

Bacteremia, Infection, and Antibiotic Choices

The report by Jacobs et al¹ in this issue of RESPIRATORY CARE reports the effects on infectious complications of changing the approach to antibiotic coverage prior to performing percutaneous dilational tracheotomy (PDT) in intensive care unit patients. The experimental protocol included clinically assessing the patient for evidence of infection and obtaining blood cultures before and for 5 days following PDT. The major finding in the pre-protocol group was that patients found to be infected prior to PDT were more likely to become bacteremic or to develop septic shock in the days following PDT. The protocol consisted of treating bacteremia or lower respiratory tract infection with appropriate antibiotics prior to performing PDT. This delayed the performance of the PDT while the antibiotics treatment occurred and also lengthened intensive care unit stay, but, happily, was associated with a small reduction in mortality. The major impact of the protocol was to begin treatment of infected patients with appropriate antibiotics prior to performing PDT. It is not clear that antibiotic changes were the only reason for the observed improvement. Attention of caregivers to barrier precautions, hand washing, and invasive catheter management probably improved as well under the protocol.

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The Jacobs et al report does not address the question of the value of antibiotic prophylaxis in the performance of PDT. It is not clear whether the performance of PDT is associated with increased infection risk. What *is* supported is the aggressive identification of infected patients and the use of culture-directed antibiotics.

Most clinicians agree, although not without controversy, that empirical antibiotic prophylaxis (single-dose, broad-spectrum antibiotic including Gram-negative coverage) has been shown to reduce wound infections, sepsis, and bacterial endocarditis following elective and emergency surgery.^{2,3} Whether antibiotic prophylaxis is useful in minor procedures or clean operations performed in non-infected patients is not clear.⁴ PDT can be considered a minor procedure. However, the trachea is almost always colonized in patients intubated for more than 5 days. Bactere-

mia is a frequent occurrence in healthy patients. For instance, following either oral or nasal intubation, the incidence of bacteremia may be as high as 25%.⁵ The implications of isolated bacteremia are not clear.⁶ None of the patients with positive blood cultures reported in the intubation study mentioned above developed any signs of local or systemic infection.⁷

In evaluating the data in the Jacobs et al report, it appears that cutaneous wound infection was not seen in any of the patients, either before or following the infection treatment protocol. This suggests that prophylaxis as such is unnecessary for PDT; it is equivalent to a clean surgical procedure. However, the lower respiratory tract was frequently colonized, and bacteremia occurring during PDT was usually due to these organisms. Antibiotic therapy directed toward this group of organisms may have reduced bacteremia and prevented infection in the protocol-treated group. It is interesting that the single patient who developed septic shock in the protocol group had no signs of previous infection and had persistently negative blood cultures. The implications of the Jacobs et al study are (1) if an invasive procedure is planned on a patient with lower respiratory tract colonization or infection, antibiotic treatment, perhaps for several days, should be given to reduce the infectious complications, and (2) patients without active infection or substantial colonization require no antibiotic administration prior to PDT.

Many unanswered questions remain. Should asymptomatic bacteremia be treated with antibiotics? Should tracheal colonization be treated if no invasive procedure is planned? What is an invasive procedure? Is intubation a risk for dissemination of bacteria, and should infected patients receive prophylaxis? What about bronchoscopy? What about simple tracheal suctioning? It must be recognized that antibiotics are only supportive therapy. Infected patients must clear the infection with their own immune response. Antibiotics may help by reducing the load of infectious agents, but the host must do most of the work. A healthy host will have no problems with even a substantial bacteremia, but a chronically ill host may fail to contain organisms even with the help of appropriate antibiotics.⁸ Other general measures of antisepsis (eg, hand washing, sterile barriers, and aseptic technique) probably contribute more to prevention of infectious complications

from critical illness and invasive procedures than does antibiotic prophylaxis.

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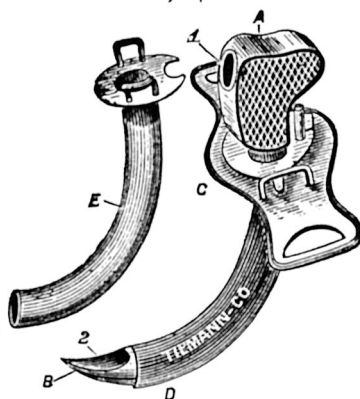
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