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To Remove or Not to Remove – Central Line Infections

Lane and Matthay, "Central Line Infections." *Current Opinions in Critical Care* 2002, 8:441-448.
McGee and Gould. "Preventing Complications of Central Venous Catheterization." *NEJM* 2003, 348: 1123-33.
Mermel et al, "Guidelines for the Management of Intraveascular Catheter-Related Infections." *Clinical Infectious Diseases* 2001, 32: 1248-72.

Key Points:

- **Determine this is a true infection vs. colonization**
- **Decision to remove is based on patient-related factors, organism, and catheter**
- **Risk vs. benefit should include risk of complicated bacteremia and morbidity / mortality from infection vs. risk of re-insertion of catheter**
- **Remember: guidelines are simply guidelines (note the level of evidence)**

Epidemiology / Cost

- 80,000 episodes of catheter-related bloodstream infections (CR-BSI) per year -> 2400 – 20,000 deaths
- Increased length of hospitalization and morbidity
- Coag-negative staphylococcus, Staph aureas, Enterococcus, Candida albicans
    - Mortality 8.2% for Staph aureus compared with 0.7% coag-negative staph
    - Increasing resistance

Definition / Diagnosis

- Bacteremia / fungemia with
    - Clinical signs of infection (fevers, chills, tachycardia, hypotension, WBC)
    - No evidence other source
    - Same organism peripheral and from CVC
- Infection vs. colonization: >=15 CFU by semiquantitative (roll-plate) or >=10^2 by quantitative (sonication)per catheter segment or 5:1 CVC vs. peripheral
    - Semi-quantitative: 60% sensitivity (increased for catheters placed <1 week)
    - Quantitative: 80% sensitivity (should be used for >1 week catheters)
    - Flush culture (also quantititative): 40-50% sensitivity
- Differential time to positivity: catheter culture positive 120 minutes before peripheral culture
    - Studied in long-term catheters or implanted devices, without extensive prior antibiotics
- Cultures drawn from catheter: study of hospitalized patients with cancer and indwelling CVC -> PPV 63% and NPV 99% (peripheral cultures PPV 73%, NPV 98%) – good for excluding CR-BSI

Removal of catheter

- 80% of catheters removed are not infected
- Risk / benefit: risk of complications from CR-BSI vs. risk of re-insertion of new catheter
    - Patient
        - Immunocompromise
        - Degree of illness
        - Persistence of illness despite antibiotics
    - Catheter
        - Local signs of infection (remember poor sensitivity for physical exam)
        - Catheter culture results
    - Organism
        - Type of organism
        - Persistent positive cultures
- Nontunneled CVC:
    - Severe disease or erythema / puruslence at exit site
    - Clinical signs of unexplained sepsis
    - Positive blood cultures with significant colonization by quantitiative or semiquantitative cultures
- Tunneled CVC:
    - Complicated infections (septic thrombosis, endocarditis, osteomyelitis)
    - Pocket infections or port abscesses

    - Postpone reinsertion until repeat cultures negative after treatment (preferably after full course)
- Organisms:
    - Bacillus and Corynebacterium; Mycobacterium fortuitum, mycobacterium chelonae; Pseudomonas (other than aeruginosa), B. Cepacia, Stenotrophomonas, Agrobacterium, Acinetobacter
    - Candidemia from catheter infection

Prevention

- Choice of insertion site (subclavian over femoral)
- Indwelling time (3-5% after 3 days, 5-10% after 7 days)
- Type of catheter:
    - Silver-impregnated catheters
    - Chlorhexidine/silver sulfadiazine (decrease direct medical costs by $196 per catheter)
    - Minocycline- and rifampin-coated catheters (effective in one randomized trial, ? resistance in animal models, no cost-effectiveness study)
- Catheter care: antibiotic ointment promotes fungi and resistance, ? gauzes and frequency of dressing changes
- Maximum sterile barriers and procedure
- Routine guidewire exchange or reinsertion at new site not recommended except for pulmonary artery catheters

See additional handout from IDSA guidelines (2001)