Association between intravascular thermoregulation devices and the development of venous thrombo-embolic phenomenon

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Intravascular thermoregulation devices (ITDs) have proved effective for achieving targeted temperature management in critically ill patients.¹ Previous reports, however, have suggested an association between ITDs and venous thrombo-embolic phenomenon (VTE).² Our local quality improvement initiative explored this possible association.

All patients with ITDs (Thermoguard XP temperature management system³) inserted over a two-year period in our 28-bed intensive care unit (ICU) were identified retrospectively from a departmental record of procedures. Of twenty-five patients who received ITDs, review of medical notes, discharge summaries, and imaging revealed that three had subsequent radiological evidence of VTE.

Of these, one had the ITD inserted to achieve therapeutic hypothermia (target 33°) and the others, for the prevention of pyrexia (target 37.5–38°). In all three patients, ITDs were sited in femoral veins, under ultrasound without peri-procedural complications. In one patient, the VTE was clinically apparent and confirmed with Doppler; in the other two patients, VTE were incidental findings on ECHO and CT. Thrombi were local to the site of ITD placement in the femoral vein in one patient and involved the inferior vena cavae of the other two. One patient later had incidental CT evidence of pulmonary embolism.

Other risk factors for VTE included critical illness, reduced mobility, mechanical ventilation, obesity and medications, namely the combined oral contraceptive pill and antipsychotics. All three patients received prophylactic mechanical treatment against VTE, but pharmacological prophylaxis was held in one case due to bleeding risk. Critically, we note that two of the three cases had ITDs in situ for more than 72 h, longer than the manufacturer's recommendation, and one of these had a combination of ITD and haemofiltration vascular access catheter in the same site for over a week. Review of hospital outcomes demonstrated that all three survived admission and were either discharged home or transferred to another unit for rehabilitation.

Our finding that at least 12% of our ICU patients managed with ITDs over a two-year period had radiological evidence of VTE compares to a similar frequency of 12.7% (CI: 12.7%; 95% CI: 8.7–17.5%) reported for all ICU patients screened for thrombosis in a meta-analysis of seven studies (n = 1783).⁴ We stress, however, that our reported figure represents the minimum frequency, given that we did not routinely screen our patients and noting that two of the three cases were asymptomatic for VTE.

The mechanism of a potential association between ITDs and VTE remain to be clarified, and further investigation is warranted with screening in larger patient groups and comparative studies involving other intravascular devices. Our observation nonetheless highlights the importance of timely removal of ITDs and justifies a high index of clinical suspicion for VTE occurrence, particularly as VTE has been linked to key outcomes including duration of ICU and hospital stay and hospital mortality.⁴ In addition, given that targeted temperature management with the newer (gel-based) surface cooling devices is equally efficacious, there may be a justified move away from the use of ITDs in the future.

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