Legionnaire`s disease

Health & Medicine, Disease

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Since the identification of Legionella two decades ago, a significant amount of information has accumulated concerning the microbiology, epidemiology, clinical manifestations, control, and therapy of infections caused by these organisms. The number of species in the genus Legionella has increased dramatically. Legionella is considered to be responsible for 2–13% of cases of community-acquired pneumonia requiring hospitalization (Brieman and Butler, 1998).

The various Legionella species can cause two distinct diseases: a severe form of pneumonia known as Legionnaire disease or a less serious, influenza-like illness known as Pontiac fever, which is generally recognized only during those outbreaks in which a cluster of cases of Legionella pneumonia sparks an epidemiologic investigation that uncovers these less serious infections.

Microbiology

The organism is a Gram-negative bacillus. There are currently 42 described species of Legionellae representing 64 serogroups in thefamily(Benson and Fields, 1998). Legionellaceae and the genus Legionella. The phenotypic characteristics of Legionellae are defined by growth requirements, and biochemical characteristics including fatty acid analysis and ubiquinone analysis, protein profiles, carbohydrate analysis, serology, monoclonal antibodies, and molecular techniques (DNA-DNA hybridization).

L. pneumophila is a facultative intracellular pathogen that invades and replicates within free-living protozoa (i. e. amoeba) and mammalian cells (Benson and Fields, 1998). Within natural environments, L. pneumophila can persist as a free-living microbe, but it replicates exclusively as an intracellullar parasite within amoeba. L. pneumophila causes Legionnaire's disease by replication in alveolar macrophages and monocytes.

During infection the Legionnaire's disease bacterium survives and multiplies within a specialized phagosome that is near neutral pH and does not fuse with host lysozymes. Studies show that the regulation of macrophage resistance versus susceptibility to infection is mediated by specific genetic mechanisms. The induction of cytokines by Legionella can activate immune cells, especially T helper cells. Activated macrophages restrict the growth of Legionella (Segal and Shuman, 1998)

Epidemiology

Cases can occur in clusters or sporadically from the community or in the hospital setting. The disease is much more common than previously

appreciated with at least 13 000 cases estimated to occur per year in the United States (Brieman and Butler, 1998). There may also be local environmental factors that are important and still not well defined.

Although immunosuppressed patients and specifically transplant patients seem to have a higher risk of developing Legionnaire's disease, there are many more non-immunosuppressed individuals in the community who may be infected with Legionella. nvestigations into community outbreaks still find cooling towers to be a source of the Legionella

Clinical Manifestation

Luttichau et al(1998) investigated an outbreak of Pontiac fever in children and adults, caused by a contaminated whirlpool. The authors isolated L. pneumophila serogroup OLDA from one of the children and believe that this represents the first reportedculture-confirmed case of Pontiac fever. The outbreak was characterized by a short incubation period, influenza-like symptoms, and rapid recoveries, all features typical of Pontiac fever.

The median incubation period for the children was shorter (43 h) than for the adults (70 h). The median duration of the illness was 87 h for the children versus 61 h for the adults. The most common symptoms noted by the adults were fever, dizziness, headache, cough, fatigue, arthralgia and abdominal pain. Ear pain and rash were more common in children.

Diagnosis

The diagnosis of Legionnaire's disease remains troublesome in many hospitals. Serological studies are useful too late for the clinician and cultures

must be incubated for at least 3 days. Legionella urinary antigen assays are useful early in clinical disease but the kits that are currently available only identify patients with disease caused by L. pneumophila serogroup 1. Recent improvements in the methodology for performing polymerase chain reaction on bronchoalveolar lavage solutions are encouraging (Chiba etal, 1998)

Treatment

Antimicrobial agents generally considered clinically effective for Legionella infections include macrolides, fluoroquinolones, tetracyclines, and rifampins. In a study several new antimicrobial agents with in-vitro activities against Legionellae that were found better than those of erythromycin; included were a new rifampin-like drug, rifapentine, dalfopristin-quinupristin, and a new ketolide (HMR3647).

The advantages of the quinolone agents include bactericidal activity against Legionella and a prolonged post-antibiotic effect whereas erythromycin is only inhibitory. In an additional study using HL-60 cells to evaluate new macrolides, Stout et al (1998)documented that the most active inhibitors of L. pneumophila intracellular multiplication were (in order of activity) azithromycin, erythromycin, roxithromycin, dirithromycin and clarithromycin.

In a recent editorial, Edelstein (1998) suggested that azithromycin or one of the more active fluoroquinolones should be used in preference to erythromycin for the treatment of Legionnaire's disease in immunocompromised patients, based on their greater in-vitro activity as well as their better pharmacodynamic properties. In addition to producing a potentially better outcome, these agents will often improve patient

compliance because of fewer side-effects and the shorter duration of therapy.

Conclusion

Infections caused by Legionella spp. are a significant cause of morbidity and occasionally mortality. The projected number of cases of infection caused by Legionella spp. are much greater than those reported to CDC's surveillance system, indicating both underdiagnosis and under-reporting.

Hopefully, new information concerning the molecular biology and pathogenesis will provide a better understanding of infection caused by these organisms. Recent studies suggest that the newer macrolides and newer fluoroquinolones are the optimal agents for these organisms.

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