



BACTERIOLOGICAL SPECTRUM OF POST OPERATIVE WOUND INFECTIONS FOLLOWING CAESAREAN SECTION AND THEIR ANTIBIOGRAM IN A TERTIARY CARE HOSPITAL

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Abstract: Surgical site infection (SSI) is one of the most common postoperative complication and causes significant postoperative morbidity and mortality. Patients: A prospective study was carried out in a total of 200 patients operated from department of obstetrics & gynaecology. Materials and Methods: The identification of the infecting organism was done by staining, and culture and antibiotic susceptibility by Disc Diffusion method. Results: Out of 200 patients, 60 patients got infected post-operatively. Staphylococcus aureus was the most common organism isolated. One of the strains were Methicillin resistant. Drug resistance was widespread, especially in Enterobacteriaceae. Another concern in recent times is the isolation of Acinetobacter from surgical wounds. Judicious use of antibiotics along with evidence-based medicine is the need of the hour to stop the rise of these superbugs.

KEY WORDS: Antibiotic susceptibility, Caesarean Section; Surgical Wound Infections; Wounds and Injuries; Antibiotics; Risk Factors; Nosocomial Infections.

Introduction

Surgical site infection (SSI) is one of the most common complications following caesarean section, and has an incidence of 3%–15% worldwide.¹⁻³ The risk for developing SSI has significantly decreased in the last three decades, mainly owing to improvements in hygiene conditions, antibiotic prophylaxis, sterile procedures, and other practices.^{4,5} Postcesarean SSI may increase maternal morbidity and mortality.^{6,7}

The recent guideline states that infections occurring within 90 days (if implant is in place) are considered as SSI for deep incisional SSI and organ space SSI (CDC 2016-18 guidelines). Post-operative wound infections are one of the health care associated infections which account for 22% of HCAI, and are second most common HCAI.⁸ In India, the SSI incidence varies from 4.04% to 30%.⁹ Three major factors contribute to post-operative wound infection: a) degree of microbial contamination of the wound during surgery, b) duration of operative procedure, c) host factors (age, obesity, malnutrition, diabetes, carrier state i.e., chronic Staphylococcal carriage, immunosuppression, anaemia, renal failure, radiation etc).^{10,11}

The common organisms associated with abdominal and gynaecological surgeries are Escherichia coli, Klebsiella species, Pseudomonas species, Acinetobacter species, Staphylococcus aureus and Streptococcus species. Increase in multidrug resistant microorganisms is causing a serious therapeutic problem for surgeons. Hence it is necessary to know the prevalent organisms and their antibiogram for early initiation of the treatment.¹²

Though it is not possible to eliminate post-operative wound infections, they can be reduced to a minimal level which could benefit the patient as well as the medical resources used.¹³

Aims and objective:

- This study was undertaken to study the aerobic bacterial profile of post-operative wound infections and to determine their antibiotic susceptibility pattern.

Material and methods:

This study was conducted in the department of Microbiology in a tertiary care hospital in Nanded, from June 2017 to December 2018.

The swabs were obtained from deep inside the wound avoiding contact with skin under all aseptic precautions.^{14,15}

A smear was prepared and stained by Gram-staining method for early presumptive diagnosis and inoculated on Blood agar and McConkey's agar by streak method using Nichrome wire loop. The plates were incubated at 37°C overnight for 18-24 h. Identification of isolates was done by morphology and colony characteristics according to CLSI guidelines. Antimicrobial susceptibility was done using disk diffusion tests according to CLSI guidelines.

All the *Staphylococcus aureus* isolates were screened for *mecA*-Mediated Oxacillin resistance using the surrogate marker cefoxitin (30 µg).

Screening test for detection of inducible clindamycin resistance

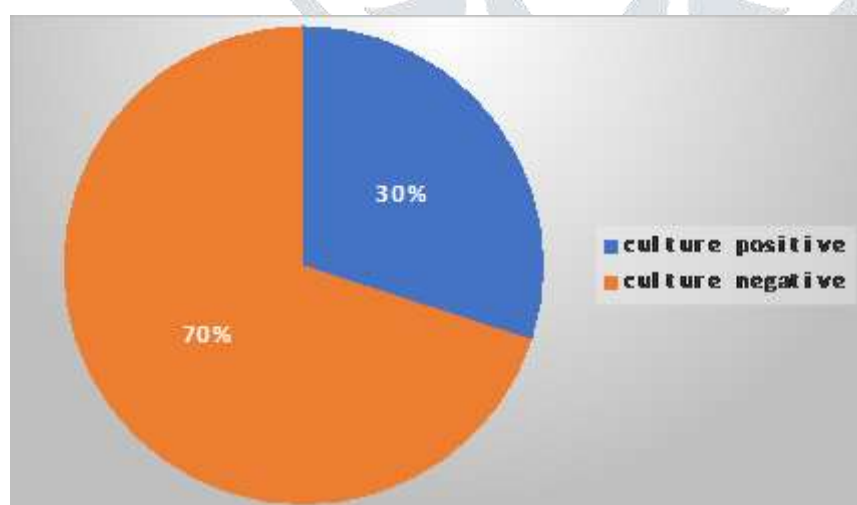
All the *Staphylococcal* isolates were screened for detection of inducible Clindamycin resistance by disk diffusion method by placing Erythromycin (15 µg) and Clindamycin (2 µg) which were placed 15–26 mm apart. Presence of a D-zone (flattening of the inhibition zone adjacent to Erythromycin disk) indicated that the isolate had inducible resistance to Clindamycin.

Result & discussion:

A total of 200 surgeries were performed during the study period in the department of Obstetrics and Gynaecology.

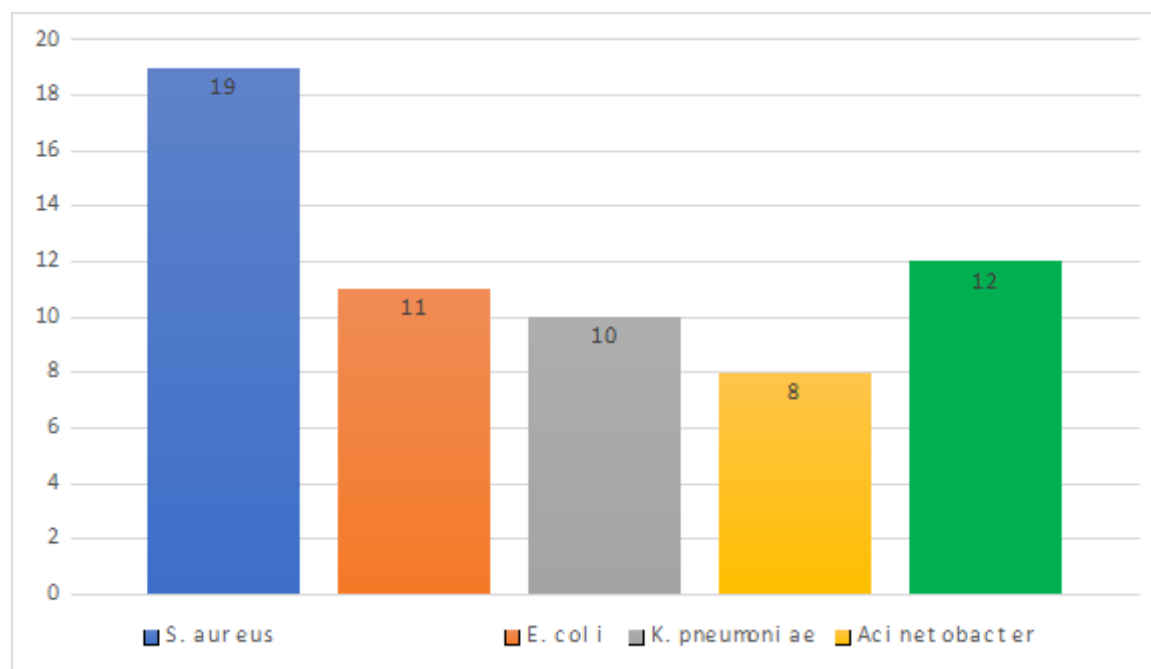
Out of 200 culture positive were 60 (30%), our finding is similar to a study by Aniruddha S. Mundhada et al., from Nagpur, who reported an incidence of lower segment caesarean structure (LSCS) (31.81%)

Figure 1: culture positive and culture negative isolates

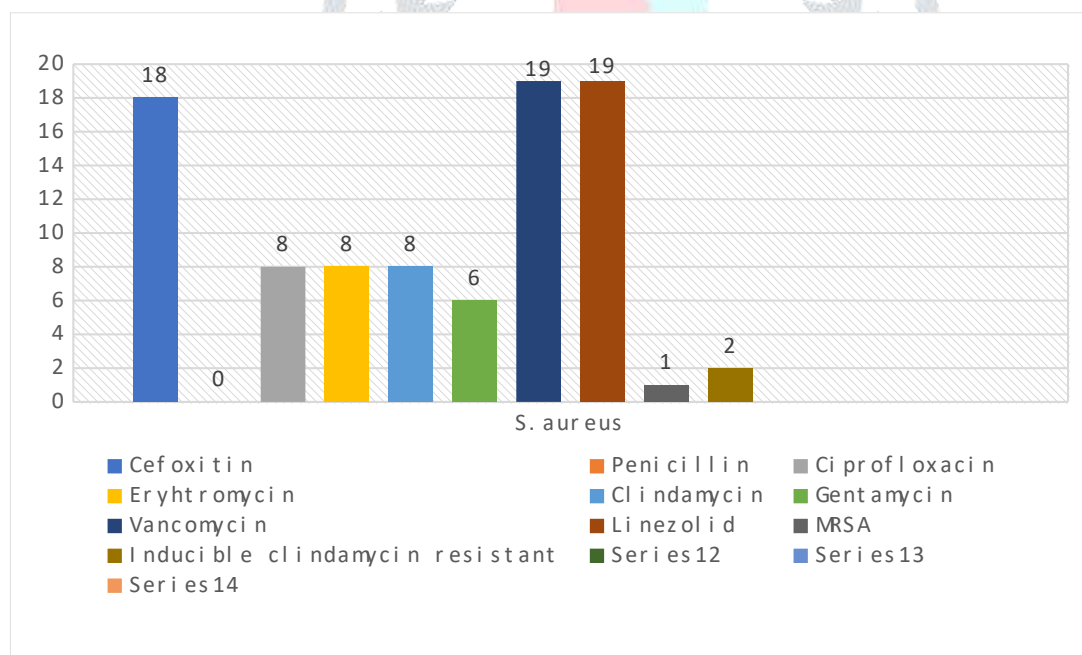


The majority of SSI cases yielded growth of *Staphylococcus aureus* (19, 31.66%) followed by *Escherichia coli* (11, 18.33%) *Klebsiella pneumoniae* 10(16.66%), *Acinetobacter* 8 (12.33%). Polymicrobial infections were found in 12 (20%) cases. The main organisms found to be growing together were: *Klebsiella* and *E. coli*; *Klebsiella* and *Proteus*; *Klebsiella* and *S. aureus*; *E. coli* and coagulase-negative *Staphylococcus*, and *E. coli* and *Proteus*.

Figure 2: Organisms isolated from postoperative infected cases



Staphylococcal isolates were 100% resistant to penicillin. Totally, 8 strains (42.10%) are sensitive to erythromycin & clindamycin, 6 strains (36.84%) are sensitive to gentamicin, 8 strains (42.10%) are sensitive to ciprofloxacin and all are sensitive to Vancomycin and Linezolid. 1 strain (5.26%) strains is resistant to ceftiofur, means one is methicillin resistant.

Figure 3: Sensitivity pattern of *Staphylococcus aureus*

This study shows, 3 strains (33.33%) of *E. coli* were sensitive to ampicillin, 5 strains (50%) were sensitive to gentamicin and ciprofloxacin, 6 strains (66.66%) were sensitive to amikacin, 3 strains (33.33%) were sensitive to cefotaxime and only 1 strain (10%) was sensitive to tetracycline. In case of *K. pneumoniae* 1 strain (14.28%), each shows susceptibility to ampicillin and gentamicin, 2 strains (28.57%) were sensitive to cefotaxime and 3 strains (42.85%) to amikacin and ciprofloxacin. None of the strains were sensitive to tetracycline. Cefotaxime resistant strains of *E. coli* (7 strains) and *K. pneumoniae* (5 strains) were tested for ESBL production by Double Disk Diffusion Test. All the 12 strains tested were ESBL producing. The 2 strains of *Acinetobacter* isolated were sensitive to amikacin, imipenem and resistant to ciprofloxacin, ceftazidime, tetracycline and gentamicin.

Three strains (75%) of *P. aeruginosa* were sensitive to gentamicin, and 2 strains (50%) were sensitive to ciprofloxacin. All the strains were sensitive to ceftazidime, amikacin, imipenem and piperacillin.

Discussion:

In this study, 32 patients got infected postoperatively with the postoperative SSI rate of 30%. This is comparable with the rates reported by various authors.^{16,17}

The high susceptibility of *Enterobacteriaceae* to cefotaxime and amikacin in this study proved the usefulness of cefotaxime and amikacin in *Enterobacteriaceae* infections. ^[18]

In this study, the susceptibility of *P. aeruginosa* to amikacin and ceftazidime indicates that, these drugs can be used against pseudomonal infections. Majumder *et al.* ^[19] have reported that 15% of *S. epidermidis* were oxacillin resistant, whereas 52.9% of *S. aureus* to be Oxacillin resistant.

CONCLUSION

There was predominance of Gram positive bacilli from SSIs, with E.coli being the most common isolates. We found most of the Gram negative isolates were multiply resistant to commonly prescribed antimicrobial agents. The present study also found an increase in SSIs due to ESBLs producing *Escherichia coli* and *Klebsiella pneumoniae* strains as well as MRSA. Ceftriaxone, a third generation cephalosporins commonly used for antimicrobial prophylaxis to prevent SSIs was found to be effective against most of gram negative organisms and MRSA isolates

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