A Novel Solution: The Key to Un-“lock”ing Catheter Dysfunction?

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Central venous catheter (CVC) dysfunction due to infection, thrombosis, or central venous stenosis continues to be a major source of morbidity and mortality in patients undergoing hemodialysis (1). Intermittent catheter lock solutions, whether antithrombotic, antimicrobial (antipseptic or antibacterial), or a combination thereof, may help minimize these complications (2). Efforts to identify an ideal lock solution that prevents both infection and thrombosis, and angiing, and a multitude of lock solutions has been evaluated in clinical studies with varying results (3, 4).

In the recently published randomized, double-blind, multicenter trial 3 LOCK IT-100 trial (Study Assessing Safety & Effectiveness of a Catheter Lock Solution in Dialysis Patients to Prevent Bloodstream Infection) (5), researchers investigated the efficacy of taurolidine/heparin lock solution in 795 patients undergoing hemodialysis across 70 centers. The primary endpoint was catheter-related bloodstream infection (CRBSI), and the secondary endpoint was catheter patency. Taurolidine is a derivative of the amino acid taurine, with in vitro studies indicating broad antimicrobial activity against gram-positive and gram-negative bacteria, including antibiotic-resistant strains, as well as mycobacteria and clinically relevant fungi, whereas heparin has been the standard of care for preventing catheter-related thrombosis.

A preplanned interim analysis by the Clinical Adjudication Committee led to the Data and Safety Monitoring Board recommendation of terminating the study early due to a highly statistically significant result favoring the taurolidine/heparin solution with no safety concerns or differences in catheter patency between the two groups. In the final analysis, 9 patients (n = 397 [2%]) in the taurolidine/heparin arm developed CRBSI vs. 32 patients (n = 398 [8%]) in the heparin arm—a 71% risk reduction in CRBSI. These findings are consistent with earlier, smaller studies showing significant reduction in CRBSIs in patients undergoing hemodialysis with taurolidine/heparin lock solutions (6).

These promising results led to the US Food and Drug Administration’s designation of the solution as a Qualified Infectious Disease Product (7). Furthermore, the Centers for Medicare & Medicaid Services determined that it met the criteria for the Transitional Drug Add-On Payment Adjustment (8), which provides additional payment reimbursement beyond the End-Stage Renal Disease bundled rate to outpatient practitioners for up to 5 years. These measures will help increase the initial uptake of this proprietary lock solution in outpatient hemodialysis units. However, as a considerable proportion of patients undergoing hemodialysis are under the umbrella of large dialysis organizations, their involvement will be critical for widespread adoption.

Additionally, long-term efficacy and safety data are needed before recommendations can be made for specific patient populations, as a caveat that is universally applicable to all lock solutions is their potential for systemic effects due to leakage into the systemic circulation, despite being localized within the catheter lumen (9). It remains to be seen if the taurolidine/heparin catheter lock solution will become the norm for all patients dialyzing with a CVC or if it will be reserved for those vulnerable patients who are solely dependent on their CVC for dialysis access and in whom a CRBSI would be catastrophic. If longitudinal studies demonstrate decreased morbidity and mortality in the long-term, as well as improved economic impacts downstream from decreased hospitalizations and complications, the paradigm for access choice may change. Consequently, CVCs might be used more liberally for those patients who are not ideal candidates for arteriovenous accesses. In the future, indications may well be expanded to patients not undergoing dialysis who require long-term CVCs for chemotherapy, intravenous antibiotics, or total parenteral nutrition.

The adage, “An ounce of prevention is worth a pound of cure,” still holds true. The best prophylaxis remains avoidance of CVCs for most patients on dialysis. If necessity mandates catheter placement, irrespective of the lock solution used, the “key” to minimizing dysfunction includes education of all dialysis staff and patients on proper catheter care and universal adoption of strict aseptic techniques. These meticulous infection control and hygienic measures may further minimize the morbidity and mortality associated with CVCs (10).

References