Infectious and Thrombotic Complications of Central Venous Catheters

Nadine Nakazawa

Objective: *To provide a review of the pathogenesis, prevention, and management strategies of infectious and thrombotic complications of central venous access devices (CVADs).*

Data Source: *Journal articles, case reports, product information, personal experience, professional guidelines.*

Conclusion: *Infectious and thrombotic catheter-related complications are common and serious complications that can negatively impact patient outcomes. There has been significant national attention on patient safety, and in particular, the prevention of catheter-related bloodstream infections.*

Implications for Nursing Practice: *Clinicians have a crucial role in preventing and identifying CVAD-related complications. Understanding the pathogenesis of infectious and thrombotic complications, the principles of best practice, and adhering to these practices consistently, in all practice settings, are critical in order to minimize unnecessary risks to patients with an indwelling CVAD.*

Key Words: *Central venous catheters, central venous access devices, catheter-related infections, catheter-related bloodstream infections, catheter-related thrombosis.*

CENTRAL venous access devices (CVADs) provide reliable venous access for short-term and extended infusion of intravenous chemotherapy, biotherapy, and supportive therapies in oncology patients during the diagnostic phase, treatment phase, or the palliative phase of their disease course. These therapies can occur over months or many years, depending on the trajectory of their disease, co-morbidities, and complications. Damage can occur to the peripheral veins in which these infusions are delivered, and that damage can be cumulative and permanent.

CVADs are unique devices in that clinicians and primarily nurses use and manage these invasive

Nadine Nakazawa, RN, BS, OCN®, CRNI: *PICC Nurse, Stanford Hospital & Clinics, Stanford, CA. Immediate Past President 2009-2010, Association for Vascular Access.*

Address correspondence to Nadine Nakazawa, 119 Edgehill Dr., San Carlos, CA 94070 e-mail: nnakazawa17@hotmail.com

© 2010 Elsevier Inc. All rights reserved.
0749-2081/10/2602-$32.00/0.
doi:10.1016/j.soncn.2010.02.007

devices. There are published guidelines for the insertion, care, and maintenance of CVADs, but the highest levels of "evidence," randomized controlled clinical trials (RCTs), have been performed primarily with temporary CVADs in the intensive care population and only on selective clinical issues. There are many unanswered questions about specific practices, products, procedures, types of catheters, and use in different practice settings. There is a lack of a consistent knowledge about these devices, which leads to significant variation in procedural practices from clinician to clinician even in the same health care organization. A consistent adherence by all practitioners to the most recent guidelines is required to prevent the patient from acquiring catheter-related infectious and thrombotic complications. These common catheter-related complications can significantly impact patient outcomes by delaying or complicating treatment or management of their disease. This article will address the pathogenesis of catheter-related infectious and thrombotic complications and prevention and management strategies.

Issues Related to Catheter Insertion and Venous Anatomy

To understand how and why these complications occur, a brief overview of venous and skin anatomy is imperative. Long-term central venous catheters, such as tunneled catheters or implanted ports, are usually placed on the upper chest wall below the clavicle, with the catheter tunneled in the subcutaneous tissue over the clavicle and inserted into the internal jugular vein. Alternatively, the catheter can be tunneled up to the infraclavicular area and the catheter inserted into the axillary/subclavian vein outside the border of the lung fields. Once healed, the pocket of an implanted port or the tunnel of a tunneled CVAD provide a barrier to block bacteria from migrating down the catheter tract to the bloodstream. Catheters should not be inserted into the subclavian vein in the narrow juncture near the sternal border between the clavicle and first rib because this may cause the catheter to be compressed or "pinched" between these two boney structures. This "pinching" occurs with arm movement, leading to impingement of the catheter when attempting to infuse or withdraw to obtain a blood return. Repeated wear and tear on that portion of the catheter can lead to catheter fracture or embolus. Proper catheter placement at the time of insertion by a clinician who specializes in vascular access is key to preventing kinking of the catheter at the insertion site or anywhere in the tunnel up to the insertion site into the vein. Poor choice of catheter type and/or size and insertion techniques are major causes of catheter dysfunction caused by mechanical kinking or less than ideal catheter tip placement.[1,2]

Peripherally inserted central catheters (PICC) are CVADs that are inserted percutaneously into a large upper arm vein and advanced to the central circulation. Ideally, a PICC is placed using ultrasound guidance into a large vein in the upper arm, decreasing kinking and thrombophlebitis rates that were more commonly seen when PICCs were placed using a landmark approach in the antecubital fossa. PICCs can dwell for months at a time, as long as the patient needs the device and there are no complications. PICCs may be the ideal device for patients with infectious complications for the delivery of IV antibiotics over the course of many weeks, for patients with bowel obstructions or malabsorption who need parenteral nutrition for weeks or months, or for patients with thrombocytopenia or other bleeding coagulopathies for whom central access into the thoracic vessels is contraindicated.[1,3-5]

Catheter Tip Location

The ideal catheter tip location for all types of CVADs is in the vicinity of the lower one-third of the superior vena cava (SVC), near the juncture with the SVC. At this point, the catheter tip is free-floating in the lumen of the SVC, parallel to the vessel walls. Any type of infusate, whether vesicant, irritant, highly alkaline or acidic, or highly osmolar, can be infused safely because of the high rate of blood flow returning through the SVC to the right side of the heart providing adequate hemodilution.[6-9] The Oncology Nursing Society reiterated the 1989 US Food and Drug Administration recommendation that a catheter tip should not reside in the right atrium.[10] The Association for Vascular Access, the Infusion Nursing Society, and other organizations strongly recommend that the catheter tip should reside in the SVC, preferably in the lower third near the junction of the right atrium.[6,9,11] Several studies have shown that there is a relatively low risk of deep vein thrombosis associated with catheter tips positioned in the lower third of the SVC, versus very high rates of thrombosis when tips are placed in the upper third of the SVC or higher vessels.[7,8]

Download English Version:

https://daneshyari.com/en/article/2676755

Download Persian Version:

https://daneshyari.com/article/2676755

Daneshyari.com