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Assessment of Surgical Site Infection in A Tertiary Care Set Up in Kolkata

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Abstract: *The common Health Care Associated Infection (HCAI) as per CDC updated 2007 is UTI (32%) followed by postoperative wound infections (22%), Nosocomial pneumonia (15%) and Nosocomial septicaemia (14%). Keeping these facts in mind, the present study aimed at the assessment of the surgical site infection in a tertiary care set up in eastern India. The study was conducted in the Department of Microbiology, in a tertiary care set up of Kolkata from January to December, 2016. The total number of elective and emergency surgeries done during the one-year period was 402 which included 373 elective (major) and rest, emergency cases. Twenty two cases were clinically suspected to be postoperative wound infection were studied as per standard microbiology guidelines. The commonest microorganism causing wound infection in the study was Staphylococcus aureus (11 out of 22 i.e., 50%) followed by Escherichia coli (6 out of 22 i.e., 27%). Pseudomonas aeruginosa (2 out of 22 i.e., 9%), Klebsiella pneumonia (2 out of 22 i.e., 9%)and Acinetobacter spp.(1 out of 22 i.e., 4.5%) were also isolated. No polymicrobial involvement was found. Amongst 11 isolated Staphylococcus, 6 were MRSA (Methicillin Resistant Staphylococcus aureus) (54.5%) and all the Staphylococcus isolates were sensitive to Vancomycin and Linezolid. All the Gram negative isolates were sensitive to polyene antibiotics. One Pseudomonas, one Klebsiella and the Acinetobacter isolates were carbapenemase producers. 8 out of 11 Staphylococcus isolates (72%), 4 out of 6 Escherichia coli isolates (66.7%), all Pseudomonas and Acinetobacter isolates were resistant to fluoroquinolones. 4 out of 11 Gram negative isolates were ESBL producers (36.3%)and 3 were Amp C beta lactamase producers (27.2%). Postoperative wound infection (surgical site infection) is an important aspect of Nosocomial infections which demands implementation of antibiotic stewardship and apt sterilization practices.*

Keywords: *SSI, MRSA, ESBL, Carbapenemase, Amp C beta lactamase*

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I. Background

Wound infection is defined as the deposition and multiplication of bacteria in tissue with an associated host reaction [1]. In 1992, the US Centres for Disease Control (CDC) revised its definition of 'wound infection', creating the definition 'surgical site infection' (SSI) to prevent confusion between the infection of a surgical incision and the infection of a traumatic wound. SSI has been defined to standardize data collection for the National Nosocomial Infections Surveillance (NNIS) program. SSIs are classified into incisional SSIs, which can be superficial or deep, and organ/space SSIs, which affect the rest of the body other than the body wall layers [2]. According to WHO report 2002, prevalence rate of health care associated infection (HCAI) is 7.7% - 9% in developed countries and 10-11.8% in developing countries [3]. The common Health Care Associated Infection (HCAI) as per CDC updated 2007 is UTI (32%) followed by postoperative wound infections (22%), Nosocomial pneumonia (15%) and Nosocomial septicaemia (14%) [4]. Keeping these facts in mind, the present study aimed at the assessment of the surgical site infection in a tertiary care set up in eastern India.

II. Materials And Methods

The study was conducted in the Department of Microbiology, in a tertiary care set up of Kolkata from January to December, 2016. The total number of elective and emergency surgeries done during the one-year period was 402 which included 373 elective (major) and rest, emergency cases. Twenty two cases were clinically suspected to be postoperative wound infection were studied as per standard microbiology guidelines.
Antibiotic sensitivity testing of the isolates was done by the Stokes method for Staphylococcus and Kirby Bauer method for Gram-negative bacilli. The following antibiotic discs were used for sensitivity testing of Penicillin (10 units), Erythromycin (15 mcg), Gentamicin (10 mcg), Vancomycin (30mcg), Linezolid (30mcg)Cefazolin (30 mcg). Ampicillin (10 mcg), Gentamicin (10 mcg), Cefazolin (30 mcg), Ceftriaxone (30 mcg), Amikacin (30 mcg), Ciprofloxacin (5 mcg) and Ceftazidime (30 mcg), Cefoxitin(30mcg), Cefoperazone/ Sulbactam(75/30

mcg), Piperacillin/ Tazobactam(100/10 mcg), Ceftazidime/ Clavulanic acid (30/10 mcg), Aztreonam (30 mcg), Imipenem(10mcg), Meropenem (10mcg). Extended spectrum beta lactamase (ESBL) production was screened by measuring the zone difference between Ceftazidime and Ceftazidime/ Clavulanic acid (zone differences > 5 mm). MRSA and Amp C beta lactamase screening of Gram negative isolates were done by testing the sensitivity of the isolates to Cefoxitin. Carbapenemase production was confirmed by modified Hodge test.

III. Results

The commonest microorganism causing wound infection in the study was *Staphylococcus aureus* (11 out of 22 i.e., 50%) followed by *Escherichia coli* (6 out of 22 i.e., 27%). *Pseudomonas aeruginosa* (2 out of 22 i.e., 9%), *Klebsiella pneumonia* (2 out of 22 i.e., 9%)and *Acinetobacter* spp.(1 out of 22 i.e., 4.5%) were also isolated. No polymicrobial involvement was found. Amongst 11 isolated *Staphylococcus*, 6 were MRSA (Methicillin Resistant *Staphylococcus aureus*) (54.5%) and all the *Staphylococcus* isolates were sensitive to Vancomycin and Linezolid. All the Gram negative isolates were sensitive to polyene antibiotics. One *Pseudomonas*, one *Klebsiella* and the *Acinetobacte*r isolates were carbapenemase producers. 8 out of 11 *Staphylococcus* isolates (72%), 4 out of 6 *Escherichia coli* isolates (66.7%), all *Pseudomonas* and *Acinetobacter* isolates were resistant to fluoroquinolones. 4 out of 11 Gram negative isolates were ESBL producers (36.3%)and 3 were Amp C beta lactamase producers (27.2%).

IV. Discussion

In this present study, SSI prevalence is 5.47% while the global estimates of SSI have varied from 0.5–15% [4]. Studies in India have consistently shown higher rates ranging from 23–38% [5, 6]. In a prospective study of surgical site infections in a teaching hospital in Goa, the overall SSI rate was estimated to be 30.7% [4]. In comparison to these studies, the present study shows a pretty lower percentage of SSI which is an indicator of satisfactory infection control practices. The study performed by Gupta et al shows that the most important isolate was *Staphylococcus aureus* in clean surgeries [4]. Similarly, in the present study, the commonest microorganism causing wound infection was *Staphylococcus aureus* (11 out of 22 i.e., 50%) followed by *Escherichia coli* (6 out of 22 i.e, 27%). In the study performed by Bhattacharya et al, among the *Staphylococcus aureus* isolates, 25.45% strains were MRSA whereas in this present study, almost 54.5 % of the *Staphylococcus* isolates were MRSA [7]. Similar to the findings of Bhattacharya et al, all the MRSA were sensitive to Vancomycin and Linezolid [7]. In this study, 4 out of 11 Gram negative isolates were ESBL producers (36.3%) and 3 were Amp C beta lactamase producers (27.2%). One *Pseudomonas*, one *Klebsiella* and the *Acinetobacte*r isolates were carbapenemase producers. 8 out of 11 *Staphylococcus* isolates (72%), 4 out of 6 *Escherichia coli* isolates (66.7%), all *Pseudomonas* and *Acinetobacter* isolates were resistant to fluoroquinolones. Data from the NNIS CDC 2007 also shows that multidrug resistant *Klebsiella*, *E. coli*, *Acinetobacter* & *Pseudomonas* are now the major hospital pathogen [3,8].

V. Conclusion

Postoperative wound infection (surgical site infection) is an important aspect of Nosocomial infections which demands implementation of antibiotic stewardship and apt sterilization practices.

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