

the 123 patients in our study were thought to have died due to a port-related bacteremia. Both were patients with acquired immunodeficiency syndrome and a high degree of immunosuppression (CD4 counts of 41 and 58 cells/mm³ at the time of device implantation). Excluding these two cases, nearly two thirds (21) of the remaining 32 infections did not require removal of the PAS-Port device to treat infection. In 6 of the 11 cases where the device was removed, infection was due to *S aureus*.

A limitation of our study was that detailed information about the frequency of device access was not available from the medical records. More frequent PAS-Port access could potentially elevate a patient's risk of infection, and frequency of access may vary greatly between different underlying illnesses, depending on treatment regimens. In addition, for certain underlying oncological diagnoses, there were very few patients, which limited the usefulness of comparisons between underlying illness groups.

In summary, our study provides useful information regarding the risk and rate of catheter-associated infections related to the use of a long-term implantable vascular access device (PAS-Port), especially among HIV-infected individuals. While infections occurred in a quarter of patients, the overall infection rate per 1,000 device days was relatively low. The majority of infections were due to gram-positive bacteria. The specific underlying illness may be an important predictor of the risk of infection in patients with long-term venous access devices.

REFERENCES

- Kahn ML, Barboza RD, King GA, Heisel JE. Initial experience with percutaneous placement of the PAS Port implantable venous access device. *Journal of Vascular and Interventional Radiology* 1992;3:459-461.
- Foley MJ. Radiologic placement of long-term central venous peripheral access system ports (PAS Port): results in 150 patients. *Journal of Vascular and Interventional Radiology* 1995;6:255-262.
- Rubenstein EB, Fender A, Rolston KVI, Elting LS, Prasco P, Palmer J, et al. Vascular access by physician assistants: evaluation of an implantable peripheral port system in cancer patients. *J Clin Oncol* 1995;13(6):1513-1519.
- Brant-Zawadzki M, Anthony M, Mercer EC. Implantation of P.A.S. port venous access device in the forearm under fluoroscopic guidance. *AJR* 1993;160:1127-1128.
- Lundberg G, Wahlberg E, Rickberg A, Olofsson P. PAS-Port: a new implantable vascular access device for arm placement: experiences from the first two years. *Eur J Surg* 1995;161:323-326.
- Maki DG. Pathogenesis, prevention, and management of infections due to intravascular devices used for infusion therapy. In: Bisno AL, Waldvogel FA, eds. *Infections Associated With Indwelling Medical Devices*. 2nd ed. Washington, DC: American Society for Microbiology; 1994:155-212.
- Norwood S, Ruby A, Civetta J, Cortes V. Catheter-related infections and associated septicemia. *Chest* 1991;99:968-975.
- Pearson ML, Hospital Infection Control Practices Advisory Committee. Guideline for prevention of intravascular-device-related infections. *Infect Control Hosp Epidemiol* 1996;17:438-473.
- Groeger JS, Lucas AB, Thaler HT, Friedlander-Klar H, Brown AE, Kiehn TE, et al. Infectious morbidity associated with long-term use of venous access devices in patients with cancer. *Ann Intern Med* 1993;119:1168-1174.
- Johnson JA, Dirlake RH. Peripherally-placed central venous access ports: clinical and laboratory observations. *Am Surg* 1994;60(12):915-919.
- Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definitions for nosocomial infections, 1988. *Am J Infect Control* 1988;16:128-140.
- Gilbert DN, Dworkin RJ, Raber SR, Leggett JE. Outpatient parenteral antimicrobial-drug therapy. *N Engl J Med* 1997;337:829-838.
- Skies DJ, Grant P, Keiser PP. Nontunneled central venous catheters in patients with AIDS are associated with a low infection rate. *J Acquir Immune Defic Syndr Hum Retrovirol* 1998;17:220-226.
- Dega H, Eliaszewicz M, Gisselbrecht M, Fleury J, Pialoux G, Janssen B, et al. Infections associated with totally implantable venous access devices (TIVAD) in human immunodeficiency virus-infected patients. *J Acquir Immune Defic Syndr Hum Retrovirol* 1996;13:146-154.
- Sweed M, Guenter P, Lucente K, Turner JL, Weingarten MS. Long-term central venous catheters in patients with acquired immunodeficiency syndrome. *Am J Infect Control* 1995;23:194-199.
- Raviglione MC, Battan R, Pablos-Mendez A, Aceves-Casillas P, Mullen MP, Taranta A. Infections associated with Hickman catheters in patients with acquired immunodeficiency syndrome. *Am J Med* 1989;86:780-786.
- Mukau L, Talamini MA, Sitzmann JV, Burns RC, McGuire ME. Long-term central venous access vs other home therapies: complications in patients with acquired immunodeficiency syndrome. *Journal of Parenteral and Enteral Nutrition* 1992;16:455-459.
- Stanley HD, Charlebois E, Harb G, Jacobson MA. Central venous catheter infections in AIDS patients receiving treatment for cytomegalovirus disease. *J Acquir Immune Defic Syndr Hum Retrovirol* 1994;7:272-278.
- Skoutelis AT, Murphy RL, MacDonell KB, VonRoenn JH, Sterkel CD, Phair JP. Indwelling central venous catheter infections in patients with acquired immune deficiency syndrome. *J Acquir Immune Defic Syndr Hum Retrovirol* 1990;3:335-342.
- Widmer AF. Intravenous-related infections. In: Wenzel RP. *Prevention and Control of Nosocomial Infections*. 3rd edition. Baltimore, MD: Williams and Wilkins; 1997:777,794.

Vancomycin-Resistant Enterococci and Biomaterial Surfaces

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Enterococci are a frequent cause of nosocomial infections and often are found adherent to indwelling catheters. Concern about such device-associated infections has increased with the appearance of vancomycin-resistant (VR) enterococci. However, the possible influence of vancomycin resistance in the pathogenesis of biomaterial-centered infection has not yet been assessed. Using polyethylene terephthalate (PET) disks as model

surfaces, Su and coinvestigators from Baylor College of Medicine, Houston, Texas, evaluated possible differences in the adherence and persistence of vancomycin-sensitive (VS) and VR strains of *Enterococcus faecium* and *Enterococcus faecalis* on biomaterial surfaces in vitro and in vivo. The results indicated that (1) as expected, the clearance of free VR and VS organisms after intraperitoneal injection into normal mice is equally efficient; (2) in vitro, VR bacteria are roughly twice as adherent to plasma-coated PET surfaces as are VS organisms; (3)

however, in vivo persistence of VS organisms preadherent to biomaterial implants is 5- to 10-fold better than that of preadherent VR organisms. The authors conclude that a discrete change in bacterial cell-wall composition between VR and VS enterococci may contribute to the substantial differences in bacterial adhesion and survival of adherent organisms.

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