Research Progress on the Epidemiological Characteristics and Treatment of BP-Induced Melioidosis in China

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Abstract: Burkholderia pseudomallei is a non-fermentative gram-negative bacterium that is positive for oxidase and enzyme, does not form spores and does not have metachromatic particles. It is the pathogen of human anthrax. Burkholderia melioides is easy to cultivate and has strong antimicrobial resistance. Although lipopolysaccharide (LPS) or capsular polysaccharide subunit vaccine can play a part of immune protection in mouse models, there is no effective vaccine for melioidosis. Melioidosis is a kind of zoonosis caused by Burkholderia melioides infection. In China, it is mainly prevalent in the southern region, with the focus of Hainan, Guangdong, Guangxi, Taiwan, etc. The main routes of infection include inhalation subcutaneous inoculation and skin damage infection, which are usually found in sewage, soil and paddy fields, and often caused by agricultural contact. It is estimated that there are about 165000 cases of people infected with melioidosis and 89000 deaths every year in the world, of which the incidence rate in South Asia, East Asia and the Pacific is 44%, 40%, and the mortality is 47% and 35% respectively [1]. Its lesions can involve all organs of the body, which is easy to cause high misdiagnosis rate and case fatality rate. As an endemic infectious disease, melioidosis has the characteristics of wide distribution, difficult diagnosis, strong latency, strong pathogenicity, and difficult treatment. Therefore, this article aims to improve the attention of Chinese medical workers to melioidosis, and makes a detailed review from the five aspects of pathogenic characteristics, epidemiological characteristics, clinical characteristics, diagnosis and treatment, and prevention and control measures of melioidosis. To understand the epidemiological characteristics and drug resistance of pathogenic bacteria in patients with blood flow infection of paragangrene, and provide data support for the prevention and control of blood flow infection of paragangrene

Keywords: Paragangrene; Epidemiological Characteristics; Burkholderia

Introduction

Anthrax is a zoonotic infectious disease caused by Burkholderia melioides. Burkholderia melioides is an environmental saprophytic bacterium, which widely exists in water, soil and other living environments, and has high pathogenicity to humans and animals. Burkholderia melioides mainly inhabits the soil, water and paddy fields in tropical areas. It is widely distributed in Southeast Asia and northern Australia. The damaged skin, digestive tract and respiratory tract can be infected. People and animals are infected by contact with contaminated soil or water. Therefore, people who are easily exposed to epidemic water or soil are high-risk groups, such as farmers, workers, fishermen, etc. The clinical manifestations of paragangrene are diverse, including acute bacteremic pneumonia, disseminated visceral abscess and local infection, and it is called "like a hundred diseases". In the acute phase, it often mainly invades the human lungs, causing refractory pneumonia, lung cavities, and rapidly causing septicemia. [2] In the chronic phase, it is mostly the suppurative performance of the affected organs and tissues. The disease is usually serious, and if it is not treated in time, the mortality rate is high. At present, the disease has become a major public health problem for people in tropical and subtropical areas.

1. Pathogenic characteristics of Burkholderia melioides

Burkholderia paragangrenoides is a short gram-negative bacterium with blunt round ends, strong staining at both ends, flagella, no spores and no capsule. The morphological characteristics of paragangrenous are relatively special. After 48 hours of culture on the blood plate, a slightly raised gray-white rough disk-shaped colony with strong metal texture and earthy smell can be formed, which can be used as the characteristics of clinical laboratory to identify the bacteria. In recent years, the research on the formation of biofilm of Burkholderia melioides has also become a hot spot. The formation of biofilm provides a shelter for pathogens. At the same time, the formation of biofilm has a certain relationship with the escape of pathogens from the body's immunity, the mechanism of drug resistance and the recurrence after cure [3].

2. Epidemiological characteristics of paragangrenosis

The disease is mainly distributed in tropical and subtropical regions between 20 ° north and south latitudes, such as Southeast Asia and northern Australia, and has also been reported in Central America, the Caribbean, the Middle East, Africa, Europe and other regions. China is mainly popular in southern regions, including Hainan, Guangdong, Guangxi, Fujian, Hong Kong and Taiwan. Hainan is the most important epidemic focus in China, and also the area with the highest isolation rate of Burkholderia pseudomallei. Hainan Province is a subtropical monsoon climate and also a high incidence area of typhoons. It has rainy season from May to October and typhoon season from June to October every year. [4] The specific microenvironment composed of various climatic factors in the coastal area may be more suitable for the survival and transmission of anthrax.

3. Clinical characteristics of paragangrenosis

The clinical features are "change-like" lesions, which are mainly divided into acute infection, chronic infection, subacute infection and recessive infection, which are mainly related to the immunity of the body and the amount of bacteria infected [5]. The patients with acute infection have a sudden and severe onset of disease, which often lead to acute sepsis, severe pneumonia, multifunctional multiple organ failure and other major clinical manifestations, such as shivering, high fever, dyspnea, abdominal pain, myalgia, cough and pus sputum, and can also form local abscess or necrosis, such as liver and spleen abscess, joint abscess, bone necrosis, etc. Localized paragangrenosis can be manifested as acute suppurative lesions, shallow and deep abscess, pericarditis, osteoarthritis, prostatic abscess, etc. The clinical manifestation of fulminant sepsis like gangrene is similar to that of other gram-negative bacterial sepsis. The main cause of death is severe sepsis and the resulting organ failure

4. Diagnosis and treatment of melioidosis

Bacterial isolation and culture is the "gold standard" for the diagnosis of paragangrene. For the population with high-risk occupation, susceptibility factors and infection that is difficult to control, multiple bacteriological examinations of relevant parts including blood culture should be carried out as soon as possible. The treatment plan of paragangrenosis is mainly divided into intensive and eradication treatment. During the treatment period, a sufficient amount of sensitive antibiotics can have better therapeutic effect and good prognosis. At present, there is no specific treatment and standard treatment plan for the treatment of patients with paragangrene. The clinical treatment is mostly empirical, including early effective antibiotic treatment, adequate nutrition supplement, and correction of hypovolemic shock caused by septicemia. Research shows that the vast majority of deaths are related to inadequate antibiotic treatment, and the uncured cases may be related to mistreatment and delayed treatment. [6] In clinical treatment, drug sensitivity test in vitro should be conducted, and appropriate drugs should be selected for early treatment with sufficient amount and duration

5. Prevention and control measures of paragangrenosis

The characteristics of paragangrene are not only low cure rate and high mortality, but also variable clinical manifestations and long treatment course. There is great pressure to do a good job in the detection, prevention and control of the disease. At present, there is no effective vaccine, so it is very important to do a good job of three-level prevention. In addition, we should strengthen the health education for doctors and the public at the grass-roots level. Corresponding publicity and education should be carried out for high-risk groups and doctors in the epidemic area, especially to improve the ability and awareness of clinicians to identify the disease and better improve the level of prevention, control and treatment of paragangrene. Conduct effective serological screening for high-risk groups in epidemic areas. Improve the accuracy of clinical diagnosis, and further develop detection methods for early and rapid diagnosis. Measures such as regular reexamination of cured patients and follow-up of patients' living environment and the incidence of human and animal diseases can improve the ability to prevent and control melioidosis. Regular monitoring should be strengthened, and the source of infection should be disinfection and sterilization to cut off its route of infection, so as to curb the spread of Burkholderia melioidosis.

Summary

At present, little is known about the global disease burden, epidemic distribution, and the pathogenic mechanism and molecular characteristics of Burkholderia melioides infection. At present, in the global case report data, the number of reported cases of anthrax in 46 countries that are known to be epidemic areas is seriously insufficient. For another 34 countries that have never reported the disease, anthrax may be a potential new epidemic [7, 8]. Anthrax like mostly occurs in the rainy season, especially in the tropical and subtropical regions of the world after heavy rains and typhoons. The clinical manifestations of paragangrene are complex and diverse, and blood flow infection is the most common type of infection reported in China. It can be manifested as asymptomatic infection, local skin abscess, acute or chronic pneumonia, joint infection or severe systemic sepsis, among which the mortality rate of infectious shock cases is higher than 90%. With the increase of reports of paragangrene, Burkholderia paragangrenoides is increasingly considered as one of the important pathogens for humans. Melioidosis has natural resistance to a variety of antibiotics. At present, Melioidosis in this region is still sensitive to the main antibiotics for clinical treatment. However, due to its rapid genomic variation, it is very easy to produce new drug resistance characteristics, which may cause difficulties or even failures in the treatment of conventional infections. Standardized and individualized antibiotic treatment programs for paragangrenosis are very important. Burkholderia paragangrenosis is most sensitive to tetracycline, imipenem, compound sulfamethoxazole and ceftazidime. These four antibiotics are also currently used as antibiotics for drug sensitivity analysis and targeted treatment in Hainan, China. Some studies have reported that Burkholderia paragangrene has emerged resistance to ceftazidime, compound sulfamethoxazole and other antibiotics, which has brought new challenges to the treatment. The disease of multiple tissues and organs can be caused by paragangrene, which is very easy to be misdiagnosed. However, there are some limitations in the current epidemic screening technology of paragangrenosis in China. Although paragangrenosis has been discovered for more than one hundred years, people generally lack full understanding of the disease. Because of its diverse clinical symptoms, the rate of missed diagnosis, misdiagnosis and mortality are high. Therefore, it is necessary to strengthen the monitoring of the status of Burkholderia melioides in the region, carry out more comprehensive epidemiological and ecological research from the genetic characteristics, and implement an effective disease monitoring and reporting system to improve people's understanding of the melioidosis, including the actual disease burden in the epidemic area, which is of great significance to the diagnosis and treatment of melioidosis. To sum up, the cure rate of paragangrene is low, and the mortality and recurrence rate are high, so medical staff should pay attention to it. Middle aged and old people, people in

contact with epidemic water and soil, coastal areas, summer and autumn are the high risk factors of melioidosis. In the future prevention and control work, we should strengthen the awareness of key groups and regions on melioidosis, and reduce its incidence rate.

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