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Culture positive staphylococcus aureus infection in children admitted in a tertiary care hospital: a case series

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Abstract

Introduction: Staphylococcus aureus is one of the common organisms causing invasive disease in pediatric age group especially in communities where widespread vaccination against streptococcus pneumonia and H.Influenzae have reduced the incidence of serious infections caused by these organisms. S. Aureus is frequently implicated in hospital acquired infections and neonates and infants are most vulnerable for these infections because of quantitative and qualitative immaturity of innate immunity. Other risk factors for staphylococcal sepsis include central lines, total parenteral nutrition, cystic fibrosis, babies receiving immunosuppression or steroid therapy. With the emergence of methicillin resistant staphylococcus aureus this infection has become a serious healthcare problem in pediatric age group. Despite being an important cause of morbidity and mortality in pediatric age group only few population-based studies of culture positive Staphylococcus aureus infection in children have been conducted.

Aims and Objectives: To describe the clinical features and presentations of cases of culture positive Staphylococcus aureus in children in a tertiary hospital over the period of one year.

Materials and Methods: Retrospective review of case notes of ten patients who were admitted over the period of 6 months with reference to laboratory confirmed culture positive Staphylococcus aureus infection. The presentation and clinical features were studied in detail. Special emphasis was given to cases infected with methicillin resistant staphylococcus aureus.

Inclusion criteria

(1) Children less than 10 years with culture positive staphylococcal infections.
(2) Documented culture and sensitivity patterns.
(3) Documented response to treatment.

Exclusion Criteria

(1) Children more than 10 years of age.
(2) Documented culture or sensitivity report not available.

Observations and Results: Ten children in between age group of 3 months to 10 years admitted in a tertiary care hospital with culture positive Staphylococcus aureus infections were studied in this case series. The culture sensitivity patterns were compared. Out of 10 culture positive reports 6 reports were suggestive of methicillin resistance staphylococcus aureus growth and 4 reports were suggestive of methicillin sensitive staphylococcus aureus growth. The mean age of presentation was three and half years (median three years). All patients presented with superficial or deep skin infections. 7/10 (70%) were apparently well and taking feeds properly.

Four children presented with multiple abscesses of which one patient was a diagnosed case of chronic granulomatous disease ,two were diagnosed with hyper IgE syndrome, one was nasal carrier of staphylococcus aureus, one with cellulitis, one with Ludwig's angina, one patient had post- vaccination thigh abscess, one with pyopneumothorax and the remainder with abscess. Of these, one child presented with parotid abscess. Two had a personal history of recurrent skin infections or abscesses. None had close family members with a history of skin infections.

Conclusions: The incidence of culture positive staphylococcal infections is increasing in our hospital. These infections can be both MRSA and MSSA. Of concern is the fact that one of our patients presented with culture positive-SA infections within the first 3 month of life has MRSA growth in pus culture sensitivity.

Keywords: Staphylococcus Aureus, Culture sensitivity, MRSA (Methicillin Resistant Staphylococcus aureus), Hyper IgE syndrome

Introduction

Staphylococcus aureus is one of the most common pathogens encountered in pediatric practice and is the most common cause of bacterial skin-and-soft tissue infection (SSTI)[1].While SSTIs are the most common manifestation, *S. aureus* also is responsible for a wide spectrum of invasive infections including musculoskeletal infections, toxic shock syndrome, osteomyelitis, purpura fulminans, complicated pneumonia, and endocarditis [2]. The emergence of community-acquired methicillin-resistant *S. aureus* (CA-MRSA) led to an evolution of the severity of disease with an increase in invasive infections in some series [3].

Children with congenital or acquired syndrome causing immunosuppression like severe combined immunodeficiency, chronic granulomatous disease and acquired immunodeficiency syndrome represent a unique group for the acquisition of antimicrobial resistant infections due to their frequent encounters with the health care system, need for empiric antimicrobials, and immune dysfunction [4]. While most pediatricians are familiar with the treatment of staphylococcal infections ,these vulnerable children pose clinical challenges as a result of poor immune function, frequent antibiotic resistance, and the presence of medical devices and catheters that circumvent normal anatomic barriers [5]. These infections are further complicated in that there is a relative paucity of literature on the clinical features and management of *S. aureus* infections in immunocompromised children, and clinical decisions must be drawn from the very limited available pediatric data or extrapolated from studies of adults [6, 7, 8]. This case series include three such immunocompromised children.

In the last decade, the overall burden of methicillin-resistant Staphylococcus aureus (MRSA) has considerably increased, both in communities and healthcare settings [9, 10]. It has caused serious health consequences since it was first identified in 1961 [11]. A number of studies have reported that MRSA can cause adverse clinical outcomes, including necrotizing pneumonia [12, 13], subcutaneous abscesses [14] and so on, which should raise our awareness of elucidating its current situation and taking relevant preventive strategies. In the United States, the proportion of methicillin resistance in Staphylococcus aureus (S. aureus) strains approached almost 60% in 2003, with an average resistance rate of around 50% over the period 1998–2002 [15]. In Europe, the proportion of methicillin resistance in S. aureus strains, which are isolated from infected patients, varied from less than 0.5% to more than 50% in 2011, with a pooled average rate of around 17% [16]. Children are important reservoirs of MRSA and may play a central role in disseminating MRSA in the community and hospital settings [17]. However, there is lack of data regarding the prevalence of MRSA among Indian children, this case series highlights need for further research in this field.

Materials and Methods

This was a retrospective study comprising of 10 cases of culture positive staphylococcus aureus infection in children below ten years of age admitted to hospital in 2016-17. Detail history, examination findings, investigations-including culture sensitivity of pus/blood/body fluids (pleural, CSF, peritoneal etc.) and any significant past or family history was noted.

These data were tabulated in the form of distribution of cases as per age, gender, presenting complaints, diagnosis, drug susceptibility and treatment. Culture sensitivity tests were done from single authenticated laboratory. Drug susceptibility pattern were compared in these ten cases.

Results

All children were less than 10 years of age as that was the inclusion criteria of the study. The cases were further divided into age groups less than 1 year, 1-5 years and 5-10 years.

Table 1: Age distribution of the studied cases.

Age	Number Of cases	Percentage
Less than 1 year	2	20%
1-5 years	7	70%
More than 5 years	1	10%

Gender distribution of the studied cases revealed that there was a male preponderance in the affected case with a male to female ratio being 1: 0.66.

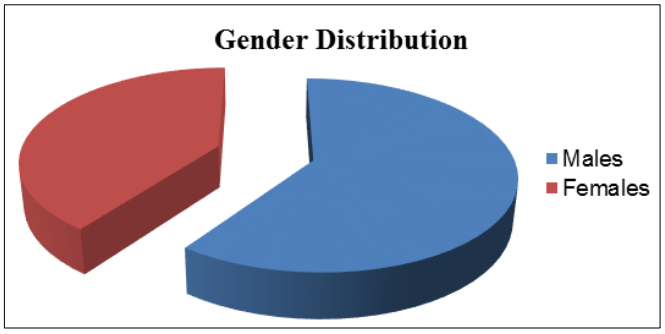

Fig 1: Gender Distribution of the studied cases.

The analysis of presenting complaints of the studied cases revealed that most of the patients (90%) presented with local inflammation, swelling or abscess formation. Second most common sign seen in these patients was fever. Less common signs and symptoms included signs of CNS involvement or focal deficits (20%) and respiratory distress (10%).

Table 2: Presenting complaints in studied cases.

Presenting complaints	No of patients	Percentage
Local Signs of inflammation, swelling or abscess	9	90%
Fever	8	80%
Signs of CNS involvement or focal deficit	2	20%
Cough or respiratory distress	1	10%

The culture and sensitivity patterns of the studied cases revealed that 60% of the patients had staphylococcus aureus infection resistant to Methicillin while 40% cases had infection with methicillin sensitive staphylococcus aureus.

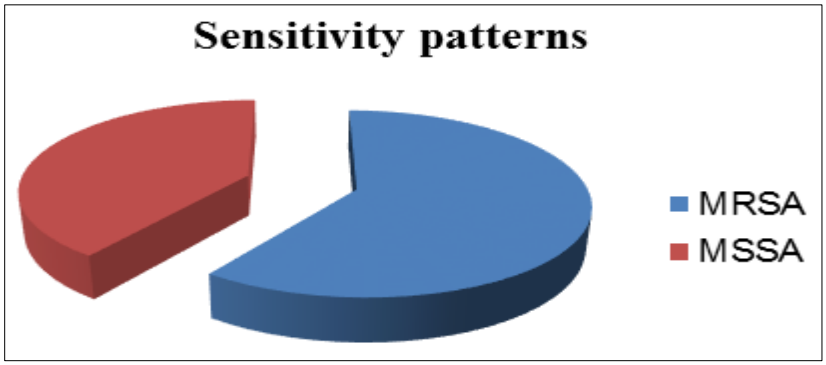

Fig 2: Sensitivity patterns of the studied cases.

The demographic data, presenting complaints, final diagnosis, culture and sensitivity patterns of the studied cases is Summarized in the table given below (Table 3).

Table 3: Summary of the studied cases.

Age(yrs)	Sex	Chief complaints	Diagnosis	Culture report	Drug sensitivity	Drug Resistance	Remark
1.5	F	Swelling over left thigh	Left thigh cellulitis	MSSA	ER,AZ,GT, AM,LZD,	PN,TC	
2	F	Fever and submandibular swelling	Ludwigs angina	MRSA	TC,GT,CLD,VM	PN,AM,CPR	
1	M	Cough and breathlessness	Pyopneumothorax	MSSA	AZ,TC,GT,CLD	PN,CPR	
5	M	Multiple swelling all over body	Multiple subcutaneous abscess in a case of HyperIgE syndrome	MRSA	TC,GT,CLD,LZD,VM	PN,CPR,ER	HyperIgE Syndrome
2.5	F	Swelling behind ear, seizures ,c/f of meningitis	Shunt infection with meningitis in an operated case of occipital meningoencephalocele	MRSA	TC,GT,LZD,VM	PN,CPR,ER, CLD	
10	M	Parotid swelling with lower limb weakness	Parotid abscess with spinal cord demyelination	MSSA	ER,TC,GT,CLD	PN,CPR	
5	M	Multiple swelling all over body	Staphylococcal septicemia in a case of hyper IgE syndrome	MSSA	ER,TC,GT,CLD,	PN,CPR	HyperIgE Syndrome
3 m	M	Swelling over right thigh	Post vaccination right thigh abscess	MRSA	TC,AM,LZD,VM	PN,CPR,ER	
4	M	Multiple swelling all over body	Multiple abscess in a case of chronic granulomatous disease	MRSA	TC,AM,LZD,VM	PN,CPR,ER	
3	F	Swelling in mandibular and gluteal region	Gluteal and mandibular abscess with anemia in a case of MRSA carrier	MRSA	TC,AM,LZD,VM	PN,CPR,ER	

ER-Erythromycin,AZ-Azithromycin,GT-Gentamycin,AM-Amikacin,LZD-Linezolid,PN-Penicillin,TC-Tetracyclin, CLD-Clindamycin, VM-Vancomycin,CPR-Ciprofloxacin

Discussion

In this case series ten cases enrolled were aged been 3 months to ten years, with average age of presentation at three and half years (median three years).of the ten cases six were male and four were female .

Four out of 10 cases presented with multiple abscesses which on detail work up, 2 were diagnosed to have hyper IgE syndrome, one was a diagnosed case of chronic granulomatous disease, and 1 was carrier for the organism (nasal carrier).

One child presented with left thigh cellulitis, one with Ludwigs angina, one with post-vaccination thigh abscess, one with pyopneumothorax, and the remainder parotid abscess and ventriculoperitoneal shunt infection with meningitis. Two had a personal history of recurrent skin infections or abscesses. None had close family members with a history of skin infections.

Methicillin resistant staphylococcus aureus infection is emerging as a major health care problem around the globe. Infections caused by MRSA are more severe, difficult to treat and associated with higher rate of complications [18]. Many studies have shown that these infections do not respond to empirical treatment with usual antibiotics and may prompt pediatricians to use clindamycin or vancomycin as empirical treatment [19]. There is a gradual shift of MRSA infection from high risk group (patients with a history of recent hospitalization, surgery or invasive procedures) to the patients without any of these risk factors. Also there is a dramatic increase in the incidence of MRSA infections in community acquired pneumonias [20]. Various studies have shown that the incidence of MRSA has increased up to the level of 60-70% even in patients with no risk factors for such infections making it imperative to include the antibiotics known to be effective in MRSA infections whenever there is doubt[21]. In no

circumstance the treatment should be delayed for confirmation of culture or sensitivity patterns [22].

In this case series of ten cases of staphylococcal infection 6(60%) cases were found to be MRSA and 4 (40%) cases were found to be MSSA, All the ten cases were found to be resistant to penicillin and ciprofloxacin. Patients were treated as per drug sensitivity report, the average duration of hospital stay was 37 days, it was more in patients with immunocompromised conditions.

Taken together, this retrospective observational study noted that the there is a high incidence of MRSA infections in pediatric population. The prevention, diagnosis and management of these infections is a crucial task faced by community physicians and pediatricians.

Conclusion

The incidence of culture positive staphylococcal infections is increasing in our hospital. These infections can be both MRSA and MSSA. Infants presenting with MRSA infection is a worrisome trend. There is need of multiple studies on staphylococcal infection and drug sensitivity in India as development of resistance is very common in staphylococcal infection.

References

1. Moran GJ, Krishnadasan A, Gorwitz RJ, *et al.* Emergency ID Net Study Group. Methicillin-resistant S. aureus infections among patients in the emergency department. N Engl J Med. 2006; 355(7):666-674.
2. Honarpisheh H, Camp R, Lazova R. Staphylococcal PurpuraFulminans: Report of aCase. Am J Dermatopathol. 2015; 37(8):643-6.
3. Green BN, Johnson CD, Egan JT, Rosenthal M, Griffith EA, Evans MW. Methicillin-resistant Staphylococcus aureus: an overview for manual therapists. Journal of Chiropractic Medicine. 2012; 11(1):64-76.
4. Kaur DC, Chate SS. Study of Antibiotic Resistance Pattern in Methicillin Resistant Staphylococcus Aureus with Special Reference to Newer Antibiotic. Journal of Global Infectious Diseases. 2015; 7(2):78-84.
5. Gonzalez BE, Teruya J, Mahoney DH Jr, *et al.* Venous thrombosis associated with staphylococcal osteomyelitis in children. Pediatrics. 2006; 117(5):1673-1679.
6. Martínez-Aguilar G, Avalos-Mishaan A, Hulten K, Hammerman W, Mason EO Jr, Kaplan SL. Community-acquired, methicillin-resistant and methicillin-susceptible Staphylococcus aureus musculoskeletal infections in children. Pediatr Infect Dis J. 2004; 23(8):701-706.
7. Pannaraj PS, Hulten KG, Gonzalez BE, Mason EO Jr, Kaplan SL. Infective pyomyositis and myositis in children in the era of community-acquired, methicillin-resistant Staphylococcus aureus infection. Clin Infect Dis. 2006; 43(8):953-960.
8. J Chase McNeil Department of Pediatrics, Section of Infectious Diseases, Baylor College of Medicine, Houston, TX, USA Staphylococcus aureus - antimicrobial resistance and the immunocompromised child. Infection and Drug Resistance. 2014; 7:117-127.
9. Chambers HF, Deleo FR. Waves of resistance: Staphylococcus aureus in the antibiotic era. Nat Rev Microbiol. 2009; 7(9):629-41.
10. Kock R, Becker K, Cookson B, van Gemert-Pijnen JE, Harbarth S, Kluytmans J, *et al.* Methicillin-resistant Staphylococcus aureus (MRSA): burden of disease and control challenges in Europe. Euro Surveill. 2010; 15(41).
11. Eriksen KR. Celbenin-resistant staphylococci. UgeskrLaeger. 1961; 123:384-6.
12. Aguilar-Company J, Magnifico-Arfinengo B, Revilla-Lopez E, Pigrau-Serrallach C. [Necrotizing pneumonia caused by community- acquired methicillin-resistant Staphylococcus aureus]. Med Clin (Barc). 2016; 146(1):e1-2.
13. Chen J, Luo Y, Zhang S, Liang Z, Wang Y, Zhang Y, *et al.* Community-acquired necrotizing pneumonia caused by methicillin-resistant Staphylococcus aureus producing Panton-Valentine leukocidin in a Chinese teenager: case report and literature review. Int J Infect Dis. 2014; 26:17-21.
14. Van Sorge NM, Beasley FC, Gusarov I, Gonzalez DJ, von Kockritz-Blickwede M, Anik S.*et al.* Methicillin-resistant Staphylococcus aureus bacterial nitric-oxide synthase affects antibiotic sensitivity and skin abscess development. J Biol Chem. 2013; 288(9):6417-26.
15. National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2004, issued October 2004. Am J Infect Control. 2004; 32(8):470-85.
16. De Kraker ME, Jarlier V, Monen JC, Heuer OE, van de Sande N, Grundmann H. The changing epidemiology of bacteraemias in Europe: trends from the European Antimicrobial Resistance Surveillance System. ClinMicrobiol Infect. 2013; 19(9):860-8.
17. Hisata K, Kuwahara-Arai K, Yamanoto M, Ito T, Nakatomi Y, Cui L, *et al.* Dissemination of methicillin resistant staphylococci among healthy Japanese children. J ClinMicrobiol. 2005; 43(7):3364-72.
18. Luini M, Cremonesi P, Magro G, Bianchini V, Minozzi G, Castiglioni B,*et al.* Methicillin-resistant Staphylococcus aureus (MRSA) is associatedwith low within-herd prevalence of intra-mammary infections in dairy cows:Genotyping of isolates. Vet Microbiol. 2015; 178(3-4):270-4.
19. Wargo KA, McCreary EK, English TM. Vancomycin Combined With Clindamycin forthe Treatment of Acute Bacterial Skin and Skin-Structure Infections. Clin Infect Dis. 2015; 61(7):1148-54.
20. Bukharie HA. A review of community-acquired methicillin-resistant Staphylococcus aureus for primary care physicians. Journal of Family and Community Medicine. 2010; 17(3):117-120.
21. VanEperen AS, Segreti J. Empirical therapy in Methicillin-resistantStaphylococcus Aureus infections: An Up-To-Date approach. J Infect Chemother. 2016; 22(6):351-9.
22. Mascitti KB, Gerber JS, Zaoutis TE, Barton TD, Lautenbach E. Preferred Treatment and Prevention Strategies for Recurrent Community-Associated Methicillin-resistant Staphylococcus aureus Skin and Soft-Tissue Infections: A Survey of Adult and Pediatric Providers. American journal of infection control. 2010;38(4):324-328.