



Open- vs Closed-Tip Valved Peripherally Inserted Central Catheters and Midlines: Findings from a Vascular Access Database

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Abstract

Today's patients are more complex in terms of comorbidities and other conditions requiring multiple, long-lasting therapies such as chemotherapy, total parenteral nutrition, blood transfusion or blood component infusions, and frequent blood sampling. The use of central venous catheters represents an important aspect of care for many patients. It is essential to inform health care workers of the risks associated with central venous catheters such as systemic and infectious complications, mechanical complications, and/or thrombotic complications. To maintain monitoring of our peripherally inserted central catheter team's activity, we developed and adopted a database in which all the data regarding each catheter are recorded. By doing that, we have improved catheter management, clinical efficiency, as well as achieved a cost reduction. We implanted 1416 vascular access devices in 1341 patients of both sexes (632 male and 709 female) for a total of 135,778 vascular access device-implant days between March 2010 and December 2013 for several indications. We have followed-up total complications and we correlated them with the need for catheter removal. The results were that open-tipped catheters resulted in both more complications and a greater need for removal.

Keywords: PICC, midline, Groshong

Introduction

Infusion therapy is complex, invasive, high volume, and risk prone, yet required as a lifesaving therapy for many patients, especially because today's patients are more complex in terms of comorbidities and other conditions requiring multiple, long-lasting therapies such as chemotherapy, total

parenteral nutrition (TPN), blood transfusion or blood component infusions, and frequent blood sampling.^{1,2} So, the clinicians involved in infusion therapy and consequently in the selection, implant, and management of vascular access devices should adopt the concept of a vascular access planning by shifting their approach to this problems toward the so-called "proactive approach" in place of the traditional "reactive approach."³

To achieve these goals, the adoption of safe technologies can be the turning point for effective and outstanding medical care.

The use of central venous catheters (CVCs) represents an important aspect for many patients today. It is essential to

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Figure 1. Registry cover with the different options.

inform health care workers of the risks associated with CVCs, such as systemic and infectious complications, mechanical complications, and/or thrombotic complications. It is also important to record all the events related to each vascular access device (VAD) for its entire dwell time.

Rationale

The rationale for our work is based on the fact that in the Azienda Ospedaliera Hospital a nursing peripherally inserted central catheter (PICC) team has been active working with PICC and midline devices for >4 years.⁴⁻⁶

One of the aims of the PICC team is the continuous monitoring of the quality of its work and the patient outcomes associated with that work.

To achieve this goal, the team maintains complete traceability of each catheter from the time of the implant to the removal with a sort of “VAD history.” This is helpful to review and eventually update all the different stages regarding the use of a VAD:

- Implant - Who is going to implant it? What kind of VAD? What is the indication for the implant?
- Management - Where is it used? Who is going to care for it?
- Removal - Why is it being removed? Note all complications encountered.

Furthermore, the medical device industry continues to provide new technology that offer different indications for use and different care regimens.

We used several different types of catheters over the course of our study. The knowledge of individual catheter features and performance was crucial to choose the ideal catheter for each patient. Unfortunately there are not many studies in the literature that can be used to direct catheter choices based on proven outcomes.^{7,8}

To be able to maintain the monitoring of our activity, we developed and adopted a database in which all the data regarding each catheter are recorded. By doing that, we have improved management and clinical efficiency as well as achieved a cost reduction.⁹

Materials and Patient Populations

Our retrospective, analytic, and monocentric study is based on the data related to VADs that was collected from March 1, 2010, to December 31, 2013, in the Gorgonzola Hospital Oncology Department - A.O. Melegnano (Lombardia, Italy). It includes all the adult oncology patients receiving PICC and midline catheters, particularly focusing on infections and mechanical and thrombotic complication rates occurring through the entire life span of such devices.^{10,11}

Five different kinds of PICC and 3 midline catheters were used:

- 4F single-lumen silicone, valved-tip PICC (Groshong PICC; Bard Access Systems, Salt Lake City, UT),
- 4F single-lumen polyurethane power injectable PICC (Turbo-Ject; Cook Medical, Bloomington, IN),

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