

# Community-Acquired Mecithillin-Resistant Staphylococcus Aureus : A Case Report on Necrotizing Fasciitis And Deep Vein Thrombosis In Adolescent Boy

A Alanazi, J Alenazi, S Alola, E Banyan, M Shalaan

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## Abstract

Staphylococcus aureus (S. Aureus) is the most common species of staphylococci to cause Staph infections. The infections caused by S. aureus were not difficult to manage. However, in recent past, S. aureus is transformed to its variant forms, including, Methicillin-resistant S. aureus (MRSA) by acquiring methicillin resistant gene (mec A gene). Previously, the MRSA was known for its origin from hospitals, but more recently, it is known to be acquired, from the communities too. Here we report the case presentation of a male adolescent with complicated fibular osteomyelitis, necrotizing fasciitis and deep vein thrombosis caused by Community acquired (CA) MRSA. The preliminary complaint of the patient was swelling in right foot and leg associated with high fever, pain, dyspnea and cough. The clinical presentation fit him as acute respiratory distress syndrome and hence antibiotics (ceftixone and vancomycin) were started. Doppler ultrasound revealed deep vein thrombosis (DVT). Analysis of blood culture showed the presence of MRSA. Hence rifampin and gentamicin were added and ceftriaxone was discontinued. MRI revealed osteomyelitis in the distal part of fibula. The bone infection was so severe that despite of using the three antibiotics, the patient remained febrile with increased leukocytes and neutrophils, the ankle redness became confined with malleolus on each side and the sepsis remained uncontrollable. Repeated MRI showed inflammatory findings, including cellulitis, pyogenic myositis, deep fasciitis and fibular periosteal reactions, suggestive of necrotizing fasciitis. Upon confirmation of fasciitis, fasciotomy with debridement and irrigations was done in multiple sessions and a high dose intravenous immunoglobulin was administered as an adjuvant therapy, resulting in reversal of the disease progression. In light of reports in the literature, we replaced antibiotics with immunoglobulins as a post surgery treatment, which worked well.

## INTRODUCTION

Bacteria of the genus Staphylococcus are gram-positive cocci that are microscopically observed as individual organisms, mostly as duo, and in asymmetrical bunch. S. aureus, being omnipresent is a crucial source of infections of armpit, perineal areas, anterior nares, soft-tissue endovascular tissue, pneumonia, septic arthritis, endocarditis, osteomyelitis, sepsis, and atopic dermatitis (Von et al., 2001; Perez-Vazquez et al., 2009). It is known to cause necrotizing fasciitis, DVT as well as toxin-mediated syndromes like shock and food poisoning (Perez-Vazquez et al., 2009; David and Daum, 2010). S. aureus has developed resistance to a wide range of antimicrobial agents, which makes the treatment complicated. Most serious etiological microbe for many types of infections is MRSA. The Methicillin-susceptible S. aureus transformed to MRSA by acquiring methicillin resistant gene (mec A gene) into their

genome (Oliveira et al., 2006). The mec A gene allows a bacterium to be resistant to Methicillin, Penicillin, Erythromycin, Tetracyclin and other penicillin-like antibiotics ([http://en.wikipedia.org/wiki/MecA\\_gene](http://en.wikipedia.org/wiki/MecA_gene)). MRSA has become one of the most significant hospital or a community pathogen worldwide (Huang et al., 2006; Ghebremedhin et al., 2009).

## CASE PRESENTATION

A 12 year old boy came to Emergency Department of the King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia as a referral from a private clinic, complaining of swelling in the right foot and leg coupled with high fever for the last 4 days, he had shortness of breath and mild cough. These symptoms were attributed to minor hits while he was playing football. Foot swelling had increased and extended to involve the calf muscle of the right leg. Although there was no change in the skin, the

swelling was associated with restraining pain, especially with movements and hence he was confined to bed before his presentation.

There was no history of surgery before and patient denied any penetrating trauma, painful joints, sore throat and URI symptoms. However, a year before, he had mild attack of bronchial asthma, which responded well to ventolin. His vaccination records were up to date and he has not been on any medication during this year. Origin of disease from the hospital is ruled out, as none of his family members, friends and/or relatives work in health sector.

The first round examination revealed; body weight 60 kg, height 165 cm BP 90/60, body temperature 39°C. He was found to be in respiratory distress (tachypnea, sat; 90-94; tachycardic, 160). Chest auscultation revealed diffuse crackles bilateral with fair air entry. The right foot and leg swelling was prominent with tenderness, hotness and limited extension and flexion. The patient was resuscitated with normal saline boluses and prompt antibiotics (ceftixone and vancomycin) were started after blood was taken for culture. Chest X-ray showed bilateral infiltrate. Arterial blood gas showed pH 7.40, PCO<sub>2</sub> 35, PO<sub>2</sub> 120, HCO<sub>3</sub> 21, BE -3.1, sat 98 in 15 L, O<sub>2</sub> non re-breather face mask. Presumed 100% inspired FIO<sub>2</sub> his hypoxia index was 120 which fit him to be in acute respiratory distress.

Doppler ultrasound showed DVT. The patient was shifted to the PICU. Two days later, the erythema started to be more obvious over the right ankle. MRSA was detected in the blood culture and hence, rifampin and gentamicin were added and ceftriaxone discontinued. Subsequent investigations included CT, abdominal ultrasound, which were unremarkable for the other foci. However, .MRI showed osteomyelitis in distal part of fibula. Despite of treatment with rifampin, gentamicin and vancomycin, the patient remain febrile with increasing leucocytosis (20k 35k 45k 55k) and predominant neutrophils. The ankle redness became confined and more localized with malloulus on each side of the ankle and his sepsis state was not controlled. MRI repeated (five days interval) showed inflammatory findings, including cellulitis, pyogenic myositis, deep fasciitis and fibula periostial reactions, suggestive of necrotizing fasciitis.

The patient was sent to the OR and a fasciotomy was done with debridement and irrigations in multiple OR sessions. High dose IV immunoglobulin was administered as adjuvant therapy. Subsequent investigations revealed him to free of

MRSA and all the related pathogenesis.

## DISCUSSION

The case presentation suggests the adolescent boy to have complicated fibular osteomyelitis with necrotizing fasciitis and deep vein thrombosis caused by CA-MRSA. The report of this case has interestingly pooled up the different steps that lead to the final diagnosis and treatment. Nevertheless, the links that lead to the diagnosis and treatment are appealing in exploring the pathogenesis and management and might be a record that usher into a speedy future diagnosis and treatment.

The preliminary complaint was swelling in right foot and leg associated with high fever, pain, dyspnea and cough. The swelling and restraining pain had extended to involve the calf muscle of the right leg. Although the symptoms persisted for four days, there was no laboratory analysis and the treatment was symptomatic till he came to our emergency department. The symptomatic treatment is just a time lapse that will deteriorate the condition. Hence, patient education is necessary to make them realize, to visit the nearest emergency, within 24 hours of the infliction (Chan and Holford, 2001).

First round examination of the clinical presentation fit him as acute respiratory distress with obvious swelling, tenderness and hotness of foot and leg which had limited extension and flexion. Blood was taken for culture before the patient was sent for x-ray. In the meanwhile, antibiotics (ceftixone and vancomycin) were started. Doppler ultrasound showed DVT. Two days later erythema was more apparent on the right ankle joint extending to lower and posterior part of the leg.

MRSA was detected in the blood culture, hence rifampin and gentamicin were added and ceftriaxone was discontinued. Recently, MRSA, is transpired as a mounting apprehension for the health care providers. It has become the most common multidrug-resistant infection-causing bacteria, which has been a source of considerable morbidity and mortality (Uekotter et al., 2011). Historically, the risk factors for MRSA acquisition included recent hospitalization, outpatient visit, nursing home admission, but recent reports suggest that acquisition of MRSA from community is also on the increase (Beam and Buckley, 2006; Nerby et al., 2011). This particular case has been without any history of hospitalization and even none of his immediate relatives and/or friends had any history of being in the hospital or

working in the health sector. These facts confirm a non-hospital origin of the infection (Huang et al., 2006).

Subsequent investigations included CT abdominal ultrasound, which were unremarkable for the other foci. Nevertheless, MRI showed osteomyelitis in the distal part of fibula. The bone infection was so severe that despite of rifampin, gentamicin and vancomycin, the patient remained febrile. There was an increase in leucocytosis and an abnormal ratio of neutrophils, the ankle redness became confined with malleolus on each side of the ankle and his sepsis state was not controlled. Wolf (2011) also reported osteomyelitis causes several pathological changes. Repeated MRI showed cellulitis, pyogenic myositis, deep fasciitis and fibula periosteal reactions, suggestive of necrotizing fasciitis. In a recent study, CA-MRSA is reported to cause serious pathological changes including orbital cellulitis, myositis, pyomyositis and necrotizing fasciitis (Vasaka et al., 2011; Tseng et al., 2011). Literature reports confirm MRSA to cause both necrotizing fasciitis, as well as fibular osteomyelitis. The necrotizing fasciitis is a potentially fatal bacterial infection of the soft tissues. Establishing the diagnosis at the early stages of the diseases is a great challenge (Wronski et al., 2011). Upon confirmation of fasciitis, fasciotomy was done with debridement and irrigations in multiple sessions and a high dose intravenous immunoglobulin was administered as an adjuvant therapy, resulting in reversal of the disease progression. In a study on necrotizing fasciitis, Herr et al., (2011) reported radical surgical debridement, along with systemic antibiotic therapy as well as enhanced intensive care therapy, which is sometimes combined with immunoglobulins. The post surgery management in this particular case involved use of immunoglobulins and the treatment with antibiotics was considered superfluous. In a recent study on osteomyelitis caused by CA-MRSA, the post surgery treatment with antibiotics was unsuccessful (Wolf, 2011).

## CONCLUSION

The CA-MRSA related infections cause manifold complications resulting in serious morbidity and mortality. The infection is known to cause fibula osteomyelitis, DVT and necrotizing fasciitis, but the diagnosis is very complicated and by the time the disease is identified, the patient suffer serious co morbidities and may even die.

Hence, in-depth and far reaching options of management should be kept open with the slightest clue on preliminary symptoms.

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**Author Information**

**Abdullah Foraih Alanazi**

Department of Pediatric Emergency, King Saud Bin Abdulaziz University for Health Sciences

**Jaber Alenazi**

College of Applied Medical Sciences, King Abdulaziz Medical City

**Suliman Alola**

College of Applied Medical Sciences, King Abdulaziz Medical City

**Esam Banyan**

College of Applied Medical Sciences, King Abdulaziz Medical City

**Mohamed Shalaan**

College of Applied Medical Sciences, King Abdulaziz Medical City