Chronic MRSA in a Basketball Player With a Hammer Toe Deformity

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Staphylococcus aureus (“staph”) is a common bacterium found on the skin or in the nose of healthy people. Thirty percent of individuals who have staph spores living on their skin show no signs or symptoms of a staph infection.1 Methicillin-resistant Staphylococcus aureus (MRSA) is a bacterium that does not respond to antibiotic treatment, such as penicillin or cephalosporins.2 If MRSA is left untreated, the infection can spread quickly and may be fatal. In 2005, there were 94,360 cases of invasive MRSA, of which 18,650 resulted in death.3

Athletes are considered a high-risk group for community-associated MRSA (CA-MRSA) because (1) they often suffer injury to the skin, (2) they are in close contact with others, and (3) they share clothing, sports equipment, or toiletries (e.g., razors).4 Additional risk factors include improper care of wounds, direct skin-to-skin contact with MRSA lesions, and crowded living conditions (e.g., dorm rooms).5

Early recognition and treatment of MRSA is essential for preventing the infection from spreading to others. Athletic trainers and coaches should encourage proper hygiene and ensure that athletes have their own equipment and uniforms. The purpose of this report is to present a case that involved chronic MRSA infections that were perpetuated by hammer toes.

History

A 22-year-old male basketball player with a pre-existing hammer toe deformity reported to an athletic trainer in October with an open fissure on the plantar aspect of the affected toe (Figure 1). He was treated with Betadine soaks and antibiotics after a culture tested positive for MRSA, and the open fissure fully healed. In early December, the athlete reported a weeping lesion on the dorsum of the left third toe, which tested positive for MRSA. The team’s orthopedic physician ordered radiographs, which were considered unremarkable. Antibiotic therapy was initiated, which consisted of trimethoprim/sulfamethoxazole 80/400 mg taken orally twice each day, and the athlete was counseled about the importance of proper hygiene. He was allowed to continue activity as tolerated while the lesion healed. The athlete did not miss any practices or games.

Key Points

- Open lesions should always be carefully evaluated and continuously monitored for potential MRSA infection.
- Chronic MRSA infections can lead to extensive loss of playing time, costly treatments, and the necessity of surgical intervention.
- The underlying cause of chronic MRSA infections must be identified and addressed for successful treatment to be realized.
In mid-December, the athlete presented a recurring lesion over the dorsum of the same left third toe. This lesion was cultured and diagnosed as MRSA. The team’s orthopedic physician prescribed the same antibiotics again. However, the lesion still showed signs of infection with some drainage late December, so the physician increased the athlete’s dosage of trimethoprim/sulfamethoxazole to 160/800 mg taken orally twice each day.

Early in January, the lesion had healed and only a small callus remained as evidence of the previous lesion. By mid-February, the athlete presented a swollen left third toe that had a blood blister over the callus on the dorsum of the same toe. After another culture was found to be positive for MRSA, the antibiotic trimethoprim/sulfamethoxazole 160/800 mg taken orally twice each day was prescribed again (Table 1). Following strict hygiene practices, and limiting activity, the lesion had fully healed by the end of March. Subsequently, the athlete was cleared for all activity.

The athlete had bilateral hammertoe deformities, chondromalacia of the left knee, and a history of an ACL repair of the left knee. These pre-existing conditions may have altered the biomechanical function of his left lower extremity.

### Chief Complaint and Treatment

After multiple MRSA-infected lesions over a 5-month period, the athlete reported to the athletic trainer in

![Figure 1](image)

**Figure 1** Swelling present in the left third phalanx with callus formed over healing lesion.

### Table 1. Antibiotics Prescribed Throughout the Course of Treatment for Chronic MRSA

<table>
<thead>
<tr>
<th>Antibiotic Name</th>
<th>Date Prescribed</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>10/29</td>
<td>80/400 mg BID for 21 days</td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>12/12</td>
<td>160/800 mg BID for 21 days</td>
</tr>
<tr>
<td>Mupirocin</td>
<td>12/12</td>
<td>Apply to nostrils and on toe twice daily for 2 weeks</td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>12/22</td>
<td>160/800 mg BID for 21 days</td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>2/24</td>
<td>160/800 mg BID for 21 days</td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>4/5</td>
<td>160/800 mg BID for 21 days</td>
</tr>
<tr>
<td>Mupirocin</td>
<td>4/5</td>
<td>Apply to nostrils, upper intergluteal creases, and inguinal creases BID for 2 weeks</td>
</tr>
<tr>
<td>Linezolid</td>
<td>4/8</td>
<td>600 mg BID for 21 days</td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>4/15</td>
<td>160/800 mg BID start after Linezolid is finished and continue for at least 9 weeks and up to 20 weeks</td>
</tr>
<tr>
<td>Amoxicillin-clavulanic acid</td>
<td>4/15</td>
<td>Start 875/125 mg BID after Linezolid is finished and continue for at least 9 weeks and up to 20 weeks</td>
</tr>
<tr>
<td>Mupirocin</td>
<td>4/15</td>
<td>Use BID for 5 days then repeat again in one month</td>
</tr>
<tr>
<td>Chlorhexidine body wash</td>
<td>4/15</td>
<td>Use 3 times per week for 4–6 weeks then decrease to once per week for 4–5 months</td>
</tr>
<tr>
<td>Linezolid</td>
<td>6/10</td>
<td>600 mg BID for 21 days</td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>6/17</td>
<td>160/800 mg BID start after Linezolid is finished and continue for at least 9 weeks and up to 20 weeks</td>
</tr>
</tbody>
</table>

*BID = twice a day*
early April complaining again of a sore and swollen third left toe, which had an open fissure at its plantar base (Figure 2). He was referred to a dermatologist for evaluation, and an MRI was ordered. Antibiotics were prescribed, which included trimethoprim/sulfamethoxazole, 160/800 mg taken orally twice each day for 21 days, and the topical ointment mupirocin, which was applied to the nares, inguinal creases, and upper intergluteal creases. The physician recommended that the athlete soak his entire body in a diluted Clorox bleach bath for approximately 10 minutes, 3 times per week. Burrow’s solution foot soaks (30 minutes, twice daily) were also ordered. The athlete was provided with a surgical shoe that restricted toe movement, and he was instructed to elevate his foot as much as possible over the following 4–6 weeks until the lesion healed. The athlete was also referred for evaluation by an infectious disease specialist.

The athlete’s history and MRI findings were interpreted by the infectious disease specialist as consistent with a diagnosis of cellulitis in the left third toe, with associated osteomyelitis. Because swelling was evident around the third digit without fluid in the PIP joint, a CT scan was ordered. The results demonstrated extensive erosive changes to the proximal portion of the middle phalanx (more dorsal than plantar). Minimal sclerotic changes in the distal portion of the proximal phalanx suggested chronic osteomyelitis and a possible Brodie’s abscess in the proximal portion of the distal third phalanx. Additional lab testing was negative for hepatitis B virus, hepatitis C virus, human immunodeficiency virus, and tuberculosis. Complete blood count (CBC), c-reactive protein (CRP), glucose, and erythrocyte sedimentation rate (ESR) serology were also normal. Linezolid, an antibiotic with increased activity against MRSA, was prescribed 600 mg taken orally twice each day also was prescribed with trimethoprim/sulfamethoxazole because of its ability to destroy or neutralize the group A Streptococcus pyogenes growth. Additional therapies prescribed included application of mupirocin in the nares, chlorhexidine body washes 3 times per week for 4–6 weeks, and subsequently, one time per week for an additional 4–5 months.

By late April, the lesion exhibited healthy granulation, but the primary diagnosis of osteomyelitis remained. An orthopedic surgeon recommended resectional arthroplasty and debridement of the joint to eradicate any infection and avascular bone. Allowing the lesion to completely heal before surgery increased the likelihood that subsequent cultures taken would provide accurate results. The orthopedist considered the lesion completely healed in late May, and the surgery was scheduled for June. Radiographs revealed less bone erosion than that which had previously been evident, indicating that the antibiotics had prevented further bone loss. A revised surgical plan included PIP arthroplasty and drilling into the intramedullary canal to encourage blood flow, which would facilitate eradication of the infection by antibiotics administered after the surgery. The surgical procedure included lengthening of the extensor tendon over the MTP joint for correction of the hammertoe deformity. During performance of the PIP arthroplasty, a K-wire was used to drill into the bone surface, thereby encouraging vascular influx of intravenously-administered cefazolin. Following surgery, linezolid and trimethoprim/sulfamethoxazole were prescribed.

At 2 weeks postsurgery, the athlete’s toe swelling had subsided, and cultures revealed no evidence of MRSA. The surgical sutures applied following the extensor tendon procedure were removed, but a postsurgical bolster was left in place. The athlete was allowed to perform full weight-bearing activity, but he was advised to continue wearing the surgical shoe. At 4 weeks postsurgery, the athlete was cleared for full participation in physical activities. He was advised to wear a toe crest to prevent curling into flexion. When transitioning to a regular shoe, the athlete was instructed to ensure that the toe box provided an adequate amount of space. He was instructed to wear shoes as much as possible and to avoid barefoot weight-bearing and aquatic activity. Rehabilitation included basic ROM exercises, as allowed by orthotics and footwear, postural balancing activities, and a gradual return to play (Figure 3).
Differential Diagnosis

Conditions that could have been responsible for the symptoms presented by the athlete in this case include friction blisters, MRSA infection, insect bite, folliculitis, cellulitis, fungal infection, fastidious bacteria, *M. tuberculosis* infection, or other noninfectious causes of osteomyelitis.

Discussion

The reported case involved multiple skin lesions associated with friction blisters, which became infected with MRSA. Multiple bouts of MRSA infection resulted in development of osteomyelitis. The pre-existing hammertoe condition was apparently a major contributing factor. A hammertoe is a deformity that is characterized by PIP joint plantar flexion and MTP joint dorsiflexion. The PIP joint was subjected to localized friction as a result of insufficient room in the toe box of the athlete’s shoe. Although the toe deformity was not the direct cause of the MRSA infection, it created the lesion that became infected. Because MRSA is highly contagious, the athlete’s lack of vigilance in practicing good hygiene may have contributed to the chronic nature of the infection.

The typical treatment for MRSA is antibiotic administration, which is combined with drainage or debridement when necessary. Because MRSA can easily spread to other areas of the body, its containment is a primary concern. Lesion drainage was not deemed necessary in the reported case. Because the extent of radiographic evidence of osteomyelitis decreased following antibiotic administration, the physician was confident that the MRSA infection was effectively controlled.

Lengthening of the extensor tendon is a typical treatment for a hammertoe, but most cases are not surgically treated, unless the condition causes pain that interferes with normal activities. Drilling into the intramedullary canal to increase blood flow is not an uncommon surgical procedure, but it is not typically performed in the phalanges. The combination of treatments completely eradicated the MRSA infection, but the relative contributions of each component to resolution of the condition cannot be specified.
Conclusion

MRSA infection presents the potential for development of a serious condition, but it is typically easy to treat with antibiotics, drainage, and debridement. Early recognition and prompt treatment are essential to avoid complications such as osteomyelitis. The underlying cause of chronic MRSA infections should be identified and addressed. In the reported case, the underlying factor that perpetuated the infection was a toe deformity. Poor personal hygiene may be a factor that contributes to development of chronic MRSA infections. Whenever MRSA infection has been identified, extra precautions should be taken to ensure that facilities are as clean as possible and that good personal hygiene is practiced by all athletes.

References


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