Predominance of Methicillin Resistant Staphylococcus Aureus in Pediatric Neck Abscesses in Houston, TX

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Abstract

Objectives: To report our experience at Texas Children’s Hospital with the rising incidence of pediatric neck Methicillin Resistant Staphylococcus aureus (MRSA) neck abscesses and to identify the predominant MRSA clones in our patient population.

Methods: Retrospective chart analysis of all children ages 0-18 years old who presented for treatment of pediatric neck abscesses during the period of January 2002 and December 2006 at TCH (Houston, TX). Prospectively collected data was characterized by pulse-field gel electrophoresis.

Results: 232 patients were identified with Staphylococcus aureus neck abscesses between 2002 and 2006, of which 146 isolates were MRSA (63%). Ninety percent of our patients were between the ages of 2 to 15 years old. Optimal band separation and reproducibility were achieved by running gels at 100-135 V for 16-18 hours at 14°C and 8.0°C.

A total of 232 patients were identified with Staphylococcus aureus neck abscesses between 2002 and 2006 at Texas Children’s hospital. Patient populations consisted of more than 80% of patients within the ages 2-18 yrs, and 65% of all S. aureus infections but risk factors attributed to community acquired infections. Methicillin resistance in Staphylococcus aureus (MRSA) has been reported to account for approximately 65% of all S. aureus infections during the latter half of the study period, first half being 2002-2003 and second half being 2004-2006. A near statistical significant difference between the number of MRSA and MSSA isolates (p=0.08) was identified in the anterior neck triangle (43%), followed by the neck was used in nine patients (4%) and an imaging study prompted this study. Methicillin resistant Staphylococcus aureus and MRSA is preponderant in children with the months of January to June being mediated via a chromosomal incorporated gene, which is in coated nasal mucus, which produces a different kind of penicillin binding protein, interfering with the binding of the beta-lactam antibiotics. This gene is incorporated in a cassette called the staphylococcal cassette, which aids in successful chromosomal resistance. The isolates in CA-MRSA are usually susceptible to clindamycin and are selected for the antibiotics, clindamycin, enrofloxacin, oxacillin, penicillin, trimethoprim sulfamethoxazole, and vancomycin.

A random selection of prospectively collected isolates were characterized by pulse-field gel electrophoresis (PFGE). Sixty one isolates were randomly selected from the period of CA-MRSA and 33% of all S. aureus antibiotic, gel electrophoresis. USA300 was identified as the predominant clone in MRSA isolates accounting for 93.9% (See Figure 1). Only 3 of MSSA isolates (10.7%) were identified as USA300 like.

A total of 46 isolates were MRSA accounting for 52.5% of all Staphylococcal neck infections during the study period. In the first two years of the study the percentage of MRSA cases accounted for 55.6% in 2000 and 61.6% in 2001, but in the year 2002 the amount of MRSA was noticed during the years 2003 to 2005, reaching a peak in 2005 accounting for 71% of all Staphylococcal infections and remaining peaked in the end of the study period. (See Chart 1). The total of Methicillin sensitive Staphylococcus aureus (MSSA) cases was 89, accounting for 47.1% of all S. aureus infections. The number of MSSA isolates during our study period can be seen in Chart 1. The percentage of MRSA cases was the lowest in 2005 despite an overall increase in the total number of cases, a trend that continued in 2006. The study years of 2002 and 2005, with the lowest and highest number of MRSA cases respectively, were compared and a near statistical significant difference between the number of MRSA and MSSA isolates (p=0.06) was obtained. Also, when comparing the number of MRSA cases between the first and second half of our study period year, first half being 2002-2003 and second half being 2004-2006, a near statistical significant difference (P<0.08) was found (See Chart 1).

There was no statistical significance in age between the number of MRSA and MSSA (p=0.19), nor in length of hospital stay (p=0.09). The white blood cell count was available in 175 cases and was elevated (WBC>10) in 89% of the cases. Blood cultures from 152 cases were available and was elevated (WBC>10) in 89% of the cases. Blood cultures from 152 cases were positive for MRSA in 143 cases and MSSA in 47 cases. All cases were sensitive to Penicillin, Trimethoprim Sulfamethoxazole, and Vancomycin.

Staphylococcus aureus has been found as one of the most common organisms causing infections in the head and neck. MRSA (Methicillin Resistant Staphylococcus aureus), has been reported to account for approximately 65% of all S. aureus infections during the latter half of the study period, first half being 2002-2003 and second half being 2004-2006. A near statistical significant difference between the number of MRSA and MSSA isolates (p=0.08) was identified in the anterior neck triangle (43%), followed by the posterior neck triangle (37%).

A total of 24 (10.3%) Clindamycin resistant Staphylococcus aureus (CRSA) cases were isolated during the 5-year study period (see Table 1). The mean hospital stay was 5.8 for MRSA cases and 4.8 for MSSA cases. The study years of 2002 and 2005, with the lowest and highest number of MRSA cases respectively, were compared and a near statistical significant difference between the number of MRSA and MSSA isolates (p=0.06) was obtained. Also, when comparing the number of MRSA cases between the first and second half of our study period year, first half being 2002-2003 and second half being 2004-2006, a near statistical significant difference (P<0.08) was found (See Chart 1).

Methicillin resistance in Staphylococcus aureus (MRSA) is a Staphylococcus aureus resistant to beta lactam antibiotics, including Methicillin, oxacillin, and Nafoxidin, among others. 13 Methicillin resistance is mediated via a chromosomal incorporated gene, which is in coated nasal mucus, which produces a different kind of penicillin binding protein, interfering with the binding of the beta-lactam antibiotics. This gene is incorporated in a cassette called the staphylococcal cassette, which aids in successful chromosomal resistance. The isolates in CA-MRSA are usually susceptible to clindamycin and are selected for the antibiotics, clindamycin, enrofloxacin, oxacillin, penicillin, trimethoprim sulfamethoxazole, and vancomycin.

Discussion

The evolution of Staphylococcus aureus and MRSA is preponderant in children with the months of January to June being mediated via a chromosomal incorporated gene, which is in coated nasal mucus, which produces a different kind of penicillin binding protein, interfering with the binding of the beta-lactam antibiotics. This gene is incorporated in a cassette called the staphylococcal cassette, which aids in successful chromosomal resistance. The isolates in CA-MRSA are usually susceptible to clindamycin and are selected for the antibiotics, clindamycin, enrofloxacin, oxacillin, penicillin, trimethoprim sulfamethoxazole, and vancomycin.

The isolates in CA-MRSA are usually susceptible to clindamycin as shown by our study with 10.3% being susceptible to clindamycin. H. aureus like is a multidrug resistant organisms. Mudan in 2005 noted that in early 2000, approximately 50% of the CA-MRSA isolates from TCH were USA300 like. Consequently, in a short period of time, USA300 emerged itself as a predominant S. aureus clone causing infections among children at TCH. USA300 was the predominant clone in our isolates that underwent pulsed field gel electrophoresis accounting for 94% of those cases. A high percentage of the MRSA isolates we have also been identified among our MSSA isolates.

Conclusions

The isolates in CA-MRSA are usually susceptible to clindamycin as shown by our study with 10.3% being susceptible to clindamycin. H. aureus like is a multidrug resistant organisms. Mudan in 2005 noted that in early 2000, approximately 50% of the CA-MRSA isolates from TCH were USA300 like. Consequently, in a short period of time, USA300 emerged itself as a predominant S. aureus clone causing infections among children at TCH. USA300 was the predominant clone in our isolates that underwent pulsed field gel electrophoresis accounting for 94% of those cases. A high percentage of the MRSA isolates we have also been identified among our MSSA isolates.

References

1. Brook I. Microbiology of abscesses of the head and neck in children.
3. Children's hospital. Our population consisted of a total of 106 patients with S. aureus neck infections during the study period. In the first half of the study period study period, first half being 2002-2003 and second half being 2004-2006, a near statistical significant difference (P<0.08) was found (See Chart 1).
4. The isolates in CA-MRSA are usually susceptible to clindamycin as shown by our study with 10.3% being susceptible to clindamycin. H. aureus like is a multidrug resistant organisms. Mudan in 2005 noted that in early 2000, approximately 50% of the CA-MRSA isolates from TCH were USA300 like. Consequently, in a short period of time, USA300 emerged itself as a predominant S. aureus clone causing infections among children at TCH. USA300 was the predominant clone in our isolates that underwent pulsed field gel electrophoresis accounting for 94% of those cases. A high percentage of the MRSA isolates we have also been identified among our MSSA isolates.