Community Acquired MRSA Skin and Soft Tissue Infection and its Possible Relationship With IgG Deficiency and CD4 Lymphopenia

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Citation

S Antony, N Regalado, F Ciriza, O Alozie, L Brumble. *Community Acquired MRSA Skin and Soft Tissue Infection and its Possible Relationship With IgG Deficiency and CD4 Lymphopenia*. The Internet Journal of Dermatology. 2010 Volume 8 Number 2.

Abstract

Staphylococcus aureus is the most common pathogen associated with infections of skin and soft tissue structures[1] Staphylococcus aureus colonizes the skin of approximately 35% of Americans of which approximately 1% is methicillin resistant Staphylococcus aureus (MRSA)[1,2,3]. The vast majority of skin and soft tissue infections have been associated with Community acquired-MRSA strains, but other presentations such as pneumonia, necrotizing fascitis and on rare occasions, septicemia have occurred [4,5] . Risk factors for CA-MRSA infections include being a child, an athlete, a member of the armed forces or an intravenous drug user with the majority of these being immunocompetent [6,7] . CA-MRSA infections have also been reported in patients with immunodeficiency states such as HIV, cancer etc [8,9]. This study was performed to identify any existing correlations between CA-MRSA skin infections and immunocompromised conditions, as assessed by IgG deficiency and CD4 lymphopenia and to define the local epidemiology of (CA-MRSA) skin infections in El Paso, Texas in an Infectious Disease Clinic over a 3 year period.

MATERIAL AND METHODS

Data was collected prospectively from the medical and laboratory records of outpatients seen at a Infectious Disease Clinic in El Paso, Texas between 2006 -2009. Inclusion criteria for analysis included: (1) Documented skin and soft tissue infections (SSTIs) , (2)

Positive wound cultures obtained just prior to or at the time of evaluation, (3) No known previous history of MRSA colonization or infections, and (4) No recent history of hospitalization, nursing home admission, dialysis, surgery, indwelling catheter or devices that pass through the skin in the past year.

Data collected included age, gender, complete blood count (CBC), IgG level and CD4 count. Possible confounders including diabetes, steroid use, cancer or other immune-compromised states and sick contacts were assessed. Description of the lesions included site and characteristics of the infection, as well as the clinical course including surgical intervention, antibiotic therapy and relapses or recurrences.

If family members were susupected of having the same presentation, phone interviews or face to face contact was established to determine if they had a reasonable probability of having MRSA skin infections. Any cultures that were done on them by other physicians were reviewed. Patients were followed for an average of 2 years following their initial presentation. The definition of a cure was no further skin and soft tissue infections at the end of the 2 year period.

RESULTS

A total of 158 patients with CA-MRSA SSTI were evaluated. Fifty-five patients met the

CDC criteria to be included in the study which included patients that presented with MRSA in the outpatient setting with no previous history of MRSA infection or colonization, being hospitalized, in nursing home, skill nurse facility, hospice, dialysis, surgery or with indwelling catheters in the last year (http://www.cdc.gov/mrsa/diagnosis/). The group contained 34 female (62%) and 21 (38%) males. The average age of this group was 48 (+/-15). The average WBC count at presentation was 6.9 (+/-2.8), with CD4 and IgG

being 801.2 (N 400-800 cell/ml)and 854.6 (600-1200ug/ml) (+/- 210.5 and 173.2) respectively. Fifty-three of the 55 patients had normal CD4 counts. Forty-nine of the 55 patients had normal IgG levels (Table 1). The remaining patients were thought to have combined immunodeficiency syndrome.

CD4 and IgG was higher in females compared to males (818 vs 773 and 873 vs 826, respectively), but this was not statistically significant (p = 0.45 and 0.35, respectively).

Majority of the patients (41) had no co-morbid conditions. Fifty eight percent of the patients had deep lesions, with approximately 59% of patients having a family contact that was concurrently infected with CA-MRSA. All patients were treated with antibiotics, with trimethoprim-sulfamethoxazole (Bactrim) being the most commonly used antibiotic, either alone or in combination. (Table 2). Forty eight percent (26) of the patients were managed per CDC guidelines[5], with surgical incision and drainage; all specimens grew out MRSA. Twenty eight percent (15) of the patients relapsed (same presentation within 2 years of the initial diagnosis). There was no association between gender and any characteristics of the SSTI lesions (Figure 2).

However, female patients seemed to have a slightly higher percentage of infections than males. Female patients, in this study, also had more relapses.

None of the patients tested evaluated had risk factors for HIV that were determined at the time of interview.

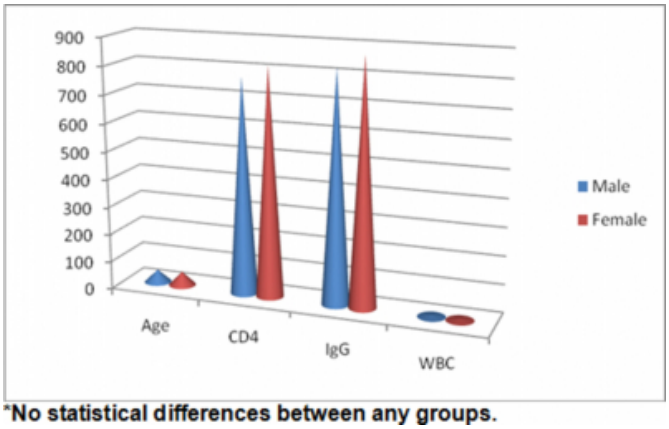
Figure 1

Table 1 – Study Participant Characteristics

	N	Mean	SD
Age (years)	55	48	15
CD4 (cell/mm^3)	55	801	211
IgG	52	854.63	173.23
WBC (cells * 10^3/uL)	48	6.92	2.76

Figure 2

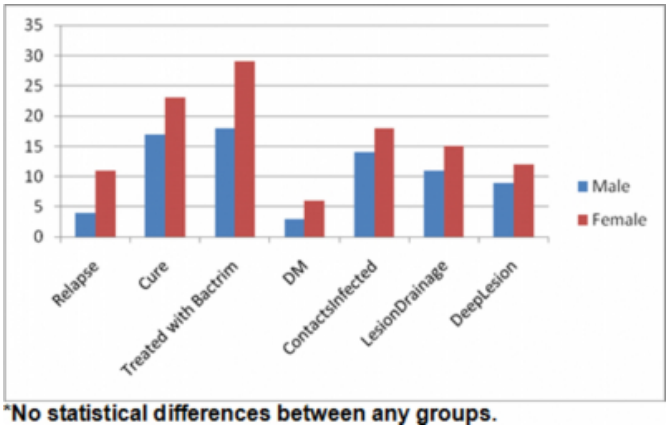
Figure 1 – Gender Differences across Laboratory Characteristics



*No statistical differences between any groups.

Figure 3

Figure 2 – Gender differences Across Study



*No statistical differences between any groups.

Figure 4

Table 2 – Antibiotic Usage during Hospitalization for CA-MRSA

Antibiotic	N (%)
Bactrim alone	28 (53.9)
Bactrim/Clindamycin	13 (25)
Bactrim/Daptomycin	1 (1.9)
Bactrim/Tetracycline	1 (1.9)
Clindamycin alone	3 (5.8)
Daptomycin alone	1 (1.9)
Linezolid alone	1 (1.9)
Tetracycline alone	2 (3.9)
Tetracycline/Clindamycin	1 (1.9)
Tetracycline/Daptomycin	1 (1.9)

Bactrim=trimethoprim-sulphamethaxazole

DISCUSSION

CA-MRSA associated SSTIs have become a growing problem over the last decade. Most of these infections seem to occur in school age children, in young adults, in prisons and in persons participating in contact sports. These are all relatively healthy populations, leading one to believe that immunodeficiency may not play a role in the disease process. However a recent study showed an increase risk of CA-MRSA among HIV-infected patients. Therefore controversy still exists in the community, as to the effect of immunocompetence on CA-MRSA infection.

In our study we did not find a statistically significant relationship between immune status, as measure by CD4 and IgG, and CA-MRSA infection. We did not find a difference in the IgG levels or CD4 counts between males and females. Despite the fact the women seemed to have more diabetes (67% vs. 33%), which has been associated with CA-MRSA SSTI[6], there was no statistical difference in infection rates, between male and females.

There was also no gender relationship between patients when assessed for infected home contacts, those that had their lesions drained, antibiotic duration, antibiotic choice or cure relapse). Interestingly, 59% of patients had infected contacts at the same time of patient presentation attesting to the fact that lateral spread of this organism is common 7.

Looking at therapeutics in patients with SSTIs, we did not find a significant relationship between TMP-SMx usage (alone or in combination therapy) with a cure. In this sample, there was a significantly less relapse rate in patients who used TMP-SMX (success rate 65% (female) to 81% (male). This seems to be supported in day to day clinical practice. This may be due to the fact that the dosing regimen, duration of therapy and side effects is less complicated than other currently available regimens like clindamycin , doxycycline etc.

IgG deficiency and CD4 lymphopenia have been associated with bacterial, viral and other opportunistic infections [12,13,14,15,16] but in this study we did not see a correlation between the IgG or CD4 levels and CA-MRSA infections.

Texas has a large population of persons with diabetes mellitus and this study showed that females with MRSA SSTI were 5 times more likely to be infected than were the males (30% vs. 6%) however, we could not definitely state that diabetes was a significant risk factor for MRSA skin infections (data from NHANES showed that diabetics are more likely to be colonized with MRSA than non-diabetics (17). The type of infections noted included both superficial (<3inches) and deep (>3 inches). We did not note a significant difference in either sex. In logistic modeling females had more relapses than males (OR = 2.034, CI: 0.552 – 7.504), however it was not statistically significant. Adding IgG or CD4 to the model did not significantly change the relationship.

CONCLUSION

In summary, we did not find any relationship between immune status, as measured by IgG or CD4, with CA-MRSA SSTIs. This is the first study that suggests that immunocompetence may not be a risk factor for MRSA associated SSTI. In fact, simple incision and drainage may be all that is required. However, when patients do present with recurrent infections over a period of time, an immuno-deficiency work up should be considered. The majority of the patients were given TMP-SMX as a part of their treatment, either alone or in combination with other antibiotics. The treatment choice was not associated with relapse. While HIV and other systemic forms of immunocompromise have been reported to be associated with higher rates of CA-MRSA infections, the majority of patients that presented in this study, with CA-MRSA SSTIs, are not functionally immunocompromised.

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