References

From Cliniques Universitaires UCL Mont-Godinne, Yvoir, Belgium.

The online-only Data Supplement, consisting of a movie, is available with this article at http://circ.ahajournals.org/cgi/content/full/116/19/e516/DC1.

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*"Bruit de rouet" corresponds to a specific murmur heard with a stethoscope in massive and severe air embolism. This French description makes an analogy to the noise produced by a waterwheel. This term is used in most French textbooks to describe massive air embolism ("bruit de rouet" or "bruit de moulin").

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Figure 1. A, Massive arrival of air bubbles in right chambers of the heart 20 minutes after central venous catheter removal. Right ventricular (RV) end-diastolic diameter was 48 mm, and a clear free-wall dysfunction was observed. LV indicates left ventricle; RA indicates right atrium. B, Forty-five minutes later, no more air bubbles were seen in the right chambers; surprisingly, we observed some residual bubbles in the left ventricle (LV). Note the normalization of right ventricular (RV) free-wall motion with a RV diameter of 32 mm.
Figure 2. The top ECG was performed 3 days before air embolism; the bottom ECG was performed 3 hours after the first air embolism. We observed modified T waves from V1 to V4, probably because of acute right heart strain.