Commercial Diver Medical Report: *Methicillin Resistant Staphylococcus Aureus*

UW is pleased to introduce a new column by Tony Alleman, MD MPH, and Joseph Serio, MD, tackling pertinent issues concerning today's commercial diver. If you have a medical diving question, email them at talleman@occmed-sl.com.

A commercial diver visited our office with a history of a painful, swollen, infected thumb several days after sustaining a minor abrasion from a barnacle while diving. He was first seen in a local emergency facility and started on ciprofloxacin (Cipro) two days earlier, but had not responded.

We added doxycycline, in addition to the ciprofloxacin, for better coverage of infections typically caused by marine organisms. After seven days and progression of the infection, the thumb required incision and drainage of the infection, and packing with gauze that was removed two days later.

A culture obtained during the procedure returned from the lab identifying the organism causing the infection as Staphylococcus aureus, which is resistant to methicillin and ciprofloxacin.

The diver was then started on trimethoprim/sulfamethoxazole (Bactrim) and rifampicin (Rifampin) with rapid resolution of the infection over a 10-day period. A nasal culture taken after antibiotic therapy was negative for any Staphylococcus species and the diver was returned to regular duty.

The Facts on Staphylococcus Aureus

Staphylococcus aureus is a gram positive bacterium that has been a pathogen (capable of causing human infection) for as long as we have had medical literature. Penicillin was introduced in the 1940s after being discovered to have the ability to kill the Staphylococcus organism. Antibiotic resistance to penicillin was noted in a medical article in 1944 and eventually led to the introduction of methicillin in 1959, and other subsequent penicillins, that were again able to kill staphylococcus aureus.

However, since the mid-1980s, Staphylococcus aureus has developed resistance to methicillin. That strain is now commonly known as methicillin-resistant Staphylococcus aureus, or MRSA.(1)

The Staphylococcus bacterium is normally found in humans, but occasionally seen in animals. It is found primarily in the nose or on the skin where there may be no clinical signs of infection.

When the integrity of the skin is compromised, such as an abrasion or a laceration, conditions become right for bacteria to cause infection. Staphylococcus can cause infection after an incubation period of four to 10 days.

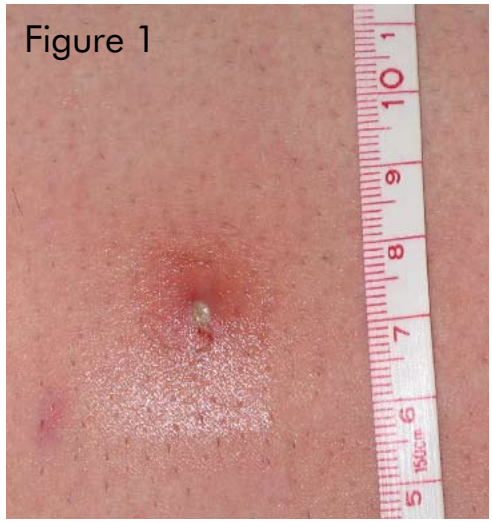
Figure 1

Typically, the infection starts as a painful pimple or a small boil anywhere from 1/8 inch to 1 inch in diameter (see Figures 1 and 2) but can rapidly progress to several inches if left untreated over a 24- to 48-hour period (Figure 3).

Smaller lesions may be noted on other parts of the body than where the infection started. In Figure 4 we see smaller satellite lesions developing near the primary infection site.

As the infection progresses, the skin may become disrupted resulting in draining pus and blood. Any suspicious skin lesions should be evaluated by medical personnel as soon as possible in order to determine the need for treatment.

A Big Problem for Divers

Diving personnel having signs of clinical infection should be removed from the offshore environment. MRSA left untreated can result in more serious conditions such as pneumonia, surgical wound infections that could result in loss of limbs, or infection in the bloodstream that could cause death.

Transmission of Staphylococcus is through contact with either a person that is an asymptomatic carrier of the organism, or one that has an active infection.

Household contacts are extremely susceptible to infection because of the close proximity of living conditions.

Offshore platforms and vessels fulfill the criteria of being large households and therefore one asymptomatic person can easily spread MRSA to multiple coworkers over a short period of time.

Draining skin lesions are the most likely sources to spread infection and the infectious period exists as long as they remain. Since the infection is spread by hand to hand contact, hand washing is extremely important in prevention of disease.

MRSA can live on surfaces, but only for a short period of time. Sharing of razors, towels, clothes, or beds should be prohibited in the offshore environment to prevent the spread of MRSA and other diseases.

If an MRSA infection is suspected on the job site, the worker should be given separate living quarters if possible. After identification of MRSA on a vessel or an offshore platform, safety personnel must be diligent about disinfecting the living quarters and washing all linens and towels used by workers with known infection.

Several bacteria have been studied under hyperbaric conditions using heliox and oxy-

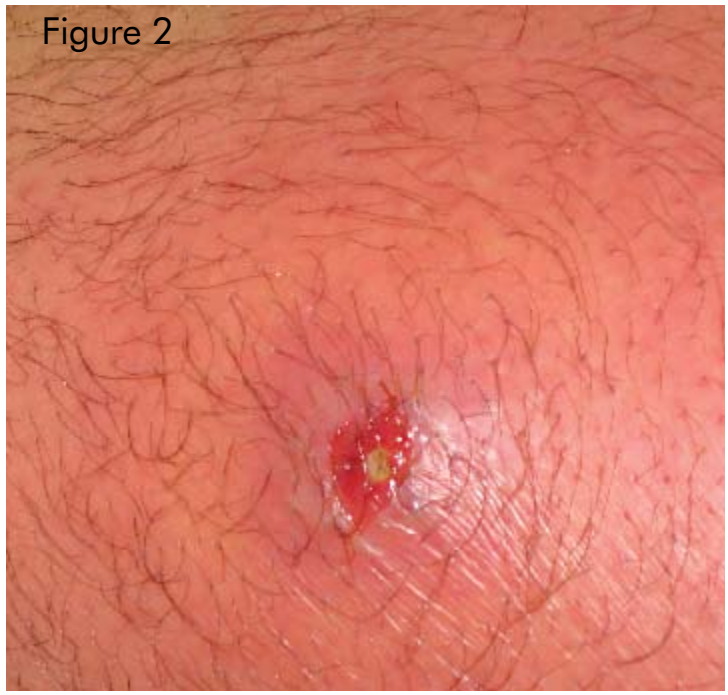
Figure 2

gen similar to those used in saturation diving. Staphylococcus aureus was shown to have increased resistance to several antibiotics including penicillin when tested under hyperbaric conditions. (2)

MRSA in saturation divers was first described in 2003 when six divers all developed infections during a 45-day saturation dive. Antibiotic testing of the organisms from all six divers confirmed that all the organisms isolated had the same patterns of antibiotic resistance and the same molecular typing. (3) UW

DO
- Notify medical personnel of suspicious lesions
- Wash your hands frequently

DON'T
- Share towels
- Share beds
- Share razors
- Share clothes

About the Authors

Dr. Serio has been practicing hyperbaric medicine for 40 years. He is nationally known to the diving community and provides medical support for diving injuries to many of the commercial diving contractors in Louisiana. Since hurricane Katrina he currently practices in Lafayette, LA at the Occupational Medicine Clinics of South Louisiana.

Dr. Alleman is board certified in occupational medicine and is certified to perform diving physicals. He has been the medical director of the Occupational Medicine Clinics of South Louisiana for the past three years and primarily practices in their New Iberia office.

Photos courtesy Dr. Bob Bourgeois, Bourgeois Medical Clinic, Morgan City, LA.

1. Chambers HF (2001) "The changing epidemiology of Staphylococcus aureus?". Emerg Infect Dis 7 (2): 178-82.

2. Hind J, Attwell RW (1996) "The effect of antibiotics on bacteria under hyperbaric conditions." J Antibicrob Chemother 1996 Feb:37(2):253-63.

3. Wang J, Barth S, Richardson M, Corson K, Mader J. (2003) "An outbreak of Methicillin-resistant Staphylococcus aureus cutaneous infection in a saturation diving facility." Undersea Hyperb Med. 2003 Winter:30(4):277-84.