

A Short Commentary on the Risks of Infected Vascular Catheters Retention and the Difficulty of Removal in Persistently Neutropenic Patients Affected by Hematological Malignancies

Elena Amabile*, Luca Vincenzo Cappelli and Alessandra Micozzi

Department of Translational and Precision Medicine, Sapienza University of Rome, Rome, Italy

*Corresponding author: Dr. Elena Amabile, Department of Translational and Precision Medicine, Sapienza University of Rome, Rome, Italy, E-mail: amabile@bce.uniroma1.it

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Abstract

Central Venous Catheter-Related (CVC) infections are of particular importance in onco-hematological patients, who frequently require these devices for chemotherapy administration, blood transfusion and parenteral nutrition. These patients are at particular risk of central venous catheter related infections due to the disease and treatment-related immunosuppression. Neutropenia is an important risk factor for CVC-related infections and correlates with an increased risk of mortality. Infected CVCs can expose patients to a risk of developing complications as disseminated infections and endocarditis. Thus, in our report we underline the importance of removing the CVC as soon as possible in the presence of pathogens known for their role in the development of CVC-related infections. Management difficulties are related to the absence of a ready-to-use intravascular device in those who are often patients in critical clinical conditions.

Keywords: Catheter; Blood transfusion; *Candida* infections; Antibiotics

About the Study

We reported a case of central venous catheter-related *Candida parapsilosis* fungemia evolved to disseminated infection with skin and ocular involvement in a neutropenic patient undergoing re-induction chemotherapy because of a recurrence of blast crisis of chronic myeloid leukemia [1]. In this patient, the delay in vascular catheter removal facilitated the spreading of a mild pathogen (*C. parapsilosis*) which revealed its ability to cause a potentially lethal infection in a deeply immunocompromised host. *C. parapsilosis* is able to colonize polyurethan devices so we encountered important difficulties in managing the infection due to the need to maintain venous access that guaranteed the patient adequate support in fluids and antimicrobials agents. However, the infection's source persistence led to a persistent fungemia despite the best antifungal therapy administered with the development of a disseminated infection [1].

CVC related infections outcomes and management in neutropenic onco-hematological patients

Early CVC removal within 3 days has been reported to have a positive effect on early mortality rates in patients with CVC related Candidemia treated with antifungal therapy [2]. More than 80% of cases of *Candida* infection were documented in patients with acute leukaemia [2]. The attributable mortality rate was 33%. Species-specific attributable mortality rate ranged from 6% for infections caused by *C. parapsilosis* to 54% for those due to *C. tropicalis*. The underlying hematologic malignancy, severity of immunosuppression, and presence of indwelling devices represent determinant factors for the outcome more than any antifungal therapy [2].

As the retention of the CVC in patients with suspected CVC-related infection can result in treatment failure or recurrence of infection in spite of antibiotic therapy, CVC removal is encouraged in all patients whenever possible [3]. Early CVC removal is particularly indicated in patients with deteriorating clinical state, sepsis or septic shock and in case of severe complications such as endocarditis, septic thrombosis, abscess formation and osteomyelitis. CVC removal is also warranted in case of continued positive blood cultures 72 hours after initiation of therapy in spite of appropriate antimicrobial therapy. CVC retention along with systemic antibiotic treatment may be acceptable in hemodynamically stable patients under careful surveillance and for selected pathogen. Early CVC removal is always recommended in patients with CVC-related infections due to *Candida* spp. and *Staphylococcus aureus* [3]. *S. aureus* is the most prevalent pathogen of Infective Endocarditis (IE); it comprises 60% of cases and is associated with the use of intravascular catheters [4]. Almost 10% of IE occur in hospitalized patients except for patients with valvular replacement; more than 80% of the patients have an endovenous indwelling catheter [4]. *S. aureus* is more common in nosocomial acquisition than in community acquired infections [4]. Several studies in patients with *S. aureus* bacteremia indicate an increased risk for hematogenous complications, relapse of infection and death of infection if the CVC is retained after detection of *S. aureus* [3]. El Zackhem and colleagues reported a higher rate of relapse in cancer patients whose CVC was retained beyond 3 days compared with those whose CVC was removed or exchanged within the first 3 days from the onset of bacteremia [3,5]. *Enterococcus* species are the third most common organisms causing Central Line-Associated Bloodstream Infections (CLABSI). The management of enterococcal CLABSI,

including the need for and timing of catheter removal, is not well defined [6,7]. In a study on the management of Enterococcal central-line associated bloodstream infections in patient with cancer. Awad, et al. showed that patients with Mucosal Barrier Injury (MBI) were more likely to have a higher rate of neutropenia, a significantly higher rate of bacteremia by Vancomycin Resistant Enterococcus (VRE) and a significantly higher mortality rate [7]. Early CVC removal in less than 3 days was associated with a better overall outcome compared to late removal between 3 and 7 days (78% vs. 67%, $p=0.003$) [7]. IE is a rare

occurrence among patients with acute leukemia; the often low platelet count might be a cause for this low frequency [6]. Left-sided IE is an indication for surgical intervention but high rates of complications are related to surgical valve procedures for treatment of IE [4,6].

At our institute there have been 2 cases of infective endocarditis on native mitral valve in neutropenic patients suffering from haematological neoplasms, both bearing a CVC. Their clinical and microbiological characteristics are shown in Table 1.

Sex	Age	Hematological malignance	Chemotherapy	Pathogen isolated	Antimicrobial therapy	CVC removal	Valve replacement
M	58	Myelofibrosis	Thiotepa, busulfan, fludarabine conditioning regimen + allogenic HSCT	<i>S.aureus</i> MRSA	Daptomycin	Yes	Yes
M	65	AML	Azacytidine	VRE	Linezolid	Yes	Yes

Table 1: Clinical and microbiological characteristics of the 2 cases of IE at our institution.

Conclusion

In presence of pathogens known for their ability to colonize intravascular devices such as *Candida parapsilosis* and other *Candida* species, *S. aureus* and *Enterococcus* spp. It is necessary to proceed with the removal of the catheter as soon as possible, because the permanence of the infectious source significantly reduces the action and effectiveness of the antibiotic therapy, with the risk of serious complications as disseminated infections or endocarditis.

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