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Please read this section first

The HPCSA and the Med Tech Society have confirmed that this clinical case study, plus your routine review of your EQA reports from Thistle QA, should be documented as a "Journal Club" activity. This means that you must record those attending for CEU purposes. Thistle will **not** issue a certificate to cover these activities, nor send out "correct" answers to the CEU questions at the end of this case study.

The Thistle QA CEU No is: **MT-13/00142**.

Each attendee should claim **THREE** CEU points for completing this Quality Control Journal Club exercise, and retain a copy of the relevant Thistle QA Participation Certificate as proof of registration on a Thistle QA EQA.

MICROBIOLOGY LEGEND

CYCLE 35 ORGANISM 2

Enterobacter aerogenes

Enterobacter aerogenes is a Gram-negative, oxidase negative, catalase positive, rod-shaped, nosocomial and pathogenic bacterium that causes opportunistic infections in skin and other tissues. Some strains can become very treatment resistant, a result of their colonization within hospital environments.

Enterobacter species, particularly Enterobacter cloacae and Enterobacter aerogenes, are important nosocomial pathogens responsible for various infections, including bacteremia, lower respiratory tract infections, skin and soft-tissue infections, urinary tract infections (UTIs), endocarditis, intra-abdominal infections, septic arthritis, osteomyelitis, CNS, and ophthalmic infections.

Risk factors for nosocomial Enterobacter infections include hospitalization of greater than 2 weeks, invasive procedures in the past 72 hours, treatment with antibiotics in the past 30 days, and the presence of a central venous catheter. Specific risk factors for infection with nosocomial multidrug-resistant strains of Enterobacter species include the recent use of broad-spectrum cephalosporins or aminoglycosides and ICU care.

These "ICU bugs" cause significant morbidity and mortality, and infection management is complicated by resistance to multiple antibiotics. Enterobacter species possess inducible beta-lactamases, which are undetectable in vitro but are responsible for resistance during treatment. Physicians treating patients with Enterobacter infections are advised to avoid certain antibiotics, particularly third-generation cephalosporins, because resistant mutants can quickly appear. The crucial first step is appropriate identification of the bacteria. Antibiograms must be interpreted with respect to the different resistance mechanisms and their respective frequency, as is reported for Enterobacter species, even if routine in vitro antibiotic susceptibility testing has not identified resistance.

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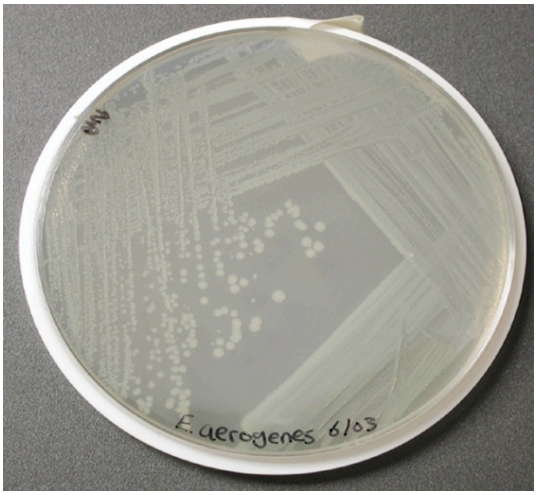
Signs and symptoms

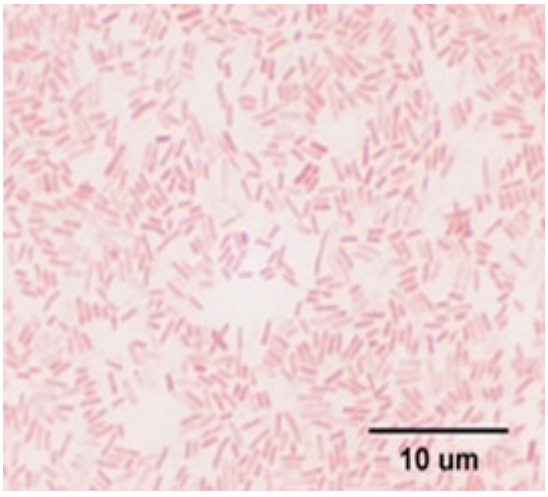
Enterobacter infections do not have a clinical presentation that is specific enough to differentiate them from other acute bacterial infections. Enterobacter lower respiratory tract infections can manifest identically to those caused by Streptococcus pneumoniae or other organisms.

Laboratory studies

Factors in the microbiologic diagnosis and assessment of Enterobacter infection include the following:

- The most important test to document Enterobacter infections is culture; when the patient presents with signs of systemic inflammation (e.g. fever, tachycardia, tachypnea) with or without shock (e.g. hypotension, decreased urinary output), blood cultures are mandatory
- Direct Gram staining of the specimen is also useful, because it allows rapid diagnosis of an infection caused by gram-negative bacilli and helps in the selection of antibiotics with known activity against most of these bacteria
- In the laboratory, growth of Enterobacter isolates is expected to be detectable in 24 hours or less; Enterobacter species grow rapidly on selective (i.e. MacConkey) and nonselective (i.e. sheep blood) agars





Gram Negative Stain

Management

Antimicrobial therapy is indicated in virtually all Enterobacter infections. With few exceptions, the major classes of antibiotics used to manage infections with these bacteria include the following:

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- Beta-lactams: Carbapenems are the most reliable beta-lactam drugs for the treatment of severe Enterobacter infections; fourth-generation cephalosporins are a distant second choice
- Aminoglycosides: Aminoglycoside resistance is relatively common and varies widely among centers
- Fluoroquinolones have good bactericidal activity against gram-negative bacilli; their bioavailability ranges from very good to excellent (with the exception of norfloxacin). Newer quinolones have increased their spectrum toward gram-positive organisms and, in some cases, toward
- Trimethoprim-sulfamethoxazole (TMP-SMZ): Resistance to TMP-SMZ is more common
- Ciprofloxacin and levofloxacin have the best activity against gram-negative bacilli and should generally be selected over the newer fluoroquinolones if clinically indicated.

Bacterial resistance to antibiotics continues to be a significant threat. Many strains of Enterobacter species are already resistant to many antibiotics. The presence of inducible resistance genes on plasmids in other members of the Enterobacteriaceae family is concerning for the possibility of transfer of genes between bacteria, resulting in the development of further resistance in Enterobacter species. Good antibiotic prescription, good monitoring of bacterial resistance, and good infection-control practices are among the most important measures that should be in place in each hospital.

References

1. http://emedicine.medscape.com/article/216845-differential
2. microbewiki.kenyon.edu/index.php/Enterobacter_aerogenes

Questions

1. What are the characteristics of E. aerogenes?
2. What are the risk factors for E. aerogenes?
3. What is the recommended treatment protocol for E. aerogenes?

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