METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS IN A MALAYSIAN NEONATAL UNIT

V K E Lim
H I Zulkifli

Department of Microbiology
Faculty of Medicine
National University of Malaysia
P O Box 12418
Kuala Lumpur
Malaysia

V K E Lim, MBBS, MSc, MRCPath
Associate Professor

Department of Paediatrics
Faculty of Medicine

H I Zulkifli, MBBS
Registrar

SYNOPSIS

Methicillin resistant *Staphylococcus aureus* is a common isolate from clinical specimens obtained from babies at the special care nursery of the Kuala Lumpur Maternity Hospital. Major infections due to this organism were, however uncommon and the organism had in the majority of cases been present as a coloniser or as a cause of superficial infection. Netilmicin is a valuable antibiotic in the treatment of the severe infections.

INTRODUCTION

Methicillin resistant *Staphylococcus aureus* (MRSA) appeared almost immediately after the introduction of methicillin in 1959 (1). It however remained a relatively rare phenomenon until the late seventies when major outbreaks were reported in the United States of America, Greece, South America and Australia (2). In Malaysia MRSA has been isolated from patients at the Kuala Lumpur Maternity Hospital since 1978. This paper describes the pattern of occurence of MRSA in the special care nursery (SCN) of the Kuala Lumpur Maternity Hospital over a period of six months in 1984.

METHODS

Isolates of MRSA from babies in the SCN over a period of six months were noted and the paediatricians contacted and informed. Each case was discussed to ascertain the significance of the isolate. The patients were grouped into three categories (a) significant major infection (b) superficial infection and (c) mere colonisation. Other patient details like age, sex, birth weight, details of labour, reason for admission, previous antibiotic therapy and concomitant illnesses were also recorded. Wherever possible, patients with MRSA were nursed in isolation facilities. Where significant infection was deemed to have occurred appropriate changes in antibiotic therapy were made. The clinical progress of the patient was also charted until discharge or death. Where deaths occurred a cardiac blood specimen was sent for culture.

Antibiotic sensitivity testing was performed using a standardised disk method. In the case of methicillin the test was modified by incubation at 30 C instead of 35 C.

RESULTS

A total of 858 babies delivered at the Kuala Lumpur Maternity Hospital were admitted to the SCN over this six month period. Of these, 53 babies were found to be either colonised or infected over this six month period. The reasons for admission into the SCN are summarised in Table 1.

The birth weight of the babies ranged from 907 grams to 4309 grams with a mean of 2340 grams (SD = 910). The sites of isolation of MRSA from these babies were blood (9), pus (7), eye (15), umbilicus (18), nose (1) catheter tips (10) and tracheal aspirates and endotracheal tubes (5). In 11 babies MRSA was isolated from more than one site. The time interval between admission to the SCN and the first isolation of MRSA ranged from between 1 to 41 days with a mean of 6.03 days (SD = 6.2). Of the 53 patients all except 5 babies were on an antibiotic regimen of gentamicin and penicillin at the time of isolation of the MRSA.

Of these 53 babies, 21 were considered to be merely colonised, 23 were considered to have minor superficial infections and 9 had significant serious disease. The minor infections included eye discharge (14), septic spots on skin (4), umbilical sepsis (3) and scalp abscess secondary to intravenous drips (2). All cases of minor infections were treated with local antiseptics and with the exception of one baby were all discharged well. The single death in this group was a result of respiratory failure. Details of the 9 babies with major significant infections are summarised in Table 2.

TABLE 1
REASONS FOR ADMISSION OF MRSA COLONISED/INFECTED BABIES TO THE SPECIAL CARE NURSERY (SCN)

Reason for admission	No of babies
Preterm with or without respiratory distress syndrome	24
Presumed sepsis*	7
Meconium aspiration	6
Foetal distress and perinatal asphyxia	5
Caesarean section**	4
Haemolytic disease of the newborn	2
Twins**	1
Hydrops foetalis	1
Congenital rubella	1
Subaponeurotic haemorrhage	1
Neonatal jaundice	1
Total	53

* Including maternal pyrexia
** Admitted for observation

TABLE 2
BABIES WITH MAJOR MRSA INFECTIONS

No.	Reason for Admission	Infection	Antibiotics	Outcome
1.	Preterm with RDS	Septicaemia	PEN, GENT	Death
2.	Preterm with RDS	Septicaemia	PEN, GENT/ AMP, NET	Death
3.	RDS	Septicaemia	PEN, GENT/ AMP, NET	Well
4.	Preterm	Septicaemia	PEN, GENT	Death
5.	Preterm	Septicaemia	PEN, GENT	Death
6.	Preterm with RDS	Septicaemia	PEN, GENT/ NET, CTX	Well
7.	Preterm with RDS	Septicaemia	PEN, GENT/ NET, MOX	Well
8.	Preterm	Septicaemia Osteomyelitis	PEN, GENT/ NET, FUC	Death
9.	Preterm with RDS	Septicaemia	PEN, GENT	Death

Note: PEN = Penicillin, GENT = Gentamicin, AMP = Ampicillin, NET = Netilmicin, CTX = Cefotaxime, MOX = Moxalactam, FUC = Fucidin

DISCUSSION

MRSA are strains of *Staphylococcus aureus* which have developed an intrinsic resistance to the penicillinase-stable penicillins like methicillin and cloxacillin as well as the cephalosporins. This resistance to methicillin is often accompanied by resistance to many other antibiotics particularly the aminoglycosides (3). The strain of MRSA endemic in the Kuala Lumpur General Hospital is resistant to penicillin, methicillin, tetracycline, erythromycin, cephalosporins, gentamicin, tobramycin and kanamycin. It remains sensitive to fucidin, vancomycin, netilmicin, amikacin, cotrimoxazole and rifampicin.

MRSA has been described to be an organism of low pathogenicity which is often harmles to the host (4). This survey confirms this in that the majority of isolates of MRSA were shown to be either mere colonisers or causing only superficial infections. Serious infections however has been shown to occur in immunocomprised patients as in neonatal nurseries and intensive care units. Serious infections in neonates caused by MRSA include septicaemia, osteomyelitis, infected shunts, surgical wounds and endocarditis (5). Of the nine babies with severe invasive disease due to MRSA 8 had septicaemia and 1 had septicaemia and osteomyelitis. Of these 5 succumbed as a result of the septicaemic invasion. In 4 of these babies, death occurred before the appropriate change in antibiotics could be made. The baby with osteomyelitis responded well to a combination of netilmicin and fucidin but succumbed almost two months later as a result of *Klebsiella* septicaemia. Three babies with major disase were discharged well. All three babies received netilmicin in combination with another antibiotic.

Vancomycin has been shown to be effective in MRSA infection (6). It is considered the drug of choice. Vancomycin however is not easily available in our hospital and we have found netilmicin to be a valuable alternative. It should, however, be stressed that a similar pattern of antibiotic sensitivity may not exist in other hospitals. Sensitivity tests must always be performed.

Sensitivity testing for methicillin is difficult to perform as only a small proportion of the cells in a culture are capable of appearing resistant if the test is performed in the usual way. This problem can be overcome by the addition of salt to the test medium or by incubating the culture of 30 C instead of the usual 35 C. Only methicillin should be tested for as disc tests wtih cloxacillin are unreliable (7).

Factors affecting acquisition of MRSA include length of stay in hospital and previous antibiotic administration (8). As many as 80 percent of patients were reported to be on broad spectrum antibiotic at time of acquisition of the MRSA. In this study 48 out of the 53 patients were on antibiotics when the MRSA was first isolated. The spread of the organism is by patient to patient via the hands of personnel. Carriage of the strain among staff members is rarely implicated, (4) and we were unable to detect any carriage among staff members during the period of study. The organism when established in a hospital or unit is extremely difficult to eradicate and of 18 reported outbreaks in the US only 2 institutions have reported successful eradication (8). In Australia eradication of the strain from the nursery was achieved only upon closure of the unit (5). This was not possible in our unit as the unit is the only one serving the Kuala Lumpur Maternity Hospital which has an average of about 19,000 deliveries a year. A significant number of mothers are unbooked cases who had not previously attended any antenatal clinic. Various measure were taken including creation of isolation cubicles, application of more stringent criteria for admission into the SCN and observance of strict hand washing for both staff and patients. Despite this we were unable to eradicate the MRSA from the nursery.

ACKNOWLEDGEMENTS

We wish to thank Professor Barrie Heyworth, Professor of Paediatrics at the Department of Paediatrics, National University of Malaysia, Dr Ali Azman and Dr Khaidir, both lecturers in the same department for their help and advise in the preparation of this paper.

REFERENCES

1. Jevons MP: Celbenin resistant staphylococci. Br Med J 19611; 1: 124-5.
2. Thompson RL, Wenzel RP: International recognition of methicillin resistant *Staphylococcus aureus*. Ann Int Med 1982; 97: 925-6.
3. Locksley RM, Cohen ML, Quinn TC, Tompkins LS: Multiply resistant *Staphylococcus aureus*. Introduction, transmission and evaluation of nosocomial infection. Ann Int Med 1982; 97: 317-24.
4. McDonald PJ: Methicillin resistant staphylococci. Med J Australia 1982; 1: 445-6.
5. Gilbert GL, Asche V, Hewstone AS, Mathiesen JL: Methicillin resistant *Staphylococcus aureus* in neonatal nurseries. Med J Australia 1982; 1: 455-9.
6. Sorrel TC, Packham DR, Shanker S, Foldes M, Munro R: Vancomycin therapy for methicillin resistant *Staphylococcus aureus*. Ann Int Med 1982; 97: 334-50.
7. Waterworth PM. Laboratory Methods. In: Garrod LP, Lambert HP, O'Grady F. eds. Antibiotics and Chemotherapy 5th ed Edinburgh: Churchill Livingstone, 1981: 464-504.
8. Thompson RL, Cabenzdo I, Wenzel RP: Epidemiology of nosocomial infections caused by MRSA. Ann Int Med 1982; 97: 309-17.