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Original Article

A prospective study on various factors influencing post-operative wound infection in emergency surgeries

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ABSTRACT

Background: The risk of surgical site infection (SSI) is approximately 1–3% for elective surgery and more for emergency surgeries. Apart from patient endogenous factors, the role of external risk factors in the pathogenesis of SSI is well recognized. However, among the various measures to prevent SSI, only some are based on strong evidence, and there is insufficient evidence to show whether one method is superior to any other. Therefore, this study was carried out to find out the various factors causing post-operative wound infection, the commonly associated microorganisms, and antibiotic sensitivity and resistance pattern.
Methods: The study was conducted in tertiary care hospital, Pondicherry between September 2012 and September 2014. All the patients who underwent emergency surgeries in the Department of General Surgery were included in the study. An elaborative clinical study of post-operative wound infection was conducted. The suture site was inspected for any sign of infection starting from the second post-operative day till discharge from hospital. Wound swabs were collected and sent for aerobic culture and sensitivity.
Results: In this study, open appendectomy was the most common surgery that was performed on an emergency basis. Anemia followed by hypoalbuminemia were the two important comorbid conditions. The rate of infection for clean-contaminated, contaminated, and dirty wound were 16.88%, 38%, and 20% respectively.
Conclusion: SSI occupies a significant proportion among various hospital-acquired infections. SSI not only prolongs the hospitalization but also markedly increases the expenditure and morbidity.

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1. Introduction

Hospital-acquired infections are recognized as being associated with increasing morbidity and health expenditure. As a result, it leads to prolonged length of hospital stay, discomfort, pain, and sometimes permanent disability.[1,2] Infections of the surgical site account for approximately 14% of all hospital-acquired infections (HAI), which was estimated to double the length of post-operative stay in hospital and significantly increase the cost of healthcare.[1–4]

With the introduction of antibiotic therapy in the middle of the 20th century, a new adjunctive method to treat and prevent surgical infections was fostered. However, with prolonged and injudicious use of antibiotics, management of surgical site infections has become tougher. The present day surgeons are experiencing increasing number of serious infections related to a combination of various factors and increased use of diagnostic and treatment modalities that cause greater bacterial exposure or suppression of host response.

The modern surgeons cannot escape from the responsibility of dealing with infections. They should have the knowledge for appropriate use of aseptic technique, proper use of prophylactic, and therapeutic antibiotics with adequate monitoring care and support.

2. Methodology

This study was conducted in the Department of General Surgery in Mahatma Gandhi Medical College and Research Institute during the period of September 2012–September 2014. An elaborate clinical study of post-operative wound infection which involves various factors with regard to date of admission, history, special investigations, preoperative preparation, type of surgery, and clinical features were taken into account. The suture site was inspected by surgical specialist for any signs of infection starting from the second post-operative day till discharge from hospital. Following discharge, all the patients were followed up to 45 days for any evidence of SSI. The criteria for SSI were based on CDC definition of SSI. From those infected patients, wound swabs were collected and sent for aerobic culture and sensitivity. Anaerobic and fungal cultivations methods were excluded.

2.1. *Sample collection*

Wounds were examined for signs and symptoms of infection in post-operative period, until the patient was discharged from the hospital. The area around surgical wound was cleaned with chlorhexidine solution. The exudates were collected from the depth of the wound using two sterile cotton swabs for aerobic culture.

2.2. *Transport*

All specimens collected were transported immediately to the laboratory for further processing and were incubated at 37 °C.

2.3. *Processing*

A direct smear was made on a clean glass slide using first swab and stained by Gram staining. The smear was screened for presence of pus cells and organisms. From Gram's reactions, arrangement, morphology, and types of organisms were noted.

2.4. *Aerobic culture*

The second swab was inoculated on blood agar and Mac Conkey's agar. These agar plates were incubated at 37 °C for one to two days. All the primary plates were observed for any visible growth after overnight incubation and if there was no growth after one day, they were further incubated for another one day, and observed for growth. The isolates were identified following standard identification procedures like colony morphology, Gram stained smear from the colony, motility, enzymatic tests, and other special tests if any. Antimicrobial susceptibility testing of the bacterial isolates was done by Kirby Bauer disk diffusion method using the Muller Hinton agar according to CLSI guidelines.

2.5. *Ethical issues*

Institute Ethical committee clearance was obtained to carry out this study. Written consent was received from all the study participants.

3. Results

In our study, majority of the patients with SSI were present between the age group of 21–30 yrs accounting to 27.3% of the total study population. The youngest patient was 2-year-old female and the oldest was 80-year-old male. Majority were male patients (Table 1).

Total of 132 emergency cases were operated in the period of study. Appendectomy was the most commonly performed emergency surgery, which accounted for 47.7%, followed by hollow viscous perforation, 37.1% (Table 2).

Out of 132 emergency cases, 77 (58.3%) cases were categorized under clean-contaminated, 50 (38%) cases categorized under contaminated type and 5 (4%) cases under dirty type according to surgical wound classification (Table 3).

Table 1 – List of antibiotics used for antibiotic susceptibility testing according to CLSI guidelines.

1. Ampicillin (AMP) 10 μ	2. Ciprofloxocin (CIP)5 μ
3. Oxocillin (OX) 1 μ	4. Cefotaxime (CTX)30 μ
5. Cotrimoxozole (SXT) 25/23.75 μ	6. Ceftazidime (CAZ)30 μ
7. Amikacin (AMK) 30 μ	8. Imipenem (IPM)10 μ
9. Gentamicin (GEN) 10 μ	10. Vancomycin (VAN)30 μ
11. Amoxycillin/Clavulanic acid (20/10 μ)	12. Piperacillin–Tazobactam (TZP)100 μg/10 μg
13. Colistin (COL) 10 μ	14. Polymixin B (POL)300 μ
15. Tobramycin (TOB) 10 μ	16. Erythromycin (ERY)15 μ
17. Teicoplanin (TEC) 30 μ	18. Linezolid (LNZ)30 μ
19. Cefoxitim (CFX) 30 μ	20. Tetracycline (TCY)30 μ
21. Penicillin (PEN) 10 μ	22. Clindamycin (CD)2 μ
23. Ceftriaxone (CRO) (30 μ)	