

Post-operative Wound Infection in Cases operated in a Tertiary Level Hospital Jaipur (Rajasthan) India

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Abstract— Wound infection is the second commonest nosocomial infection and most troublesome disorder of wound healing. This study was carried out on 100 post-operative cases of Surgical Unit 1st of General Surgery Department of Sawai Man Singh Hospital, Jaipur (Rajasthan) India in years 2014.

After interview of these, swab from post-operative wound was taken and sent for culture and sensitivity test in Microbiology. Results were inferred by Chi-square test and unpaired 't' test. Among all operative cases 21% were found infected. Cases, who were operated in emergency have significantly more post-operative wound infection. Mean age and mean postoperative stay of cases with post-operative infected wound was significantly higher than in cases without post-operative infected wound. But mean pre-operative stay, mean duration of operation and type of operation was not associated with post-operative wound infection. Pre-operative antibiotics lowered the occurrence of post-operative wound infection. Maximum proportion of causative agent found in post-operative infected wound was Staphylococci (90.48%) followed with Streptococci, E. Coli, Klebsella and Pseudomonas.

Keywords— Post-operative wound Infection, Hospital stay

1. Introduction

Wound infection is the commonest and most troublesome disorder of wound healing¹. The discovery of the antimicrobial agents also enables us to perform surgery in many conditions that were previously thought to be impossible in the pre-antibiotic era due to the risk of infection². Infection in a wound is a manifestation of disturbed host-bacteria equilibrium that is in favour of bacteria. The absolute prevention of surgical wound infection seems to be an impossible goal.

It is the second commonest nosocomial infection³ and causes patient discomfort, prolonged hospital stay, more days off work, increased cost of therapy and the cost of an operation increase by 300% to 400%⁴. An important requirement in the prevention of SSI is the availability of correct and recent data i.e. surgical audit and wound surveillance.

The majorities of micro-organisms are less than 0.1mm in diameter and can therefore only be seen under a microscope. They can be categorized into different groups, such as bacteria, fungi, protozoa and viruses, depending on their structure and metabolic capabilities⁵.

A recent systematic review of antimicrobial agents has concluded that systemic or topical antimicrobials are not generally indicated for the management of chronic wound infections⁶. However, there may be some value in the prophylactic use of topical antimicrobials for the initial management of acute cellulitis, whilst awaiting clarification of antibiotic sensitivity and the establishment of a therapeutic regimen.

Resistance to antibiotics has become a serious problem in recent years particularly with the rise of epidemic strains of MRSA. It could therefore be suggested that all antibiotic use should be based on known sensitivities.

This study was designed and carried out in Surgical wards of Sawai Man Singh Hospital, Jaipur (Rajasthan) India to study the profile of post operative infection of surgical wounds and its associating factors.

2. Methodology

A descriptive type of observational study was carried out on 100 post-operative cases of Surgical Unit 1st of General Surgery Department of Sawai Man Singh Hospital, Jaipur (Rajasthan) India in years 2014.

Sample size was calculated⁹ 100 subjects accepting assuming 6% of absolute allowable error at 95% confidence limit assuming 10% overall prevalence of post operative wound infections.¹⁰ For study purpose post-operative cases operated within 10 days excluding extremes of ages (<20 and >60 years) and those who either not given consent for the study or not able to communicate or had other chronic illness were included. These patients were interviewed in details clinic-demographic details as per proforma. Swab from post-operative wound was taken and sent for culture and sensitivity test in Microbiology department of SMS Medical College, Jaipur. Report of culture and sensitivity was also recorded in prescribed space in proforma.

Statistical Analysis: Significance of difference in proportion were inferred by Chi-square test and significance of difference in means were inferred by unpaired 't' test with the statistical software Primer version 6.

3. Results

Out of total 100 cases of post-operative wound sent for culture and sensitivity, 21% were found infected. (Fig. 1)

Figure 1

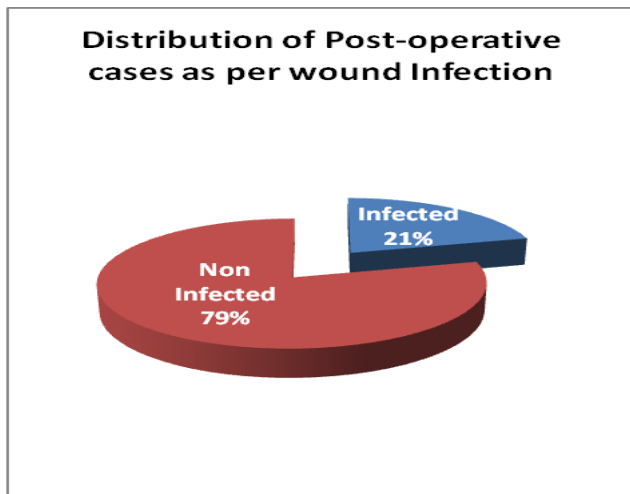
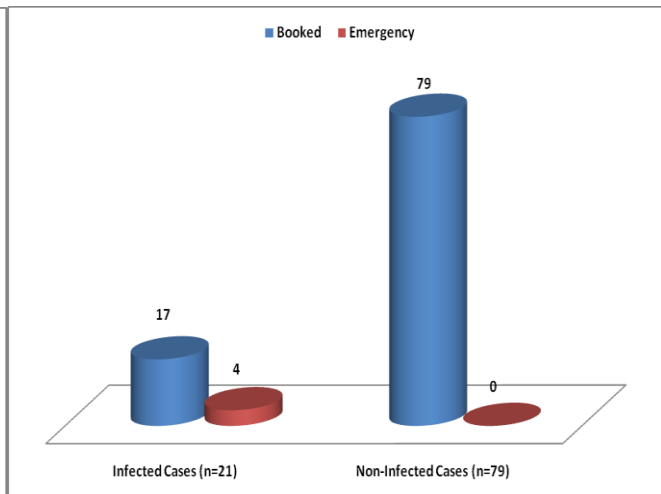


Figure 2



It was observed that that all the cases operated in emergency were having post-operative infected wound whereas only 21.3% of previously booked cases were post-operative infected wound i.e. operation done in emergency have significantly ($p < 0.001$) more infection in post-operated wound. (Fig 2)

It was also observed that mean age in cases with post-operative infected wound was significantly higher than in cases without post-operative infected wound i.e. 59.7 ± 8.6 v/s 46.2 ± 7.9 years. It depict that higher the age more chances of post-operated wound infection ($p < 0.001$). Likewise mean postoperative stay of cases with post-operative infection was found significantly ($p < 0.001$) more than cases without post-operative infection i.e. 35.2 v/s 11.6 days. But mean pre-operative stay and mean duration of operation was not with significant ($p > 0.05$) difference. (Fig. 3)

It was also found that proportion of cases with post-operative infected wound was significantly ($p < 0.001$) lower in patients who had taken pre-operative antibiotics than the others (10.71% v/s 75%) i.e. pre-operative antibiotics can lowered the infection in post-operated wound. (Fig. 4)

Figure 3

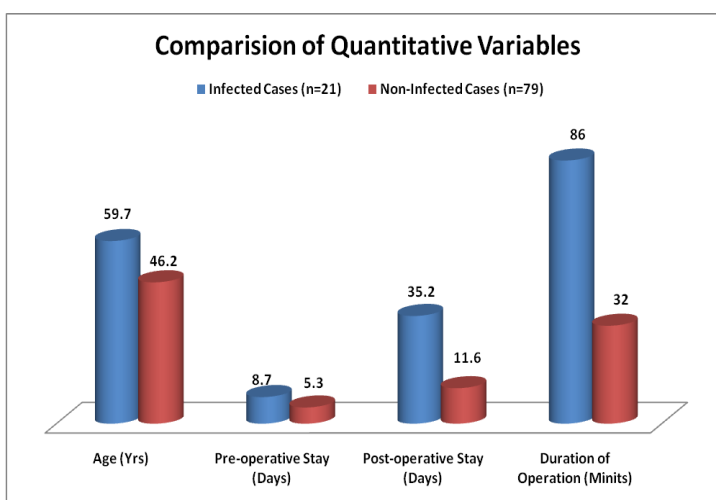
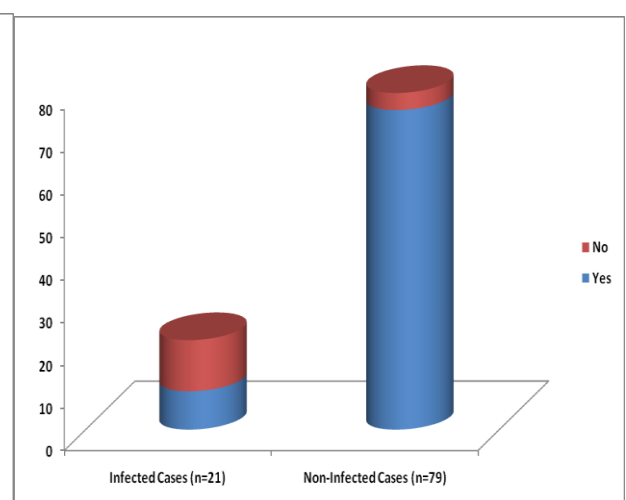


Figure 4



It was also found in this study that although all the cases of Prostatectomy cases had post-operative wound infection followed by Intestinal surgery (42.11%), Cholecystectomy (33.33%) but the difference distribution of proportion of these cases as per type of operation was not significant ($p > 0.05$). (Table 1)

Table no. 1
Association of Post-operative Wound Infection with Type of surgery

S. No.	Type of Operation	Infected Cases (n=21)	Non-Infected Cases (n=79)
1	Appendicectomy	0	8
2	Breast Surgery	0	2
3	Cholecystectomy	1	3
4	Inguinal Hernia	2	8
5	Intestinal Surgery	8	19
6	Incisional Hearnia	0	3
7	Hysterectomy	2	8
8	Nephrolithotomy	2	7
9	Thyroidectomy	0	2
10	Prostatectomy	3	3
11	Others	3	16

Chi-square test=8.611 at 10 DF

P Value=0.569

LS=NS

It was revealed from the study that age of patient, pre-operative antibiotics, pre and post-operative stay, booking status and duration of operation were associated with infection in post-operated wound whereas infection in post-operated wound was not associated with season and type of operation (Table 2).

Table No. 2
Associating Factors with Infection in Post-operated wound

S. No.	Factors	P Value	Associating Status
1	Age	<0.001	Yes Associated
2	Season	0.751	Not Associated
3	Pre-operative Stay	0.004	Yes Associated
4	Post-operative Stay	<0.001	Yes Associated
5	Type of Operation	0.596	Not Associated
6	Timing of Operation	<0.001	Yes Associated
7	Duration of Operation	<0.001	Yes Associated
8	Drainage Tube	0.003	Yes Associated
9	Pre-operative Antibiotics	<0.001	Yes Associated

When causative agents of post-operative wound were identified by culture it was found that maximum proportion of causative agent found in post-operative infected wound was Staphylococci (90.48%) followed with Streptococci, E. Coli, Klebsella and Pseudomonas. (Table 3)

Table No. 3
Causative Organism of Infection in Post-operated wound (n=21)

S. No.	Causative Organism	*Number	%
1	Staphylococci	19	90.48
2	Streptococci	8	38.1

3	E. Coli	3	14.29
4	Klebsella	2	9.52
5	Pseudomonas	1	4.76

*multiple response

4. Discussion:

This study observed 21% post-operative wound infection rate. Despite advances in the operative techniques and better understanding of the pathogenesis of wound infection, postoperative wound infection continues to be a major source of morbidity and mortality for patients undergoing operative procedures. Overall wound infection rate was 11% with 30% of hospital-acquired infection reported by Damani et al⁷. Another study has quoted a figure of 40% in all clean and clean contaminated procedures, resulting in increased cost and morbidity of the patient⁸. A study conducted at Mayo Hospital, Lahore reported an infection rate of 5.05% in clean and 8.39% amongst clean-contaminated cases⁹. Different studies have shown a range of 5-30% post-operative wound infection rate¹¹.

In the present study it was observed that mean pre-operative stay in cases with post-operative infected wound was significantly higher than in cases without post-operative infected wound. Surgical site infection was found more in patients with extended pre-operative hospital stay in another studies also.^{11,12}

In the present study it was observed that mean age in cases with post-operative infected wound was significantly higher than in cases without post-operative infected wound i.e. age is associated with infection in post-operated wound. Well comparable findings were of Masood A et al¹² who reported that patients in the age group 51-60 years were infected more than those in the younger age groups. Other authors like Scott et al¹⁴ and Perl TM¹⁵ also made almost similar observations that increased age was associated with an increased probability of a post-operative wound infection.

This study also reported that mean post-operative stay in cases with post-operative infected wound was significantly higher than in cases without post-operative infected wound i.e. post-operative stay is associated with infection in post-operated wound. Well comparable observations were made by other authors^{14,15}. Postoperative wound infection increases the length of stay in hospital was also observed by other authors like Michalopoulos A et al¹⁷ and Perl TM¹⁵.

The present study shows that although all the cases of Prostatectomy cases had post-operative wound infection followed by Intestinal surgery (42.11%), Cholecystectomy (33.33%) but the difference distribution of proportion of these cases as per type of operation was not significant ($p > 0.05$). In contrast to this many authors^{12,15} found that proportion of cases with post-operative infected wound depend upon the type of surgery.

Simultaneously it was observed in the present study that all the cases operated in emergency were having post-operative infected wound whereas only 21.3% of scheduled cases were post-operative infected wound i.e. operation done in emergency have significantly more infection in post-operated wound. Well supported by Michalopoulos A et al¹⁷ who reported that emergency surgical procedures were more susceptible to infection ($p = 0.08$) than scheduled procedures.

It was also revealed in the present study that mean duration of operation in cases with post-operative infected wound was significantly higher than in cases without post-operative infected wound. Well supported by Michalopoulos A et al¹⁷ who reported that duration of the operation was found to be correlated within faction ($R = 0.208$, $p < 0.01$). Other author¹⁵ also reported that duration of the operation was found to be associated with the proportion of post-operative wound infection.

So present study reveal that post-operative wound infection rate was not associated with type of operation done but defiantly significantly higher in cases operated in emergency and for long duration. Although some authors^{12,17} reported more probability of post-operative wound infection in cases where duration of operation was more but similar observations were made by other authors^{12,17,18}.

This study also shows that proportion of cases with post-operative infected wound was significantly lower in patients with pre-operative antibiotics than in cases not taken pre-operative antibiotics i.e. pre-operative antibiotics can lower the infection in post-operated wound. Well supported observations were of a study in which series the patients received prophylactic antibiotic at the time of induction of anesthesia in clean cases. Single dose prophylactic antibiotic therapy is a recommendation in clean cases¹⁹.

The present study also shows that maximum proportion of causative agent found in post-operative infected wound was Staphylococci (90.48%) followed with Streptococci, E. Coli, Klebsella and Pseudomonas. Masood et al¹² also observed the common organisms involved in the SSI were Staphylococcus aureus, E. coli, Streptococcus pyogenes and Pseudomonas group. Arora et al²⁰ also have reported *Staphylococcus aureus* has been described as the most common single pathogen involved in postoperative wound infections.

CONCLUSIONS

It was revealed from the study that operative cases 21% was found infected. Mean age and mean postoperative stay of cases with post-operative infected wound was significantly higher than in cases without post-operative infected wound. But mean pre-operative stay, mean duration of operation and type of operation was not associated with post-operative wound infection. Pre-operative antibiotics lowered the occurrence of post-operative wound infection. Maximum proportion of causative agent found in post-operative infected wound was Staphylococci followed with Streptococci, E. Coli, Klebsella and Pseudomonas.

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