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Seafood-associated mycobacterial infections

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Producers should offer workers puncture-proof gloves and other appropriate safety gear



The first sign of mycobacterium infection is a small nodule that slowly enlarges and may form purplish plaques.

Bacteria of the genus *Mycobacterium* are ubiquitous in the environment and are commonly found in marine and aquatic ecosystems. Included in this genus are the bacterial species that cause human tuberculosis and leprosy, though these illnesses are not specifically associated with oceanic or aquatic systems. Several other species, however, cause human infections directly related to exposures that occur in maritime environments or through contact with seafood.

These infections are of particular importance to aquaculture workers and others who handle, process, and prepare seafood products. In addition, workers from other industries who are exposed to fish tanks and aquariums may be at risk.

Frequent exposure

Mycobacterium marinum is perhaps the most common and best known of these aquatic pathogens. This organism causes lethal and contagious illness in fish and shrimp, often resulting in devastating losses for aquaculture facilities.

Additional species implicated in human infections include *M. chelonae*, *M. fortuitum*, and *M. shottsii*. These organisms can be differentiated in the laboratory, which may be necessary to ensure optimal treatment, although the characteristics of the infections produced by the different species are quite similar.

Apparently, all these species can cause “fish tuberculosis” in piscine and shrimp populations, as well. These organisms are commonly isolated from fish tank surfaces, both fresh and salt aquarium water, and natural aquatic and marine environments. Human exposure is therefore quite frequent.

Infections

Human infection from these mycobacteria results from wound inoculation or direct skin contact with infected fish, shrimp, or shellfish, or water contaminated by these organisms. Minor puncture wounds such as those inflicted by the carapace of a shrimp or fish fin spines can be a site of inoculation. As a result, most of these infections begin on the extremities, especially the hands.

Since these pathogens are relatively slow-growing bacteria, infection tends to be insidious and takes time to become apparent. The inoculation event is often forgotten by the time symptoms occur. The incubation period between inoculation and appearance of symptoms ranges 1-6 weeks.

The first sign of infection is a small, reddened papule or nodule that slowly enlarges and may form purplish plaques. These areas may then ooze or ulcerate, but are usually fairly painless unless secondary infection with different bacteria occurs. They are not contagious. Common terms for these infections have included “fish tank granuloma,” “swimming pool granuloma,” “fish handler’s disease” and others.

Given the long incubation period and slow progression of these lesions, patients may not seek medical intervention for months or even years. Many of these infections are self-limited and will ultimately heal spontaneously, although this can also take up to several years. Associated symptoms, such as fever, chills, and weight loss, are usually absent in uncomplicated cases.

In a small percentage of cases, a more invasive disease develops. This can occur in a “sporotrichoid” form, in which nodular and/or ulcerating lesions spread upward on the affected limb along the lymphatic channels. This form tends to be longer-lasting and rarely heals without specific treatment.

On occasion, infections can extend to deeper tissue structures, resulting in infection of tendons, joint capsules, or bones; bursitis; or septic arthritis. Spread of infection throughout the body (dissemination) is rare, most often occurring in the setting of immunologic impairment, such as with HIV infection, chemotherapy treatment, or corticosteroid administration. Without aggressive therapy, widespread dissemination of infection can be lethal.

Diagnosis complicated

Diagnosis of these illnesses is complicated by their slow onset and resemblance to other localized skin infections. However, a high degree of suspicion for mycobacterial infection should occur in settings with aquaculture workers and others exposed to fish, shrimp, bivalve shellfish, and their associated environments.

Culture of the offending organism provides a definitive diagnosis, but can take several weeks to complete due to the slow-growing nature of these bacteria. Multiple cultures from separate sites may be required. A biopsy of infected tissue may be needed to obtain specimens for culture and microscopic examination. Specific tissue staining for acid-fast bacilli is sometimes helpful.

Treatment

Treatment for these infections consists of antibiotic administration and, often, surgical drainage and/or excision of infected tissue. There is no one ideal treatment regimen, and therapy is tailored to the individual patient's requirements and the antibiotic sensitivity of the specific organism involved.

Surgical removal of small lesions is often curative. Surgical intervention is also a frequent necessity for treatment of deeper infections, such as those involving joints and bones. Suggested antibiotic regimens have included tetracyclines, quinolones, aminoglycosides, sulfa drugs, and rifampin.

Treatment can last several months, as response tends to be slow and relapse is likely with too short a regimen. Therapy should be continued for several weeks after the complete disappearance of lesions to assure eradication of the organism. Most of these infections require 3-6 months of treatment. Prognosis is generally good in the absence of disseminated disease.

Proactive actions

Minimizing the risk of infection in the workplace is important for the prevention of these infections. Proper safety precautions include avoiding skin punctures and contact with potentially infectious water and materials. Puncture-proof gloves and other appropriate safety gear can be helpful. Any punctures or other wounds should receive rapid attention and disinfection.

With proper precautions, many of these infections can be avoided. Should they occur, however, notification to health care providers about potential exposure to mycobacteria and the environments in which these bacteria live would be very helpful in speeding diagnosis and treatment.

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