CORRELATION OF INFECTION OF SURGICAL WOUNDS WITH PRE-OPERATIVE HOSPITAL STAY IN A MEDICAL COLLEGE HOSPITAL

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HOW TO CITE THIS ARTICLE:

Prasanna Gupta, Atul Agrawal. "Correlation of Infection of Surgical Wounds with Pre-Operative Hospital Stay in a Medical College Hospital". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 18, March 02; Page: 3065-3070, DOI: 10.14260/jemds/2015/445

ABSTRACT: BACKROUND: Ideally the patient should have the operation within 24 hours of admission to hospital before the skin has a chance to become significantly colonized by the 'hospital staphylococci'. **METHODOLOGY:** The study was conducted in the department of microbiology, Medical College Calicut for a period of one year from July 2007 to June 2008. The total number of elective and emergency surgeries done during the one year period in the above three units was 1902 which included 1074 elective (Major) and 828 emergency cases. One hundred and two cases of clinically suspected postoperative wound infection (Fifty nine elective and fourty three emergency) from the above cases was studied in detail. The study included twenty seven 'clean', thirty two 'clean-contaminated', thirteen 'contaminated' and thirty 'dirty' cases. Records of these cases were analyzed for preoperative antibiotic prophylaxis. **RESULTS:** High infection rate was noted with a prolonged preoperative hospital stayed had wound infection (60%).

KEYWORDS: preoperative hospital stay, surgical wound infection.

INTRODUCTION: Ideally the patient should have the operation within 24 hours of admission to hospital before the skin has a chance to become significantly colonized by the 'hospital staphylococci'. Elthamy et al (1995) reports a low incidence of postoperative wound infection with a short preoperative hospital stay.^[1] Another important environmental factor is long term ICU stay, which is associated with an increased risk of infection.^[2,3,4] This will change the normal microbial flora of the body and subsequent super infection by resistant gram-negative bacilli, methicillin resistant Staphylococcus aureus and fungi. Use of inhalation techniques and irradiation will worsen the situation. Pseudomonas aeruginosa is responsible for bacterial infection in immunologically compromised hosts such as diabetic patients and those on steroid therapy. They are common in those who have been hospitalized for a long time. Preoperative stay should be reduced to a minimum. Patients who have longer preoperative hospitalizations are more likely to develop postoperative wound infections. There are two reasons are for this, Patient may acquire more virulent or antibiotic resistant hospital flora. Secondly, patients on prolonged hospital stay have compromised host defenses. It also contributes to increase the chance of postoperative wound infection.^[5] In elective surgery, patient may be seen and investigated at assessment clinics to avoid a long preoperative stay.

MATERIALS & METHODS: Samples were collected from patients with suspected surgical site infection, using sterile cotton swabs. Swab was taken if there was any suspicion or evidence of wound infection as indicated by local inflammation or discharge. The wound was thoroughly irrigated with sterile normal saline until all visible debris had been washed away. Loose necrotic slough, if any, was also removed. Care was taken not to clean the wound with betadine or any other antiseptic solution

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before swabbing the area. The area selected was the highly vascular granulation tissue rather than the yellow fibrous slough. The material was collected by pressing the swab over the clean wound surface to extract tissue fluid as this may contain the potential pathogen.^[6,7] Two swabs were collected from each site. One swab was used for direct smear examination after Gram staining. The second swab was subjected to culture and antibiotic sensitivity testing by standard microbiological techniques. The swab was plated on Blood agar and Mac Conkey's agar .Blood agar plates were incubated in the candle jar (CO_2) at 37°c for 24 hours. A sterile report was given only after 48 hours of incubation. From the culture plates, Gram stained smears were made from different types of colonies after noting the colony characteristics. Identification of bacteria was carried out as described by Koneman.^[8]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 Gram positive cocci: Penicillin (10units), Erythromycin (15mcg), Gentamicin (10mcg), Vancomycin(30mcg), Cefazolin(30mcg). Oxacillin screen agar was used for Staphylococci .Ampicillin (10mcg), Gentamicin (10mcg), Cefazolin(30mcg), Ceftriaxone(30mcg), Amikacin(30mcg), Ciprofloxacin(5mcg) were used for sensitivity testing of Gram negative bacilli. For Pseudomonas Ceftazidime (30mcg) was also used. In 50 cases a repeat swab was taken and processed as there was a delay in wound healing and poor response to treatment. All cases were followed upto the date of discharge. Condition of the wound was noted at the time of discharge from the hospital.

RESULTS: Total number of surgeries done during the one year period in the three surgical units was 1902 which comprised of 1074 elective and 828 emergency cases. One hundred and two suspected postoperative wounds were studied. Twenty seven were of the 'clean' type of surgical wounds, thirty two of the 'clean-contaminated', thirteen of the 'contaminated' and thirty of the 'dirty' cases. The incidence of postoperative wound infection was 5.36%. Among one hundred and two clinically suspected cases studied, bacteriologically proven surgical site infection was identified in thirty six patients. The prevalence of infection being 35% (36/102). In the 'clean' surgical group, five patients developed infection, the prevalence was 18.5%. Prevalence of Infection in the 'clean-contaminated' group was 37.5% (12/32). In the 'contaminated' group it was 38.5% (5/13) and in the 'dirty' group it was 47% (14/30). Lowest infection rate was seen in clean surgery followed by clean-contaminated, contaminated and dirty surgeries. Type of organisms causing infection in 36 cases is shown in Table 1a and 1b.

Type of Organism	No .of cases	Percentage		
Gram Positive	14	39%		
Gram Negative	17	47%		
Poly microbial	5	14%		
Total	36	100%		
Table : 1a				

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Organisms	No. of isolates	% of isolation		
Staphylococcus aureus	18	43		
Escherichia Coli	15	36		
Pseudomonas aeruginosa	4	9.5		
Klebsiella Oxytoca	1	2.3		
Enterobacter kobei	1	2.3		
Enterobacter intermedius	1	2.3		
Acinetobacter baumannii	1	2.3		
Serratia marcescens	1	2.3		
Total	42	100		
Table 1b: Organisms isolated from infected wounds				

The duration of preoperative hospital stay and its relationship with infection rate are given in Table 2

Period of preoperative	No. of	No. of infected	% of	
hospital stay	cases	cases	infection	
1-3 days	61	18	29.5	
4-7 days	16	5	31.2	
7-14 days	15	7	43.7	
>14 days	10	6	60	
Total	102	36	35	
Table 2: Preoperative hospital stay and infection rate				

Sixty one patients had a preoperative stay between 1-3 days. Rate of infection in these patients was 29.5%. High infection rate was noted with a prolonged preoperative hospital stay of more than 2 weeks. Six out of ten patients who had more than 14 days of preoperative hospital stay had wound infection (60%).

DISCUSSION: SSI is considered as a surgeon's nightmare. Postoperative wound infection is an integral part of hospital acquired infection. It accounts for about one-third of all nosocomial infections.^[9,10] It not only increases the cost of health care by prolonging hospitalization but accounts for greater morbidity and mortality to surgical patients. According to a study the incidence of SSIs with regard to abdominal surgical sites and operating conditions is as follows: clean wounds (1.5-3.7%), clean – contaminated (3-4%), contaminated(8.5%) and dirty-infected wounds (28-40%).^[11] A prospective study of surgical site infections in a teaching hospital in goa the overall SSI rate was estimated to be 30.7%. 5.4% for clean, 35.5% clean-contaminated and 78.8% for contaminated operations.^[12] A prolonged preoperative hospital stay is associated with a high risk of infection. It is identified as an important risk factor in infection by many authors like Shanson, Timothy D Jacob and Yalcin et al. It gives chance for the multiple resistant hospital strains for colonization.^[13, 3, 14] The results of this study shows a high infection rate in association with a prolonged pre-operative stay in the hospital. (Table11) The maximum infection rate (60%) was present in those groups of patients

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who had a prolonged preoperative stay of more than 14 days. A lower infection rate of 29.5% was observed in the group with the 1-3 days of preoperative stay. This is in accordance with many studie.^[6,15,16,17] Timothy D Jacob is of the opinion that prolonged preoperative stay is an important risk factor for developing postoperative wound infections.^[13] He explains the percentage of infection and duration of preoperative stay, 1 day – 1.2%, 1 week – 2.1% and >2 weeks – 3.4%. Therefore the length of pre-op stay in hospital must be kept to a minimum. Prolonged hospital stay make patients susceptible to colonization and infection by hospital strains of bacteria.



CONCLUSION: Postoperative wound infection (Surgical site infection) is an important aspect of nosocomial infections which is a serious problem in hospital practice. The study was selected to find out the pattern of postoperative wound infection and the role of antibiotics in these patients which is responsible for much morbidity and mortality to patients. One hundred and two cases of postoperative wounds were studied in detail during the one year period from July 2007 to June 2008 at Calicut medical college. The prevalence rate of post-operative wound infection among study group was 35%. The most important isolate in the study was Staphylococcus aureusin clean surgeries. In clean-contaminated, contaminated and dirty surgery cases multidrug resistant E.coli and Staphylococcus aureus(MRSA) were the main pathogens followed by Pseudomonas, Enterobacter, Acineto bacterand Klebsiella. The type of surgeries, length of preoperative stay, antibiotic prophylaxis etc had an important role in determining the pattern of wound infection. The incidence of postoperative wound infection was 5.36%. Even the clean category surgery patients received antibiotic prophylaxis which may be the reason for the low incidence of post-operative wound infection. Antibiotics have a definite role in the treatment of established infections. Development of a suitable antibiotic policy is essential for our hospital to reduce the postoperative wound infection rates. Establishment of proper surveillance programme is also essential.

ACKNOWLEDGMENTS: I would like to express my sincere gratitude to Dr. Beena philomona J, associate professor department of microbiology Calicut medical college Kerala for her contribution and support during this work.

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FINANCIAL OR OTHER COMPETING INTERESTS: None

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> Date of Submission: 04/02/2015. Date of Peer Review: 05/02/2015. Date of Acceptance: 20/02/2015. Date of Publishing: 27/02/2015.