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Review

Erysipelothrix rhusiopathiae

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ABSTRACT

Erysipelothrix rhusiopathiae is a facultative, non-spore-forming, non-acid-fast, small, Gram-positive bacillus. The organism was first established as a human pathogen late in the nineteenth century. Three forms of human disease have been recognised since then. These include a localised cutaneous lesion form, erysipeloid, a generalised cutaneous form and a septicaemic form often associated with endocarditis. The organism is ubiquitous and able to persist for a long period of time in the environment, including marine locations. It is a pathogen or a commensal in a wide variety of wild and domestic animals, birds and fish. Swine erysipelas caused by *E. rhusiopathiae* is the disease of greatest prevalence and economic importance. Diseases in other animals include erysipelas of farmed turkeys, chickens, ducks and emus, and polyarthritis in sheep and lambs. Infection due to *E. rhusiopathiae* in humans is occupationally related, principally occurring as a result of contact with contaminated animals, their products or wastes, or soil. Erysipeloid is the most common form of infections in humans. While it has been suggested that the incidence of human infection could be declining due to technological advances in animal industries, infection still occurs in specific environments. Additionally, infection by the organism is possibly under-diagnosed due to the resemblance it bears to other infections, and problems encountered in isolation and identification. Various virulence factors have been suggested as being involved in the pathogenicity of *E. rhusiopathiae*. The presence of a hyaluronidase and neuraminidase has been recognised, and it was shown that neuraminidase plays a significant role in bacterial attachment and subsequent invasion into host cells. The role of hyaluronidase in the disease process is controversial. The presence of a heat labile capsule has been reported as important in virulence. Control of animal disease by sound husbandry, herd management, good sanitation and immunization procedures is recommended.

Contents

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1. Introduction

Erysipelothrix rhusiopathiae, formerly the only species of the genus *Erysipelothrix*, is a facultative, non-spore-forming, non-acid-fast, small, Gram-positive bacillus (Brooke and Riley, 1999). The organism was first established as a human pathogen late in the nineteenth century. Three forms of human disease have been recognised since then. These include a localised cutaneous lesion form, erysipeloid, which was so-called to distinguish it from the human streptococcal disease erysipelas, a generalised cutaneous form, and a septicaemic form often associated with endocarditis (Gorby and Peacock, 1988). The organism is ubiquitous and able to persist for a long period of time in the environment, including marine locations. It is a pathogen or a commensal in a wide variety of wild and domestic animals, birds and fish (Conklin and Steele, 1979). Swine erysipelas caused by *E. rhusiopathiae* is the disease of greatest prevalence and economic importance (Wood, 1992). Diseases in other animals include erysipelas of farmed turkeys, chickens, ducks and emus, and polyarthritis in sheep and lambs. The organism causes no known disease in fish but can survive for long periods of time on the mucoid exterior slime of fish (Wood, 1975).

Infection due to *E. rhusiopathiae* in humans is occupationally related, principally occurring as a result of contact with contaminated animals, their products or wastes, or soil. Erysipeloid is the most common form of infections in humans. Some other names have been used to describe this infection, including whale finger, seal finger, speck finger, blubber finger, fish poisoning, fish handler's disease, and pork finger (Reboli and Farrar, 1989; Wood, 1975). These reflect the occupational attributes of the disease. While it has been suggested that the incidence of human infection could be declining due to technological advances in animal industries, infection still occurs in specific environments (Reboli and Farrar, 1989). Additionally, infection by the organism is possibly under-diagnosed due to the resemblance it bears to other infections, and problems encountered in isolation and identification (Dunbar and Clarridge, 2000). Diagnosis of erysipeloid can be difficult if not recognised clinically.

2. Nomenclature and taxonomy

2.1. Erysipelothrix rhusiopathiae

E. rhusiopathiae, literally 'erysipelas thread of red disease', has a long history and many nomenclature changes. The earliest member of the genus *Erysipelothrix* was termed *E. muriseptica*, which was first isolated by Koch in 1876 in the blood of mice with septicaemia. In 1882, a bacillus was observed in pigs dying of rouget by Pasteur and Dumas. Later, Loeffler reported a similar bacillus in the skin blood vessels of a pig that had died of swine erysipelas. This was the first description of this organism as an infectious agent causing disease in swine (Wood, 1975).

E. rhusiopathiae was first described as a cause of human disease in 1870, and further cases were documented in 1873 as erythema serpens (Barber and Gledhill, 1948). It was, however, not until 1884, when Rosenbach isolated an organism from a patient with localised cutaneous lesions, that *Erysipelothrix* was established as a human pathogen. He used the term 'erysipeloid' to differentiate between the human streptococcal disease erysipelas and the condition he had observed (Wood, 1975). Subsequently, *Erysipelothrix* has been identified as the cause of infection in many animal species. Rosenbach distinguished three separate species of the organism, *E. muriseptica*, *E. porci* and *E. erysipeloid*, based on their isolation from mice, pigs and humans, respectively. It was later realised that these three organisms were nearly identical strains of the same species. The name *E. insidiosa* was proposed for them originally by Trevisan in 1885. This and all 36 other documented names for the organism were rejected in 1966 in favour of *E. rhusiopathiae*, a combination that originated in 1918 (Ewald, 1981).