

# Skin Infections in Wrestlers and Other Athletes

Whether viral, bacterial, or fungal, these infections put not only the individual athlete but whole teams at risk. The following questions and answers will help you recognize these surprisingly common infections.

By Mark Bechtel, MD, Ann Bechtel, RN, BSN, and Matt Zirwas, MD

**C**lose bodily contact, dirty wrestling mats, shared equipment, sweaty and abraded skin—it's not surprising that wrestlers are vulnerable to skin infections. It's more surprising, perhaps, that *all* wrestlers don't have skin infections *all* the time.

Not only are individual wrestlers at risk, but infections can hit high school and college teams hard and spread fast. Epidemics of cutaneous herpes simplex infections and tinea infections, for instance, are quite common. Early recognition and treatment of these infections is important in preventing the infection from spreading among teammates, coaches, and tournament participants. Other sports, such as football and swimming (see box on page 26), also have their share of infectious organisms, but wrestling is the sporting event most likely to transmit infectious diseases among participants. Thus, it's an important mode of transmission for physicians to comprehend for diagnosis and treatment.

## WHAT TYPES OF INFECTIOUS ORGANISMS ARE TRANSMITTED THROUGH WRESTLING?

Wrestlers are very vulnerable to viral, bacterial, and fungal infections. Epidemics of herpes simplex (herpes gladiatorum) and fungal infections (tinea corporis gladiatorum) are common in high school and college contact sports. Direct skin contact also promotes molluscum contagiosum and warts, located primarily on the face, neck, hands, and arms.

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Bacterial impetigo, folliculitis, and furunculosis are not uncommon. In addition, wrestlers can contract scabies, pediculosis corporis, and pediculosis capitis. In 1984, an epidemic of head lice from wrestling mats used for gym class spread through a school in Columbus, Ohio.

## WHAT ARE THE CLINICAL CLUES TO HERPES GLADIATORUM?

Cutaneous infection with herpes simplex virus (HSV) has become so ubiquitous in sports competition that it's been given its own name: herpes gladiatorum. According to the Centers for Disease Control and Prevention, approximately 3% of high school wrestlers had HSV skin infections during the 1984-85 season. In 1999, Anderson reported that 20% to 40% of NCAA Division I wrestlers were infected.

Patients often have a prodrome of stinging, pain, burning, and itching. Initially, the lesions may manifest as erythematous patches or papules, followed by clustered vesicles on an erythematous base (see image on page 27, left). The vesicles rupture and evolve into crusts that heal with or without therapy. Regional lymphadenopathy is common.

A 2005 study by Anderson at the University of Minnesota found that most outbreaks (96%) occurred on the front surfaces of the body, with 71.9% reported on the head, face, and neck. These are areas of direct skin contact when wrestlers are engaged in the lock-up position. The extremities are also involved.

Unfortunately, an infected wrestler may shed the

## >>FAST TRACK<<

**Epidemics of herpes simplex and fungal infections are common in high school and college contact sports.**

## Same Problem, Different Sports

Wrestlers aren't the only athletes at risk for skin infections. Rugby players, for instance, who often scrape arms and legs and then link arms during competition, also may be vulnerable to herpes simplex infections. (In their case, it's called herpes rugbeiovum.) They also get folliculitis, as do football players, runners, and cyclists. In general, furunculosis is most common in rowing, swimming, football, rugby, and basketball. Pseudomonas can cause green feet and nails in various athletes, hot-tub folliculitis from whirlpools, scuba diving dermatitis under wet suits, and otitis externa in swimmers.

The largest MRSA outbreaks have occurred in football players, followed by wrestlers, volleyball players, and cross-country runners. A 2005 study reported a clone of MRSA among professional football players on the St. Louis Rams team. The researchers investigated outbreaks of abscesses due to MRSA by transmission and microbiologic characteristics. Infections from MRSA occurred in 9% of the Rams players and at turf-abrasion sites; they were significantly associated with the lineman or the linebacker position and higher body mass index. Samples containing MRSA were recovered from whirlpools and taping gel and nearly half of 84 nose swabs.

virus for days before an infection becomes obvious. Anderson found a 32.7% probability of an infected wrestler transmitting HSV to sparring partners. The

length of time from exposure to outbreak varied from 4 to 11 days, with an average of 6.8 days.

Research suggests that about 8% of patients with herpes gladiatorum develop eye complications, including herpes conjunctivitis, blephar-

itis, and keratitis. A 1997 report indicated that ocular recurrence has a five-year risk of more than 33% and may affect the cornea.

### HOW IS HERPES GLADIATORUM DIAGNOSED?

Always suspect herpes gladiatorum with the onset of painful clustered vesicles or punctuate erosions, especially on the head and neck. These lesions are more painful than impetigo or acne.

The differential diagnosis of herpes gladiatorum includes bullous impetigo, contact dermatitis, tinea corporis gladiatorum, molluscum contagiosum, and acne. The Tzanck smear provides the most rapid diagnosis but has poor sensitivity and specificity. Viral culture for HSV is the gold standard, but this may take two to three days to obtain results. Direct immunofluorescence analysis of active lesions can provide results within hours and has excellent sensitivity and specificity. Advances in polymerase chain reaction technology will help improve the speed and accuracy of HSV detection.

Because wrestlers fear disqualification from matches due to HSV infection, they may try to alter the appearance of the lesions by scratching or rubbing them or applying makeup, making diagnosis more difficult.

### HOW IS HERPES GLADIATORUM INFECTION TREATED?

Acyclovir 200 mg five times per day for seven days for primary infections and reduced to five days for recurrent infections is the most inexpensive therapy, but compliance is a concern with young athletes. A more expensive, but perhaps easier, alternative is famciclovir 500 mg twice a day for 7 to 10 days for primary infections and five days for recurrent infections, or valacyclovir one gram twice a day for 7 to 10 days for primary infections and 500 mg twice a day for six days for recurrent infections.

Anderson, who has studied herpes gladiatorum extensively, has suggested prophylactic antivirals for HSV type 1 (HSV-1) seropositive individuals throughout the wrestling season to minimize transmission. In 2006, he evaluated the use of valacyclovir to prevent acquisition of primary HSV-1 in high school wrestlers at a 28-day wrestling camp. Prophylactic valacyclovir reduced clinical outbreaks by 87%, compared to the previous year without antiviral use.

Per NCAA guidelines, before being allowed to return to wrestling, the wrestler must have been on oral antiviral therapy for 120 hours, all lesions must be dried with adherent crust, and there can be no new blisters within 72 hours of precompetition skin checks.

### WHAT ARE THE CLINICAL CLUES TO TINEA CORPORIS GLADIATORUM?

Tinea corporis gladiatorum (TCG), or ringworm, is a dermatophyte infection of the skin and hair, usually due to *Trichophyton*. Like herpes gladiatorum, TCG

## >>FAST TRACK<<

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**> Herpes gladiatorum.** Erythematous patches or papules progress to clustered vesicles on an erythematous base.



**> Tinea corporis gladiatorum.** Peripheral scaling of the borders and central clearing are characteristic of this infection.

often occurs in epidemics, especially in high school wrestlers. In a 2002 study, dermatologist Brian B. Adams reported on one such epidemic in Ohio and suggested that asymptomatic carriers may carry the fungus on their scalps.

Tinea corporis gladiatorum manifests as well-defined erythematous plaques with peripheral scaling of the borders and central clearing (see image, right), usually on the head, neck, and forearms. You may also see scaling erythematous patches of the scalp with varying degrees of hair loss. Kerion formation, manifesting as a boggy swollen plaque involving the scalp, has been noted with an intense cell-mediated immune response against the fungal organisms. Tinea infections of the skin can be diagnosed by potassium hydroxide (KOH) exam. Unfortunately, however, a KOH exam of the scalp is less reliable and scalp infections often require fungal culture for definitive diagnosis.

#### HOW ARE FUNGAL INFECTIONS TREATED?

Most cases of tinea pedis and localized tinea corporis can be treated with twice-daily applications of antifungal creams for four weeks. Ciclopirox has the advantage of being antifungal with both gram-negative and gram-positive bacterial coverage.

Systemic antifungal therapy is necessary for onychomycosis, tinea capitis, or widespread tinea cor-

poris. Oral griseofulvin, terbinafine, itraconazole, and fluconazole, for example, are used to treat tinea capitis. A twice-weekly antifungal shampoo such as selenium sulfide 2%, ketoconazole, or ciclopirox is an important adjunctive treatment. Onychomycosis should be treated with terbinafine 250 mg daily for three months with appropriate laboratory monitoring. Widespread tinea corporis can be treated with four weeks of oral terbinafine, ketoconazole, or griseofulvin.

A study in 2000 compared prophylactic fluconazole 100 mg once weekly with placebo for four weeks during a regular wrestling season. The fluconazole group had a significantly lower incidence of infection (6%) compared with the placebo group (22%). The researchers concluded that fluconazole was effective and safe for primary prevention of TCG.

The NCAA's guidelines require 72 hours of treatment with an antifungal drug for tinea corporis before a wrestler can compete. If lesions persist despite treatment, they can be covered with OpSite and a protective dressing. With scalp involvement, wrestlers should have two weeks of oral antifungal therapy prior to competition. *continued*

#### >>FAST TRACK<<

**Widespread tinea corporis can be treated with four weeks of oral terbinafine, ketoconazole, or griseofulvin.**



**> Impetigo.** Classic presentation of pustular, weeping, erythematous papules and plaques, with honey-colored crusts.

**WHAT ARE THE CLINICAL CLUES TO BACTERIAL INFECTION?**

Gram-positive bacteria, such as *Staphylococcus aureus* and *Streptococcus pyogenes*, and gram-negative *Pseudomonas aeruginosa* are the most common bacterial organisms causing infections in sports participants. Methicillin-resistant *S. aureus* (MRSA) is emerging as a major cause of many sports-related cutaneous infections. Likely fomites of bacterial infections include athletic tape, skin lubricants, padding, weights, shared towels and equipment, whirlpools, and mats. The most common bacterial infections are impetigo, folliculitis, and furunculosis.

Impetigo may present as erythematous papules and plaques that become pustular and weeping, with honey-colored crusts (see image). This nonbul-

**>>FAST TRACK<<**

**Consider systemic antibiotics for lesions around the nares or external auditory canals, large and recurrent lesions, or those with surrounding cellulitis.**

lous presentation is usually caused by *S. pyogenes*; the second most likely cause is *S. aureus*. Bullous impetigo manifests as clear, fluid-filled vesicles that may coalesce into larger purulent bullae.

The bullae are often fragile and rupture, producing a varnish-colored base with a collarette of scale. Bullous impetigo is typically caused by *S. aureus*, usually a phage II, type 71.

Folliculitis, usually due to *S. aureus*, manifests as an erythematous papule or pustule around a hair follicle. When the entire hair follicle and surrounding tissue are involved, a furuncle (an inflammatory abscess) may develop (see image on page 29). Furuncles are most common in areas prone to friction and minor trauma, such as the anterior thighs, buttocks, groin, and beneath the belt.

*Staphylococcus aureus*, and now community-acquired MRSA in particular, is the primary cause of furunculosis. One-third of respondents to a 2006 survey of Texas high school athletic programs reported MRSA infections.

Gram-negative infections are usually due to *P. aeruginosa* and may cause a telltale greenish discoloration of the skin and nails, which does not wipe off.

**HOW ARE BACTERIAL INFECTIONS TREATED?**

Mild to moderate cases of bacterial folliculitis can be managed with antibacterial cleansers containing chlorhexidine or triclosan. Mupirocin 2% ointment or cream can be used three times a day for 10 days on localized eruptions. A new alternative, retapamulin ointment 1%, has been approved for the treatment (twice daily for five days) of impetigo involving susceptible strains of *S. aureus* or *S. pyogenes*. Retapamulin has demonstrated potent in vitro activity against mupirocin-resistant strains of *S. aureus*.

Widespread or recurrent outbreaks of folliculitis should be managed empirically with oral antibiotics with good staphylococcal coverage until culture results allow a more targeted choice. Treat chronic *S. aureus* nasal carriage nightly for five days with mupirocin ointment. Treat furuncles with warm compresses and incision and drainage (remember that MRSA often presents as furunculosis). Consider systemic antibiotics for lesions around the nares or external auditory canals, large and recurrent lesions, or those with surrounding cellulitis. Treatment of nasal carriage should also be considered. The vast majority of cases are due to *S. aureus*; only rarely are gram-negative organisms involved.

For patients with impetigo, clean the area and remove crusts. Treat isolated lesions with mupirocin

2% ointment or retapamulin. For widespread uncomplicated eruptions when MRSA is not an issue, use an oral beta-lactamase antibiotic, such as dicloxacillin, cephalexin, or amoxicillin/clavulanate.

Always incise, drain, and culture significant pus-containing infections. Maintain a high level of suspicion for MRSA. If an antibiotic is needed in the setting of furunculosis, there is a high likelihood of community-acquired MRSA. Consider using trimethoprim-sulfamethoxazole or tetracycline derivatives as first-line therapy. Refractory infections always require culture and adequate drainage. An infectious disease or surgical consult may be needed. Potential alternative antibiotics, based on cultures, include clindamycin, linezolid, vancomycin, and daptomycin.

### WHAT DO YOU TELL THE PATIENT?

Prevention is critical—and cleanliness is next to healthiness. Urge athletes to shower immediately after practice and sports competitions (always wearing sandals or other protective footwear), and to avoid sharing equipment, clothes, and towels. Sports mats, locker rooms, shower floors, and pool decks should be cleaned regularly. Wrestlers should change their practice and competition gear every day and clean the headgear daily with soap and water. Athletic shoes, which can harbor fungal organisms, should be cleaned regularly or replaced.

Advise patients that sweating, abrasions, and mat burns may predispose to infection. Topical aluminum chloride solutions may help reduce sweat and improve dyshidrotic dermatitis, reducing fungal transmission. Encourage wrestlers to thoroughly wash their feet and completely dry between their toes.

Wearing the proper sports clothing is another infection-preventing measure. Abrasive clothing should be avoided. Perspiration-wicking clothes can help; long-sleeved shirts and long pants will expose less skin during practice. Clothing should be laundered in water that is at least 140°F in temperature.

If they have significant facial abrasions, wrestlers can wear face shields to minimize transmission of infection. Absorbent, well-fitting socks and athletic shoes are also a good idea. Wrestlers should keep their toenails trimmed to minimize trauma to the toes. Protective gloves should be considered for weightlifting.

If there is an epidemic, especially of herpes, a tournament may need to be suspended. □



**> Folliculitis.** A furuncle (or inflammatory abscess) may develop when the entire hair follicle and surrounding tissue are involved.

### SUGGESTED READING

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