

Frequency and Treatment of Methicillin Resistant *Staphylococcus aureus* in Obstetric and Gynaecological Sepsis

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ABSTRACT

Objective: To perform culture and sensitivity for pathogens causing puerperal and postoperative wound sepsis and determine the frequency of Methicillin Resistant *Staphylococcus aureus* (MRSA) in such infections.

Study Design: Observational study.

Place and Duration of Study: Obstetrics and Gynaecology Ward, Jinnah Postgraduate Medical Centre, Karachi, from December 2008 to May 2010.

Methodology: All patients presenting with puerperal sepsis or postoperative wound infection were enrolled. Pus was collected for culture and sensitivity using standard technique. Two samples were taken from each patient; one before starting the treatment and one at the end of treatment. Ames transport medium was used. Empirical treatment with triple regimen (Ampicillin, Metronidazole and Gentamicin) was started immediately to cover Gram positive as well as negative bacteria in addition to anaerobic infection. After receiving the sensitivity report, antimicrobial agent were changed accordingly. Samples from ward and theater staff and environment were also taken to look for possible mode of transmission. Data was recorded on a proforma. Discrete variables are expressed as percentages.

Results: *Staphylococcus aureus* was the most frequent organism isolated in 34.6% cases. Methicillin sensitive *Staphylococcus aureus* was seen in 20% cases and methicillin resistant *Staphylococcus aureus* was seen in 14.6%. Out of these 14.6% MRSA, (17) 77% was associated with puerperal sepsis and rest (5) 23% was associated with post-operative wound infection. It showed best sensitivity to vancomycin.

Conclusion: *Staphylococcus aureus* and *E. coli* were common causative agent of postoperative infections and puerperal sepsis.

Key Words: Methicillin resistant *Staphylococcus aureus*. Puerperal sepsis. Surgical site infection.

INTRODUCTION

Methicillin-resistant *Staphylococcus aureus* (MRSA) is an emerging cause of sepsis all over the world. Community-associated MRSA were more virulent than a hospital-associated.¹ The number of pregnant women afflicted with community-acquired MRSA infections has been rising and may cause serious effects in mother and the new born.^{2,3} Infections caused by MRSA doubled in the U.S. between 2003 and 2008.⁴ Treatment of *Staphylococcus aureus* was revolutionized by introduction of penicillin. First time resistance to this group was found in 1960 and first outbreak was notified in 1970. Methicillin resistance clinically means resistance to all β -lactam antibiotics. Healthcare-associated MRSA accounts for more than 50% of *S.aureus* seen in patients admitted in ICU and about 40% in other patients. Risk factors include diabetes, hospitalization in previous two years, contact with healthcare workers and

exposure to antibiotics especially cephalosporin, aminoglycosides and fluoroquinolones.⁵ Prevention is always better than cure and as treatment is expensive, therefore greater emphasis should be on prevention i.e. hand washing after handling patients and their bedding, topical treatment of colonized patients before surgery, and isolation of infected patients.⁶ Very scanty data is available on this infection women of reproductive age in Pakistan.

So this study was conducted to determine the causative organisms causing puerperal and postoperative wound sepsis, the frequency MRSA in such infections and to evaluate their antibiotic sensitivity patterns in Obstetrics and Gynaecology patients.

METHODOLOGY

It was a prospective, non-randomized observational study conducted at the Department of Obstetrics and Gynaecology, Jinnah Postgraduate Medical Centre, Karachi, from December 2008 to May 2010. All patients admitted in the ward during this period with puerperal sepsis or infected vaginal/ abdominal wounds, who consented to participate in the study were included in the study and patients who did not wish to participate in the study or had taken antibiotics in the last 72 hours were excluded from the study. Blood was taken for complete blood count, random blood sugar, urine for

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routine examination and pus was sent for culture and sensitivity. Pus was collected by the doctor on duty using standard aseptic techniques. Two cultures were taken from each patient, one before starting the treatment and one at the end of treatment and were sent to the laboratory. Ames transport medium was used. Cultures were grown on McConkey's agar and if *Staphylococci* were cultured, their resistance was checked against methicillin. The isolates found to be methicillin resistant (MRSA) based on disc sensitivity producing a zone of inhibition < 10 mm with 1 ug oxacillin and < 9 mm with 5 ug methicillin were regarded as oxacillin / methicillin resistant *Staphylococcus (S.) aureus* (MRSA). New techniques like PCR assay IDI-MRSA,⁷ assay and high through output genomics,⁸ were not available at the facility.

Empirical treatment with triple regimen (Ampicillin, Metronidazole, and Gentamicin) was started immediately to cover Gram positive as well as negative bacteria in addition to anaerobic infection. After receiving the sensitivity report, antimicrobial agent were changed accordingly. Response to treatment was monitored daily through leucocyte count. To look for possible mode of transmission, theater staff and ward nurses were screened by taking samples from anterior nares for culture and sensitivity. Samples were also taken from non-living objects such as beds, drip stand, infusion set, Foley's catheter, dressing tray etc.

Data of each patient was recorded on a proforma. The results were analyzed according to the type of data. Continuous variables like age and parity are expressed as mean \pm SD. Discrete variables were expressed as percentages. Calculations were performed with statistical software package SPSS.

RESULTS

A total of 150 patients who consented for study were enrolled. Mean age of patients was 30 years, ranging from 19 to 50 years with mean parity of three. All patients were initially started on triple regimen, after c/s report is available, patient was switched over to sensitive drugs. In cases where no growth was reported, triple regimen was continued in 13 patients. All patients responded well to the triple therapy. There were 52 cases (34.6%) of *Staphylococcus aureus* out of whom 22 (14.6%) were MRSA while 30 (20%) were methicillin sensitive *Staphylococcus aureus* (MSSA). In 16 cases, MSSA were the sole causative agents while in 14 cases multiple bacteria were causing infection. Out of 14.6% cases of MRSA, 17 (77%) was associated with puerperal sepsis and rest 5 (23%) were associated with postoperative wound infection. All patients responded when antibiotic according to sensitivity was given except for 17 patients. Repeat culture showed organisms which were different from first c/s report, so antibiotic was changed accordingly. Six patients improved but one expired due to septicemia.

Table I: Staphylococci in different procedures.

Operational procedure		MRSA	MSSA	MSSA and other bacteria	MRSA and other bacteria
Emlscs	n	14	8	9	2
	%	70%	50%	64.2%	100%
TAH	n	5	4	3	
	%	25%	25%	21.4%	
SVD	n	0	1	1	
	%	-	6.2%	25%	
Laparotomy	n	0	0	0	
	%	-	-	-	
Uterine evacuation	n	1	3	1	
	%	5%	18.8%	25%	
Total	n	20	16	14	2

Table II: Sensitivity of agents against Staphylococci.

Therapy		MRSA	MSSA
Amikacin	n	2	17
	%	9.09%	56.6%
Penicillins	n	0	6
	%	-	20%
Vancomycin	n	17	0
	%	77.2%	-
Fusidic acid	n	1	-
	%	4.5%	-
Paratam	n	-	1
	%	-	3.3%
Cephalosporin	n	-	3
	%	-	10%
Quinolones	n	-	2
	%	-	6.6%
Doxycyclin	n	1	-
	%	4.5%	-
Tobramycin	n	1	1
	%	4.5%	3.3%
Total	n	22	30

Screening of staff/objects showed one theater nurse out of 6 nurses and one operating table in emergency theater out of six objects, positively colonized by MRSA. Frequency of MRSA and MSSA in different types of surgeries is shown in the Table I.

DISCUSSION

Sepsis is one of the most common causes of maternal mortality. Antenatal colonization may cause postnatal infection and also put the baby at risk. In a study conducted in India, overall prevalence of *S. aureus* nasal colonization was 52.3% and that of MRSA 3.89%. MRSA nasal carriage was 3.16% in children without prior exposure to healthcare settings.⁹ In a study conducted at Lahore to see the frequency of MRSA colonization in general population,¹⁰ *S. aureus* was detected in anterior nares of 14.8% population out of which 19.5% isolates were MRSA positive.

The incidence of MRSA is different all over the world. UK has one of the worst MRSA rate in Europe.¹¹ In large US hospitals, increase in MRSA, from 4% in 1980 to 50%

in late 1990, was recorded by the National Nosocomial Infections Surveillance.¹² The prevalence of MRSA colonization was found to be very low (0.7%) in patients attending emergency room in a hospital of Brazil.¹³ Screening of healthcare workers was done at Sheikh Zayed Hospital in Lahore and 10.7% were found to be positive for MRSA.¹⁴ A multicentre study was conducted in Pakistan to see prevalence of MRSA strains in various cities.¹⁵ It was found to be 42% over a 10 months period. There was a difference in the MRSA frequency in different parts of the country; highest seen in Lahore (61%), closely followed by Karachi (57%), Rawalpindi (46%), Peshawar (36%), Azad Kashmir (32%), and Quetta (26%) while minimum resistance were seen in Sukkur (2%).¹⁵ In the present study, *Staphylococcus aureus* was found to be 34.6% out of which methicillin sensitive *Staphylococcus* was 20% and MRSA was 14.6%. MRSA was sensitive to vancomycin and amikacin. In a Kuwaiti hospital, methicillin resistance was found to be 32%.¹⁶

There is evidence that combination of anti-microbials with different mechanisms of action reduces mortality,¹⁷ so Ampicillin, gentacin and metronidazole were started while culture and sensitivity report was awaited. Vancomycin was the best agent for MRSA,¹⁸ but resistance is also developing against it.¹⁹ In this study, 2 cases of MRSA were resistant to vancomycin; repeat cultures showed the presence of MRSA and *Klebsiella*. In those 2 cases, amikacin was given. Patient with persistent MRSA expired due to septicemia. A study group of AKUH recommended fusidic acid, rifampicin and chloramphenicol as they have high sensitivity for MRSA.²⁰ Now a vaccine is being developed in view of the developing resistance of MRSA.²¹

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CONCLUSION

Staphylococcus aureus and *E. coli* were common causative agent of postoperative infections and puerperal sepsis.

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