

Ophthalmic methicillin-resistant *Staphylococcus aureus* infections: Sensitivity and resistance profiles of 65 isolates in central California

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ABSTRACT

Purpose: To capture the sensitivity and resistance trends of ophthalmic methicillin-resistant *Staphylococcus aureus* (MRSA) in a heterogeneous demographic. **Methods:** Between 1/1/2004-12/31/2011, ophthalmic MRSA infections were searched in the electronic medical record system of Community Regional Medical Center in Fresno, California. We reviewed whether the infection was community-acquired or hospital-acquired, culture site, and sensitivity/resistance profiles. **Results:** The ophthalmic MRSA isolates tested for vancomycin, sulfamethoxazole-trimethoprim, and gentamycin were 100% sensitive to these antibiotics. Tetracycline and rifampin had the next highest sensitivity to resistance ratio, followed by clindamycin. More cases were community-acquired than hospital acquired. Almost half of the hospital-acquired cases were in newborns. Most hospital acquired infections were post-ophthalmic surgery. **Conclusion:** There is an increasing trend of community-acquired ophthalmic MRSA infection with eyelid involvement being the most common manifestation. Hospital-acquired cases are common in newborns and post-ophthalmic surgery. Have a high index of suspicion for MRSA infection with suspected “insect bites”. Vancomycin, sulfamethoxazole-trimethoprim, gentamycin, tetracycline, and rifampin are good choices to treat ophthalmic MRSA infection. There may be emerging resistance to clindamycin, at least in the Central California region. If MRSA infection is suspected, erythromycin and fluoroquinolones should be avoided.

Keywords: Methicillin-Resistant *Staphylococcus aureus*; MRSA; Eye Infections; Ophthalmic Infections; Ocular Infections

1. INTRODUCTION

In the past methicillin-resistant *Staphylococcus aureus*

(MRSA) was a common cause of hospital-acquired infections [1]. Now more than half of all skin and soft tissue infections worldwide are due to the community-acquired MRSA strain [2,3]. Ocular MRSA infections can be aggressive and cause severe ophthalmic disease including blindness [4]. Frequently inadequate antibiotic coverage is prescribed for ophthalmic MRSA infections due to unfamiliarity with both the presentation of these infections and with appropriate antibiotic coverage [5]. We reviewed the electronic medical record system for patients with MRSA of the eye and orbit in a large community hospital in Fresno, California to further understand antibiotic sensitivities and treatment. The aim of our study was to assist physicians (in general practice as well as ophthalmologists) in the recognition and appropriate treatment of this potentially sight threatening infection.

2. METHODS

The electronic database of a large community hospital (Community Medical Center, Fresno, California) was searched for patients who had an ophthalmic bacterial culture performed between January 1st, 2004-December 31st, 2011 which grew MRSA. Data collection included culture source, sensitivity and resistance profiles, and whether the infection was community or hospital-acquired. This study was approved by the Institutional Review Board.

Results: There were 65 ophthalmic MRSA isolates identified. Forty cases were in men, 25 were in women. Eyelid involvement was the most common, followed by conjunctivitis. Thirty-eight cases were community-acquired. Two of these cases were initially diagnosed as spider bites. Twenty-seven cases were hospital acquired, with 13 cases (almost half) being in newborns. Most hospital-acquired cases occurred after ophthalmic surgery. Interestingly, two hospital-acquired cases were misdiagnosed as shingles.

All isolates tested for vancomycin, sulfamethoxazole-trimethoprim, and gentamycin were sensitive to these antibiotics and none were resistant. Tetracycline and rifampin had the next highest sensitivity to resistance ratios. Approximately 40% of ophthalmic MRSA isolates were resistant to clindamycin. Most isolates were resistant to levaquin (80%) and erythromycin (90%). All isolates tested were resistant to penicillin G and oxacillin.

We were not able to identify the antibiotic used in all cases. In 10 cases, an inadequate initial antibiotic was used and not changed to an appropriate antibiotic. In 3 cases, an inadequate initial antibiotic was changed to an appropriate antibiotic. In 11 cases, an initial appropriate antibiotic was used.

3. DISCUSSION

Blomquist examined 49 cases of ophthalmic MRSA from 2000-2004. He found 76% of cases to be CA-MRSA and 24% were hospital-acquired MRSA infections. Blomquist reported eyelid involvement followed by conjunctivitis to be the most common manifestations of ophthalmic MRSA infection. He also reported that two cases were misdiagnosed as insect bites. Blomquist's study found ophthalmic MRSA isolates to be most sensitive to vancomycin, followed by sulfamethoxazole/trimethoprim, rifampin, gentamycin, and tetracycline [5].

Friedlin *et al.* at the University of California San Francisco, examined 88 ophthalmic MRSA isolates in 41 patients from 1998-2006 and reported blepharoconjunctivitis (78%) was the most common manifestation. Their ophthalmic MRSA isolates showed 100% sensitivity to vancomycin, 97.7% sensitivity to sulfamethoxazole, 93.2% sensitivity to tetracycline, and 63.6% sensitivity to bacitracin. Only 14.8% were sensitive to erythromycin and ciprofloxacin. This study did not differentiate between CA-MRSA and nosocomial infection [6].

The Ocular Tracking Resistance in US Today (TRUST) conducted a study from 2005-2006 that examined 33 cases of ophthalmic MRSA from a variety of hospitals in various states. In this study, the site of ocular infection was not specified nor was there differentiation between CA-MRSA and hospital-acquired infection. Asbell *et al.* reported that 93.9% of their ophthalmic MRSA isolates were sensitive to trimethoprim, 15.2% were sensitive to quinolones, and 6.1% were sensitive to azithromycin [7].

Walvick and Amato reported 234 ophthalmic MRSA isolates between 2002-2008 in the Kaiser Permanente Northern California system. All isolates tested for vancomycin, trimethoprim/sulfamethoxazole, and rifampin were sensitive to these antibiotics and none were resistant. Gentamycin and chloramphenicol had the next highest sensitivity to resistance ratios, followed by tetracycline and trimethoprim. There were 157 isolates of community-acquired MRSA and 53 isolates of hospital-

acquired MRSA. It was not mentioned in the medical record review in 24 isolates if patients were previously hospitalized prior to obtaining the cultures.

The most common ophthalmic MRSA infection was eyelid involvement in 78 cases. There were 58 cases of conjunctivitis, 15 cases with corneal involvement, 11 cases of dacryocystitis, 7 cases of endophthalmitis, and 2 cases of orbital cellulitis. One quarter of isolates (63 cases) did not mention the specific ophthalmic culture source. Spider bite was assumed by the patient or mentioned as an initial diagnosis in 8 cases [8].

Amato *et al.* conducted a study from 2002-2007 of 93 cases of ocular MRSA in a pediatric population from a Northern California health maintenance organization. Approximately 70% of the cases were community-acquired. Forty-three percent of the cases were in newborns. Lid involvement and conjunctivitis were the most common manifestations of ocular MRSA. Vancomycin, tetracycline, gentamycin, and sulfamethoxazole/trimethoprim offered the best sensitivity. Approximately half (51%) of the ocular MRSA isolates were resistant to fluoroquinolones [9].

A Canadian study from 2000-2010 examined 129 cases of ophthalmic MRSA infection. Vancomycin, rifampin, sulfamethoxazole/trimethoprim, and tetracycline offered the best coverage. Most ophthalmic MRSA isolates were resistant to erythromycin (88%) and fluoroquinolones (78%) [10].

A large study from Taiwan examined 274 cases of MRSA ocular infection from 1999-2008. Approximately half (52%) of the cases were community-acquired. Most of the community-acquired cases were in the younger population and eyelid involvement was the most common manifestation. Most hospital-acquired cases were post-surgical. Sulfamethoxazole/trimethoprim carried excellent sensitivity and most ocular MRSA cases were resistant to erythromycin (88%) and clindamycin (81%) [11].

Our findings carry many consistencies with the literature. Community-acquired MRSA is becoming much more common and eyelid involvement appears to be the most common manifestation of ophthalmic MRSA infections [5-9,11]. It has also been noticed that MRSA infections are often misdiagnosed as spider bites and a high index of suspicion for MRSA is warranted for any patient reporting a "insect bite" [5,8,12]. Published sensitivities and resistance profiles are consistent in regards to antibiotic selection. Vancomycin, sulfamethoxazole-trimethoprim, gentamycin, tetracycline, and rifampin appear to be the best first choices for ophthalmic MRSA infections. Erythromycin and fluoroquinolones are should be avoided for MRSA infections [5-10]. Interestingly, our study showed that there may be increasing resistance to clindamycin with ophthalmic MRSA infections; a trend

mentioned in other recent studies as well [11]. We hope that these findings help provide guidance for all physicians (in general practice and ophthalmologists) in recognizing and properly treating ophthalmic MRSA as well as stimulate further studies for this increasingly troublesome condition.

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