

## PODIATRIC SPORTS DERMATOLOGY PART II: Bacterial Infections in Contact Sports

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### INTRODUCTION

Sports medicine topics tend to focus on musculoskeletal problems, yet the most common sports injuries are dermatologic in nature.<sup>1</sup> This article will highlight bacterial infections common to the lower extremity in contact sport athletes. Bacteria has an easier entry into the athlete's epidermis due to sweat saturation (which causes supersaturation and vulnerability of the stratum corneum), skin trauma/abrasions, and occluding athletic gear that can provide a warm, moist environment for bacterial growth.<sup>1,2</sup>

### GRAM POSITIVE INFECTIONS

#### Impetigo

Impetigo, also termed “scrum strep” by rugby players, is most common in contact sports such as rugby, soccer, wrestling, and football, particularly if there is already an abrasion present. It is caused by *Staphylococcus aureus* or *Streptococcus species* (pyogens or Group A), with outbreaks of Methicillin Resistant *Staphylococcus aureus* (MRSA) becoming more common.<sup>2</sup> Clinically, nonbullous impetigo presents as well-defined, erythematous papules and plaques with honey-colored crusts.<sup>3,4</sup> Bullous impetigo is less common and presents as crusted erosions or bullae and is caused by toxin-producing strains of *Staphylococcus aureus*.<sup>4</sup> In more severe cases, lymphadenopathy, strep throat, and even poststreptococcal glomerulonephritis can occur. Diagnosis is by clinical examination and wound culture, throat culture or urinalysis is also indicated for severe cases. Topical antibiotics such as erythromycin, Neosporin, or mupirocin BID/ TID are indicated for isolated lesions, more extensive cases will require oral antibiotics (such as cephalexin, dicloxacillin, or Bactrim for MRSA) for 10-14 days based on the wound culture. The author also recommends utilizing Chlorhexidine gluconate soap during treatment. Prevention relies on athletes not sharing anything that touches skin to skin. Injured skin should be cleansed and covered. Some also suggest warm water soaks for crust removal.<sup>3</sup> If the infection spreads to other team members then the athlete's activity should be restricted till the issue is resolved.<sup>2</sup> Typically, it requires at least 5 days of

therapy with crusting of the lesion before the athlete can return to competition, especially in high contact sports such as wrestling.<sup>2</sup>

#### Bacterial Folliculitis

*Staphylococcus aureus* infects hair follicles on the leg resulting in well-defined, small, red scattered pustules at the follicular orifice.<sup>1,3</sup> This is particularly a problem common to areas frequently shaved like the legs of female athletes or in male athletes in which it is common to shave the legs for competition (such as wrestling). This can also occur secondary to friction from clothing or other athletic gear such as shinguards. The diagnosis is made via clinical examination and wound culture after lancing the pustule. Similar to impetigo, treatment consists of topical antibiotic ointment (mupirocin BID/TID if MRSA suspected) and oral antibiotics as needed. The same precautions should be taken as that with impetigo. The author recommends that shaving should be avoided as much as possible, but at least should be avoided just prior to the athletic activity.

#### Furuncles and Carbuncles

Furunculosis is essentially folliculitis with added cellulitis and increased pain.<sup>5</sup> A prior open wound, body shaving, shared skin lubricants or tape, sometimes whirlpool use, and the lack of proper facilities (showers, towel laundry, etc) seem to correlate with team epidemics of furunculosis, including MRSA furunculosis.<sup>1</sup> There is some debate however whether fomites play a role in transmission.<sup>3</sup> Furuncles appear as tender large erythematous and sometimes fluctuant nodules at the extremities, these may worsen into an abscess or several may coalesce into a carbuncle.<sup>1</sup> Lancing the lesion with a sterile blade before wound culture best identifies that causative bacteria, typically *Staphylococcus aureus* (or MRSA). Treatment and prevention are the same as in impetigo or folliculitis. Warm compresses can help with the pain. If the lesions are large, surgical incision and drainage may be necessary.<sup>3,5</sup>

#### Erysipelas and Cellulitis

Acute erythema, edema, pain, and increased warmth at a skin lesion can lead to more severe systemic symptoms and regional lymphadenopathy. Erysipelas (or “St. Anthony's

fire”) is often caused by *Group A beta-hemolytic Streptococcus* (GABHS) and involves infection of the superficial dermal lymphatic vessels presenting as plaques with a well-defined, abrupt border.<sup>3,5</sup> Cellulitis is deeper and caused by either GABHS or *Staphylococcus aureus*. Culturing of cellulitis is only useful if open lesions are present.<sup>3</sup> Oral antibiotics are typically prescribed (cephalosporins in particular) and cool wet compresses are also useful.<sup>5</sup>

### Erythrasma

More typically seen in the groin but can occur anywhere that is warm, dark, occluded and sweat-macerated, in the foot this most often is interdigital.<sup>1,5</sup> These red, discrete, plaques are caused by *Corynebacterium minutissimum* and fluoresce a coral-red color under a Wood’s lamp. Antibacterial soap used for 30 seconds twice during a shower showed significant clearing compared with placebo.<sup>1</sup> Oral tetracycline or erythromycin seem to be superior to topical antibiotics. Routine use of antibacterial soaps during the sport season may be helpful.

### Pitted Keratolysis

Pitting (1-5 mm sized pits) and a foul odor of the skin at the plantar foot are characteristic of pitted keratolysis, also known as “sweaty sock syndrome” because it is often seen in conjunction with hyperhidrosis and occlusive shoe gear.<sup>1,3</sup> *Micrococcus* and *Corynebacterium* are a few of the gram positive organisms thought to cause pitted keratolysis. Diagnosis is made clinically because of the pitting and it is purported that submerging the foot in water makes these pits more obvious.<sup>1</sup> The patient may relate an “intense burning sensation.”<sup>5</sup> The author typically uses topical 2% erythromycin pads BID, although clindamycin and benzoyl peroxide have also been used. Domeboro soaks TID may also be useful. Severe cases will necessitate oral antibiotics. Aluminum chloride application, frequent sock changes, and wicking socks can be used to decrease the hyperhidrosis component.<sup>3</sup>

### Paronychia

Paronychia is common to athletes in tighter shoe gear such as soccer cleats. Staphylococci and streptococci are the most common pathogens although other bacteria have been isolated. This is mentioned for completeness, but the common podiatrist is well-versed in its treatment.

## GRAM NEGATIVE INFECTIONS

*Pseudomonas aeruginosa* is the primary culprit of gram negative bacterial infections in contact sport athletes. It can infect hair and nails in the lower extremity.

### Green foot

*Pseudomonas* growth in shoes can cause a nonpainful discoloration of the skin and toenails that does not scrape or wash off.<sup>1</sup> The color of the discoloration with frequent wearing of a particular pair of occlusive shoes often leads to the diagnosis. Culture of the skin may be negative, but culture of the shoe surface will reveal Pseudomonas growth.<sup>1</sup> Treatment focuses on the prevention of hyperhidrosis (Aluminum chloride) and washing of the shoes.

### Hot Tub Folliculitis (*Pseudomonas folliculitis*)

Hot tub folliculitis is the most common gram-negative bacterial infection in athletes.<sup>2,3</sup> However, any athlete or nonathlete is equally at risk for *Pseudomonas* folliculitis, particularly if they have an abrasion or laceration allowing for bacterial entry and utilize whirlpool physical therapy or a frequently used hot tub, whirlpool, or warm swimming pool. Chlorine levels lower due to high temperatures, turbulence, and heavy use thereby allowing *Pseudomonas* proliferation. The high temperature of the tub dilates the follicles. Of note, pustular wound cultures may or may not grow *Pseudomonas*, therefore diagnosis should rely more heavily on the history and physical examination.<sup>2</sup> The athlete will present 1-5 days post-hot tub or whirlpool exposure complaining of a itchy rash with red or green papules or pustules at the submerged body part with sparing of the palms and soles, typically lasting for a week with or without systemic symptoms.<sup>1,2</sup> The folliculitis resolves spontaneously in a week provided use of the hot tub is discontinued and antihistamines may be utilized as needed for the pruritis.<sup>1</sup> Oral antibiotic treatment is reserved for the immunocompromised. Topical antibiotics should be avoided as they may be related to recurrence.<sup>2</sup> Prevention is focused on maintaining adequate chlorination and limiting the number of people in the hot tub or whirlpool.

## REFERENCES

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