COMMUNITY ACQUIRED METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS IN AN ATHLETIC ENVIRONMENT

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Abstract

The following case report describes the progress of a Methicillin Resistant Staphylococcus Aureus (MRSA) infection. Approximately eighteen, male collegiate football athletes of varying ethnicities contracted this bacterial infection from an unknown source. This case study focuses on a 19 year-old, white, male collegiate football player who contracted the MRSA to the epidermis of his left knee in September of 2003. The athlete initially presented with an effused left knee joint as well as an abrasion to the area. The area was warm to the touch and the athlete complained of knee pain when walking. After three days of a treatment of Keflex from health services, the athlete was referred to a physician. His presentation deviated from the normal MRSA infection, which usually presents with a red raised pustule. After twenty-four hours the pustule becomes black, a large area of redness surrounds the pustule, and an increase in temperature occurs. Because of this deviation, a differential diagnosis of cellulitis was a consideration. As a complication of the MRSA infection, he was diagnosed with septic arthritis, admitted to the hospital, and treated using oral Ciprofloxacin (Cipro) at a dose of 500mg and a direct intravenous line to administer Vancomycin. This was the first case that was clinically impressed in this population that affected a joint rather than an area of tissue. After two days of hospitalization and a total of ten days on Vancomycin and fourteen days on Cipro, the athlete responded to the treatment. He returned to play once the direct line was removed, there was no fluid excretion from the abrasion, and the athlete had no pain when participating in football. Two weeks after the first hospitalization, the athlete subsequently was hospitalized again for two days after his knee became effused a second time and did not respond to the original oral treatment. After the administration of antibiotics intravenously, the athlete responded to treatment and was released. The prevalence of community acquired MSRA is increasing not only in the general population, but within the college athletic setting as well. It is important to make ATC's aware of the signs and symptoms, and how highly contagious MRSA can be. If left undiagnosed and untreated, MSRA can spread systemically causing further infection to the body internally; infect bone, damage skin to the point of needing skin grafts to repair the injured area, and can cause death.

Purpose

The purpose of this case report is to increase awareness of the potential increase in incidences of MRSA at the collegiate level as well as the signs and symptoms associated with MRSA. ATCs should note the importance of early detection, treatment, and the potential risks of the contagiousness of MRSA if misdiagnosed or undiagnosed in a population.

Introduction

- MRSA stems from the original staphylococcus aureus (Staph) bacterium. Staph is a bacterium that is commonly found in the human body and is a typical cause of infection. When the staph infection no longer responds to commonly prescribed antibiotics, it becomes titled as "methicillin resistant". The cause of the non-responsive nature of the bacterium is not due to a mutation of that strand, but to an acquirement of DNA from another bacterium that binds to the normal attachment site of antibiotics, therefore, not allowing the antibiotic to bind, react, and eradicate the bacterium[1].
- Staph aureus also produces beta-lactamase, an enzyme, that renders penicillin inactive, which is why an antibiotic that is not susceptible to beta-lactamase is necessary to treat this infection[2].
- Staph is a organism carried in the nares, or nostrils, of 30% of healthy adults, many without any symptoms of colonization[3].
- Men are more likely to develop it over women[3].
- The majority of patients who develop subsequent infections at a site unrelated to the initial site from which MRSA was isolated and it can be carried in the nares for > 1 year[3].
- Beginning the last week of August, 2003, an outbreak of MRSA occurred on the campus of Sacred Heart University in Fairfield, Connecticut, involving the football team. There were approximately eighteen 18-22 year old, single, male athletes who contacted this bacteria infection from an unknown source. All infected athletes reported to the athletic training staff with similar symptoms.
- The athletes presented with a red, raised pustule with an area of redness surrounding it. The red area was not painful, but was warm to the touch (See Figure 1). Histories of the athletes were taken to determine if there was an allergic reaction occurring.
- The athletes were instructed to observe the area of redness, that was demarcated for twenty-four hours, for an increase in the diameter of redness, and if they noticed any increase in symptoms (i.e. more redness, more swelling, difficulty breathing, etc), to seek further medical assistance.
- The day after noticing the pustule and redness, the athletes reported to the athletic training room for a follow-up. The pustule that was red the day before was now black, the surrounding red area was larger and warmer to the touch, and the pustule was larger in size. Patients were immediately sent to a physician to rule out an infection, osteomyelitis, impetigo, or carbuncle.
- Upon seeing the physician, the pustule was lanced, a culture was taken of the fluid in the pustule, and its contents were drained (See Figure 2). When the culture came back positive for the resistant strain of staphylococcus aureus and was confirmed by the physician that the lump was MRSA, any additional athletes that presented with the similar signs and symptoms were referred immediately to the campus's health services.

Case Description

- A Division I AA collegiate, male, football player 19 years of age contracted the MRSA infection from an unknown origin to the epidermis of his left knee after participating in football practice on the turf field during early September, 2003.
- The player reported having a red, raised pustule with an area of redness around the lesion. The inflamed area was not painful, but there was a noticeable change in the temperature of the skin. The player at this time did not seek medical advice.
- Upon waiting 3 days after noticing the pustule, the player saw the ATC complaining of pain and swelling in his left knee, however, there was now no sign of redness or a raised pustule, just a small abrasion. The player was referred to the campus health center that same day to rule out an infection and to receive tx. He was further referred to a primary care physician (PCP) to rule out cellulitis.
- The PCP Dx the player with septic bursitis, as the bacteria had infected the pre-patella bursa of his left knee. The MD was concerned that the infection would spread further systemically (See Figure 3).
- The PCP referred the player to a rheumatologist. The rheumatologist Dx the player with having septic arthritis and admitted him to the hospital for Tx, five days after noticing the pustule. He was hospitalized for three days.
- During the hospitalization, the medical staff inserted a direct line/catheter into the heart and administered IV Vancomycin BID. The player was instructed to administer the antibiotic on his own after he was discharged. He was also instructed how to keep the insertion site of the line clean and dry. He continued with the antibiotic Tx for two weeks after being Dx.
- After two weeks of antibiotic Tx, the direct line was removed and the player was cleared by his PCP to return to practice. The return to play criteria included the direct line being removed, there was no fluid excretion from the infected area, and the player had no pain when participating in football. The site of the lesion was healing according to normal healing procedures.
- The player continued with activities and practice, however, his left knee began to swell once again one week following the removal of the direct line. He was prescribed Cipro PO by his PCP. After the ten-day regimen, the player had not responded as well as the MD would have liked, and was admitted to the hospital once again, keeping him only one night and giving him IV antibiotics. After this 2nd hospitalization, the knee responded to Tx.
- The player was recovering well with no further side effects or complications from the infection of his knee. Approximately one week later the player presented with a skin lesion on the upper neck area. The player was referred to the same PCP who treated his knee.
- Tx for the chin included the infected site being lanced, drained, and covered with a sterile dressing. He was again put on Cipro for ten days. Following the 5th day of the 2nd ten-day regimen of antibiotics, the site of the infection was healing satisfactorily and the player was allowed to participate in football again. A pad as well as a tegaderm dressing was placed over the infected area and was fit into his chinstrap to protect the area from re-opening.
- Upon evaluation at the beginning of November, the wound had healed completely and the player was sign and symptom free of the infection. The player continued with the remainder of the season and had no further complications.

Figure 1 – Left thigh red, raised pustule after 24 hrs of initial detection

Figure 2 – Left thigh, the pustule was lanced and drained

Figure 3 – Left knee, Septic Bursitis

Differential Diagnoses

Due to the difference in the presentations of the clinical signs and symptoms, potential initial diagnoses include abscesses, cellulitis, crusted erosions, crusted plaques, papules and nodules, pustules, abscess, folliculitis/furunculosis, paronychia, impetigo, wound infection, or insect bites[4, 5, 6, 7]. As a precursor to Figure 1, the raised area appears smaller and less red. This is when it might be misconstrued as folliculitis, an abscess, or an insect bite. In Figure 1, the bump has progressed and you can see the red, raised area where one might assess it as a pustule. If not caught early and the infection is not treated, the bump might disappear or get masked by swelling and redness and can appear as a cellulitis as in Figure 3. Without early detection and treatment, the infection can spread and develop into osteomyelitis or septic bursitis (as seen in Figure 3) or even endocarditis and bacteremia[2, 6, 7, 8].

Discussion

- Various contributing factors that should be considered in the possible causes of the transmission of MRSA. These factors are open wounds, poor personal and equipment hygiene, sharing of clothing, towels, razors, direct contact with someone who has colonizations or a diagnosed MRSA infection, prior antibiotic use, hospitalization, IV drug use, recent surgical procedures, chronic illness such as Diabetes Mellitus and malignancy, or prior colonization. Many patients do not have all of these risk factors, yet still contracted MRSA.[2,3,5,6, 9]
- Sacred Heart University employed various techniques to prevent the spread of MRSA. The techniques that were used was to put Phisohex soap dispensers in the showers, disinfected protective pads, encouraged good hygiene for players, coaches, and the health care team, cover all reported wounds, wash towels in water at the appropriate temperature, discontinued use of the whirlpools, soaked water bottles in bleach solution, and kept those infected out of contact with others.[1,5,6,9]
- The Center for Disease Control (2003) recommends that all lacerations are kept clean and covered, use gloves when tending to wounds, utilize proper disposal of used and cont aminated supplies, wash hands frequently with antibacterial soap, especially after every patient, disinfect the treatment area after every use, and avoid sharing personal items like towels, uniforms, and clothes.[9]
- In regards to athletics, the Connecticut State Department of Health (2003) advises that players should wear clean clothes to practice, shower after every practice, uniforms should be washed in water above 160 degrees Fahrenheit, and dried in 180 degrees Fahrenheit.[10]
- MRSA is difficult to diagnose since it could present itself in various forms. Some identification techniques that can be utilized include taking a detailed patient history to screen for potential risk factors, determine if the current infection is persistent or progresses during the standard treatment of other possible diagnoses, refer them to a physician and have a bacterial culture taken to test for MRSA bacterium, and whether there is the presence of necrotic tissue at the site of infection.[4, 5, 6, 7]
- In order to determine if the infection is positive for the MRSA bacteria, the physician must acquire a sample to be tested to aid in the definitive diagnosis. Performing this test will help determine the antibiotic sensitivity of the pathogenic bacteria.[5] Removal of the necrotic area and the infected fluid will promote the healing and decrease the chances of infecting other areas of the body.
- As with any wound, it is important to keep the area covered not only for the protection of the wound, but to prevent further spread to the athlete or to other athletes. The process of covering the area should include, cleaning the area with sterile water, inserting a wick into the lanced area, and placing several sterile gauze pads on the wound to provide padding to the area and to prevent any fluid reaching the surface of the pad. The pads were secured with cloth tape to help decrease the irritation to the skin. Once the athlete was cleared for practice, he was wrapped differently. Cleaning was the same as above, and Tegaderm was placed over top of the sterile dressing to decrease the chances of any fluid escaping.
- The physician prescribed oral Cipro for ten days. This is the minimum amount of days one should be on the antibiotic. There is the possibility of needing 2-3 weeks of antibiotic therapy[5] which our athlete needed. Cipro was the drug chosen because the strain of MRSA for this case study was not resistant to the drug and is a broad-spectrum antibiotic.[11]
- During one course of treatment, IV Vancomycin, a glycopeptide antibiotic [11], was used in combination with oral Cipro. Its indicated use is only for severe infections.[6]
- Linezolid, an antimicrobial drug from the oxazolidinone family that is becoming more popular, is another choice for the first line of defense for treatment [2,6,8], however, it was not prescribed in this case study. Another treatment option is intranasal mupircin 2% ointment. Its primary use is to decolonize the nares, however, it too was not prescribed in this case and it is not intended to eradicate the current epidermal infection.[2,5,8]

Conclusion

- Due to the various mutations occurring, multiple strains of bacteria are evolving and MRSA is becoming more prevalent and moving more to the community. This may be due to many of the medical staff of hospitals are moving into outpatient settings.[11]
- With the increase for potential outbreaks, ATCs must be able to recognize warning signs and institute precautionary measures. MRSA can spread easily from person to person during sport activity via direct contact, contact with clothing that is infected, sharing of personal items, or the use of equipment that has not been cleaned often enough or in the correct fashion. If the infection is not taken care of in an effective and timely manner, it can lead to further and more serious complications.[2,9]
- It is important to refer the athlete to a physician immediately so the appropriate tests can be performed and medications can be prescribed. The physician's guidelines for treatment must be followed implicitly. Regardless of who is infected, you want to make sure that proper OSHA standards are being followed in that one uses gloves when treating open wounds and hand washing is occurring between treating people. Isolation of the person(s) who have contracted MRSA and proper laundering of clothing are also key principles in decreasing the likelihood of further infection.[1,5,9]
- If the infection is not diagnosed early and proper treatment is not given, the infection can spread to a different epidurmal site on the same athlete, to more athletes, to members in the community, or throughout other systems of the body. If untreated, systemic problems can occur.
- These more sever problems include osteomyelitis, endocarditis, septic arthritis/bursitis, bacteremia. These conditions need advanced medical care and more intensive treatment. Surgical debridement and skin grafts may be needed if the infection is allowed to affect deeper layers of the skin. With more advanced infections and subsequent intensive treatments, you also run the risk of death being the ultimate complication.[2,6,7,8,9]

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