ORIGINAL ARTICLE

A CLINICAL STUDY OF POSTOPERATIVEWOUND INFECTION IN ATERTIARY CARE HOSPITAL

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ABSTRACT

Introduction: Patients undergoing surgical procedures unfortunately end up having infection at the site of surgical wound called as post operative wound infection. Spectrum of infection varies from a small stitch abscess to tissue destruction and septicemia.

The study aims to determine the incidence of wound infection, factors influencing the incidence, organisms involved and their sensitivity towards antimicrobial agents.

Methods: Study was conducted in a 1500 bedded tertiary care hospital. Hospitalized patients who were to be operated of age >15 years of either sex were included. Patients suffering from chronic infections like diabetic ulcer, gangrene etc, were excluded. Pre-operative history, operative notes and post operative observation including culture and antimicrobial sensitivity were done.

Results: 18% of post operative wounds were found to be infected, incidence of infection in clean wounds was 11.36% and in dirty wounds it was 33.33%. Extremes of body mass index, increasing age, duration of operation, pre operative hospital stay and poor nutritional status lead to increase in incidence. 77.78% of total infected wounds had gram -ve bacteriae mainly E. coli, Proteus, Klebseilla and P. aeruginosa. S. aureus was found in 22.21% of infected cases. Maximum sensitivity was found with imipenem and amikacin.

Conclusion: No two medical institutions have an exact same environment so infection rates would fluctuate within an institution at different times and in between different institutions. A quality control study at different setups will point out to factors which can be worked on in general, namely a shorter pre-op stay, stratifying patients by cumulating risk factors and paying extra attention at wound care in these patients.

Keywords: surgical wound, infection, culture sensitivity, post operative wound,

INTRODUCTION

Wound infection is a well known postoperative complication in surgical procedures which lays heavy burden on the patients and social health system[1].Out of all the infective complications post-operative wound infection is the commonest one. The incidence varies from hospital to hospital and also varies in different studies which have been reported from time to time. In our study, we have considered only the problem of wound infection out of all post operative infective complications following surgical procedures. In most cases such complications prolong hospitalization with a significant increase in the cost of care.[2,3]

Different risk factors may be involved including age, sex, nutrition and immunity, prophylactic use of antibiotics, operation type and duration, type of shaving, and secondary infections; but there has been no clear consensus on the risk factors contributing to post operative wound infection following surgery. The access and knowledge of this data to surgeons clearly reduces infection rates.[4,5]

According to studies, observation of the infected wound is useful in reduction of the postoperative wound infection by surveillance-induced infection control efforts.[6,7]Previous studies on wound infection in hospitalized patients have shown rates of 5-17%. There is, however, considerable variation in rate of wound infection from hospital to hospital. In order to accurately assess success in infection prophylaxis, a standard "acceptable" wound infection rate must be established at each institution. Continual monitoring in the form of wound surveillance can then allow each hospital to identify and immediately correct specific problem areas.

This study focuses on the various preoperative, operative, post-operative factors which influence the post-operative wound infection incidence.

OBJECTIVES

The objective of the study is to determine the incidence of post operative wound infection in surgical wards and detection of the commonest organism involved in the infected wounds and duration, nutrition status and

nature of surgery influence the susceptibility to wound infection.

METHODS

The study was conducted in surgical unit of a tertiary care hospital, Pune. Study was started after taking permission from institution's ethical committee. Hospitalized patients, who were to be operated, and of age above 15yrs,of either sex were included in the study whereas cases of chronic infection e.g. gas gangrene, non healing ulcer, diabetic ulcer were not included in the study. A through clinical history of 100 patients was taken. Essential pre-operative, operative, post-operative criteria written in a preformed proformed were assessed. In the post-operative period, wound swab was taken or discharge was collected. Culture and sensitivity testing was done. For the sake of finding correct incidence of wound infection, the classification of wound formed adopted by the National Research Council[8] was considered.

RESULTS

Table 1: Incidence according to age, BMI (in kg/m²), Hb level (in gm%)

	Total patients (n=100)	Infected (%
Age (in years)		
<20	14	1 (7.14)
20-40	37	6 (16.2)
41-60	28	7 (25)
>60	21	4 (18.2)
BMI (in kg/m²)		
<20	12	3 (25)
20.1-25	55	8 (14.54)
25.1-30	26	5 (19.23)
>30	7	2 (28.57)
Hb level (in gm%)		
<9gm%	12	4 (33.33)
9-12gm%	53	7 (13.20)
>12gm%	35	7 (20)

Table 1 show that older individuals more frequently had infected wounds. Both extremes of BMI were associated with higher incidences of wound infection. Low Hb levels and poor nutritional status are associated with increased risk of infection.

Table 2 shows that a steady rise of wound infection with increasing contamination was seen. Maximum incidence was found in emergency surgeries. Preoperative antibiotics not a major determinant in influencing the incidence of wound infection. A shorter preoperative stay was associated with low rates of infection. A sharp rise in wound infection was seen in surgeries lasting more than 3 hours.

Table 2:-Incidence according to type of wound, type of surgery, pre-op antibiotics, pre-op stay, Duration of surgery

	Infected	Total patients	%
Type of wound			
Clean	5	44	11.4
Clean contaminated	3	22	13.6
Contaminated	5	19	26.3
Dirty	5	15	33.3
Total	18	100	18
Type of surgery			
Elective	11	69	15.94
Emergency	7	31	22.58
Total	18	100	18
Pre-op antibiotics			
Given	11	59	18.67
Not given	7	41	17.07
Total	18	100	18
Pre-op stay			
<2 days	3	29	10.34
2-4 days	5	35	14.28
>5days	10	36	27.78
Total	18	100	18
Duration of surgery(in hrs)			
0-1	0	8	0
1-2	2	36	5.56
2-3	6	29	20.7
3-4	7	18	38.9
>4	3	9	33.3
Total	18	100	18

DISCUSSION

From this study overall incidence of infection was found to be 18%. According to classification of wound given by National noscomial infection study (NNIS) the rate of infection in clean (11.36%), clean contaminated (13.63%), contaminated (26.31) and dirty (33.33%) as shown in table number 1.This shows that bacterial contamination of the incision is directly related to the incidence of wound infection. Although it has been demonstrated by many investigators[9] that most, if not all wounds are to some extent contaminated at operation, it would appear from this data that the degree of bacterial contamination is directly related to the risk of sepsis and steady rise in infection rate is associated with increasing degree of operative contamination, progressing from 11.36% in clean wound to 33.33% in dirty cases. Several investigators studying surgical wound infections[10,11]using similar classification of the operative procedures have come to similar conclusion.

There exists a role of systemic and local host defense factors which influence the development of infection by invading microorganisms. For every operative wound there exists a complex interplay between the forces of bacterial invaders and the host defenses. As a result of these multiple factors a few apparently clean wounds become infected and some obviously dirty wounds heal soundly. Despite the importance of these non-bacterial factors the dose of bacterial contamination is important

in the development of postoperative infection. It can therefore be stated that the primary risk of wound infection in elective clean operative procedures is airborne or exogenous while in the other categories (e.g. contaminated wounds) post-operative infection is usually due to endogenous bacteria that escape from diseased, traumatized or surgically resected viscera as is supported by this study.

Study showed increased incidence of infection at advanced age. The incidence was minimum in age group <20years 7.14, and gradually increased with increasing age. It can be correlated as the advanced age is more susceptible to infection due to reduced host defenses. As age increases there is atrophy of the most of the organs and systems and also there is reduced immunity and therefore where would be more chances of infection.Elman[12]and Srivastava[13] observed the same. It is concluded that the age of patient probably plays significant and direct role in determining the risk of surgical infection.

In our study we found an increasing incidence of wound infection with an increase in body mass index. Patients whose body mass index was above 30kg/m^2 had an incidence of 28.57%. This poor tolerance of fatty tissue to bacterial contamination has long been noted clinically[15].Both blood volume and blood flow per unit weight are lower in adipose tissue.

As compared to the group of patients up to 1-5 days (14.28%) the patients from group >5 days (27.78%) showed more incidence of infection. This shows more susceptibility to infection as the preoperative stay increases probably due to primary colonization of the patient with hospital acquired resistant microorganism.[13].

The study shows incidence of infection in cases given antibiotics preoperatively as 18.64% and those who were not given as 17.07%.There are many reports which demonstrate results in favor of prophylactic antibiotics[16]. But some old studies show increased incidence of infection in cases in which preoperative antibiotics were used[17, 18].The effective use of prophylactic antibiotics depends upon the appropriate timing of their administration. Among the various routes by which prophylactic antibiotic can be administered, systemic administration intravenously is preferred in most surgical patients. Parenteral antibiotics in sufficient doses generally should first be given within one hour before operation. This timing results on therapeutic drug levels in the wound and related tissues during the operation but does not allow for the development of bacterial resistance. The drugs should be continued for only 24-72hours, a period during which the concentration of bacteria in the wound and dissected tissues may exceed the capacity of the unaided tissues to destroy them and to heal. Continuation of administration of prophylactic drugs beyond a total of 72hous may increase the risk of drug toxicity or bacterial superinfection and does not reduce the incidence of subsequent infection.

The incidence of infection in relation to duration has progressively increased. The total bacterial contamination of the wound increase with the time whether by airborne route, by exogeneous contact or by endogenous contact. In long procedures, the opportunity to systemic insult to the patient, through blood loss or otherwise, is generally greater than in short procedures which may be reflected in a diminished general resistance to infection.

The study showed a trend of increase in wound infection rate with the extremes of haemoglobin level. Patients whose haemoglobin level was below 9gm% had maximum incidence of wound infection, rate being 33.33. The increase in wound infection in patients with low haemoglobin level is due to associated underlying pathologies for e.g. malnutrition, bleeding tendencies, infective states, malignant state of the patient.

The study shows that the commonest organism responsible for post-operative wound is Escherichia coli, and the commonest group of organisms responsible for infection belongs to gram –ve bacilli group. E.coli alone comprised of 5 cases, proteus 3, pseudomonas 2, and 1 case showed both E.coli and pseudomonas. 3 cases had Klebseilla.4 culture specimens had staphylococcus.

Maximum sensitivity was found with imipenem and amikacin.

CONCLUSION

A quality control study should be done at every major surgical setting and should be compared with a study at a different setting to find out similarities and scope of improvement if any. Elective surgeries should have a shortest possible pre-operative stay, preferably overnight stay only. Risk factors should be cumulatively assessed to stratify patients into high or low risk and with more attention being paid to the former. Escherichia coli remain the major culprit in wound infection. Prophylaxis should be limited to patients in whom there is a high risk.

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